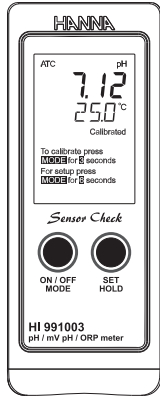


# Instruction Manual

## HI 991003

### Portable pH / mV Meter with Sensor Check



### WARRANTY

All Hanna Instruments meters are warranted for two years against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. The probes are warranted for a period of six months.

This warranty is limited to repair or replacement free of charge. Damage due to accidents, misuse, tampering or lack of prescribed maintenance are not covered.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the problem. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

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Dear Customer,

Thank you for choosing a Hanna Instruments Product.

Please read this instruction manual carefully before using the instrument. If you need additional technical information, do not hesitate to e-mail us at [tech@hannainst.com](mailto:tech@hannainst.com).

### PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipment. If noticeable damage is evident, notify your dealer.

**Note:** Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing together with the supplied accessories.

### GENERAL DESCRIPTION

HI 991003 is a portable pH/pH-mV/ORP/temperature meter, with unique Sensor Check feature, that allows the user to determine the electrode status at any time.

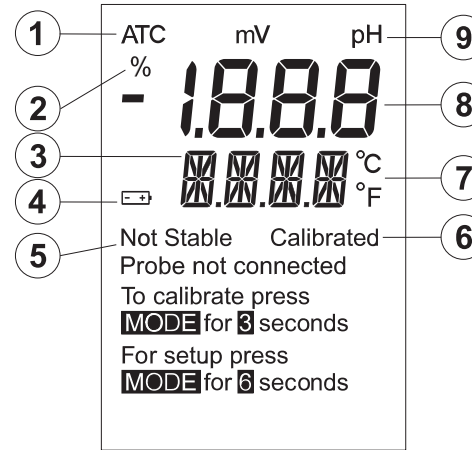
Main features also include: extended measurement ranges; waterproof and compact casing; large dual-line display; low battery detection; automatic pH calibration at one or two points within two memorized buffer sets (standard or NIST); selectable temperature unit (°C or °F).

The pH/ORP electrode has a built-in temperature sensor for simultaneous temperature compensated pH and temperature readings, and also contains an integral pH sensor preamplifier to provide pH measurements impervious to noise and electrical interferences. The mV reading is also available.

Each meter is supplied with:

- HI 1297D pH/ORP/temperature probe with DIN connector and 1 m (3.3') cable
- Calibration & cleaning solution sachets
- 3 x 1.5V AAA batteries
- Instruction manual.

### LCD DESCRIPTION



1. Automatic Temperature Compensation indicator
2. Battery percentage (visible at power up)
3. Secondary display
4. Low battery indicator
5. Stability indicator
6. pH calibration indicator
7. Selectable temperature unit
8. Primary display
9. Measuring unit for primary display

### ACCESSORIES

- HI 1297D Combination preamplified pH/ORP/temperature probe with DIN connector and 1 m (3.3') cable
- HI 1296D Combination amplified pH/temperature probe with DIN connector and 1 m (3.3') cable
- HI 7004L pH 4.01 buffer solution, 500 mL
- HI 7006L pH 6.86 buffer solution, 500 mL
- HI 7007L pH 7.01 buffer solution, 500 mL
- HI 7009L pH 9.18 buffer solution, 500 mL
- HI 7010L pH 10.01 buffer solution, 500 mL
- HI 7020L ORP 200/275 mV test solution, 500 mL
- HI 70300L pH electrode Storage solution, 500 mL
- HI 7061L pH electrode Cleaning solution, 500 mL
- HI 76405 Electrode holder

