



pH • EC • DO Benchtop Meter HI2600

Dear Customer,

Thank you for choosing a Hanna Instruments® product.

Please read this instruction manual carefully before using this instrument as it provides the necessary information for correct use of this instrument, and a precise idea of its versatility.

If you need additional technical information, do not hesitate to e-mail us at tech@hannainst.com.

Visit www.hannainst.com for more information about Hanna Instruments and our products.

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1. PRELIMINARY EXAMINATION

Remove the instrument and accessories from the packaging and examine it carefully.

For further assistance, please contact your local Hanna Instruments office or email us at tech@hannainst.com.

Each device* is supplied with:

- HI11310 pH digital electrode
- pH calibration kit
 - » pH 4 buffer solution (2 sachets)
 - » pH 7 buffer solution (4 sachets)
 - » pH 10 buffer solution sachets (2 sachets)
 - » Electrode cleaning solution (2 sachets)
- HI764026 Electrode holder for HI2600 family
- HI920018 USB-C to USB-C cable
- USB-C power adapter
- Instrument quality certificate
- Probe/electrode quality certificate
- Battery safety insert
- Quick reference guide with QR code for instruction manual download

Note: Save all packing material until you are sure the instrument works correctly. Any damaged or defective item must be returned in its original packing material with the supplied accessories.

Ordering information

- HI2600-01 (US power plug)
- HI2600-02 (EU power plug)

* HI2600 accepts compatible pH, ORP (HI36180), conductivity (HI763100), or dissolved oxygen digital (HI764080) probes interchangeably. Probes can be ordered at www.hannainst.com

1.1. SAFETY MEASURES

Handling and usage precautions

The unit, although not fragile, can be damaged by improper handling and usage.

- Transport the unit with all cables removed.
- Keep the unit on a stable and even surface, away from contact with liquid.
- Avoid excessive dirt and dust.
- Protect the unit from contact with food, oils, and chemicals.
- If the device becomes wet, gently wipe the exterior with a clean, dry cloth.
- Keep away from direct sunlight.
- Use in a safe place that is appropriate to application requirements.
- Use attachments and accessories specified in this manual only.
- Operate the capacitive keys without applying pressure.
- Do not puncture the screen or drop the unit.
- Do not use the device near heat sources.
- Do not place objects on top of the device.
- Do not insert objects into the ports, spaces around keys, other than the intended cable, USB drive.

Battery safety

The coin-cell battery is replaceable by a professional service center only.

 WARNING	
<ul style="list-style-type: none"> • INGESTION HAZARD: This product contains a button cell or coin battery. • DEATH or serious injury can occur if digested. • A swallowed button cell or coin battery can cause Internal Chemical Burns in as little as 2 hours. • KEEP new and used batteries OUT OF REACH OF CHILDREN. • Seek immediate medical attention if a battery is suspected to be swallowed or inserted inside any part of the body. 	

- Remove and immediately recycle or dispose of used batteries according to local regulations and keep away from children.
Do NOT dispose of batteries in household trash or incinerate.
- Even used batteries may cause severe injury or death.
- Call a local poison control center for treatment information.
- Coin-cell battery type CR2032 | Nominal voltage 3.0 V
- Non-rechargeable batteries are not to be recharged.
- Do not force discharge, recharge, disassemble, heat above 85 °C (185 °F) or incinerate. Doing so may result in injury due to venting, leakage or explosion resulting in chemical burns.
- Ensure the batteries are installed correctly according to polarity (+ and -).
- Do not mix old and new batteries, different brands or types of batteries, such as alkaline, carbon-zinc, or rechargeable batteries.
- Remove and immediately recycle or dispose of batteries from equipment not used for an extended period of time according to local regulations.
- Always completely secure the battery compartment. If the battery compartment does not close securely, stop using the product, remove the batteries, and keep them away from children.

2. GENERAL DESCRIPTION & INTENDED USE

HI2600 enables fast, accurate measurements utilizing the Hanna Instruments® digital electrode/probes for pH (HI11310), ORP (HI36180), conductivity (HI763100), or dissolved oxygen (HI764080).

Each digital electrode/probe has a unique serial number and the parameter that it measures is automatically identified by the meter. Once connected, the sensor(s) is(are) ready to measure their parameter along with temperature.

The intuitive design simplifies configuration, calibration, measurement, data logging and transfer of data to a USB thumb drive or computer.

The benchtop meter offers a Basic Mode that streamlines measurement configuration and is useful for routine applications.

The compact meter (and probe) can be used as a portable device (using its rechargeable battery) or used as a laboratory instrument.

Large display with capacitive keys

The meter features a 5.5" (14 cm) LCD display. The large display provides a 130 ° wide viewing angle.

2.1.1. Main Features

- Automatic parameter recognition
 - pH/ORP**
 - » Choice of measurement unit:
 - pH, mV
 - EC**
 - » Choice of measurement unit:
 - Conductivity: $\mu\text{S}/\text{cm}$, mS/cm
 - TDS > ppm (mg/L), g/L
 - Salinity > NaCl, PSU, g/L
 - DO**
 - » Choice of measurement unit:
 - ppm (mg/L), %
- Adjustable resolution for pH and EC measurements
- CAL Check™ indicators (digital pH probes only)
- Sensor Check™ indicators (HI11311, HI12301 digital pH probes only)
- Dedicated GLP key
- GLP data included with logged data
- Simplified data transfer to a PC
- Up to 8 hour battery life when used as a portable device
- Internal clock and date

3. SYSTEM SPECIFICATIONS

3.1.1. HI2600 » using HI11310 pH electrode

	pH	mV	Temperature
Range	-2.00 to 16.00 pH -2.000 to 16.000 pH *	± 1000.0 mV	-20.0 to 120.0 °C ** (-4.0 to 248.0 °F)
Resolution	0.01 pH 0.001 pH *	0.1 mV	0.1 °C (0.1 °F)
Accuracy at 25 °C / 77 °F	±0.01 pH ±0.002 pH *	±0.2 mV	±0.5 °C (0.9 °F)
pH calibration	Automatic, up to three (five*) points Option to select from five (seven*) standard buffers: pH 1.68*, 4.01 or 3.00, 6.86, 7.01, 9.18, 10.01, 12.45* and two custom buffers*		
Temperature compensation	Automatic, using integral temperature sensor -5.0 to 100.0 °C (23.0 to 212.0 °F)		
Logging	Up to 1000* records organized in: <ul style="list-style-type: none"> • Manual log-on-demand, maximum 200 logs • Manual log-on-stability, maximum 200 logs • Interval logging* 		

* When operating in Standard Mode only!

** Temperature limits will be reduced to actual probe limits.

3.1.2. HI2600 » using HI36180 ORP probe

	ORP	Temperature
Range	± 2000.0 mV	-20.0 to 120.0 °C**(-4.0 to 248.0 °F)
Resolution	0.1 mV	0.1 °C (0.1 °F)
Accuracy at 25 °C / 77 °F	±0.2 mV (±999.9 mV) ±1 mV (±2000 mV)	±0.5 °C (0.9 °F)
Calibration	Single point offset	
Temperature compensation	Automatic, using integral temperature sensor -5.0 to 100.0 °C (23.0 to 212.0 °F)	
Logging	Up to 1000* records organized in: <ul style="list-style-type: none"> • Manual log-on-demand, maximum 200 logs • Manual log-on-stability, maximum 200 logs • Interval logging* 	

* When operating in Standard Mode only!

