

HydroMaster

USER'S GUIDE

HM-500



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1. INTRODUCTION

A. Overview

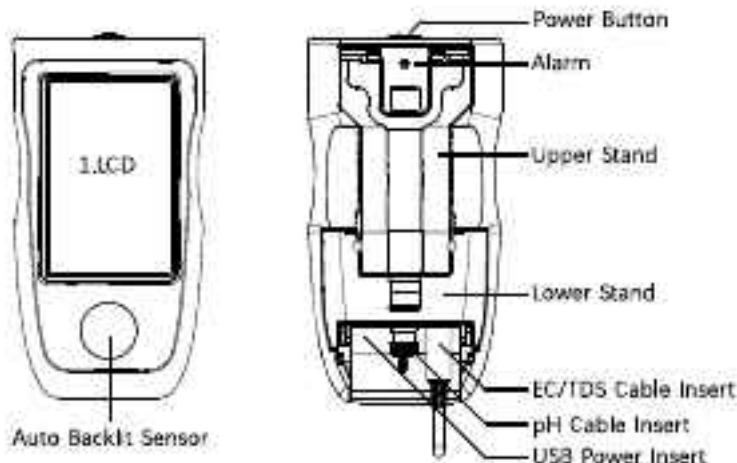
Thank you for purchasing the HM-500 (HydroMaster®) by HM Digital.

The HM-500 monitors pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS) and temperature with very high accuracy. This instrument can be calibrated with various buffer solutions, and is equipped with automatic buffer recognition for user convenience. The touch-screen LCD makes it user-friendly, and features automatic light detection making it easy to view in dark environments.

B. What's Included

- + 1 HM-500 / HydroMaster Monitor
- + 1 SP-PS / PH Probe
- + 1 SP-C5 / EC / TDS / Temp Sensor
- + 1 HMS-BRKT / Wall mount bracket
- + 1 HMS-PWRCSLE / USB Power adapter & cable
- + 2 HMS-FLTOSC / Probe holder float discs
- + 1 User's guide
- + 1 PH-P4 / PH-4 liquid packet
- + 1 PH-P7 / PH-7 liquid packet
- + 1 CP-1000 / 1000PPM liquid packet
- + 1 PH-STOR / pH Storage liquid packet

