INSTRUCTION MANUAL



HI97105 • HI97115 Bluetooth®

Marine Master
Waterproof Multiparameter Photometer

Marine Line

Hanna Instruments Inc., 584 Park East Drive, Woonsocket, RI 02895 USA
www.hannainst.com

Dear Customer,

Thank you for choosing a Hanna Instruments® product.

This manual has been written for:

- **HI97105** photometer with software version v1.08 and higher
- **HI97115** photometer with software version v1.08 and higher

Software version 1.07 and higher is security compliant with **EU RED article 3.3 (d)(e)**.

Please read this instruction manual carefully before using these instruments as it provides the necessary information for correct use of these instruments, and a precise idea of their versatility.

If you need additional technical information, do not hesitate to e-mail us at **tech@hannainst.com**.

Visit **www.hannainst.com** for more information about Hanna Instruments and our products.

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1. PRELIMINARY EXAMINATION

Remove the instrument and accessories from the packaging and examine it carefully. For further assistance, please contact your local Hanna Instruments® office or email us at tech@hannainst.com.

Each **HI97105** or **HI97115** is supplied with:

- Sample cuvette (2 pcs.)
- Sample cuvette cap (2 pcs.)
- 1.5V AA Alkaline batteries (3 pcs.)
- Battery safety insert
- Instrument quality certificate
- Quick reference guide with instructions for manual download & instrument quality certificate

Each **HI97115C*** is delivered in a rugged carrying case and is supplied ** with:

- Sample cuvette (2 pcs.)
- Sample cuvette cap (2 pcs.)
- Marine pH reagent, 30 mL dropper (1 pc.)
- Marine Alkalinity reagent, 30 mL bottle (1 pc.)
- Marine Ammonia starter kit » Reagent A, 30 mL bottle (1 pc.)
  Reagent B and C (reagent for 25 tests, each)
- Marine Calcium starter kit » Reagent A, 30 mL bottle (1 pc.)
  Reagent B (reagent for 25 tests)
- Marine Magnesium starter kit » Reagent A, 120 mL bottle (1 pc.)
  Magnesium Indicator reagent (for 25 tests)
- Marine Nitrate High Range reagent (for 25 tests)
- Marine Nitrite Low Range reagent (for 25 tests)
- Phosphate Indicator Reagent and Sulfamic Powder Reagent (for 25 tests)
- 1 mL graduated syringe with tip (3 pcs.)
- Minipipette with tip (1 pc.)
- 3 mL Pasteur pipette (2 pcs.)
- 5 mL syringe with black printing and tip (1 pc.)
- 5 mL syringe with blue printing and tip (1 pc.)
- 1.5V AA Alkaline batteries (3 pcs.)
- Cloth for wiping cuvettes
- Scissors
- Battery safety insert
- Quick reference guide with instructions for manual download & instrument 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.*

* **HI97115UC***, instrument code in the USA.*

*** Marine Nitrate Low Range testing reagent not supplied.*

2. SAFETY MEASURES

The chemicals contained in the reagent kits may be hazardous if improperly handled. Read the Safety Data Sheets (sds.hannainst.com) before performing tests.

Safety equipment	Follow instructions carefully and wear suitable eye protection and clothing when required.
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	Contact a licensed waste disposal provider for proper disposal of reagent kits and reacted samples.

Coin-cell Battery Safety

The coin-cell battery is replaceable by a professional service center only.

⚠ WARNING

- **INGESTION HAZARD:** This product contains a button cell or coin battery.
- **DEATH** or serious injury can occur if digested.
- A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**.
- **KEEP** new and used batteries **OUT OF REACH OF CHILDREN.**
- **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.



- Remove and immediately recycle or dispose of used batteries according to local regulations and keep away from children.
  Do NOT dispose of batteries in household trash or incinerate.
- Even used batteries may cause severe injury or death.
- Call a local poison control center for treatment information.
- Coin-cell battery type CR2032
- Nominal voltage 3.0 V
- Non-rechargeable batteries are not to be recharged.
- Do not force discharge, recharge, disassemble, heat above 85 °C (185 °F) or incinerate. Doing so may result in injury due to venting, leakage or explosion resulting in chemical burns.
- Ensure the batteries are installed correctly according to polarity (+ and −).
- Do not mix old and new batteries, different brands or types of batteries, such as alkaline, carbon-zinc, or rechargeable batteries.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
- Always completely secure the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, and keep them away from children.

3. SPECIFICATIONS

3.1. PHOTOMETER SPECIFICATIONS

Auto logging	200 readings
Display	128 x 64 pixel B/W LCD with backlight
Auto-off	After 15 minutes of inactivity (after 30 minutes of inactivity if a Zero has been done but not a Read)
Battery type	1.5 V AA Alkaline (3 pcs.)
Battery life	> 800 measurements (without backlight)
Environment	0 to 50 °C (32 to 122 °F) 0 to 100 % RH, non-serviceable
Dimensions	142.5 × 102.5 × 50.5 mm (5.6 × 4.0 × 2.0")
Weight	380 g (13.4 oz.), with batteries
Casing	IP67 rating, floating

3.2. MEASUREMENT SYSTEM

Light source	LED	
Bandpass filter	Wavelength Bandwidth Wavelength accuracy	525 nm & 610 nm 8 nm ±1.0 nm
Light detector	Silicon photocell	
Cuvette type	Round 24.6 mm diameter (22 mm inside diameter)	

3.3. METHODS

	Range	Resolution	Accuracy at 25 °C (77 °F)	LED	Description
pH	6.3 to 8.6 pH	0.1 pH	±0.2 pH of reading	525 nm	Colorimetric Adaptation of Phenol Red Method
Alkalinity	0.0 to 20.0 dKH	0.1 dKH	±0.3 dKH ±5 % of reading	610 nm	Colorimetric Method Reaction causes a distinctive range of colors from yellow to greenish blue to develop.
Ammonia	0.00 to 2.50 ppm (as NH_3)	0.01 ppm	±0.05 ppm ±5 % of reading	610 nm	Adaptation of the Salicylate Method The Reaction between Ammonia and Ammonium and the reagent causes a blue-green tint in the sample.
Calcium	200 to 600 ppm	1 ppm	±6 % of reading	610 nm	Adaptation of Zincon Method
Magnesium	1000 to 1800 ppm (as Mg^{2+})	5 ppm	±5 % of reading	610 nm	Adaptation of Colorimetric EDTA Method using calmagite indicator Reaction between magnesium and the reagents causes a blue to violet tint in the sample.
Nitrate LR	0.00 to 5.00 ppm (as NO_3^-)	0.01 ppm	±0.25 ppm ±2 % of reading	525 nm	Zinc Reduction Method Reaction between nitrate and the reagent causes a pink tint in the sample.
Nitrate HR	0.0 to 75.0 ppm (as NO_3^-)	0.1 ppm	±2.0 ppm ±5 % of reading	525 nm	Zinc Reduction Method Reaction between nitrate and the reagent causes a pink tint in the sample.
Nitrite LR	0 to 800 ppb (as NO_2^--N)	1 ppb	±10 ppb ±4 % of reading	525 nm	Adaptation of EPA Diazotization Method 354.1 Reaction between nitrite and the reagent causes a pink tint in the sample.
Phosphate ULR	0.00 to 0.90 ppm	0.01 ppm	±0.02 ppm ±5 % of reading	610 nm	Adaptation of Standard Methods for Examination of Water and Wastewater, 20th Edition, Ascorbic Acid Method Reaction between phosphate and the reagent causes a blue tint in the sample.

4. DESCRIPTION

4.1. GENERAL DESCRIPTION & INTENDED USE

The HI97115 is a waterproof multiparameter portable photometer that benefits from Hanna's® years of experience as a manufacturer of analytical instruments.

The instrument is a compact and versatile Marine multiparameter photometer designed to accurately determine pH, Alkalinity, Ammonia, Calcium, Magnesium, Nitrate, Nitrite, and Phosphate levels in aquariums and marine biology applications.
The photometer has an **advanced optical system** that uses a Light Emitting Diode and a narrow band interference filter for accurate, repeatable readings. The optical system is sealed from outside dust, dirt, and water.

The meter uses an exclusive **positive-locking system** to ensure that the cuvettes are placed into the holder in the same position every time.

With the **CAL Check™ functionality**, users are able to validate the performance of the instrument at any time. Hanna Instruments® CAL Check cuvettes are certified against NIST-traceable reference instrument(s).

The **built-in tutorial** mode guides users step-by-step through the measurement process. The tutorial mode includes all steps required for sample preparation, the required reagents and quantities.

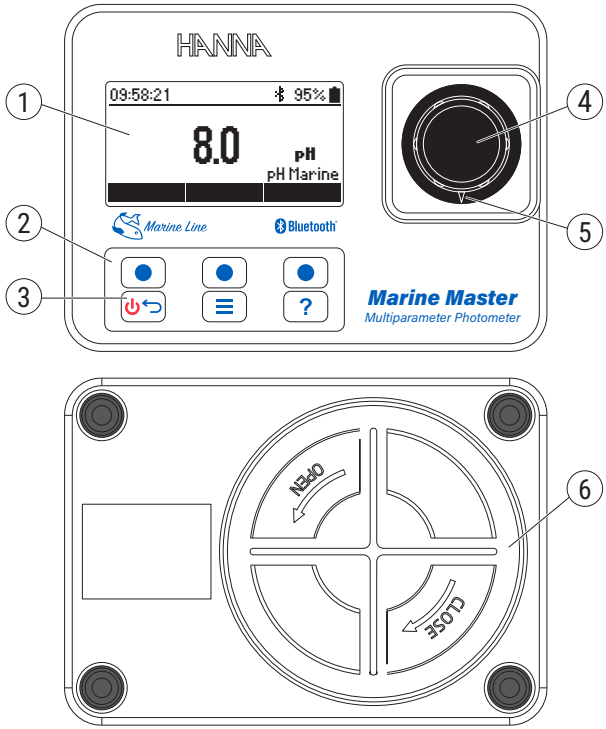
Suitable for field or bench measurements, the photometer features:

- Sophisticated optical system
- Meter validation using certified CAL Check cuvettes
- Tutorial mode guides the user step-by-step
- Option to assign locations to logged readings
- Auto logging
- Waterproof IP67, floating case

Operating Modes

The HI97115 can be used as a stand-alone photometer or connected to the Hanna Lab App using Bluetooth wireless technology and a compatible smart device.
The Hanna Lab App functions include calibration, measurement, data logging, graphing, and data sharing.