** Temperature limits will be reduced to actual probe limits.

3.1.4. HI2600 » using HI763100 four-ring conductivity probe

	EC	TDS	Salinity*	Temperature
Range	0.00 to 29.99 $\mu\text{S}/\text{cm}$ 30.0 to 299.9 $\mu\text{S}/\text{cm}$ 300 to 2999 $\mu\text{S}/\text{cm}$ 3.00 to 29.99 mS/cm 30.0 to 200.0 mS/cm up to 500.0 mS/cm absolute conductivity ‡	0.00 to 14.99 ppm (mg/L) 15.0 to 149.9 ppm (mg/L) 150 to 1499 ppm (mg/L) 1.50 to 14.99 g/L 15.0 to 100.0 g/L up to 400.0 g/L absolute TDS ‡ (with 0.80 factor)	0.0 to 400.0 % NaCl 2.00 to 42.00 PSU 0.00 to 80.00 g/L	-20.0 to 120.0 °C** (-4.0 to 248.0 °F)
Resolution	0.01 $\mu\text{S}/\text{cm}$ 0.1 $\mu\text{S}/\text{cm}$ 1 $\mu\text{S}/\text{cm}$ 0.01 mS/cm 0.1 mS/cm	0.01 ppm 0.1 ppm 1 ppm 0.01 g/L 0.1 g/L	0.1% NaCl 0.01 PSU 0.01 g/L	0.1 °C (0.1 °F)
Accuracy at 25 °C / 77 °F	± 1% of reading (± 0.05 $\mu\text{S}/\text{cm}$ or 1 digit, whichever is greater)	± 1% of reading (± 0.03 ppm or 1 digit, whichever is greater)	± 1% of reading	± 0.5 °C (0.9 °F)
EC calibration	Cell factor calibration Six standards available: 84 $\mu\text{S}/\text{cm}$, 1413 $\mu\text{S}/\text{cm}$ 5.00 mS/cm , 12.88 mS/cm , 80.0 mS/cm , 111.8 mS/cm One point offset: 0.00 $\mu\text{S}/\text{cm}$			
Salinity calibration* (% NaCl only)	Single point with HI7037 standard			
Temperature compensation	<ul style="list-style-type: none"> • Automatic, -5 to 100 °C (23 to 212 °F) • NoTC, can be selected to measure absolute conductivity 			
Conductivity temperature coefficient*	0.00 to 6.00 %/°C (EC and TDS only) (1.90 %/°C default)			
TDS factor*	0.40 to 0.80 (0.50 default)			
Logging	Up to 1000* (400) records organized in: <ul style="list-style-type: none"> • Manual log-on-demand, maximum 200 logs • Manual log-on-stability, maximum 200 logs • Interval logging*, maximum 600 logs (100 lots) 			

* When operating in Standard Mode only!

‡ Absolute conductivity (TDS) is the conductivity value without temperature compensation.

3.1.5. HI2600 » using HI764080 Dissolved Oxygen probe

	DO	Temperature
Range	0.00 to 45.00 ppm (mg/L) 0.0 to 300.0%	–20.0 to 120.0 °C * (–4.0 to 248.0 °F)
Resolution	0.01 ppm (mg/L) 0.1%	0.1 °C (0.1 °F)
Accuracy at 25 °C / 77 °F	± 1.5% of reading ± 1 digit	± 0.5 °C (0.9 °F)
DO calibration	One or two points at 0% (HI7040) and 100% (water-saturated air)	
Pressure compensation	Automatic 450.0 to 850.0 mmHg	
Resolution	0.1 mmHg	
Salinity compensation	0 to 40 g/L	
Resolution	1 g/L	
Temperature compensation	0.0 to 50.0 °C (32.0 to 122 °F)	
Logging	Up to 1000 records organized in: <ul style="list-style-type: none"> • Manual log-on-demand, maximum 200 logs • Manual log-on-stability, maximum 200 logs • Interval logging**, maximum 600 logs (100 lots) 	

* Temperature limits will be reduced to actual probe limits.

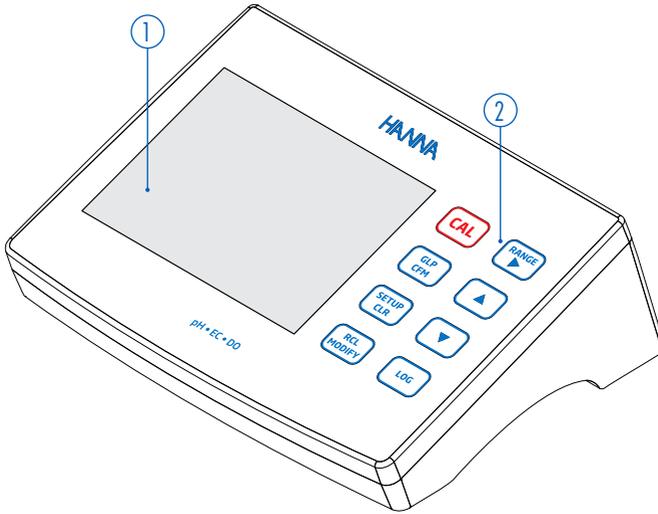
** When operating in Standard Mode only!

3.1.6. Additional Specifications

PC interface	USB-C
Storage interface	USB-C
Power supply	USB Type C (5 VDC; 500 mA)
Environment	0 to 50 °C (32 to 122 °F) Maximum 95 % RH non-condensing
Dimensions	205 x 160 x 77 mm (8.0 x 6.2 x 3.0 ")
Weight	Approximately 0.85 kg (1.87 lbs.)

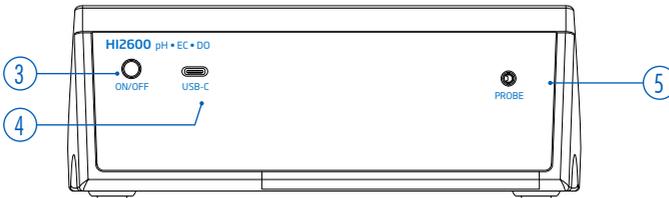
4. FUNCTIONAL & LCD DESCRIPTION

4.1. FRONT VIEW



1. Liquid Crystal Display (LCD)
2. Capacitive keys

4.2. REAR VIEW



3. Power button
4. USB-C connection for power or PC interface
5. Jack input (3 mm) for digital electrode/probes

4.3. DIGITAL PROBES

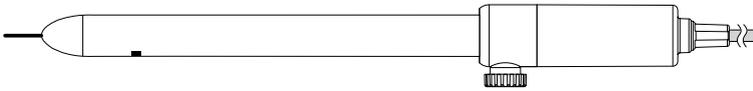
HI2600 accepts compatible pH, ORP, conductivity, or dissolved oxygen digital probes interchangeably.

Probe compatibility

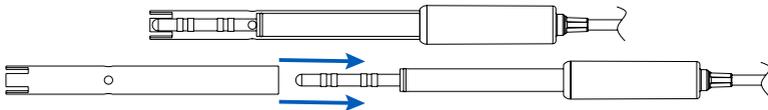
- HI11310
 - » Digital pH electrode with integral temperature sensor



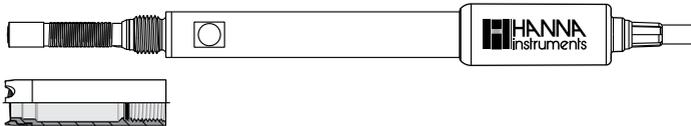
- HI36180
 - » Digital ORP probe with integral temperature sensor



- HI763100
 - » Digital four-ring conductivity probe with integral temperature sensor



- HI764080
 - » Digital polarographic dissolved oxygen probe with integral temperature sensor

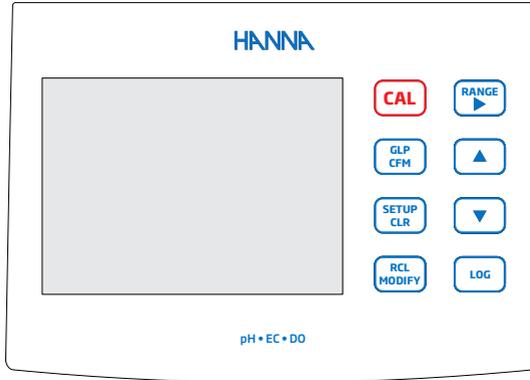


Probes can be ordered at www.hannainst.com

Probe Features

- Direct signal processing for noise-free measurements
- Automatic sensor recognition
- Storage of last calibration data
- Built with materials suitable for use in chemical analysis
- Integral temperature sensor
- 3 mm jack termination
- Unique serial ID for probe traceability

4.4. KEYPAD FUNCTION



Capacitive keys

Description

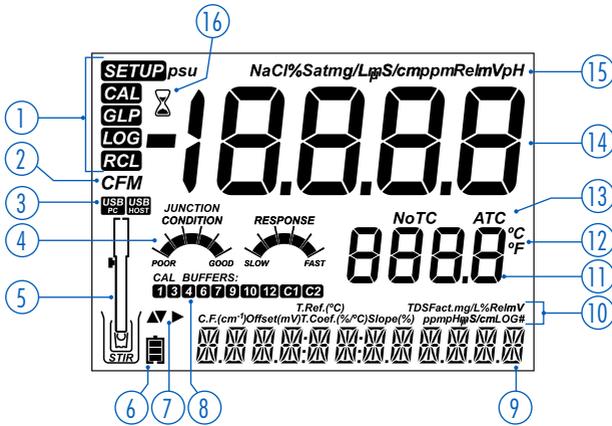
	Enter and exit calibration.
	Display GLP calibration information. In SETUP, confirm change made. During calibration, accept calibration points.
	Enter/exit SETUP mode. During calibration, clear previous calibration data. Clear log records in log recall.
	View logged records or view percentage of used log memory.
	Select measurement range. Navigate right in setup menu items. View GLP data for a data point in log recall.
	Scroll through setup menu items. Change selection when modifying a parameter in setup.*
	Log data by manual log-on-demand or manual log-on-stability. Start/stop interval logging.

