HI83308

Water Conditioning Photometer

INSTRUCTION MANUAL

HANNA instruments®

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 correct use of the instrument, as well as a precise idea of its versatility.
If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

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1. PRELIMINARY EXAMINATION

Remove the instrument and accessories from the packaging and examine it carefully to make sure that no damage has occurred during shipping. Notify your nearest Hanna Customer Service Center if damage is observed.

Each HI83308 is supplied with:

- Sample Cuvette and Cap (4 pcs.)
- Cloth for Wiping Cuvettes
- Scissors
- USB Cable
- 5 Vdc Power Adapter
- Instruction Manual
- DO bottle (glass stopper bottle)
- Quality Certificate

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

2. SAFETY MEASURES

- The chemicals contained in the reagent kits may be hazardous if improperly handled.
- Read the Safety Data Sheets (SDS) before performing tests.
- Safety equipment: Wear suitable eye protection and clothing when required, and follow instructions carefully.
- Reagent spills: If a reagent spill occurs, wipe up immediately and rinse with plenty of water. If reagent contacts skin, rinse the affected area thoroughly with water. Avoid breathing released vapors.
- Waste disposal: for proper disposal of reagent kits and reacted samples, contact a licensed waste disposal provider.

3. SPECIFICATIONS

Measurement Channels		4 x optical channels 1 x digital electrode channel (pH measurement)
Absorbance	Range	0.000 to 4.000 Abs
	Resolution	0.001 Abs
	Accuracy	±0.003 Abs (at 1.000 Abs)
	Light Source	light emitting diode
	Bandpass Filter Bandwidth	8 nm
	Bandpass Filter Wavelength Accuracy	±1.0 nm
	Light Detector	silicon photocell
	Cuvette Types	round, 24.6 mm diameter
	Number of Methods	27
pH	Range	-2.00 to 16.00 pH (± 1000.0 mV)*
	Resolution	0.01 pH (0.1 mV)
	Accuracy	±0.01 pH (±0.2 mV) (@ 25 °C / 77 °F)
	Temperature Compensation	ATC (-5.0 to 100.0 °C; 23.0 to 212.0 °F)*
	Calibration	2 points, eligible from 5 available buffers (4.01, 6.86, 7.01, 9.18, 10.01 pH)
	Electrode	Intelligent pH / temperature electrode
Temperature	Range	-20.0 to 120.0°C (-4.0 to 248.0 °F)
	Resolution	0.1 °C (0.1 °F)
	Accuracy	±0.5 °C (±0.9 °F) (@ 25 °C / 77 °F)
Additional Specifications	Logging	1000 readings (mixed photometer and electrode)
	Display	128 x 64 pixel B/W LCD with backlight
	USB-A (Host) Functions	mass-storage host
	USB-B (Device) Functions	power input, mass-storage device
	Battery Life	> 500 photometer measurements, or 50 hours of continuous pH measurement
	Power Supply	5 Vdc USB 2.0 power adapter/type micro-B connector 3.7 Vdc Li-polymer rechargeable battery, non-serviceable
	Environment	0 to 50 °C (32 to 122 °F); 0 to 95% RH, non-serviceable
	Dimensions	206 x 177 x 97 mm (8.1 x 7.0 x 3.8")
	Weight	1.0 kg (2.2 lbs.)

*Limits will be reduced to actual probe/sensor limits.

4. DESCRIPTION

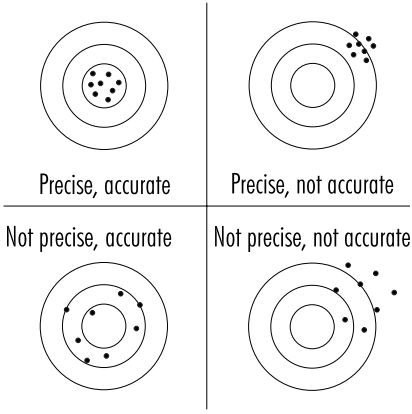
4.1.GENERAL DESCRIPTION

HI83308 multiparameter photometer is compact and versatile meter with two measurement modes: Absorbance and pH/ mV. Absorbance mode include CAL Check feature and 27 different methods that cover a wide variety of applications, making it ideal for both benchtop and portable operation.

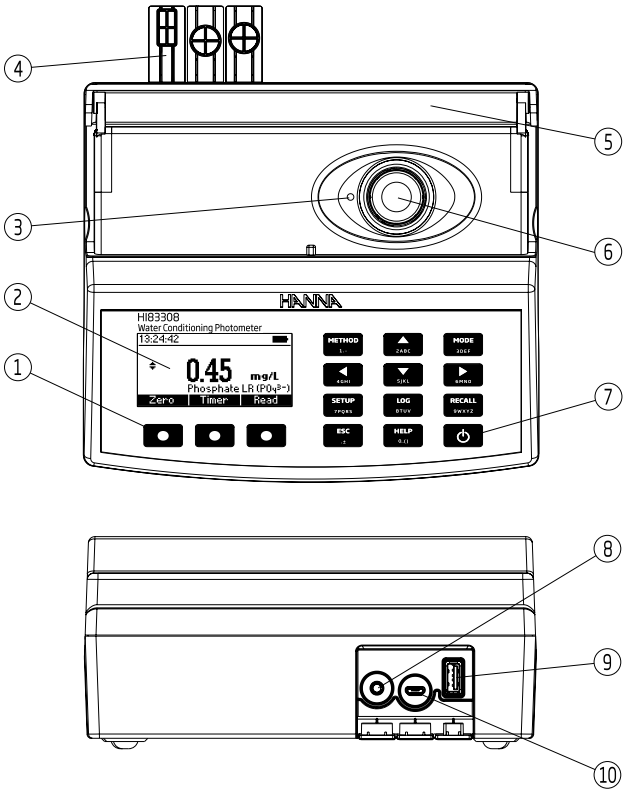
- Digital electrode input for pH measurements
- Certified CAL Check cuvettes to confirm meter functionality
- Dual purpose micro-USB flash drive
- Li-polymer rechargeable battery
- Auto-off
- Absorbance mode
- User and sample name entry
- GLP features

4.2.PRECISION AND ACCURACY

Precision is how closely repeated measurements are to one another. Precision is usually expressed as standard deviation (SD).
Accuracy is defined as the closeness of a test result to the true value.
Although good precision suggests good accuracy, precise results can be inaccurate. The figure explains these definitions.
For each method, the accuracy is expressed in the related measurement section.



4.3. FUNCTIONAL DESCRIPTION



1) Splash-proof keypad
2) Liquid Crystal Display (LCD)
3) Indexing mark
4) Protective port covers
5) Light-blocking cover panel
6) Cuvette holder
7) ON/OFF power button
8) 3.5 mm TRRS (jack) input for digital electrodes
9) Standard USB host connector for data transfer to a USB flash drive
10) Micro-USB device connector for power or PC interface

Keypad Description

The keypad contains 12 direct keys and 3 functional keys with the following functions:

Press the functional keys to perform the function displayed above them on the LCD.

Press to access the list of photometer methods.

Press to move up in a menu or a help screen, to increment a set value, or to access second level functions.

Press to toggle between photometer and pH (electrode) mode.

Press to move left in a menu or to decrement a set value.

Press to move down in a menu or a help screen, to decrement a set value, or to access second level functions.

Press to move right in a menu or to increment a set value.

Press to access the setup screen.

Press to log the current reading.

Press to review saved logs.

Press to exit the current screen.

Press to display the help screen.

ON/OFF power button.

4.4. PRINCIPLE OF OPERATION

Absorption of light is a typical phenomenon of interaction between electromagnetic radiation and matter. When a light beam crosses a substance, some of the radiation may be absorbed by atoms, molecules or crystal lattices.

If pure absorption occurs, the fraction of light absorbed depends both on the optical path length through the matter and on the physical-chemical characteristics of the substance according to the Lambert-Beer Law:

$$-\log \mathbf{I}/\mathbf{I}_o = \varepsilon_\lambda \, c \, d$$

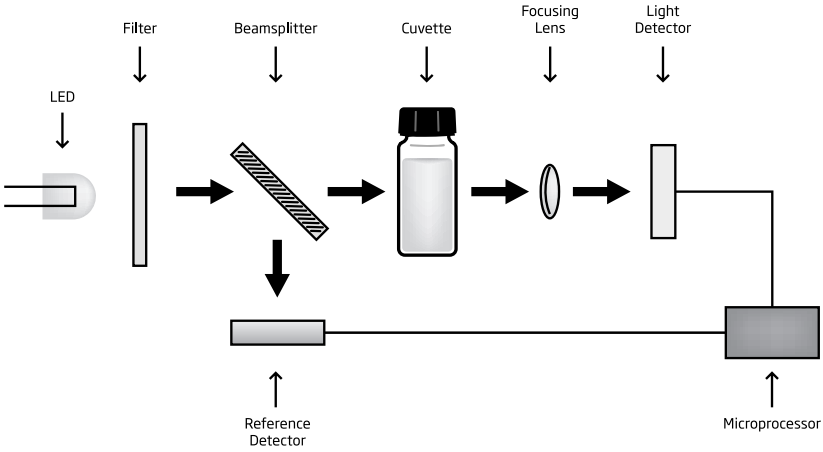
or

$$A = \varepsilon_\lambda \, c \, d$$

I_o = intensity of incident light beam
I = intensity of light beam after absorption
ε_λ = molar extinction coefficient at wavelength λ
c = molar concentration of the substance
d = optical path through the substance

Therefore, the concentration "c" can be calculated from the absorbance of the substance as the other factors are constant.
Photometric chemical analysis is based on specific chemical reactions between a sample and reagent to produce a light-absorbing compound.

4.5. OPTICAL SYSTEM



Instrument Block Diagram

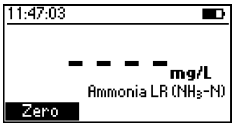
The internal reference system (reference detector) of the HI83308 photometer compensates for any drifts due to power fluctuations or ambient temperature changes, providing a stable source of light for your blank (zero) measurement and sample measurement.
LED light sources offer superior performance compared to tungsten lamps. LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce little heat, which could otherwise affect electronic stability. LEDs are available in a wide array of wavelengths, whereas tungsten lamps have poor blue/violet light output.
Improved optical filters ensure greater wavelength accuracy and allow a brighter, stronger signal to be received. The end result is higher measurement stability and less wavelength error.
A focusing lens collects all of the light that exits the cuvette, eliminating errors from cuvette imperfections and scratches, eliminating the need to index the cuvette.

5. GENERAL OPERATIONS

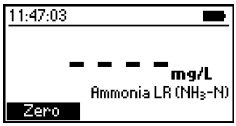
5.1. POWER CONNECTION AND BATTERY MANAGEMENT

The meter can be powered from an AC/DC adapter (included) or from the built-in rechargeable battery. The meter will perform an auto-diagnostic test when it is first powered on. During this test, the HANNA® logo will appear on the LCD. After 5 seconds, if the test was successful, the last method used will appear on the display. The battery icon on the LCD will indicate the battery status:

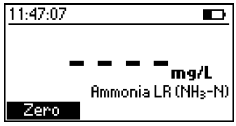
- battery is charging from external adapter



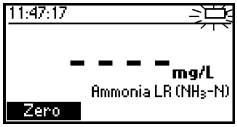
- battery fully charged (meter connected to AC/DC adapter)



- battery capacity (no external adapter)



- battery near 0% (no external adapter)



- battery exhausted (no external adapter)

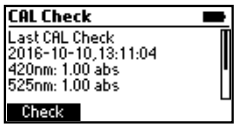
To conserve battery, the meter will turn off automatically after 15 minutes of inactivity (30 minutes before a READ measurement). If a photometer measurement is on the screen, an auto-log is created before shutdown.

5.2. GENERAL SETUP

Press **SETUP** key to enter in **Setup** menu, highlight desired option using  and press **Select**.

CAL Check (Photometer Only)

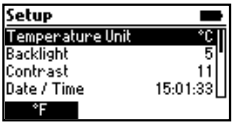
Press **Select** to enter the CAL Check screen. The date, time and values for the last CAL Check are displayed on the screen.
To start a new CAL Check press **Check** key and follow the prompts on the screen.



Temperature Unit (pH Only)

Option: °C or °F

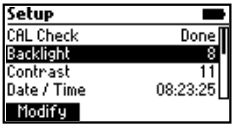
Press the functional key to select the desired temperature unit.

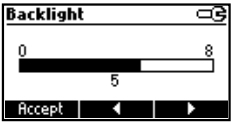


Backlight

Values: 0 to 8

Press the **Modify** key to access the backlight intensity.
Use the functional keys or the ◀ ▶ keys to increase or decrease the value.
Press the **Accept** key to confirm or **ESC** to return to the **Setup** menu without saving the new value.

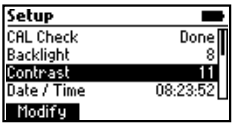


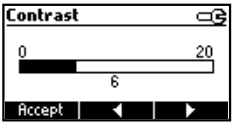


Contrast

Values: 0 to 20

Press the **Modify** key to change the display's contrast.
Use the functional keys or the ◀ ▶ keys to increase or decrease the value.
Press the **Accept** key to confirm the value or **ESC** to return to the **Setup** menu without saving the new value.





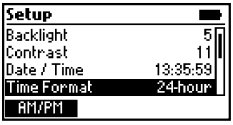
Date / Time

Press the **Modify** key to change the date/time.
Press the functional keys or the ◀ ▶ keys to highlight the value to be modified (year, month, day, hour, minute or second).
Use the ▲ ▼ keys to change the value.
Press the **Accept** key to confirm or **ESC** to return to the **Setup** without saving the new date or time.

Time Format

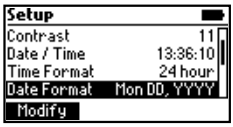
Option: AM/PM or 24-hour

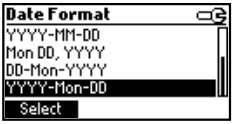
Press the functional key to select the desired time format.



Date Format

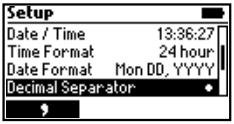
Press the **Modify** key to change the Date Format.
Use the ▲ ▼ keys to select the desired format.
Press the **Select** key to confirm or **ESC** to return to the **Setup** menu without saving the new format.





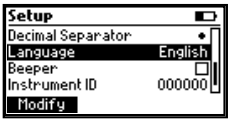
Decimal Separator

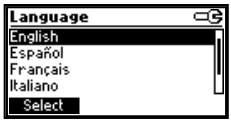
Option: Comma (,) or Period (.)
Press the functional key to select the desired decimal separator. The decimal separator is used on the measurement screen and CSV files.



Language

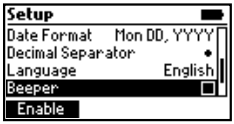
Press the **Modify** key to change the Language. Use the ▲ ▼ keys to select the desired language.
Press **Select** to choose one of the 7 languages installed.





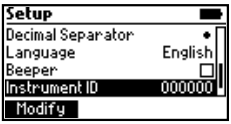
Beeper

Option: Enable or Disable
When enabled, a short beep is heard every time a key is pressed. A long beep alert sounds when the pressed key is not active or an error is detected. Press the functional key to enable/disable the beeper.



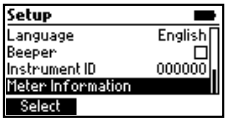
Instrument ID

Option: 0 to 999999
This option is used to set the instrument's ID (identification number). Press the **Modify** key to access the instrument ID screen. Use the functional keys or the ◀ ▶keys to highlight the digit to be modified. Press the ▲ ▼ keys in order to set the desired value. Press the **Accept** key to confirm the value or **ESC** to return to the **Setup** menu without saving the new value.



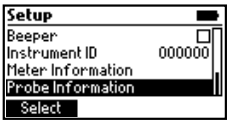
Meter Information

Press the **Select** key to view the model, serial number, firmware version and selected language. Press **ESC** to return to the **Setup** menu.



Probe Information (pH mode only)

Press the **Select** key to view model number, serial number and firmware version for the connected probe.
Press **ESC** to return to the **Setup** menu.



5.3. USING HANNA DIGITAL ELECTRODES

The HI83308 can be used to perform direct pH measurements by connecting a HANNA® digital pH electrode with a 3.5 mm TRRS connector. To begin taking probe measurements, connect the electrode to the 3.5 mm port marked with "EXT PROBE" located at the rear of the meter. If the meter is in "Photometer Mode", set the meter to "Probe Mode" by pressing the **MODE** key.

5.4. MODE SELECTION

The HI83308 has two operational modes: Photometer Mode and Probe Mode.
Photometer Mode enables on-demand measurement of a cuvette using the integrated optical system. Photometric-related functions, such as Method selection, Zero, Read, and Timers are available in this mode.

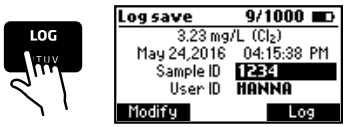
Probe Mode enables continuous measurement using a Hanna Digital Electrode connected to the 3.5 mm port. Probe-related functions, such as calibration and GLP, are available in this mode.
To switch between Photometer Mode and Probe Mode, use the MODE button.

Note: The active mode cannot be switched while in menus, such as Setup, Recall, Method, etc.

5.5. LOGGING DATA

The instrument features a data log function to help you keep track of all your analysis. The data log can hold 1000 individual measurements. Storing, viewing and deleting the data is possible using the **LOG** and **RECALL** keys.

