HI84534

Titratable Acidity
Mini Titrator & pH Meter
For Vinegar

INSTRUCTION MANUAL

HANNA® instruments

Dear Customer,

Thank you for choosing a Hanna Instruments product.
Please read this instruction manual carefully before using this meter.
This manual will provide you with the necessary information for correct use of this meter, as well as a precise idea of its versatility.
If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com or view our worldwide contact list at www.hannainst.com.

TABLE OF CONTENTS

1. Preliminary Examination 5
2. General Description & Intended Use 6
   - 2.1. Principle of Operation 6
   - 2.2. Significance of Use 7
3. Specifications 8
4. Functional Description 10
   - 4.1. Overhead View 10
   - 4.2. Rear View 10
   - 4.3. Keypad Description 11
   - 4.4. LCD Description 12
   - 4.5. Dosing Pump 12
5. Titrator Setup 13
   - 5.1. Electrode 13
   - 5.2. Dosing Pump 14
6. Setup Menu 17
   - 6.1. Concentration Unit 17
   - 6.2. Calibration Timeout 17
   - 6.3. pH Resolution 17
   - 6.4. Temperature Unit 18
   - 6.5. Time 18
   - 6.6. Date 18
   - 6.7. Key Beep 18
   - 6.8. Error Beep 19
   - 6.9. Decimal Separator 19
   - 6.10. LCD Contrast 19
   - 6.11. LCD Backlight 19
   - 6.12. Language 20
   - 6.13. Tutorial 20
   - 6.14. Meter Information 20
   - 6.15. Restore Factory Settings 20
7. Electrode Calibration 21
   - 7.1. Preparation 21
   - 7.2. Calibration Procedure 22
   - 7.3. Error and Warning Messages 23

TABLE OF CONTENTS

8. Pump Calibration 25
   8.1. Preparation 25
   8.2. Procedure 25
   8.3. Errors and Warning Messages 26
9. Titration 27
   9.1. Sample Preparation 27
   9.2. Procedure 27
   9.3. Errors and Warning Messages 29
10. pH Measurement 30
11. Logging 31
   11.1. Titrator 31
   11.2. Meter 32
   11.3. PC Interface and Data Transfer 33
12. Titrator GLP Information 34
   12.1. Pump 34
   12.2. Electrode 34
13. Troubleshooting Guide 35
14. Accessories 37

Certification 38

Recommendations for Users 38

Warranty 38

1. PRELIMINARY EXAMINATION

Remove the meter from the packing material and examine it carefully. For further assistance, please contact your local Hanna Instruments Office or email us at tech@hannainst.com.

Each HI84534 mini titrator is supplied with:

- HI84534-70 Reagent kit for titratable acidity in vinegar
- HI1131B pH electrode
- HI7662-T Temperature probe
- HI7082 Electrode fill solution (30 mL)
- 100 mL beakers (2 pcs.)
- Tube set (aspiration tube with titrant bottle cap and dispensing tube with tip)
- Dosing pump valve
- 5 mL syringe (1 pc.)
- 1 mL syringe (1 pc.)
- Capillary pipette (1 pc.)
- Stir bar
- Power adapter
- Instrument quality certificate
- Instruction manual

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

2. GENERAL DESCRIPTION & INTENDED USE

The HI84534 is an affordable, easy to use automatic minititrator and pH meter designed for the rapid and accurate analysis of Total Titratable Acidity in Vinegar. The HI84534 minititrator is a valuable tool because of its ability to eliminate subjective factors including color indicators, errors in mathematical calculations or erratic titrant additions, it will quickly become a valuable acidity analysis tool of vinegar.

The instrument employs a powerful and effective built-in algorithm to analyze the pH response to determine the exact endpoint, and then perform the necessary calculations.

The main features of the HI84534 are:

- pH and mV meter
- A dedicated **HELP** key
- Titration graph is visible in the display
- Data can be stored using the log feature and then exported to a USB stick or transferred to a PC
- Log on demand for up to 400 samples (200 for titration results, 200 for mV/pH measurements)
- GLP feature, to view calibration data for pH electrode and pump

2.1. PRINCIPLE OF OPERATION

Vinegar acidity is determined by neutralization of all available hydrogen ions present in the sample, with a strong base solution:

$$H^+ + HO \rightarrow H_2O$$

In an ideal solution, the end point of an acid titration corresponds stoichiometrically to the complete neutralization of the acids present.

The pH end point at 8.2 is automatically detected by the pH electrode. End point detection by potentiometric method is more objective than the end point detection using color indicators. For precise results, the sample volume, titrant volume and the titrant concentration must be known.

The HI84534 minititrator is designed to determine the acidity of vinegar. The titration is displayed in % w/v (g/100mL) or g/L of the acetic acid.

It is important to titrate fresh samples of vinegar. For increased precision, keep the vinegar in capped vessels (avoid prolonged exposure to air).

To maintain the high accuracy of the mini titrator requires a simple pump calibration procedure.

The pump calibration involves the analysis of a known volume of a known solution. The instrument will perform a differential analysis to compensate for changes in the dosing system. This procedure should be performed daily.

2.2. SIGNIFICANCE OF USE

Vinegar is made when acetic acid bacteria is added to an alcohol beverage such as wine. The bacteria will eat the ethanol and produce a tart, pungent liquid know as acetic acid. The acetic acid concentration in vinegar typically ranges from 4 to 9 % (w/v). The pH of vinegar is typically between 2.5 to 3.0, depending on the acetic acid concentration.

Vinegar can be made out of anything that has alcohol (ethanol) in it, including wine, beer, and hard cider. The type of vinegar depends on what liquid the ethanol has been fermented in. White vinegar is made a vodka type liquor made from grain, while apple cider vinegar is made from apples and balsamic vinegar is made from grape must. Outside of the United States popular vinegars include rice, coconut and cane. Vinegars are commonly used in food preparation, medicine, agriculture and in cleaning solutions.

The titratable acidity of vinegar is determined by titrating the sample with a strong base to a fixed pH. The end point is determined by the potentiometric input and the results are typically expressed as % (g/100mL) or g/L acetic acid. The HI84534 minititrator method is based on the Official Methods of Analysis of AOAC International.

