



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 93114

Turbidity & Chlorine Measurements





www.hannainst.com

Dear Customer,

Thank you for choosing a HANNA instruments® product.

Please read this instruction manual carefully before using the instrument.

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

For any additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

This instrument is in compliance with the CE directives.

TABLE OF CONTENTS

Preliminary Examination	3
General Description	4
Principle of Operation	6
Functional Description	9
Specifications	12
Operational Guide	13
Calibration	19
Diagnostic mode	27
Logging	28
User-selectable Shutdown	30
Battery Replacement	31
Diagnostic Codes	32
Accessories	33
Warranty	34
CE Declaration of Conformity	35

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, immediately notify your dealer.

HI 93114 is supplied complete with:

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

An optional starter kit **HI 731327** is also available, complete with:

- 2 glass cuvetts with caps
- Calibration standards **HI 93102-0** (AMCO-AEPA-1 @0 NTU* solution, 30 mL bottle) and **HI 93102-20** (AMCO-AEPA-1 @20 NTU* solution, 30 mL bottle)
- **HI 93703-50** cuvet cleaning solution
- Tissue for wiping cuvetts
- 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

With the hand held **HI 93114**, three important parameters in water quality analysis are at your fingertips. Free and total chlorine measurements and US EPA compliant turbidity measurements are performed quickly and reliably with this lab-grade microprocessor-based field instrument.

HI 93114 is particularly useful for potable water measurements and municipalities.

With **HI 93114** measurements can be performed using either concentration or relative absorbance of the sample depending on the requirements of the application.

HI 93114 can be calibrated using the factory preprogrammed calibration points or can be custom calibrated when in colorimetric mode.

This rugged instrument has been engineered to offer all the sophistication and reliability of benchtop laboratory instrumentation in the size of a handheld meter.

HI 93114 complies with GLP 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, the meter 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 for storing up to 25 measurements along with time and date information for retrieval at a later date.

The large dual-level display can show the measured parameter on the main part, while the lower level indicates current mode (e.g. "F CL" for free chlorine or "TR" for turbidity). Additional symbols show low battery condition, logging mode, date, time, etc.

A pure green LED is utilized as light source for both turbidimetric and colorimetric measurements. A silicon photocell receives the transmitted light from colorimetric channel, while another photocell detects the scattered light from the turbidimetric (nephelometric) channel.

In order to measure chlorine parameters, it is necessary to do the zero with the blank sample, and then add 1 packet of reagent. After placing the cuvet back in the meter and pressing READ, the measurement is shown directly on the LCD.

The instrument also features an automatic shut-off with user-selectable delay at 10, 20, 30, 40, 50 or 60 minutes.

PRINCIPLE OF OPERATION

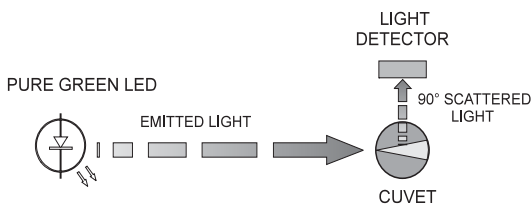
Turbidity Mode

HI 93114 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 SiO₂). The conversion table between these measurement units is shown below:

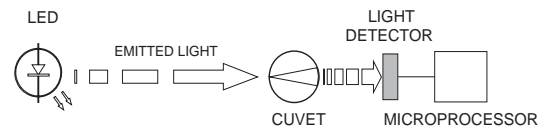
	JTU	NTU/FTU	SiO ₂ (mg/L)
JTU	1	19	2.5
NTU/FTU	0.053	1	0.13
SiO ₂ (mg/L)	0.4	7.5	1

* 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_0 , a portion of the radiation is absorbed by the substance's molecules and a radiation of intensity I , lower than I_0 , is emitted.

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

$$\log I_0/I = \epsilon_\lambda c d$$

Where $\log I_0/I = \text{Absorbance (A)}$

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_0 .

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.