Note: During measurement, use the keys to select desired message. Options include date, time, calibration data, battery charge.

If a measurement error or log status change occurs during measurement, the third line displays a pertinent message.

* To make number changes faster, hold down or key.

4.5. LCD DESCRIPTION



1. Mode tags
2. Confirm tag
3. USB-PC connection status
4. pH electrode diagnostics
5. Electrode/probe(s) symbol
6. Battery symbol
7. Arrow tags, displayed when they are available
8. pH buffers used for calibration
9. Third LCD line
 - » message area
10. Labels
11. Second LCD line
 - » temperature measurement
12. Temperature units
13. Temperature compensation status
14. First LCD line
 - » measurement line
15. Measurement units
16. Stability indicator

5. SETUP / INSTALLATION

5.1. SETTING UP THE METER

The main operating modes are setup, calibration, measurement, data logging, and data export. Follow this general outline of steps to get started.

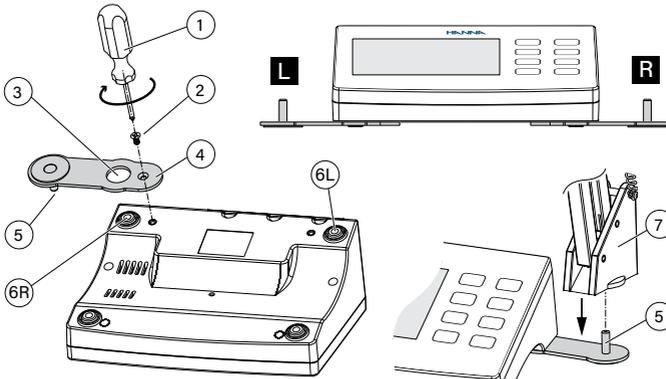
1. Use supplied USB-C to USB-C cable to connect the meter to power.
2. Press the ON/OFF button to turn the meter on.
3. Plug in the probe required for measurement.
4. Setup the parameters required for the measurement.
5. Calibrate the sensor/probe.

The system is now ready for measurements.

5.2. ATTACHING THE ELECTRODE ARM

Attaching the Electrode Holder Base Plate

- Take the [HI764026](#) electrode arm from the box.
- Identify the metal base plate (4) with the integral pivot pin (5) and the screw (2).
- The plate may be attached to either side of the meter, left (L) or right (R).
- Place the meter face down on a clean, dry surface.
- Align the hole on the base plate (3) over the rubber foot (6R or 6L).
- The pivot pin (5) should be facing downward.
- Use a screwdriver (1) to tighten the screw (2) and attach the base plate to the meter.



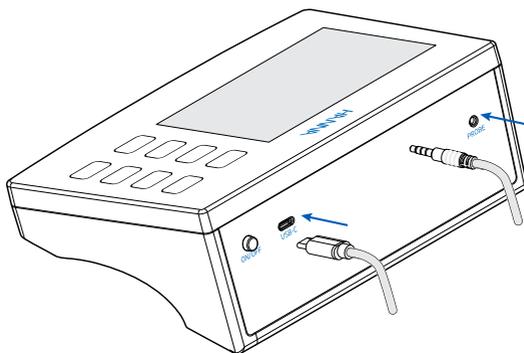
- Position the meter with the display facing up.
 - Slide electrode holder (7) over the pivot pin (5).
- A “slide in” motion is required to lock the arm into position.

5.3. POWERING THE UNIT

1. Plug one end of the USB-C cable into the USB-C port of the meter.
2. Plug the other end of the USB-C cable into the power adapter.
3. Plug the adapter into the wall.
4. Press the black ON/OFF power button.

At start up, the meter briefly displays the initialization screen.

Note: The meter is supplied with a rechargeable battery inside. The battery provides about 8 hours of continuous use. Whenever it is connected to the power adapter or to a PC, the battery is charging.



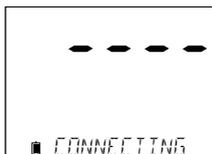
5.4. ELECTRODE & PROBE CONNECTIONS

pH electrode, ORP, conductivity, and DO probes attach to the meter through a jack connector, making attaching and removing the probe an easy process.

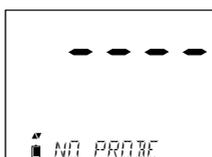
When connected, the probe is automatically detected.

- Insert the plug into the socket located on the meter's rear panel.
- Make sure the probe is completely connected.

If the probe is recognized, "CONNECTING" message is displayed along with sensor model.



If the probe is not connected or not recognized, "NO PROBE" message is displayed.



5.5. GENERAL SETUP

The General Setup options are displayed regardless of the sensor being used.

These settings remain when switching to another probe type or when no probe is connected.

Note: Settings are reset to default when meter is restarted.

- » Tap  key to access configurable options.
- » Use the   keys to navigate options.
- » Tap  key to modify setting.
Use  or   keys to modify options.
- » Tap  key to confirm the change.
- » Tap  key to exit setup.

General Setup items	Description	Options	Default	Basic Mode
USB connection	When connected to a PC, select between logging or data export.	<ul style="list-style-type: none"> • LOG ON METER • EXPORT TO PC 	LOG ON METER	Available
Log	<ul style="list-style-type: none"> • Manual log-on-demand • Manual log-on-stability • Timed interval lot logging 	<ul style="list-style-type: none"> • Manual log • Stability log Fast, Medium, Accurate • Interval log 5, 10, 30 seconds • Interval log 1, 2, 5, 15, 30, 60, 120, 180 minutes 	Interval (5 seconds)	Manual log Stability log (medium)
Set calibration expiration warning	"EFL TIME" is displayed when set time in this parameter has been exceeded.	1, 2, 3, 4, 5, 6, 7 days OFF	7 days	Not available
Probe specific	Parameters that are specific to a measurement type are inserted here in the SETUP list.			
Set date	Tap  to set date. Tap  to save.	YYYY/MM/DD Date	Set date	Available
Set time	Tap  to set time. Tap  to save.	24 hr:MM:SS Time	Set time	Available
Set Auto-Off	Saves battery life by automatically turning off when no key press is detected for time set and meter is not in active logging or calibration mode.	5, 10, 30, 60 minutes OFF	10 minutes	Available

General Setup items	Description	Options	Default	Basic Mode
Sound	If enabled, a short audible tone is produced for key stroke or calibration confirmation. A longer audible tone is produced for wrong key.	On Off	On	Available
Temperature unit	Select degree Celsius or Fahrenheit scale for displayed and logged temperatures.	°C or °F	°C	Available
LCD contrast	Permits modification of the display contrast for various lighting conditions.	1 to 8	3	Available
Flash Format*	Permits formatting the flash drive.	On Off	Off	Available
Message transition	Select how messages are displayed on third LCD line of display.	Word scroll Letter scroll	Letter scroll	Available
Reset configuration to default	Tap  and  when prompted to reset parameters.			Available**
Meter firmware Probe firmware	Displays meter firmware version. Use  to switch to probe firmware (if connected) and diagnostic mode for troubleshooting.	View only	Current firmware version	Available
Meter ID Meter SN Probe SN	Meter ID Meter and connected probe serial number. Use  to navigate options.	User selectable meter ID	0000/Serial Number	Available
CSV file separator	Used to separate columns in the CSV file.	Comma (,) Semicolon (;)	Comma	Available

* Only seen under special conditions, when log errors are present.

** It resets with Basic Mode OFF.

6. pH CONFIGURATION

6.1. UNDERSTANDING STANDARD vs BASIC OPERATING MODES

Useful for routine applications, the Basic Mode streamlines measurement configuration.