Storing data: You can store only a valid measurement. Press **LOG** and the last valid measurement will be stored with date and time stamp.

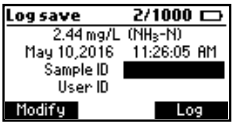


5.6. ADDING SAMPLE / USER NAMES TO LOG DATA

A sample ID and user ID can be added to the saved log. Use the ▲▼ keys to highlight the Sample ID or User ID then press **Modify**.

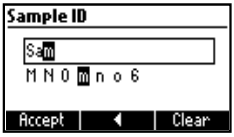
Text Entry

Sample ID and User ID care entered using the alphanumeric multi-tapping keypad.

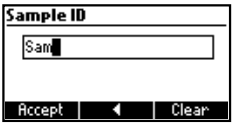


Enter one character at a time by pressing the key with the assigned character repeatedly until the desired character is highlighted. For reference, a list of the characters available for the current key will be shown under the text box.

The character will be entered after a two-second delay or after another key is pressed.



Once all characters have been entered, press **Accept** to use the displayed text.



The following functions are available during **Text Entry**:

- **Accept**: Press to accept the current displayed text.
- **Arrow**: Press to delete the last character.
- **Clear**: Press to delete all characters.

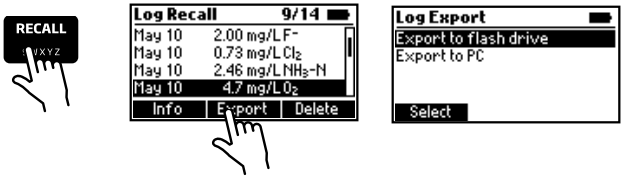
ESC Press to discard all changes and return to the previous screen.

5.7. DATA MANAGEMENT

Viewing and deleting: You can view, export and delete the data by pressing the **RECALL** key. Use the ▲▼ keys to scroll through the saved logs. Press **Info** to view additional information about the selected log.

Data Export:

Log data can be exported to a USB flash drive or to a PC. To access Data Export functions, press **Recall** then **Export**.



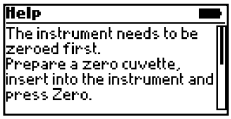
Use the ▲ ▼ keys to select the desired export location.
For export to USB Flash Drive, insert the USB Flash Drive into the dedicated port at the back of the meter labeled HOST USB, then follow the on-screen prompts.

For export to PC, connect the meter to a PC using the supplied micro-USB cable. Insert the cable into the port at the back of the meter labeled PC PWR. Follow the on-screen prompts. When the meter says PC connected, use a file manager (such as Windows Explorer or Mac Finder) to move the file from the meter to the PC. The meter will appear as a removable disk.

Log data is exported as a single file containing all logged photometer and probe data. The file name is: "HI83308.csv". The CSV file (Comma-Separated Values) may be opened with a text editor or spreadsheet application.

5.8. CONTEXTUAL HELP

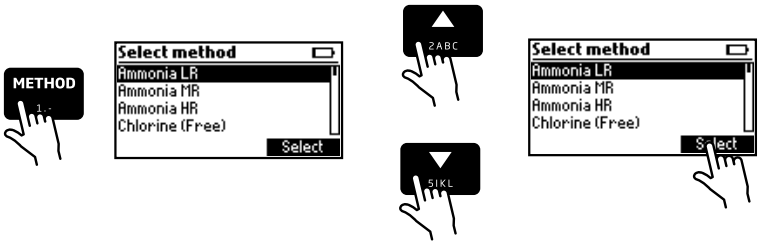
HI83308 offers an interactive contextual help mode that assists the user at any time.
To access the help screen press **HELP**.
The instrument will display additional information related to the current screen. To read all the available information, scroll the text using the ▲ ▼ keys.
To exit help mode press **ESC** key and the meter will return to the previous screen.



6. PHOTOMETER MODE

6.1. METHOD SELECTION

In order to select the desired method press the **METHOD** key and a screen with the available methods will appear.
Press the ▲▼ keys to highlight the desired method. Press **Select**.



After the desired method is selected, follow the procedure described in the related section.
Before performing a method read all the instructions carefully.

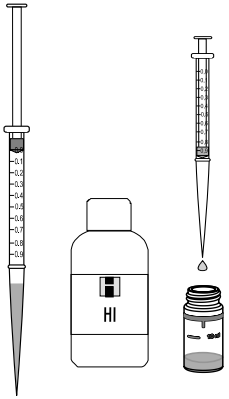
6.2. COLLECTING AND MEASURING SAMPLES AND REAGENTS

6.2.1. PROPER USE OF SYRINGE

(a) Push the plunger completely into the syringe and insert the tip into the solution.

(b) Pull the plunger up until the lower edge of the seal is exactly on the mark for the desired volume.

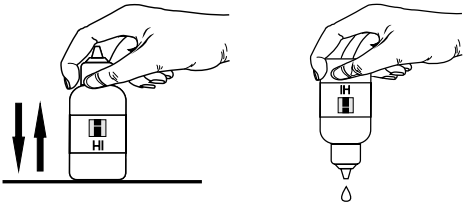
(c) Take out the syringe and clean the outside of the syringe tip, be sure that no drops are hanging on the tip of the syringe. Then, keeping the syringe in vertical position above the cuvette, push the plunger down into the syringe, the desired volume has been delivered into the cuvette.



6.2.2. PROPER USE OF DROPPER

(a) For reproducible results, tap the dropper on the table several times and wipe the outside of the tip with a cloth.

(b) Always keep the dropper bottle in a vertical position while dosing the reagent.

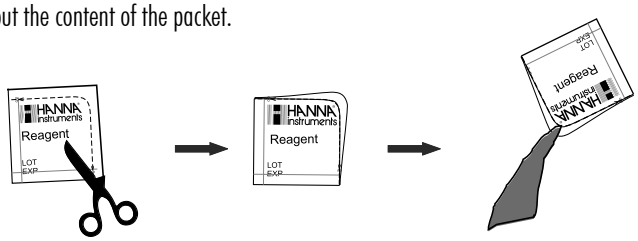


6.2.3. PROPER USE OF POWDER PACKET

(a) Use scissors to open the powder packet

(b) Push the edges of the packet to form a spout

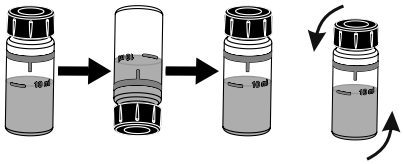
(c) Pour out the content of the packet.



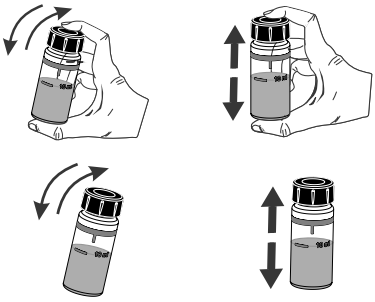
6.3. CUVETTE PREPARATION

Proper mixing is very important for reproducibility of the measurements. The proper mixing technique for each method is listed in the method procedure.

(a) Invert the cuvette a couple of times or for a specified time: hold the cuvette in the vertical position. Turn the cuvette upside-down and wait for all of the solution to flow to the cap end, then return the cuvette to the upright vertical position and wait for all of the solution to flow to the cuvette bottom. This is one inversion. The correct speed for this mixing technique is 10-15 complete inversions in 30 seconds.
This mixing technique is indicated with "invert to mix" and the following icon:



(b) Shaking the cuvette, moving the cuvette up and down. The movement may be gentle or vigorous. This mixing method is indicated with "shake gently" or "shake vigorously", and one of the following icons:



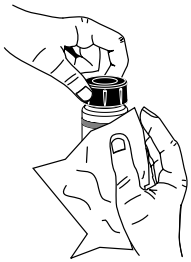
shake gently *shake vigorously*

In order to avoid reagent leaking and to obtain more accurate measurements, close the cuvette first with the supplied HDPE plastic stopper and then the black cap.

Whenever the cuvette is placed into the measurement holder, it must be dry outside and free of fingerprints, oil or dirt. Wipe it thoroughly with HI731318 or a lint-free cloth prior to insertion.

Shaking the cuvette can generate bubbles in the sample, causing higher readings. To obtain accurate measurements, remove such bubbles by swirling or by gently tapping the cuvette.

Do not let the reacted sample stand too long after reagent is added. For best accuracy, respect the timings described in each specific method.
It is possible to take multiple readings in a row, but it is recommended to take a new zero reading for each sample and to use the same cuvette for zeroing and measurement when possible.
Discard the sample immediately after the reading is taken, or the glass might become permanently stained.
All the reaction times reported in this manual are at 25 °C (77 °F). In general, the reaction time should be increased for temperatures lower than 20 °C (68 °F), and decreased for temperatures higher than 25 °C (77 °F).



Interference

In the method measurement section the most common interferences that may be present in a typical water sample have been reported. It is possible that a particular application could introduce other compounds that will also interfere.

6.4. TIMERS AND MEASUREMENT FUNCTIONS

Each method requires a different preparation procedure, reaction times, sample preparations, etc. If a timer or timers are necessary for proper sample preparation, the **Timer** key will be available.

To use a reaction timer, press the **Timer** key.

The default timer will start immediately. To stop and reset the timer, press **Stop**.

If the selected method requires more than one timer, the meter will automatically select each timer in the appropriate order. To bypass the default order, you may press the desired key to activate a different timer (only while the current timer is stopped). Press **Continue** to start the active timer.

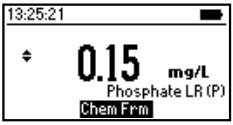
For some methods, the timer is only necessary after a **Zero** measurement has been performed. In this case, the timer key will only be available after the **Zero** measurement has been performed.

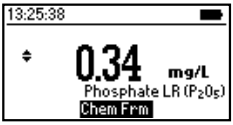
If the method requires a **Zero** or **Read** measurement after a timer has expired, the meter will automatically perform the appropriate action. Follow the instructions in the Method Procedure.

To perform a **Zero** or **Read** measurement, insert the appropriate prepared cuvette, then press the **Zero** or **Read** key. A **Zero** measurement must be conducted before **Read** measurements.

6.5. CHEMICAL FORMULA / UNIT CONVERSION

Chemical formula/unit conversion factors are pre-programmed into the instrument and are method specific. In order to view the displayed result in the desired chemical formula press ▲ ▼keys to access the second level function and then press the **Chem Frm** key to toggle between the available chemical formulas for the selected method.





6.6. METER VALIDATION / CAL CHECK

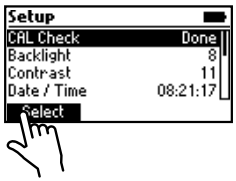
WARNING: Do not validate the meter with standard solutions other than the HANNA® CAL Check Standards. For accurate validation results, please perform tests at room temperature (18 to 25 °C; 64.5 to 77.0 °F).

Validation of the HI83308 involves absorbance measurements of certified HANNA® CAL Check Standards (see "Accessories"). The "CAL Check" screen guides the user through the measurement of each CAL Check Standard and applies the factory calibration corrections to each measurement. The HI83308 stores the results of the most recent CAL Check measurements which may be viewed on the "CAL Check" screen. Compare these results with the values printed on the Certificate provided with each HANNA® CAL Check Standards kit.

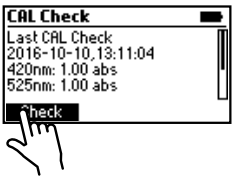
To perform a validation:

1. Press **Setup** button.

2. Highlight **CAL Check**, then press **Select**.



3. Follow the prompts on the screen. The meter will prompt to measure each cuvette provided in the HANNA® CAL Check Standards kit. To abort the process at any time, press **ESC** button.



4. Press **ESC** to return in **Setup** menu.

6.7. ABSORBANCE MEASUREMENTS

Raw absorbance measurements may be performed on the HI83308 for personal or diagnostic purposes. For example, you may monitor the stability of a reagent blank by occasionally measuring its absorbance versus deionized water.

To measure the raw absorbance of a prepared sample:

1. Enable "Photometer Mode" if necessary by pressing the **MODE** key.

2. Press the **METHOD** key.

3. Highlight the appropriate Absorbance method (according to the wavelength to be used), then press **Select**. Absorbance methods are located at the bottom of the method list.
4. Prepare the sample cuvette according to the method.
5. Insert a cuvette filled with deionized water, then press **Zero**.
6. Insert the prepared sample cuvette, then press **Read**.

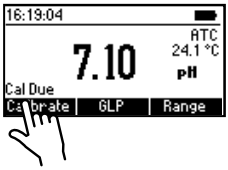
WARNING: Never use Absorbance methods for validation using HANNA® CAL Check cuvettes. The factory calibration corrections for CAL Check cuvettes are applied while in CAL Check mode only!

7. PROBE MODE

7.1. pH CALIBRATION

Press **MODE** to enter in pH/ mV measurement mode.

Press **Calibrate** to access electrode calibration functions.

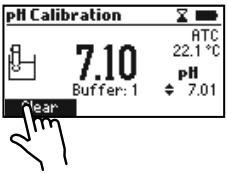


Calibration Mode

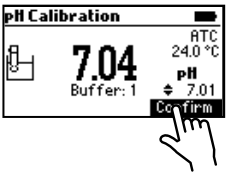
While in pH Calibration Mode, the display will show the current pH reading, the current temperature reading, the current selected buffer, and the buffer number ("Buffer: 1" for the 1st buffer, "Buffer: 2" for the 2nd buffer).

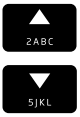
The following functions are available in pH Calibration Mode:

- **Clear**: Press to clear the current calibration from the probe.



- **Confirm**: Press to accept the current calibration point. Only available if the measurement is stable and within the limits for the selected buffer.





Press to cycle through the list of available buffers: 4.01, 6.86, 7.01, 9.18, 10.01 pH.

Press to exit calibration and return to pH Measurement Mode.

Preparation

Pour small quantities of the buffer solutions into clean beakers. If possible, use plastic beakers to minimize any EMC interferences. For accurate calibration and to minimize cross-contamination, use two beakers for each buffer solution: one for rinsing the electrode and one for calibration. If you are measuring in the acidic range, use pH 7.01 or 6.86 as the first buffer and pH 4.01 as the second buffer. If you are measuring in the alkaline range, use pH 7.01 or 6.86 as the first buffer and pH 10.01 or 9.18 as the second buffer.

Procedure

Calibration can be performed using one or two calibration buffers. For more accurate measurements, a two-point calibration is recommended.
Submerse the pH electrode approximately 3 cm (1¼") into a buffer solution and stir gently. From the Probe Measurement screen, press the **Calibrate** key to begin the calibration process.

When the reading is stable and close to the selected buffer, the **Confirm** key will become available. Press **Confirm** to accept and store the calibration point.

The meter will now prompt for the second buffer ("Buffer: 2"). To use only a one-point calibration, press ESC to exit calibration mode at this time. The meter will store the calibration information to the probe and return to Measurement mode. To continue calibrating with a second buffer, rinse and submerse the pH electrode approximately 3 cm (1¼") into the second buffer solution and stir gently. If necessary, press ▲ 2ABC / ▼ 5JKL keys to select a different buffer value.

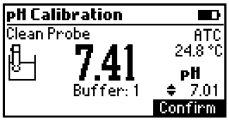
When the reading is stable and close to the selected buffer, the **Confirm** key will become available. Press **Confirm** to accept and store the second calibration point.

The meter will store the two-point calibration information to the probe and return to Measurement mode. The list of calibrated buffers will appear at the bottom of the screen.

7.2. pH CALIBRATION MESSAGES

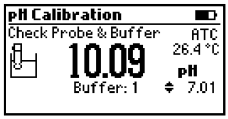
Clean Probe:

The "Clean Probe" message indicates poor electrode performance (offset out of accepted window, or slope under the accepted lower limit). Often, cleaning the probe will improve the pH electrode's response. See pH Electrode Conditioning and Maintenance for details. Repeat calibration after cleaning.



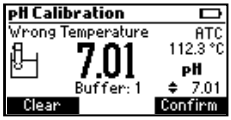
Check Probe & Buffer:

The “Check Probe & Buffer” message appears when there is a large difference between the pH measurement and the selected buffer value, or the electrode slope is outside of the accepted slope limit. You should check your probe and confirm the correct buffer selection. Cleaning may also improve this response.



Wrong Temperature:

The buffer temperature is too extreme for the selected buffer value.



7.3. pH MEASUREMENT

The HI83308 can be used to perform direct pH measurements by connecting a HANNA® digital pH electrode with a 3.5 mm TRRS connector. To begin taking probe measurements, connect the electrode to the 3.5 mm port marked with EXT PROBE located at the rear of the meter. If the meter is in “Photometer Mode”, set the meter to “Probe Mode” by pressing the **MODE** key.

While taking pH probe measurements, the following functions are available:

- **Calibrate**: Press to access electrode calibration functions.
- **GLP**: Press to review the last calibration information, including date/time, buffers used, slope, and offset.
- **Range**: Press to switch between “pH” units and “mV” units.

MODE 3DEF	Press to switch to Photometer mode.
SETUP 7PQRS	Press to access the meter's Setup menu.
LOG 8TUV	Press to log the current measurement.
RECALL 9WXYZ	Press to review the meter's log history.
HELP 0.()	Press to view contextual help information.