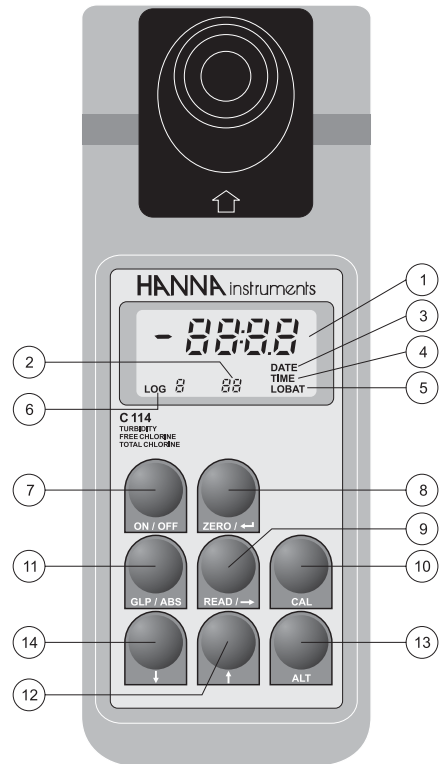
The cuvet is an optical element and hence has an important role in the measurement process. Both the measurement and the calibration cuvetts must be optically identical to provide the same measurement conditions.

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 cuvetts to prevent any contamination.

FUNCTIONAL DESCRIPTION



1) Primary LCD:

When the meter is switched on, the LCD shows all segments for a few seconds.

It then displays four dashes to indicate "ready to measure".

In "Read" and "Zero" mode, "SIP" is shown to indicate "Sample In Progress".

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

2) **Secondary LCD:**

The three-digit lower level shows the current measurement mode ("F CL", "tCL", or "tr"), and diagnostic or calibration modes, such as "d 11", "2 Fn", "5 c1".

- 3) **DATE:** Indicates that the main LCD is showing the current date, the date of last calibration or the date of logged measurement in memory.
- 4) **TIME:** Indicates that the main LCD is showing the current time, the time of last calibration or the time of logged measurement in memory.
- 5) **LOBAT:** Blinks to warn the user of low battery voltage.
- 6) **LOG:** Blinks to indicate that the meter is in the scroll mode viewing the logged data.
If fixed, it indicates that the meter is in the log mode and every reading will be stored in memory.
- 7) **ON/OFF** key: Turns the meter on and off.
- 8) **ZERO/ ←** key: In ion specific mode, it zeros the sample.
In calibration and diagnostic modes, it works as ENTER.
In turbidity mode, it is not used.
- 9) **READ/ →** key: Takes concentration/turbidity measurement of the sample.
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 retrieved.
If pressed together with the ALT key for less than 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 than 3 seconds, a blinking "CAL" will appear and the calibration procedure is entered.

- 11) **GLP/Abs** key: In ion specific mode, it will toggle concentration/absorbance readings on main LCD.
In turbidity mode, GLP data (date, time and the 2 calibration values) will be shown.
If pressed in time/date setup mode, the meter will quit current mode without making any change.

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

- 13) **ALT** key: Activates alternative functions.

- 14) **↓** key: Scrolls downwards through the parameters to be measured.

In calibration and diagnostic modes, 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

		HI93114
Range	Turbidity	0.00 to 50.0 NTU*
	Free Cl₂	0.00 to 2.50 mg/L
	Total Cl₂	0.00 to 3.50 mg/L
Resolution	Turbidity	0.01 and 0.1 NTU*
	Free Cl₂	0.01 mg/L
	Total Cl₂	0.01 mg/L
Accuracy	Turbidity	±0.5 NTU* or ±5% (whichever greater)
	Free & Total Cl₂	±0.03 mg/L or ±3% (whichever greater)
Light Source		Pure green LED
Light Source Life		Life of the instrument
Light Detector		Two silicon photocells
Battery Type		4 x 1.5V AA alkaline
Battery Life		60 hours or 1000 measurements
Auto-off		Selectable after 10, 20, 30, 40, 50 or 60 minutes
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

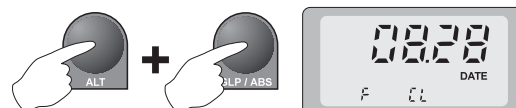
OPERATIONAL GUIDE

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 ALT and 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.



