HydroMaster

USER'S GUIDE

HM-200

TABLE OF CONTENTS

1. INTRODUCTION

A. Overview

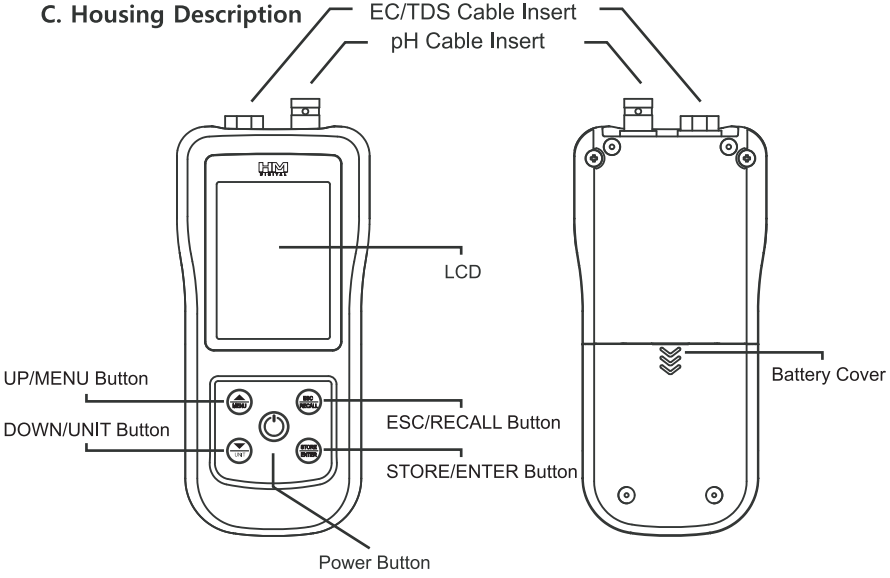
Thank you for purchasing the HM-200, by HM Digital.

The HM-200 monitors pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS) and temperature. This portable instrument with backlight function can be calibrated with various calibration solutions and buffers.

B. What's Included

- 1 HM-200 / HydroMaster Portable Monitor
- 1 SP-C2 / EC/TDS/Temp Sensor
- 1 SP-P5 / PH Probe
- 1 Protective Sleeve
- 1 PH-P7 / PH-7 liquid packet
- 1 PH-P4 / PH-4 liquid packet
- 2 AA Batteries
- 1 User's guide

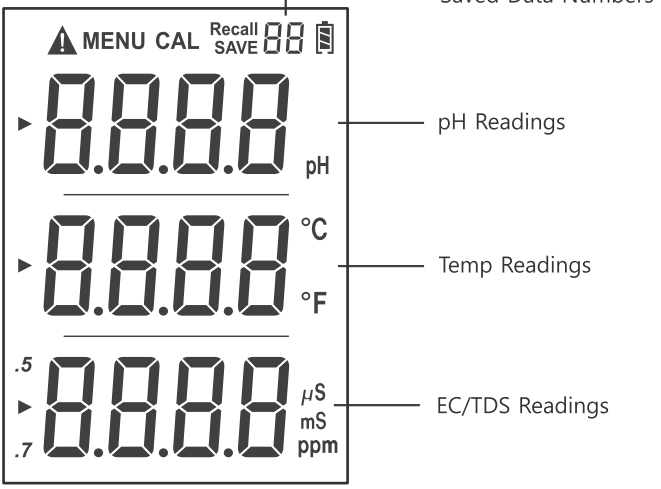
C. Housing Description



D. Specification

1. Measurement Range
   - pH: 0.0 - 14.0
   - Temperature: 0 - 55 °C / 32 - 130 °F
   - TDS: 0 - 9990 ppm
   - 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 (NaCl) 0.5 scale / ppm (442™) 0.7 scale
   - EC: µS / mS
5. Resolution
   - pH: 0.1 pH
   - Temp: 0.1°C / 0.1 °F
   - TDS: TDS: ppm: 0.1ppm (0 - 99.9ppm) / 1 ppm (100 - 999ppm) / 10ppm (1000-9990 ppm)
   - EC: µS: 0.1 µS (0 - 99.9 µS) / 1 uS (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
8. Power Source: 2 Double A (AA) batteries
9. Service Environment: 0 - 50 °C / RH 80 %
10. Display: Main LCD Screen
11. Probe: ABS with Electrodes Conductivity Sensor / Single Junction Ag/AgCl pH Sensor
12. Sensor Cables: 2m (80 inch) Non-shielded and Coaxial Cable
13. Dimensions: Approx. 5.5 x2.6 x 1.1 inches / 14 x 6.6 x 2.8 cm
14. Weight: Approx 212 g (7.5 oz) for body (batteries and cover included) / 155 g (5.5 oz) for two probes

