

Test Instrument User's Guide

For the

NEO-STAT+™ Meter

pHoenix™ Meter

HYDRA Water Quality Instrument™



MesaLabs

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Description

MESA LABS hand-held test instruments, the NEO-STAT+ Meter, the pHoenix Meter, and the HYDRA Water Quality Instrument, are designed to help you quickly and easily check the conductivity, pH and temperature of liquids.

Measurement Parameters				
	Conductivity	Temperature	pH	Resistivity/TDS
NEO-STAT+	X	X		
pHoenix	X	X	X	
HYDRA	X	X	X	X

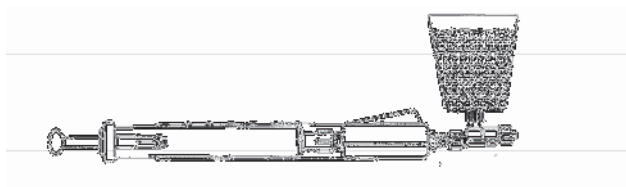
Applications for Use

Conductivity, temperature and pH are key indicators of many systems' performance that require periodic monitoring and adjusting to achieve optimal results. MESA LABS hand-held test instruments may be used to test liquids in a variety of settings including commercial, environmental, industrial, laboratory, and medical. Measurements are temperature-compensated to allow for a wide range of testing conditions.

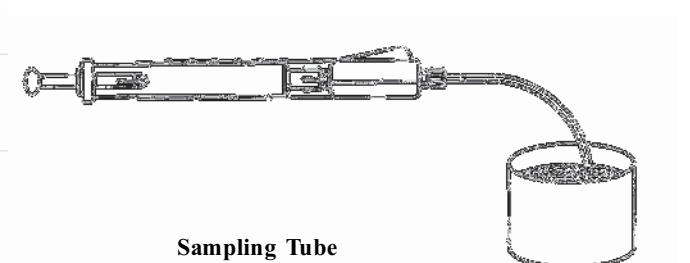
Principles of Operation

The instrument enclosure contains the measurement cell, electronic circuitry, and digital display. A syringe attaches to the side of the unit with luer connectors and is used to draw liquids through the cell. The mode switch is used to turn on the instrument, to freeze the readings on the display for easy recording, and to select modes during instrument calibration. Readings are shown simultaneously on the liquid crystal display. On the HYDRA Water Quality Instrument, the user may toggle between TDS and resistivity in the conductivity area of the display. The instrument turns off automatically 3 minutes after the last test.

A liquid may be tested using one of the following methods:



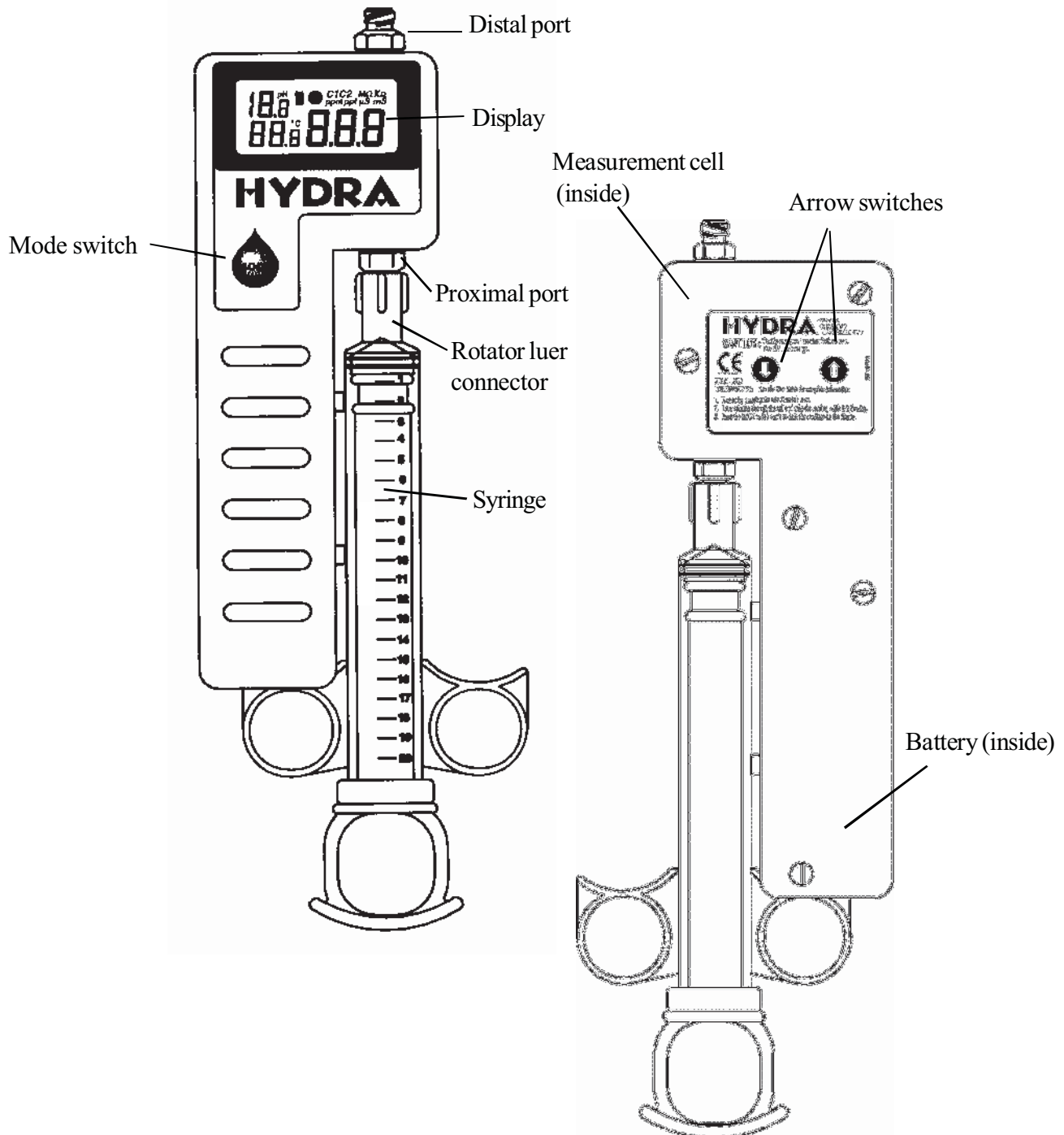
Sample Collection Cup



Sampling Tube

Features and Controls

The labeled parts are common to all three instruments.



Safety and Storage

Cautions

Verify accurate function of your test instrument before taking measurements or whenever inaccurate readings are suspected. To verify function, use standard solutions traceable to the National Institute of Standards and Technology (NIST) Standard Reference Material or an equivalent standards organization. For temperature, use a NIST-traceable thermometer having a resolution of 0.1°C.

Use sodium chloride (NaCl) standard solution for instrument calibration. Each instrument is temperature-compensated for sodium chloride (NaCl) solution. Using other solutions, such as potassium chloride (KCl) may result in inaccurate calibration.

Discard used liquid samples into the appropriate waste container. Do not reintroduce into the system being tested.

DO NOT submerge your instrument in liquids. DO NOT allow liquids to enter the enclosure.

Cleaning and Storage

NEO-CARE Cell Cleaning Solution is ideal for pHOenix, Hydra, and NEO-STAT+ meters. To clean, rinse the meter thoroughly by filling the syringe and expelling NEO-CARE slowly three times. After the third time, expel the NEO-CARE from the meter, draw the syringe back halfway pulling air into the cell and cap the sample port. The meter can then be stored like this, with the port capped to prevent the residual NEO-CARE in the cell and syringe from drying out. NEVER store your meter with dialysate, bleach, or RO water in the cell.

Please see page #7 for additional information on disinfection and storage of your meters.

Store your test instrument away from extreme temperatures.

Taking Measurements

Instrument switches are enclosed in [brackets]. Display symbols are enclosed in “quotations.”

CAUTION: Verify calibration of your instrument before taking measurements. See “Checking Instrument Calibration.”

- 1) Press and release the [MODE] switch to turn the meter on. Choose one of the following measurement methods:

- **Sampling tube (top right):** Connect a clean sampling tube to the distal port of the instrument via the luer adapter. Place the end of the tube into the test solution.
- **Sample collection cup (top far right):** Connect a clean, dry sample collection cup to the distal port of the instrument. Fill the sample cup approximately $\frac{3}{4}$ full with test solution.
- **Hemodialysis delivery system: (bottom far right, right)** Insert male slip luer adapter into sample port. Be sure to insert the adapter far enough into port to depress the spring plate.



