Instruction Manual

HI 93102

Multiparameter Turbidity & Ion Specific Meter

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 precise idea of its versatility. If you need more technical information, do not hesitate to e-mail us at **tech@hannainst.com**.

This instrument is in compliance with CE directives.

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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.

HI 93102 is supplied complete with:

- Glass cuvet with cap
- Batteries (4 x 1.5V AA)
- Instruction manual

The **HI 731327** complete maintenance kit is also available, including:

- 2 glass cuvets
- Primary calibration standards:
  HI 93102-0 AMCO-AEPA-1 0 NTU* calibration solution, 30 mL
  HI 93102-20 AMCO-AEPA-1 20 NTU* calibration solution, 30 mL
- **HI 93703-50** cleaning solution, 230 mL
- Tissue for wiping cuvets
- Rugged carrying case

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

* 1 NTU (Nephelometric Turbidity Unit) = 1 FTU (Formazine Turbidity Unit)

GENERAL DESCRIPTION

The Hanna **HI 93102** is a portable microprocessor driven, multiparameter, turbidity and ion specific meter. It measures Free & Total Chlorine, Cyanuric Acid, pH, Iodine, Bromine, Low Range Iron and Turbidity.

In the colorimetric mode, the user can select either factory preprogrammed calibration settings or calibrate the meter using customized calibration values based on the concentration or relative absorbance of the sample. Calibration data is also stored in a non-volatile EEPROM.

In the turbidity mode, periodic recalibration of the meter with primary standards according to regulatory requirements or personal experience is suggested. Turbidity ranges are 0.00-9.99 NTU and 10.0-50.0 NTU.

HI 93102 complies with G.L.P. Standards (Good Laboratory Practice), that is:

- When switched on, the LCD displays all segments (display check).
- Battery status is monitored during every measurement cycle warning the user if the batteries become weak.

  In addition, **HI 93102** will turn itself off before low voltage causes erroneous readings.
- It utilizes a real time clock and recalls calibration data such as date, time and calibration values.

To facilitate field tests, the meter provides a logging mode. In this mode, the user can store up to twenty five time-tagged measurements in RAM and scroll the memory at any time.

There are eight keys for the different operationals modes. The large Liquid Crystal Display is dual-level: the upper level has four digits and can display the measured parameter in hundredths. The lower level has three characters and indicates current mode (e.g. F CL for free chlorine or TR for turbidity). Different LCD segments indicate low battery, logging mode, date, time, etc.

A pure green LED has been utilized as a light source for both turbidimetric and colorimetric measurements. A silicon photocell is used to receive transmitted light from colorimetric channel while another photocell receives scattered light from the turbidimetric (nephelometric) channel.

In order to measure colorimetric parameters, all the operator has to do is zero the blank sample and then add 1 packet of reagent (for Bromine, Chlorine, Cyanuric Acid, Iodine and Low Range Iron) or 0.2 mL of Phenol Red (for pH). After placing the cuvet back in the meter and pressing READ, the measurements are shown directly on the LCD.

The instrument operates with four AA batteries and may be operator-programmed to turn itself off automatically after 10, 20, 30, 40, 50 or 60 minutes of inactivity.

HI 93102 and all accessories such as sample vials, reagent pillows, primary standards, can be easily stored in the optional carrying case.

PRINCIPLE OF OPERATION

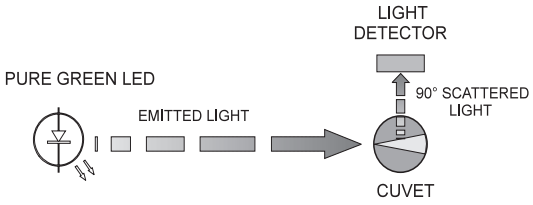
Turbidity Mode

HI 93102 has been designed to perform measurements according to the USEPA's 180.1 method and the Standard Method 2130B.

The instrument functions by passing a beam of light through a vial containing the sample being measured.

The light source is a Pure Green LED to ensure that any interference caused by a colored samples is minimized.

A sensor, positioned at 90° with respect to the direction of light, detects the amount of light scattered by the undissolved particles present in the sample. The microprocessor converts such readings into NTU* values.



NTU units are equal to FTU units. However, there are other known measurement units for turbidity, namely the Jackson Turbidity Unit (JTU) based on the old method of Jackson's candle, and Silica Unit (mg/L of SiO_2). The conversion table between these measurement units is shown below:

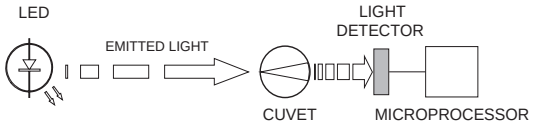
	JTU	NTU/FTU	SiO_2 (mg/L)
JTU	1	19	2.5
NTU/FTU	0.053	1	0.13
SiO_2 (mg/L)	0.4	7.5	1

* 1 NTU = 1 FTU

Colorimetric Mode

The color of every object we see is determined by a process of absorption and emission of the electromagnetic radiation (light) of its molecules.

Colorimetric analysis is based on the principle that specific compounds react with others to form a color, the intensity of which is proportional to the concentration of the substance being measured.



Block diagram of an ion specific measurement

When a substance is exposed to a beam of light intensity I_o, a portion of the radiation is absorbed by the substance's molecules and a radiation of intensity I, lower than I_o, is emitted.