4.2. FUNCTIONAL DESCRIPTION



1. Liquid Crystal Display (LCD)
2. Keypad
3. ON/OFF power button
4. Cuvette holder
5. Indexing mark
6. Battery cover

Keypad Description

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

Press the functional key to perform the function displayed above it on the LCD.

Press and hold to power on/off.
Press briefly to return to the previous screen.

Press to access the menu screen.

Press to display the context-sensitive help menu.

4.3. PRECISION & ACCURACY

Precision is how closely repeated measurements are to one another, usually expressed as standard deviation (SD).
Accuracy is defined as the closeness of a test result to the true value and is method specific.
Although good precision suggests good accuracy, precise results can be inaccurate.

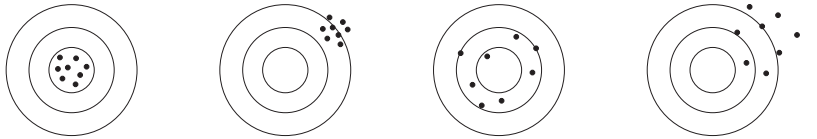


Figure 1: **Precision versus Accuracy**

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

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

Figure 2: **Lambert-Beer law**

4.5. OPTICAL SYSTEM

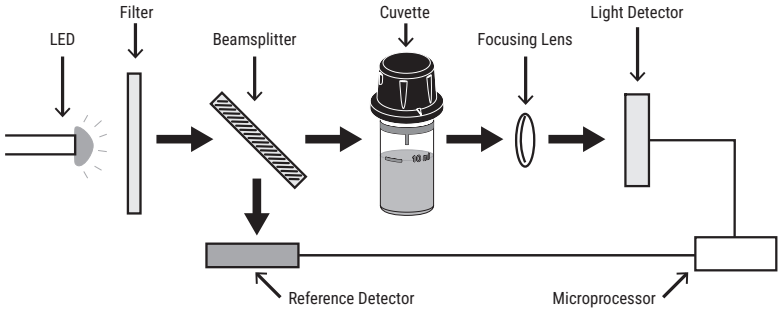


Figure 3: **Instrument Block Diagram**

The **internal reference system** (**reference detector**) of the photometer compensates for any drifts due to power fluctuations or ambient temperature changes, providing a stable source of light for the 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, reducing the need to index the cuvette.

5. GENERAL OPERATIONS

5.1. METER VALIDATION: CAL CHECK™

Validation of the **photometer** involves verifying the concentration of the certified CAL Check standards*.

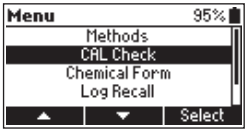
The CAL Check screen guides users step-by-step through the validation process.

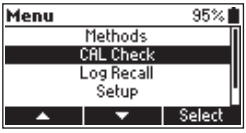
Warning: *Do not use any solutions or standards other than the Hanna Instruments® CAL Check standards. For accurate validation, please perform it at room temperature, 18 to 25 °C (64.5 to 77.0 °F).*

Note: *Protect the CAL Check cuvettes from direct sunlight by keeping them in the original packing. Store between 5 and 30 °C (41 to 86 °F). Do not freeze.*

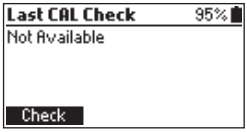
To perform a CAL Check:

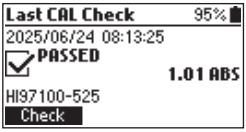
1. Press the ☰ key to enter the menu.
2. Use the functional keys to select *CAL Check* and press **Select**.





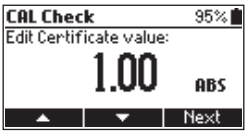
"Not Available**"** message or date, time, and status of the last CAL Check will be displayed on the screen.





Note: *CAL Check is for the bandpass filter used by the selected method. Methods with the same bandpass filter use the same CAL Check standards.*

3. Press **Check** to start a new CAL Check.
   Press the ⏻ key at any time to abort the validation process.
4. Use the functional keys to enter the certificate value of the calibration standard found on the CAL Check Standard Certificate.

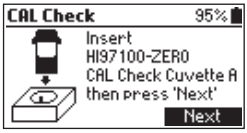


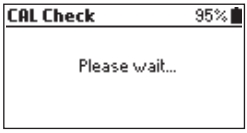
5. Press **Next** to continue.

   Note: *This value will be saved in the instrument for future validation.*

* *CAL Check standards and testing reagents are sold separately. Please refer to 10. Accessories section for ordering code.*

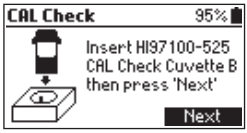
6. Insert the **HI97100-ZERO** CAL Check Cuvette A then press **Next** to continue. **"**Please wait...**"** message will be displayed during the measurement.

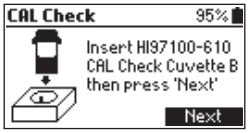


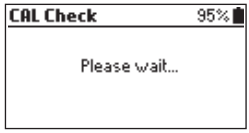


7. Insert the CAL Check Cuvette B for the selected method (i.e. **HI97100-525** for pH, Nitrate LR, Nitrate HR, Nitrite LR or **HI97100-610** for Alkalinity, Ammonia, Calcium, Magnesium, Phosphate ULR), then press **Next** to continue. The **"**Please wait...**"** message will be displayed during the measurement.

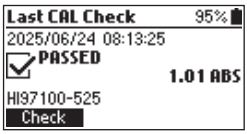
Note: *HI97100-ZERO, HI97100-525, and HI97100-610 are included in the HI97105-11 CAL Check™ standards for Marine Master photometer – cuvette kit. Please see 10. Accessories for ordering codes.*

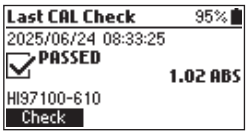




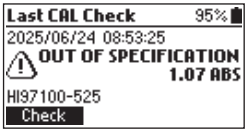


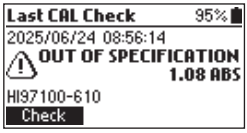
8. When the CAL Check is complete, the display will show one of the following messages and the value obtained during the measurement:
   - » **"PASSED"**: measured value is within the accuracy specification





   - » **"OUT OF SPECIFICATION"**: measured value is outside of the tolerance window





   A. Check the certified value, expiration date, and clean the outside of the cuvette.
   B. Repeat the CAL Check procedure.
   C. If this error continues, contact your nearest Hanna Instruments® customer service center.

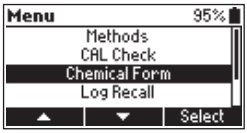
5.2. CHEMICAL FORMULA & UNIT CONVERSION

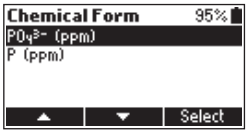
Chemical formula and unit conversion factors are method-dependent and pre-programmed into the instrument.

Note: *When powered on, the instrument starts with the previously selected chemical form.*

To view the displayed result in the desired chemical formula:

1. Press the ☰ key to enter the menu.
2. Use the functional keys to select *Chemical Form* (if available for selected method)
3. Press **Select** to change the displayed chemical formula.
4. Use functional keys to highlight desired chemical formula. Press **Select**.





5.3. LOGGING DATA & LOG RECALL

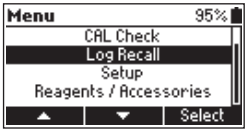
The instrument features a data autolog function to help users keep track of all measurements. Every time a measurement is made the data is automatically saved. The data log can hold 200 individual measurements.

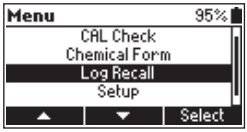


Note: *When the data log is full (200 data points), the meter will rewrite the oldest data point. A confirmation message will display before a log is overwritten.*

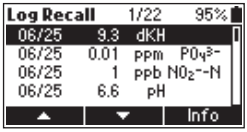
Viewing and deleting the data is possible using the *Log Recall* menu.

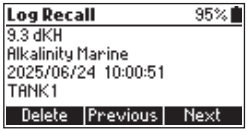
1. Press the ☰ key to enter the menu. Use the functional keys to select *Log Recall* and press **Select**.



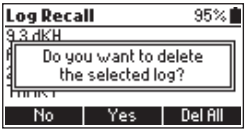


2. Use the functional keys to highlight a log and press **Info** to view additional information about the log. From this screen **Next** and **Previous** can be used to view other logs.

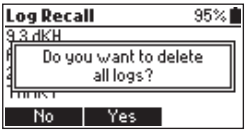




3. Press **Delete** to erase logged data. After pressing **Delete** a prompt on display will ask for confirmation.



4. Press **No** or the ⏻ key to return to the previous screen. Press **Yes** to delete selected log. Press **Del All** to erase all the logged data.
   If **Del All** is pressed, follow the prompt to confirm. Press **Yes** to delete all logged data, **No**, or the ⏻ key to return to the log recall.