- 2) Draw liquid through the cell. Liquid should be flowing while measurement is taken. When no air bubbles are present and the readings stabilize, press and release the [MODE] switch to hold the readings on the display. A “HOLD” symbol will appear on the display. Press [MODE] again to deactivate the hold feature.

HYDRA: Press either arrow switch on the back of the instrument to toggle between conductivity, resistivity, and TDS readings.

- 3.) Discard the used solution in the appropriate disposal or waste container. The instrument will turn off automatically three minutes after final use.

CAUTION: **Discard used liquid samples** into the appropriate waste container. Do not reintroduce into the system being tested.

- 4.) Rinse the cell, syringe interior, and sampling cup/tube thoroughly with RO water after use.

Checking Instrument Calibration

Verify accurate calibration of the conductivity and pH functions before use or whenever inaccurate readings are suspected. The HYDRA Water Quality Instrument's total dissolved solids and resistivity values are calculated from the conductivity measurement; those functions do not need to be calibrated. Periodically check the temperature function of the instrument to confirm accurate readings.

CAUTION: Use only sodium chloride (NaCl) standard solution. MESALABS test instruments are temperature-compensated for NaCl solution. Other solutions, such as potassium chloride (KCl), may result in inaccurate calibration.

Checking Calibration of the Conductivity and pH Functions

You will need:

- ✓ Conductivity standard solution (Choose a value closest to liquids typically tested)
 - ✓ 7.00 pH buffer solution (pHoenix, HYDRA only)
 - ✓ Sample collection cup, sampling tube
- 1) Connect a clean sampling tube or sample collection cup to the distal port of the instrument.
 - 2) Rinse the container with some of the conductivity standard solution to eliminate any contaminants. Discard the rinse solution. Pour at least 50 ml of fresh solution into the rinsed container.
 - 3) Slowly draw solution through the cell. Observe the reading on the display while the solution is flowing. If the display reads the value of the conductivity standard solution being measured, calibration is not needed. If calibration is needed, refer to the appropriate instrument calibration guide.
 - 4) Repeat steps with 7.00 pH buffer solution. (pHoenix, HYDRA only)



MESA LABS Care and Calibration Stations (*right*) provide a fast, convenient means for rinsing, disinfecting, verifying, and calibrating your instruments. One-way check valves prevent evaporation and contamination of your standard solutions while minimizing waste. Used solution is expelled through the check valve to a sink or waste container via a drainage tube. A laminated wall chart provides step-by-step instructions and a handy rack is included with all configurations. See "Parts and Accessories."

Checking Calibration of the Temperature Function

The meter's temperature circuit is very stable and is not likely to require user calibration. MESA LABS does NOT recommend that users attempt calibration of the temperature function unless inaccurate readings are suspected. Submerge a NIST-traceable thermometer with a resolution of 0.1°C into a solution bath at a temperature close to room temperature. Connect a clean sampling tube to the distal port of the instrument. Draw the test solution through the cell. Solution should be flowing while the measurement is taken for best measurement accuracy. Observe the reading on the display while the solution is flowing. If the instrument displays the value indicated by the thermometer, calibration is not needed. If calibration is needed, refer to the appropriate instrument calibration guide.

Replacement Parts

Replacement syringes, accessories and standard solutions are available from MESA LABS or your local distributor.

Replacing the Syringe

Typical life is 6-9 months, depending on use. When moving the plunger in and out of the barrel becomes difficult, it is time to replace the syringe.

- 1) Using your fingers, turn the rotator luer connector counterclockwise to disconnect the syringe.
- 2) Install a new syringe. Turn the rotator luer connector clockwise to secure.

Replacing the Battery

When the low battery indicator appears on the display, replace it as soon as possible. The instrument will continue to function normally until the battery voltage drops below a critical limit. At that time, the low battery indicator will be shown on an otherwise blank display and the instrument will turn off after 2 seconds. *Instrument functions are inoperable when the low battery indicator is the only symbol displayed!*

To replace the battery:

- 1) Loosen all five enclosure screws and remove the back cover.
- 2) Remove the battery and replace it with a new one, observing the proper polarity.