6.1.1. Standard Mode

The Standard pH Mode permits:

- Up to a 5-point buffer calibration
- Option to use up to 2 custom buffers
- Option to display 0.001 pH resolution
- Full CAL Check™ diagnostic features:
 - » Used buffers
 - » Probe condition
 - » Response time
 - » Contaminated buffer diagnostic (message) during calibration
 - » pH electrode maintenance required message during calibration
- Additional sensor check indicators, when using HI11311 or HI12301 pH electrodes, include:
 - » Broken electrode diagnostic
 - » Compromised (or fouled) reference junction diagnostic
- Full logging capability, including Interval, Manual log on demand, Manual log on stability

6.1.2. Basic Mode

When working in Basic Mode, there are no decisions to make regarding the pH measurement itself.

The Basic pH Mode provides a simplified setup menu and permits:

- Up to 3-point buffer calibration
 - » Option to select from pH 4.01, pH 6.86, pH 7.01, pH 9.18, or pH 10.01
- Display of 0.01 pH resolution
- CAL Check™ and sensor check diagnostic features limited to messages during calibration

Note: Calibration reminders are not available.

- Basic GLP information:
 - » Offset
 - » Slope
 - » Buffers used
 - » Calibration date
- Manual log-on-demand and manual log-on-stability (stability criteria: medium only)
- pH condition and response graphs are not displayed.
- Measurement screen displays pH data and temperature.

Note: Changing from Standard to Basic operation in setup, clears previous calibration data. A prompt will force the user to facilitate this.

Differences Between Standard and Basic Modes

	Standard Mode	Basic Mode*
Calibration	5 points 2 custom buffers	3 points
Diagnostics**	CAL Check™ Sensor Check™ Error messages GLP	CAL Check™ Sensor Check™ Error messages GLP basic
Log types	Manual log-on-demand Manual log-on-stability (fast, medium, accurate) Interval logging	Manual log-on-demand Manual log-on-stability (medium)
Recommended pH electrodes	HI11310 • HI12300 HI11311 • HI12301 HI10530 • HI10430	HI11310* HI12300

*All sensors work in Basic Mode but buffer selection does not extend to seven buffers.

** Not all diagnostic features are available in Basic Mode.

6.2. pH SETUP

- Connect a pH probe to the meter.
- Press  key to access pH setup menu.

The parameter-specific options will be seen inserted into the menu.

Note: When working in Basic Mode, the pH parameter list will not be displayed.

Option	Description	Choices	Default	Basic Mode
Basic Mode	A limited set of parameters and calibration buffers are available	Off On	Off	Available
Information	Used buffers, probe condition, response times displayed when calibrating with pH 7.01 and 4.01; and/or 10.01 buffers.	Off On	On	Not available
First Custom Buffer	Permits users to enter a custom pH buffer value to use during calibration.	Off Value	Off	Not available
Second Custom Buffer	Permits users to enter a second custom pH buffer value to use during calibration.	Off Value	Off	Not available
First Calibration Point	Allows users to choose how the first point in calibration will be made.	Offset Point	Offset	Uses Offset
Resolution	Allows the user to select between 0.01 and 0.001 pH resolution.	0.01 pH 0.001 pH	0.01 pH	Uses 0.01 pH resolution
Set Out Of Calibration Range	A measurement outside the calibrated range (buffers used) will trigger a warning message.	Off On	On	Not available

6.3. pH CALIBRATION

6.3.1. Calibration in Standard Mode

- Set up a routine service schedule where measurement integrity is validated.
- Do not handle the sensing surfaces of the sensors.
- Avoid rough handling and abrasive environments that can scratch the reactive surfaces of the sensors.
- For best technique, use a rinse beaker and a separate calibration beaker for each buffer.
- Do not return the used buffers to the bottles of “fresh” buffer.
Discard buffers after use.
- For measurements across a temperature gradient (when sample temperature is drastically different from the buffers), allow the electrodes to reach thermal equilibrium before conducting calibrations or making measurements.
- Choose calibration buffers that bracket the sample pH.

6.3.2. Calibration Guidelines

- If measuring in the acidic range, use pH 7.01 or 6.86 as the first buffer and pH 4.01 (or 3.00*) as the second buffer.
- If measuring in the alkaline range, use pH 7.01 or 6.86 as first buffer and pH 10.01 or 9.18 as the second buffer.

Note:* Only visible when using specific pH electrodes and will replace 4.01 pH buffer.

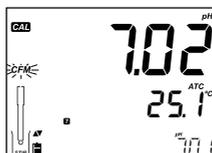
6.3.3. Procedure

The instrument will automatically skip custom buffers which are in a ± 0.2 pH window of an already calibrated buffer.

- Submerge the pH electrode approximately 3 cm (1¼”) into a buffer solution and stir gently.
- Tap **CAL** to enter calibration.
The **EFM** tag is displayed along with the “**7.01**” buffer on the third LCD line.
- If necessary, use **▲** **▼** to select a different buffer value.
The “**⌚**” indicator along with **STIR** tag are on display.
“**WAIT**” message is displayed blinking until the reading is stable.



- When the reading is stable and close to the selected buffer, **EFM** tag is displayed blinking.
Tap **GLP CFM** to confirm calibration.



The calibrated value is displayed on the first LCD line and the second expected buffer value on the third.



- Rinse and submerge the pH electrode approximately 3 cm (1¼") into the second buffer solution.
- Stir gently.
- If necessary, use   to select a different buffer value. The "⌚" indicator along with *S T I P* tag are on display. "WAIT" message is displayed blinking until the reading is stable.
- When the reading is stable and close to the selected buffer, *E F M* tag is displayed blinking. Tap  to confirm calibration.
- Repeat procedure with additional pH buffers (up to five).
- After confirming the last calibration point (or if all five buffer values were calibrated), tap . "SAVING" message is displayed as the information is stored on meter. The meter then returns to measurement mode.



Each time a buffer is confirmed, the new calibration data replaces the old data for the corresponding buffer or for any buffer in the proximity of ± 0.2 pH.

If current buffer has no previous data stored and the calibration is not full (five buffers), the current buffer is added to the existing calibration.

If the existing calibration is full, the instrument asks which buffer to replace.

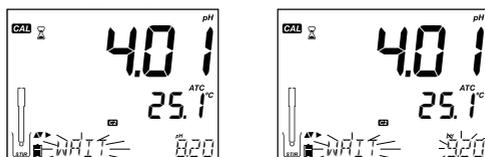


- Use   to select another buffer to be replaced.
- Tap  to confirm the buffer that will be replaced.
- Tap  key to leave calibration without replacing.

Note: If the replaced buffer is outside the ± 0.2 pH window of the calibrated buffers, it is possible to select this buffer during the next calibration.

Working With Custom Buffers

- Use   to select a previously configured custom buffer .
The E_1 or E_2 tag will be displayed once selected.
- Tap  if you want to modify the custom buffer value.
The buffer value will start blinking.
- Use   to change the buffer value.
After 5 seconds, the buffer value is updated.
- Tap  if you want to change it again.



Note: Custom buffer values can be adjusted ± 1.00 pH around the set value during calibration.

First Calibration Point

When performing a new calibration, or adding to an existing one, the user can select how the first new calibration point will be treated in reference to the existing calibration point.

This is configured in setup via First Calibration Point option.

The choice is “Point” or “Offset”.

Point

A buffer value can be recalibrated and added to the previous calibration set.

The electrode slope of the other calibration points will be reevaluated with the recalibrated buffer value.

Offset

The new buffer calibration point can create a constant offset to all existing pH calibration data (existing calibration must have a minimum of two pH buffers).

Recalibrating a pH sensor or adding to an existing calibration follows the described procedure.

- Tap .
- Place sensor in selected buffer solution.
When sensor has equilibrated, the E_{FM} tag is displayed blinking.
- Tap .
- Tap  to exit calibration.
- Alternately, continue calibrating in additional buffers.
The latest calibration point will be added to the existing data.
GLP will reflect the latest calibration data.
Older calibration buffers will be seen as blinking buffers.

Note: Each time a buffer is confirmed, the new calibration data replaces the old data for the corresponding buffer or for any buffer in the proximity of ± 0.2 pH.

If the current buffer has no previous data stored and the calibration has not used five buffers, the current buffer is added to the existing calibration.

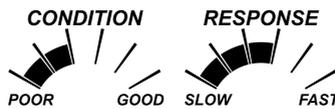
If the existing calibration is full, the instrument asks which buffer to replace.



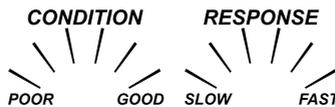
When in Standard Mode, electrode condition (*CONDITION*) and electrode response time (*RESPONSE*) can be on display. Part of the CAL Check™ system, these are configurable setup options.