For high accuracy it is recommended to calibrate your electrode often. pH electrodes should be recalibrated at least once per week, but daily calibration is recommended. Always recalibrate after cleaning an electrode. See page 23 for more information on pH calibration.

To take pH measurements:

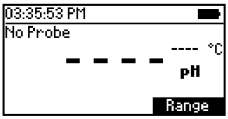
- Remove the protective cap and rinse the electrode with water.
- Collect some sample in a clean, dry beaker.
- Preferably, rinse the electrode with a small amount of sample. Discard the rinse.
- Submerse the electrode tip approximately 3 cm (1¼") into the sample to be tested and stir the sample gently. Make sure the electrode junction is completely submersed.
- Allow time for the electrode to stabilize in the sample. When the ⧗ symbol disappears, your reading is stable.

If measurements are taken successively in different samples, it is recommended to rinse the electrodes thoroughly with deionized or distilled water and then with some of the next sample to prevent cross-contamination.

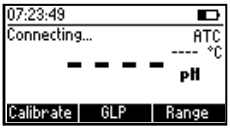
pH measurements are affected by temperature. HANNA® Digital pH electrodes include a built-in temperature sensor and automatically calculate corrected pH values. The measured temperature is displayed on the screen with the pH measurements.

7.4. pH MEASUREMENT MESSAGES / WARNINGS

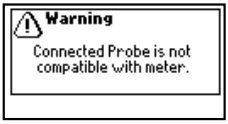
No Probe:
No probe is connected or the probe is broken.



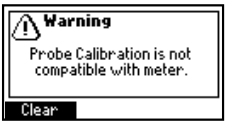
Connecting:
The meter has detected a probe and is reading the probe configuration and calibration information.



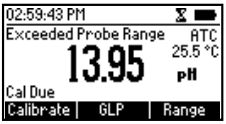
Incompatible Probe:
The connected probe is not compatible with this device.



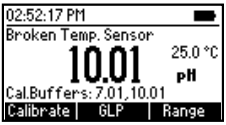
Incompatible Calibration:
The probe's current calibration is not compatible with this meter. The calibration must be cleared to use this probe.



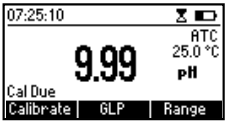
Exceeded Probe Range:
The pH and/or temperature measurement exceed the specifications of the probe. The affected measurement value(s) will be flashing.



Broken Temperature Sensor:
The temperature sensor inside the probe is broken. Temperature compensation will revert to a fixed value of 25 °C (77 °C).

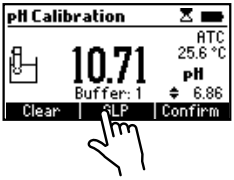


Cal Due:
The probe has no calibration. See section Probe Calibration.



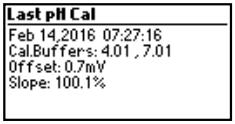
7.5. pH GLP

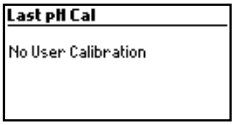
Good Laboratory Practice (GLP) refers to a quality control function used to ensure uniformity and consistency of sensor calibrations and measurements. To view the GLP information, press the **GLP** key from the Probe Measurement screen.



The pH GLP screen displays the following information about the last pH calibration:

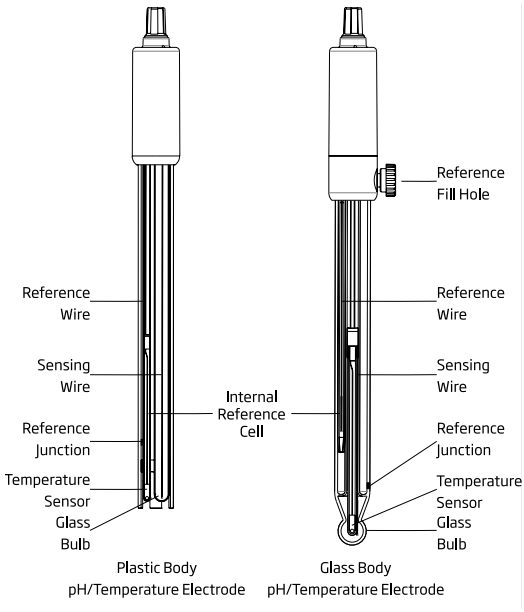
- Date and time of the last calibration
- List of buffers used in the last calibration
- Calculated slope and offset





- Press **ESC** to return in measurement mode.

7.6. pH ELECTRODE CONDITIONING AND MAINTENANCE



Remove the protective cap of the pH electrode.
DO NOT BE ALARMED IF SALT DEPOSITS ARE PRESENT.
This is normal with electrodes. They will disappear when rinsed with water.
During transport, tiny bubbles of air may form inside the glass bulb affecting proper functioning of the electrode. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer. If the bulb and/or junction is dry, soak the electrode in HI70300 or HI80300 storage solution for at least one hour.

For refillable electrodes:
If the filling solution (electrolyte) is more than 2½ cm (1") below the fill hole, add HI7082 or HI8082 3.5M KCl Electrolyte Solution for double junction electrodes.
Unscrew the fill hole cover during measurements so the liquid reference junction maintains an outward flow of electrolyte.

Measurement

Rinse the electrode tip with distilled water. Submerse the tip 3 cm (1¼") in the sample and stir gently for a few seconds. For a faster response and to avoid cross-contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested, before taking measurements.

Storage Procedure

To minimize clogging and ensure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of HI70300 or HI80300 Storage Solution or, in its absence, Filling Solution (HI7082 or HI8082 for double junction electrodes). Follow the preparation procedure before taking measurements.

Note: NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

Periodic Maintenance

Inspect the electrode and the cable. The cable used for connection to the instrument must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.
For refillable electrodes: Refill the reference chamber with fresh electrolyte (HI7082 or HI8082 for double junction electrodes). Allow the electrode to stand upright for 1 hour.
Follow the Storage Procedure above.

Cleaning Procedure

Use diagnostic messages to aid pH electrode troubleshooting. Several cleaning solutions are available:

- General – Soak in Hanna HI7061 or HI8061 General Cleaning Solution for approximately ½ hour.
- Protein –Soak in Hanna HI7073 or HI8073 Protein Cleaning Solution for 15 minutes.
- Inorganic – Soak in Hanna HI7074 Inorganic Cleaning Solution for 15 minutes.
- Oil/grease – Rinse with Hanna HI7077 or HI8077 Oil and Fat Cleaning Solution.

Note: After performing any of the cleaning procedures, rinse the electrode thoroughly with distilled water, refill the reference chamber with fresh electrolyte (not necessary for gel- filled electrodes) and soak the electrode in HI70300 or HI80300 Storage Solution for at least 1 hour before taking measurements.

Temperature Correlation For pH Sensitive Glass

Verify the temperature range by reading the limits on electrodes cap. The pH electrode's life also depends on the temperature that is used. If constantly cycled between two temperatures, the life of the electrode is drastically reduced.

8. METHOD PROCEDURES
8.1. AMMONIA LOW RANGE

SPECIFICATIONS

Range	0.00 to 3.00 mg/L (as NH_3-N)
Resolution	0.01 mg/L
Accuracy	±0.04 mg/L ±4% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 420 nm
Method	Adaptation of the ASTM Manual of Water and Environmental Technology, D1426 Nessler method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93700A-0	Ammonia Low Range Reagent A	4 drops
HI93700B-0	Ammonia Low Range Reagent B	4 drops

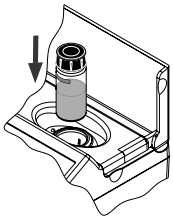
REAGENT SETS

HI93700-01	Reagents for 100 tests
HI93700-03	Reagents for 300 tests

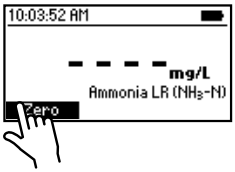
For other accessories see page 100.

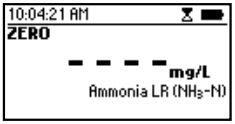
MEASUREMENT PROCEDURE

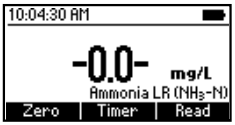
- Select the Ammonia LR method using the procedure described in the Method Selection section (see page 17).



- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

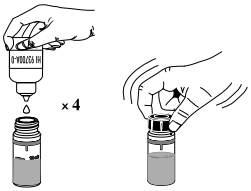




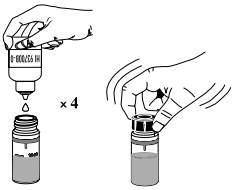


- Remove the cuvette.

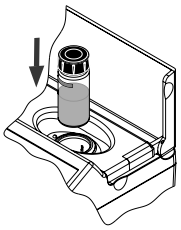
- Add 4 drops of HI93700A-0 Ammonia Low Range Reagent A. Replace the cap and mix the solution.



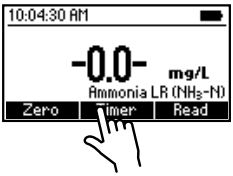
- Add 4 drops of HI93700B-0 Ammonia Low Range Reagent B. Replace the cap and mix the solution.

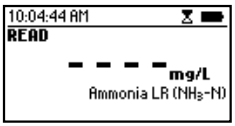


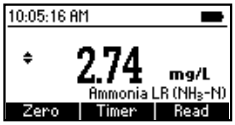
- Reinsert the cuvette into the instrument and close the lid.



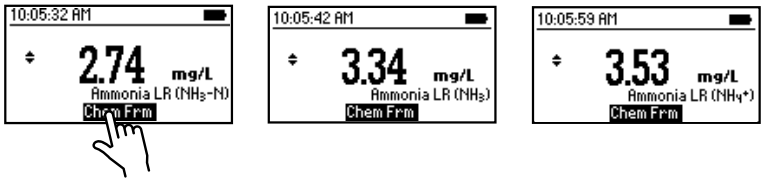
- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of ammonia nitrogen (NH_3-N)**.







- Press ▲ or ▼ to access the second level functions.
- Press the **Chem Frm** key to convert the result to **mg/L of ammonia (NH_3) and ammonium (NH_4^+)**.



- Press ▲ or ▼ to return to the measurement screen.

INTERFERENCE

Interference may be caused by:
Acetone
Alcohols
Aldehydes
Glycine
Hardness above 1 g/L
Iron
Organic chloramines
Sulfide
Various aliphatic and aromatic amines

8.2. AMMONIA MEDIUM RANGE

SPECIFICATIONS

Range	0.00 to 10.00 mg/L (as NH_3-N)
Resolution	0.01 mg/L
Accuracy	±0.05 mg/L ±5% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 420 nm
Method	Adaptation of the ASTM Manual of Water and Environmental Technology, D1426, Nessler method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93715A-0	Ammonia Medium Range Reagent A	4 drops
HI93715B-0	Ammonia Medium Range Reagent B	4 drops

REAGENT SETS

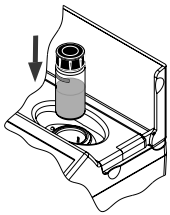
HI93715-01	Reagents for 100 tests
HI93715-03	Reagents for 300 tests

For other accessories see page 100.

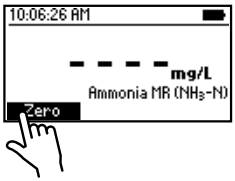
MEASUREMENT PROCEDURE

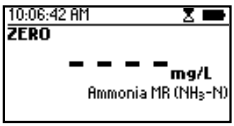
- Select the Ammonia MR method using the procedure described in the Method Selection section (see page 17).

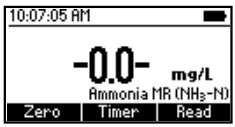
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.



- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

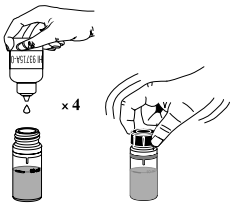




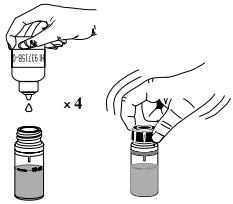


- Remove the cuvette.

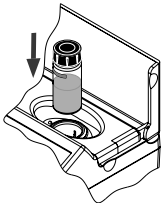
- Add 4 drops of HI93715A-0 Ammonia Medium Range Reagent A. Replace the cap and mix the solution.



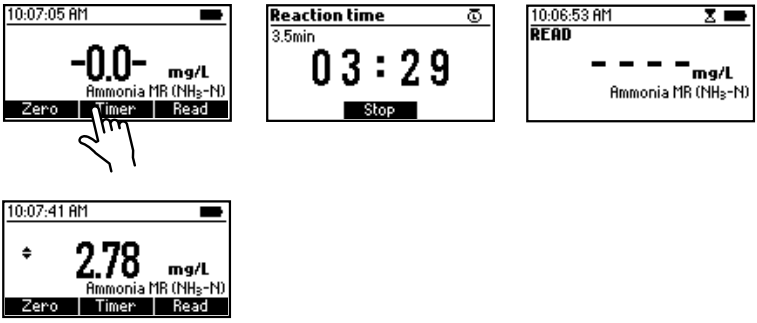
- Add 4 drops of HI93715B-0 Ammonia Medium Range Reagent B. Replace the cap and mix the solution.



- Reinsert the cuvette into the instrument and close the lid.

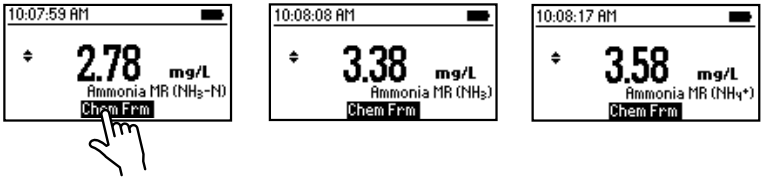


- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results to **mg/L of ammonia nitrogen (NH_3-N)**.



- Press ▲or▼ to access the second level functions.

- Press the **Chem Frm** key to convert the result in **mg/L of ammonia (NH_3) and ammonium (NH_4^+)**.



- Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Acetone
Alcohols
Aldehydes
Glycine
Hardness above 1 g/L
Iron
Organic chloramines
Sulfide
Various aliphatic and aromatic amines

8.3. AMMONIA HIGH RANGE

SPECIFICATIONS

Range	0.0 to 100.0 mg/L (as NH_3-N)
Resolution	0.1 mg/L
Accuracy	±0.5 mg/L ±5% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 420 nm
Method	Adaptation of the ASTM Manual of Water and Environmental Technology, D1426, Nessler method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93733A-0	Ammonia High Range Reagent A	4 drops
HI93733B-0	Ammonia High Range Reagent B	9 mL

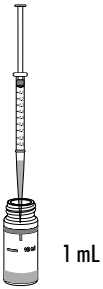
REAGENT SETS

HI93733-01	Reagents for 100 tests
HI93733-03	Reagents for 300 tests

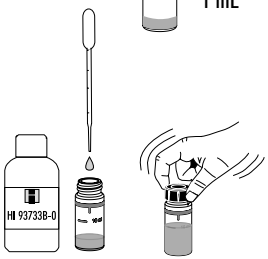
For other accessories see page 100.

MEASUREMENT PROCEDURE

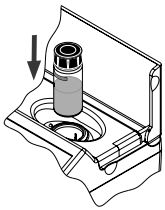
- Select the Ammonia HR method using the procedure described in the Method Selection section (see page 17).



- Add 1mL of unreacted sample to the cuvette using 1mL syringe.

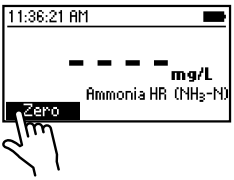


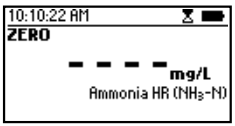
- Use the pipette to fill the cuvette up to the 10 mL mark with HI93733B-0 Ammonia High Range Reagent B. Replace the cap and mix the solution.

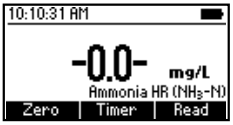


- Place the cuvette into the holder and close the lid.

- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

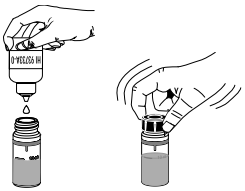




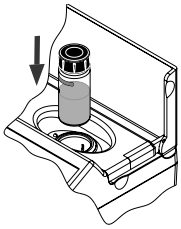


- Remove the cuvette.

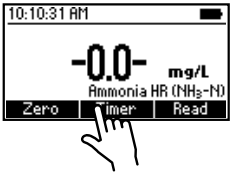
- Add 4 drops of HI93733A-0 Ammonia High Range Reagent A. Replace the cap and swirl the solution.

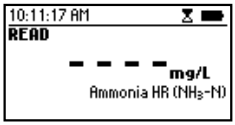


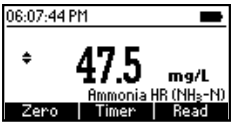
- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of ammonia nitrogen (NH_3-N).**

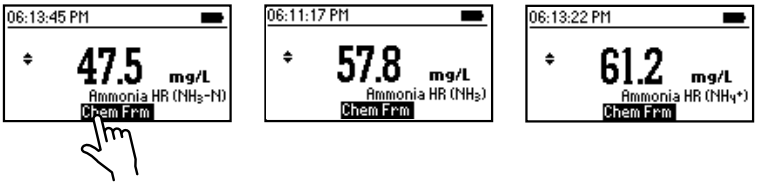






- Press ▲ or ▼ to access the second level functions.