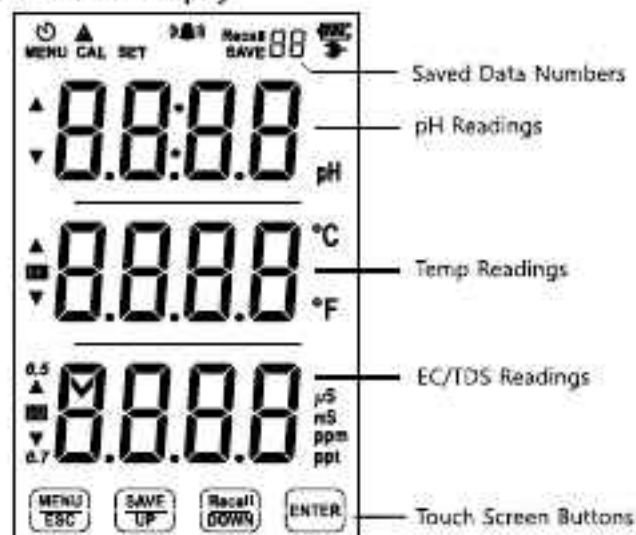
C. Housing Description



D. Specifications

1. Measurement Range
 - pH: 0.0 - 14.0
 - Temperature: 0 - 55 °C / 32 - 130 °F
 - TDS: 0 - 9990 ppm / 0 - 10.00 ppt
 - EC: 0 - 9990 µS / 0 - 20.00 mS
2. Automatic Temperature Compensation Range (ATC)
 - ATC: 0.0 - 60.0 °C
3. Accuracy
 - pH: ± 0.1 pH
 - Temp: ± 1 °C / °F
 - EC/TDS: ± 2 %
4. Measurement Scales
 - pH: pH
 - Temp: °C / °F
 - TDS: ppm & ppt (NaCl) 0.5 scale / ppm (442^m) 0.7 scale
 - EC: µS / mS
5. Resolution
 - pH: 0.1 pH
 - Temp: 0.1°C / 0.1 °F
 - TDS: ppm: 0.1ppm (0 - 99.9ppm) / 1 ppm (100-999ppm) / 10ppm (1000-9990 ppm)
ppt: 0.01 ppt (0.01 - 10.00 ppt)
 - EC: µS: 0.1 µS (0 - 99.9 µS) / 1 µS (100 - 999 µS) / 10µS (1000-9990 µS)
mS: 0.01 mS (0.01 - 20.00 mS)
6. Data Storage: Up to 20 readings
7. Auto Shut-Off: After 5 minutes (While in Battery mode)
8. Alarm: Adjustable Set Point (See section 5)
9. Power Source: AC 110 V - 240V / Rechargeable Lithium Ion Battery
10. Service Environment: 0 - 50 °C / RH 80 %
11. Display: LCD Touch Screen controls with Auto Backlit lighting
12. Probe: ABS with Electrodes Conductivity Sensor / Single Junction Ag/AgCl pH Sensor
13. Sensor Cable: 2m (80 inch) shielded and Coaxial Cable
14. Dimensions: Approx. 8 x 4 x 1.4 inches / 20 x 11 x 3.6 cm
15. Weight: 15.2 oz (0.43 Kg) for body / 5 oz (140 g) for two probes (without case)

E. LCD Screen Display



F. Switch and Keypad Controls

- | | |
|--|--|
|  | Touch 3 seconds to change from the home screen mode to menu. |
|  | Quick touch to save readings while in the home screen mode. |
|  | Touch for 3 seconds to recall saved data. |
|  | Touch for 3 seconds to turn off back light or touch to turn light on. Also used to save device settings and both measurement calibrations. |
|  | Raises numeric values when adjusting settings or calibration. Also moves selection cursor up when in menu mode. |
|  | Lowens numeric values when adjusting settings or calibration. Also moves selection cursor down when in menu mode. |
|  | Exits to the main menu when in menu mode. Also cancels settings or calibration. |
|  | Turns the power on/off. Also changes the EC/TDS scale being used. |

G. Icon Description

MENU	Changes to menu mode from the home screen
CAL	Calibration Mode Indicator
SET	Alarm setting indicator and for making corrections
	Alarm Delay Indicator
	pH meter sensor is unstable Device needs maintenance
	Out of-range alarm indicator
Recall	Recalls saved data and measurement readings
SAVE	Saving data
	Device is in charging mode
	Battery life indicator
0.5 0.7	NaCl and 442 Conversion factor indicators
HI LO	High and low alarm indicator
 	Alarm out of range Arrow cursors in Menu Mode
pH	pH readings indicator
°C °F	Temperature scale Indicators
µS mS	EC scale indicators.
ppm ppt	TDS scale indicators.

2. pH CALIBRATION, CARE & MAINTENANCE

A. pH Information & Maintenance

[The pH electrode included with the HydroMaster (HM-500) has been carefully handcrafted. For optimal performance and probe longevity, carefully follow the instructions below.]

- The life of a pH electrode will depend on how it is used and maintained. (It is backed by a 6 month factory warranty)
- Inside the glass bulb of the pH sensor is a Potassium Chloride (KCl) solution. It is also in the cap of the pH sensor.
After usage, always store the probe in the sensor cap. For long-term use, purchase a KCl solution and use it for storage.
- Always keep the electrode wet. If the electrode dries it may shorten its life and the pH reading may not be as accurate. If this is the case, immerse the electrode in KCl storing solution for a minimum of 2 hours to re-saturate.
- Rinse the electrode with clean water or distilled water (if available) between or after measurements to eliminate cross contamination of solutions.

[Warning]

- Avoid direct sunlight or heat.
- Do not touch the glass part of the electrode with your hands or hard materials.
- Exposure to highly basic or acidic solutions, extremely high and/or low temp water may cause damage to the electrode, thereby shorten its life.
- If the measuring time of the pH meter slows down or if the pH reading is unstable, it's most likely time to change the electrode.
- When wiping the electrode with a dry cloth, be careful of static electricity, as it may delay pH readings.

B. pH Operation

1. The HM-500 is factory calibrated. However, we recommend initially re-calibrating the instrument before 1st usage and then once a month thereafter.
2. Remove the sensor cap. Be careful not to spill KCl storage solution from the cap.
3. Immerse the electrode in the solution you would like to measure and stir gently to remove air bubbles surrounding electrode. (Air bubbles can affect accuracy of pH readings).
4. Measurements take between 10-60 seconds to stabilize.