The quantity of radiation absorbed is given by the Lambert-Beer Law:

$$\log I_o/I = \varepsilon_\lambda \, c \, d$$

Where $\log I_o/I$ = Absorbance (A)

ε_λ = molar extinction coefficient of the substance at wavelength λ

c = molar concentration of the substance

d = optical distance light travels through the sample

Since other factors are known, the concentration "c" can be calculated from the color intensity of the substance determined by the emitted radiation I.

An LED (Light Emitting Diode) emits radiation at a relatively narrow spectrum, supplying the system with the intensity I_o.

A substance absorbs a color complimentary to the color it emits. For example, a substance appears yellow because it absorbs blue light. As a result, the Hanna meters use LED's with specific wavelengths to measure samples.

The optical distance (d) is measured by the internal diameter of the cuvet containing the sample.

The photoelectric cell collects the radiation I that is not absorbed by the sample and converts it into an electric current.

The microprocessor converts the value into the desired measuring unit and displays it on the LCD.

The measurement process is done in two phases: setting the meter to zero and actual measurement.

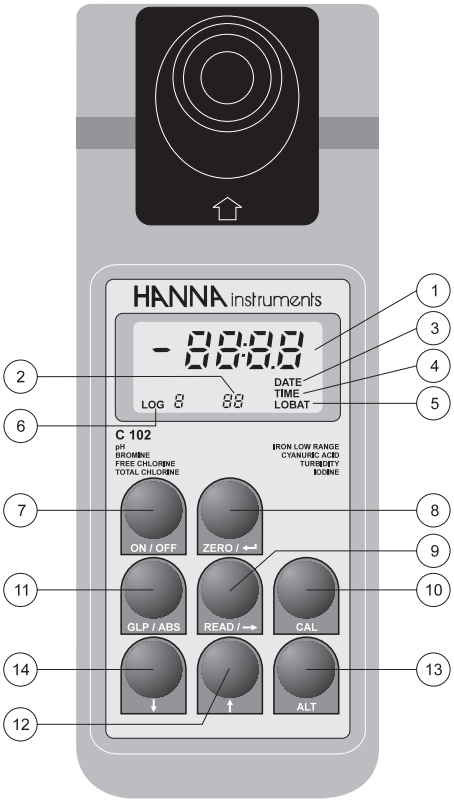
The cuvet is an optical element and hence has an important role in the measurement process. Both the measurement and the calibration cuvets must be optically identical to provide the same measurement conditions.

It is also important that the surface of the cuvet is clean and free from scratches or dents, in order to avoid measurement interference due to unwanted reflection and absorption of light.

It is recommended that wherever possible the cuvet walls are not touched by the operator.

Furthermore, in order to maintain the same conditions during the zeroing and the measuring phases, it is necessary to close the cuvets to prevent any contamination.

FUNCTIONAL DESCRIPTION



1) **Primary LCD**: The four-digit LCD shows all segments for several seconds when the meter is switched on. It then displays four dashes to indicate "ready to measure". It is also the area where the date, time and value of last calibration are shown. In "Read" and "Zero" mode, "SIP" is shown to indicate "Sample

In Progress". The upper level also indicates the concentration or turbidity of the sample, as well as different diagnostic modes, such as "-BA-" for low battery.

2) **Secondary LCD**: The three-digit LCD shows the current mode of measurement that is "F CL", "t CL", "CY", "PH", "Id", "Br", "L FE", "tr", and diagnostic or calibration modes, such as "d 11", "2 Fn", "5 c1".

3) **DATE**: Indicates that the upper level of LCD is showing the current date, the date of last calibration or the date of logged measurement in memory.

4) **TIME**: Indicates that the upper level of LCD is showing the current time, the time of last calibration or the time of logged measurement in memory.

5) **LOBAT**: Blinking segment warns user of low battery voltage.

6) **LOG**: If intermittent, it indicates that the user is in the scroll mode viewing the logged measurements. If fixed, it indicates that the meter is in the log mode and every reading taken will be stored in memory.

7) **ON/OFF** key: Turns the meter on and off.

8) **ZERO /** ↵ key: In ion specific (colorimetric) mode, it zeros the sample. In calibration and diagnostic modes, it functions as ENTER (not used in turbidity mode).

9) **READ /** → key: Takes the measuremnt of concentration/turbidity of the sample which is shown on the LCD. In diagnostic or calibration mode, shifts the flashing digit to the right.

10) **CAL** key: If pressed during calibration, the calibration procedure will be aborted and the last calibration data will be reinstated. If pressed together with the ALT key for less then 3 seconds, the diagnostic mode will be entered. If pressed together with the ALT key again, the meter will quit diagnostic mode. If pressed for more then 3 seconds, an intermittent "CAL" prompt will appear on the upper LCD level and the calibration procedure is entered.

11) **GLP / Abs** key: In ion specific mode, it will toggle concentration/absorbance readings on the upper LCD. In turbidity mode, date, time and the two calibration values of the current mode will be

shown. If pressed in time/date setup mode, the meter will quit current mode without making any changes to current time/ date.

12) ↑ key — Scrolls upwards through the parameters to be measured. In calibration/diagnostic mode, increments the blinking digit by one. If pressed together with ALT while the meter is in logging mode, the upper LCD will show the data (date/time/value) in the memory.

13) **ALT** key: — Alternative functions.

14) ↓ key: — Scrolls downwards through the parameters to be measured. In calibration/diagnostic mode, decreases the blinking digit by one. If pressed together with ALT while the meter is in logging mode, the upper LCD will show the current lot number.