• Press the **Chem Frm** key to convert the result to **mg/L of ammonia (NH_3) and ammonium (NH_4^+)**.



• Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Acetone
Alcohols
Aldehydes
Glycine
Hardness above 1 g/L
Iron
Organic chloramines
Sulfide
Various aliphatic and aromatic amines

8.4. CHLORINE, FREE

SPECIFICATIONS

Range	0.00 to 5.00 mg/L (as Cl_2)
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the EPA DPD method 330.5.

REQUIRED REAGENTS

POWDER:

Code	Description	Quantity
HI93701-0	Free Chlorine Reagent	1 packet

LIQUID:

Code	Description	Quantity
HI93701A-F	Free Chlorine Reagent A	3 drops
HI93701B-F	Free Chlorine Reagent B	3 drops

REAGENT SETS

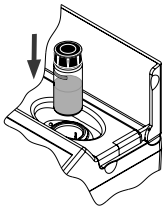
HI93701-F	Reagents for 300 tests (liquid)
HI93701-01	Reagents for 100 tests (powder)
HI93701-03	Reagents for 300 tests (powder)

For other accessories see page 100.

MEASUREMENT PROCEDURE

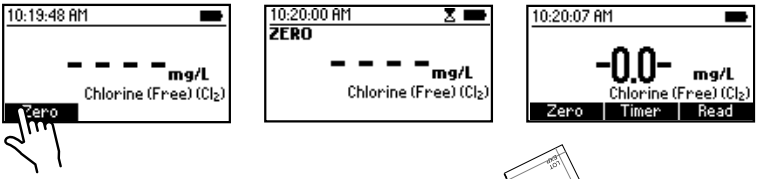
- Select the Chlorine (Free) method using the procedure described in the Method Selection section (see page 17).

- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

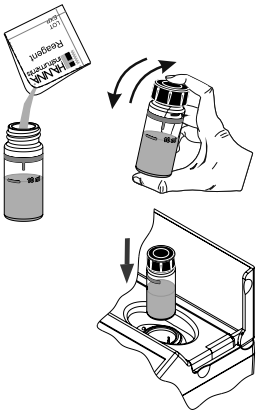


- Place the cuvette into the holder and close the lid.

- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



- Remove the cuvette.

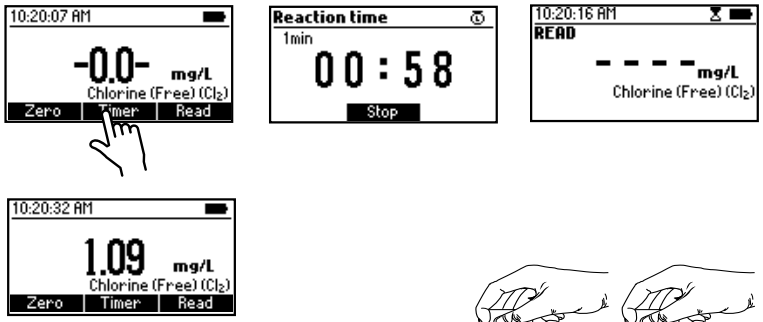


POWDER REAGENT PROCEDURE

- Add the content of one packet of HI93701-0 Free Chlorine Reagent. Replace the cap and shake gently for 20 seconds.

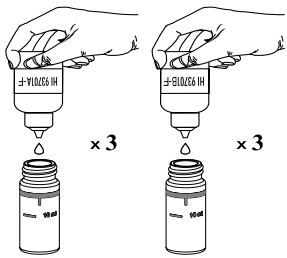
- Reinsert the cuvette into the instrument and close the lid.

- Press **Timer** and the display will show the countdown prior to the measurement or alternatively, wait for 1 minute and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of chlorine (Cl_2)**.



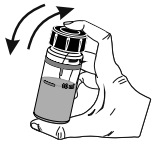
LIQUID REAGENT PROCEDURE

- To an empty cuvette add 3 drops of HI93701A-F Free Chlorine Reagent A and 3 drops of HI93701B-F Free Chlorine Reagent B.

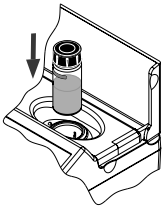


- Swirl gently to mix.

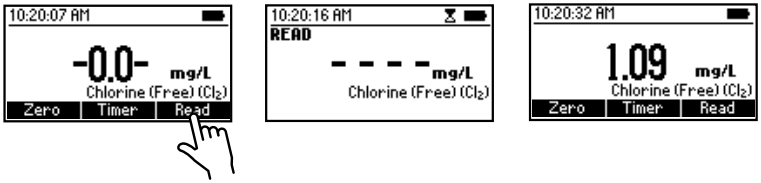
- Add 10 mL of unreacted sample (up to the mark). Replace the cap and shake gently.



- Insert the cuvette into the instrument and close the lid.



- Press **Read** to start the reading. The instrument displays the results in **mg/L of chlorine (Cl_2)**.



Note: Free and Total Chlorine have to be measured separately with fresh sample following the related procedure if both values are desired.

INTERFERENCES

Interference may be caused by: Bromine, Iodine, Ozone, Oxidized forms of Chromium and Manganese. In case of water with hardness greater than 500 mg/L $CaCO_3$, shake the sample for approximately 2 minutes after adding the powder reagent.
If the water used for this procedure has an alkalinity value greater than 250 mg/L $CaCO_3$ or acidity value greater than 150 mg/L $CaCO_3$, the color of the sample may develop only partially, or may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH.

8.5. CHLORINE, TOTAL

SPECIFICATIONS

Range	0.00 to 5.00 mg/L (as Cl_2)
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the EPA DPD method 330.5.

REQUIRED REAGENTS

POWDER:

Code	Description	Quantity
HI93711-0	Total Chlorine Reagent	1 packet

LIQUID:

Code	Description	Quantity
HI93701A-T	Total Chlorine Reagent A	3 drops
HI93701B-T	Total Chlorine Reagent B	3 drops
HI93701C-T	Total Chlorine Reagent C	1 drop

REAGENT SETS

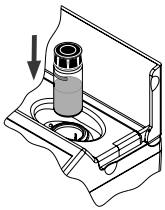
HI93701-T	Reagents for 300 tests (liquid)
HI93711-01	Reagents for 100 total tests (powder)
HI93711-03	Reagents for 300 total tests (powder)

For other accessories see page 100.

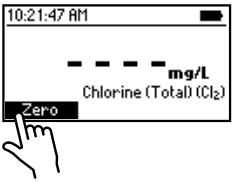
MEASUREMENT PROCEDURE

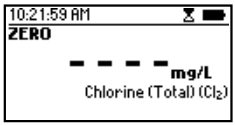
- Select the Chlorine (Total) method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

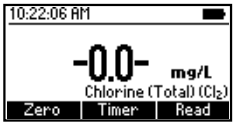
- Place the cuvette into the holder and close the lid.



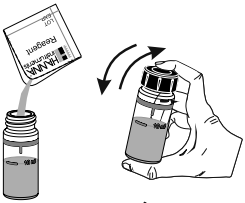
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.





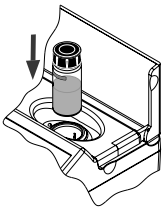


- Remove the cuvette.



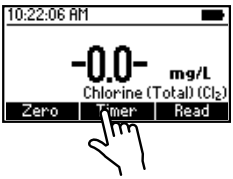
POWDER REAGENT PROCEDURE

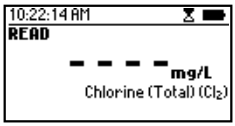
- Add 1 packet of HI93711-0 Total Chlorine Reagent. Replace the cap and shake gently for 20 seconds.

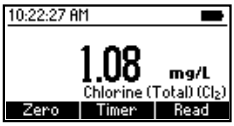


- Reinsert the cuvette into the instrument and close the lid.

- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of chlorine (Cl_2)**.

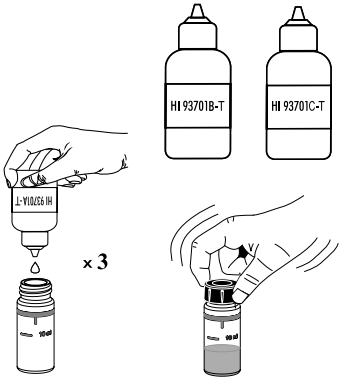




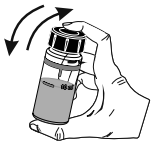


LIQUID REAGENT PROCEDURE

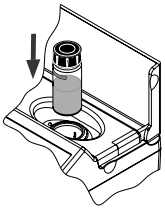
- To an empty cuvette add 3 drops of HI93701A-T Total Chlorine Reagent A, 3 drops of HI93701B-T Total Chlorine Reagent B, and 1 drop of HI93701C-T Total Chlorine Reagent C. Swirl gently to mix.



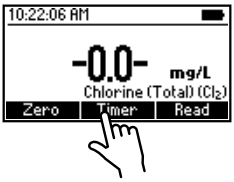
- Add 10 mL of unreacted sample (up to the mark). Replace the cap and shake gently.

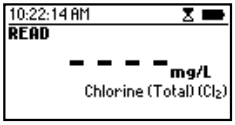


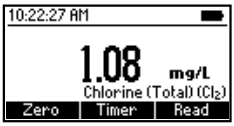
- Insert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 2 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of chlorine (Cl_2)**.







Note: Free and Total Chlorine have to be measured separately with fresh unreacted samples following the related procedure if both values are desired.

INTERFERENCES

Interference may be caused by: Bromine, Iodine, Ozone, Oxidized forms of Chromium and Manganese. In case of water with hardness greater than 500 mg/L $CaCO_3$ shake the sample for approximately 2 minutes after adding the powder reagent.
If the water used for this procedure has an alkalinity value greater than 250 mg/L $CaCO_3$ or acidity value greater than 150 mg/L $CaCO_3$, the color of the sample may develop only partially, or may rapidly fade. To resolve this, neutralize the sample with diluted HCl or NaOH.

8.6. COPPER LOW RANGE

SPECIFICATIONS

Range	0.000 to 1.500 mg/L (as Cu)
Resolution	0.001 mg/L
Accuracy	±0.010 mg/L ±5% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the EPA method.

REQUIRED REAGENTS

Code	Description	Quantity
HI95747-0	Copper Low Range Reagent	1 packet

REAGENT SETS

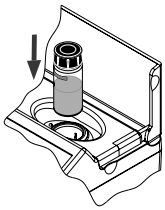
HI95747-01	Reagents for 100 tests
HI95747-03	Reagents for 300 tests

For other accessories see page 100.

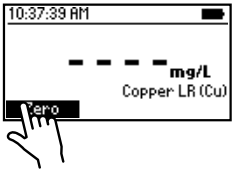
MEASUREMENT PROCEDURE

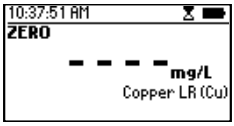
- Select the Copper LR method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

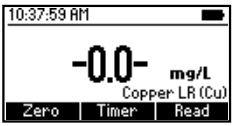
- Place the cuvette into the holder and close the lid.



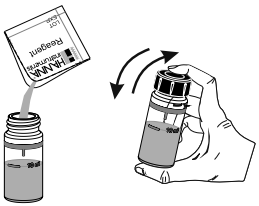
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



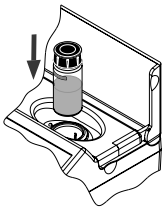




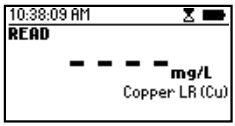
- Remove the cuvette.
- Add one packet of HI95747-0 Copper Low Range Reagent. Replace the cap and shake gently for about 15 seconds.

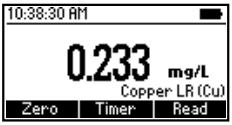


- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 45 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of copper (Cu)**.





INTERFERENCES

Interference may be caused by:
Silver, Cyanide.
For samples overcoming buffering capacity of reagent (around pH 6.8), pH should be adjusted between 6 and 8.

8.7. COPPER HIGH RANGE

SPECIFICATIONS

Range	0.00 to 5.00 mg/L (as Cu)
Resolution	0.01 mg/L
Accuracy	±0.02 mg/L ±4% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the EPA method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93702-0	Copper High Range Reagent	1 packet

REAGENT SETS

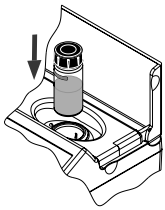
HI93702-01	Reagents for 100 tests
HI93702-03	Reagents for 300 tests

For other accessories see page 100.

MEASUREMENT PROCEDURE

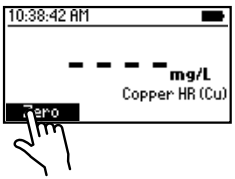
- Select the Copper HR method using the procedure described in the Method Selection section (see page 17).

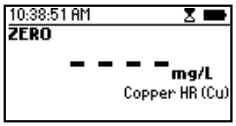
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

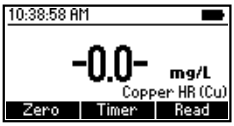


- Place the cuvette into the holder and close the lid.

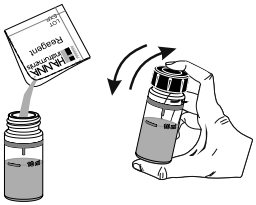
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



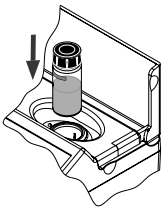




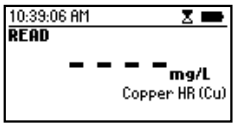
- Remove the cuvette.
- Add one packet of HI93702-0 Copper High Range Reagent. Replace the cap and shake gently for about 15 seconds.

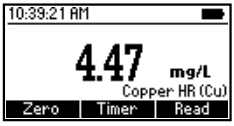


- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 45 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of copper (Cu)**.





INTERFERENCES

Interference may be caused by:
Silver, Cyanide.
For samples overcoming buffering capacity of reagent (around pH 6.8), pH should be adjusted between 6 and 8.

8.8. FLUORIDE LOW RANGE

SPECIFICATIONS

Range	0.00 to 2.00 mg/L (as F^-)
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, SPADNS method.

REQUIRED REAGENT

Code	Description	Quantity
HI93729-0	Fluoride Low Range Reagent	4 mL

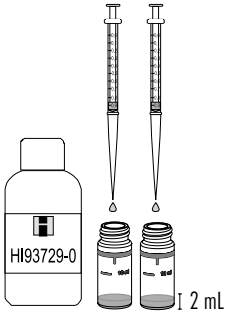
REAGENT SETS

HI93729-01	Reagents for 100 tests
HI93729-03	Reagents for 300 tests

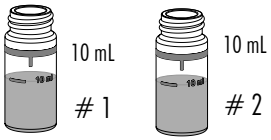
For other accessories see page 100.

MEASUREMENT PROCEDURE

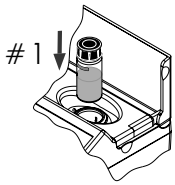
- Select the Fluoride LR method using the procedure described in the Method Selection section (see page 17).



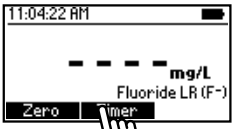
- Add 2 mL of HI93729-0 Fluoride Low Range Reagent to two cuvettes.
- Use a plastic pipette to fill the cuvette to the 10 mL mark with deionized water (#1), replace the cap and invert several times to mix.
- Use a plastic pipette to fill the second cuvette to the 10 mL mark with unreacted sample (#2), replace the cap and invert several times to mix.

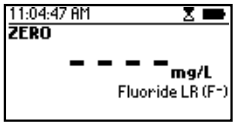


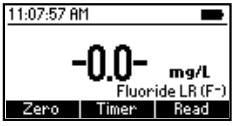
- Place the first cuvette (#1) into the holder and close the lid.

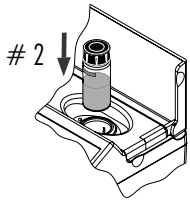


- Press **Timer** and the display will show the countdown prior to zeroing the blank or, alternatively, wait for two minutes and press **Zero.** The display will show "-0.0-" when the meter is zeroed and ready for measurement.

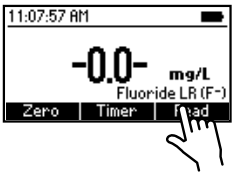


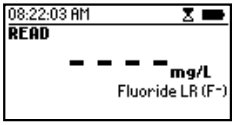


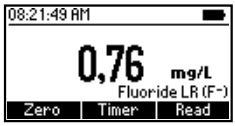




- Remove the cuvette.
- Insert the second cuvette (#2) with the reacted sample into the instrument and close the lid.
- Press **Read** to start reading. The instrument displays the results in **mg/L of fluoride (F^-).**







Note: For wastewater or seawater samples, before performing measurements, distillation is required. For most accurate results use two graduated pipettes to deliver exactly 8 mL of deionized water and 8 mL of sample.

INTERFERENCES

Interferences may be caused by:
Alkalinity (as $CaCO_3$) above 5000 mg/L
Aluminum above 0.1 mg/L
Iron, ferric above 10 mg/L
Chloride above 700 mg/L
ortho-Phosphate above 16 mg/L
Sodium hexametaphosphate above 1.0 mg/L
Sulfate above 200 mg/L
Highly colored and turbid samples may require distillation
Highly alkaline samples can be neutralized with nitric acid.