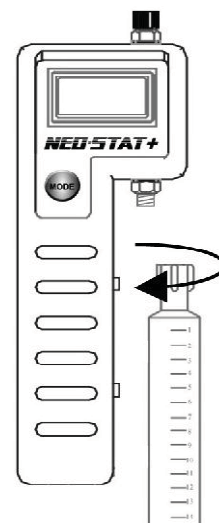
CAUTION: Replace with an EVEREADY Alkaline Energizer®, No. 522, if possible. Some 9V batteries are too large to fit properly in the case. This may damage or prevent proper sealing of the enclosure and allow liquids to enter the case.

- 3) Replace the back cover. Take care to align the edges of the front and back covers to ensure proper sealing.
- 4) Tighten the housing screws. DO NOT over tighten—this may damage the enclosure.

Replacing the pH Reference Electrode (pHoenix, HYDRA)

The expected life of the pH electrode is 12 to 18 months depending upon use. When the response slows it is time for the pH reference electrode to be replaced. *MESA LABS or an authorized distributor must replace this part.*

NOTE: Store your instrument with NEO-CARE™ or 4.00 pH buffer solution in the cell to extend the life of the pH reference electrode.



Cleaning Your Instrument

Using a damp cloth, wipe the exterior of the instrument daily, including the ports and syringe, with a mild soap solution. Clean the sample collection cup and sampling tube with soapy water as needed. Rinse thoroughly with water. Dry with a soft cloth. If disinfection is required, use bleach at a dilution of 1 part bleach to 99 parts water.

CAUTION: DO NOT allow liquid to enter the case. DO NOT use abrasive materials or acetone as they may damage the case and/or syringe.

Disinfecting the Cell and Syringe

RINSING RECOMMENDATIONS

It is recommended that RO water be the only choice for rinsing meters.

DISINFECTION RECOMMENDATIONS

Use a 1% bleach solution (1 part bleach to 99 parts RO water; mixed fresh daily) with a 10 minute dwell time. This method is best performed prior to the first shift of morning patients. After the 10 minute dwell time, expel the bleach solution; rinse well (2 to 3 times) with RO water, and verify the values of the instrument you are using; 7.0 pH and 14.0 conductivity for the pHoenix meter. Verify other values if you are measuring extended ranges.

CLEANING AND STORAGE RECOMMENDATIONS

NEO-CARE Cell Cleaning Solution is ideal for pHoenix, Hydra, and Neo-Stat+ meters. To clean, rinse the meter thoroughly by filling the syringe and expelling NEO-CARE slowly three times. After the third time, expel the NEO-CARE from the meter, draw the syringe back halfway pulling air into the cell and cap the sample port. The meter can then be stored like this, with the port capped to prevent the residual NEO-CARE in the cell and syringe from drying out. NEVER store your meter with dialysate, bleach, or RO water in the cell.

CAUTION: Diluted bleach solution must not remain in the meter for longer than 10 minutes. Dwell times longer than 10 minutes will cause premature deterioration of the condo and pH cells within the meter. Thoroughly rinse with RO water to remove and residual bleach before taking readings. **NEVER** use bleach solution for overnight storage.

NOTE: The regular use of NEO-CARE will minimize hard deposits and bacteria filming from forming on the cell sensors. *Deposits on the cell sensors may cause inaccurate readings.*

Specifications

NEO-STAT+ Meter			
	RANGE	RESOLUTION	ACCURACY
CONDUCTIVITY*	.10 to 1.99 mS	.01 mS	±.01
	2.0 to 19.9 mS	0.1 mS	±0.1
	20.0 to 120.0 mS	1 mS	±2.0
	120.0 to 200.0 Ms	1 mS	±30.0 mS
	1.0 to 19.99 mS	0.1 mS	±0.1 mS
*CONDUCTIVITY SPECIFICATION FOR METERS WITH SERIAL NUMBERS NS06499 OR LOWER			
TEMPERATURE	15° to 90 °C	1°	±1°

*Temperature-compensation: 15° to 45°C.

pHoenix Meter			
	RANGE	RESOLUTION	ACCURACY
CONDUCTIVITY*	.10 to 1.99 mS	.01 mS	±.01
	2.0 to 19.9 mS	0.1 mS	±0.1
	20.0 to 120.0 mS	1 mS	±2.0
	120.0 to 200.0 mS	1 mS	±30.0 mS
TEMPERATURE	15° to 90 °C	1°	±1°
pH	2.0 to 10.0 pH	0.1 pH unit	± 0.1

*Temperature-compensation: 15° to 45°C.