3. SPECIFICATIONS

Titrator	Range	0.3 to 10.0 % w/v (g/100mL) as acetic acid 3 to 100 g/L as acetic acid
	Resolution	0.1%, 1 g/L
	Accuracy	3% of reading or ± 0.1 % , whichever is greater 3% of reading or ± 1 g/L, whichever is greater
	Sample volume	1 mL
	Titration method	Acid-base titration
	Principle	Fixed end point titration to pH 8.2
	Pump speed	10 mL/min
	Stirring speed	600 rpm
	Data storage	Up to 200 titrations
pH/mV meter	pH range	- 2.0 to 16.0 pH, - 2.00 to 16.00 pH
	pH resolution	0.1 pH, 0.01 pH
	pH accuracy	± 0.01 pH
	pH calibration	1, 2 or 3 calibration points; 4 available buffers (4.01, 7.01, 8.20, 10.01)
	mV range	-2000.0 to 2000.0 mV
	mV resolution	0.1 mV
	mV accuracy	± 1.0 mV
	Data storage	Up to 200 data points (pH or mV)
Temperature	Range	-20.0 to 120.0 °C (-4.0 to 248.0 °F)
	Resolution	0.1 °C
	Compensation	manual or automatic
	Accuracy	±0.4 °C without probe error

Additional Specifications	pH electrode	HI1131B
	Temperature probe	HI7662-T
	Power supply	12 Vdc power adapter
	Dimension	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
	Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing

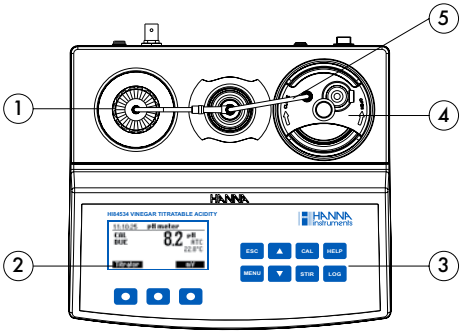
REQUIRED REAGENTS

Code	Description
HI84534 - 50	Titratable acidity titrant
HI84534 - 55	Titratable acidity calibration standard

4. FUNCTIONAL DESCRIPTION

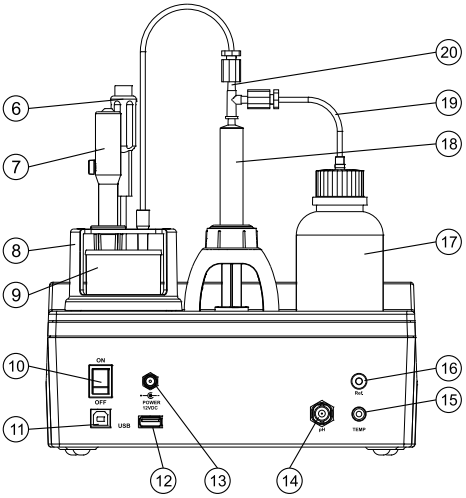
4.1. OVERHEAD VIEW

1. Titrant bottle
2. Liquid Crystal Display (LCD)
3. Keypad
4. Electrode holder
5. Dispensing tube

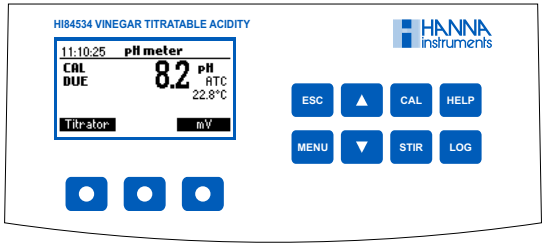


4.2. REAR VIEW

6. Temperature probe
7. pH electrode
8. Electrode holder
9. Beaker
10. Power switch
11. USB connector (PC interface)
12. USB connector (storage interface)
13. Power adapter
14. BNC electrode connector
15. Temperature connector
16. Reference connector
17. Titrant bottle
18. Syringe
19. Aspiration tube
20. Dosing pump valve



4.3. KEYPAD DESCRIPTION



ESC – used to leave the current screen and to return either to the previous screen or to the main screen. In **Setup**, exits a parameter without changing the value.

▲ / ▼ – used to modify the parameters' values, to scroll the information displayed while viewing a help screen or to move between the options from the instrument's **Setup**

CAL – used to access the electrode and pump calibration options

HELP – used to access/exit the instrument's contextual help

LOG – used to save the titration result or the pH/mV reading

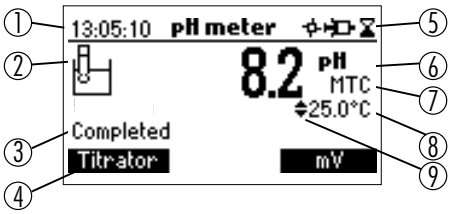
MENU – used to enter **Setup**, **Recall** or **GLP** menus

STIR – used to start/stop the stirrer

Note: *The stirrer starts automatically during pump calibration and titration, it cannot be stopped by pressing STIR key.*

4.4. LCD DESCRIPTION

During the instrument's operation information is displayed on the LCD.



1. Current time and instrument mode, titrator or pH meter
2. pH electrode condition
3. Instrument status
4. Virtual option keys
5. Stirrer and reading status
   - Stirrer on
   - Stirrer is not working properly
   - Pump running
   - Unstable reading
6. Main reading information
7. pH temperature compensation, ATC (automatic) or MTC (manual)
8. Temperature reading
9. ▲▼ Indicates the parameter can be modified

4.5. DOSING PUMP

The dosing pump is based on a valve that automatically moves the titrant between the titrant bottle and syringe when filling the syringe and between the syringe and sample when dispensing. A replaceable 5 mL plastic syringe is used to limit the amount of titrant used per test to ensure the highest possible accuracy. Before a set of titrations, it is necessary to prime the dosing system.

Note: *Once titrations have been completed, the dosing system should be cleaned with deionized water using the prime feature.*

5. TITRATOR SETUP

5.1. ELECTRODE

Remove the electrode protective cap.
DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT. This is normal with electrodes and they will disappear when rinsed with distilled/deionized water.
During transport, tiny bubbles of air may have formed inside the glass bulb. The electrode cannot function properly under these conditions. These bubbles can be removed by "shaking down" the electrode as you would do with a glass thermometer.
If the bulb is dry, soak the electrode in HI70300 Storage Solution for at least one hour.