6.3.4. Electrode Condition & Electrode Response Time

- Meter’s pH CAL Check™ feature assesses and displays **electrode condition** (based on offset and slope) and **response** time during calibration.
- The **RESPONSE** gauge is a function of the stabilization time between the first and second buffers, when calibration is performed between a pair of pH 4.01, 7.01 or 10.01 buffers.
The **RESPONSE** gauge reflects the electrode’s performance and should be expected to slowly decrease over the life of the electrode.



- If the instrument is not calibrated, calibration history’s been deleted, or it’s been calibrated only at one point, the electrode **CONDITION** and the electrode **RESPONSE** gauges will be empty.
To have electrode’s condition and response time displayed continuously, daily calibration is required.



Note: Electrode’s condition and response time may be viewed directly in GLP.

6.3.5. Junction Condition (HI11311 & HI12301 Only)

Meter's Sensor Check™ feature assesses the health of HI11311 or HI12301 reference junction during calibration. The junction gauge may also be viewed directly in GLP.

- If the junction is compromised (not 100%) the **JUNCTION** gauge is displayed blinking.



- The junction condition is a function of the electrode's reference impedance which should be kept low. If the reference junction becomes fouled from a precipitate or coating, the impedance will rise and cause the pH measurement to drift.

Note: This diagnostic feature serves as a warning to clean the sensor.

6.3.6. Calibration in Basic Mode

Three-Point Calibration

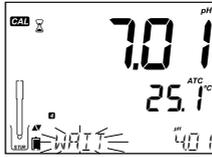
- Submerge the pH electrode approximately 3 cm (1¼") into a buffer solution and stir gently.
- Tap **CAL** to enter calibration. The **EFM** tag is displayed along with the "7.02" buffer on the third LCD line.
- If necessary, use **▲** **▼** to select a different buffer value. The "⌚" indicator along with **STIR** tag are on display. "WFI T" message is displayed blinking until the reading is stable.



- When the reading is stable and close to the selected buffer, **EFM** tag is displayed blinking. Tap **GLP** **CFM** to confirm calibration.



The calibrated value is displayed on the first LCD line and the second expected buffer value on the third.



- Repeat with up to two more buffers.
- After confirming the last calibration point, “SAVING” message is displayed as the information is stored on meter. The meter then returns to measurement mode.
- Press **CAL** after the first or second calibration point is confirmed, and the meter will store the calibration data and then return to measurement mode

Notes: When performing a new calibration, or adding to an existing calibration, the first calibration point will be treated as an offset.

Clear Calibration

- Tap **SETUP CLR** after entering calibration to clear previous calibrations stored on probe. “CLEAR CALIBRATION” message is displayed.
- Tap **SETUP CLR**. The instrument returns to measurement mode and “CAL OFF” message is displayed.

6.3.7. pH Buffer Temperature Dependence

Calibration pH buffers are affected by temperature.

During calibration with standard buffers, the meter will display the pH buffer value at 25 °C, however, it will use the appropriate value for that buffer at the temperature of the buffer for the calibration.

Immediately after exiting calibration, the buffer will read its value at the temperature of measurement.

Temperature		pH Buffers							
°C	°F	1.679	3.000	4.010	6.862	7.010	9.177	10.010	12.454
0	32	1.670	3.072	4.007	6.982	7.130	9.459	10.316	13.379
5	41	1.670	3.051	4.002	6.949	7.098	9.391	10.245	13.178
10	50	1.671	3.033	4.000	6.921	7.070	9.328	10.180	12.985
15	59	1.673	3.019	4.001	6.897	7.046	9.273	10.118	12.799
20	68	1.675	3.008	4.004	6.878	7.027	9.222	10.062	12.621
25	77	1.679	3.000	4.010	6.862	7.010	9.177	10.010	12.450
30	86	1.683	2.995	4.017	6.851	6.998	9.137	9.962	12.286
35	95	1.688	2.991	4.026	6.842	6.989	9.108	9.919	12.128
40	104	1.693	2.990	4.037	6.837	6.983	9.069	9.881	11.978
45	113	1.700	2.990	4.049	6.834	6.979	9.040	9.847	11.834
50	122	1.707	2.991	4.062	6.834	6.978	9.014	9.817	11.697
55	131	1.715	2.993	4.076	6.836	6.979	8.990	9.793	11.566
60	140	1.724	2.995	4.091	6.839	6.982	8.969	9.773	11.442
65	149	1.734	2.998	4.107	6.844	6.987	8.948	9.757	11.323
70	158	1.744	3.000	4.123	6.850	6.993	8.929	9.746	11.211
75	167	1.755	3.002	4.139	6.857	7.001	8.910	9.740	11.104
80	176	1.767	3.003	4.156	6.865	7.010	8.891	9.738	11.003
85	185	1.780	3.002	4.172	6.873	7.019	8.871	9.740	10.908
90	194	1.793	3.000	4.187	6.880	7.029	8.851	9.748	10.819
95	203	1.807	2.996	4.202	6.888	7.040	8.829	9.759	10.734

6.4. pH CALIBRATION MESSAGES

The CAL Check™ feature may flag diagnostic messages during a calibration.

Electrode aging is a slow process therefore substantial changes from previous calibrations are likely due to a temporary problem with the probe or buffers.

These messages are seen in Standard and Basic Modes.

- “WRONG BUFFER” is displayed when the difference between the pH reading and the value of the selected buffer is too great.
 - » Check buffer solution.



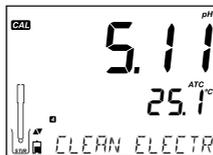
- “WRONG OLD POINTS INCONSISTENCY” is displayed if the new calibration differs significantly from the last value of that probe in that buffer.
 - » Clear the previous calibration and attempt a new calibration with fresh buffers.



- » Tap **CAL** followed by **SETUP CLR**.
“CLEAR CALIBRATION” message is displayed.
- » Tap the **GLP CPM** to clear all calibration information or tap **CAL** to exit.
The probe may retain a single point calibration if first point was accepted.
Once calibration information is cleared, “CAL TIME” message is displayed.



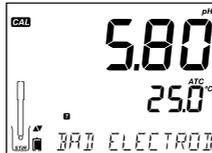
- “CLEAN ELECTRODE” indicates poor electrode performance. The offset is out of accepted window or the slope under the accepted lower limit.
 - » Clean the probe and repeat the calibration. See [11.2. pH Electrode/ORP Probe](#) for details.



- "CHECK ELECTRODE CHECK BUFFER" is displayed when electrode slope exceeds the highest accepted slope limit.
 - » Check connected probe and use fresh buffer.
 - » Clean the probe to help improve response time.



- "BAD ELECTRODE" is displayed if cleaning procedure performed as a result of the above two messages is not successful.
 - » Replace the probe.



- "WRONG BUFFER TEMPERATURE" is displayed if buffer temperature is outside the defined buffer temperature range.

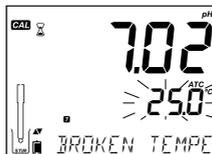
Note: Temperature limits will be reduced to actual sensor specifications.



- "CONTAMINATED BUFFER" indicates possible buffer contamination.
 - » Refresh buffer solution and continue the calibration procedure.



- "BROKEN TEMPERATURE SENSOR" is displayed, along with blinking "25.0 °C", should the temperature sensor malfunction or break.
 - » Replace the probe if this occurs.



Note: If this occurs during logging "25 °C !" will appear in the CSV file.

6.5. pH GLP INFORMATION

Good Laboratory Practice (GLP) is a quality control function used to ensure uniformity of sensor calibrations. GLP information is available in Basic and Standard Modes, and is included with every data log.

- Tap  to open latest calibration file information.
Newest calibration points are reported as a solid number whereas older calibration data (still used) is displayed blinking.
- Use   to scroll through GLP information:

“NO CAL” message displayed blinking if calibration has not been performed.



Calculated offset and percent slope.

The GLP slope is the average of the calibration slopes.

The percentage is referenced to the ideal slope value at 25 °C (77 °F).

Last calibration time
hh:mm:ss format



Calibration date
yyyy.mm.dd format



E1 and E2 tags displayed when calibrating with custom buffers.

Note: not available when operating in Basic Mode

“EXPIRATION WARNING DISABLED” message if warning disabled.