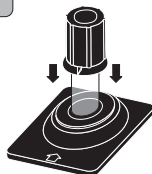
Turn the meter on. After the initialization routine, the LCD will show:



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:

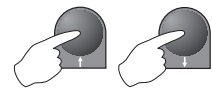


COLORIMETRIC MEASUREMENTS

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



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

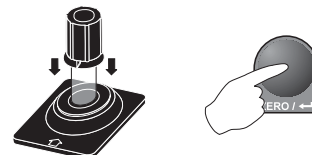


F CL Free Chlorine **t CL** Total Chlorine

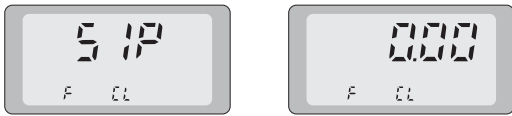
Measuring Chlorine

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

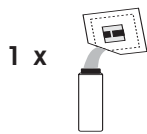
Insert the blank sample into the cuvet holder and ensure that the notch on the cap is positioned securely into the groove. Press ZERO.



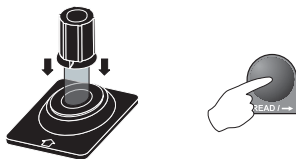
The meter will show "SIP" for a few seconds and then a zero indication:



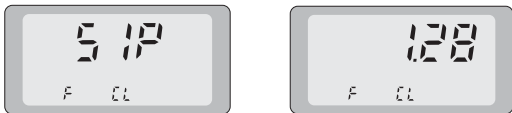
For the Free or Total Chlorine add the content of its respective packet:



Replace the cap and shake the cuvet. For best results wait 2½ mins. for Total Chlorine. 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:



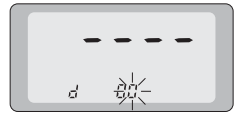
Measurements in user-customized mode

Note: The meter must be calibrated for this purpose. Follow the 2 point procedure on page 26 before proceeding.

Turn the meter on, and press both ALT and CAL buttons.



The main LCD will show four dashes and "d 00" is displayed on the lower part, with the second "0" flashing:



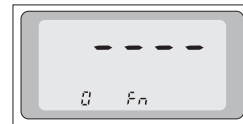
Using the ↑, ↓ and → keys change the lower row of the display to show "d 11":



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):

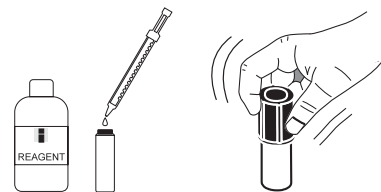


Press ALT and CAL until four dashes are displayed on the upper display and "# fn" are shown in the lower part of the LCD.

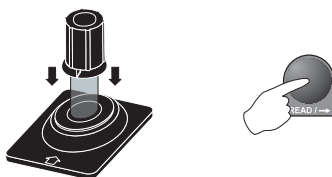


Using the ↑ and ↓ keys select the number from 0 to 1 where the appropriate calibration data have been stored.

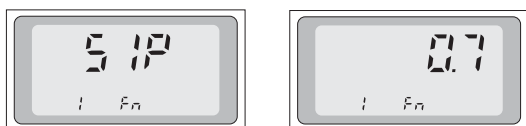
Add the appropriate reagent into the blank sample cuvet. Shake and allow a few seconds for color to develop.



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.



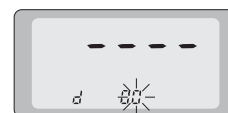
Shake the standard vigorously for a few seconds and wait a few minutes for the bubbles to disappear.



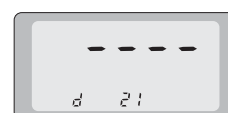
Turn the meter on and press both ALT and CAL momentarily.



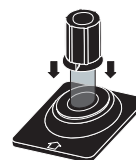
The LCD will show four dashes on the upper part and "d 00" on the lower part of the LCD with the second "0" blinking.



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 ←.



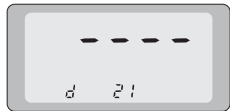
The display will blink “-Lt-” for several seconds, indicating that the LED is being adjusted for the turbidimetric channel.



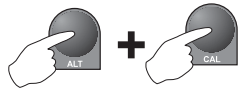
Afterwards, a sequence of numbers between -511 to 512 will appear on the upper part of the LCD indicating different levels of LED light intensity.

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”.

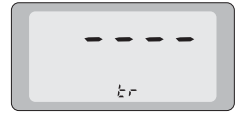
To enter the calibration mode, press and hold the ALT and CAL keys together for at least three seconds. The upper display will start flashing “CAL” for approximately 3 seconds.