Storage

To assure a quick response time, the glass bulb should be kept moist and not allowed to dry out. Replace the solution in the protective cap with a few drops of HI70300 or HI80300 storage solution. Follow the preparation procedure section before taking measurements.

Note: *Never store the pH electrode in distilled or deionized water.*

Periodic Maintenance

Inspect the electrodes and the cables. The cable used for connection to the instrument must be intact and there must be no broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with distilled/deionized water.

Cleaning Procedure

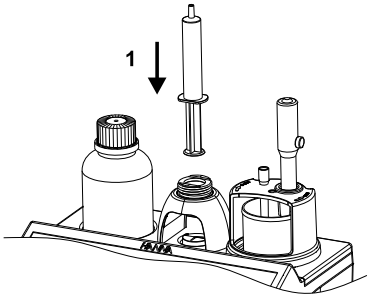
Soak in Hanna HI7061 or HI8061 general cleaning solution for approximately ½ hour.
Rinse the electrode thoroughly with distilled or deionized water and soak the electrode in HI70300 or HI80300 storage solution for at least 1 hour before use. Recalibrate electrode before taking measurements.

5.2. DOSING PUMP

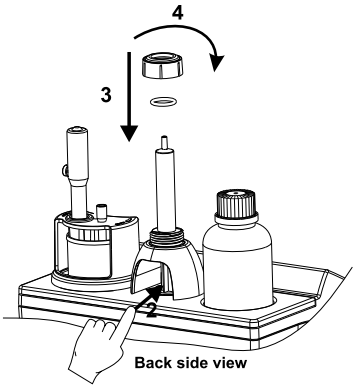
Installation

To install the dosing pump follow the procedure below:

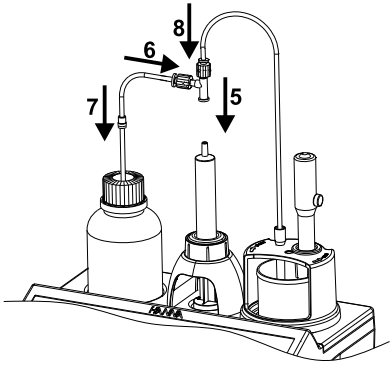
- Extend the plunger on the 5 mL syringe to its maximum volume.
- Place the syringe in the dedicated spot on the top of the meter (1).



- Position the bottom of the syringe into the holder on the pump (2). Once the syringe is in place lower the barrel until it sits flush on the holder.
- Put the o-ring and syringe-fixing nut over the syringe (3) and turn clockwise to secure it in place (4).



- Place the valve on the top of the syringe (5). Ensure it fits securely.
- Insert the aspiration tube into the left side of the valve (6) and replace the titrant bottle cap with the attached cap (7).
- Insert the dispensing tube into the top of the valve (8), place the dosing tip in the top of the electrode holder.

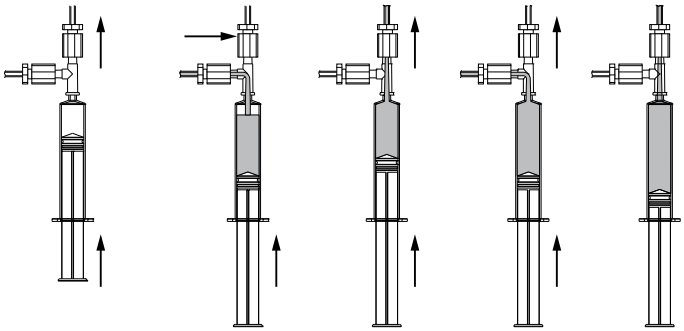


Prime Procedure

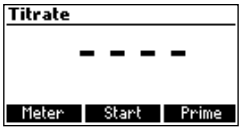
Prime cycle should be performed:

- if you notice there is no titrant in the tip
- whenever the dosing system tubes are replaced
- whenever a new bottle of titrant is used
- before starting a pump calibration
- before starting a series of titrations

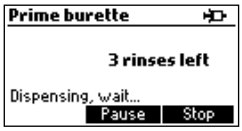
The prime cycle is used to fill the syringe before starting a set of titrations.
Two rinse cycles of the syringe are shown in the figure below. The dispensing tube is connected to the top of the valve and the aspiration tube on the left side.



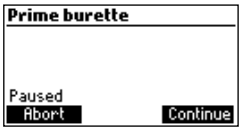
Note: *The aspiration tube must be inserted in the titrant bottle. The dosing tip must be placed over a rinse beaker. Before starting the prime procedure, make sure you are using the appropriate titrant solution for the selected range.*



- From titration mode, press **Prime** to prime the burette.
- Use the ⮟/⮝ keys to select the number of rinses and then press **Start**. A minimum of 3 rinses is recommended to ensure all of the air bubbles have been removed.



- To stop the prime cycle press **Stop**. To pause the prime cycle press **Pause**, to continue press **Continue**.



Note: *The "Pump Error" message will be displayed if the pump is not working properly. Check the tubing, valve and syringe. Press* ***Restart*** *to try again.*

6. SETUP MENU

The titrator's setup menu may be accessed from the titrator or pH/mV meter by pressing the **MENU** key, then **Setup**.

A list of setup parameters will be displayed with currently configured setting.

While in the setup menu, it is possible to modify the instrument's operation parameters. The ▼/▲ keys permit the user to scroll the setup parameters.

Press **HELP** to view the contextual help.

Press **ESC** to return to the main screen.

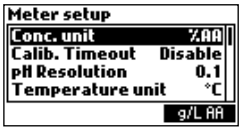
6.1. CONCENTRATION UNIT

Option: %AA or g/L AA

Press the corresponding virtual option key to select the concentration unit.