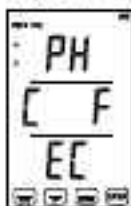
[Warning]

- Calibration is required when replacing the electrode or after long-term (inactive) storage to ensure accurate readings.
- Calibrate 1st to pH 7.0 then pH 4.0, or pH 10.0 buffer solutions, based on your application.

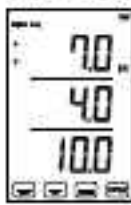
C. pH Calibration



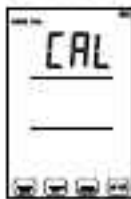
1. From HOME SCREEN, press and hold the [MENU] button for 3 seconds to select [MENU] mode.
2. Once in [MENU] mode use the [DOWN] key, and select "CAL", then press [ENTER] key.



3. The CAL screen will appear "PH", "C F", and "EC". Select "PH" by pressing the [ENTER] key to enter pH calibration mode.



4. The values "7.0", "4.0", "10.0" will appear on the screen. Immerse the pH electrode in pH 7.0 buffer solution and wait.
5. Move the cursor to "7.0" by using the [UP/DOWN] keys, and touch [ENTER] to start pH 7.0 calibration.



6. After calibration has begun, "C.CA.CAL" will blink in this order across the screen.
7. The word "End" will appear on the screen after 2-30 seconds when calibration is complete. If there's a problem with the electrode "Err" will blink three times on the screen and will automatically return to the pH calibration menu.
8. Once this is completed, repeat calibration for pH 4.0 or pH 10.0 following steps 1-5 (except select pH 4 or pH 10 in step 5).

3. EC/TDS CALIBRATION & MAINTENANCE

A. EC/TDS Basic Information.

EC (*Electrical Conductivity*) and TDS (*Total Dissolved Solids*) are closely related. TDS measures the concentration of dissolved solids within water or a nutrient solution.

TDS is calculated by sending a charge in the water which measures the electrical conductivity of that solution, and is then converted to TDS using the following conversion factors:

[Conversion Factors]

- **442™ (or 0.7 Factor):** developed by Myron L, to simulate natural water (river, lake, or drinks). The 442™ is named after the three main ingredients of the solution: 40% sodium bicarbonate, 40% sodium sulfate, and 20% sodium chloride.
- **NaCl (or 0.5 Factor):** Stands for sodium chloride. This solution is widely used in the Water Market.

EC (μS , mS) does not require the usage of a conversion factor – the factor is used only when converting EC data to TDS.

[EC, TDS Available Mode]

The HM-500 includes the following scales and modes:

- Two different EC measuring scales: microsiemens (μS) and millisiemens (mS). 1000 μS equals 1 mS .
- Two different TDS measuring scales and modes: PPM (Parts Per Million) and PPT (Parts Per Thousand), both available in 0.5 & 0.7 scale 1000 ppm equals 1 ppt.

[EC, TDS and Automatic Temperature Compensation (ATC)]

- Temperature plays an important role when measuring EC or TDS. If the temperature of the calibration solution you're using is higher than 25°C (77°F), the device will read measurements that are higher than normal. In comparison, if the temperature is lower than 25°C (77°F), the device will read measurements lower than normal. Thus, the international standard measurement requires an EC or TDS reading at 25°C (77°F).
- Since maintaining temperature of the solution you are measuring at 25°C (77°F) can be difficult, the HM-500 includes an Automatic Temperature Compensation (ATC) function that converts the reading to reflect that of 25°C (77°F).

B. EC/TDS Electrode Maintenance.

- Avoid direct sunlight or heat.
- Do not touch sensor pins of the electrode with your hands or sharp materials.
- Scratching electrodes will cause corrosion.
- To clean contaminated sensor, please use alcohol with a soft cloth to clean and then rinse with clean water or distilled water (preferably). Gently shake off excess water or blot-dry with dry cloth, and store probe with cap on.
- When reading the EC/TDS of different solutions, rinse the electrode with water (preferably distilled) when necessary. **REMEMBER:** dirty sensors can affect accuracy of future readings. Using the electrode the recommended temperature range for use is 1-50°C (33.8-122°F).

[Warning]

- Higher Temps will damage the electrode.
- Do not use probe in rapidly changing temperatures - Will cause damage.
- Physical shock to probe may cause damage.