8.9. IRON LOW RANGE

SPECIFICATIONS

Range	0.000 to 1.600 mg/L (as Fe)
Resolution	0.001 mg/L
Accuracy	±0.010 mg/L ±8% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the TPTZ Method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93746-0	Iron Low Range Reagent	2 packets

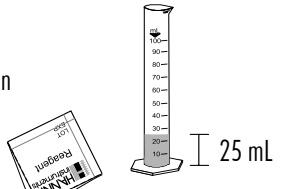
REAGENT SETS

HI93746-01	Reagents for 50 tests
HI93746-03	Reagents for 150 tests

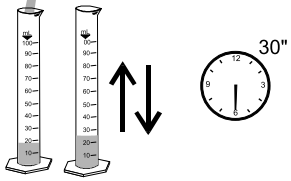
For other accessories see page 100.

MEASUREMENT PROCEDURE

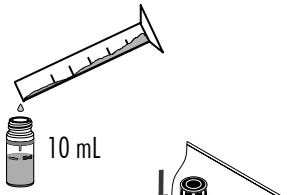
- Select the Iron LR method using the procedure described in the Method Selection section (see page 17).



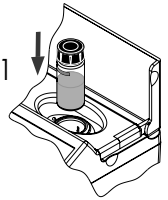
- Fill one graduated mixing cylinder up to the 25 mL mark with deionized water.
- Add one packet of HI93746-0 Iron Low Range Reagent, close the cylinder and shake vigorously for 30 seconds. This is the blank.



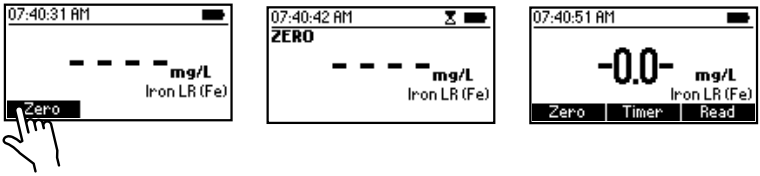
- Fill a cuvette with 10 mL of the blank (up to the mark) and replace the cap.



- Place the cuvette into the holder and close the lid.

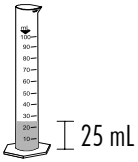


- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

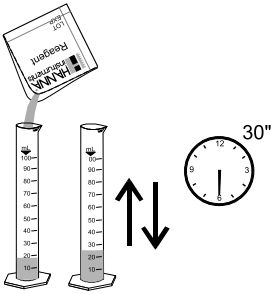


- Remove the cuvette.

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

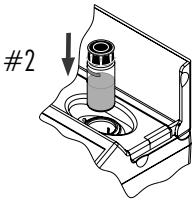


- Add one packet of HI93746-0 Iron Low Range Reagent, close the cylinder and shake vigorously for 30 seconds. This is the reacted sample.

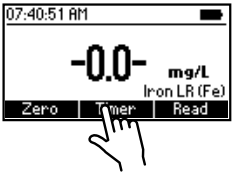


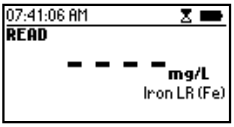
- Fill a cuvette with 10 mL of the reacted sample (up to the mark) and replace the cap.

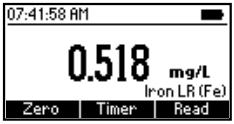
- Insert the sample into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays concentration in **mg/L of iron (Fe)**.







INTERFERENCES

Interference may be caused by:
Cadmium above 4.0 mg/L
Chromium^{3+} above 0.25 mg/L
Chromium^{6+} above 1.2 mg/L
Cobalt above 0.05 mg/L
Copper above 0.6 mg/L
Cyanide above 2.8 mg/L
Manganese above 50.0 mg/L
Mercury above 0.4 mg/L
Molybdenum above 4.0 mg/L
Nickel above 1.0 mg/L
Nitrite ion above 0.8 mg/L
Sample pH should be between 3 and 4 to avoid fading of the developed to fade or turbidity formation.

8.10. IRON HIGH RANGE

SPECIFICATIONS

Range	0.00 to 5.00 mg/L (as Fe)
Resolution	0.01 mg/L
Accuracy	±0.04 mg/L ±2% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 3500-Fe B., Phenanthroline Method

REQUIRED REAGENTS

Code	Description	Quantity
HI93721-0	Iron High Range Reagent	1 packet

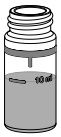
REAGENT SETS

HI93721-01	Reagents for 100 tests
HI93721-03	Reagents for 300 tests

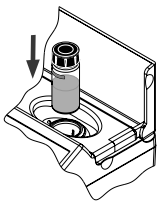
For other accessories see page 100.

MEASUREMENT PROCEDURE

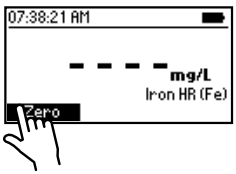
- Select the Iron HR method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

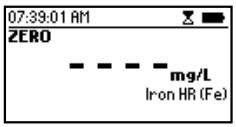


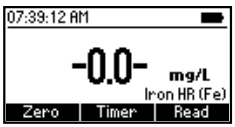
- Place the cuvette into the holder and close the lid.



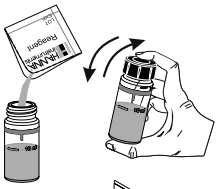
- Press the **Zero** key. The display will show "-0.0-" the meter is zeroed and ready for measurement.



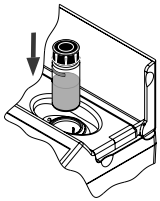




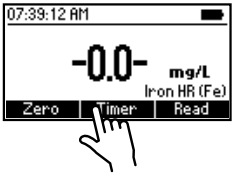
- Remove the cuvette and add the content of one packet of HI93721-0 Iron High Range Reagent. Replace the cap and shake until powder is completely dissolved.

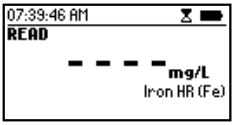


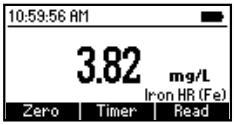
- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the result in **mg/L of iron (Fe)**.







INTERFERENCES

Interference may be caused by:
Molybdate Molybdenum above 50 ppm
Calcium above 10000 ppm (as $CaCO_3$)
Magnesium above 100000 ppm (as $CaCO_3$)
Chloride above 185000 ppm.

8.11. MANGANESE LOW RANGE

SPECIFICATIONS

Range	0 to 300 µg/L (as Mn)
Resolution	1 µg/L
Accuracy	±10 µg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the PAN Method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93748A-0	Manganese Low Range Reagent A	2 packets
HI93748B-0	Manganese Low Range Reagent B	0.40 mL
HI93748C-0	Manganese Low Range Reagent C	2 mL
HI93703-51	Dispersing Agent	6 drops

REAGENT SETS

HI93748-01	Reagents for 50 tests
HI93748-03	Reagents for 150 tests

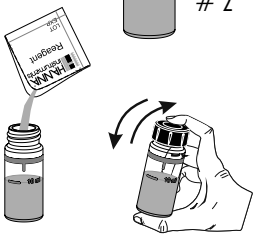
For other accessories see page 100.

MEASUREMENT PROCEDURE

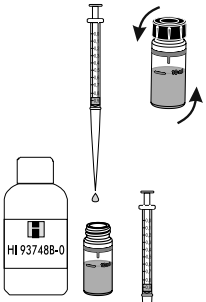
- Select the Manganese LR method using the procedure described in the Method Selection section (see page 17).
- Fill one cuvette (#1) with 10 mL of deionized water (up to the mark).

- Fill a second cuvette (#2) with 10 mL of sample (up to the mark).

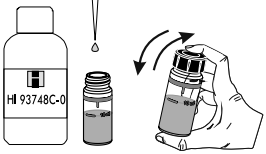
- Add one packet of HI93748A-0 Manganese Low Range Reagent A to each cuvette, replace the caps and shake gently until completely dissolved.



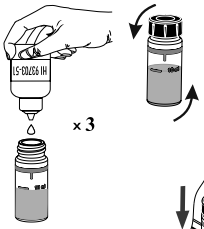
- Add 0.2 mL of the HI93748B-0 Manganese Low Range Reagent B to each cuvette, replace the caps and invert gently to mix for about 30 seconds.



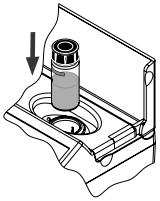
- Add 1 mL of the HI93748C-0 Manganese Low Range Reagent C to each cuvette, replace the caps and shake gently.



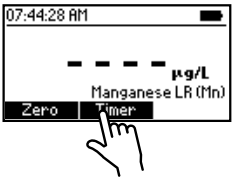
- Add 3 drops of HI93703-51 Dispersing Agent to each cuvette, replace the caps and invert gently to mix for about 30 seconds.

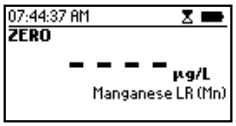


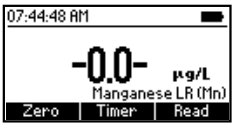
- Place the first cuvette (#1) with the reacted deionized water into the holder and close the lid.



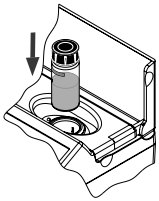
- Press **Timer** and the display will show the countdown prior to zeroing the blank. Alternatively wait for 2 minutes and then press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



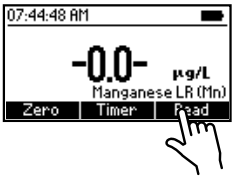


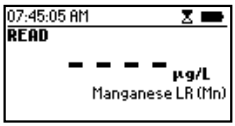


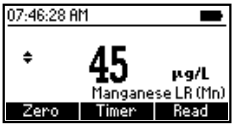
- Insert the second cuvette (#2) with the reacted sample into the instrument.



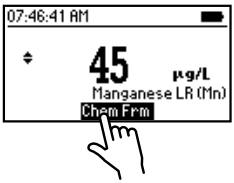
- Press **Read** to start the reading. The instrument displays the results in **µg/L of manganese (Mn)**.

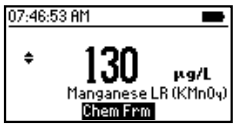


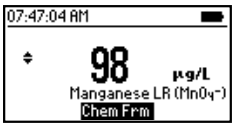




- Press ▲ or ▼ to access the second level functions.
- Press the **Chem Frm** key to convert the result to **µg/L of potassium permanganate ($KMnO_4$) and permanganate (MnO_4^-)**.







- Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Aluminum above 20 mg/L
Cadmium above 10 mg/L
Calcium above 200 mg/L as $CaCO_3$
Cobalt above 20 mg/L
Copper above 50 mg/L
Iron above 10 mg/L
Lead above 0.5 mg/L
Magnesium above 100 mg/L as $CaCO_3$
Nickel above 40 mg/L
Zinc above 15 mg/L

8.12. MANGANESE HIGH RANGE

SPECIFICATIONS

Range	0.0 to 20.0 mg/L (as Mn)
Resolution	0.1 mg/L
Accuracy	±0.2 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Periodate method.

REQUIRED REAGENTS

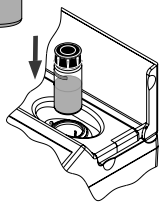
Code	Description	Quantity
HI93709A-0	Manganese High Range Reagent A	1 packet
HI93709B-0	Manganese High Range Reagent B	1 packet

REAGENT SETS

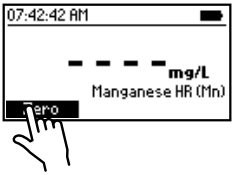
HI93709-01	Reagents for 100 tests
HI93709-03	Reagents for 300 tests

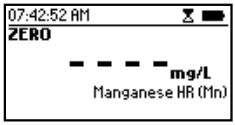
For other accessories see page 100.

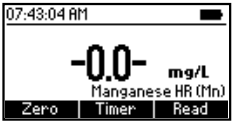
MEASUREMENT PROCEDURE



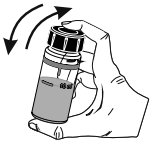
- Select the Manganese HR method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



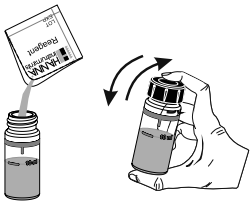




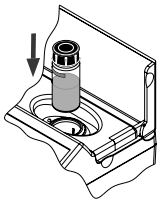
- Remove the cuvette.
- Add one packet of HI93709A-0 Manganese High Range Reagent A. Replace the cap and shake gently for 2 minutes to mix.



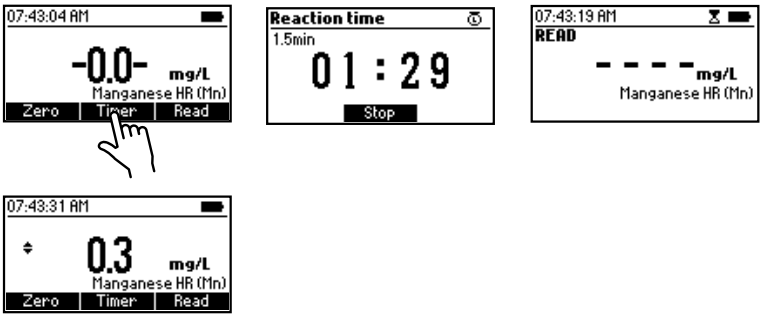
- Add one packet of HI93709B-0 Manganese High Range Reagent B. Replace the cap and shake gently for 2 minutes to mix.



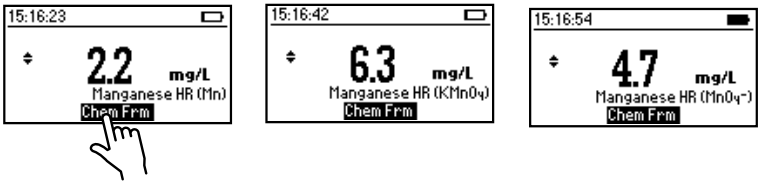
- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 1 minute and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of manganese (Mn)**.



- Press ▲ or ▼ to access the second level functions.
- Press **Chem Frm** key to convert the result to **mg/L potassium permanganate ($KMnO_4$) and permanganate (MnO_4^-)**.



- Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Calcium above 700 mg/L
Chloride above 70000 mg/L
Iron above 5 mg/L
Magnesium above 100000 mg/L

8.13. MOLYBDENUM

SPECIFICATIONS

Range	0.0 to 40.0 mg/L (as Mo^{6+})
Resolution	0.1 mg/L
Accuracy	±0.3 mg/L ±5% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 420 nm
Method	Adaptation of the mercaptoacetic acid method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93730A-0	Molybdenum Reagent A	1 packet
HI93730B-0	Molybdenum Reagent B	1 packet
HI93730C-0	Molybdenum Reagent C	1 packet

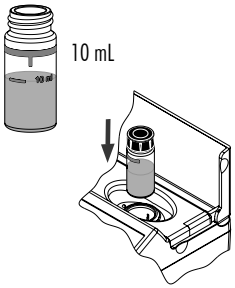
REAGENT SETS

HI93730-01	Reagents for 100 tests
HI93730-03	Reagents for 300 tests

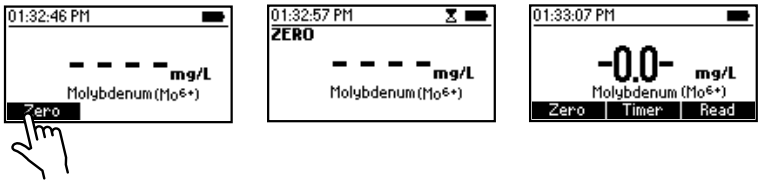
For other accessories see page 100.

MEASUREMENT PROCEDURE

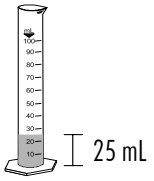
- Select the Molybdenum method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.



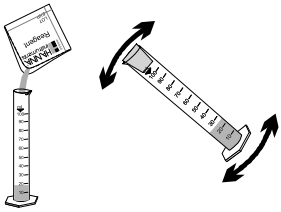
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



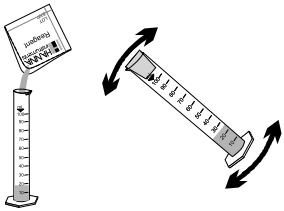
- Fill one graduated mixing cylinder up to the 25 mL mark with the sample.



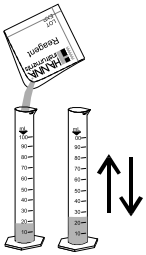
- Add one packet of HI93730A-0 Molybdenum Reagent A, close the cylinder and invert several times until completely dissolved.



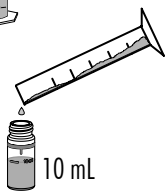
- Add one packet of HI93730B-0 Molybdenum Reagent B to the cylinder, close and invert several times until completely dissolved.



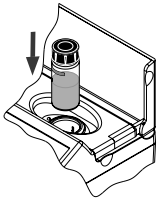
- Add one packet of HI93730C-0 Molybdenum Reagent C to the cylinder, close and shake vigorously.