E. LCD Screen Display



F. Switch and Keypad Controls

MENU	Raises numeric values when adjusting settings or calibration. Also moves selection cursor up when in menu mode. Press and hold for 3 seconds to change from the home screen mode to menu.
STORE ENTER	Press to save readings while in the home screen mode. Also used to save device settings and both measurement calibrations.
ESC RECALL	Exits to the main menu when in menu mode. Also cancels settings or calibration. Press and hold for 3 seconds to recall saved data.
	Turns the power on/off. Also with device on, press to turn LCD backlight on and off.
UNIT	Lowers numeric values when adjusting settings or calibration. Also moves selection cursor down when menu mode. Press to change EC/TDS scale being used.

G. Icon Description

MENU	Changes to menu mode from the home screen
CAL	Calibration Mode Indicator
	pH meter sensor is unstable. Device needs maintenance
Recall	Recalls saved data and measurement readings
SAVE	Saving data
	Battery life indicator
.5 .7	NaCl and 442 Conversion factor indicators
▶	Arrow cursors in Menu Mode
pH	pH readings indicator
°C °F	Temperature scale Indicators
µS mS	EC scale indicators.
ppm	TDS scale indicators.

2. pH CALIBRATION, CARE & MAINTENANCE

A. pH Information & Maintenance

[The pH electrode included with the HM-200 has been carefully handcrafted. For optimal performance and probe longevity, carefully follow the instrutions 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 moist. 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 and extremely high and/or low temp water may cause damage to the electrode, thereby shortening 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-200 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”, “4”, “10”will appear on the screen. Immerse the pH electrode in pH 7.0 buffer solution and wait.
   (*When calibrating multiple pH points, HM-200 must calibrate pH 7 first.*)
5. Move the cursor to “7.0” by using the [UP/DOWN] keys, and press [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 30 seconds when calibration is complete. If there’s a problem with the electrode “rE-trY” 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 or pH 10 following steps 1-5*(except in Step 5 use pH 7.0 in place of pH 4 or pH 10)*.

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 wells). 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-200 includes the following scales and modes:

- Two different EC measuring scales: microsiemens (µS) and millisiemes (mS). 1000 µS equals 1 mS.
- TDS measuring scale and mode: PPM (Parts Per Million) available in 0.5 & 0.7

[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-200 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 1-55°C (33.8-131°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 the [Down / UNIT] button key of device (µS, mS, ppm 0.5 or 0.7).
   - The default scale setting (unit of measurement) when powering on the device is µS (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.

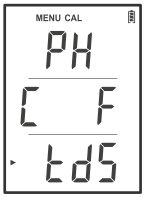
[Warning]
• When measuring for EC/TDS place the sensor at the center of the solution. Placing sensor at the edge or bottom of the solution container may cause inaccurate readings.
• We recommend using glassware (beaker/flask) to avoid electronic static interference. The electrode is very sensitive to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

D. EC/TDS Calibration

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 [UP / MENU] key for 3 seconds to select [MENU] mode.

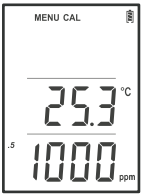
3. Use [DOWN / UNIT] key and select “CAL” mode. Select by pressing [STORE / ENTER]



4. ”PH”, “C F”, “TDS” will now appear the screen. Use [DOWN/ UNIT] key and press [STORE / ENTER] to select “tds” calibration mode.