SPECIFICATIONS

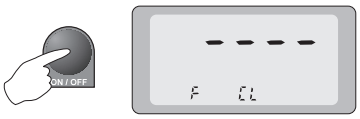
	HI 93102
Range Turbidity	0.00 to 50.0 NTU*
Bromine	0.00 to 8.00 mg/L
Free Cl_2	0.00 to 2.50 mg/L
Total Cl_2	0.00 to 3.50 mg/L
CYS	0 to 80 mg/L
Iodine	0.0 to 12.5 mg/L
LR Iron	0.00 to 1.00 mg/L
pH	5.9 to 8.5
Resolution	
Turbidity	0.01 and 0.1 NTU*
Bromine	0.01 mg/L
Free Cl_2	0.01 mg/L
Total Cl_2	0.01 mg/L
CYS	1 mg/L
Iodine	0.1 mg/L
LR Iron	0.01 mg/L
pH	0.1
Accuracy	
Turbidity	±0.5 NTU* or ±5% (whichever greater)
Bromine	±0.08 mg/L; ±3%
Free Cl_2	±0.03 mg/L; ±3%
Total Cl_2	±0.03 mg/L; ±3%
CYS	±1 mg/L; ±15%
Iodine	±0.1 mg/L; ±5%
LR Iron	±0.02 mg/L; ±3%
pH	0.1 pH
Light Source	Pure Green LED
Light Source Life	Life of the instrument
Light Detector	Two Silicon Photocells
Power Source	4 x 1.5V AA alkaline batteries
Battery Life	60 hours or 1000 measurements
Auto-off	Selectable after 10, 20, 30, 40, 50 or 60 min. of non-use
Environment	0 to 50°C (32 to 122°F) RH max 95% (non-condensing)
Dimensions	220 x 82 x 66 mm (8.7 x 3.2 x 2.6")
Weight	510 g (1.1 lb.)

* 1 NTU = 1 FTU

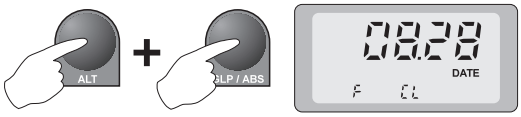
OPERATIONAL GUIDE

SET CURRENT TIME/DATE

To set or change the current time, turn on the meter. After initialization routine, the LCD will show:

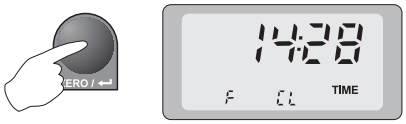


Press and hold the ALT and GLP keys together. Display will show the current date in MM.DD format (e.g. August 28 is shown as 08.28).



Release the keys. The month digits will blink. Make the necessary adjustments with the ↑ and ↓ keys. To skip to the day digits, press the → key.

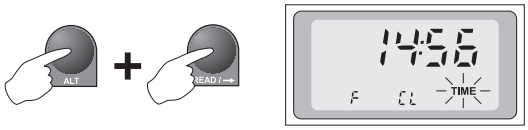
After the adjustments, press the ↵ key. The unit will store the newly set month-day data in its EEPROM and will show the current time by a 24 hour clock HH.MM format, e.g. 2:28 pm is:



Similarly, make the necessary adjustments as described above and press ↵. The newly set up “month - day - hour - minute” data will be stored in memory.

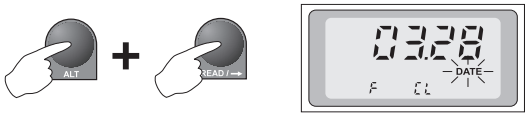
CURRENT TIME/DATE RECALL

To recall current TIME/DATE press and hold the ALTand READ keys together. The current time and an intermittent “TIME” will be displayed.



Release the keys.

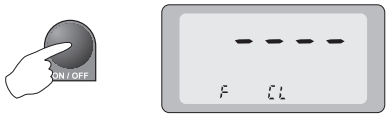
Press and hold the ALT and READ keys again and the meter will show the current date together with an intermittent “DATE”.



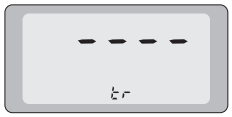
TURBIDITY MEASUREMENTS

Fill the vial with the sample. The surface of the vial should be clean and scratch free.

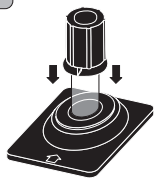
Turn the meter on. After the initialization routine, the LCD will show:



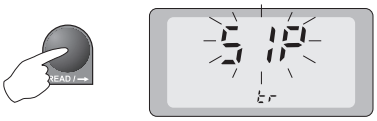
Use the ↑ and ↓ keys to set the lower level of the LCD to turbidity (tr).



Insert the sample into the cuvet holder and ensure that the notch on the cap is positioned securely into the groove.



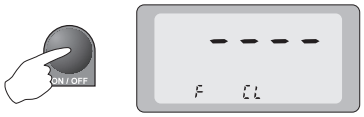
Press READ. The meter will intermittently display “SIP” on the upper level of the LCD.



