USER'S GUIDE

COM-300
pH / EC / TDS / TEMP METER

CONTENTS

OVERVIEW

Thank you for purchasing the Professional Series COM-300 Meter. The COM-300 is an advanced waterproof combo meter with superior accuracy. The meter measures four parameters: pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS) and temperature. It can be used to test the acidity or alkalinity of almost any liquid, provided the liquid contains less than 50% alcohol and a conductivity of at least 10 µS (5 ppm TDS (0.5 scale)). The COM-300 features 2 different conductivity conversion factors to convert EC to TDS using the 0.5 (NaCl) or 0.7 (442TM) as well as selectable modes for measurements in the µS, mS and ppm scales. The meter incorporates automatic temperature compensation (ATC) to accommodate for discrepancies in temperature that would naturally occur. The meter also features digital calibration for easy and precise calibration that will yield better results.

CONTACT INFORMATION

If you have any problems or questions regarding your meter, please contact HM Digital, Inc

HM Digital, Inc.　　　　　　　　Info@HMDigital.com
Los Angeles, CA USA　　　　　　　HMDigital.com
　　　　　　　　　　　　　　　　1-800-383-2777

SPECIFICATIONS

pH Range: 0.0 – 14.0 pH
EC Range: 0 - 9990 µS; 0 - 9.99 mS
TDS Range: 0 - 8560 ppm (mg/L); 0.5 (NaCl) scale; 0.7 (442) scale, 0 - 5000 ppm (mg/L)
Temperature Range: 0.1 - 50℃; 32 - 122°F
Resolution:
        pH: 0.1 pH
        EC: 0 - 999: 1 µS; 1000 - 9990: 10 µS; 0-9.99 mS: 0.01 mS
        TDS: 0 - 999: 1 ppm / 1000-9990: 10 ppm
        Temperature: 0.1 ℃/°F
Accuracy:
        +/- 0.1 pH
        +/- 2% EC/TDS
        +/- 1 ℃/°F
EC-to-TDS Conversion Factor: Pre-programmed, non-linear conversions for 0.5 (NaCl) or 0.7 (442™) solutions, selected by the user
Temperature Compensation: Automatic (ATC) to 25℃ (ATC range: 1-50℃)
Calibration:
        pH: Push Button Auto-calibration to 4, 7 or 10 pH for a fine tune digital calibration.
        EC/TDS: Digital calibration by push button (to any point within the range)
Auto Shut-Off: After 5 minutes
Probe: Detachable electrodes
Display: LCD panel
Housing: IP-67 Waterproof (Submersible, floats)
Power source: 2 x AAA batteries
**Battery Life:** Approximately 100 hours of usage (high ranges use greater power consumption)
Dimensions: 18.5 x 3.4 x 3.4 cm (7.3 x 1.3 x 1.3 inches)
Weight: 124g (4.4 oz) with batteries

HOUSING AND SCREEN DESCRIPTION

Housing

1. Lanyard hook
2. Battery compartment
3. LCD display
4. Button panel
5. [⏻] Power/Enter button
6. PH/EC mode, calibration mode, calibration-up button
7. EC/TDS mode, hold, calibration-down button
8. Sensor locking ring
9. Detachable sensor (Part # SP-C3)
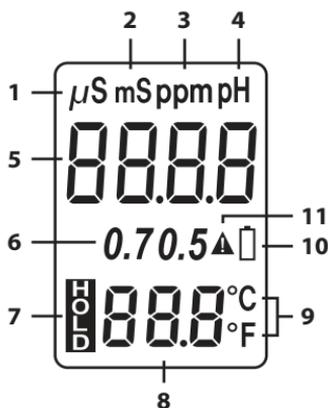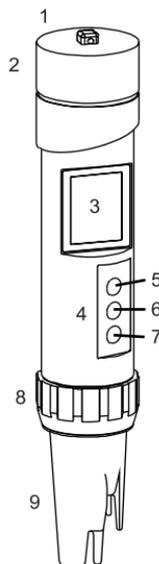
LCD Display