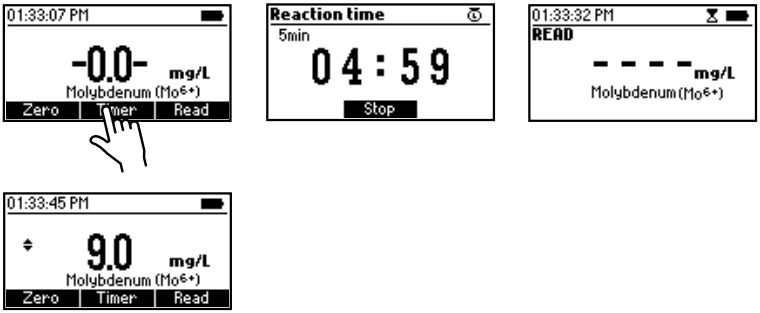
- Fill an empty cuvette with 10 mL of reacted sample (up to the mark) and replace the cap.



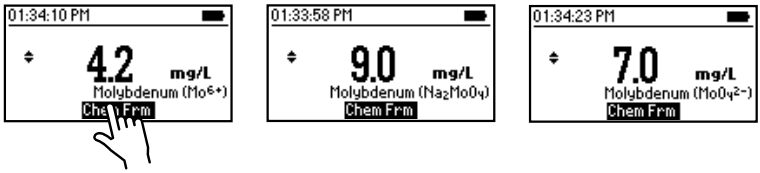
- Insert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 5 minutes and press **Read**. When the timer ends the meter will perform the reading. The instrument displays concentration in **mg/L of molybdenum (Mo^{6+})**.



- Press ▲ or ▼ to access the second level functions.
- Press the **Chem Frm** key to convert the result to **mg/L of molybdate (MoO_4^{2-}) and sodium molybdate (Na_2MoO_4)**.



- Press ▲or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Aluminum above 50 mg/L
Chromium above 1000 mg/L
Copper above 10 mg/L
Iron above 50 mg/L
Nickel above 50 mg/L
Nitrite, as NO_2^-
Sulfate above 200 mg/L
Highly buffered samples or with extreme pH may exceed the buffering capacity of the reagents

8.14. NICKEL LOW RANGE

SPECIFICATIONS

Range	0.000 to 1.000 mg/L (as Ni)
Resolution	0.001 mg/L
Accuracy	±0.010 mg/L ±7% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the PAN method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93740A-0	Nickel Low Range Reagent A	2 packets
HI93740B-0	Nickel Low Range Reagent B	2 mL
HI93740C-0	Nickel Low Range Reagent C	2 packets
HI93703-51	Dispersing Agent (optional reagent)	4-6 drops

REAGENT SETS

HI93740-01	Reagents for 50 tests
HI93740-03	Reagents for 150 tests

For other accessories see page 100.

MEASUREMENT PROCEDURE

- Select the Nickel LR method using the procedure described in the Method Selection section (see page 17).

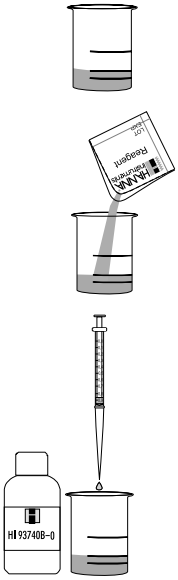
  Note: For best results samples should be between 20 and 24 °C.

- Fill one graduated beaker with 25 mL of deionized water (blank) and another one with 25 mL of sample.

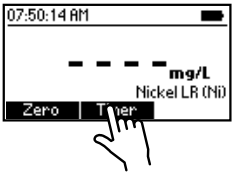
- Add one packet of HI93740A-0 Nickel Low Range Reagent A to each beaker. Cap and swirl gently until the reagent is dissolved.

  Note: If sample contains iron (Fe^{3+}), it is important that all powder is dissolved before continuing.

- Add 1 mL of HI93740B-0 Nickel Low Range Reagent B to each beaker, and swirl to mix.



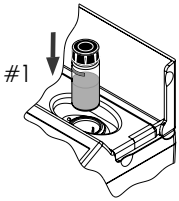
- Press **Timer** and the display will show a countdown or alternatively, wait for 15 minutes.



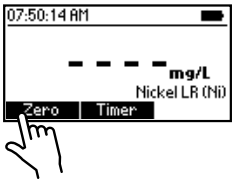
- Add one packet of HI93740C-0 Nickel Low Range Reagent C to each beaker, cap and swirl to mix until completely dissolved.

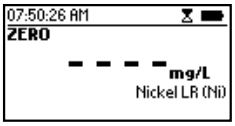
- Fill one cuvette (#1) with 10 mL of the blank (up to the mark).

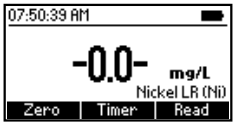
- Place the cuvette into the holder and close the lid.



- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

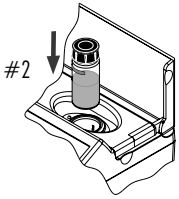




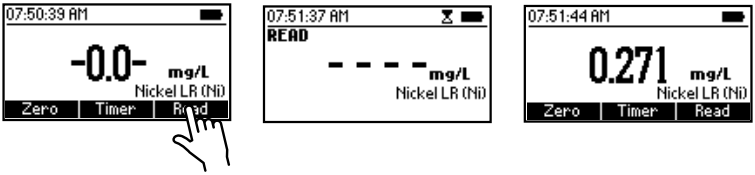


- Fill a second cuvette (#2) with 10 mL of the reacted sample (up to the mark).

- Insert the second cuvette into the instrument and close the lid.



- Press **Read** to start the reading. The instrument displays the results in **mg/L of nickel (Ni)**.



Note: A temperature above 30 °C may cause turbidity. In this case add 2-3 drops of HI93703-51 Dispersing Agent to each cuvette and swirl until turbidity is removed before zeroing the meter and reading the sample.

INTERFERENCES

Interference may be caused by:
Co^{2+} must not be present
Fe^{2+} must not be present
Al^{3+} above 32 mg/L
Ca^{2+} above 1000 mg/L (as $CaCO_3$)
Cd^{2+} above 20 mg/L
Cl^- above 8000 mg/L
Cr^{3+} above 20 mg/L
Cr^{6+} above 40 mg/L
Cu^{2+} above 15 mg/L
F^- above 20 mg/L
Fe^{3+} above 10 mg/L
K^+ above 500 mg/L
Mg^{2+} above 400 mg/L
Mn^{2+} above 25 mg/L
Mo^{6+} above 60 mg/L
Na^+ above 5000 mg/L
Pb^{2+} above 20 mg/L
Zn^{2+} above 30 mg/L

8.15. NICKEL HIGH RANGE

SPECIFICATIONS

Range	0.00 to 7.00 g/L (as Ni)
Resolution	0.01 g/L
Accuracy	±0.07g/L ±4% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the photometric method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93726-0	Nickel High Range Reagent	1 packet

REAGENT SETS

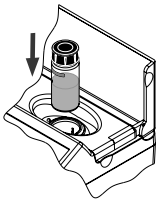
HI93726-01	Reagents for 100 tests
HI93726-03	Reagents for 300 tests

For other accessories see page 100.

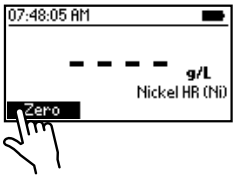
MEASUREMENT PROCEDURE

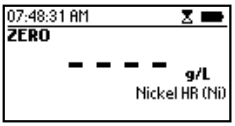
- Select the *Nickel HR* method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

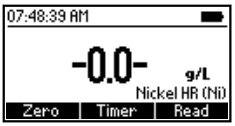
- Place the cuvette into the holder and close the lid.



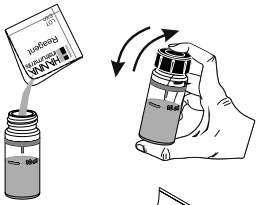
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



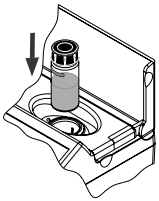




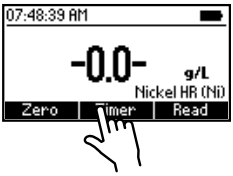
- Remove the cuvette and add one packet of HI93726-0 Nickel High Range Reagent. Replace the cap and shake gently until completely dissolved.

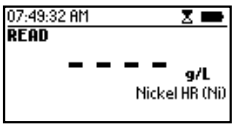


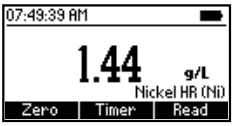
- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 1 minute and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the concentration in **g/L of nickel (Ni)**.







INTERFERENCES

Interference may be caused by copper.

8.16. NITRATE

SPECIFICATIONS

Range	0.0 to 30.0 mg/L (as NO_3^- - N)
Resolution	0.1 mg/L
Accuracy	±0.5 mg/L ±10% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the cadmium reduction method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93728-0	Nitrate Reagent	1 packet

REAGENT SETS

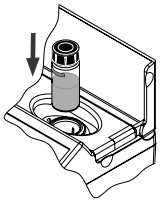
HI93728-01	Reagents for 100 tests
HI93728-03	Reagents for 300 tests

For other accessories see page 100.

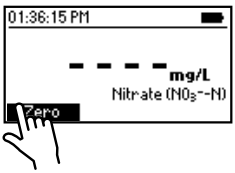
MEASUREMENT PROCEDURE

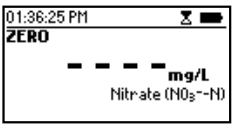
- Select the Nitrate method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of sample, (up to the mark), and replace the cap.

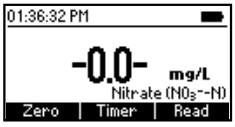
- Place the cuvette into the holder and close the lid.



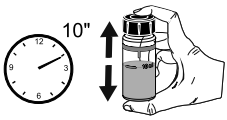
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



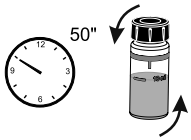




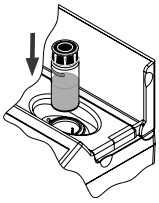
- Remove the cuvette and add one packet of HI93728-0 Nitrate Reagent.



- Replace the cap and shake vigorously up and down for exactly 10 seconds. Continue to mix by inverting the cuvette gently for 50 seconds, while taking care not to induce air bubbles. Powder will not completely dissolve. Time and method of shaking could sensitively affect the measurement.

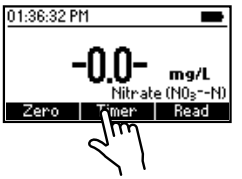


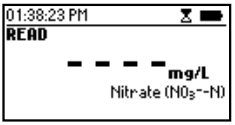
Note: The method is technique-sensitive. See procedure on page 19 Cuvette Preparation for proper mixing technique.

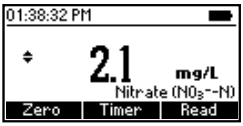


- Reinsert the cuvette into the instrument and close the lid.

- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 4 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of nitrate-nitrogen (NO_3-N)**.

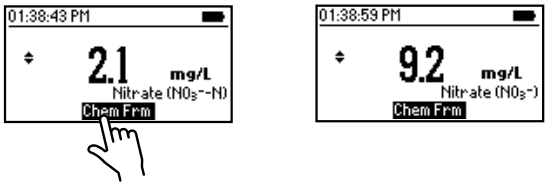






- Press ▲ or ▼ to access the second level functions.

• Press the **Chem Frm** key to convert the result to **mg/L of nitrate (NO_3^-)**.



• Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Ammonia and amines, as urea and primary aliphatic amines
Chloride above 100 ppm
Chlorine above 2 ppm
Copper
Iron(III)
Strong oxidizing and reducing substances
Sulfide must be absent

8.17. OXYGEN, DISSOLVED

SPECIFICATIONS

Range	0.0 to 10.0 mg/L (as O_2)
Resolution	0.1 mg/L
Accuracy	±0.4 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 420 nm
Method	Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Azide modified Winkler method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93732A-0	Dissolved Oxygen Reagent A	5 drops
HI93732B-0	Dissolved Oxygen Reagent B	5 drops
HI93732C-0	Dissolved Oxygen Reagent C	10 drops

REAGENT SET

HI93732-01	Reagents for 100 tests
HI93732-03	Reagents for 300 tests

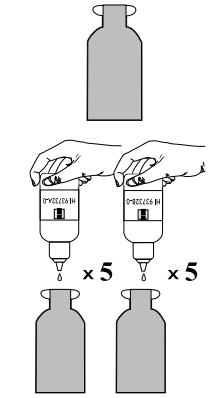
For other accessories see page 100.

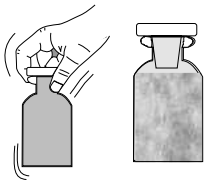
MEASUREMENT PROCEDURE

- Select the Oxygen (dissolved) method using the procedure described in the Method Selection section (see page 17).
- Fill one 60 mL glass bottle completely with the unreacted sample.
- Replace the cap and ensure that a small part of the sample spills over.
- Remove the cap and add 5 drops of HI93732A-0 and 5 drops of HI93732B-0.
- Add more sample, to fill the bottle completely. Replace the cap and ensure that a part of the sample spills over.

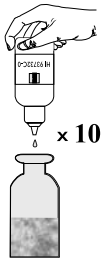
  Note: This ensures no air bubbles have been trapped inside the bottle. Trapped air bubbles could alter readings.

- Invert the bottle several times until the sample turns orange-yellow and a flocculating agent appears.

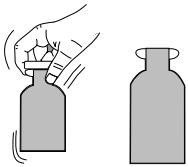




- Let the sample stand for approximately 2 minutes to allow flocculating agent to settle.
- When the upper half of the bottle is clear, add 10 drops of HI93732C-0 Dissolved Oxygen Reagent C.

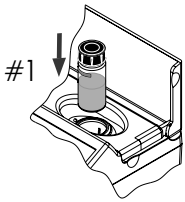


- Replace the cap and invert the bottle until the settled flocculating agent dissolves completely. The sample is ready for measurement when it is yellow and completely clear.

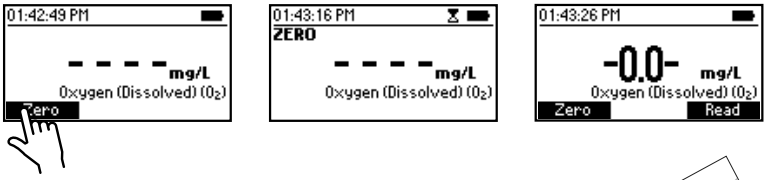


- Fill the first cuvette (#1) with 10 mL of the unreacted sample (up to the mark), and replace the cap.

- Place the cuvette into the holder and close the lid.

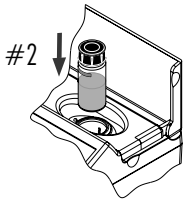


- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



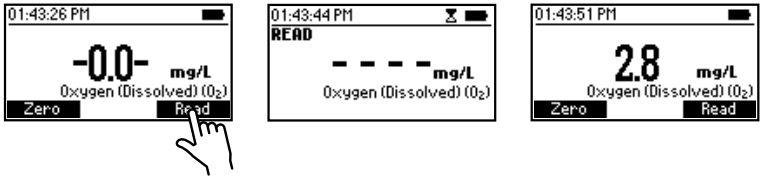
- Remove the cuvette.

- Fill second cuvette (#2) with 10 mL of the reacted sample (up to the mark) and replace the cap.



- Insert the cuvette into the holder and close the lid.

- Press **Read** to start the reading. The instrument will display the results in **mg/L of oxygen (O_2)**.



INTERFERENCES

Interferences may be caused by reducing and oxidizing materials.

8.18. pH

SPECIFICATIONS

Range	6.5 to 8.5 pH
Resolution	0.1 pH
Accuracy	±0.1 pH at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the Phenol Red method.

REQUIRED REAGENTS

Code	Description	Quantity
HI 93710-0	pH Reagent	5 drops

REAGENT SETS

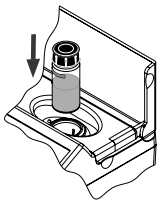
HI 93710-01	Reagents for 100 pH tests
HI 93710-03	Reagents for 300 pH tests

For other accessories see page 100.

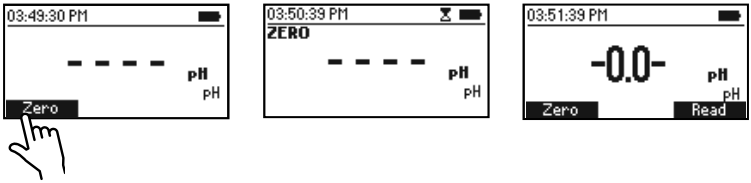
MEASUREMENT PROCEDURE

- Select the pH method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.

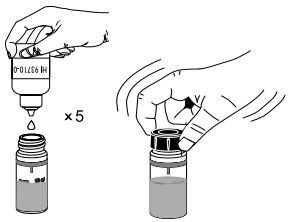
- Place the cuvette into the holder and close the lid.



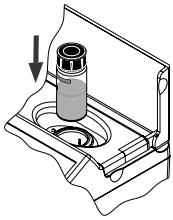
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



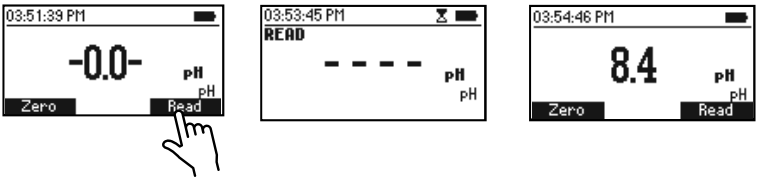
- Remove the cuvette and add 5 drops of HI93710-0 pH Reagent Indicator. Replace the cap and mix the solution.