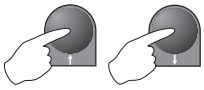
After a few seconds the display will show the turbidity value, e.g. 5.34 NTU:

COLORIMETRIC MEASUREMENTS

Turn the meter on. After the initialization routine, the LCD will display:



Use the ↑ and ↓ keys to choose the desired parameter:

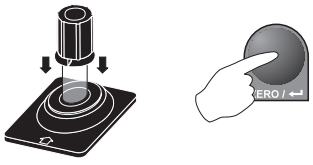


F CL	Free Chlorine	**t CL**	Total Chlorine
CY	Cyanuric Acid	**PH**	pH
Id	Iodine	**Br**	Bromine
L FE	Iron		

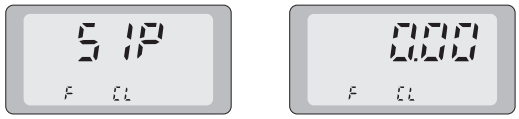
Measuring Chlorine, Cyanuric Acid, pH, Iodine, Bromine

Fill the vial with the sample (blank). The surface of the vial should be clean and scratch free.

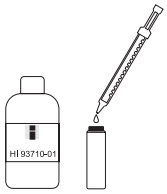
Insert the blank sample into the cuvet holder and ensure that the notch on the cap is positioned securely into the groove. Press ZERO.



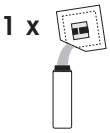
The meter will show “SIP” for a few seconds and then a zero indication:



For pH, add 0.2 mL of HI 93710-01:

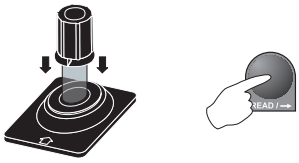


For Chlorine, Iodine and Bromine, add the content of their respective packet:

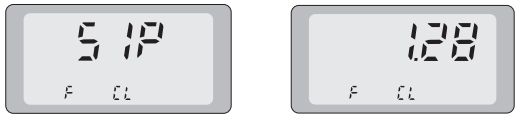


For Cianuric Acid only, add the content of one packet of HI 93722 reagent to a beaker filled up to the 25mL mark with unreacted sample up to the 25 mL mark. Stir gently to mix and then fill the cuvet up to 1.5 cm (¾“) below the rim with 10 mL of the reacted sample.

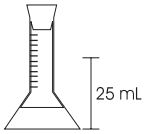
Replace the cap, shake the cuvet and allow a few seconds for color to develop. For best results, wait 2½ mins. for Total Chlorine, Bromine, Iodine, and 45 secs. for Cyanuric Acid. Insert the reacted sample into the cuvet holder and ensure that the notch on the cap is positioned securely into the groove. Press READ.



The meter will show “SIP” for a few seconds and then the concentration:

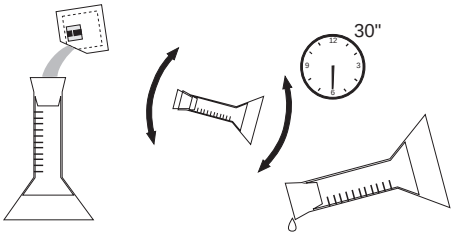


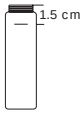
Measuring Iron



Fill one graduated mixing cylinder up to the 25 mL mark with deionized water.

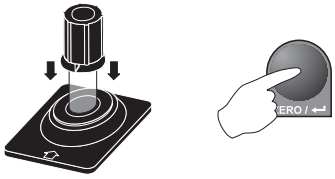
Add the content of one packet of **HI 93746** TPTZ reagent, close the cylinder and agitate for 30 seconds. This is the blank.



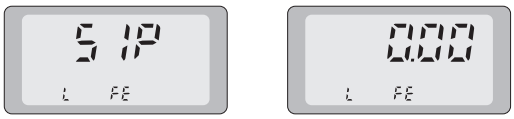


Fill a cuvet with 10 mL of the blank up to 1.5 cm (¾") below the rim and replace the cap.

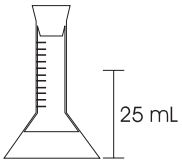
Insert the blank into the cuvet holder and make sure that the notch on the cap is positioned securely into the groove. Press ZERO.



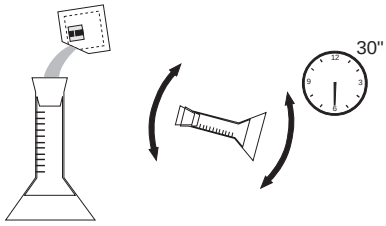
The meter will show “SIP” for a few seconds and then a zero indication:



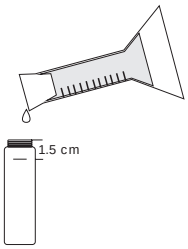
Fill one graduated mixing cylinder up to the 25 mL mark with the sample.



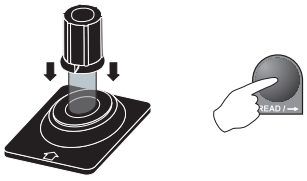
Add the content of one packet of **HI 93746** TPTZ reagent, close the cylinder and agitate for 30 seconds.



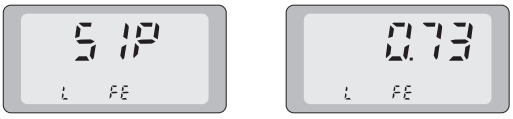
Fill a cuvet with 10 mL of the reacted sample up to 1.5 cm (¾") below the rim and replace the cap. This is the sample.



Insert the reacted sample into the cuvet holder and make sure that the notch on the cap is positioned securely into the groove. Wait 30” and then press READ.