HYDRA Water Quality Instrument			
	RANGE	RESOLUTION	ACCURACY
CONDUCTIVITY*	0.2 to 19.9 µS	0.1 µS	20° to 40°: ±1.5% FS <20° or >40°: ±2.5% FS
	20 to 199 µS	1 µS	
	0.20 to 1.99 mS	0.01 mS	
	2.0 to 19.9 mS	0.1 mS	
TDS*	0.8 to 99.9 ppm	0.1 ppm	
	100 to 999 ppm	1 ppm	
	1.00 to 9.99 ppt	0.01 ppt	
Resistivity*	1.0 to 3.0 MΩ	0.1 MΩ	
	0.05 to 0.99 MΩ	0.01 MΩ	
TEMPERATURE	10° to 90 °C	0.1°	<40°: ±0.5 >40°: ±1.0
pH*	2.0 to 12.0 pH	0.1 pH unit	±0.1



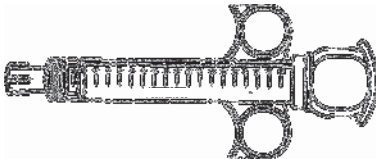




*Temperature-compensation: 20° to 40°C.

Physical Specifications† (Common to all three meters)			
DIMENSIONS	WEIGHT	POWER	BATTERY TYPE
10 x 2.5 x 1" 25 x 6.25 x 2.5 cm	7.33 oz./208 g	Battery	9V Alkaline EVEREADY® 522

Parts and Accessories

The following replacement parts, accessories, and solutions are available from MESA LABS or your local distributor.

Replacement Parts



	Description	Quantity	Part Number
	Sampling tube	10	93.0006
	Sample collection cup assembly	4	98.0021
	Control syringe	2	93.0015
	Port assembly	2	98.0010
	Male slip luer adapter	20	93.0003
	Male-female luer adapter	10	93.0007
	Calibration labels	500	93.0002
Test Instrument User's Guide for the NEO-STAT+, pHoenix and HYDRA Meters		1	98.0016
Calibration Guide, NEO-STAT+ Meter		1	93.0004
Calibration Guide, pHoenix Meter		1	96.0004
Calibration Guide, HYDRA Water Quality Instrument		1	98.0011

Accessories for Care and Calibration

Proper care and calibration of your instruments plays a critical role in maintaining your investment. MESA LABS care and calibration stations provide a fast, convenient means for rinsing, disinfecting, verifying, and calibrating your instruments.

One-way check valves prevent evaporation and contamination of your standard solutions while minimizing waste. Used solution is expelled through the check valve to a sink or waste container via a drainage tube. A laminated wall chart provides step-by-step instructions for use. A handy rack (*right*) is included with all SUPER STATION™, TRI-STATION™ and MINISTATION™ configurations.



	Description	Order No.
	SUPER STATION The two-level rack holds four 32 oz. and five 16 oz. bottles—everything required for verification plus levels 1 and 2 calibration of the pHoenix and HYDRA meters. Includes: Conductivity standard solution: 1 mS (16 oz.), 14.0 mS (32 oz.), 100 mS (16 oz.) pH buffer solution: 4.00 (16 oz.), 7.00 (32 oz.), 10.00 (16 oz.) Also includes a spare control syringe and 16 oz. of NEO-CARE Cell Cleaning Solution. Dimensions: 17 x 14 x 5"/43 x 36 x 13 cm	04.0021 04.0020 <i>(Designed specifically for use with HYDRA. 150 µS solution replaces 100 mS solution.)</i>
	4-BOTTLE TRI-STATION The single-level rack holds four 32 oz. bottles of solution and includes the most commonly needed items for mid-range verification and calibration of the pHoenix and HYDRA meters. Includes 32 oz. each of 14.0 mS conductivity standard and 7.00 pH buffer solutions, RO water bottle, and space for NEO-CARE or bleach solution. Dimensions: 17 x 10.5 x 5"/43 x 27 x 13 cm	04.0017
	3-BOTTLE TRI-STATION – (not shown) includes all items above except 7.0 pH solution. (not needed for NEO-STAT+)	04.0001
	MINI-STATION This MINI-STATION provides all the functionality and convenience of other models, in a smaller size. Holds five 16 oz. bottles of solution. Easily customized to suit your needs. <i>Solutions not included.</i> Dimensions: 17 x 9.5 x 4"/3 x 24 x 10 cm	04.0018
	RINSE STATION This independent rinse station provides convenient access to water for rinsing in any location. Holds one 32 oz. bottle for water or solution of your choice. <i>Solutions not included.</i> Dimensions: 5 x 10.5 x 5"/13 x 27 x 13 cm	04.0016

Solutions

MESA LABS standard solutions are certified traceable to NIST Standard Reference Materials and are sealed with tamper-evident packaging.