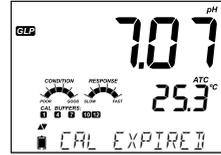
Number of days until the “CAL BLUE” alarm is displayed i.e. “CAL EXPIRES IN 2 DAYS”.

Standard mode only.

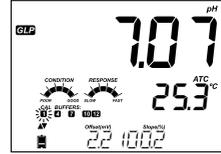


Number of days since the calibration expired i.e. "CAL EXPIRED 2 DAYS AGO"

Standard mode only.



Buffer tag displayed blinking (if buffer not from the last calibration)



Probe serial number



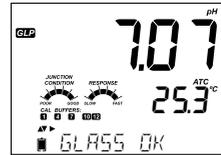
Standard Mode only

Condition and response gauges are displayed on the day of calibration.

HI11311 or HI12301 electrodes only

The glass impedance is continuously monitored, updated, and reported.

The **JUNCTION CONDITION** gauge is fully visible.



6.6. pH MEASUREMENT

- Connect the pH electrode.

When correctly plugged in, the electrode is automatically recognized.

- “REMOVE PROTECTIVE AND FILLING CAPS” message is displayed along with “PH”.
- Press any key to skip the message.
- The instrument enters measurement mode.

Note: For improved accuracy is recommended to work with calibrated electrodes!



- To prevent cross-contamination, if measurements are taken successively in different samples, rinse the electrode thoroughly with deionized water or tap water and then with some of the next sample.
 - Submerge the electrode tip approximately 3 cm (1¼”) into the sample to be tested.
 - Stir the sample gently.
 - Allow time for the electrode to stabilize.
- The pH is displayed on the first LCD line and the temperature on the second LCD line.
- Use   to view date, time, battery status, and offset with slope (third LCD line).



- If the reading is out of measurement range, the closest full scale value will be displayed blinking on the first LCD line.

Note: The pH reading is affected by temperature. The temperature effect is compensated for using the integral temperature sensor. The resulting measurement is the actual pH at the temperature of measurement.

6.6.1. Error Messages During Measurement

- “PROBE NOT RECOGNIZED” scrolled on the third LCD line indicates an incorrect probe connected to the meter or a damaged connection cable.
- “ELECTRODE OUT OF SPEC” scrolled on third LCD line indicates that the pH, ORP, or temperature exceeds the limits of the sensor.

The temperature will continue to be displayed.

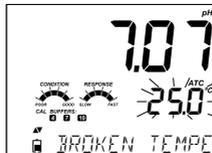


- “120 °C” displayed blinking, indicates that the temperature exceeds the meter specification of 120 °C.
- When logging and the pH or temperature exceeds meter specification, “OUT OF SPEC” message is displayed.

Note: In both cases the log file will indicate “°C!” next to the data.

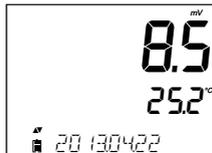
- “BROKEN TEMPERATURE SENSOR” along with “250 °C” blinking, indicate damaged temperature sensor.

The log file will indicate “°C!!” next to the data.



6.6.2. mV Reading of the pH

- Tap  to display the mV reading of the measured pH.



7. ORP CONFIGURATION

7.1. UNDERSTANDING STANDARD vs BASIC OPERATING MODES

7.1.1. Standard Mode

The Standard Mode permits logging of measurement data using manual log-on-demand, manual log-on-stability, or interval logs.

7.1.2. Basic Mode

The Basic Mode permits logging of measurement data using manual log-on-demand, manual log-on-stability (stability criteria, medium).

7.2. ORP METER SETUP

- Connect the ORP probe to the meter.
- Use  to configure ORP meter operation.

7.3. ORP CALIBRATION

7.3.1. Calibration Guidelines

- ORP is displayed in mV.
- The voltage displayed results from the difference in potential between the platinum ORP sensor and the Ag/AgCl reference electrode.
- ORP values can change with temperature. ORP values should be reported with the reference electrode used and the temperature.
- The inert noble metal ORP surface provides an electron-exchange site with the sample (or standard) and its surface. The electron exchange is typically very fast in well-poised solutions (e.g. standards) but may be lengthier in actual samples.
- Calibration is used to compensate for changes due to contamination of the platinum surface and drift in the reference electrode. It establishes a baseline that can be used as a comparison for future work.
- A relative mV calibration can also be made to remove the voltage attributable to the Ag/AgCl reference electrode, to display the ORP versus a SHE (Standard Hydrogen Electrode).

7.3.2. Procedure

- Connect the probe to the meter.
- Place electrode into the [HI764026](#) electrode holder for easy transfer in and out of containers during calibration.
- Tap  to select Rel. mV range.
- Tap  to enter calibration.
The meter will open Rel. mV calibration screen.

- Place ORP electrode tip into a beaker of standard or a sample with known value.

[HI7021](#) (ORP solution for platinum and gold electrodes) reads 240 mV at 25 °C.

[HI7022](#) (ORP solution for platinum and gold electrodes) reads 470 mV at 25 °C.

- “*WAIT*” message is displayed blinking. The **AbS** tag is on display.
- When the reading is stable, **CFM** tag is displayed blinking.
- Tap  to confirm reading and proceed to manually (**MANUAL** tag is on display) configure calibration point.
- Use   to enter calibration point. **CFM** tag displayed blinking.
- When configured, tap  to confirm calibration. “*SWING*” message is displayed. Meter stores calibration value then returns to measurement mode.

7.4. ORP MEASUREMENT

- Connect the ORP probe to the meter.
Make sure the electrode has been recently calibrated and is working correctly.
- Place electrode into the **HI764026** electrode holder for easy transfer in and out of containers during sample measurement and storage.
- Rinse with purified water between buffers and/or samples.
- Blot (never rub!) the sensor with a lint-free tissue between buffers and samples.
- To limit sample contamination, pour two beakers of buffers and samples.
Use one beaker to rinse the sensor and the second for measurement.
Note: Use the same size beaker and immersion depth for samples and buffers.
- Gently stir the test sample to ensure the sensor is measuring a representative sample.
- Open the fill hole cover and keep the fill solution topped off to permit the fill solution to flow through the ceramic junction and maintain a stable reference signal.
- If measuring across a temperature gradient, allow the sensor to reach thermal equilibrium.
- Once the reading indicates Stable, record measurement data.
- When all samples have been measured, rinse the electrode and replace storage cap with storage solution.
- Replace fill hole cover.

8. EC CONFIGURATION

8.1. UNDERSTANDING STANDARD vs BASIC OPERATING MODES

Useful for routine applications, the Basic Mode streamlines measurement configuration.

8.1.1. Standard Mode

The Standard Mode permits:

- Complete configuration of all options for the measurement of conductivity (EC), TDS, salinity.
- Logging of measurement data using manual log-on-demand, manual log-on-stability, or interval logs.
- Export of logged data to a thumb drive or a PC.

8.1.2. Basic Mode

The Basic Mode permits:

- EC and TDS measurements only
- Use of default values for:
 - » Cell factor
 - » Temperature compensation coefficient
 - » TDS conversion factor
- User-selectable measurement units for TDS
- Logging of measurement data using manual log-on-demand, manual log-on-stability (medium)
- Continuous auto-ranging

Differences between Standard and Basic Modes

	Standard Mode	Basic Mode
Measurement	EC TDS Salinity	EC TDS
Setup parameters	Fully selectable	Default values
Log types	Manual log-on-demand Manual log-on-stability (Fast, Medium, Accurate) Interval logging	Manual log-on-demand Manual log-on-stability (Medium)

8.1.3. Measurements Available with the EC Probe

Use  to navigate options.

- Temperature compensated or absolute conductivity measurement
 - » expressed in $\mu\text{S}/\text{cm}$ or mS/cm
- Total Dissolved Solids (TDS) measurement; a calculated measurement derived from the ionized particles in a sample and the conductivity measurement
 - » expressed in mg/L , ppm, or g/L
- Salinity measurement, Standard Mode only
 - » Practical Salinity (PSU)
 - » Natural Seawater (g/L)
 - » NaCl %

8.2. EC METER SETUP

- Connect the conductivity probe to the meter.
- Use  to configure EC meter operation.
The EC-specific parameters will be seen inserted into the menu.

Note: When working in Basic Mode the EC parameter list is simplified.