%AA g/100 mL Acetic Acid

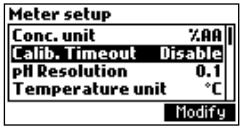
g/L AA g/L Acetic Acid

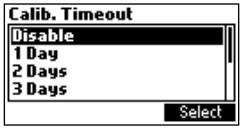


6.2. CALIBRATION TIMEOUT

Option: Disabled or up to 7 days

Press **Modify** to access the calibration timeout screen. Use the ▼/▲ keys to set the number of days before the pH calibration expired warning message is displayed. Press **Select** to confirm or the **ESC** key to return to the setup menu without saving the changes.

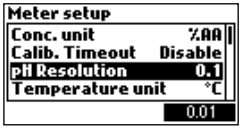




6.3. pH RESOLUTION

Option: 0.1 or 0.01

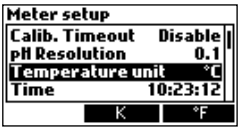
Press the displayed virtual option key to select the pH resolution.



6.4. TEMPERATURE UNIT

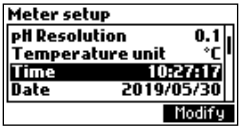
Option: °C, °F, K

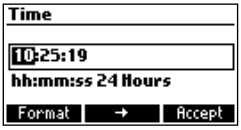
Press the virtual option key to select the temperature unit.



6.5. TIME

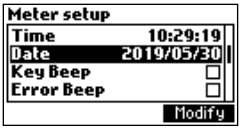
Press the **Modify** key to change the time and time format. Press **Format** to switch between 12 hour (am/pm) and 24 hour mode. Press → to highlight the value to be modified. Use the ⮟/⮝ keys to change the value. Press **Accept** to confirm the new value or the **ESC** key to return to the setup menu without saving the changes.

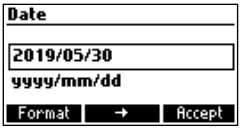




6.6. DATE

Press the **Modify** key to change the date and date format. Press **Format** to cycle between the available date formats. Press → to highlight the value to be modified. Use the ⮟/⮝ keys to change the value. Press **Accept** to confirm the new value or the **ESC** key to return to the setup menu without saving the changes.

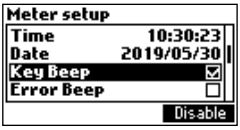




6.7. KEY BEEP

Option: Enable or Disable

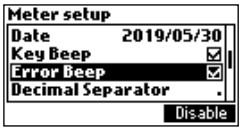
Press the virtual option key to select the option. If enabled, a short beep will be heard every time a key is pressed.



6.8. ERROR BEEP

Option: Enable or Disable

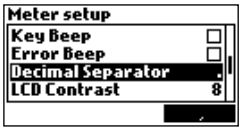
Press the virtual option key to select the option. If enabled, a beep will be heard when an error occurs.



6.9. DECIMAL SEPARATOR

Option: Dot (.) or Comma (,)

Press the virtual option key to select the decimal separator. The decimal separator is used on the measurement screen and CSV files.

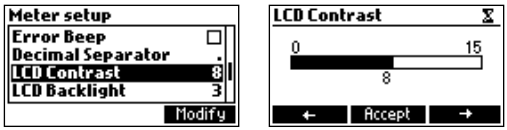


6.10. LCD CONTRAST

Option: 0 to 15

Press **Modify** to change the display's contrast. Use the ↓/↑ keys or ←/→ keys to increase or decrease the value.

Press **Accept** to confirm the new value or the **ESC** key to return to the setup menu without saving the changes.

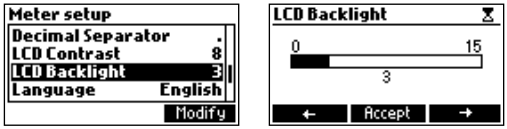


6.11. LCD BACKLIGHT

Option: 0 to 15

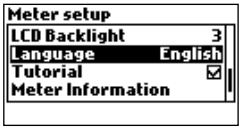
Press **Modify** to change the display's backlight. Use the ↓/↑ keys or ←/→ keys to increase or decrease the value.

Press **Accept** to confirm the new value or the **ESC** key to return to the setup menu without saving the changes.



6.12. LANGUAGE

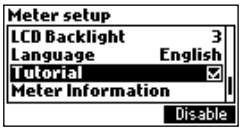
Press the virtual option key to change the language. If the selected language cannot be loaded, the previously selected language will be reloaded. If no language can be loaded at startup, the instrument will work in “safe mode”. In “safe mode” all messages are displayed in English and tutorial and help information are not available.



6.13. TUTORIAL

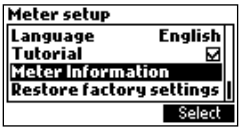
Option: Enable or Disable

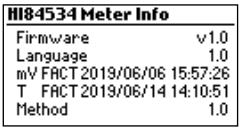
If enabled additional information will be displayed during the calibration and titrations.



6.14. METER INFORMATION

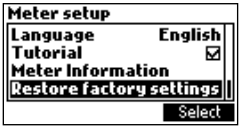
Press **Select** to view the firmware version, language version, mV factory calibration date and time and temperature factory calibration date and time. Press the **ESC** key to return to the Setup mode.

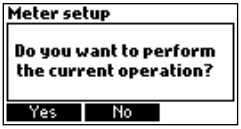




6.15. RESTORE FACTORY SETTINGS

Press **Select** to restore factory settings. Press **Yes** to confirm the restore process or **No** or the **ESC** key return to the setup menu.





7. ELECTRODE CALIBRATION

It is recommended to calibrate the instrument frequently, especially if high accuracy is required.
The pH electrode should be recalibrated:
a) Whenever the pH electrode is replaced
b) At least once a week, but daily is advised
c) After testing aggressive chemicals and after the electrode is cleaned
d) When high accuracy is required
e) If the pH calibration expired warning is displayed during measurement
Every time you calibrate the instrument use fresh buffers and clean the electrode.

7.1. PREPARATION

A one, two or three-point calibration can be performed, using four predefined buffers 4.01, 7.01, 8.20 and 10.01 pH. For a single point calibration 8.20 pH is recommended, however any of the buffers may be used.