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.

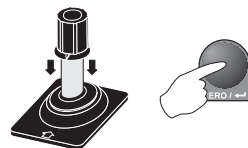


After entering the calibration mode, the display will show the first point of the previous calibration. The most significant digit will also be blinking.

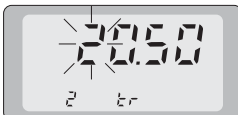


Using the ↑, ↓, → keys, set the turbidity of first calibration standard (from 0.00 to 50.0 NTU).

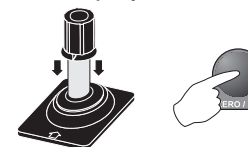
Insert the standard vial into the cuvet holder and ensure that the notch is positioned securely into the groove. Press the ← key. The display will indicate Sample In Progress (SIP).



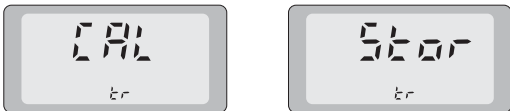
After the first calibration point is memorized, the LCD will indicate the second point of the previous calibration with the most significant digit blinking.



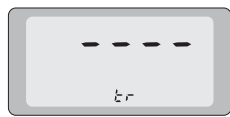
Using the ↑, ↓, → keys, set the turbidity of the second calibration standard (from 0.00 to 50.0 NTU). Insert the standard into the cuvet holder and make sure that the notch is positioned securely into the groove. Press the ← key. The display will indicate “SIP” again.



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.



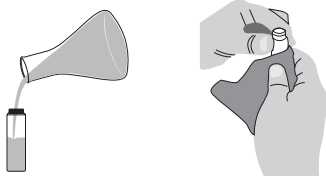
By pressing CAL during calibration, user can quit the calibration mode at any time without changing the previously stored calibration data.



COLORIMETRIC CALIBRATION

Zero calibration

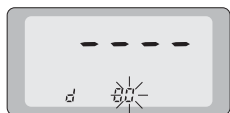
To calibrate the span of the meter, fill the cuvet with a clean deionized water sample. Inspect and thoroughly clean the surface of the vial.



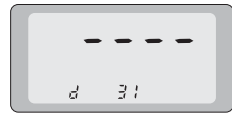
Turn the meter on and press both ALT and CAL momentarily.



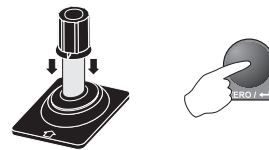
The display will show four dashes and "d 00". The second "0" will blink to allow the user to make a selection.



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.

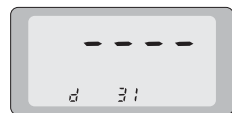


The display will blink "-Lc-" for several seconds, indicating that adjustment of the LED for the colorimetric measurements is in progress.

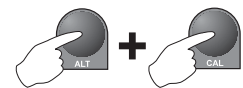


After this, a sequence of numbers between -511 to 512 will appear on the upper LCD indicating the different levels of LED light intensity. In approximately one minute, the adjustment will be made and the calibration data will be stored in the non-volatile memory.

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".



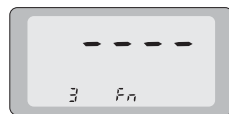
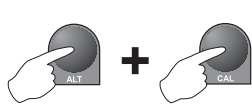
Using the ↑ and ↓ keys, set the lower part of the LCD to “d 11” and then press the ← key.



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 0 or 1 on the lower part of the LCD.



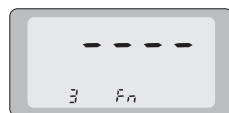
Press and hold the ALT and CAL keys together for at least three seconds. The upper display will start flashing “CAL” for approximately three seconds.



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.

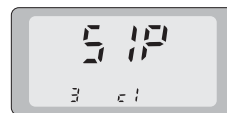
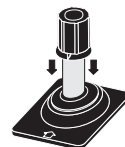


After entering the calibration mode, the display will show the first point of the previous calibration with the most significant digit blinking.



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.