### SPECIFICATIONS

Range (*)	-2.00 to 16.00 pH ±825 mV (pH-mV) ±1999 mV (ORP) -5.0 to 105.0°C / 23.0 to 221.0°F
Resolution	0.01 pH 1 mV 0.1°C / 0.1°F
Accuracy (@20°C/68°F)	±0.02 pH ±1 mV (pH-mV) ±2 mV (ORP) ±0.5°C up to 60°C; ±1.0°C outside ±1.0°F up to 140°F; ±2.0°F outside
Temperature Compensation	Automatic -5.0 to 105.0°C (23 to 221°F)
pH Calibration	Automatic, 1 or 2 point choose between 2 sets of buffers (standard: 4.01/7.01/10.01 or NIST: 4.01/6.86/9.18)
Probe (included)	HI 1297D amplified pH/ORP probe with internal temperature sensor, DIN connector and 1 m (3.3') cable
Battery Type	3 x 1.5V AAA
Battery Life	Approximately 1200 hours of continuous use
Auto-off	After 8 minutes of non-use
Environment	0 to 50°C (32 to 122°F); RH max. 100%
Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")
Weight	205 g (7.2 oz.)

(\*) the temperature range is limited to 80°C (176°F) if using the HI 1296D or HI 1297D sensors.

To clean the meter, use water only.

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

## OPERATIONAL GUIDE

First time you use the instrument open the battery compartment and put the batteries inside observing the polarity.

### To connect the probe

With the meter turned off, connect the **HI 1297D** probe to the DIN socket on the bottom of the meter by aligning the pins and pushing in the plug. Tighten the nut to ensure a good connection. Remove the protective cap from the probe before taking any measurements.

### To turn the meter ON and check the battery status

Press the **ON/OFF/MODE** button until the display lights up. At start-up, all the LCD segments are displayed for 1 second, then the percent indication of the remaining battery life is displayed for another second (E.g. "100 % BATT"). The meter then enters the normal measuring mode.

**Note:** If the display needs to be checked, keep the **ON** button pressed while turning the meter on. The meter will display all segments as long as the button is pressed.

### To select the measurement range

While in measurement mode, press the **SET/HOLD** button to select pH, pH-mV or ORP (mV) measurement range.

**Note:** "pH-mV" indicates the mV value equivalent to the pH.

### To freeze the display

While in measurement mode, press and hold the **SET/HOLD** button until "HOLD" appears on the secondary display and the reading will be frozen on the LCD (E.g. "pH 5.73 HOLD"). Press any button to return to normal mode.

### To turn the meter OFF

While in normal measurement mode, press the **ON/OFF/MODE** button. "OFF" will appear on the secondary display. Release the button.

The meter is provided with an acoustic signal active when a key is pressed.

**Note:** When the meter detects the absence of probe at its input, the message "Probe not connected" appears on LCD and "----" blinking on LCD lines. When a probe is connected, the "Probe not connected" tag is turned off, and the readings are displayed on LCD lines.

## pH MEASUREMENT & CALIBRATION

- Make sure the meter has been calibrated before use.
- If the probe is dry, soak it in **HI 70300** storage solution for 30 minutes to reactivate it.
- Submerge the probe in the sample to be tested while stirring it gently. Wait until the "Not Stable" tag on the LCD is turned off.
- The pH value automatically compensated for temperature is displayed on the primary LCD, while the secondary LCD displays the sample temperature.
- If measurements are taken in different samples successively, rinse the probe tip thoroughly to eliminate cross-contamination. After cleaning, rinse the probe tip with some deionized water and some of the sample to be measured.

### pH calibration

For better accuracy, frequent calibration of the pH sensor with the meter is recommended. In addition, the meter must be recalibrated whenever:

- a) The pH electrode is replaced.
  - b) After testing aggressive chemicals.
  - c) Where high accuracy is required.
  - d) At least once a month.
- While in pH measurement mode, press and hold the **ON/OFF/MODE** button until "OFF" on the secondary display is replaced by "CAL". Release the button. Place the sensor into the first calibration buffer.
  - The meter enters the calibration mode, displaying "pH 7.01 USE" (or "pH 6.86 USE" if the NIST buffer set was selected).
  - For a *single-point calibration* place the probe in any buffer from the selected buffer set (E.g. pH 4.01, 9.18 or 10.01). The meter will automatically recognize the buffer value.
  - If the buffer is not recognized or the calibration offset is out of the accepted range "----WRONG" is displayed.
  - If the buffer is recognised "REC" is displayed until the reading is stable and the calibration is accepted.
  - If using pH 7.01 (or pH 6.86 from NIST buffer set), after acceptance of the buffer press any key to exit. "OK1" message is displayed and meter returns to pH measurement mode.
  - If using 4.01 or 10.01 (9.18) buffer the "OK1" message is displayed and meter returns to pH measurement mode.
  - For a *two-point calibration*, proceed as for the single point calibration selecting 7.01/6.86 pH buffer.
  - The "pH 4.01 USE" message is displayed.
  - Place the probe in the second calibration buffer (pH 4.01 or 10.01, or, if using NIST, pH 4.01 or 9.18). When the second buffer is accepted, the LCD will display "OK2" for 1 second and the meter will return to the normal measurement mode.

