



**COVER SHEET
STANDARD OPERATING PROCEDURE**

Operation Title: Field Instrument Calibration and Documentation

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DISTRIBUTION:

() Division of Technical Services.....By: _____ Date: _____



1.0 APPLICABILITY

This Standard Operating Procedure (SOP) applies to all BRWM staff working on petroleum remediation sites within the Petroleum Program. It is also applicable to all parties that investigate, mitigate, or remediate petroleum releases.

This SOP is not a rule and is not intended to have the force of law, nor does it create or affect any legal rights of any individual, all of which are determined by applicable statutes and law. This SOP does not supersede statutes or rules.

2.0 PURPOSE

The purpose of this document is to describe the MEDEP/TS procedure for field instrument calibration and documentation, as required by Section 7.1 of the Department's LUST QAPP. A variety of equipment is available to the MEDEP/TS Program for conducting soil, groundwater and indoor air investigations. A subset of the available equipment can be seen in Table 2.0. All equipment is maintained and calibrated according to the manufacturers' instructions and in accordance with the appropriate analytical methods. Manufacturers' instructions and other instructional documentation will be kept in the equipment logbook maintained by support staff in MEDEP/TS. As new equipment is purchased or other otherwise made available to MEDEP/LUST Program, the equipment list and SOPs will be updated, as needed.

3.0 RESPONSIBILITIES

All MEDEP/TS Staff must follow this procedure when using field equipment. Staff must be determined to be competent in the use of all equipment prior to the use of the equipment to collect samples for soil, groundwater or indoor air investigations. In addition, staff must complete annual refresher training to demonstrate ongoing competency. Documentation of initial and ongoing equipment use competency for MEDEP staff is maintained by the MEDEP/TS Hydrogeology Unit or other designated personnel. Non-MEDEP personnel are responsible for maintaining their own competency demonstrations. Competency demonstrations for non-MEDEP personnel should be provided to the MEDEP upon request.



4.0 DEFINITIONS

- 4.1 ACCEPTANCE CRITERIA – The conditions that instrument must meet to ensure that data obtained will be valid and acceptable for decision making.
- 4.2 BUMP TEST – Measure known concentration to determine if the instrument meets the acceptance criteria.
- 4.3 CALIBRATION GAS – Containerized gas certified to have known concentrations of volatile compounds.
- 4.4 CALIBRATION STANDARDS – packets of liquid standards that are used with the water quality meters.
- 4.5 NEW EQUIPMENT – Any equipment, not currently listed here, purchased by the Department, intended for field measurement of site conditions, that require calibration by the manufacturer.
- 4.6 PID/FID – An instrument designed to measure ionizable organic compounds in air using either a Photo Ionizing Detector (PID) or a Flame ionizing detector (FID).
- 4.7 WATER QUALITY METERS – Instruments that measure common components found in groundwater, usually by connecting to a probe (i.e. specific conductance, temperature, pH, Eh, DO, etc.).
- 4.8 WATER QUALITY TEST KITS – Colorimetric kits that measure common components found in groundwater (i.e. DO, Fe, Mn).
- 4.9 ZERO AIR – Ambient air conditions assumed to contain no appreciable volatile components.
- 4.10 ZERO GAS – Containerized gas certified to have no volatile components.



5.0 GUIDELINES AND PROCEDURES

5.1 INTRODUCTION

To ensure that all field equipment is performing within specifications and will provide accurate readings on current conditions at remedial sites, all field instruments are to be bump tested or calibrated, and then documented before and after use. Bump test and calibration results must be recorded in the equipment log and the staff field book. Bump test results must be compared to the acceptance criteria to assure that the instrument responds appropriately to the calibration gas. If bump test results are outside the acceptance criteria, the instrument must be calibrated prior to use. Instruments used to make field decisions related to remediation of contaminated media must be bump tested after field use to document the accuracy of the instrument. All instrument calibrations and bump tests should be recorded in the instrument log book.

5.2 PLANNING

A well-developed Conceptual Site Model (CSM) is imperative for effective use of this technique (see MEDEP/TS SOP# RWM-PP-006 – Conceptual Site Model for Petroleum Contamination). Prior to conducting any sampling event, a Sampling and Analysis Plan (SAP) should be developed (see MEDEP/TS SOP# RWM-DR-014 - Development of a Sampling and Analysis Plan).

5.3 PROCEDURE

5.3.1 OVERVIEW

The Division of Technical Services maintains indoor air and soil gas instruments (PID/FID, 4-gas meter, MSA Altair, GEM 5000, etc.), water meters with probes (pH, eH, DO, etc.), and water test kits (Hach, CheMets, etc.). The equipment that is maintained by the Division of Technical Services changes periodically, so procedures listed below should be updated with the addition and retirement of equipment.