The meter will show “SIP” for about a few seconds and then the concentration:



Note: To review the relative absorbance of the sample, wait until the concentration measurement is completed, and then press GLP/Abs. The display will show the absorbance in milliunits to-

gether with the “Ab” indicator, e.g.:
533 Ab = 533 milliabs. units

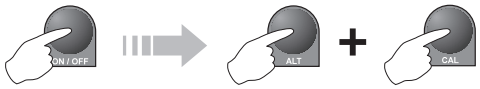
Note: Absorbance readings may have a negative sign if the transmittance of the “ZERO” sample is less then that of the reacted sample.

Note: For better accuracy wash glassware with HCl 6N.

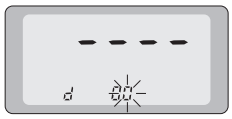
Measurements in user-customized mode

Note: The meter must be calibrated for this purpose. Follow the two-point customized calibration on page 26 before proceeding.

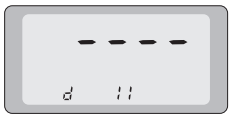
Turn the meter on and by momentarily pressing both ALT and CAL.



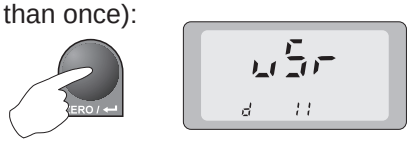
The LCD will show four dashes on the upper and “d 00” on the lower part of the LCD with the second “0” flashing:



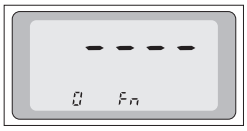
Using the ↑, ↓ and → keys change the lower row of the display to show “d 11”:



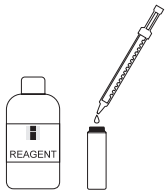
Press the ↵ key. This key is also used as a toggle between *USER* (USR) and *FACTORY* (FCT) programmed functions. Select the USER mode (if necessary by pressing the ↵ key more than once):

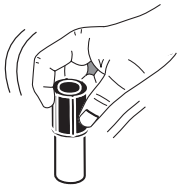


Press ALT and CAL until four dashes are displayed on the upper display and “# fn” are shown in the lower part of the LCD.

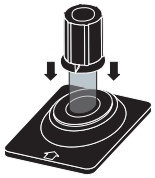


Using the ↑ and ↓ keys select the number from 0 to 7 where the appropriate calibration data have been stored.
Add the appropriate reagent into the blank sample cuvet. Shake and allow a few seconds for color to develop.





Insert the reacted sample into the cuvet holder and make sure that the notch on the cap is positioned securely into the groove. Press READ.



The meter will first show “SIP” for a few seconds and afterwards the sample concentration:

CALIBRATION

TURBIDITY CALIBRATION

The meter should be properly calibrated with a standard prepared as described in USEPA method 180.1.

Span calibration

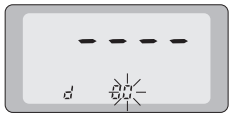
To calibrate the span of the meter, fill the cuvet with the primary turbidity formazine standard of 50 NTU.

Inspect and clean thoroughly the surface of the vial.

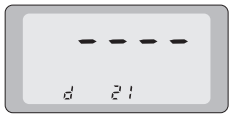
Shake the standard vigorously for a few seconds and wait a few minutes for the bubbles to disappear.

Turn the meter on and press both ALT and CAL momentarily.

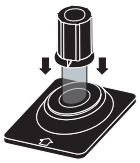
The LCD will show four dashes on the upper and “d 00” on the lower part of the LCD with the second “0” blinking.



Using the ↑, ↓ and → keys change the lower row of the display to show “d 21”.



Insert the previously prepared 50 NTU standard into the cuvet holder and make sure that the notch on the cap is positioned securely into the groove. Press ↵.

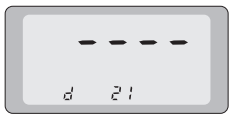


The display will blink “-Lt-” for several seconds, indicating that the LED is being adjusted for the turbidimetric channel.

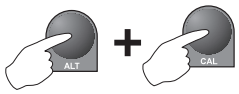
Afterwards, a sequence of numbers between -511 to 512 will appear on the upper part of the LCD indicating different levels of LED light intensity.

In approximately one minute, the adjustment will be made and the calibration data stored in the non-volatile memory.

The display will show four dashes again indicating the end of the span calibration procedure.



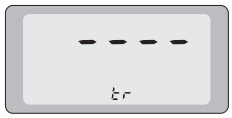
Press the ALT and CAL keys together again to leave the diagnostic mode.



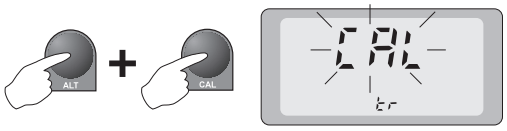
Two-point customized calibration

To enter the turbidity calibration mode, the meter should be in “turbidity” mode.

Use the ↑ and ↓ keys to set the lower level of the LCD to “tr”.

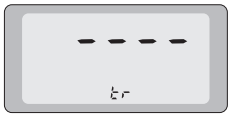


To enter the calibration mode, press and hold the ALT and CAL keys together for at least three seconds. The upper display will start flashing “CAL” for approximately three seconds.

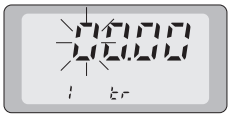


To confirm entry into the calibration mode, press the CAL key again while “CAL” is blinking.