Setup Item	Description	Options	Default	Basic Mode Configuration
Basic mode		Off On	Off	Available
Temperature compensation	Select ATC or No TC to configure absolute conductivity.	No TC ATC	ATC	ATC automatically used
C.F (cm ⁻¹)	Enter actual Cell Factor value Manual calibration.	0.010 to 9.999 cm ⁻¹	1.000 cm ⁻¹	Automatically determined during calibration
T.Coef. (%/°C)	Relates to the solution being measured at temperatures other than 20 or 25 °C. Used to correct measured conductivity to a reference temperature by applying a fixed factor for linear compensation.	0.00 to 6.00 (%/°C)*	1.90 (%/°C)**	Automatically set to 1.90%/°C
T.Ref. (°C)	Select either 20 °C or 25 °C reference temperature for temperature-corrected conductivity.	20 °C 25 °C	25 °C	Available
TDS conversion factor	Used to mathematically convert conductivity to a TDS value.	0.40 to 0.80	0.50	Automatically set to 0.50
View T.Ref. or T.Coef.	Select whether to display the reference temperature (T.Ref.) or the temperature coefficient (T.Coef.) along with the measurement.	T.Ref.(°C) T.Coef.(%/°C)	T.Ref (°C)	T.Ref. (°C) automatically displayed
EC range	If AUTO is used, the meter automatically finds the correct conductivity range and unit. If a fixed value is used, measurements made outside the ranges are considered out of range. Units remain fixed throughout the measurement.	AUTO 29.99 μS/cm 299.9 μS/cm 2999 μS/cm 29.99 mS/cm 200.0 mS/cm 500.0 mS/cm	AUTO	Meter autoranges

* Setting to 0.00 is the same as using No TC.

** Close for natural waters or salt solutions.

Setup Item	Description	Options	Default	Basic Mode Configuration
TDS range*	<p>If AUTO is used, meter automatically finds the correct TDS measurement range and units. The meter will select the scale with the highest possible resolution, but may change in the middle of a series of measurements both the units and displayed resolution</p> <p>If a fixed value is used, measurements made outside the ranges are considered out of range.</p> <p>Units will remain fixed throughout the measurement.</p>	<p>AUTO</p> <p>14.99 mg/L</p> <p>149.9 mg/L</p> <p>1499 mg/L</p> <p>14.99 g/L</p> <p>100.0 g/L</p> <p>400 g/L</p>	AUTO	Meter autoranges
TDS unit	Select TDS measurement units.	<p>mg/L</p> <p>ppm</p>	ppm	Available
EC salinity scale	Available for salinity measurement in seawater.	<p>PSU</p> <p>NaCl%</p> <p>g/L</p>	NaCl%	Not available

* The selected range is only active during measurements. Autoranging is used during calibration. If a fixed range is used and the reading goes beyond the range limits, the full scale value of that range is displayed blinking. All log data in the CSV files will be displayed in $\mu\text{S}/\text{cm}$.

8.3. EC/TDS CALIBRATION

HI2600 meter allows:

- Conductivity calibration:
 - to calculate offset: $0.00 \mu\text{S}/\text{cm}$
 - single cell factor calibration: $84 \mu\text{S}/\text{cm}$, $1413 \mu\text{S}/\text{cm}$, $5.00 \text{ mS}/\text{cm}$, $12.88 \text{ mS}/\text{cm}$, $80.0 \text{ mS}/\text{cm}$, and $111.8 \text{ mS}/\text{cm}$
- Salinity calibration using 100 % salinity standard (Standard Mode only).

Note: Conductivity calibration is only available when EC range is configured. Salinity calibration is available in Standard Mode only, when EC salinity scale is configured.

8.3.1. Calibration Guidelines

- Remove plastic bung prior to calibration.
- Clean the probe in distilled water, shake off water droplets, and allow to dry prior to calibration.
- Use a calibration standard with a value that is close to that of the sample.
- Inspect the probe for debris or blockages.
- Ensure the vent holes are completely submerged.
- Tap the probe to remove any air bubbles that may be trapped inside the sleeve.
- Place probe in beaker of solution away from walls or bottom of beaker.
- To minimize cross-contamination, when a two-point calibration is required, use two beakers: one for rinsing the probe and the other for calibration.
- For measurements across a temperature gradient (when water temperature is drastically different from the standards), allow the probe to reach thermal equilibrium before conducting calibrations or making measurements.

8.3.2. Procedure

Connect the probe to the meter.

Calibrate the **offset**

1. Suspend the probe in the air.
Allow for the reading to stabilize.
The standard value is automatically recognized.
 2. After the reading has stabilized, tap .
- The calibration point is saved.

Cell factor automatic calibration

1. Rinse the probe with calibration solution or deionized water. Shake off excess solution.
2. Submerge the probe in the calibration standard.
The sleeve holes must be covered with solution.
3. Center the probe away from the bottom or beaker walls.
4. Raise and lower the probe to refill the center cavity.
5. Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve.
6. Tap  to enter calibration.

The *CAL* tag and the recognized standard value are displayed on the third LCD line.

7. If necessary, use   to select a different standard value.

The “⌚” indicator along with *STIR* tag are displayed.

“WAIT” message is displayed blinking until the reading is stable.



8. When the reading is stable and close to the selected standard, *CFM* tag is displayed blinking.

“SOLUTION STANDARD” message and solution value value are displayed.



9. Tap  to confirm calibration.

“SAVING” message is displayed. Meter stores calibration value then returns to measurement mode.



Cell factor (cm^{-1}) manual calibration

This option may be used to perform a manual calibration in a custom standard.

1. Rinse the probe with an aliquot of standard. Shake off excess solution.
2. Place the probe in the standard.

The sleeve holes must be covered with solution.

3. Tap  and use   to navigate to C.F. (cm^{-1}).

4. Tap .

5. Use   to change C.F. (cm^{-1}) until the display reads the custom standard value.

6. Tap .

“MANUAL CALIBRATION CLEARS PREVIOUS CALIBRATIONS” message is displayed on the third line LCD.

CAL and *CFM* tags are displayed blinking.

7. Tap  to confirm the manual calibration.

Note: *GLP* and log files indicate “Manual” as standard.

Using this calibration technique will erase any previous calibrations done in *CAL*.

8.3.3. EC Calibration Standards Temperature Dependence

HI2600 uses these values and their temperature coefficients during calibration.

°C	°F	HI7030 HI8030 ($\mu\text{S}/\text{cm}$)	HI7031 HI8031 ($\mu\text{S}/\text{cm}$)	HI7033 HI8033 ($\mu\text{S}/\text{cm}$)	HI7034 HI8034 ($\mu\text{S}/\text{cm}$)	HI7035 HI8035 ($\mu\text{S}/\text{cm}$)	HI7039 HI8039 ($\mu\text{S}/\text{cm}$)
0	32	7150	776	64	48300	65400	2760
5	41	8220	896	65	53500	74100	3180
10	50	9330	1020	67	59600	83200	3615
15	59	10480	1147	68	65400	92500	4063
16	60.8	10720	1173	70	67200	94400	4155
17	62.6	10950	1199	71	68500	96300	4245
18	64.4	11190	1225	73	69800	98200	4337
19	66.2	11430	1251	74	71300	100200	4429
20	68	11670	1278	76	72400	102100	4523
21	69.8	11910	1305	78	74000	104000	4617
22	71.6	12150	1332	79	75200	105900	4711
23	73.4	12390	1359	81	76500	107900	4805
24	75.2	12640	1386	82	78300	109800	4902
25	77	12880	1413	84	80000	111800	5000
26	78.8	13130	1440	86	81300	113800	5096
27	80.6	13370	1467	87	83000	115700	5190
28	82.4	13620	1494	89	84900	117700	5286
29	84.2	13870	1521	90	86300	119700	5383
30	86	14120	1548	92	88200	121800	5479
31	87.8	14370	1575	94	90000	123900	5575

8.4. NaCl% CALIBRATION

8.4.1. Preparation

NaCl calibration is a single point calibration at 100.0% NaCl.

Use the [HI7037](#) calibration solution (seawater solution) as a 100% NaCl calibration solution.

- Ensure Basic Mode is off.
- Ensure Salinity Scale is set to NaCl% in setup.
- From measurement mode, tap  to select the Salinity measurement.

8.4.2. Procedure

1. Rinse the probe with [HI7037](#) calibration solution or deionized water.
Shake off excess solution.
2. Submerge the probe in the calibration solution. The sleeve holes must be completely submersed.
3. Center the probe in the beaker, away from the bottom or beaker walls.
4. Raise and lower the probe to refill the center cavity.
Tap the probe repeatedly to remove any air bubbles that may be trapped inside the sleeve.
5. Tap  to enter calibration.