- If the buffer is not recognised or the slope is out of accepted range "----WRONG" is displayed. Change the buffer, clean the electrode or press any key to exit calibration.

**Note:** When the calibration procedure is completed, the "Calibrated" tag is turned on.

It is always recommended to carry out a two-point calibration for better accuracy.

### To exit calibration and reset default values

- After entering the calibration mode and before the first point is accepted, it is possible to quit the procedure and return to the last calibration data by pressing the **ON/OFF/MODE** button. The LCD displays "----ESC" for 1 second and the meter returns to normal mode.
- To reset the default values and clear a previous calibration, press the **SET/HOLD** button after entering the calibration mode and before the first point is accepted. The LCD displays "----CLR" for 1 second, the meter resets to the default calibration and the "Calibrated" tag on the LCD disappears.

## SENSOR CHECK

The Sensor Check feature allows the user to check the electrode status at any time. This is possible by setting the meter to pH-mV range. The **offset value** is the reading of the electrode immersed in pH7 buffer (@25°C/77°F). If this reading is outside the range  $\pm 40$  mV, the electrode is considered "poor" and it is recommended to replace it with a new one.

The **slope value** of the electrode is the difference between readings in pH7 and in pH4 buffers. For a new electrode this is about 174 mV (@25°C/77°F). With time, the slope value decreases. When it reaches the value of about 150 mV, the electrode is considered "poor", and it is recommended to replace it with a new one.

**Note:** Always recalibrate the meter after replacing the electrode.

To ensure reliable readings, the electrode must be cleaned with cleaning solution before measuring the offset and the slope.

## ORP MEASUREMENT

- Make sure the probe is connected.
- Set the meter to ORP (mV) range.
- Place the probe into the sample to be tested, stir briefly and wait until the "Not Stable" tag on the LCD is turned off.
- The meter will show the ORP (mV) value and the temperature of the sample.

**Notes:** • The ORP range is factory calibrated and cannot be calibrated by the user. **HI 7020L** ORP solution can be used to validate ORP sensor is reading correctly.

- "ATC" tag turns off because the mV readings are not temperature compensated.

## METER SETUP

Setup mode allows the selection of the temperature unit and the type of pH buffer set.

To enter the Setup mode, press and hold the **ON/OFF/MODE** button until "CAL" on the secondary display is replaced by "TEMP" and the current temperature unit (E.g. "TEMP °C"). Then:

- *for °C/°F selection*, use the **SET/HOLD** button. After the temperature unit has been selected, press **ON/OFF/MODE** to enter the buffer set selection mode; press **ON/OFF/MODE** twice to return to the normal measuring mode.
- *to change the type of calibration buffer set*, after setting the temperature unit, the meter will show the current buffer set: "pH 7.01 BUFF" (for standard buffer set: 4.01/7.01/10.01) or "pH 6.86 BUFF" (for NIST buffer set: 4.01/6.86/9.18). Change the set with the **SET/HOLD** button, then press **ON/OFF/MODE** to return to normal mode.

## BATTERY REPLACEMENT

The meter is supplied with batteries.

The meter displays the remaining battery percentage when turned on. When the level is below 5%, the "☞" symbol on the LCD blinks to indicate a low battery condition. If the battery level is low enough to cause erroneous readings, the Battery Error Prevention System (BEPS) turns the meter off. It is recommended to replace the batteries as soon as the display will flash the battery symbol. To replace the batteries, follow the next steps:

- Open the battery compartment cap (on the bottom of the instrument).
- Remove old batteries.
- Replace new batteries observing the polarity on the rear of the instrument.
- Close the battery compartment cap.