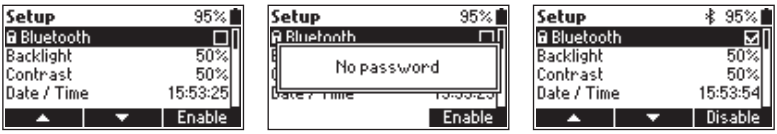
5.4. GENERAL SETUP

- Press the ☰ key to enter the menu.
- Use the functional keys to select *Setup* and press **Select**.
- Use the functional keys to highlight desired option.

Bluetooth

Option: Enable, Disable

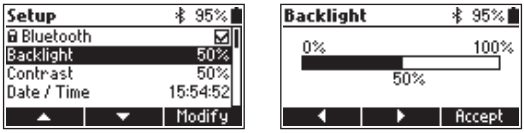
Press the functional key to enable or disable the Bluetooth option.
All data transmitted via Bluetooth must be password protected (🔒).
If meter password is not configured when enabling Bluetooth, "No password" message is displayed.
Press **Enable** and use the functional keys to enter a 5-digit password in the text box.
Once connected, the Bluetooth (ᛒ) icon is displayed in the top right corner of the screen.



Backlight

Option: 0 to 100 %

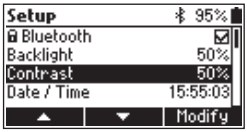
- Press **Modify** to access backlight intensity.
- Use the functional keys to increase or decrease the percentage intensity value.
- Press **Accept** to confirm or the ⏻ key to return to the *Setup* menu without saving the new value.

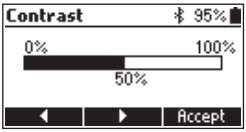


Contrast

Option: 0 to 100 %

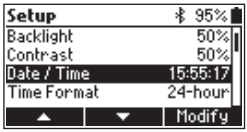
- Press **Modify** to change the display's contrast.
- Use the functional keys to increase or decrease the percentage contrast value.
- Press **Accept** to confirm the value or the ⏻↩ key to return to the *Setup* menu without saving the new value.





Date & Time

- Press **Modify** to change the date and time.
- Press the functional keys to highlight the value to be modified (year, month, day, hour, minute, or second).
- Press **Edit** to modify the highlighted value. Use the functional keys to change the value.
- Press **Accept** to confirm or the ⏻↩ key to return to the previous screen.



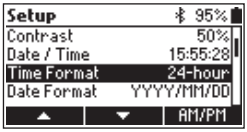




Time Format

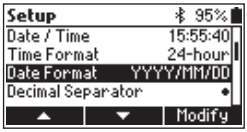
Option: AM/PM, 24-hour

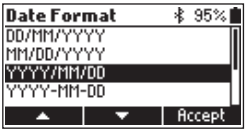
Press the functional key to select the desired time format.



Date Format

- Press **Modify** to change the date format.
- Use the functional keys to select the desired format.
- Press **Accept** to confirm or the ⏻↩ key to return to the *Setup* menu without saving the new format.

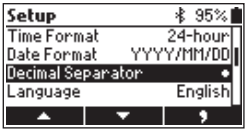




Decimal Separator

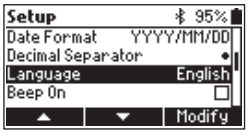
Option: Comma (,) or Period (.)

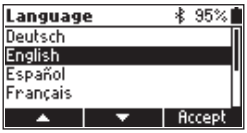
Press the functional key to select the desired decimal separator. The decimal separator is used on the measurement screen.

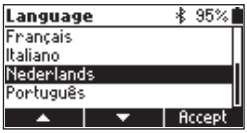


Language

- Press **Modify** to change the language.
- Use the functional keys to select the desired language.
- Press **Accept** to choose one of the languages installed.







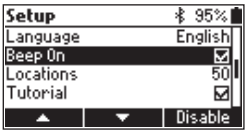
Beeper

Option: Enable, 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 or disable the beeper.

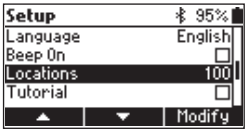


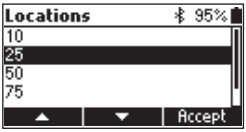
Locations

Option: 10, 25, 50, 75, 100

This function allows users to edit between 10 (default) and up to 100 reading locations.

- Press **Modify** and use the functional keys to set desired option.
- Press **Accept** to confirm or the ⏻ key to return to the *Setup* menu without saving.



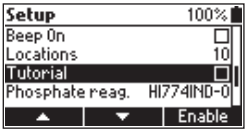


Tutorial

Option: Enable, Disable

Press the functional key to enable or disable the tutorial.

When enabled, the user will be guided step-by-step through the measurement procedures.



Phosphate Reagents

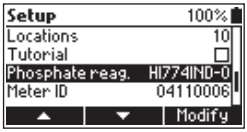
Option: HI774IND-0, HI774-0

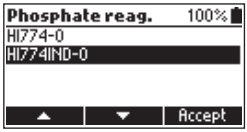
Allows the user to select from two reagent alternatives.

» **HI774IND-0** Phosphate Indicator Reagent, which is used together with Sulfamic Powder Reagent

» **HI774-0** Phosphate Ultra Low Range Reagent

- Press **Modify** and use the functional keys to set desired reagent option.
- Press **Accept** to confirm or the ⏻↩ key to return to the *Setup* menu without saving.

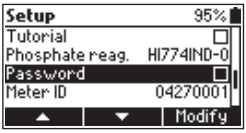




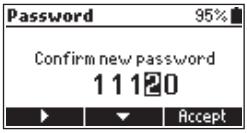
Password

The meter password protects against unauthorized access and secures data transfer. When implemented, Bluetooth paring, deleting previously paired devices, and restoring factory settings require authentication before modifying.
To enable the password:

- Select **Password** then press **Modify**.
- Use the functional keys to enter a 5-digit password in the tex box.
- Press **Accept**.
- The meter will prompt for confirmation.
  Re-enter the password and press **Accept** to save.

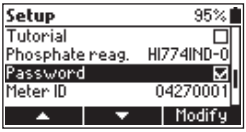






To modify the password:

- Select **Password** then press **Modify**.
- Enter the password then press **Accept**.
- Next, enter new password and press **Accept** to save new password.







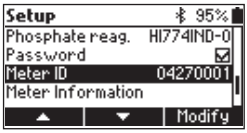
Note: *Entering an incorrect password ten times, triggers a security lockout. To unlock the device, contact tech@ hannainst.com and provide the error code shown on display.*

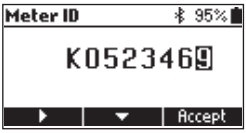
Password Reauthentication

Once the password is entered and the user authenticates, a timer begins.
A one-minute pause in activity triggers the session timeout.
Upon returning to the device after the timeout, the user is prompted to enter the password again before regaining access.

Meter ID

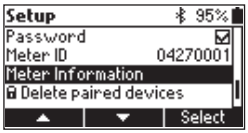
- Press **Modify** and use the functional keys to set desired ID.
- Press **Accept** to confirm or the ⏻ key to return to the *Setup* menu without saving the new Meter ID.

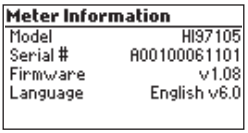


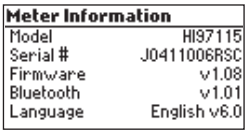


Meter Information

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



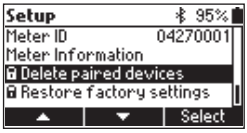


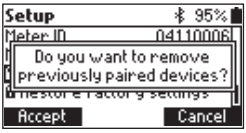


Delete Paired Devices (password-protected function)

This function removes all previous Bluetooth connections.

- Press **Select** to delete all paired devices.
- With option selected, to unlock password protection and enter edit mode, the user is required to authenticate.
  When prompted, use the functional keys to enter the 5-digit password in the text box. Press **Accept**.
  🔓 symbol indicates function is now unlocked and can be modified.
- With option selected, press **Select** again.
- The meter will prompt for confirmation. Press **Accept** to delete previously paired devices.

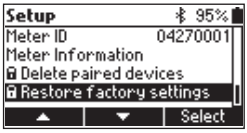


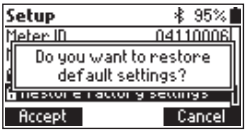


Restore Factory Settings (password-protected function)

- Press **Select** to reset to factory settings.
- With option selected, to unlock password protection and enter edit mode, the user is required to authenticate.
  When prompted, use the functional keys to enter the 5-digit password in the text box. Press **Accept**.
  🔓 symbol indicates function is now unlocked and can be modified.

- With option selected, press **Select** again.
- The meter will prompt for confirmation. Press **Accept** to restore default settings.





5.5. REAGENTS & ACCESSORIES

- Press the ☰ key to enter the menu.
- Use the functional keys to select *Reagents / Accessories* and press **Select** to access a list of reagents and accessories.
- Press the ⏻ key to exit.





5.6. INSTRUCTION MANUAL

- Press the ☰ key to enter the menu.
- Use the functional keys to select *Instruction manual* and press **Select** see details on how to access the online manual.
- Scan the QR code or use link to download the PDF.
- Press the ⏻ key to exit.





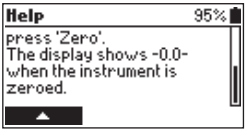


5.7. CONTEXTUAL HELP

The photometer offers an interactive contextual help mode that assists the user at any time.

- Press the ? key to access the help screen.
  The instrument will display additional information related to the current screen.
- Use the functional keys to scroll the text and read all the available information.
- Press the ⏻ to exit help mode, or press the ? key to return to the previous screen.





5.8. BLUETOOTH CONNECTIVITY

All data transmitted via Bluetooth must be password protected (🔒).
Meter password must be set before Bluetooth functionality can be enabled and securely paired.
See 5.4. General Setup » Password section.