5.3.2 PROJECT SPECIFIC CONSIDERATIONS

The project-specific methodology needs to consider factors such as:

Is the field instrument appropriate for the site conditions:

- Contaminants of concern
- Range of possible concentrations
- Cleanup guidelines
- Exposure points

5.3.3 AIR MONITORING EQUIPMENT

5.3.3.1 PID/FID



5.3.3.1.1 PID/FID BUMP TEST

Start the instrument and allow it to warm up. Connect it to a supply of the calibration gas of a known concentration. The acceptance criteria for this type of instrument is 5% +/- if the readings will be used to make remedial decisions for the site. The acceptance criteria is 10% +/- if the readings are to be used to check for trends or to provide a line of evidence to be combined with other lines of evidence to make an intermediate site decision.

5.3.3.1.2 PID/FID CALIBRATION –

Calibration should follow the manufacturer's instructions using a calibration standard gas, e.g. Isobutylene or a site specific VOC of concern.

Air monitoring equipment shall be bumped and/or calibrated routinely on a monthly basis or as directed by the manufacturer and prior to its use in the field at the beginning of each working day and checked at the end of each working day. Data from these calibrations should be recorded in the user's field book and then copied into the designated instrument log book upon the meter's return to the office.

5.3.3.2 4-GAS METER

Calibration should follow the manufacturer's instructions using a calibration standard gas and a carbon dioxide scrubber to make sure the CO₂ sensor is properly functioning.

Air monitoring equipment shall be calibrated routinely on a monthly basis or as directed by the manufacturer and prior to its use in the field and at the beginning of each working day. Data from these calibrations should be recorded in the user's field book and then copied into the designated instrument log book upon the meter's return to the office.

5.3.3.3 MSA Altair

Calibration should follow the manufacturer's instructions using a calibration standard gas.

Air monitoring equipment shall be calibrated routinely on a monthly basis or as directed by the manufacturer and prior to its use in the field and at the beginning of each working day. Data from these calibrations should be recorded in the user's field book and then copied into the designated instrument log book upon the meter's return to the office.

5.3.3.4 GEM 5000

See SOP RWM-TS-LG03, Protocol for Use of the GEM™ 5000 Gas Analyzer, March 19, 2015

5.3.4 WATER QUALITY PROBES

Water quality probes, such as the Hanna Combo pH/EC pens, shall be calibrated routinely as directed by the manufacturer, Attachment A. Pens shall be calibrated prior to their use in the field at the beginning of each working day and checked at the end of each working day. Data



from these calibrations should be recorded in the user's field book and then copied into a designated field book upon the probe's return to the office. **Standard Methods** recommend calibrating according to manufacturer's procedure, making sure to bracket the expected range of the samples. Some instruments will require a three-point calibration (i.e. pH 4-7-10), some only need a two-point calibration (i.e. pH 0-10).

5.3.5 WATER QUALITY KITS

Water Quality Kits shall be used as directed by the manufacturer, including the use of reagents. Staff shall confirm that all reagents and other dated solutions are not expired prior to its use in the field. Confirmation of this check should be recorded in the user's field book.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

Data quality objectives should be stated in the SAP. Quality Assurance/Quality Control (QA/QC) samples may be collected if needed to meet DQOs. Typical types of QA/QC samples that may be collected or prepared at the laboratory include replicate MIS samples to allow determination of a UCL for the DU, laboratory control blank spikes, and analysis of reference material containing known concentrations of the target analytes. All analytical data should be reviewed and assessed to determine if DQOs have been met. If review indicates DQOs have not been met, corrective action will be recommended by the reviewer.

7.0 REFERENCES

7.1 Standard Methods, 18th Edition 1992, ed. A Greenberg, L Clesceri, A Eaton

7.2 <https://www.epa.gov/hw-sw846>

[7.3](#) SOP RWM-TS-LG03, Protocol for Use of the GEMtm 5000 Gas Analyzer, March 19, 2015



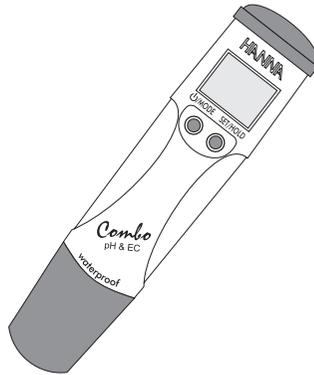
Attachment A

Hannah Instruments Instruction Manual pH/EC/TDS/Temperature (HI98129) and
Hannah Instruments Instruction Manual pH/ORP & Temperature (HI98121)

Instruction Manual

HI 98129 • HI 98130

pH/EC/TDS/Temperature with Only One Tester



WARRANTY

HI 98129 and HI 98130 are warranted for one year against defects in workmanship and materials when used for their intended purpose and maintained according to instructions. The electrode is warranted for a period of six months. This warranty is limited to repair or replacement free of charge.