1. EC mode (µS)
2. EC mode (mS)
3. TDS mode (ppm)
4. pH mode
5. pH / EC / TDS measurement
6. Calibration solution / conversion factor selected
7. Hold mode (appears when HOLD is pressed)
8. Temperature measurement
9. Celsius / Fahrenheit mode
10. Low battery indicator
11. Warning symbol

SWITCHING BETWEEN pH AND EC/TDS MODES: To switch between the pH and EC/Conductivity modes press the 'PH/EC' (middle button) on the meter.

BEFORE YOU START!

1. The meter's electrode is shipped with a wetted sponge of Potassium Chloride (KCl) storage solution. If the sponge is dry (solutions can evaporate) use the included Mylar pack of storage solution to saturate the probe before 1st use. Let it sit in solution for a minimum of 30 minutes.
2. For new meters, for your first few tests, lightly swirl the meter in the water or solution you are testing 3 times and allow the meter to sit while adjusting to the reading.
3. If you need to test the pH of low conductivity/TDS water (below 50 µS/25 ppm), you should do so only after using the meter a few times in a pH buffer solution or higher conductivity water.
4. Never touch the glass sensor or reference tube with your fingers. Be sure not to hit the sensor or reference tube against a glass or beaker, to avoid cracking it.
5. Always make sure that the cap is on tight after usage.

TAKING MEASUREMENTS

The COM-300 can take measurement in pH, Electrical Conductivity, Total Dissolved Solids (TDS) and temperature. Please make sure to read the Switching modes section to ensure that your meter displays the desired readings.

pH Measurements

1. Remove the cap.
2. Press the [⏻] power button. The display will activate.
3. If the meter is in EC/TDS mode press the 'PH/EC' button to switch to pH mode.
3. Dip the meter into the water sample, liquid or solution to be tested.
4. <u>Lightly swirl</u> the meter to ensure the removal of trapped air bubbles or electric charges.
   Do not tap it against the glass.
5. The meter will display a reading almost immediately. Keep the meter in the liquid until the reading stabilizes (approx. 5-30 seconds) for an accurate reading.

   > NOTE - Minor fluctuations are a normal function of pH in
   >   certain environmental situations.

6. To view the reading out of the liquid, press the HOLD button while the meter is in the liquid. This will freeze the reading on the screen. Pressing the HOLD button again will release it.
7. press the [⏻] power button to turn the meter off.
8. Shake any excess water off the meter. For best results, rinse with distilled or deionized water after each usage and wipe with a tissue. Put the cap back on. Store the meter standing upright to ensure complete saturation of the sensor.

NOTE - The COM-300 is extremely sensitive in low conductivity water (below 50 µS). It is not recommended to use this meter in the water below 10 µS. If you do use the meter in such water, it is better to test in flowing water, or by swirling the meter continuously while obtaining the reading. The reading should stabilize in 30-45 seconds.
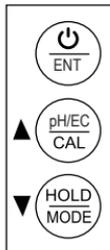
EC / TDS Measurement

1. Remove the cap.
2. Press the [⏻] power button. The display will activate.
3. To change the mode, press and hold the "HOLD / MODE" button (see the Switching Modes section for more information). The unit will cycle through the four possible modes:

   a. EC - µS

   b. TDS - ppm (with 0.5 conversion factor and temperature coefficient)

   c. TDS - ppm (with 0.7 conversion factor and temperature coefficient)

   d. EC - mS

4. Release the "HOLD / MODE" button when the display shows the desired mode.

5. Dip the Meter into the water sample or solution to be tested.

6. Lighty swirl the meter and tap it against the bottom of the beaker to ensure the
   removal of trapped air bubbles or electric charges

7. The meter will display a reading almost immediately. Keep the meter in the water
   until the reading stabilizes (approx. 30 seconds) for an accurate reading.