If the CAL key is not pressed, the upper display will show "----", indicating that calibration mode was not entered. In which case, hold down the ALT and CAL keys together for 3 seconds to restart the procedure.

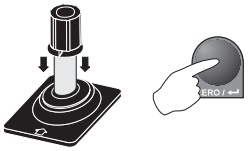


After entering the calibration mode, the display will show the first point of the previous calibration. The most significant digit will also be blinking.

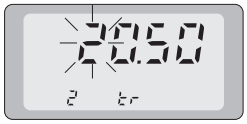


Using the ↑, ↓, → keys, set the turbidity of first calibration standard (from 0.00 to 50.0 NTU).

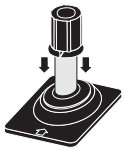
Insert the standard vial into the cuvet holder and ensure that the notch is positioned securely into the groove. Press the ↵ key. The display will indicate Sample In Progress (SIP).

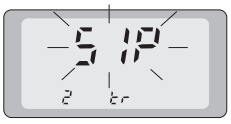


After the first calibration point is memorized, the LCD will indicate the second point of the previous calibration with the most significant digit blinking.



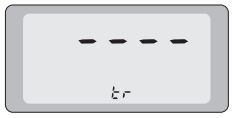
Using the ↑, ↓, → keys, set the turbidity of the second calibration standard (from 0.00 to 50.0 NTU). Insert the standard into the cuvet holder and make sure that the notch is positioned securely into the groove. Press the ↵ key. The display will indicate "SIP" again.





After the second calibration point is memorized, the unit will store the calibration data together with time and date in the EEPROM while intermittently indicating "CAL" and "Stor" for several seconds.

Subsequently, the upper display will show "----", indicating that the meter is calibrated and ready to measure turbidity of an unknown sample.

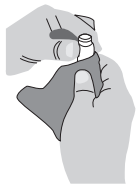


By pressing CAL during calibration, user can quit the calibration mode at any time without changing the previously stored calibration data.

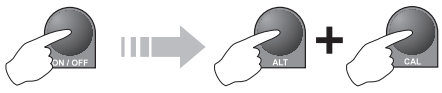
<u>COLORIMETRIC CALIBRATION</u>

<u>Zero calibration</u>

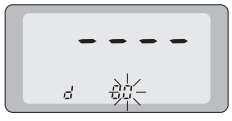
To calibrate the span of the meter, fill the cuvet with a clean deionized water sample. Inspect and thoroughly clean the surface of the vial.



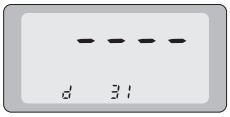
Turn the meter on and press both ALT and CAL momentarily.



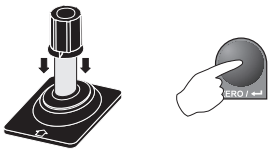
The display will show four dashes and "d 00". The second "0" will blink to allow the user to make a selection.



Using ↑, ↓, → keys set the lower part to “d 31”.



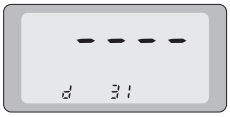
Insert the previously prepared deionized water standard into the cuvet holder and make sure that the notch on the cap is positioned securely into the groove. Press the ↵ key.



The display will blink “-Lc-” for several seconds, indicating that adjustment of the LED for the colorimetric measurements is in progress.

After this, a sequence of numbers between -511 to 512 will appear on the upper LCD indicating the different levels of LED light intensity. In approximately one minute, the adjustment will be made and the calibration data will be stored in the non-volatile memory.

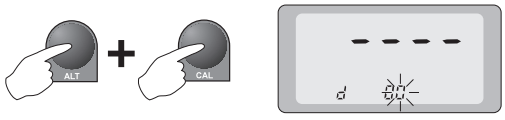
Display will show four dashes again indicating the end of the zero calibration procedure.



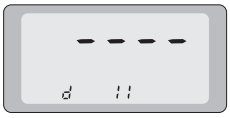
Press the ALT and CAL keys again to leave the diagnostic mode.

Two-point customized calibration

To enter the colorimetric calibration mode, press momentarily both the ALT and CAL keys. The LCD will show four dashes and “d00”.

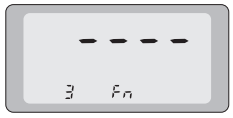


Using the ↑ and ↓ keys, set the lower part of the LCD to “d 11” and then press the ↵ key.

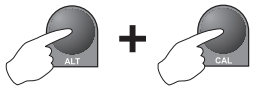


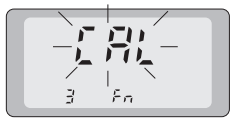
The ↵ key is used as a toggle function in this mode and allows the user to select between *USER* (USR) or *FACTORY* (FCT) programmed functions.

Select the USER mode and press ALT and CAL keys together to leave the diagnostic mode. The display of the meter will indicate four dashes together with a number from 0 to 7 on the lower part of the LCD.



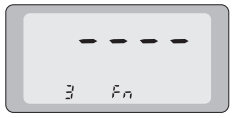
Press and hold the ALT and CAL keys together for at least three seconds. The upper display will start flashing “CAL” for approximately three seconds.





To confirm entry into the calibration mode, press the CAL key again while “CAL” is still blinking.