Using Hanna Lab App

To connect the photometer to the Hanna Lab App:

1. Power on the instrument and press *Continue* to enter measurement mode.
   ᛒ symbol is displayed flashing indicating the instrument is in discoverable mode.

   Note: *For Bluetooth connectivity, ensure Bluetooth option is configured as Enabled (default) in Setup. To disable, configure as Disabled.*

2. On smart device: download and start the App. Grant required access.
   Tap ᛒ and the instrument's ID appears in the list of Available Devices.
   Tap "Connect" to enable Bluetooth connectivity. All readings are transmitted directly to the application.

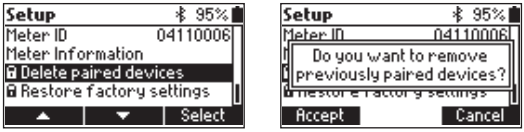


Pairing a New Device

With Bluetooth enabled and password protected, a 6-digit Bluetooth pin will be generated the first time the instrument and the smart device are paired. Once the devices are paired, the pin is not required when reconnecting.

Delete Paired Devices

1. Use the functional keys to select *Delete Paired Devices*.
   With option selected, when prompted, enter the 5-digit password in the text box then press **Accept**.
2. 🔓 symbol indicates function is now unlocked and can be modified. Press **Select** again.
3. The meter will prompt for confirmation. Press **Accept** to delete previously paired devices.



The pairing process in "Pairing a New Device" must be repeated if previously paired devices are removed before attempting a new (or existing) Bluetooth connection.

5.9. HANNA LAB APPLICATION

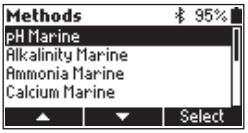
- The Hanna Lab App is available from the App Store® and on Google Play.*
- Consult the Help section of the application for information on measurement, data logging, graphing, and data sharing.
- Measurements can be displayed alone, with tabulated data, or as a graph. The graph can be panned and zoomed with pinch-to-zoom technology.

App Store is a trademark of Apple, Inc.
Google Play and the Google Play logo are trademarks of Google LLC.

6. PHOTOMETER

6.1. METHOD SELECTION

1. Press the ☰ key to enter the menu.
2. Use the functional keys to select *Methods* and press **Select**.
3. Use the functional keys to highlight the desired method then press **Select**.



The instrument enters measurement screen.

- If tutorial mode is disabled, follow the measurement procedure.
- If tutorial mode is enabled, press **Measure** and follow the messages on the screen.

Note: *At power on the instrument starts with the previously selected method.*

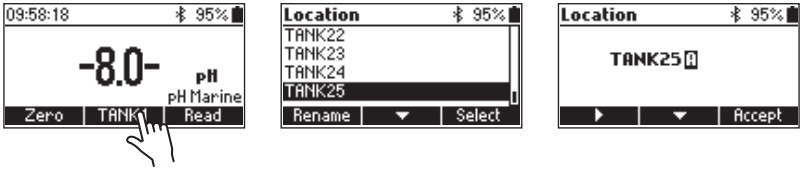
6.2. READING LOCATION SELECTION

The user has the option to select a measurement location from up to 100 TANKS.
From menu, having previously selected required Method, press the corresponding functional key to select a location.

Notes: *Changing measurement location resets the Zero reading.*
At power on the instrument starts with the previously selected location.

Editing Tank Name

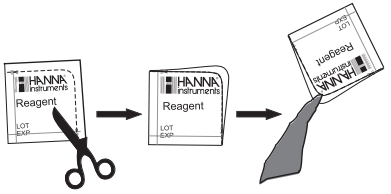
1. From measurement screen press the corresponding functional key.



2. With option highlighted press **Rename**.
3. Use the functional keys to enter the name (up to 15 characters).
4. Press **Accept** to confirm.
5. Press the ⏻ key to return to the measurement screen.

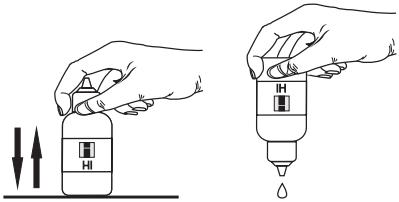
6.3. COLLECTING & MEASURING SAMPLES AND REAGENTS

Proper Use of Powder Packet



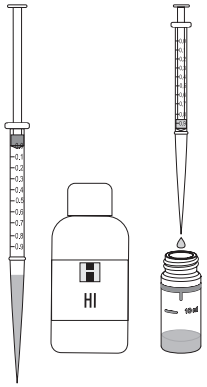
1. Use scissors to open the powder packet.
2. Push the edges of the packet to form a spout.
3. Pour out the content of the packet.

Proper Use of Dropper Bottle



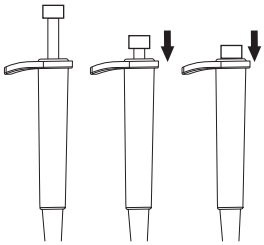
1. Tap the dropper on the table several times. Wipe the outside of the tip with a cloth.
2. Always keep the dropper bottle in a vertical position while dosing the reagent.

Proper Use of Syringe



1. Push the plunger completely into the syringe and insert the tip into the solution.
2. Pull the plunger up until the lower edge of the seal is exactly on the mark for the desired volume.
3. 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.
4. Keep the syringe in a vertical position above the cuvette and then push the plunger down into the syringe to deliver desired volume into the cuvette.

Proper Use of Minipipette



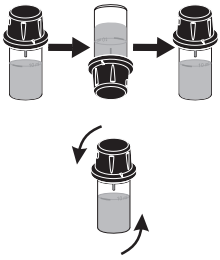
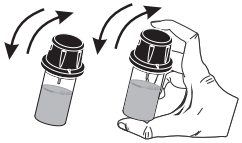
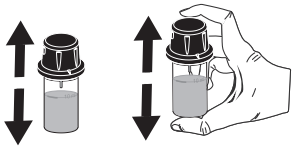
1. Attach the pipette tip.
2. Press the button down to the first stop.
3. Immerse the pipette tip in the liquid approximately 2-3 mm.
4. Slowly let the button move back to original position, wait 2 seconds.
5. Remove the pipette tip from the liquid.
6. To dispense the liquid, place pipette tip on container inside wall.
7. Slowly press button down to first stop.
8. Wait until all of the liquid has been dispensed.
9. Press button down to second stop, this will allow any remaining liquid to be dispensed.

6.4. CUVETTE PREPARATION



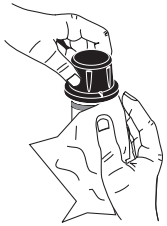
Proper mixing is very important for reproducibility of the measurements.

- The mixing technique for each method is listed in the method procedure.
- 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.

Technique	Icons	Description
Invertion		For one inversion: • Hold the cuvette in vertical position. • Turn the cuvette upside-down and wait for all of the solution to flow to the cap end. • Return the cuvette to the upright vertical position. • Wait for all of the solution to flow to the cuvette bottom. The correct speed for this technique is 10-15 complete inversions in 30 seconds.
Shake	**Gentle** shake  **Vigorous** shake 	

6.5. MEASUREMENT RECOMMENDATIONS

General Guidelines



- 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 microfiber cleaning cloth or a lint-free wipe 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 has been added. For best accuracy, respect the timings described in each 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 sample immediately after reading has been taken, or the glass might become permanently stained.

- All reaction times reported in this manual are at 25 °C (77 °F). In general, reaction time should be increased for temperatures lower than 20 °C (68 °F), and decreased for temperatures higher than 25 °C (77 °F).

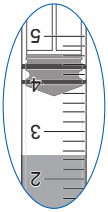
Method-Specific Guidelines

Marine Ammonia

- Prepare sample cuvette immediately after collecting sample from tank. Ammonia is volatile and will dissipate if stored in a bottle before analysis, causing low measurements.

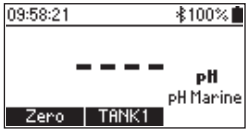
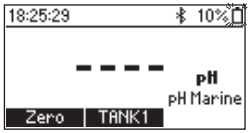
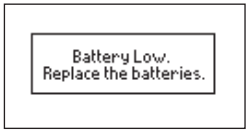
Marine Magnesium

- Keep the tips with their appropriate syringes during measurement.
- Measure liquids accurately by syringe by drawing up the plunger until the bottom seal of the plunger is at the desired volume mark. Do NOT raise the liquid to the mark as this will give a false high volume. An air gap between the plunger and liquid is normal. See image at the right.
- Always use clean, dry cuvettes and syringes/tips.
- Rinse with deionized (RODI) water only; never rinse with tank water.
- Dry the cuvettes before use to prevent dilution.
- Clean the syringes and tips before storage.



6.6. BATTERY MANAGEMENT

The meter will perform an auto-diagnostic test when it is powered on. During this test, the Hanna Instruments® logo will appear on the LCD. If the auto-diagnostic test was successful, the meter is ready for use.
To conserve the battery, the meter turns off automatically after 15 minutes of inactivity. If a zero reading has been done but not a Read, auto-off time is increased to 30 minutes. The battery icon on the LCD indicates the battery status:

	Battery is full.	
	Battery is below 10 %.	Replace batteries soon.
	Battery is low.	Replace batteries with new ones.

7. METHOD PROCEDURE

7.1. MARINE pH

REQUIRED REAGENTS

Code	Description	Quantity
HI780-0	Marine pH Reagent	5 drops

REAGENT SETS

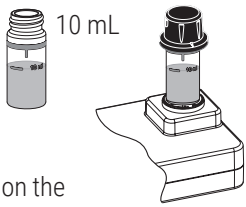
HI780-25	Marine pH Reagent	100 tests

For other accessories see 10. Accessories section.