Description	Value	Size	Order No.
Conductivity Standards millisiemens/cm at 25°C Shelf life: 12 months Discard 30 days after opening.	150 μ S / 71 ppm	16 oz./475 ml	02.0045
	1 mS / 490 ppm	16 oz./475 ml	02.0037
	14.0 mS / 7865 ppm	16 oz./475 ml	02.0014
		32 oz./950 ml	02.0027
	100 mS	16 oz./475 ml	02.0036
pH Buffer Reference Standard ± 0.01 at 25°C Shelf life: 18 months Discard 90 days after opening.	4.00 pH color-coded red	16 oz./475 ml	02.0032
	7.00 pH color-coded green	16 oz./475 ml	02.0030
		32 oz./950 ml	02.0031
	10.00 pH color-coded blue	16 oz./475 ml	02.0034
NEO-CARE Cell Cleaning Solution Gently, yet effectively, removes hard deposits and bacterial filming from cell sensors for greater accuracy and extended instrument life. Non-toxic.		16 oz./475 ml	02.0013
		32 oz./950 ml	02.0028
		1 gallon	02.0003

Ensure Standard Solution Accuracy

- Keep solutions tightly capped to avoid evaporation.
- Take measurements immediately after pouring — evaporation will cause errors.
- Rinse the inside of the sample container, tube or adapter, measurement cell, and syringe with the standard solution. Discard this rinse solution and take measurements on a fresh sample.
- **Never, EVER** pour used solution back into the bottle.

Discard solution the appropriate number of days after opening the bottle or after the expiration date.

Limited Warranty

MESA LABORATORIES, INC. warrants to the original purchaser of the NEO-STAT+ Meter, the pHoenix Meter, and the HYDRA Water Quality Instrument that it will repair or replace, at its option, any malfunctioning or defective part without charge for **12 months from the original purchase date**. Parts used for replacement are warranted for the remainder of the original warranty period. MESA LABS will provide labor without charge to the original purchaser for a warranty repair.

TO OBTAIN WARRANTY SERVICE, the original purchaser must deliver, at its own expense, the product to MESA LABS at the address below:

MESA LABORATORIES, INC.
12100 W. 6th Avenue
Lakewood, Colorado 80228 USA

RETURN AUTHORIZATION is required for warranty repair.

THIS WARRANTY DOES NOT COVER:

- 1) Disposable items such as the battery or control syringe
- 2) Routine calibration or cell cleaning
- 3) pH Reference and Sensor
- 4) Defects caused by:
 - a) modification, alteration, repair or service of the product by anyone other than MESA LABS or an authorized service center
 - b) misuse due to negligence or accident
 - c) operation or maintenance of the product in a manner contrary to the manufacturer's instructions

Any express warranty not provided herein, and any remedy for breach of contract that but for this provision might arise by implication or operation of law, is hereby excluded and disclaimed. The implied warranties of merchantability and of fitness for any particular purpose are expressly limited to the terms mentioned above.

Under no circumstances shall MESA LABS be liable to the original purchaser or to any other person for any special or consequential damages, whether arising out of breach of warranty, breach of contract, or otherwise.

For further warranty information, contact MESA LABS, Inc.

Service and Support

MESA LABS offers full repair and calibration services at its corporate headquarters and authorized distributor locations throughout the world.

DO NOT attempt to repair or modify the instrument, as this will void the warranty. Any service required other than battery or syringe replacement, or calibration must be referred to either MESA LABS or an authorized distributor.

Please contact MESA LABS for further information.

Write to MESALABS, Inc.
 12100 W. 6th Avenue
 Lakewood, Colorado 80228
 USA

Telephone 1-800-992-6372 Toll-free USA/Canada
 1-303-987-8000

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