   NOTE - Newer meters may take up to 2 minutes to fully stabilize.
             This time will decrease with usage as the sensor adapts.

8. To view the reading out of the water sample or solution, quickly press the "HOLD / MODE" button
   while the meter is in the water. This will hold the reading on the screen. Quickly pressing the
   "HOLD / MODE" button again will release it.

9. Press the [⏻] power button to turn the meter off.

10. Shake any excess water off the meter. For best results, rinse with distilled or deionized water after each usage and wipe with a tissue. Put the cap back on. Store the meter standing upright to ensure complete saturation of the sensor.

Temperature Measurements

The temperature reading is always displayed on the LCD panel during measurement mode and is shown simultaneously for pH and EC/TDS readings. It is not shown when the meter is in calibration mode. The default reading for the meter is in Celsius.

1. Remove the cap.
2. Click the [⏻] power button. The display will activate.
3. The temperature reading is always displayed on the LCD screen (except in calibration and reset mode) and can be used to take air or liquid temperature measurements.
4. To measure the temperature of a water sample or solution, dip the meter into it. The temperature reading will change immediately (unless the liquid is at room temperature). For very hot or cold liquids, the reading may take slightly longer to stabilize.

NOTE - Because of the sensitivity of the pH sensor and reference tube, it is not recommended to use your meter as a thermometer in very hot or very cold liquids. Do not keep the meter in very hot or cold liquids for extended periods of time.

SWITCHING MODES

Electrical Conductivity (EC) and Total Dissolved Solids (TDS) Overview: While EC and TDS are often used synonymously, there are important differences to note. EC, when applied to water, refers to the electrical charge or a given water sample. TDS refers to the total amount of substances dissolved in the water other than the pure H_2O. The only true way of measuring TDS is to evaporate the water and weigh what's left. Since this is very difficult to do for the average person, we can estimate the TDS level by measuring the EC of the water. Every digital TDS meter in the world first measures the EC of the water and then converts that measurement to TDS.

All element have some electrical charge. Since different elements have different charges, it is necessary to convert the EC to TDS using a scale that mimics the charge of that water type. The following are the most common water samples, and for the COM-300, each has its own non-linear conversion factor:

KCl: Potassium Chloride is the international standard to calibrate instruments that measure conductivity. The COM-300 is factory calibrated with a 1413 µS (micro-Siemens) KCl solution.
442™: Developed by the Myron L Co., 442™ simulates the properties of natural water (rivers, lakes, wells, drinking water, etc.) with a combination of 40% Sodium Bicarbonate, 40% Sodium Sulfate, and 20% Sodium Chloride.
NaCl: Sodium Chloride is used in water where the predominant ions are NaCl, or whose properties are similar to NaCl, such as seawater and brackish water.

→ Measurements in EC (µS or mS) do not have a conversion factor.

How temperature affects the reading: temperature greatly affects both the EC and TDS readings. The international standard temperature for EC and TDS readings is 25° Celsius. Without compensation, the EC and TDS readings will increase when the temperature is greater than 25° and decrease when the temperature is lower than 25°. The COM-300 is equipped with Automatic Temperature Compensation (ATC). The meter will automatically adjust the reading to what it would be at 25°. Each TDS conversion factor uses a specific ATC coefficient. The EC modes (µS or mS) use the Potassium Chloride (KCl) ATC coefficient. For additional information on TDS, please visit HMDigital.com and click on "what is TDS?" in EDUCATION CENTER.

Example : mS mode

Defaults: EC (µS) and the temperature reading in Celsius

Switching EC and TDS Modes:

The COM-300 has two different modes for EC.
Scales: µS (micro-Siemens) or mS (milli-Siemens). 1000µS = 1 mS.

The COM-300 has two different modes for TDS.
Scales: ppm (part per million) with 2 selectable conversion factors 0.5 or 0.7

1. With the power on, press and hold the 'HOLD / MODE' button in EC/TDS mode. The display will cycle through the modes in the order listed below.