Damages due to accident, 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 failure. 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.

All rights are reserved. Reproduction in whole or in part is prohibited without the written consent of the copyright owner, Hanna Instruments.

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

Dear Customer,
Thank you for choosing a Hanna product. This manual will provide you with the necessary information for a correct operation. Please read it carefully before using the meter.
If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

These instruments are in compliance with the CE directives.

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully. If any damage has occurred during shipment, immediately notify your Dealer or the nearest Hanna Customer Service Center.

Each meter is supplied with:

- HI 73127 pH electrode
- HI 73128 electrode removal tool
- batteries (4 x 1.5V) and instructions

Note: Conserve all packing material until the instrument has been observed to function correctly. Any defective item must be returned in its original packaging.

US DESIGN PATENT
D462,024

GENERAL DESCRIPTION

HI 98129 and HI 98130 are waterproof pH/EC/TDS/temperature meters. The housing has been completely sealed against humidity and designed to float. All pH and EC/TDS readings are automatically temperature compensated (ATC), and temperature values can be displayed in °C or °F units.

For EC/TDS readings, the EC/TDS conversion factor (CONV) is selectable by the user, as well as the temperature compensation coefficient β (BETA).

The meters can be calibrated at one or two points for pH (with auto-buffer recognition and against five memorized buffer values), and at one point for EC.

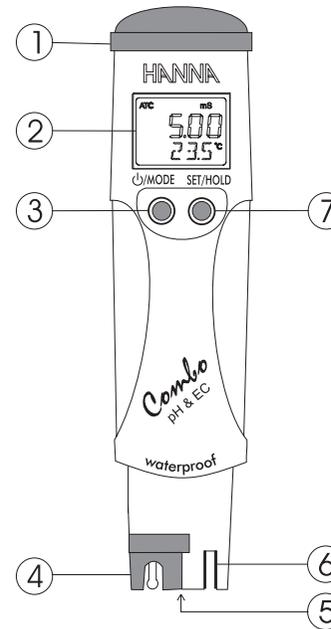
Measurements are highly accurate with a unique stability indicator right on the LCD.

These meters are also provided with battery level indication at start-up, and with a low battery symbol which warns the user when the batteries need to be replaced. In addition the Battery Error Prevention System (BEPS) avoids erroneous reading caused by low voltage level by turning the meter off.

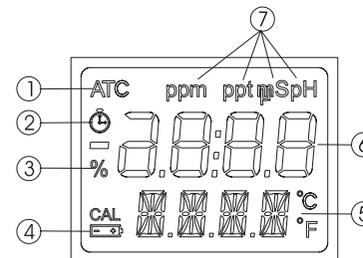
The HI 73127 pH electrode, supplied with the meter, is interchangeable and can be easily replaced by the user.

The stainless steel encapsulated temperature sensor facilitates faster and more accurate temperature measurement and compensation.

FUNCTIONAL DESCRIPTION



1. Battery compartment
2. Liquid Crystal Display (LCD)
3. ON/OFF/MODE button
4. HI 73127 pH electrode
5. Temperature sensor (behind)
6. EC/TDS probe
7. SET/HOLD button



1. Automatic temperature compensation indicator
2. Stability indicator
3. Battery life percentage indicator
4. Low battery indicator
5. Secondary display
6. Primary display
7. Measuring units for primary display

SPECIFICATIONS

Range	0.0 to 60.0°C / 32.0 to 140.0°F 0.00 to 14.00 pH 0 to 3999 μ S/cm (HI 98129) 0.00 to 20.00 mS/cm (HI 98130) 0 to 2000 ppm (HI 98129) 0.00 to 10.00 ppt (HI 98130)
Resolution	0.1°C / 0.1°F 0.01 pH 1 μ S/cm ; 1 ppm (HI 98129) 0.01 mS/cm ; 0.01 ppt (HI 98130)
Accuracy	$\pm 0.5^\circ\text{C}$ / $\pm 1^\circ\text{F}$ (@20°C/68°F) ± 0.05 pH $\pm 2\%$ f.s. (EC/TDS)
Typical EMC	$\pm 0.5^\circ\text{C}$ / $\pm 1^\circ\text{F}$
Deviation	± 0.02 pH $\pm 2\%$ f.s. (EC/TDS)
Temperature Compensation	automatic, with $\beta=0.0$ to 2.4%/°C (EC/TDS)
Environment	0 to 50°C (32 to 122°F); RH 100%
TDS Factor	0.45 to 1.00 (CONV)
Calibration	automatic, 1 or 2 point with 2 sets of memorized buffers (pH 4.01/7.01/10.01 or 4.01/6.86/9.18) for pH; automatic, at 1 point for EC/TDS
EC/TDS Cal.solutions	
HI 98129:	HI7031 (1413 μ S/cm) HI7032 (1382 ppm; CONV=0.5) HI70442 (1500 ppm; CONV=0.7)
HI 98130:	HI7030 (12.88 mS/cm) HI70038 (6.44 ppt; CONV=0.5 or 9.02 ppt; CONV=0.7)
Electrode (included)	HI 73127 pH electrode
Battery Type/Life	4 x 1.5V with BEPS/approx. 100 hours
Auto-off	after 8 minutes of non-use
Dimensions	163 x 40 x 26 mm (6.4 x 1.6 x 1.0")
Weight	100 g (3.5 oz.)