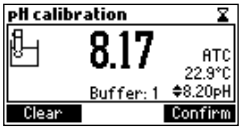
Note: *The HI84534 will not accept other pH buffers for calibration.*

- Pour small quantities of selected buffer solutions into clean beakers. For accurate calibration use two beakers for each buffer solution, the first one for rinsing the electrode and the second one for calibration.
- Put a magnetic stir bar in the beaker that will be used for calibration.
- Remove the protective cap and rinse the electrode with some of the buffer solution to be used for the first calibration point.
- Put the first beaker with calibration buffer in the beaker holder.
- Place the electrode holder on the top of the beaker and secure it by turning clockwise and press the **STIR** key.
- Immerse the pH electrode and the temperature probe approximately 2 cm (0.8") into the buffer, paying attention not to touch the stir bar.
- To enter the electrode calibration, press **CAL** then **Electrode**.
- Press **Clear** to delete the previous calibration and return to the calibration menu.

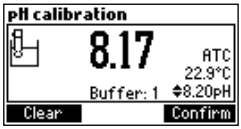
7.2. CALIBRATION PROCEDURE

One-Point Calibration

- The 8.20 buffer will be selected by default. If necessary, press the ▼/▲ keys to select a different buffer value.
- The ⧗ symbol will be shown on the display until the reading becomes stable.

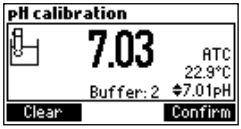


- When the reading is stable and close to the selected buffer, the ⧗ symbol will disappear and the **Confirm** key will become active.



- Press **Confirm** to confirm the calibration point. The calibrated value will be shown on the display and the second expected buffer value will be displayed.
- After the calibration point has been confirmed, press the **ESC** key to exit and save the one-point calibration.

Two-Point Calibration



- Remove the electrode holder with electrodes from the top of the beaker.
- Place the second beaker with calibration buffer in the beaker holder. Rinse the electrodes in a beaker containing the second buffer rinsing solution.
- Place the electrode holder (with electrodes) on the top of the beaker and secure it by turning clockwise and press the **STIR** key.
- If necessary, press the ▼/▲ keys to select a different buffer value.

Note: *Previously confirmed buffers are removed from the list of available buffers.*

- The ⧗ symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected buffer, the ⧗ symbol will disappear and the **Confirm** key will become active.

- Press **Confirm** to confirm the calibration point. The calibrated value will be shown on the display and the third expected buffer value will be automatically selected.
- After the second calibration point has been confirmed, press the **ESC.** The calibrated value will be shown on the display and the second expected buffer value will be displayed. Press **ESC** to exit and save the two-point calibration.

Tree-Point Calibration

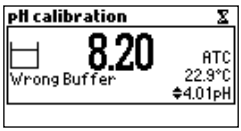
- Remove the electrode holder with electrode from the top of the beaker.
- Place the third beaker with calibration buffer in the beaker holder. Rinse the electrodes in a beaker containing the third buffer rinsing solution.
- Place the electrode holder (with electrodes) on the top of the beaker and secure it by turning clockwise and press the **STIR** key.
- If necessary press the ▼/▲ keys in order to select a different buffer value.

Note: *Previously confirmed buffers are removed from the list of available buffers.*

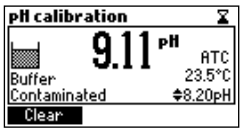
- The ⧗ symbol will be shown on the display until the reading becomes stable.
- When the reading is stable and close to the selected buffer, the ⧗ symbol will disappear and the **Confirm** key will become active.
- Press **Confirm** to confirm the calibration point. The instrument stores the calibration value and returns to calibration menu, where the date and time for the pH calibration will be updated.

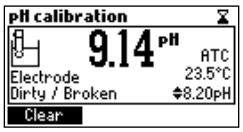
7.3. ERROR AND WARNING MESSAGES

- If the measured value is not close to the selected buffer the error message "Wrong Buffer" is displayed. Use the ▼/▲ keys to select a different buffer.

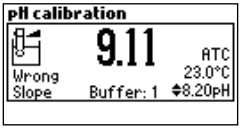


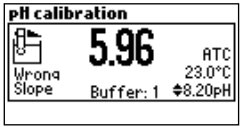
- If the measured offset isn't within the preset limits (±45 mV), the meter will display the message *"Buffer Contaminated"* alternatively with *"Electrode Dirty/Broken"*. Press **Clear** to delete the previous calibration and return to the calibration menu.



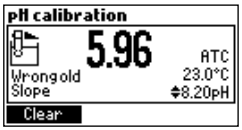


- If the computed slope isn't within the preset limits, the meter will display the message *"Wrong Slope"*. If the slope is too high the ◢ symbol will be displayed. If the slope is too low the ◣ symbol will be displayed.

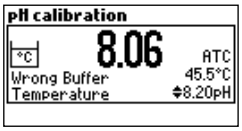




- If the *"Wrong Old Slope"* error message is displayed, an inconsistency exists between the current and the previous calibration. Clear the previous calibration by pressing **Clear** and proceed with calibration from the current calibration point. The instrument will keep all the confirmed values during the current calibration.



- If the temperature reading is out of the defined temperature range of the buffer (0 to 45 °C), the *"Wrong Buffer Temperature"* error message will be displayed, and the temperature symbol will blink on the display. Calibration cannot be confirmed.



8. PUMP CALIBRATION

The calibration of the pump must be performed every time the syringe, pump tube, the titrant bottle or the pH electrode is changed. It is recommended to perform the pump calibration before each set of titrations, after the titrator is left idle for several hours, or once daily.

- Verify the electrode has been calibrated in 8.20 pH buffer.
- Ensure the pump is primed with HI84534-50 titratable acidity titrant.

8.1. PREPARATION

- Use a clean pipette to add exactly 2 mL of HI84534-55 calibration standard to a clean beaker.

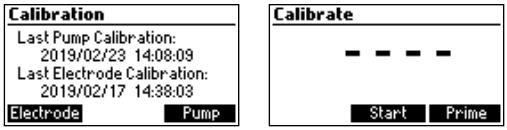
Note: *Failure to use a clean pipette will result in erroneous readings.*

- Fill the beaker up to the 50 mL mark with the distilled or deionized water.