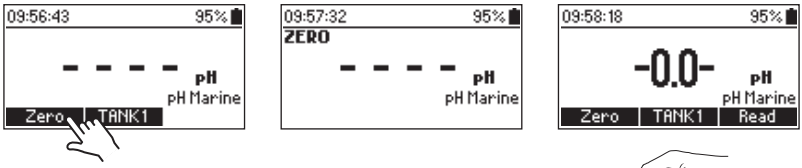
MEASUREMENT PROCEDURE

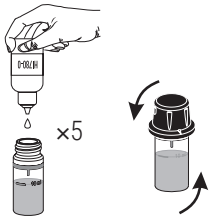
Select the **pH Marine** method using the procedure described in 6.1. Method Selection section.

Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*

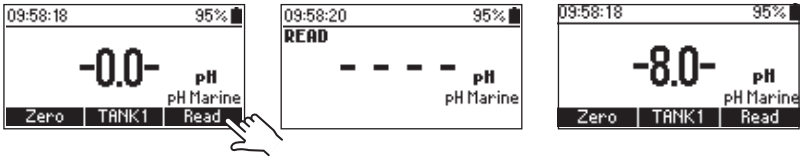


- Fill the cuvette with 10 mL of unreacted sample (up to the mark). Replace the plastic stopper and the cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.





- Remove the cuvette.
- Add 5 drops of **HI780-0** Marine pH Reagent indicator. Replace the plastic stopper and the cap. Invert 5 times to mix.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read** to start reading. The instrument displays the results in **pH**.



7.2. MARINE ALKALINITY

REQUIRED REAGENTS

Code	Description	Quantity
HI772S	Marine Alkalinity Reagent	1 mL

REAGENT SETS

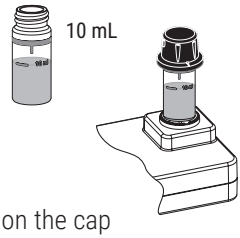
HI772-26	Marine Alkalinity Reagent	25 tests

For other accessories see 10. Accessories section.

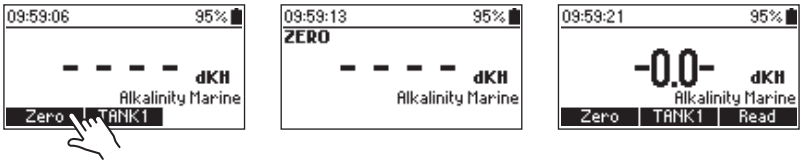
MEASUREMENT PROCEDURE

Select the **Alkalinity Marine** method using the procedure described in 6.1. Method Selection section.

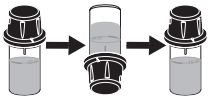
Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*



- Fill the cuvette with 10 mL of unreacted sample (up to the mark).
  Replace the plastic stopper and the cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

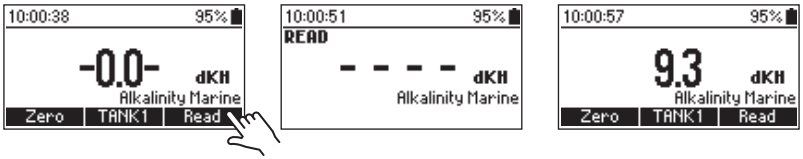


- Remove the cuvette.
- Use a 1 mL syringe and add 1 mL of **HI772S** Marine Alkalinity Reagent to the sample. Replace the plastic stopper and the cap. Invert 5 times to mix.



Note: *Pay attention not to spill reagent otherwise full color development may be inhibited.*

- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read** to start reading.
  The instrument displays the results in **degree KH (dKH)**.



7.3. MARINE AMMONIA (NH_3 / NH_4^+)

REQUIRED REAGENTS

Code	Description	Quantity
HI784A-0	Marine Ammonia Reagent A	1 mL
HI784B-0	Marine Ammonia Reagent B	1 packet
HI784C-0	Marine Ammonia Reagent C	1 packet
REAGENT SETS		
HI784-25	Marine Ammonia Reagents	25 tests

For other accessories see 10. Accessories section.

SAMPLING PROCEDURE

Prepared sample cuvette (sample plus reagents) must be 18 to 29 °C (65 to 85 °F). Warm or cool prepared cuvettes if needed.

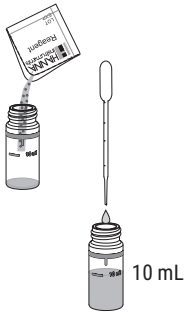
MEASUREMENT PROCEDURE

Select the **Ammonia Marine** method using the procedure described in 6.1. Method Selection section.

Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*

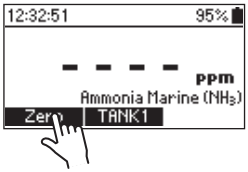
- Use a 1 mL syringe to dispense 1 mL of **HI784A-0** reagent into a clean, dry cuvette.

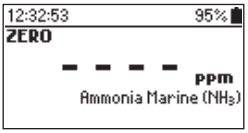
Caution: *HI784A-0 is corrosive! Dispense liquid slowly and avoid contact with skin and eyes!*

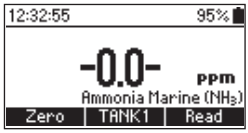


- Using scissors, open one packet of **HI784B-0** Reagent B along the dotted line.
  Push the two corners together to make a spout.
  Add the content of the packet to the cuvette.
- Use a pipette to fill the cuvette to the 10 mL mark with unreacted sample.
- Replace the plastic stopper and the cap.
  Shake gently until the powder is completely dissolved (60-90 seconds).
  Do NOT shake vigorously – this will cause more air bubbles!
  For the most accurate reading, ensure all reagent is dissolved and there are no visible bubbles.
  Ensure the outside of the cuvette is dry and clean.
- Let the cuvette stand for 30 seconds. This allows complete dissipation of micro-bubbles.

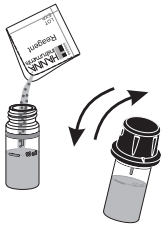
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



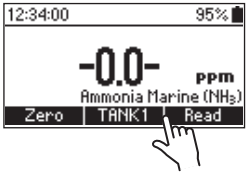




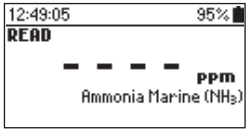
- Remove the cuvette.
- Unscrew the cuvette cap.
  Using scissors, open one packet of **HI784C-0** along the dotted line.
  Push the two corners together to make a spout.
  Add the content of the packet to the cuvette.

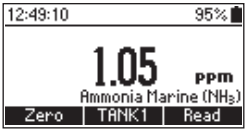


- Replace the plastic stopper and the cap.
  Shake gently to dissolve the powder (30 seconds).
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read**. The display will show a 15 minute countdown prior to the measurement.
  To skip the timer, press **Read**.
  When the timer ends, the meter will perform the reading.
  The instrument displays the ammonia/ammonium concentration in **ppm NH_3**.









- To calculate the unionized ammonia (NH_3) concentration, use the conversion table.

CALCULATING UNIONIZED TOXIC AMMONIA

This method measures NH_3 / NH_4^+.
To determine the toxic NH_3 portion, use the table to determine the percentage of toxic NH_3.
Levels of toxic NH_3 greater than 0.01 ppm have a negative effect on fish.
Multiply total ammonia (NH_3 / NH_4^+) by the percent unionized ammonia from the table to determine unionized toxic ammonia.

Example

pH 8.2
Temperature: 26 °C (79 °F)
NH_3 / NH_4^+ 1.00 ppm
Unionized toxic ammonia: 1.00 ppm x (5.0 ÷ 100)= 0.05 ppm

Percentage of Unionized Ammonia in Seawater (NH_3)

pH (NBS)	21 °C (70 °F)	24 °C (75 °F)	26 °C (79 °F)	29 °C (84 °F)
7.6	0.92%	1.1%	1.3%	1.6%
7.8	1.4%	1.8%	2.1%	2.5%
8.0	2.3%	2.8%	3.2%	3.9%
8.2	3.6%	4.4%	5.0%	6.1%
8.4	5.5%	6.8%	7.7%	9.4%
8.6	8.5%	10%	12%	14%
8.8	13%	15%	17%	21%

7.4. MARINE CALCIUM

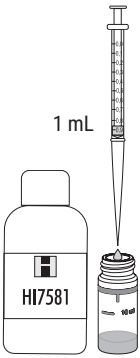
REQUIRED REAGENTS

Code	Description	Quantity
HI7581	Marine Calcium Reagent A	1 mL
HI7582	Marine Calcium Reagent B	1 packet

REAGENT SETS

HI758-26	Marine Calcium Reagents	25 tests

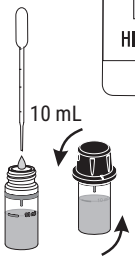
For other accessories see 10. Accessories section.



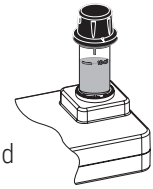
MEASUREMENT PROCEDURE

Select the **Calcium Marine** method using the procedure described in 6.1. Method Selection section.

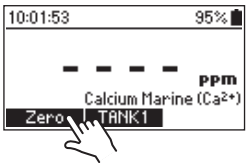
Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*

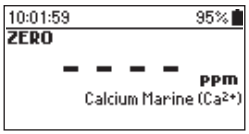


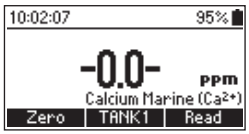
- Use a 1 mL syringe and add 1 mL of **HI7581** Marine Calcium Reagent A to the sample.
- Use the plastic pipette to fill the cuvette to the 10 mL mark with deionized water.
  Use Type 2 grade water or water that has electrical conductivity ≤ 1 µS/cm.
  For best results, measure the deionized water with a clean, rinsed 10 mL syringe.
- Replace the plastic stopper and the cap.
  Invert 3 to 5 times to mix.



- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



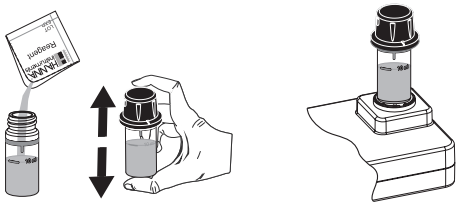




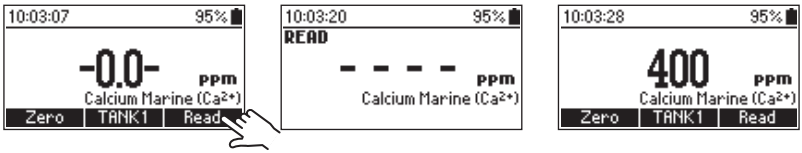
- Remove the cuvette.
- Use the minipipette to add 0.1 mL of sample to the cuvette.
  Ensure no sample remains inside the tip after dispensing.
  See 6.3. Collecting & Measuring Samples and Reagents for tips for proper usage of the minipipette.



- Add the content of one packet of **HI7582** Marine Calcium Reagent B.
  Replace the plastic stopper and the cap and shake vigorously for 15 seconds or until the powder is completely dissolved.
  Allow air bubbles to dissipate for 15 seconds before taking a reading.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.



- Press **Read** to start reading.
  The instrument displays the results in **ppm** of **calcium (Ca^{2+})**.



Note: *Do not rinse cuvettes with tap water or tank water as these contain significant amounts of calcium. Always use deionized water.*

7.5. MARINE MAGNESIUM

REQUIRED REAGENTS

Code	Description	Quantity
HI783A-0	Marine Magnesium Reagent A	4 mL
HI783IND-0	Marine Magnesium Indicator Reagent	1 packet
REAGENT SETS		
HI783-25	Marine Magnesium Reagents	25 tests

For other accessories see 10. Accessories section.

SAMPLING PROCEDURE

Prepared sample cuvette (sample plus reagents) must be 22 to 28 °C (72 to 82 °F).
Warm or cool prepared cuvettes, if needed. Temperature affects accuracy.
Handle cuvette by cap to avoid transferring heat from hands through the glass.

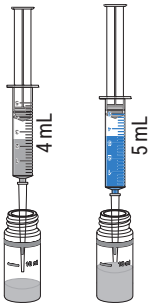
MEASUREMENT PROCEDURE

Select the **Magnesium Marine** method using the procedure described in 6.1. Method Selection section.

Note: *If tutorial mode is disabled, follow the measurement procedure below.*
If the tutorial mode is enabled, press ***Measure*** *and follow the messages on the screen.*

Ensure cuvettes, syringes, and tips are completely clean and dry before use.

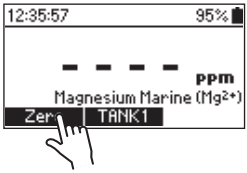
- Place the syringe tips onto each syringe.
  Ensure the O-rings remain in the tip for a proper seal.
- Use the 5 mL syringe with black printing to measure 4 mL of **HI783A-0** reagent.
  Ensure there is no excess reagent on the syringe tip, then slowly dispense the 4 mL of reagent into a clean, dry cuvette.
  If excessive reagent remains in the tip, draw a small amount of air into the syringe and use it to expel the remaining reagent into the cuvette.

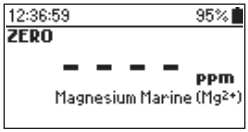


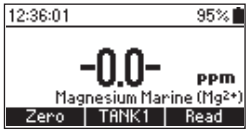
- Use the 5 mL syringe with blue printing to measure 5 mL of unreacted sample.
  Ensure there is no excess sample on the syringe tip, then slowly dispense the sample into the same cuvette.
  Ensure no sample is remaining in the tip.
  Note: *The total liquid volume will be below the 10 mL mark at this step.*
- Replace the plastic stopper and the cap.
  Gently invert the cuvette 5 times until the solution has been thoroughly mixed.



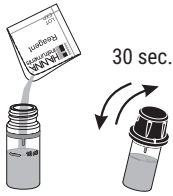
- Ensure there are no bubbles in the mixture and that the outside of the cuvette is dry and clean.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.



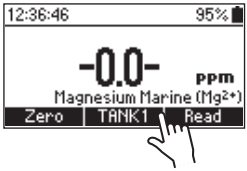




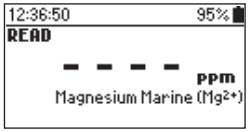
- Remove the cuvette.
- Unscrew the cap and add the content of one packet of **HI783IND-0** Marine Magnesium Indicator Reagent.
  Ensure all powder is added to the sample, loss of powder will result in false high readings.
  Replace the plastic stopper and the cap.

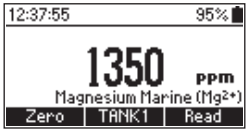


- Shake gently for 30 seconds.
  Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read.** The display will show a 3 minute countdown prior to the measurement. To skip the timer, press **Read**.
  When the timer ends, the meter will perform the reading. The instrument displays **ppm** of **Mg^{2+}.**









- Rinse cuvettes, caps, syringes, and tips thoroughly with deionized (RODI) water and allow to dry completely before storing.

INTERFERENCES

Interference may be caused by:

- Calcium below 300 ppm and above 500 ppm

7.6. MARINE NITRATE LR

REQUIRED REAGENTS		
Code	**Description**	**Quantity**
HI781A-0	Marine Nitrate LR Reagent A	4 mL
HI781B-0	Marine Nitrate LR Reagent B	1 packet
HI781C-0	Marine Nitrate LR Reagent C	1 packet
REAGENT SETS		
HI781-25	Marine Nitrate LR Reagents	25 tests

For other accessories see 10. Accessories section.

Note: *If tutorial mode is disabled, follow the measurement procedure below.*
If the tutorial mode is enabled, press ***Measure*** *and follow the messages on the screen.*

PREPARE THE FILTER HOLDER ASSEMBLY

1. Unscrew the two halves of the reusable filter holder and carefully place one paper filter on the lower piece.
   The upper piece is marked 'TOP'; the lower piece has no marking.
   Ensure the filter paper is on top of the clear colorless gasket in the filter holder.
2. Thread the upper piece over the lower piece and tighten securely. Ensure that the paper filter is not overlapping the threads. The filter holder assembly is now ready for use.

Cleaning

To clean zinc powder residue from the filter holder assembly:

1. Unscrew the filter holder and gently pop the small ridged disk out of the upper half. If necessary, use a small bristle brush and detergent.
2. Rinse thoroughly with Reverse Osmosis Deionized water (RODI) or tap water.
3. Dry before use.

FILTRATION & DILUTION

Filtering

To prevent the filter from tearing:

- Ensure that the filter and filter holder are dry before use.
- During filtering, keep a constant light pressure on the syringe plunger; it should take about 30 seconds for full filtration. Do not use excessive force.

Dilution

1. Measure 1 mL of sample using HI740143 1 mL graduated syringe.
2. Dispense into mixing vial.
3. Add nitrate/nitrite-free artificial seawater up to the 10 mL mark using HI740157P droppers.
4. Cap the vial and mix.

5. Attach the blunt needle to the 10 mL syringe. To attach, screw the covered blunt needle and remove the cap to expose opening.
6. Draw 7 mL of diluted sample into syringe and discard remaining 3 mL of sample from the mixing vial.
7. Dispense 7 mL of diluted sample back into the empty mixing vial.

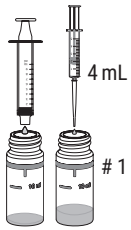
Continue with the normal procedure by adding HI781A-0. Multiply results by 10.

Note: *Measurement accuracy will be affected by dilution. Measure dilution volumes carefully!*

MEASUREMENT PROCEDURE

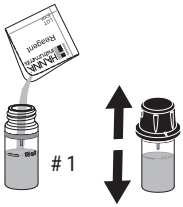
Select the Nitrate Marine LR method using the procedure described in 6.1. Method Selection.

Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*

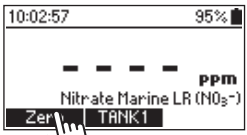


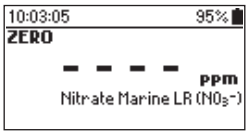
Note: *For samples containing 5-50 ppm nitrate, follow the dilution procedure.*

- Use a 10 mL syringe and measure exactly 7 mL of sample into a mixing cuvette (# 1).
- Use a 5 mL syringe and add exactly 4 mL of HI781A-0 Marine Nitrate LR Reagent into the mixing cuvette.
- Add the content of one packet of HI781B-0 Marine Nitrate LR Reagent into the mixing cuvette.
  Replace the plastic stopper and cap.
  Shake vigorously for 1 minute.

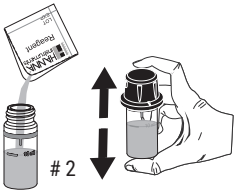


- Remove the cap of the mixing cuvette.
  Thread the covered needle onto the 10 mL syringe, remove the plastic cover and draw up the contents of the mixing cuvette into the syringe.
- Cover the needle with plastic cover and twist to remove.
  Add the filter to filter holder assembly and attach to the 10 mL syringe using the threaded connection.
  Hold the syringe and filter holder assembly over a cuvette (# 2).
- Very slowly, push the plunger into the 10 mL syringe until the 10 mL cuvette has been filled up to the 10 mL mark. Replace the plastic stopper and the cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

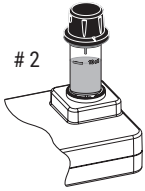




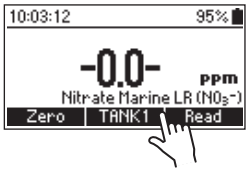




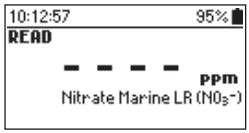
- Remove the cuvette.
- Add the content of one packet of **HI781C-0** Marine Nitrate LR Reagent.
  Replace the plastic stopper and the cap.
  Shake vigorously for 2 minutes.