C. EC/TDS Operation.

1. To select the scale you would like to measure in (EC/TDS), press (single touch) the [ON/OFF] button key on top of device (μ S, mS, ppm .5 or .7, and ppt .5). - The default scale setting (unit of measurement) when powering on the device is μ S (micro siemens).
2. Immerse the sensor of the electrode in the solution you would like to test and stir gently to remove air bubbles surrounding it.
3. Wait for the temperature to stabilize in order to obtain the most accurate reading.
4. If would like to change between EC/TDS modes during operation, (see step 1)
5. Rinse electrode with clean (preferably distilled or RO) water between/or after use for maximized accuracy and elimination of cross contamination solutions.

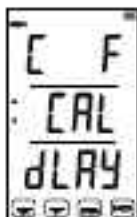
[Warning]

- When measuring for EC/TDS place the sensor at the center of the solution. Placing sensor at the edge or bottom of the solution container may cause inaccurate readings.
- We recommend using glassware (beaker/flask) to avoid electronic static interference. The electrode is very sensitive to static electricity.

D. EC/TDS Calibration.

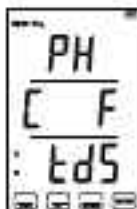
The HM-500 is factory calibrated to a 1000ppm NaCl (.5) solution, (2000 μ S).

1. Select desired EC/TDS measurement scale. (1000ppm is used in the example below). If needing to measure TDS with a NaCl standard solution, please change the scale to ppm-0.5 (NaCl) conversion factor before calibration.



2. With device on, press and hold [MENU] key for 3 seconds to select [MENU] mode.

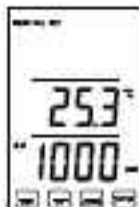
3. Use [DOWN] key and select "CAL" mode. Select by pressing [ENTER]



4. "PH", "C F", "TDS" will now appear the screen. Use [DOWN] key and press [ENTER] to select "TDS" calibration mode.

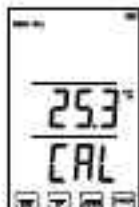


5. Immerse the sensor into testing solution. Gently stir to remove air bubbles around electrode. (This can cause interference).

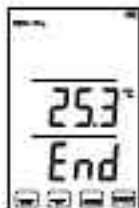


5. Once the reading stabilizes, use the [UP/DOWN] key to change reading to desired calibration point, and touch [ENTER] to start calibration.

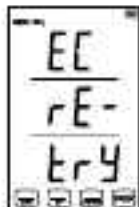
CAUTION: Pressing and holding the key will change the reading at a faster rate.



7. After calibration has begun, "C.CAL.CAL" will blink in this order across the display screen.

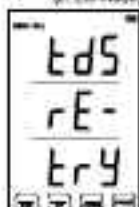


8. Once the calibration is completed, "End" will blink 3 times on the screen, indicating the desired calibration has been saved. The screen will then go back to the calibration menu. The device is now calibrated.



(In EC mode)

9. Touching the [ESC] key will navigate back 1 screen at a time. Calibration mode / then Menu mode, then HOME SCREEN.
(If the reading is unstable or the sensor is not connected properly to the instrument, the "rE-trY" sign will appear and blink 3 times on the screen and then return to the calibration menu.)



(In TOS mode)

E. EC/TDS Temperature Reading and Calibration.

The Temperature sensor is located on the bottom of the EC/TDS electrode. When calibrating temperature, do so with solution with known temperature value only.

[To Select °C or °F]

1. Press [MENU] for 3 seconds to enter menu mode.
2. Select °C °F mode, then press [ENTER]
3. Once in °C or °F mode use [UP/DOWN] key to select desired Temp °C or °F and press [ENTER] -> "End" will appear.
4. Press ESC to go to MENU mode. Once there to next step, use [DOWN] and select CAL -> Press ENTER for calibration.

[To Calibrate Temp]

1. Immerse EC/TDS sensor into solution and wait for temperature to stabilize.
2. Press [MENU] for 3 seconds to enter menu mode.
3. Use [DOWN] key to move cursor to "CAL" mode. Select by pressing [ENTER]
4. "PH", "C F", "EC" will now appear. Use [DOWN] key to move cursor to °C F°. Press [ENTER] to select Temperature calibration mode.
5. On the center of the screen, the current temperature reading will appear.
6. Use the [UP/DOWN] key to change the temperature to the known temperature and press [ENTER] to start calibration.
7. After calibration has begun, "C..CA..CAL" will blink in this order across the display screen and then "End" will blink 3 times confirming calibration is complete.
8. Touching the [ESC] key will navigate back 1 screen at a time. Calibration mode / then Menu mode, then HOME SCREEN.