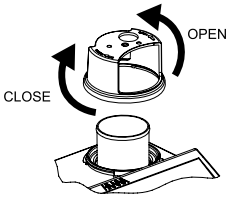
- Press the **CAL** key. The instrument displays the date and time of the last electrode calibration and the last pump calibration.

8.2. PROCEDURE

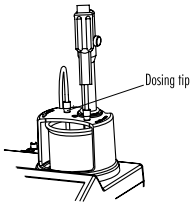
- Place the dispending tip over a waste beaker and press **Pump** then **Start**. The pump will dispense a small amount of titrant when it resets.



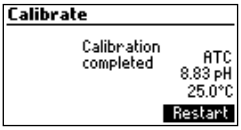
- Place the stir bar in the beaker and put the beaker in the minititrator top.



- Place the probe holder on the top of the beaker and secure it by turning clockwise.

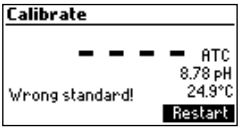


- Rinse the pH electrode with deionized water and immerse into the calibration solution until the reference junction is completely submerged. Be sure that the tip of the electrode is not hitting the stir bar. If necessary, additional distilled or deionized water can be added.
- Insert the dosing tip into the titrant tube sleeve. It is critical that the tip be immersed approximately 0.25 cm (0.1") into the solution being titrated.
- Press **Continue** to begin the calibration or **Stop** to abort it.
- At the end of the calibration, *"Calibration Completed"* appears on display. To repeat the calibration press **Restart** or the **ESC** key to return to the main screen.

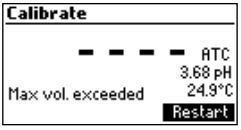


8.3. ERRORS AND WARNING MESSAGES

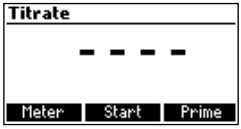
- If an erroneous condition is encountered during the calibration the message *"Wrong standard"* is displayed. Prepare a new standard, rinse the pH electrode, temperature probe, and dosing tip. The calibration can be restarted by pressing **Restart**.



- If the maximum titrant volume is dispensed, the message *"Max vol. exceeded"* is displayed. Prepare a new standard, rinse the pH electrode, temperature probe, and dosing tip. The calibration can be restarted by pressing **Restart.**



9. TITRATION



The instructions listed below should be followed carefully to ensure measurements are conducted with the highest possible accuracy and precision.

- Ensure the pump and electrode have been calibrated.
- The dosing tip is immersed in the sample (approximately 0.25 cm / 0.1")
- A clean volumetric pipette is used to transfer the sample to the titration beaker.

9.1. SAMPLE PREPARATION

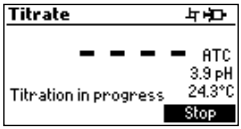
- Use a clean pipette to add exactly 1 mL of sample to a clean beaker.

Note: *Failure to use a clean pipette will result in erroneous readings.*

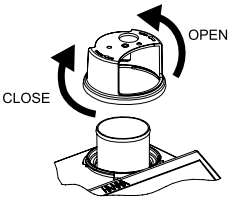
- Fill the beaker up to 50 mL with distilled or deionized water.

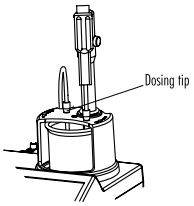
9.2. PROCEDURE

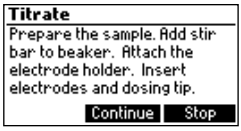
- Place the dispensing tip over a waste beaker and press **Start**. The pump will dispense a small amount of titrant when it resets.



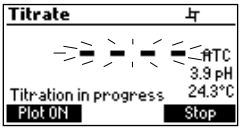
- Place the stir bar in the beaker and put the beaker in the minititrator top.
- Place the probe holder on the top of the beaker and secure it by turning clockwise.
- Rinse the pH electrode with deionized water and immerse into the sample until the reference junction is completely submerged. Be sure that the tip of the electrode is not hitting the stir bar.
- Insert the dosing tip into the titrant tube sleeve. It is critical that the tip be immersed approximately 0.25 cm (0.1") into the sample being titrated.
- Press **Continue** to begin the titration and **Stop** to abort it.

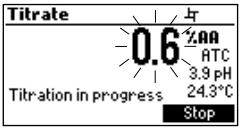




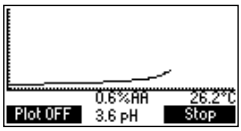


- The instrument will continuously update the concentration on the display. The value will be displayed blinking. When the reading is under range "----" symbol appears blinking.

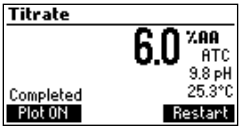


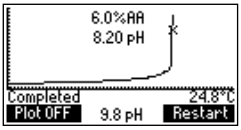


- The titration curve can be viewed during a titration by pressing **Plot ON**. Press **Plot OFF** to return to the titration screen.

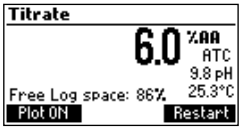


- At the end of the titration, the concentration is displayed in the selected unit. The titration curve can be viewed by pressing **Plot ON**.



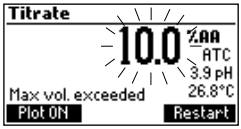


- Press the **LOG** key to save the result and the titration curve. A message will be displayed for a few seconds indicating the amount of free log space.
- Press **Restart** to begin a new titration or the **ESC** key to return to the titration menu.

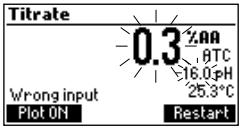


9.3. ERRORS AND WARNING MESSAGES

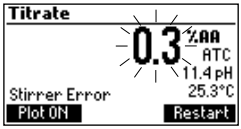
- If the concentration exceeds the range limits, the maximum concentration will be displayed blinking and the message *"Max. vol exceeded"*. Another titration can be started by pressing **Restart**.



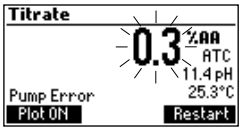
- If the pH or temperature reading exceeds the specified limits, the message *"Wrong input"* will be displayed and the pH or temperature reading will blink. Another titration can be started by pressing **Restart**.



- If an error with the stirrer occurs during the titration the message *"Stirrer Error"* will be displayed. Another titration can be started by pressing **Restart**.