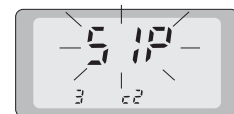
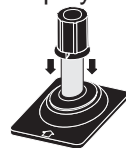


After the first calibration point is memorized, the LCD will indicate the second point of the previous calibration with the most significant digit blinking.



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, the calibration mode can be exited at any time without changing the previously stored calibration data.



DIAGNOSTIC MODE

HI 93114 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":



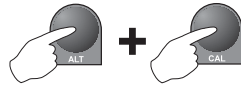
Using the ↑, ↓ and → keys, select the required diagnostic mode and press the ← key. The meter will execute one of the following user-diagnostic functions:

-
- 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

HI 93114 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). HI 93114 also reminds the 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 ALT and CAL together again.



The LCD will then show “CAL” 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 memo- rized values, press together ALT and ↑.



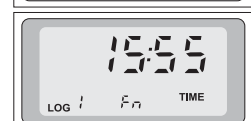
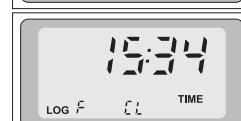
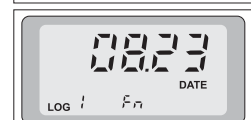
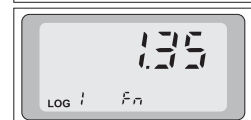
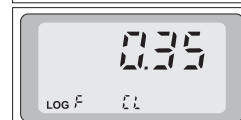
The meter will scroll all the data in the buffer showing the lot number, value, date and time.

e.g. The first recorded reading in the buffer is lot # 0, 0.35 mg/L of Free Chlorine, 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

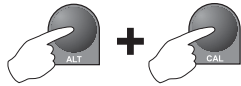


CLEARING THE MEMORY

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



To clear the buffer, press ALT and CAL.



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.



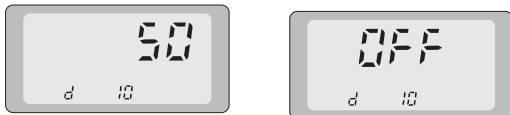
USER-SELECTABLE SHUTDOWN

With HI 93114, the users can customize the shutdown time to save power.

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



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.

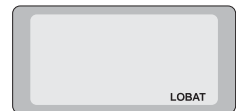


The meter will store new settings in its non-volatile memory and the display will flash “CAL” and “Stor” alternately for several seconds.



BATTERY REPLACEMENT

A “LOBAT” indication appears on the display when the batteries are weak and require replacement. The instrument can still perform approximately 50 measurements.

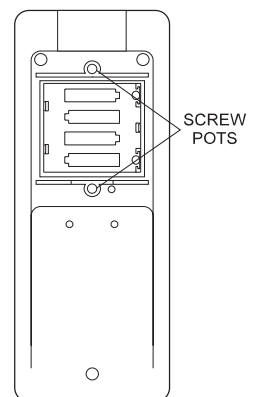


A “-BA-” indication will appear when the batteries are too weak to ensure accurate measurements. This message appears for a few seconds and then the meter turns off. Batteries must be replaced.



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

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 light level is received during the zeroing procedure: check the cuvet for scratches and ensure that the sample is not excessively turbid. Repeat the reading. If the problem persists, recalibrate the meter using deionized water in the diagnostic mode "31" (see "Calibration").
- CAP-** High light intensity during last measurement: make sure that the cuvet is capped and placed properly in the holder, and that the 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 731318** Tissue for wiping cuvetts (4 pcs)
- HI 731327** Maintenance kit: rugged carrying case including **HI93102-0** and **HI93102-20** calibration solutions, **HI 93703-50** cuvet cleaning solution, tissue for wiping cuvetts and 2 cuvetts
- HI 93102-0** AMCO-AEPA-1 calibration solution @0 NTU* , 30 mL
- HI 93102-20** AMCO-AEPA-1 calibration solution @20 NTU* , 30 mL
- HI 93701-01** Reagent kit for 100 free chlorine tests
- HI 93701-03** Reagent kit for 300 free chlorine tests
- HI 93703-50** Cuvet cleaning solution, 230 mL bottle
- HI 93711-01** Reagent kit for 100 total chlorine tests
- HI 93711-03** Reagent kit for 300 total chlorine tests

* 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.

All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner.

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

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 turbidity and ion specific meter

HI 93114

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 normative:

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.