4. DATA STORAGE

The HM-500 can store and recall up to 20 consecutive readings.

A. Saving Your Readings.

1. With power on, immerse the sensor(s) into the solution for measurements.
2. After the reading has stabilized, press the [SAVE] key.
3. On the right upper corner of screen, the "SAVE" icon will appear and the number of the saved reading will blink indicating the data is being saved.
4. While saving, the [MENU] key changes to [ESC] on the screen. If you need to cancel the current saving of data, touch the [ESC] key to cancel.
5. The instrument does not save data continuously. You can only save a **new** reading when the "SAVE" icon disappears.
6. Since the device can save up to 20 readings, when saving your next reading (21st) the data of your (1st) saved reading will be deleted. The (21st) saved reading will appear as #20.
7. The number in the upper right corner displays the current number of saved readings or the current reading you are recalling when in [RECALL] Mode.

B. Recalling Saved Readings.

1. Touch the [Recall] key and hold for 3 seconds. This will recall all the saved readings.
2. Use the [UP/DOWN] keys to scroll through and select saved readings.
3. You can choose to delete last stored reading by simultaneously pressing and holding both the [UP] & [DOWN] keys for 2 seconds. This can only happen when viewing last stored reading.
4. Press [ESC] at any time to navigate back to HOME SCREEN.

C. Deleting All Saved Data.

1. Starting from Home Screen mode, touch the [MENU] key and hold for 3 seconds to enter menu mode.
2. In MENU mode use the [DOWN] key and select "Clr" on the screen. Press [ENTER].
3. Select "SAVE" on the screen -> press [ENTER] "Cont" will appear and be flashing. Select [ENTER] to delete all readings -> "End" will appear. (This is asking if you want to continue).

5. Alarm Setting

The HM-500 features two different alarm functions that allow you to input high and low settings and will alert you with a beeping sound when the pH, EC/TDS and temperature readings reach those corresponding settings.

Alarm Settings.

Please Note: Setting High and Low alarm values for pH, Temperature, and EC/TDS is done using the same method.

1. Press and hold the [MENU] key for 3 seconds to enter menu mode.
2. Use the [DOWN] key and select the "SET" display on the screen. Press [ENTER]. "PH", "C F", and "EC" or "tds" will now appear on the screen.
3. Use [UP/DOWN] key to select whichever parameter you wish to set the alarm for. Press [ENTER] key to enter that parameter's alarm setting menu. *(We will use "PH" for this example)*
4. On the top of the screen, you will see "PH", and "off" twice below with "HI" and "LO" icons adjacent to the "off" options.
5. Use [UP/DOWN] key to select [HI] or [LO] alarm range and press [ENTER].
6. Once the "HI" alarm icon has been selected "HI" and "off" will blink simultaneously.
7. Use the [UP/DOWN] keys to turn "on" or "off" the High alarm.
8. Change "off" to "on", and press [ENTER] to enter the alarm range setting mode.
9. The default alarm value of pH 7.0 and the "HI" icon will blink at the same time.
10. Use the [UP/DOWN] keys to set the High alarm range to the desired value and touch [ENTER] to save it. *(NOTE: if the pH low alarm setting is set at pH 4.0 regardless if it's on or off, then pH High alarm range cannot be lowered below 4.1 pH. If you would like to lower the high alarm, you must first lower the pH Low alarm below pH 4.0 to change desired High alarm pH range.)*
11. To turn off the set alarm, simply change "on" to "off" by touching the [UP/DOWN] keys and then touch the [ENTER] key.
12. "End" will blink 4 times and the alarm will be turned "off" as it exits to the pH alarm "Hi", "Lo" selection screen.
13. Once the desired alarm values have been set, you will see "End" blink 4 times. After the alarm data is saved, press [ESC] to get to previous menu.

6. Alarm Sound & Delaying Your Alarm

A. Alarm Sound.

The HM-500 has 3 different alarm types.

Alarm Options:

- o **Cont** : Continuous alarm
- o **AL10** : 10-second alarm every 10 min.
- o **Mute** : Mute

1. Press [MENU] key for 3 seconds.
2. Use the [DOWN] keys and select "Beep" press -> [ENTER].
3. "Cont", "AL 10", "Mute" will be displayed on the screen. Select the desired alarm type by using the [UP/DOWN] key and select by pressing [ENTER]. "End" will blink 4 times indicating selection has been saved.

NOTE: Once the alarm is set, touching any key on the display screen can turn off the alarm temporarily, but the alarm icon will not disappear.