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used. Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance. To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24 Vac or 60 Vdc. To avoid damages or burns, do not perform any measurement in microwave ovens.

OPERATIONAL GUIDE

To turn the meter on and to check battery status

Press and hold the ψ /MODE button for 2-3 seconds. All the used segments on the LCD will be visible for a few seconds, followed by a percent indication of the remaining battery life (Eg. % 100 BATT).

To change the temperature unit

To change the temperature unit (from °C to °F), from measurement mode, press and hold the ψ /MODE button until TEMP and the current temperature unit are displayed on the lower LCD (E.g. TEMP °C). Use the SET/HOLD button to change the temperature unit, and then press the ψ /MODE button twice to return to normal measuring mode.

To freeze the display

Press the SET/HOLD button for 2-3 seconds until HOLD appears on the secondary display. Press either button to return to normal mode.

To turn the meter off

Press the ψ /MODE button while in normal measurement mode. OFF will appear on the lower part of the display. Release the button.

Notes:

- Before taking any measurement make sure the meter has been calibrated.
- To clear a previous calibration, press the ψ /MODE button after entering the calibration mode. The lower LCD will display ESC for 1 second and the meter will return to normal measurement mode. The CAL symbol on the LCD will disappear. The meter will be reset to the default calibration.
- If measurements are taken in different samples successively, rinse the probe thoroughly to eliminate cross-contamination; and after cleaning, rinse the probe with some of the sample to be measured.

pH MEASUREMENTS & CALIBRATION

Taking measurements

Select the pH mode with the SET/HOLD button. Submerge the electrode in the solution to be tested. The measurements should be taken when the stability symbol \square on the top left of the LCD disappears.

The pH value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



Calibration buffer set

- From measurement mode, press and hold ψ /MODE until TEMP and the current temperature unit are displayed on the lower LCD (E.g. TEMP °C).
- Press the ψ /MODE button again to show the current buffer set: pH 7.01 BUFF (for pH 4.01/7.01/10.01) or pH 6.86 BUFF (for NIST set, pH 4.01/6.86/9.18).

- Press the SET/HOLD button to change the buffer value.
- Press the ψ /MODE button to return to the normal measuring mode.

Calibration procedure

From measurement mode, press and hold the ψ /MODE button until CAL is displayed on the lower LCD. Release the button. The LCD will display pH 7.01 USE or pH 6.86 USE (if you have selected the NIST buffer set). The CAL tag blinks on the LCD.

For a **single-point pH calibration**, place the electrode in any buffer from the selected buffer set (eg. pH 7.01 or pH 4.01 or pH 10.01). The meter will recognize the buffer value automatically.

If using pH 4.01 or pH 10.01, the meter will display OK for 1 second and then return to the normal measuring mode.

If using pH 7.01, after recognition of the buffer the meter will ask for pH 4.01 as second calibration point. Press the ψ /MODE button to return to measurement mode or, if desired, proceed with the 2-point calibration as explained below.

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

For a **two-point pH calibration**, place the electrode in pH 7.01 (or 6.86 if you have selected the NIST buffer set). The meter will recognize the buffer value and then display pH 4.01 USE.

Rinse the electrode thoroughly to eliminate cross-contamination.

Place the electrode in the second buffer value (pH 4.01 or 10.01, or, if using NIST, pH 4.01 or 9.18). When the second buffer is recognized, the LCD will display OK for 1 second and the meter will return to the normal measuring mode.

The CAL symbol on the LCD means that the meter is calibrated.

EC/TDS MEASUREMENTS & CALIBRATION

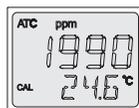
Taking measurements

Select either EC or TDS mode with the SET/HOLD button.

Submerge the probe in the solution to be tested. Use plastic beakers to minimize any electromagnetic interferences.

The measurements should be taken when the stability symbol \square on the top left of the LCD disappears.

The EC (or TDS) value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



To change the EC/TDS conversion factor (CONV) and the temperature compensation coefficient β (BETA)

- From measurement mode, press and hold the ψ /MODE button until TEMP and the current temperature unit are displayed on the lower LCD. Eg. TEMP °C.
- Press the ψ /MODE button again to show the current conversion factor. Eg. 0.50 CONV.
- Press the SET/HOLD button to change the conversion factor.
- Press the ψ /MODE button to show the current temperature compensation coefficient β . Eg. 2.1 BETA.
- Press the SET/HOLD button to change the temperature compensation coefficient β .
- Press the ψ /MODE button to return to the normal measuring mode.