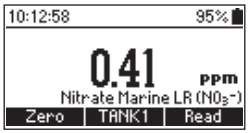


- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read**. The display will show an 8 minute countdown prior to the measurement.
  To skip the timer, press **Read**.
- When the timer ends the meter will perform the reading.
  The instrument displays the results in **ppm** of **nitrate (NO_3^-).**









INTERFERENCES

Interference may be caused by:

- Nitrite, Copper

7.7. MARINE NITRATE HR

REQUIRED REAGENTS

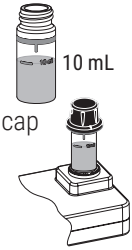
Code	Description	Quantity
HI782-0	Marine Nitrate HR Reagent	1 packet
REAGENT SETS		
HI782-25	Marine Nitrate HR Reagent	25 tests

For other accessories see 10. Accessories section.

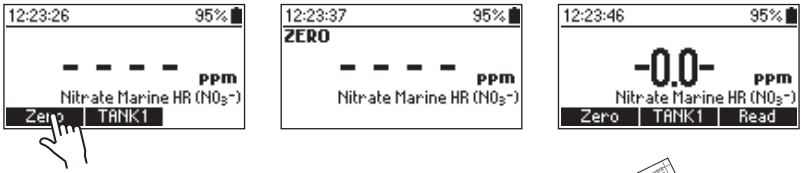
MEASUREMENT PROCEDURE

Select the **Nitrate Marine HR** method using the procedure described in 6.1. Method Selection section.

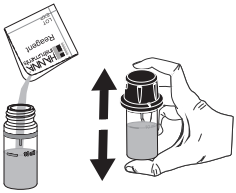
Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press* ***Measure*** *and follow the messages on the screen.*



- Fill the cuvette with 10 mL of unreacted sample (up to the mark). Replace the plastic stopper and the cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

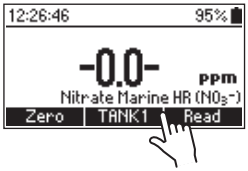


- Remove the cuvette.
- Add the content of one packet of **HI782-0** Marine Nitrate HR Reagent.
  Replace the plastic stopper and the cap.
  Shake vigorously for 2 minutes.

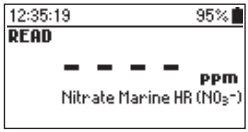


- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read**. The display will show a 7 minute countdown prior to the measurement. To skip the timer, press **Read**.

- When the timer ends, the meter will perform the reading.
  The instrument displays the results in **ppm** of **nitrate (NO_3^-).**









INTERFERENCES

Interference may be caused by:

- Nitrite

7.8. MARINE NITRITE LR

REQUIRED REAGENTS

Code	Description	Quantity
HI767-0	Marine Nitrite LR Reagent	1 packet
REAGENT SETS		
HI767-25	Marine Nitrite LR Reagent	25 tests

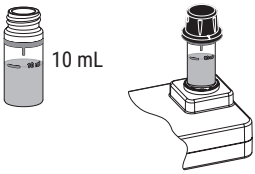
For other accessories see 10. Accessories section.

MEASUREMENT PROCEDURE

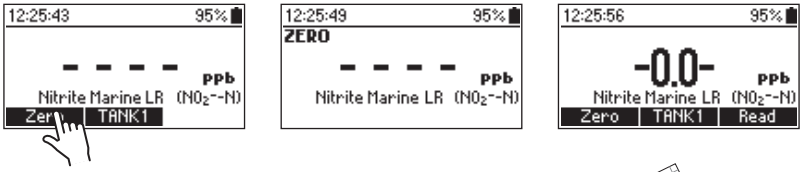
Select the **Nitrite Marine LR** method using the procedure described in 6.1. Method Selection section.

Note: *If tutorial mode is disabled, follow the measurement procedure below.*
If the tutorial mode is enabled, press ***Measure*** *and follow the messages on the screen.*

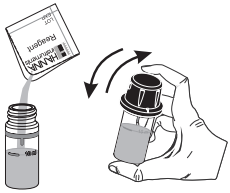
- Fill the cuvette with 10 mL of unreacted sample (up to the mark).
  Replace the plastic stopper and cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.



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

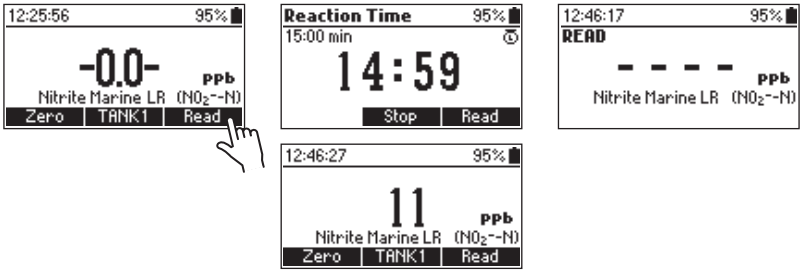


- Remove the cuvette.
- Add the content of one packet of **HI767-0** Marine Nitrite LR Reagent. Replace the plastic stopper and the cap.
  Shake gently for about 15 seconds.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.



- Press **Read**. The display will show a 15 minute countdown prior to the measurement. To skip the timer, press **Read**.

- When the timer ends, the meter will perform the reading.
  The instrument displays the results in **ppb** of **nitrite-nitrogen (NO_2^--N).**



INTERFERENCES

Interference may be caused by:

- Antimonious, Auric, Bismuth, Chloroplatinate ions, Cupric, Iron (Ferric), Iron (Ferrous), Lead, Mercurous, Silver, Strong reducing or oxidating agents
- Nitrate above 100 ppm could yield falsely high readings

7.9. MARINE PHOSPHATE ULR

REQUIRED REAGENTS

Code	Description	Quantity
HI774IND-0	Phosphate Indicator Reagent	1 packet
SULFAMIC POWDER (PWD)	Sulfamic Reagent	1 packet
HI774-0 (Alternative reagent)	Marine Phosphate ULR Reagent	1 packet

REAGENT SETS

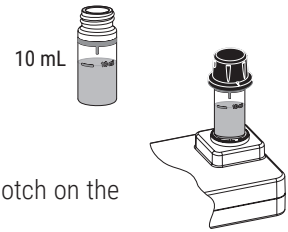
HI774-25	Marine Phosphate ULR Reagent	25 tests

For other accessories see 10. Accessories section.

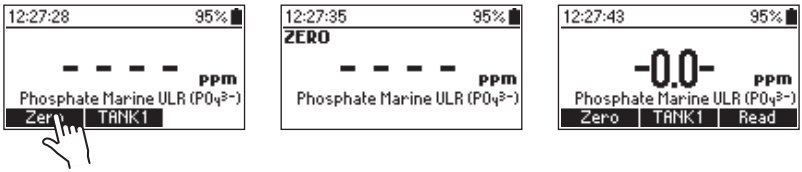
MEASUREMENT PROCEDURE

Select the **Phosphate Marine ULR** method using the procedure described in 6.1. Method Selection section.

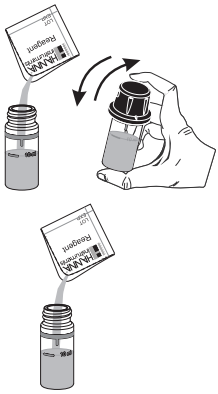
Note: *If tutorial mode is disabled, follow the measurement procedure below. If the tutorial mode is enabled, press **Measure** and follow the messages on the screen.*

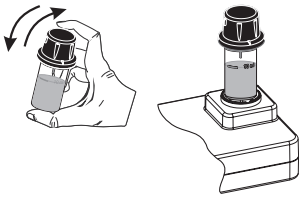


- Fill the cuvette with 10 mL of unreacted sample (up to the mark). Replace the plastic stopper and the cap.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Zero**. The display will show "-0.0-" when the meter is zeroed and ready for measurement.

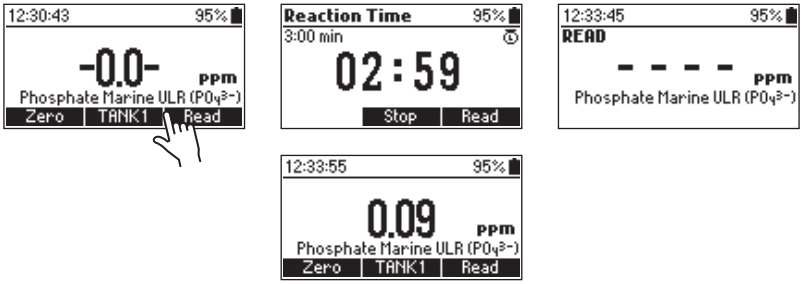


- Remove the cuvette.
- Reagent addition:
  - » Begin by adding the content of the **Sulfamic PWD** Sulfamic Reagent.
  - » Replace the plastic stopper and cap, then shake gently until the powder is completely dissolved.
  - » Remove the plastic stopper and cap, then add the content of one packet of **HI774IND-0** Phosphate Indicator Reagent.
- Alternative reagent selection:
  - » Add the content of one single packet of **HI774-0** Marine Phosphate ULR Reagent.