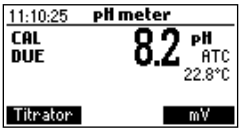


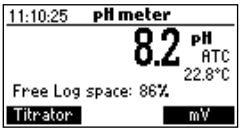
- If an error with the pump occurs during the titration the message *"Pump Error"* is displayed. Another titration can be started by pressing **Restart**.



10. pH MEASUREMENT

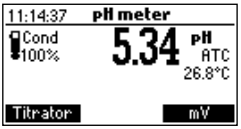
The HI84534 can be used as a pH meter for direct measurements.
Verify that the instrument has been calibrated before taking pH measurements. From titrator mode press **Meter**. If an electrode calibration hasn't been performed, or the number of days exceeds the calibration time out value set, the message *"CAL DUE"* will blink on the left side of the display (see **Calibration timeout** option in Setup for details).



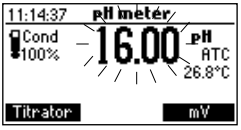


To take pH measurements:

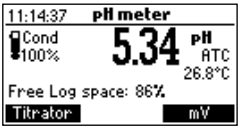
- Submerge the pH electrode 2 cm (0.8") and the temperature probe into the sample to be tested and stir gently. Allow time for the electrode to stabilize. When the reading becomes stable, the ⧗ symbol will disappear.



- If the pH reading is less than -2.00 pH or greater than 16.00 pH, the closest full-scale value will be displayed blinking.



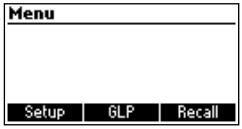
- Press the **Log** key to save the current reading. A message indicating the free log space will be displayed for a few seconds.

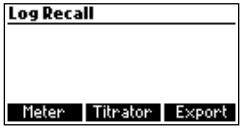


If measurements are taken successively in different samples, it is recommended to rinse the electrodes thoroughly with deionized or distilled water and then with some of the next sample to prevent cross-contamination.
The pH measurements are affected by temperature. In order to have accurate pH measurements, the temperature effect must be compensated for. To use the Automatic Temperature Compensation (ATC) feature, connect and submerge the HI7662-T temperature probe into the sample as close as possible to the electrode and wait for a few seconds. The *"ATC"* message will be shown on the display. Automatic Temperature Compensation will provide pH corrected values for the measured temperature. If Manual Temperature Compensation (MTC) is desired, the temperature probe must be disconnected from the instrument.
The default temperature of 25 °C (77 °F) or the last temperature reading will be displayed, preceded by the ▲▼ symbol and the *"MTC"* message.
The temperature can be adjusted with the ▼/▲ keys (from -20.0 to 120.0 °C).

11. LOGGING

Press the **Menu** key then **Recall** to access the log history.

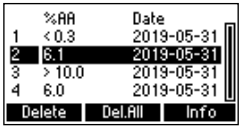




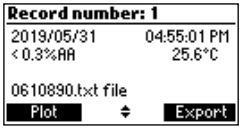
When an external USB storage device is connected, the **Export** key is displayed. It saves the meter and titrator logs in two text format files on the storage device.
Press **Meter** or **Titrator** to view the respective logs.

11.1. TITRATOR

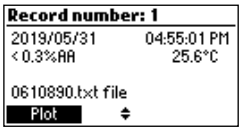
The instrument will display a list of all the records stored in the log. Use the ⮟/⮝ keys to scroll the list of records.
If the saved concentration was out of range, the "<" or ">" symbols are displayed in front of the reading.



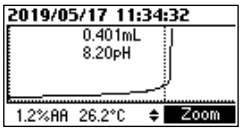
Press **Delete** to delete the selected log from the memory.
Press **Del.All** to delete all records.
Press **Info** to see detailed information about the highlighted record. The selected record data and the titration curve data file name are displayed.



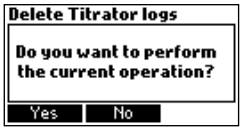
When a USB storage device is connected, the **Export** key is displayed. It saves the titration curve data as a text file on the storage device using the displayed file name.
Use the ⮟/⮝ keys when ⬍ is displayed to scroll between the log records.
Press the **ESC** key to return to the previous screen.



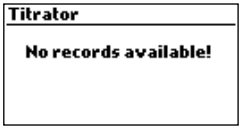
Press **Plot** to view the titration curve or the **ESC** key to return to the previous screen. On the titration curve, the end point volume and pH are displayed. The titration data (Total Titrant Volume on the x-axis and pH on the y-axis) can be scanned through with the dotted line by using the ▼/▲ keys.



To zoom the titration curve press **Zoom**.
If **Delete** or **Del.All** is pressed the instrument will ask for confirmation.

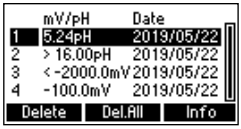


Press **Yes** to delete the record or **No** to return to the previous screen. Deleting a single record will renumber the list of records. If the titrator log is empty, the message *"No records available!"* will be displayed.

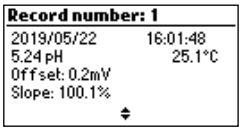


11.2. METER

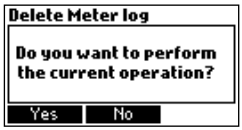
The instrument will display a list of all the records stored in the log. If the saved mV/pH measurements are out of range, the "<" or ">" symbols are displayed in front of the reading.

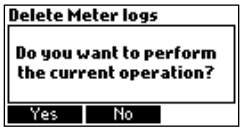


Use the ▼/▲ keys to scroll the list of records.
Press **Delete** to delete the selected log from the memory.
Press **Del.All** to delete all records.
Press **Info** to see detailed information about the highlighted record.
Use ▼/▲ keys when ▲▼ is displayed to scroll between the records.



Press the **ESC** key to return to the previous screen.
If **Delete** or **Del.All** is pressed the instrument will ask for confirmation.



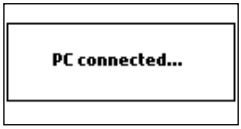


Press **Yes** to delete the record or **No** to return to the previous screen without deleting. Deleting a single record will renumber the list of records. If the pH log is empty, the message *"No records available!"* will be displayed.