NOTE - the scale icons appear above the measurement reading, and the conversion factor icons appear below the measurement reading. Since EC does not use a conversion factor, the conversion factor icons will not appear for the EC modes.

Example : ppm-442 mode

    a. EC - µS
    b. TDS - ppm (NaCl) 0.5
    c. TDS - ppm (442™) 0.7
    d. EC - mS

2. When the meter displays the desired selection, release the 'HOLD / MODE' button.
3. The meter is now ready for the use in your selected mode. The meter will keep this setting until changed again.

Switching pH and EC/TDS mode:

Example : pH mode

1. With the power on, press PH/EC button to switch between pH mode and EC/TDS mode.
2. The meter is now ready for use in your selected mode. The meter will keep this setting until changed again.

Switching Temperature Mode:

The temperature reading is always displayed on the LCD panel during measurement mode and is shown simultaneously for either EC, TDS, and pH readings. It is not shown when the meter is in calibration mode. To switch between Celsius and Fahrenheit, press and hold the 'HOLD/ MODE' button in pH mode.

EC / TDS CALIBRATION

The COM-300 is factory calibrated to a 1413 µS KCl solution. The COM-300 will retain its calibration for a very long time, but there may be cases when it is necessary to recalibrate the meter. Additionally, though factory calibration will be suitable for most applications, it may be necessary to recalibrate the meter for more accurate results.

EC and TDS meters should be calibrated as close as possible to the range that will be measured. For example, if you are typically measuring the TDS levels of filtered water and tap water, it is recommended to recalibrate at a lower level. HM Digital's 342 ppm NaCl solution is highly recommended for this. For hydroponics, pools and aquarium testing, it may not be necessary to recalibrate the meter, or you may wish to recalibrate using HM Digital's 1000 ppm (2000 µS) NaCl solution. If you are unsure if your meter needs to be calibrated, always consult a professional prior to changing the calibration of the meter. Incorrectly calibrating the COM-300 may result in inaccurate measurements.

When to recalibrate the COM-300: You will need to recalibrate if the factory calibration isn't suitable for your application (see above) or if the calibration has shifted. This can happen based on time, usage or care of the meter. The only method of determining and check the COM-300 is calibrated properly is to obtain a bottle of laboratory-certified EC or TDS calibration solution and check the meter against the solution value. The COM-300 can be calibrated to any brand or value EC or TDS Calibration Solution within the meter's range. Always calibrate to a fresh solution.

The COM-300 features digital calibration. To recalibrate the meter:
1. Turn the meter on by pressing the [⏻] power button.
2. Make sure the meter is in the mode that match the solution. if not, change the mode accordingly.
   (For example, if you are calibrating to a 0.7 solution for TDS, change the mode to ppm 0.7. See Switching modes on page 4 for more information.)
3. Dip the meter into a laboratory-certified EC or TDS calibration solution. Lightly stir and tap the meter on the bottom of the glass to remove any air bubbles or lingering electrical charges.
   NOTE- If the measurement matches the calibration solution value, then your COM-300 is already properly calibrated. Stop here!
4. Press and hold the 'PH/EC/CAL' button. The temperature display will change to a 'CAL' image.
5. The meter will automatically adjust to a reading within a range of the calibration solution.
6. Change the reading so that it matches the calibration solution. For example, if your calibration solution is 342 ppm, adjust the current reading until reads '342'. To increase the reading, press the 'UP' button (PH/EC/CAL). To decrease the reading, press the 'DOWN' button (HOLD/MODE).