Calibration procedure

- From measurement mode, press and hold the ψ /MODE button until CAL is displayed on the lower LCD.
- Release the button and immerse the probe in the proper calibration solution: **HI7031** (1413 μ S/cm) for **HI98129** and **HI7030** (12.88 mS/cm) for **HI98130**.
- Once the calibration has been automatically performed, the LCD will display OK for 1 second and the meter will return to normal measurement mode.
- Since there is a known relationship between EC and TDS readings, it is not necessary to calibrate the meter in TDS

The CAL symbol on the LCD means that the meter is calibrated.

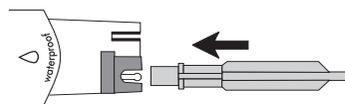
pH ELECTRODE MAINTENANCE

- When not in use, rinse the electrode with water to minimize contamination and store it with a few drops of storage (**HI 70300**) solution in the protective cap after use. **DO NOT USE DISTILLED OR DEIONIZED WATER FOR STORAGE PURPOSES.**

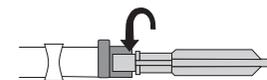
- If the electrode has been left dry, soak in storage solution for at least one hour to reactivate it.

- To prolong the life of the pH electrode, it is recommended to clean it monthly by immersing it in the **HI 7061** cleaning solution for half an hour. Afterwards, rinse it thoroughly with tap water and recalibrate the meter.

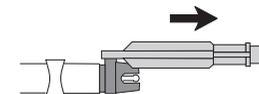
- The pH electrode can be easily replaced by using the supplied tool (**HI 73128**). Insert the tool into the electrode cavity as shown below.



- Rotate the electrode counterclockwise.



- Pull the electrode out by using the other side of the tool.

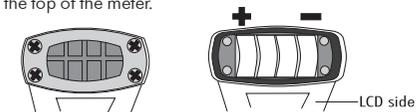


- Insert a new pH electrode following the above instructions in reverse order.

BATTERY REPLACEMENT

The meter displays the remaining battery percentage every time it is switched on. When the battery level is below 5%, the \square symbol on the bottom left of the LCD lights up to indicate a low battery condition. The batteries should be replaced soon. If the battery level is low enough to cause erroneous readings, the meter shows "0%" and the Battery Error Prevention System (BEPS) will automatically turn the meter off.

To change the batteries, remove the 4 screws located on the top of the meter.



Once the top has been removed, carefully replace the 4 batteries located in the compartment while paying attention to their polarity.

Replace the top, making sure that the gasket is properly seated in place, and tighten the screws to ensure a watertight seal.

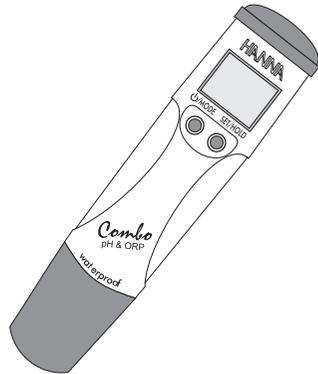
ACCESSORIES

- HI 73127** Replaceable pH electrode
- HI 73128** Electrode removal tool
- HI 70004P** pH 4.01 solution, 20 mL sachet (25 pcs)
- HI 70006P** pH 6.86 solution, 20 mL sachet (25 pcs)
- HI 70007P** pH 7.01 solution, 20 mL sachet (25 pcs)
- HI 70009P** pH 9.18 solution, 20 mL sachet (25 pcs)
- HI 70010P** pH 10.01 solution, 20 mL sachet (25 pcs)
- HI 77400P** pH 4 & 7 solutions, 20 mL sachet (5 each)
- HI 7004M** pH 4.01 solution, 230 mL bottle
- HI 7006M** pH 6.86 solution, 230 mL bottle
- HI 7007M** pH 7.01 solution, 230 mL bottle
- HI 7009M** pH 9.18 solution, 230 mL bottle
- HI 7010M** pH 10.01 solution, 230 mL bottle
- HI 70030P** 12.88 mS/cm solution, 20 mL (25 pcs)
- HI 70031P** 1413 μ S/cm solution, 20 mL (25 pcs)
- HI 70032P** 1382 ppm solution, 20 mL (25 pcs)
- HI 70038P** 6.44 ppt solution, 20 mL (25 pcs)
- HI 70442P** 1500 ppm solution, 20 mL (25 pcs)
- HI 7061M** Electrode cleaning solution, 230 mL bottle
- HI 70300M** Electrode storage solution, 230 mL bottle

Instruction Manual

HI 98121

Waterproof pH / ORP & Temperature Meter



WARRANTY

HI 98121 is warranted for one year against defects in workmanship and materials when used for its intended purpose and maintained according to instructions. The electrode is warranted for a period of six months. This warranty is limited to repair or replacement free of charge.