(When the unit is EC (µS or mS). “EC” will display instead of “tds”)

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

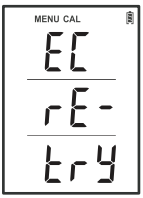


6. Once the reading stabilizes, use the [UP / MENU] and [DOWN / UNIT] key to change reading to desired calibration point, and press [STORE / ENTER] to start calibration.

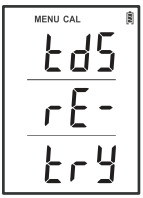
CAUTION: Pressing and holding the key will change the reading at a faster rate.

7. After calibration has begun, “C..CA..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)



(in TDS mode)

9. Pressing the [ESC / RECALL] 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.*)

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 [UP / MENU] for 2 seconds to enter menu mode
2. Select “C F” mode, then press [STORE / ENTER]
3. Once in ˚C or ˚F mode use [UP/DOWN] key to select desired Temp “C” or “F” and press [STORE / ENTER] → “End” will appear.
4. Press [ESC / RECALL] to go to MENU mode. Once there to next step, use [DOWN / MENU]] and select CAL → Press [STORE / ENTER] for calibration.

[**To Calibrate Temperature**]

1. Immerse EC/TDS sensor into solution and wait for temperature to stabilize.
2. Press [UP / MENU] for 3 seconds to enter menu mode.
3. Use [DOWN / UNIT] key to move cursor to “CAL”mode. Select by pressing [STORE / ENTER]
4. ”PH”, “C F”, “EC” will now appear. Use [DOWN / UNIT] 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 / MENU] and [DOWN / UNIT] key to change the temperature to the known temperature and press [STORE / 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. Pressing the [STORE / ESC] key will navigate back 1 screen at a time. Calibration mode / then Menu mode, then HOME SCREEN.

4. DATA STORAGE

The HM-200 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 [STORE / ENTER] 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, if you need to cancel the current saving of data, press the [ESC / RECALL] 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 your are recalling when in [RECALL] Mode.

B. Recalling Saved Readings

1. Press the [ESC / Recall] key and hold for 2 seconds. This will recall all the saved readings.
2. Use the [UP / MENU] and [DOWN / UNIT] 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 / MENU] & [DOWN / UNIT] keys for 2 seconds. This can only happen when viewing last stored reading.
4. Press [ESC / RECALL] at any time to navigate back to HOME SCREEN.

C. Deleting All Saved Data

1. Starting from Home Screen mode, press the [UP / MENU] key and hold for 2 seconds to enter menu mode.
2. In MENU mode use the [DOWN / UNIT] key and select “CLr” on the screen. Press [STORE / ENTER].
3. Select “SAVE” on the screen −> press [STORE / ENTER] “Cont” will appear and be flashing. Select [ENTER] to delete all readings −> “End” will appear.

5. CLEARING SAVED DATA

Data Clear Options:

o **SAVE :** Delete all the Saved Readings data.

o **CAL :** Reset to factory calibration.

This will delete any previously saved calibrations

1. Press and hold [MENU] key for 2 seconds.
2. Use [DOWN / MENU] key to "CLr" option. Press [STORE / ENTER]
3. “SAVE” and “CAL” will now appear on the screen.
4. Select the desired data reset option with [UP MENU] and [DOWN / UNIT] keys, then press [STORE / ENTER]
5. “Cont” will blink at the bottom of the screen. This is asking if you wish to continue. To DELETE saved data press [STORE / ENTER]. Once pressed you cannot stop data from being deleted.

6. WARRANTY

1. HM-200: One Year Limited Warranty
2. pH Probe (SP-P5): Six Month Limited Warranty
3. EC Probe (SP-C2): One Year Limited Warranty

The HM-200, manufactured by HM Digital, Inc.
("the Company") is warranted to the purchaser against defective materials and workmanship for one (1) years from the date of purchase.

From the date of purchase, pH probe (SP-P5) is warranted for six (6) months and EC probe (SP-C2) is warranted for one (1) year to the purchaser against defective materials and workmanship.

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 HM-200 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 800.383.2777 or email Info@HMDigital.com to receive further instructions. Before sending the product back to us, please include the following below,

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

Implied Warranties: Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose, are limited in duration to 1 year 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.

7. CONTACT INFORMATION

HM Digital, Inc. is a leading manufacturer of professional fluid 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
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Visit us:

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