Flashing
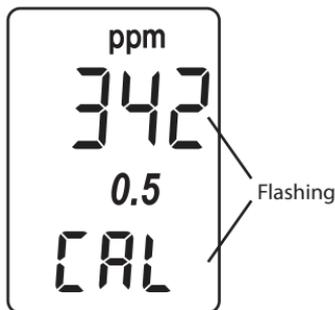
   NOTE- If the calibration reading is lowered or raised to the minimum or maximum level within the range, the screen will display the 'minimum calibration reached' icon or 'maximum calibration reached' icon, respectively. Note that this occurs only within the range of the solution the meter is currently in. When 'CAL' does not flash, it means calibration is in the middle of the range. The meter does not restrict calibration.

min. calibration reached

max. calibration reached
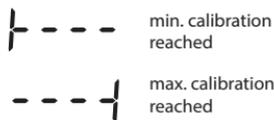
7. To set the calibration, press the [⏻] power button just once. You will see a flashing image on the screen that says "CAL" After flashing a few times, The flashing image will change to "END". (If the "END" image does not flash on the screen, the meter has not been properly calibrated).
8. Your meter is now recalibrated.

Temperature Calibration

1. You must have a correct thermometer next to the COM-300.
2. With the COM-300 on and the cap off and the meter in the air, press and hold [⏻] power and 'PH/EC/CAL' button together for 3 seconds. The meter will enter temperature calibration mode.
3. Adjust to the correct temperature by pressing the 'UP' or 'DOWN' buttons.
4. Once correct, click the [⏻] power button. The temperature will flash and the screen will flash C...CA...CAL.
5. The screen will briefly display "End" and then revert to measurement mode. It is now calibrated.
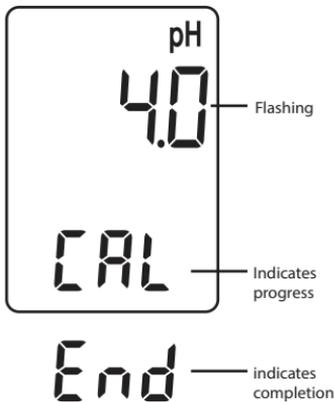
pH CALIBRATION

Your COM-300 has been factory calibrated to pH 7.0. While this is suitable for many applications, it is recommended to recalibrate the meter as close as possible to the pH level that will be tested. Recalibrating prior to every test will provide superior results (though this is not required). The COM-300 should be recalibrated at least once per month. If tests are conducted between wide ranges, calibration should be done more frequently. Additionally, it should be noted that liquid pH buffer accuracy may vary. For best results use HM Digital's pH Buffers (Model: PH-BUF).

The COM-300 features digital auto-calibration to pH 4.0, 7.0 or 10.0 and digital manual calibration to any value within the meter's range. Manual calibration can also be used for "fine tuning." For example, if calibrating to 10.01, it is recommended to use auto-calibration to 10.00, and then manual calibration to 10.01. NOTE - If calibrating to 10 after the meter was calibrated to 4 (or vice-versa), it is recommended to calibrate to 7 first, prior to calibrating to the next value. Also, if you are having trouble calibrating to 4 or 10, calibrate to 7 first, then 4 or 10.

Automatic Calibration

1. Turn the meter on by clicking the [⏻] power button. Note that the reading will fluctuate if the meter is not submerged in a liquid (it will stabilize in liquid).
2. Make sure the meter is in pH mode.
3. Insert the meter into a pH buffer solution of 4.0, 7.0 or 10.0. Press and hold the 'CAL' button for 5 seconds.
4. The temperature reading will change to a flashing 'CAL' image for 10 seconds. Do not press any buttons. The meter will automatically recognize the solution it is in (or the closest to it). This number will flash and the letters of 'CAL' will flash as 'C...CA...CAL' indicating progress. Allow 5 - 60 seconds during this stage. Do not press any buttons and do not move the meter.
5. When the meter is calibrated, 'End' will flash briefly and the screen will revert to measurement mode. Your meter is now recalibrated.

pH
4.0 — Flashing

CAL — Indicates progress

End — indicates completion

Manual Calibration (Fine Tuning)

1. Turn the meter on by clicking the [⏻] power button.
2. Make sure the meter is in pH mode.
3. Insert the meter into a known pH buffer solution.
4. Press and hold the CAL button for 5 seconds.
5. The temperature will change to a flashing 'CAL' image for 10 seconds before entering automatic calibration. During this time, click either the up button (PH/EC / CAL) or down button (HOLD/MODE) to remain in manual calibration mode.
6. Change the reading so that it matches the value of the calibration solution. To increase the reading, click the up button and to decrease the reading click the down button. Press and hold either button for rapid advancement.