- Reinsert the cuvette into the instrument and close the lid.



- Press the **Read** key to start the reading. The instrument displays the result in **pH**.



8.19. PHOSPHATE LOW RANGE

SPECIFICATIONS

Range	0.00 to 2.50 mg/L (as PO_4^{3-})
Resolution	0.01 mg/L
Accuracy	±0.04 mg/L ±4% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 610 nm
Method	Adaptation of the Ascorbic Acid method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93713-0	Phosphate Low Range Reagent	1 packet

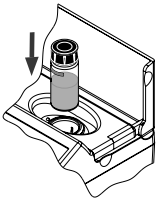
REAGENT SETS

HI93713-01	Reagents for 100 tests
HI93713-03	Reagents for 300 tests

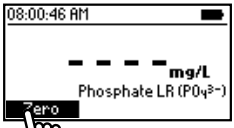
For other accessories see page 100.

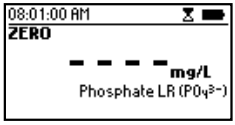
MEASUREMENT PROCEDURE

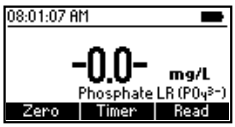
- Select the Phosphate LR method using the procedure described in the Method Selection section (see page 17).
- Rinse, cap and shake the cuvette several times with unreacted sample.
- Fill the cuvette with 10 mL of sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.



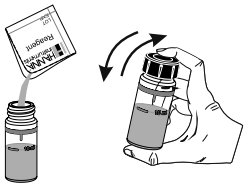
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



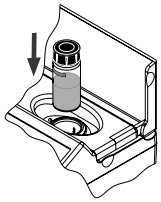




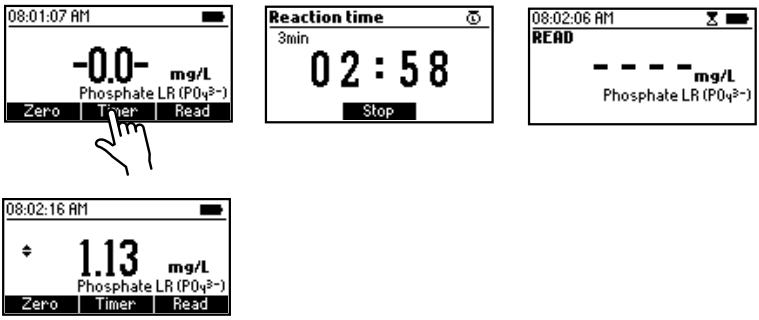
- Remove the cuvette and add the content of one packet of HI93713-0 Phosphate Low Range Reagent. Replace the cap and shake gently (for about 2 minutes) until the powder is completely dissolved.



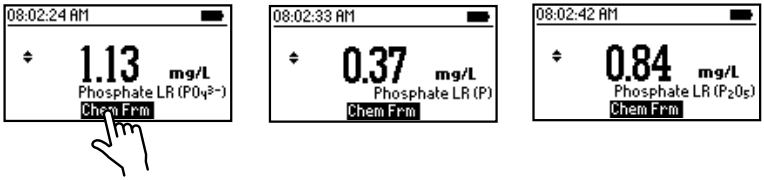
- Reinsert the cuvette into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and press **Read**. When the timer ends the meter will perform the reading. The instrument displays concentration in **mg/L of phosphate (PO_4^{3-})**.



- Press ▲ or ▼ to access the second level functions.
- Press the **Chem Frm** key to convert the result to **mg/L of phosphorus (P) and phosphorus pentoxide (P_2O_5)**.



- Press ▲or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Iron above 50 mg/L
Silica above 50 mg/L
Silicate above 10 mg/L
Copper above 10 mg/L
Hydrogen sulfide, arsenate, turbid sample and highly buffered samples also interfere.

8.20. PHOSPHATE HIGH RANGE

SPECIFICATIONS

Range	0.0 to 30.0 mg/L (as PO_4^{3-})
Resolution	0.1 mg/L
Accuracy	±1.0 mg/L ±4% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 525 nm
Method	Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93717A-0	Phosphate High Range Reagent A	10 drops
HI93717B-0	Phosphate High Range Reagent B	1 packet

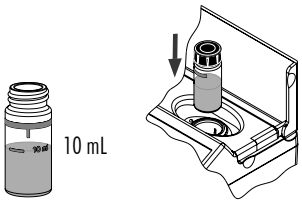
REAGENT SETS

HI93717-01	Reagents for 100 tests
HI93717-03	Reagents for 300 tests

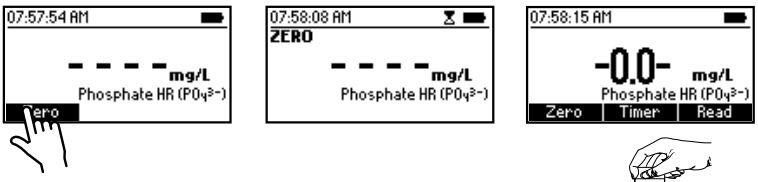
For other accessories see page 100.

MEASUREMENT PROCEDURE

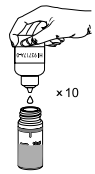
- Select the Phosphate HR method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark) and replace the cap.
- Place the cuvette into the holder and close the lid.



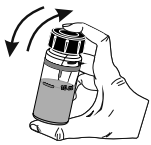
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



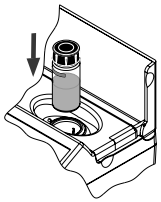
- Add 10 drops of HI93717A-0 Phosphate High Range Reagent A.



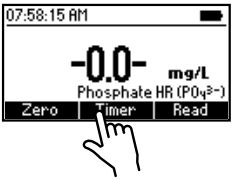
- Add one packet of HI93717B-0 Phosphate HR Reagent B to the cuvette. Replace the cap and shake gently until completely dissolved.

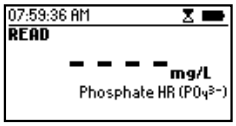


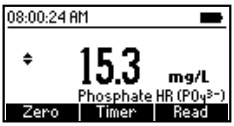
- Reinsert the cuvette into the instrument and close the lid.



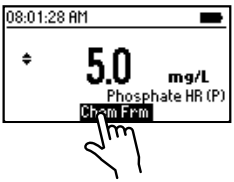
- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 5 minutes and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of phosphate (PO_4^{3-})**.

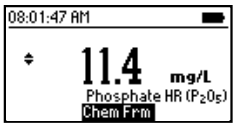


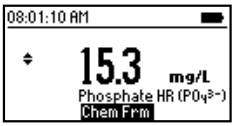




- Press ▲ or ▼ to access the second level functions.
- Press the **Chem Frm** key to convert the result to **mg/L of phosphorus (P) and phosphorus pentoxide (P_2O_5)**.







- Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Sulfide
Chloride above 150000 mg/L
Calcium above 10000 mg/L as $CaCO_3$
Magnesium above 40000 mg/L as $CaCO_3$
Ferrous iron above 100 mg/L

8.21. SILICA LOW RANGE

SPECIFICATIONS

Range	0.00 to 2.00 mg/L (as SiO_2)
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 610 nm
Method	Adaptation of the ASTM Manual of Water and Environmental Technology, D859, Heteropoly Molybdenum Blue method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93705A-0	Silica Low Range Reagent A	6 drops
HI93705B-0	Silica Low Range Reagent B	1 packet
HI93705C-0	Silica Low Range Reagent C	1 packet

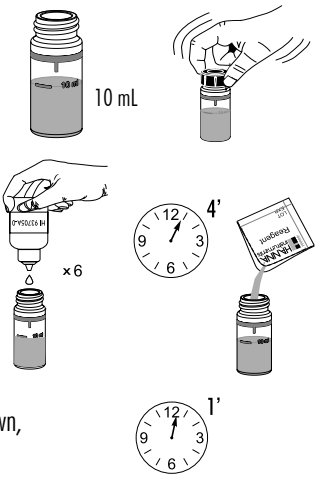
REAGENT SETS

HI93705-01	Reagents for 100 tests
HI93705-03	Reagents for 300 tests

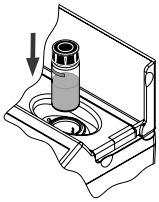
For other accessories see page 100.

MEASUREMENT PROCEDURE

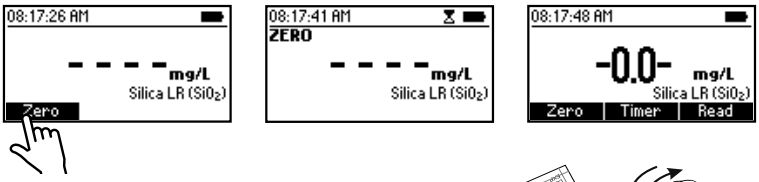
- Select the Silica LR method using the procedure described in the Method Selection section (see page 17).
- Fill the cuvette with 10 mL of unreacted sample (up to the mark).
- Add 6 drops of HI93705A-0 Silica Low Range Reagent A. Replace the cap and swirl the solution.
- Press Timer and the display will show the countdown prior to adding HI93705B-0 Silica Low Range Reagent B, or alternatively wait 4 minutes.
- Add one packet of HI93705B-0 Silica Low Range Reagent B and shake until it is completely dissolved.
- Press **Continue** and the display will show the countdown, or alternatively wait 1 minute.



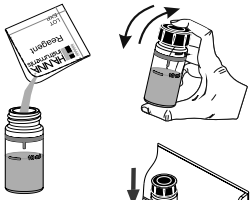
- Place the cuvette into the holder and close the lid.



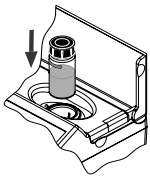
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



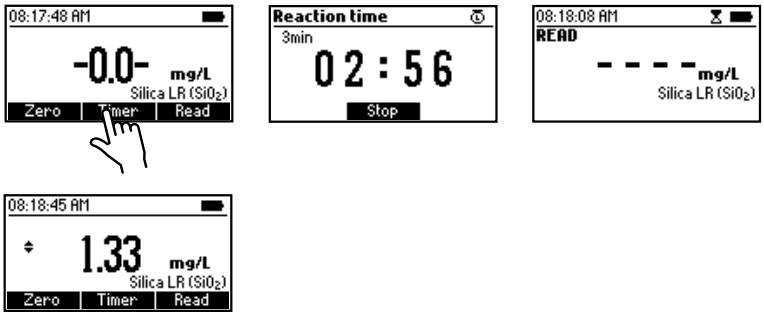
- Remove the cuvette.
- Add one packet of HI93705C-0 Silica Low Range Reagent C and shake until it is completely dissolved.



- Reinsert the cuvette into the instrument and close the lid.

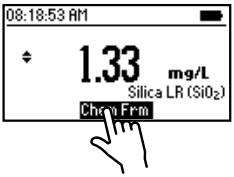


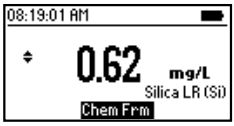
- Press **Timer** and the display will show the countdown prior to the measurement, or alternatively, wait 3 minutes and press **Read**. When the timer ends the meter will perform the reading. The instrument displays result in **mg/L of silica (SiO_2)**.



- Press ▲ or ▼ to access the second level functions.

• Press the **Chem Frm** key to convert the result to **mg/L of silicon (Si)**.





• Press ▲ or ▼ to return to the measurement screen.

INTERFERENCES

Interference may be caused by:
Phosphate above 60 mg/L (causes a 2% reduction in reading)
Phosphate above 75 mg/L (causes an 11% reduction in reading)
Sulfide and high concentration of iron
Eliminate color and turbidity interferences by zeroing the meter with the original water sample.

8.22. SILVER

SPECIFICATIONS

Range	0.000 to 1.000 mg/L (as Ag)
Resolution	0.001 mg/L
Accuracy	±0.020 mg/L ±5% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm.
Method	Adaptation of the PAN method.

REQUIRED REAGENTS

Code	Description	Quantity
HI93737A-0	Silver Reagent A	1 mL
HI93737B-0	Silver Reagent B	1 mL
HI93737C-0	Silver Reagent C	2 mL
HI93737D-0	Silver Reagent D	2 mL
HI93703-51	Dispersing Agent	6 drops

REAGENT SETS

HI93737-01	Reagents for 50 tests
HI93737-03	Reagents for 150 tests

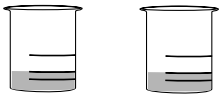
For other accessories see page 100.

MEASUREMENT PROCEDURE

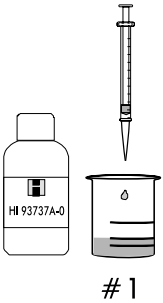
- Select the Silver method using the procedure described in the Method Selection section (see page 17).

Note: For best results perform your tests between 20-24 °C.

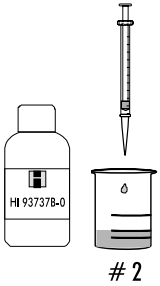
- Fill two graduated beakers with 25 mL of sample.



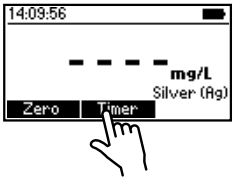
- Add 1 mL of HI93737A-0 Silver Reagent A to beaker #1 (the blank) and swirl gently to mix.



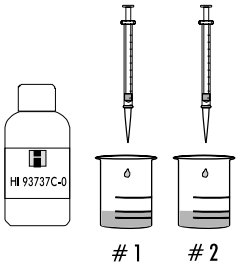
- Add 1mL of HI93737B-0 Silver Reagent B to beaker #2 (the sample) and swirl gently to mix.



- Press Timer and the display will show the countdown prior to adding HI93737C-0 Silver Reagent C or alternatively, wait for 2 minutes.

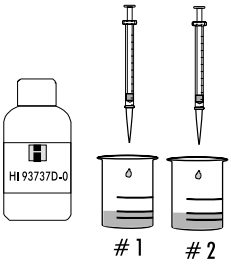


- Add 1 mL of HI93737C-0 Silver Reagent C to each beaker and swirl.

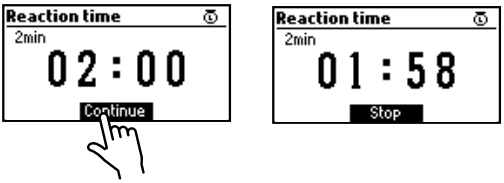


- Press **Continue** and the display will show the countdown prior to adding HI93737D-0 Silver Reagent D, or alternatively wait for 2 minutes.

- Add 1 mL of HI93737D-0 Silver Reagent D to each beaker and swirl.

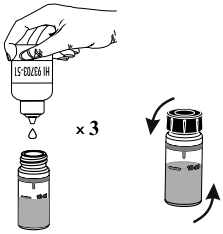


- Press **Continue** and the display will show the countdown or alternatively wait for 2 minutes.

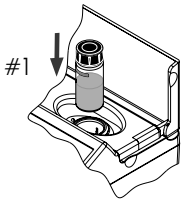


- Fill cuvette (#1) up with 10 mL of the blank (up to the mark).

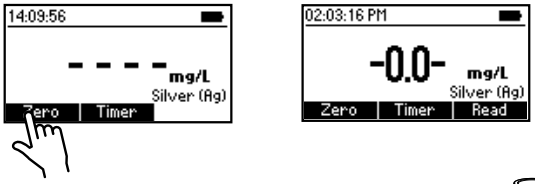
- Add 3 drops of HI93703-51 Dispersing Agent, replace the cap and invert gently for 10 seconds.



- Place the cuvette into the holder and close the lid.

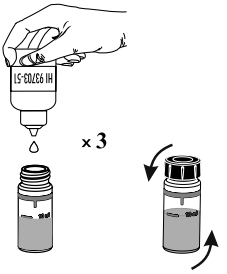


- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

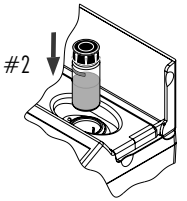


- Fill a second cuvette (#2) up with 10 mL of the reacted sample (up to the mark).

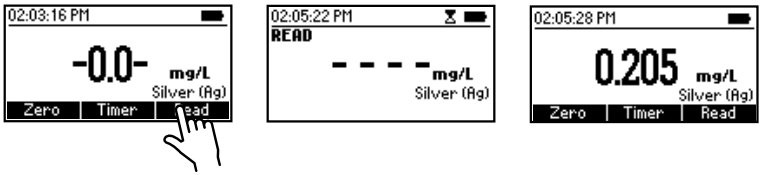
- Add 3 drops of HI93703-51 Dispersing Agent, replace the cap and invert gently for 10 seconds.



- Insert the second cuvette (#2) into the instrument.



- Press **Read** to start the reading. The instrument displays the results in **mg/L of silver (Ag)**.



INTERFERENCES

Interference may be caused by:

Al^{3+} above 30 mg/L
Ca^{2+} above 1000 mg/L (as $CaCO_3$)
Cd^{2+} above 20 mg/L
Cl^- above 8000 mg/L
Co^{2+} above 1.5 mg/L
Cr^{3+} above 20 mg/L
Cr^{6+} above 40 mg/L
Cu^{2+} above 15 mg/L
F^- above 20 mg/L
Fe^{2+} above 1.5 mg/L
Fe_3^+ above 10 mg/L
K^+ above 500 mg/L
Mn^{2+} above 25 mg/L
Mg^{2+} above 1000 mg/L (as $CaCO_3$)
Na^+ above 5000 mg/L
Ni^{2+} above 1.5 mg/L
Pb^{2+} above 20 mg/L
Zn^{2+} above 30 mg/L

8.23. ZINC

SPECIFICATIONS

Range	0.00 to 3.00 mg/L (as Zn)
Resolution	0.01 mg/L
Accuracy	±0.03 mg/L ±3% of reading at 25 °C
Light Source	LED with narrow band interference filter @ 575 nm
Method	Adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Zincon method.