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

Dear Customer,

Thank you for choosing a Hanna product. This manual will provide you with the necessary information for correct operation. Please read it carefully before using the meter. If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

This instrument is in compliance with the CE directives.

PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully. If any damage has occurred during shipment, immediately notify your Dealer or the nearest Hanna Customer Service Center.

Each meter is supplied with:

- HI 73127 pH electrode
- HI 73128 Electrode removal tool
- 4 x 1.5V batteries

Note: Conserve all packing material until the instrument has been observed to function correctly. Any defective item must be returned in its original packing.

US DESIGN PATENT
D462,024

GENERAL DESCRIPTION

HI 98121 is a waterproof pH, ORP and temperature meter. The housing has been completely sealed against humidity and designed to float.

All pH readings are automatically temperature compensated (ATC), and temperature values can be displayed in °C or °F units.

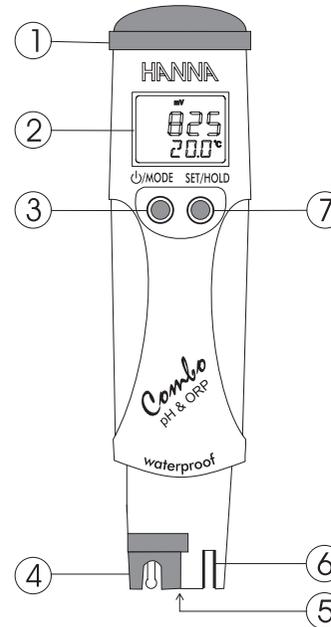
The meter can be calibrated at one or two points for pH (with auto-buffer recognition and against five memorized buffer values), while the mV (ORP) range is factory calibrated.

Measurements are highly accurate with a unique stability indicator right on the LCD.

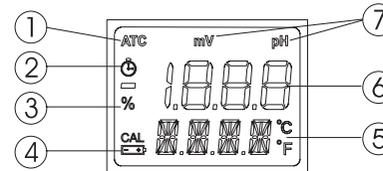
This meter is also provided with battery level indication at start-up, and with a low battery symbol which warns the user when the batteries need to be replaced. In addition the Battery Error Prevention System (BEPS) avoids erroneous reading caused by low voltage level by turning the meter off.

The HI 73127 pH electrode, supplied with the meter, is interchangeable and can be easily replaced by the user. The stainless steel encapsulated temperature sensor facilitates faster and more accurate temperature measurement and compensation.

FUNCTIONAL DESCRIPTION

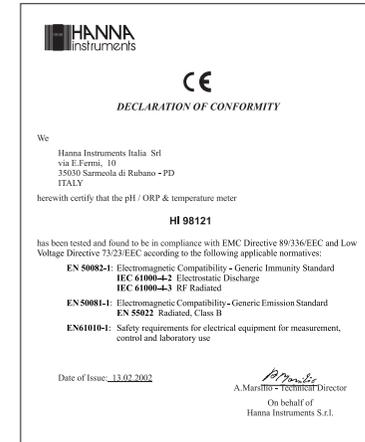


1. Battery compartment
2. Liquid Crystal Display (LCD)
3. ON/OFF/MODE button
4. HI 73127 pH electrode
5. Temperature sensor (behind)
6. ORP electrode
7. SET/HOLD button



1. Automatic Temperature Compensation Indicator
2. Stability indicator
3. Battery life percentage indicator
4. Low battery indicator
5. Secondary display
6. Primary display
7. Measuring unit for primary display

CE DECLARATION OF CONFORMITY



Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching the glass bulb and the ORP electrode at all times.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance. To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24 VAC or 60 VDC. To avoid damages or burns, do not perform any measurement in microwave ovens.

ACCESSORIES

- HI 73127 Replaceable pH electrode
- HI 73128 Electrode removal tool
- HI 70004P pH 4.01 solution, 20 mL sachet (25 pcs)
- HI 70006P pH 6.86 solution, 20 mL sachet (25 pcs)
- HI 70007P pH 7.01 solution, 20 mL sachet (25 pcs)
- HI 70009P pH 9.18 solution, 20 mL sachet (25 pcs)
- HI 70010P pH 10.01 solution, 20 mL sachet (25 pcs)
- HI 7004M pH 4.01 solution, 230 mL bottle
- HI 7006M pH 6.86 solution, 230 mL bottle
- HI 7007M pH 7.01 solution, 230 mL bottle
- HI 7009M pH 9.18 solution, 230 mL bottle
- HI 7010M pH 10.01 solution, 230 mL bottle
- HI 7021M ORP test solution (240 mV), 230 mL bottle
- HI 7022M ORP test solution (470 mV), 230 mL bottle
- HI 7061M Electrode cleaning solution, 230 mL bottle
- HI 70300M Electrode storage solution, 230 mL bottle
- HI 7091M Pretreatment reducing solution, 230 mL
- HI 7092M Pretreatment oxidizing solution, 230 mL