11.3. PC INTERFACE AND DATA TRANSFER

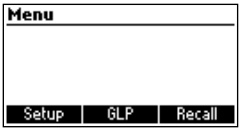
Saved titration results and pH/mV measurements can be transferred from the meter to a USB stick using the export function from the log recall menu. Two text files are transferred on the USB stick. These files can be used for further analysis on a PC. The logged data can also be transferred from the instrument to the PC using a USB cable.
Connect the USB cable and the following screen will be displayed.
Press **Meter** to generate the text file with pH/mV measurements.
Press **Titrator** to generate the text file with titration results.
Press **Plot** to generate the text files with titration plots.

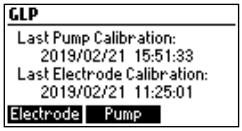
The generated files are visible on the PC and can be used for further analysis.
If the instrument has no logged Meter or Titrator records, the PC connected screen is displayed.



12. TITRATOR GLP INFORMATION

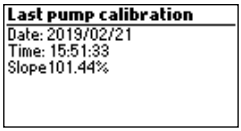
Press **Menu** then **GLP**.
From this screen it is possible to select **Electrode** or the **Pump**.



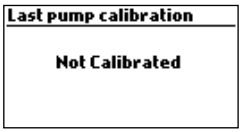


12.1. PUMP

Press **Pump** to view the pump's last calibration time, date and slope.

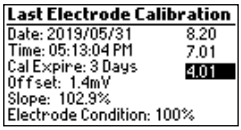


If a calibration hasn't been performed, the message *"Not Calibrated"* will be displayed.

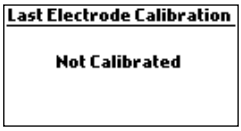


12.2. ELECTRODE

The pH meter GLP screens display the last pH calibration data.
Press **Electrode** to view information regarding electrode calibration.



The following items are included in electrode GLP: the time and date of the last calibration, offset, slope, electrode condition, calibration timeout and the calibration buffers. The buffers displayed in video inverse mode are from the previous calibration.
If a calibration hasn't been performed, the message *"Not Calibrated"* will be displayed.



13. TROUBLESHOOTING GUIDE

SYMPTOMS	PROBLEM	SOLUTION
Slow response/excessive drift.	Dirty pH electrode.	Refill with fresh fill solution. Soak the electrode tip in HI7061 cleaning solution for 30 minutes.
Reading fluctuates up and down (noise).	Clogged/dirty junction. Low electrolyte level (refillable pH electrodes only). Cable connection.	Refill with fresh fill solution. Soak the electrode tip in HI7061 cleaning solution for 30 minutes. Check cable connection to meter and verify protective cap is off.
While in pH reading mode, -2.00 or 16.00 pH is displayed blinking.	Reading out of range.	Check cable connection to meter and verify protective cap is off. Check the quality of the sample. Clean the electrodes. Refill with fresh fill solution.
The meter does not accept the pH buffer solution for calibration.	Broken pH electrode.	Replace the electrode or contact the vendor.
The pump calibration can't be performed	Broken pump tubing. Wrong or contaminated pump calibration solution. Broken pH electrode.	Verify tubing, valve, syringe are intact and solution passes when pump is primed and no air bubbles are present. Check the pump calibration solution. Verify electrode is calibrated in fresh pH buffers. Prepare another standard, prime the pump and restart the calibration.
The temperature probe is connected, but the meter displays *"MTC"*.	Broken temperature probe.	Replace temperature probe.

SYMPTOMS	PROBLEM	SOLUTION
After a titration, the instrument displays 10.0% AA or 100 g/L AA with the selected unit blinking.	Broken electrode. Instrument not calibrated. Wrong sample. Concentration out of range.	Check/clean the electrodes. Recalibrate the instrument (pump and pH). Use care during sample preparation. Check sample size and permitted range.
At startup, the meter displays the HANNA logo permanently.	One of the keys is stuck.	Check the keyboard or contact the vendor.
"Error xx" message is displayed.	Internal error.	Power off the meter and then power it on again. If the error persists, contact the vendor.
"Stirrer error" message is displayed at the end of pump calibration or titration.	Check the stir bar and beaker content.	If the error persists, contact the vendor.
Non-spinning stirrer icon blinking in pH calibration and meter mode.	Check the stir bar and beaker content.	If the error persists, contact the vendor.
"Pump error" message is displayed.	Check the tubing, valve and syringe.	If the error persists, contact the vendor.
At startup the meter displays *"Methods corrupted"*.	The method file was corrupted.	Contact the vendor.

14. ACCESSORIES

REAGENTS	
HI84534-50	Titratable acidity titrant (120 mL)
HI84534-55	Titratable acidity calibration standard (120 mL)
pH CALIBRATION SOLUTIONS	
HI7004M	Buffer solution pH 4.01 (230 mL)
HI7007M	Buffer solution pH 7.01 (230 mL)
HI70082M	Buffer solution pH 8.20 (230 mL)
HI7010M	Buffer solution pH 10.01 (230 mL)
ELECTRODES	
HI1131B	pH electrode
HI7662-T	Temperature probe
ELECTRODE FILL SOLUTION	
HI7082	Fill solution for HI1131B (4 x 30 mL)
ELECTRODE STORAGE SOLUTION	
HI70300L	Electrode storage solution (500 mL)
ELECTRODE CLEANING SOLUTION	
HI7061M	Electrode cleaning solution (230 mL)
OTHER ACCESSORIES	
HI70500	Tube set with cap for titrant bottle, tip and valve
HI7100051/8	115 Vac to 12 Vdc, 800 mA
HI7100061/8	230 Vac to 12 Vdc, 800 mA
HI731319	Stir bar (10 pcs., 25 x 7 mm)
HI740036P	100 mL beaker (10 pcs.)
HI740236	5 mL syringe for mini titrator (6 pcs.)
HI920013	PC connection cable

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 yours and the meter's safety do not use or store the meter in hazardous environments.

WARRANTY

HI84534 is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. Electrodes and probes are warranted for a period of six months. 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 (see engraved on the back 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 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.

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

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MAN84534

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