REQUIRED REAGENT

Code	Description	Quantity
HI93731A-0	Zinc Reagent A	1 packet
HI93731B-0	Zinc Reagent B	0.5 mL

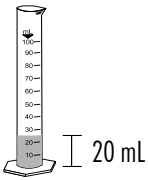
REAGENT SETS

HI93731-01	Reagents for 100 tests
HI93731-03	Reagents for 300 tests

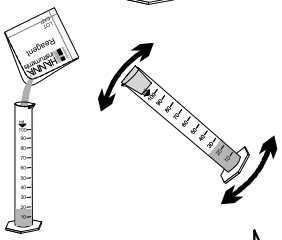
For other accessories see page 100.

MEASUREMENT PROCEDURE

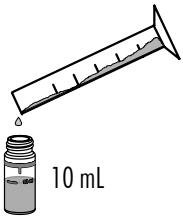
- Select the Zinc method using the procedure described in the Method Selection section (see page 17).



- Fill the graduated glass vial up to the 20 mL mark with the sample.

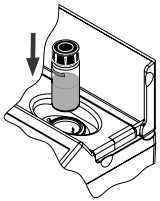


- Add one packet of HI93731A-0 Zinc Reagent A, close the cylinder, and invert several times to mix until completely dissolved.

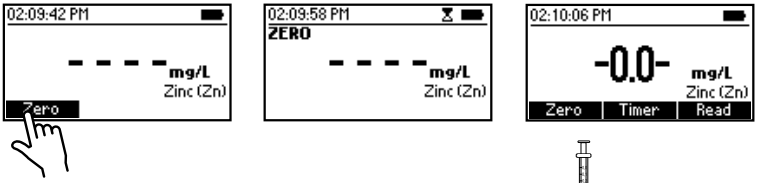


- Fill a cuvette with 10 mL of the reacted sample (up to the mark) and close the cap.

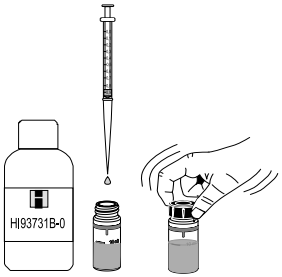
- Place the cuvette into the holder and close the lid.



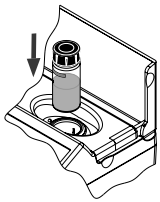
- Press the **Zero** key. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



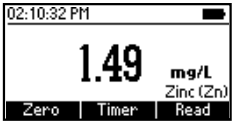
- Add 0.5 mL of HI93731B-0 Zinc Reagent B to the cuvette, close the cuvette with the supplied HDPE plastic stopper to prevent contamination.
- Replace the cap and mix for 15 seconds.



- Insert the sample into the instrument and close the lid.



- Press **Timer** and the display will show the countdown prior to the measurement or, alternatively, wait for 3 minutes and 30 seconds and press **Read**. When the timer ends the meter will perform the reading. The instrument displays the results in **mg/L of zinc (Zn)**.

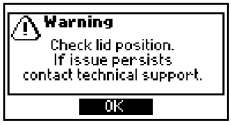


INTERFERENCES

Interference may be caused by:
Aluminum above 6 mg/L Iron above 7 mg/L
Cadmium above 0.5 mg/L Manganese above 5 mg/L
Copper above 5 mg/L Nickel above 5 mg/L

9. WARNINGS & ERRORS

The instrument shows clear warning messages when erroneous conditions appear and when measured values are outside the expected range. The information below provides an explanation of the errors and warnings, and recommended action to be taken.



Explanation: There is an excess amount of ambient light reaching the detector.

Recommended action: Make sure the lid is closed before performing any measurements. If the issue persists, please contact Hanna Instruments technical support.

Explanation: The sample and the Zero cuvettes are inverted.

Recommended action: Swap the cuvettes and repeat the measurement.

Explanation: There is either too much light or the instrument can not adjust the light level.

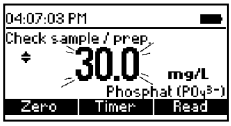
Recommended action: Please check the preparation of the Zero cuvette and that the sample does not contain any debris.

Explanation: The meter is either overheating or its temperature has dropped too low to operate within published accuracy specifications.

Recommended action: Allow the meter to reach normal environmental temperature before performing any measurements.

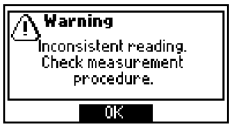
Explanation: Meter temperature has changed significantly since the zero measurement has been performed.

Recommended action: The zero measurement must be performed again.



Explanation: The measured value is outside the limits of the method.

Recommended action: If possible, change the method range. Verify that the sample does not contain any debris. Check the sample preparation and the measurement preparation.



Explanation: The measured value cannot be calculated.

Recommended action: Please check sample preparation and measurement procedure.

Explanation: Stored results of the CAL Check measurements have been lost.

Recommended action: Please redo the CAL Check measurements to ensure accurate results.

Explanation: User settings have been lost.

Recommended action: Please reset the values. If the issue persists, please contact Hanna Instruments technical support.

Explanation: Flash drive is not recognized or it might be damaged.

Recommended action: Please insert a new USB flash drive.

Explanation: Data log is full.

Recommended action: Please review logged data and delete unnecessary logs.

Explanation: Date and time settings have been lost.

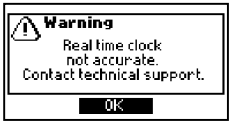
Recommended action: Please reset the values. If the issue persists, please contact Hanna Instruments technical support.

Explanation: Battery level is too low to ensure normal functioning and the meter will turn off.

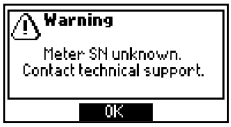
Recommended action: Connect the USB adapter to charge the battery.

The instrument shows warning messages when some of the features become unavailable. To recover them follow the *Recommended action:* Restart the meter. If the issue persists, please contact Hanna Instruments technical support.

Explanation: English is the only available language. Help function is not available.

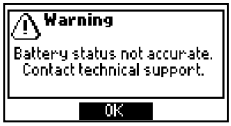


Explanation: Real time clock it's not accurate.



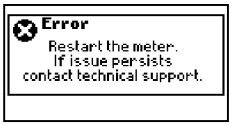
Explanation: The device serial number inside the memory can not be identified.

Explanation: Logged data are no longer accessible.



Explanation: Battery charge level is not accurate.

If a critical error appears, below message is displayed.



Explanation: A critical error has occured.

Recommended action: Restart the meter. If the issue persists, please contact Hanna Instruments technical support.

10. STANDARD METHODS

Description	Range	Method
Ammonia LR	0.00 to 3.00 mg/L	Nessler
Ammonia MR	0.00 to 10.00 mg/L	Nessler
Ammonia HR	0.0 to 100.0 mg/L	Nessler
Chlorine, Free LR	0.00 to 5.00 mg/L	DPD
Chlorine, Total LR	0.00 to 5.00 mg/L	DPD
Copper LR	0.000 to 1.500 mg/L	Bicinchoninate
Copper HR	0.00 to 5.00 mg/L	Bicinchoninate
Fluoride LR	0.00 to 2.00 mg/L	SPADNS
Iron LR	0.000 to 1.600 mg/L	TPTZ
Iron HR	0.00 to 5.00 mg/L	Phenanthroline
Manganesse LR	0 to 300 µg/L	PAN
Manganesse HR	0.0 to 20.0 mg/L	Periodate
Molybdenum	0.0 to 40.0 mg/L	Mercaptoacetic Acid
Nickel LR	0.000 to 1.000 mg/L	PAN
Nickel HR	0.00 to 7.00 g/L	Colorimetric
Nitrate	0.0 to 30.0 mg/L	Cadmium reduction
Oxygen, Dissolved	0.0 to 10.0 mg/L	Winkler
pH	6.5 to 8.5 pH	Phenol Red
Phosphate LR	0.00 to 2.50 mg/L	Ascorbic Acid
Phosphate HR	0.0 to 30.0 mg/L	Amino Acid
Silica LR	0.00 to 2.00 mg/L	Heteropoly Blue
Silver	0.000 to 1.000 mg/L	PAN
Zinc	0.00 to 3.00 mg/L	Zincon

11. ACCESSORIES

11.1. REAGENT SETS

Code	Description
HI93700-01	100 ammonia LR tests
HI93700-03	300 ammonia LR tests
HI93701-01	100 chlorine free tests (powder)
HI93701-03	300 chlorine free tests (powder)
HI93701-F	300 chlorine free tests (liquid)
HI93701-T	300 chlorine total tests (liquid)
HI93702-01	100 copper HR tests
HI93702-03	300 copper HR tests
HI93705-01	100 silica LR tests
HI93705-03	300 silica LR tests
HI93709-01	100 manganese HR tests
HI93709-03	300 manganese HR tests
HI93710-01	100 pH tests
HI93710-03	300 pH tests
HI93711-01	100 chlorine total tests (powder)
HI93711-03	300 chlorine total tests (powder)
HI93713-01	100 phosphate LR tests
HI93713-03	300 phosphate LR tests
HI93715-01	100 ammonia MR tests
HI93715-03	300 ammonia MR tests
HI93717-01	100 phosphate HR tests
HI93717-03	300 phosphate HR tests
HI93721-01	100 iron HR tests
HI93721-03	300 iron HR tests
HI93726-01	100 nickel HR tests
HI93726-03	300 nickel HR tests
HI93728-01	100 nitrate tests

Code	Description
HI93728-03	300 nitrate tests
HI93730-01	100 molybdenum tests
HI93730-03	300 molybdenum tests
HI93732-01	100 dissolved oxygen tests
HI93732-03	300 dissolved oxygen tests
HI93731-01	100 zinc tests
HI93731-03	300 zinc tests
HI93733-01	100 ammonia HR tests
HI93733-03	300 ammonia HR tests
HI93737-01	50 silver tests
HI93737-03	150 silver tests
HI93729-01	100 fluoride LR tests
HI93729-03	300 fluoride LR tests
HI93740-01	50 nickel LR tests
HI93740-03	150 nickel LR tests
HI93746-01	50 iron LR tests
HI93746-03	150 iron LR tests
HI93748-01	50 manganese LR tests
HI93748-03	150 manganese LR tests
HI95747-01	100 copper LR tests
HI95747-03	300 copper LR tests

11.2 pH ELECTRODES

Code	Description
HI10530	Triple ceramic, double junction, low temperature glass, refillable pH electrode with conical tip and temperature sensor
HI10430	Triple ceramic, double junction, high temperature glass, refillable pH electrode with temperature sensor
HI11310	Glass body, double junction, refillable pH/temperature electrode
HI11311	Glass body, double junction, refillable pH/temperature electrode with enhanced diagnostics
HI12300	Plastic body, double junction, gel filled, non refillable pH/temperature electrode
HI12301	Plastic body, double junction, gel filled, non refillable pH/temperature electrode with enhanced diagnostics
HI10480	Glass body, double junction with temperature sensor for wine analysis
FC2320	Double junction, open reference, non refillable, electrolyte viscolene, PVDF body with conical tip, pH/temperature electrode
FC2100	Double junction, open reference, non refillable, electrolyte viscolene, glass body with conical tip, pH/temperature electrode
FC2020	Double junction, open reference, non refillable, electrolyte viscolene, PVDF body with conical tip, pH/temperature electrode

Note: The enhanced diagnostics information are not displayed by meter.

11.3 pH SOLUTIONS

BUFFER SOLUTIONS

Code	Description
HI70004P	pH 4.01 Buffer Sachets, 20 mL (25 pcs.)
HI70007P	pH 7.01 Buffer Sachets, 20 mL (25 pcs.)
HI70010P	pH 10.01 Buffer Sachets, 20 mL (25 pcs.)
HI7001L	pH 1.68 Buffer Solution, 500 mL
HI7004L	pH 4.01 Buffer Solution, 500 mL
HI7006L	pH 6.86 Buffer Solution, 500 mL
HI7007L	pH 7.01 Buffer Solution, 500 mL
HI7009L	pH 9.18 Buffer Solution, 500 mL
HI7010L	pH 10.01 Buffer Solution, 500 mL
HI8004L	pH 4.01 Buffer Solution in FDA approved bottle, 500 mL
HI8006L	pH 6.86 Buffer Solution in FDA approved bottle, 500 mL
HI8007L	pH 7.01 Buffer Solution in FDA approved bottle, 500 mL
HI8009L	pH 9.18 Buffer Solution in FDA approved bottle, 500 mL
HI8010L	pH 10.01 Buffer Solution in FDA approved bottle, 500 mL

ELECTRODE STORAGE SOLUTIONS

HI70300L	Storage Solution, 500 mL
HI80300L	Storage Solution in FDA approved bottle, 500 mL

ELECTRODE CLEANING SOLUTIONS

HI70000P	Electrode Rinse Sachets, 20 mL (25 pcs.)
HI7061L	General Cleaning Solution, 500 mL
HI7073L	Protein Cleaning Solution, 500 mL
HI7074L	Inorganic Cleaning Solution, 500 mL
HI7077L	Oil & Fat Cleaning Solution, 500 mL
HI8061L	General Cleaning Solution in FDA approved bottle, 500 mL
HI8073L	Protein Cleaning Solution in FDA approved bottle, 500 mL
HI8077L	Oil & Fat Cleaning Solution in FDA approved bottle, 500 mL

ELECTRODE REFILL ELECTROLYTE SOLUTIONS

HI7082	3.5M KCl Electrolyte, 4x30 mL, for double junction electrodes
HI8082	3.5M KCl Electrolyte in FDA approved bottle, 4x30 mL, for double junction electrodes.

11.4. OTHER ACCESSORIES

Code	Description
HI72083300	carrying case
HI731318	cloth for wiping cuvettes (4 pcs.)
HI731331	glass cuvettes (4 pcs.)
HI731335N	cap for cuvette (4 pcs.)
HI731340	200 µL automatic pipette
HI731341	1000 µL automatic pipette
HI731342	2000 µL automatic pipette
HI740034P	cap for 100 mL beaker (10 pcs.)
HI740036P	100 mL plastic beaker (10 pcs.)
HI740038	60 mL glass bottle and stopper
HI740142P	1 mL graduated syringe (10 pcs)
HI740143	1 mL graduated syringe (6 pcs.)
HI740144	pipette tip (6 pcs.)
HI740157P	plastic refilling pipette (20 pcs.)
HI740220	25 mL graduated glass vial (2 pcs.)
HI740223	170 mL plastic beaker
HI740224	170 mL plastic beaker (12 pcs.)
HI740225	60 mL graduated syringe
HI740226	5 mL graduated syringe
HI740227	filter assembly
HI740228	filter discs (25 pcs.)
HI 740229	100 mL graduated cylinder
DEMI-02	demineralizer
HI75110/220E	USB power adapter, European plug

Code	Description
HI75110/220U	USB power adapter, USA plug
HI76404A	electrode holder
HI83308-11	CAL Check cuvette kit for HI83308
HI83300-100	Sample preparation kit consisting of activated carbon for 50 tests, demineralizer bottle for 10 L of water, 100 mL graduated beaker with cap, 170 mL graduated beaker with cap, 3 mL pipette, 60 mL syringe, 5 mL syringe, graduated cylinder, spoon, funnel, filter paper (25 pcs.).
HI920015	USB to micro USB cable connector
HI93703-50	cuvette cleaning solution (230 mL)
HI93703-55	activated carbon (50 pcs.)

12. ABBREVIATIONS

EPA:	US Environmental Protection Agency
°C:	degree Celsius
°F:	degree Fahrenheit
µg/L:	micrograms per liter (ppb)
mg/L:	milligrams per liter (ppm)
g/L:	grams per liter (ppt)
mL:	milliliter
GLP	good laboratory practice
UHR	ultra high range
ULR	ultra low range
HR:	high range
MR:	medium range
LR:	low range
PAN:	1-(2-pyridylazo)-2-naphtol
TPTZ:	2,4,6-tri-(2-pyridyl)-1,3,5-triazine

All Hanna Instruments conform to the **CE European Directives**.

CE RoHS compliant

Disposal of Electrical & Electronic Equipment. The product should not be treated as household waste. Instead hand it over to the appropriate collection point for the recycling of electrical and electronic equipment which will conserve natural resources.

Disposal of waste batteries. This product contains batteries, do not dispose of them with other household waste. Hand them over to the appropriate collection point for recycling.

Ensuring proper product and battery disposal prevents potential negative consequences for the environment and human health. For more information, contact your city, your local household waste disposal service, the place of purchase or go to www.hannainst.com.

MAN83308 05/19

Recommendations for Users

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade the meters' performance. For yours and the meter's safety do not use or store the meter in hazardous environments.

Warranty

The HI83308 is warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. Damage due to accidents, misuse, tampering or lack of prescribed maintenance is not covered.

If service is required, contact your local Hanna Instruments Office. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization (RGA) number from the Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed for complete protection.

World Headquarters

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MAN83308

Printed in ROMANIA