SPECIFICATIONS

Range	-2.00 to 16.00 pH
	±1000 mV
Resolution	-5.0 to 60.0°C / 23.0 to 140.0°F
	0.01 pH 1 mV 0.1°C or 0.1°F
Accuracy (@20°C/68°F)	±0.05 pH ±2 mV ±0.5°C or ±1°F
	±0.02 pH ±2 mV
Typical EMC	±0.02 pH
Deviation	±2 mV ±0.3°C or ±0.6°F
Temp. Compensation	Automatic for pH
Calibration	pH: at 1 or 2 points with 2 sets of memorized buffers (pH 4.01/7.01/10.01 or pH 4.01/6.86/9.18) ORP: factory calibrated
Electrode	HI 73127 pH electrode (included)
Environment	-5 to 50°C (23 to 122°F); RH 100%
Battery Type / Life	4 x 1.5V / approx. 250 hours
Auto-off	After 8 minutes of non-use
Dimensions	163 x 40 x 26 mm (6.4 x 1.6 x 1.0")
Weight	100 g (3.5 oz)

OPERATIONAL GUIDE

To turn the meter on and to check battery status

Press and hold the ϕ /MODE button until the LCD lights up. All the used segments on the LCD will be visible for 1 second (or as long as the button is pressed), followed by the percent indication of the remaining battery life (E.g. % 100 BATT).

To freeze the display

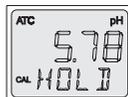
While in measurement mode, press the SET/HOLD button until HOLD appears on the secondary display. The reading will be frozen on the LCD.

Press any button to return to normal mode.

To turn the meter off

While in measurement mode, press the ϕ /MODE button. OFF will appear on the secondary display. Release the button.

Note: If measurements are taken in different samples successively, rinse the probe thoroughly to eliminate cross-contamination; and after cleaning, rinse the probe with some of the sample to be measured.



pH MEASUREMENTS & CALIBRATION

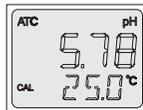
Taking measurements

Select pH mode with the SET/HOLD button.

Submerge the electrode in the solution to be tested while stirring it gently.

The measurements should be taken when the stability symbol \square on the top left of the LCD disappears.

The pH value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



Note: Before taking any pH measurement make sure the meter has been calibrated (CAL tag present on the LCD).

pH Calibration

For better accuracy, frequent calibration of the instrument is recommended. In addition, the instrument must be recalibrated whenever:

- The pH electrode is replaced.
- After testing aggressive chemicals.
- Where high accuracy is required.
- At least once a month.

Calibration procedure

From normal measuring mode, press and hold the ϕ /MODE button until OFF on the secondary LCD is replaced by CAL. Release the button. The LCD enters the calibration mode displaying "pH 7.01 USE" (or "pH 6.86 USE" if the NIST buffer set was selected).

After 1 second the meter activates the automatic buffer recognition feature. If a valid buffer is detected then its value is shown on the primary display and REC appears on the secondary LCD. If no valid buffer is detected, the meter keeps the USE indication active for 12 seconds, and then it replaces it with WRNG, indicating the sample being measured is not a valid buffer.

- For a **single-point calibration** with buffers pH 4.01, 9.18 or 10.01, the meter automatically accepts the calibration when the reading is stable; the meter displays the accepted buffer, with the message "OK 1". After 1 second the meter automatically returns to the normal measuring mode.

- For a **single-point calibration** with buffer pH 7.01 (or pH 6.86) is desired, then after the calibration point has been accepted the ϕ /MODE button must be pressed in order to return to normal mode. After the button is pressed, the meter shows "7.01" (or "6.86") - "OK 1" and, after 1 second, it automatically returns to the normal measuring mode.

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

- For a **two-point calibration**, place the electrode in pH 7.01 (or pH 6.86) buffer. After the first calibration point has been accepted, the "pH 4.01 USE" message appears. The message is held for 12 seconds, unless a valid buffer is recognized. If no valid buffer is recognized, then the WRNG message is shown. If a valid

buffer (pH 4.01, pH 10.01, or pH 9.18) is detected, then the meter completes the calibration procedure. When the buffer is accepted, the LCD shows the accepted value with the "OK 2" message, and then the meter returns to the normal measuring mode.

Note: When the calibration procedure is completed, the CAL tag is turned on.

To quit calibration and to reset to the 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 ϕ /MODE button. The secondary LCD displays "ESC" for 1 second and the meter returns to the normal measuring mode.

- To reset to 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 secondary LCD displays "CLR" for 1 second, the meter resets to the default calibration and the CAL tag on the LCD disappears.