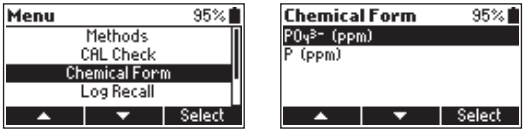




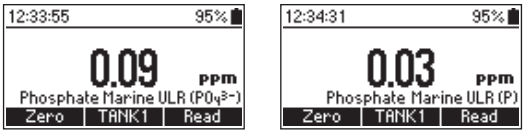
- Replace the plastic stopper and the cap.
  Shake gently for about 2 minutes until the powder is completely dissolved.
- Insert the cuvette into the holder and ensure that the notch on the cap is positioned securely in the groove.
- Press **Read**. The display will show a 3 minute countdown prior to the measurement. To skip the timer, press **Read**.
- When the timer ends, the meter will perform the reading.
  The instrument displays the results in **ppm** of **phosphate (PO_4^{3-}).**



- Press the ☰ key and use the functional keys to select *Chemical Form*.



- Use the functional keys and press **Select** to change displayed chemical formula to **ppm** of **phosphorus (P).**



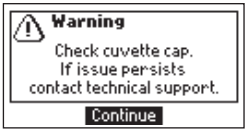
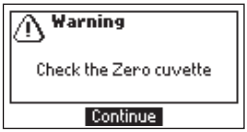
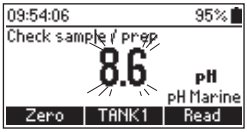
INTERFERENCES

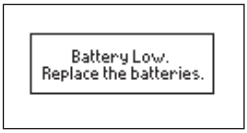
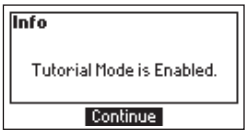
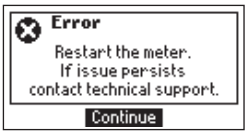
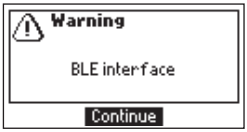
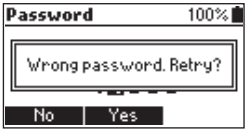
Interference may be caused by:

- Iron, Silica above 50 ppm
- Copper, Silicate above 10 ppm
- Hydrogen sulfide, arsenate, turbid sample, and highly buffered samples

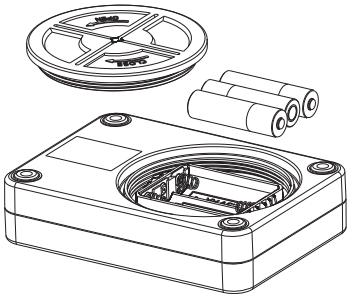
8. WARNING & ERROR DESCRIPTIONS

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.

	There is an excess amount of ambient light reaching the detector. Ensure that the notch on the cap is positioned securely in the groove before performing any measurements. If the issue persists, please contact Hanna Instruments® technical support.
	The sample and the zero cuvettes are inverted. Swap the cuvettes and repeat the measurement.
	There is either too much light or the instrument can not adjust the light level. Please check the preparation of the zero cuvette and that the sample does not contain any debris.
	The meter is overheating. It cannot operate within published accuracy specifications. The meter must be between 0 and 50 °C (32 and 122 °F) to perform any measurements.
	The meter temperature has dropped too low to operate within published accuracy specifications. The meter must be between 0 and 50 °C (32 and 122 °F) to perform any measurements.
	Meter temperature has changed significantly since the zero measurement has been performed. The zero measurement must be performed again.
	The measured value is outside the limits of the method. Verify that the sample does not contain any debris. Check sample preparation, measurement preparation and method range.
	Date and time settings have been lost. Reset the values. If the issue persists, please contact Hanna Instruments technical support.

	English is the only available language. Help function is not available. Restart the meter. If the issue persists, please contact Hanna Instruments technical support.
	Battery level is too low for the meter to function properly. Replace the batteries with new ones.
	Tutorial mode has been enabled in the Setup menu. Press **Continue** and follow the prompt on the screen. Tutorial mode can be disabled in the Setup menu.
	The log is full (200 logs). New logs will replace the oldest. Displays before a new log would overwrite the oldest record. Press **Continue** to accept.
	A critical error has occurred. Restart the meter. If the issue persists, please contact Hanna Instruments® technical support.
	Bluetooth connectivity enabled on the photometer. The instrument can return to stand-alone operating mode by disabling Bluetooth option in Setup.
	Password protection enabled and wrong password entered when prompted. Press **Yes** and enter correct password.

9. BATTERY REPLACEMENT



To replace the instrument's batteries:

1. Press and hold the key to turn the instrument off.
2. Remove the battery cover by turning it counterclockwise.
3. Remove the old batteries and replace with three new 1.5V AA batteries.
4. Replace the battery cover and turn it clockwise to close.

10. ACCESSORIES

Ordering Information	Product Description
Reagent Sets	
HI758-26	Marine Calcium Reagent - 25 tests
HI767-25	Marine Nitrite LR Reagent - 25 tests
HI772-26	Marine Alkalinity Reagent - 25 tests
HI774-25	Marine Phosphate ULR Reagent - 25 tests
HI780-25	Marine pH Reagent - approximately 100 tests
HI781-25	Marine Nitrate LR Reagent - 25 tests
HI782-25	Marine Nitrate HR Reagent - 25 tests
HI783-25	Marine Magnesium Reagent - 25 tests
HI784-25	Marine Ammonia Reagent - 25 tests
Reagent Standards	
HI97105-11	CAL Check™ standards for Marine Master photometer – cuvette kit
Other Accessories	
HI70436M	Deionized water (230 mL)
HI7101419	Blue carrying case for HI97115C/HI97115UC*
HI731318	Cloth for wiping cuvettes (4 pcs.)
HI731331	Glass cuvette (4 pcs.)
HI731336N	Cap for glass cuvette (4 pcs.)
HI731360	Glass cuvette with cap (2 pcs.)
HI731339P	0.1 mL minipipette
HI731349P	Tip for 0.1 mL minipipette (10 pcs.)
HI740142P	1 mL graduated syringe (10 pcs.)
HI740143	1 mL graduated syringe (6 pcs.)
HI740144P	Pipette tip for 1 mL graduated syringe (10 pcs.)
HI740157P	Plastic refilling pipette (20 pcs.)
HI740226	5 mL graduated syringe with black printing (1 pc.)
HI740228	Filter disc (25 pcs.)
HI740237	5 mL graduated syringe with blue printing (1 pc.)
HI740270	10 mL syringe with Luer Lock (1 pc.)
HI740271	Filter holder with Luer Lock (1 pc.)
HI740272	16 gauge blunt needle (6 pcs.)
HI740273	Marine Nitrate LR measurement kit (1 pc.)
HI93703-50	Cuvette cleaning solution (230 mL)

11. ABBREVIATIONS

dKH Degree of carbonate hardness
EDTA Ethylenediaminetetraacetic Acid
EPA US Environmental Protection Agency
HDPE High Density Polyethylene
HR High Range
LED Light Emitting Diode
LR Low Range
mg/L Milligrams per liter (ppm)
NIST National Institute of Standards and Technology
ppb Parts per billion
ppm Parts per million
RH Relative humidity
RODI Reverse Osmosis Deionized water
ULR Ultra Low Range
µg/L Micrograms per liter (ppb)

CERTIFICATION

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, or the place of purchase.

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 meter's performance. For your and the meter's safety do not use or store the meter in hazardous environments.

WARRANTY

The **Marine Master photometer** is warrantied for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. This warranty is limited to repair or replacement free of charge. 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 (engraved on the bottom of the meter), 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 meter 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 meter, make sure it is properly packed for complete protection.

REGULATORY NOTICES

Stand-alone, Bluetooth, low-energy modules

All modules have identical operation. All references to US FCC Rules and Canadian RSS standards on device classification and operation, listed under **BMD-300 Module**, apply to all models noted here.
See the back of the instrument for fitted module's compliance approvals.

BMD-300 Module
United States (FCC) FCC ID: 2AA9B04 This device complies with FCC Rules, Part 15, Subpart C "Intentional Radiators" and Subpart B, Chapter §15.105. This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case, users are required to correct the interference at their own expense.
Canada (ISED) IC: 12208A-04 This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.
Australia / New Zealand (RCM) BMD-300 complies with the AS/NZS 4268:2017.
Japan (MIC) R210-106799
South Korea (KCC) R-CRM-Rgd-BMD-300
Brazil (ANATEL): Contains ANATEL approved module # 00820-21-05903.
Mexico (IFETEL): Este equipo contiene el módulo con IFT #: NYCE/CT/0146/17/TS.

BMD-350 Module
United States (FCC) FCC ID: 2AA9B05
Canada (ISED) IC: 12208A-05
Australia / New Zealand (RCM) BMD-350 complies with the AS/NZS 4268:2017
Japan (MIC) R 210-108944
South Korea (KCC) R-C-Rgd-BMD-350
Brazil (ANATEL): Contains ANATEL approved module # 00857-21-05903
Eurasia (EAC) EAЭC N RU Д-US.HA27.B.00650/18
China (SRRC) CMIIT ID: 2018DJ7255
Mexico (IFETEL) Este equipo contiene el módulo con IFT #: RCPRIBM18-1491

ANNA-B112 Module
United States (FCC) FCC ID: XPYANNAB1
Canada (ISED) IC: 8595A-ANNAB1
Australia / New Zealand (ACMA) ANNA-B1 complies with AS/NZS 4268:2012 standard
Japan (MIC) R 204-810005 The module complies with the Japanese Technical Regulation Conformity Certification of Specified Radio Equipment (ordinance of MPT N°. 37, 1981), Article 2, Paragraph 1, Item 19 “2.4 GHz band wide band low power data communication system”.
South Korea (KCC) R-C-ULX-ANNA-B112
Brazil (ANATEL) ANATEL 03850-19-05903 This equipment operates on a secondary basis and, consequently, must accept harmful interference, including from stations of the same kind, and may not cause harmful interference to systems operating on a primary basis.
China (SRRC) CMIIT ID: 2021DJ6698
Taiwan (NCC) Contains Transmitter Module 內含發射器模組: CCAI18LP2200T2
South Africa (ICASA) ICASA TA-2019/1203 Approved