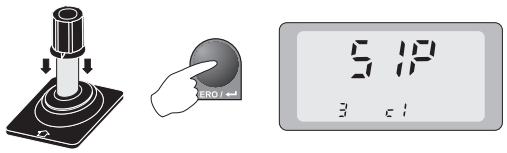
If the CAL key is not pressed, the upper row of the display will show “----”, indicating that the calibration mode was not entered. In which case, hold down the ALT and CAL keys together for 3 seconds to restart the procedure.



After entering the calibration mode, the display will show the first point of the previous calibration with the most significant digit blinking.

Using the ↑, ↓ and → keys, choose the concentration of the first calibration standard.

Insert the known standard into the cuvet holder and make sure that the notch is positioned securely into the groove. Press the ↵ key. The display will indicate sample in progress.



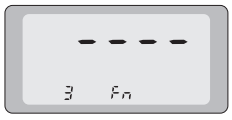
After the first calibration point is memorized, the LCD will indicate the second point of the previous calibration with the most significant digit blinking.

Using the ↑, ↓, → keys, choose the known concentration of the second calibration standard.

Insert the standard into the cuvet holder and make sure that the notch is positioned securely into the groove. Press the ↵ key. The display will blink “SIP” again.

After the second calibration point is memorized, the unit will store the calibration data, time and date in the EEPROM while intermittently indicating “CAL” and “Stor” for several seconds.

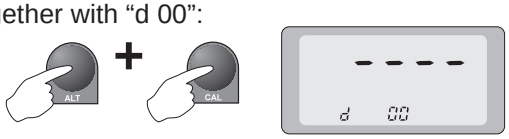
Subsequently, the upper display will show “----”, indicating that the meter is calibrated and ready to measure the concentration of an unknown sample.



By pressing the CAL key during calibration, user can leave the calibration mode at any time without changing the previously stored calibration data.

DIAGNOSTIC MODE

HI 93102 facilitates operations by providing a diagnostic mode. In this mode, user can set or verify different parameters necessary to ensure optimum performance of the meter.
To enter the diagnostic mode, turn the meter on and momentarily press ALT and CAL together. The display will show four dashes together with “d 00”:



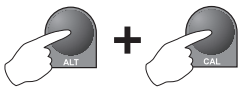
Using the ↑, ↓ and → keys, select the required diagnostic mode and press the ↵ key. The meter will execute one of the following user-diagnostic functions:

10	Customizes automatic shutdown
11	Selects User or Factory functions
12	Turns logging mode on or off
21	Calibrates span in turbidimetric mode
31	Calibrates span in colorimetric mode
40	Clears the logged memory

The following diagnostic modes are reserved for authorized service technicians:

00	Shows the *Blank* level in colorimetric mode
01	Shows the *Sample* level in colorimetric mode
02	Shows the *Dark* level in colorimetric mode
05	Shows the *Ground* voltage
06	Shows 5V on-board level
07	Shows battery voltage level
08	Shows 1.23V reference voltage level
09	Shows -5V on-board level
99	Shows software version number

To quit diagnostic mode, press the ALT and CAL keys together again.

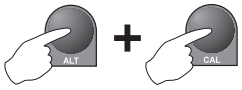


LOGGING WITH C 102

HI 93102 allows user to log 25 time/day-tagged measurements. User can easily turn the logging mode on and off, review the logged memory, review the current lot number and clean the buffer (memory). **C 102** also reminds user if its memory is full.

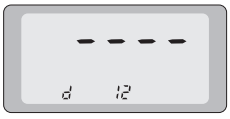
TURNING THE LOG MODE ON OR OFF

Enter the diagnostic mode by pressing ALT and CAL together.



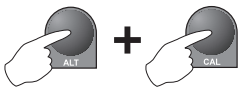
Select mode 12 and press the ↵ key.

The display will show the current (vacant) lot together with “LOG” if the log mode is on. Otherwise it will show “----” if the log mode is off.



By pressing the ↵ key, the meter toggles between the Log on and off positions. If the log on mode is selected, every time a measurement is taken (READ pressed) the relevant values will be stored in the current (vacant) lot number.

To quit diagnostic mode, press the ALT and CAL keys together again.

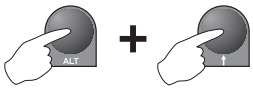


The LCD will then show “diAG” and “Stor” for a few seconds. If the log on mode was selected “LOG” will appear on the bottom left hand side

of the display to remind the user that every time a measurement is taken, the value is stored in the next available lot number.

REVIEWING THE LOGGED BUFFER

To review the memorized values, press together ALT and ↑.



The meter will scroll all the data in the buffer showing the lot number, value, date and time.

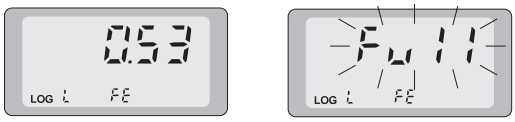
e.g. The first recorded reading in the buffer is lot # 0, 0.35 mg/L of Iron, memorized on 23rd August at 3:34 pm;

The second logged data relates to lot # 1, 1.35 mg/L of the customized parameter, logged on 23rd August at 3:55 pm.

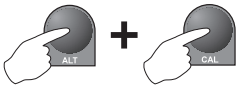
First lot *Second lot*

CLEARING THE MEMORY

After all the buffer (memory) is taken up, the LCD will blink “Full”.



To clear the buffer, press the ALT and CAL keys.



Select mode 40. Press the ↵ key. The display will show the “Cln” message, indicating that memory is being cleaned.

The lot number will be reset to 00 automatically.