   - If the calibration reading reaches the minimum or maximum offset from the buffer value (approx. +/- 3.3 pH), the screen will display the 'minimum calibration reached' icon or 'maximum calibration reached' icon, respectively. (e.g., if the meter is in a 7.0 solution, the highest it can be calibrated to is 10.3.)

7. To set the calibration, click the [⏻] power button once. 'C...CA...CAL' will flash briefly, followed by 'End' and the temperature will return to the screen. Your meter is now recalibrated.

pH
8.1

CAL — Flashing

⊢- - - min. calibration reached

- - -⊣ max. calibration reached
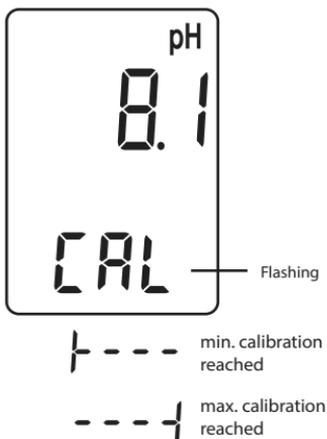
CARE, MAINTENANCE & TECHNIQUES

The COM-300 requires very little maintenance. You may need to change the batteries or clean the unit including the electrodes from time to time. In addition, please note these general techniques:

1. Do not store the unit in high temperature or direct sunlight.
2. Do not touch the electrodes. Skin oils may adversely affect the reading. If you do touch the electrodes, clean immediately with alcohol or distilled water.
3. After repeated usage in high TDS water, it is advised to clean the electrodes to prevent residue build-up.
4. For best results, always stir or tap the meter in the water sample to dislodge any air bubbles or remove any lingering electrical charges.
5. Water volume, the positioning of the electrode in the water sample, and temperature may affect the reading.
6. Do not keep the meter in very hot water for extended periods of time.
7. If testing two water samples in a wide range (e.g., 15ppm and 3000ppm), make sure to rinse the electrodes with DI or distilled water or alcohol after each test to ensure accurate readings and prevent a build-up of TDS on the electrodes.
8. The COM-300 is waterproof. However, prior to completely submersing the meter into a water, <u>always ensure the black probe gasket ring and battery compartment are secured tightly.</u> the warranty does not cover water damage due to parts that are not secured properly.

Changing the batteries:

When the meter displays a flashing battery symbol,
your batteries are getting weak and should be replaced soon.

To change the batteries:

1. Twist open the end cap on the top of the meter.
2. Twist the battery cap to the open position.
3. Remove the batteries.
4. Insert new batteries with the "+" side facing up.
   The meter uses 2 x AAA batteries.
5. Close the battery cap and turn to the close position.
6. Close and tighten the end cap to maintain waterproofness.

   NOTE: *Do not reverse the polarity of the batteries. This may short-circuit the meter.*

OPEN   CLOSE
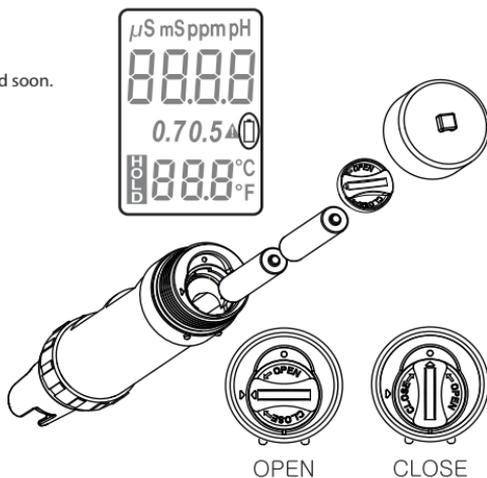
Cleaning:

To clean the unit, use a soft rag or towel. Wipe with water and a mild soap.
To clean the electrodes, use rubbing alcohol and a cotton swab. Lightly clean the electrodes. Rinse with DI or distilled water. Air dry.