ORP MEASUREMENTS

Taking measurements

Select ORP mode with the SET/HOLD button.

Submerge the electrode in the solution to be tested. The measurements should be taken when the stability symbol \square on the top left of the LCD disappears.

The ORP (mV) value is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



The ORP range is factory calibrated

Contact your nearest Hanna Service Center for recalibration, if necessary.

SETUP

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

To enter the Setup mode, select pH mode and then press the ϕ /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 the ϕ /MODE button to enter the buffer set selection mode; press the ϕ /MODE button twice to return to the normal measuring mode.

- to change the calibration buffer set:** After setting the temperature unit, the meter will show the current buffer set: "pH 7.01 BUFF" (for 4.01/7.01/10.01) or "pH 6.86 BUFF" (for NIST 4.01/6.86/9.18). Change the set with the SET/HOLD button, then press ϕ /MODE to return to the normal measuring mode.

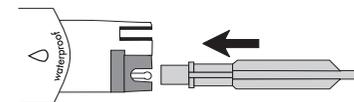
ELECTRODE MAINTENANCE

- When not in use, rinse the electrodes with water to minimize contamination and store them with a few drops of **HI 70300** storage solution in the protective cap after use. **DO NOT USE DISTILLED OR DEIONIZED WATER FOR STORAGE PURPOSES.**

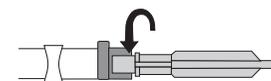
- If the electrodes have been left dry, soak in storage solution for at least one hour to reactivate them.

- To prolong the life of the electrodes, it is recommended to clean them monthly by immersing them in the **HI 7061** cleaning solution for half an hour. Afterwards, rinse it thoroughly with tap water and recalibrate the meter.

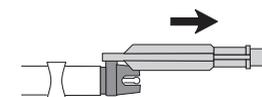
- The pH electrode can be easily replaced by using the supplied tool (**HI 73128**). Insert the tool into the probe cavity as shown below.



Rotate the electrode counterclockwise.



Pull the electrode out by using the other side of the tool.

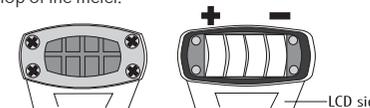


Insert a new pH electrode following the above instructions in reverse order.

BATTERY REPLACEMENT

The meter displays the remaining battery percentage every time it is switched on. When the battery level is below 5%, the \square symbol on the bottom left of the LCD lights up to indicate a low battery condition. The batteries should be replaced soon. If the battery level is low enough to cause erroneous readings, the meter shows "0%" and the Battery Error Prevention System (BEPS) will automatically turn the meter off.

To change the batteries, remove the 4 screws located on the top of the meter.



Once the top has been removed, carefully replace the 4 batteries located in the compartment while paying attention to their polarity. Replace the top, making sure that the gasket is properly seated in place, and tighten the screws to ensure a watertight seal.

RWM-PP-008-FieldInstrumentCalibration

Final Audit Report

2021-09-08

Created:	2021-08-30
By:	Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)
Status:	Signed
Transaction ID:	CBJCHBCAABAQW1HIqNHg86jaAJF97hOFotpDkZUUpqK

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 Document created by Lindsay Caron (LINDSAY.ER.CARON@MAINE.GOV)

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 Document emailed to Molly King (molly.king@maine.gov) for signature

2021-08-30 - 2:34:06 AM GMT

 Email viewed by Molly King (molly.king@maine.gov)

2021-08-31 - 12:25:09 PM GMT- IP address: 104.47.64.254

 Document e-signed by Molly King (molly.king@maine.gov)

Signature Date: 2021-08-31 - 12:25:20 PM GMT - Time Source: server- IP address: 198.182.163.115

 Document emailed to Susanne Miller (susanne.miller@maine.gov) for signature

2021-08-31 - 12:25:22 PM GMT

 Email viewed by Susanne Miller (susanne.miller@maine.gov)

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 Document emailed to Bill Longfellow (william.longfellow@maine.gov) for signature

2021-09-07 - 8:38:32 PM GMT

 Email viewed by Bill Longfellow (william.longfellow@maine.gov)

2021-09-07 - 8:43:24 PM GMT- IP address: 104.47.64.254

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Signature Date: 2021-09-07 - 8:43:43 PM GMT - Time Source: server- IP address: 24.198.167.74

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2021-09-07 - 8:43:45 PM GMT

 Email viewed by Melanie Loyzim (melanie.loyzim@maine.gov)

2021-09-08 - 11:21:34 AM GMT- IP address: 104.47.64.254

 Document e-signed by Melanie Loyzim (melanie.loyzim@maine.gov)

Signature Date: 2021-09-08 - 11:22:34 AM GMT - Time Source: server- IP address: 24.198.212.100

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2021-09-08 - 11:22:34 AM GMT