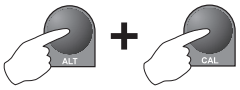
REVIEWING THE CURRENT LOT NUMBER

To check the current (vacant) lot number, while in log mode, press ALT and ↓ together.

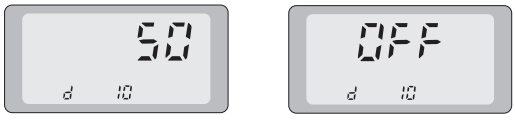
USER-SELECTABLE AUTO-OFF

With **HI 93102**, the users can customize the shutdown time to save power.

To change the shutdown time, enter the diagnostic mode by momentarily pressing the ALT and CAL keys together.



Select mode 10 and press the ↵ key repeatedly to set the desired shutdown time from 10 to 60 minutes with 10 minute increments, or disable the shutdown mode by choosing the OFF selection.



After the selection is completed, exit the diagnostic mode by pressing ALT+CAL together.

The meter will store new settings in its non-volatile memory and the display will flash “diAG” and “Stor” alternatively for several seconds.

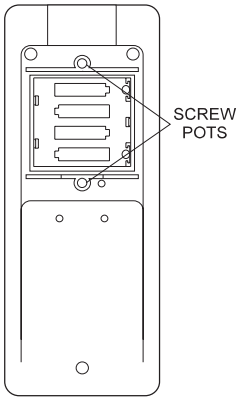
BATTERY REPLACEMENT

A “LOBAT” indication appears on the lower right hand side of the display when the batteries are weak and require replacement. At this point the instrument is still able to perform approximately 50 additional measurements.

A “-BA-” indication will appear on the display when the batteries are too weak to perform accurate measurements. This message appears for a few seconds and then the meter will completely switch itself off. At this point the batteries must be replaced.

Batteries should only be replaced in a safe area using 1.5V AA alkaline type.

In order to replace the batteries, simply remove the two screws on the rear cover of the instrument and replace all four 1.5V AA batteries with new ones, while paying attention to their polarity.



DIAGNOSTIC CODES

LOBAT Weak batteries. Change all batteries as soon as possible.

-BA- Exhausted batteries. Change all batteries immediately.

-LO- Low level of light is received during the zeroing procedure.
Check for scratches on the cuvet and ensure that sample is not excessively turbid. Repeat the readings. If the problem persists, recalibrate the meter using deionized water in the diagnostic mode “31” (see Calibration).

-CAP- Light intensity is high during last measurement. Make sure the cuvet is capped and placed properly in the holder, and that ambient light does not reach the photodetector. Repeat the measurement. If the problem persists, contact your dealer or the nearest Hanna Office.

Er 1 Hardware error. Repeat the measurement. If the error message appears again, contact your dealer or the nearest Hanna Office.

rnG Out of range. Check the measuring procedure and verify the concentration of the sample to ensure that is not too high.

ACCESSORIES

HI 731327	Maintenance kit: rugged carrying case including **HI 93102-0** and **HI 93102-20** calibration solutions, **HI 93703-50** cuvet cleaning solution, one tissue for wiping cuvets and two cuvets
HI 93102-0	AMCO-AEPA-1 @ 0 NTU* calibration solution, 30 mL
HI 93102-20	AMCO-AEPA-1 @ 20 NTU* calibration solution, 30 mL
HI 93701-01	Reagents for 100 Free Chlorine tests
HI 93701-03	Reagents for 300 Free Chlorine tests
HI 93703-50	Cuvet cleaning solution, 230 mL bottle
HI 93710-01	Reagents for 100 pH tests
HI 93710-03	Reagents for 300 pH tests
HI 93711-01	Reagents for 100 Total Chlorine tests
HI 93711-03	Reagents for 300 Total Chlorine tests
HI 93716-01	Reagents for 100 Bromine tests
HI 93716-03	Reagents for 300 Bromine tests
HI 93718-01	Reagents for 100 Iodine tests
HI 93718-03	Reagents for 300 Iodine tests
HI 93722-01	Reagents for 100 Cyanuric Acid tests
HI 93722-03	Reagents for 300 Cyanuric Acid tests
HI 93746-01	Reagents for 100 Low Range Iron tests
HI 93746-03	Reagents for 300 Low Range Iron tests
HI 731318	Tissue for wiping cuvets (4 pcs)

* 1 NTU = 1 FTU.

WARRANTY

Hanna Instruments **meters are guaranteed for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

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 the instrument was purchased. 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 and then return the instrument indicating the Authorization # 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.

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

CE DECLARATION OF CONFORMITY

HANNA instruments

CE

DECLARATION OF CONFORMITY

We

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

herewith certify that the turbidity and ion specific meter

C 102

has 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 normatives:

EN 50082-1: Electromagnetic Compatibility - Generic Immunity Standard
IEC 801-2 Electrostatic Discharge
IEC 801-3 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: 27-10-1998

P. Cesa - Technical Director
On behalf of
Hanna Instruments S.r.l.

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used.

Operation of this instrument in residential areas could cause unacceptable interference to radio and TV equipment, requiring the operator to take all necessary steps to correct the interference.

Any variation introduced by the user to the supplied equipment, may degrade the instrument's EMC performance.

To avoid electrical shocks, do not use this instrument when voltage at the measurement surface exceeds 24 Vac or 60 Vdc.

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

SALES AND TECHNICAL SERVICE CONTACTS

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