B. Delaying Your Alarm

NOTE: The purpose of the delay is to delay alarms from sounding off while setting your alarms or setting up your tank.

1. From main screen press and hold [MENU] button for 3 seconds.
When in Menu mode use your [DOWN] button to "DLAY" menu option -> press [ENTER].
2. Using the [UP] or [DOWN] button, you will have the option to select "d-15" (delay alarm for 15 minutes), "d-30" (delay alarm for 30 minutes) or "oFF" (No delay). Press [ENTER] to select and [ESC] to return to previous screen.

7. Alarm Setting Default Value Data

Alarm Setting Default Values									
pH		HI	7.0pH	Temp - °C		HI	30.0°C	Temp - °F	
		LO	4.0pH			LO	15.0°C		
EC	uS	HI	7000uS	TDS 0.5	ppm	HI	3000ppm	TDS 0.7	ppm
		LO	1000uS			LO	500ppm		
	mS	HI	7.00mS		ppt	HI	3.00ppt		ppm
		LO	1.00mS			LO	0.50ppt		

8. Clearing Saved Data

Data Clear Options:

- o **SAVE** : Delete all the Saved Readings data.
- o **AL** : Delete all the alarm ranges.
- o **CAL** : Reset to factory calibration.

This will delete any previously saved calibrations

1. Press and hold [MENU] key for 3 seconds.
2. Use [DOWN] key to "CLR" option. Press [ENTER]
3. "SAVE", "AL", "CAL" will now appear on the screen.
4. Select the desired data reset option with [UP/DOWN] keys, then press [ENTER]
5. "Cont" will blink at the bottom of the screen. This is asking if you wish to continue. To DELETE saved data press [ENTER].

Once pressed you cannot stop data from being deleted.

Alarm types, saved data (readings), and calibration set by user will default back to the original factory default settings.

9. Battery Charging Instructions

Caution when using the USB Adapter:

- The charging time for the HydroMaster is about 5 hours. However, it will take longer if the device is in use while charging.
- Please check the USB port to ensure that you connect the USB device properly.
- To avoid the risk of electric shock or fire, do not touch the USB adapter with wet hands and keep it away from damp areas.
- Please use a UL Certified USB Adapter in order to avoid damaging the device due to the risk of over current.

USB Adapter Specification: **Input: 100-240VAC 50/60Hz and 0.2A**
 Output: 5V ===== 1000mA

- If there is a lot of dust or debris on the USB charger or inside of the USB insert port, the device may not charge properly. If this happens, wipe them with a soft cloth.

10. WARRANTY

1. HydroMaster (HM-500): Three Year Limited Warranty

2. pH Probe (SP-P5): Six Month Limited Warranty

The HydroMaster ("HM-500"), manufactured by HM Digital, Inc. ("the Company") is warranted to the purchaser against defective materials and workmanship for three (3) years from the date of purchase.

The pH probe (SP-P5) and EC probe (SP-C5) are warranted to the purchaser against defective materials and workmanship for six (6) months from the date of purchase.

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

What is not covered: Transportation charges for the defective product 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 warranty does not cover water damage to the HydroMaster or SP-P5 due to parts not securely closed. Products with any evidence of such damage will not be repaired or replaced.

To obtain warranty service, please contact 800.363.2777 or email Info@HMDigital.com to receive further instructions. Before sending the product back to us, please include the following below:

- Your name
- Phone number
- Address
- Proof of date of purchase
- Description of problem

Implied Warranties: Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose, are limited in duration to 3 years from 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 include, but are not limited to batteries, lanyards and cases.

11. Contact Information

HM Digital, Inc. is a leading manufacturer of professional water testing instruments that tests for EC, TDS, pH, ORP, temperature and volume. Our products include handheld meters, in-line monitors, controllers, sensors, calibration solutions and more.

Commercial/Industrial & Personal Applications:

- Agriculture
- Alternative Health
- Aquariums & Aquaculture
- Car & Window Washing
- Carbon Filtration
- Deionization
- Distillation
- Food & Coffee Services
- Hydroponics
- Pools & Spas
- Pharmaceutical & Medical
- Reverse Osmosis
- Water Bottling
- Water Purification
- Water Treatment

Contact us:

If you need help with your device,
feel free to reach out:

Main: 800.383.2777

Tel: 310.410.3100

Fax: 310.410.3106

Email: info@hmdigital.com

Visit us:

HMDigital.com