Electrode Replacement:

If your electrode has been damaged, you can purchase a new one without needing to purchase a new meter. To replace the electrode:

1. Remove the black electrode locking ring by twisting it counter-clockwise.
2. Gently pull the electrode off the unit.
3. Gently insert the new electrode into the unit. Be sure to align the grooves and eight pins properly.
   Never force the electrode into the unit!
4. Make sure the rubber ring is properly positioned on the electrode.
5. Screw the black locking ring back onto the unit by twisting it clockwise. Tighten.

Message Symbols and Troubleshooting

You will see the corresponding message symbol(s) with the issues listed below:

Problem	Error Message	Reason(s) and/or Potential Solution(s)
The meter will not power on.		1. Change the batteries. 2. Double-check the polarity of the batteries.
Incorrect Readings.		1. Recalibrate the meter. 2. Switch modes.
The TDS/EC level is out of range (oor):	OOr	1. (oor) The meter must be used within the specified range limits.
The sensor has been disconnected or damaged internally:	$---- Err$	1. (Error) Double-check the sensor is connected, or you may need a new sensor.
The temperature is out of range:	$---- OOr$	1. (Error) The meter must be used within the specified temperature limits.
The pH measurement is unstable:	⚠	1. build-up on a sensor, air bubble present. 2. Sensor lifespan depleted, damaged sensor.

COM-300 LIMITED WARRANTY

1. COM-300: One Year Limited Warranty
2. Detachable Sensor (SP-C3): Six Month Limited Warranty

This HM Digital, Inc. ("the Company") product ("COM-300") is warranted to the purchaser against defective materials and workmanship for one (1) year from the date of purchase.

From the date of purchase, sensor (SP-C3) is warranted for six (6) months to the purchaser against defective materials and workmanship

What is covered: Repair parts and labor, or replacement at the Company's discretion. Transportation Charges for repaired or new product to be returned to the purchaser.

What is NOT covered: Transportation charges for the defective products to be sent to the Company. Any consequential damages, incidental damages, or incidental expenses, including damages to property. This includes damages from abuse or improper maintenance such as tampering, wear and tear, water damage, or any other physical damage. The COM-300 is watertight and completely Submersible. However, please ensure that the battery compartment and probe gasket ring are firmly Tightened before submerging in water. The warranty does not cover water damage to the COM-300 due to parts not securely closed.

To obtain warranty service, please contact 800.383.2777 or email Warranty@HMDigital.com to receive further instructions. Before sending the product back to us, please include the following below,

- Your name
- Phone number/ Address
- Description of problem
- Proof of purchase, must include Date

* If a returned product does not include the above-mentioned items, the Company Reserves the right to refuse warranty service.

Implied Warranties: Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose, are limited in duration to **ONE YEAR** from the date of purchase. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. To the extent any provision of this warranty is prohibited by federal and state law and cannot be preempted, it shall not be applicable. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

NOTE: Warranties are product-specific. Third-party products and products deemed by HM Digital as "accessories" are not covered under warranty. Third-party products include, but are not limited to, batteries and fittings. Accessories included, but not limited to, lanyards and product boxes.

This manual and all information contained herein copyright HM Digital, Inc. The contents of this manual cannot be reprinted without the permission of HM Digital, Inc.

442 and 442 Natural Water are registered trademarks of the Myron L Company.

Ver2.1E