The “⌚” indicator along with *STIR* and *CFM* tags will turn on.

NaCl % reading is displayed along with temperature.

“WAIT” message is displayed blinking until the reading is stable.



6. “SOLUTION STABILIZ” is displayed when the reading is stable and close to the standard.
CFM tag is displayed blinking.



7. Tap  to confirm calibration.

“SAVING” message is displayed as the meter stores the calibration values.

Meter then returns to measurement mode.

Note: If a new EC calibration is performed, the NaCl calibration is automatically cleared.

8.5. EC CALIBRATION MESSAGES

- **WRONG STANDARD** scrolled on third LCD line indicates the reading is too far from the expected value. Calibration can not be confirmed.
 - » Check calibration solution and/or clean the probe.



- **WRONG STANDARD TEMPERATURE** scrolled on third LCD line indicates that the temperature is out of the 0.0 to 60.0 $^{\circ}\text{C}$ range. Temperature value is displayed blinking.



8.6. EC/TDS GLP INFORMATION

GLP is a set of functions that allows storage and retrieval of data regarding electrode status. EC calibration data is stored automatically after a successful calibration.

- Tap **GLP** from EC measurement mode to view EC calibration data. The instrument will display the calibration standard and the temperature of the calibrated standard.
- Use **▲** **▼** to scroll through the calibration data listed here.

Cell factor in cm^{-1}



Calibration offset factor (expressed in $\mu\text{S}/\text{cm}$)



Standard solution and calibration temperature



<p>Temperature coefficient used during calibration</p>	
<p>Reference temperature</p>	
<p>Last calibration time hh:mm:ss format</p>	
<p>Last calibration date yyyy.mm.dd format</p>	
<p>Probe serial number</p>	
<p>Calibration expired warning EXPIRATION WARNING DISABLED</p>	
<p>Calibration due warning CAL EXPIRES IN X DAYS Standard mode only.</p>	
<p>Number of days since calibration expired CAL EXPIRED X DAYS AGO Standard mode only.</p>	

8.7. NaCl% GLP INFORMATION

- Tap  when the instrument is in NaCl% measurement mode.
- Use   to scroll through the calibration data listed here. The instrument will display the calibration temperature and used standard solution.
- Tap  to return to measurement mode.

Cell factor in cm^{-1}



Salinity coefficient



Standard solution and calibration temperature



Last calibration time
hh:mm:ss format



Probe serial number



Last calibration date
yyyy.mm.dd format



Calibration expired warning

EXPIRATION WARNING DISABLED



Calibration due warning

CAL EXPIRES IN X DAYS

Standard mode only.



Number of days since calibration expired

CAL EXPIRED X DAYS AGO

Standard mode only.



8.8. EC/TDS/SALINITY MEASUREMENTS

Tap  to navigate measurement from conductivity to TDS or Salinity.

8.8.1. Conductivity Measurements

- Connect a conductivity probe to the meter. Probe is automatically recognized.
- Make sure the probe has been recently calibrated and is working correctly.
- Use the [HI764026](#) electrode holder for easy transfer in and out of containers during calibration and for storage.
- Ensure plastic bung is removed prior to taking measurements.
- To limit sample contamination, pour two beakers of calibration standards. Use one beaker to rinse the sensor and another one for measurement.

Note: Use the same size beaker and immersion depth for samples and calibration standards.

- Ensure the vent holes are completely submerged.
- Tap the probe to remove any air bubbles that may be trapped inside the sleeve.
- If measuring across a temperature gradient, allow the sensor to reach temperature equilibrium.
- Measured conductivity along with the temperature and calibration or range-specific information is displayed.
- Use   to navigate calibration or range-specific information.
- If the reading is out of range, with range set to automatic, the full-scale value i.e. 200.0 mS/cm for ATC or 500.0 mS/cm for absolute conductivity, is displayed blinking.



- Once the reading is stable, record measurement data.

8.8.2. Temperature Compensated Measurements

Temperature-compensation (ATC) and absolute conductivity (NoTC) are configured in setup.

ATC readings

The temperature value is used to automatically compensate an EC or a TDS reading.

With option selected, ATE tag is on display.

A temperature coefficient for the sample must be set for temperature compensated measurements.

Default value for natural water samples is 1.90 %/°C.

Temperature Coefficient

To change the temperature coefficient:

- Navigate to setup and select "T.Coef.(%/°C)" (see [8.2. EC Meter Setup](#)).
- Use   to display the current temperature coefficient.

The value is displayed along with cell factor used to convert the measured conductance to conductivity, based on cell geometry. If the temperature reading is out of range, the closest full scale value will be displayed with "°C" blinking.

No TC readings

The temperature value is displayed but not taken into account and the display shows the uncompensated EC or TDS value. When option selected, the $NoTC$ tag is displayed.

Note: Default compensation mode is ATC. The compensation is referenced to the selected reference temperature.

8.8.3. TDS Measurements

- Tap  to switch to TDS measuring range.

The TDS reading is displayed along with the temperature reading.

- If the reading is out of range, the full-scale value i.e. 100.0 g/L for ATC or 400.0 g/L for uncompensated TDS, is displayed blinking.



8.8.4. Salinity Measurements

The [HI2630](#) and [HI2631](#) meter enables conductivity measurements when used with the [HI763100](#) four-ring conductivity probe. The integral temperature sensor adjusts the measured conductivity to a reference temperature by applying compensation algorithms.

Salinity measurements are not available when operating in Basic Mode!

The electrolytic conductivity (EC) reading from the [HI763100](#) sensor can be used to calculate salinity PSU, salinity %, and salinity g/L.

- Tap  twice to navigate from conductivity to the configured salinity scale.
- Configure salinity scale and salinity unit in setup.

Salinity PSU

Salinity PSU relates the ratio of electrical conductivity of a normal seawater sample at 15 °C and 1 atmosphere to a potassium chloride solution (KCl) with a mass of 32.4356 g/Kg water at the same temperature and pressure. Under these conditions the ratio is equal to 1 and $S = 35$.

The practical salinity scale may be applied to values 0 through 42.00 psu at temperatures between 0 to 35 °C.

Note: Salinity PSU measurements require conductivity calibration first.



Salinity (%)

In this scale 100 % salinity is equivalent to roughly 10 % solids.

- Enter salinity scale setup and select NaCl % unit.
- Press the  until "NaCl%" is displayed on the LCD.

The NaCl% reading is displayed on the first LCD line and the temperature reading on the second LCD line.



- If the reading is out of range, the full-scale value (400.0 %) is displayed blinking. If reading is out of range when logging, "!" is placed next to the measurement unit. Data marked in the CSV files with "!" should not be considered reliable.

Salinity (g/L)

Measurements are based on the 0.00 to 80.00 g/L Natural Seawater Scale from 10 to 31 °C.

It determines the salinity based upon a conductivity ratio of sample to standard seawater at 15 °C and an approximate salinity value of 35 in seawater.

Note: Salinity g/L measurements require conductivity calibration first.



- If the reading is out of the measurement range, highest value possible value is displayed blinking along with a warning message. If reading is out of range when logging, "!" is placed next to the measurement unit. Data marked in the CSV files with "!" should not be considered reliable.

8.8.5. Error Messages

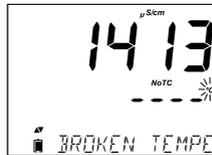
- “PROBE OUT OF SPEC” message indicates EC, TDS, salinity, or temperature has exceeded probe limit. The temperature is displayed blinking.
- “120°C” displayed blinking indicates that the temperature has exceeded 120 °C meter specifications.
- When logging, if the EC, TDS, salinity, or temperature exceeds probe limits, “OUT OF SPEC.” message is displayed.

Note: The log file will indicate a “°C!” next to the data.

- “BROKEN TEMPERATURE SENSOR” message displayed along with “_ _ _” and NoTC tag indicates faulty sensor.

Measure unit is displayed blinking, and the log file will indicate “°C!” next to the data.

Absolute conductivity (NoTC) will be marked with an “A” in the CSV files and dashes will appear in the temperature field.



9. DISSOLVED OXYGEN CONFIGURATION

9.1. UNDERSTANDING STANDARD vs BASIC OPERATING MODES

9.1.1. Standard Mode

The Standard Mode permits:

- Salinity configuration for DO measurement
- **Concentration** measurements expressed in ppm or mg/L
 - » based upon oxygen solubility in air-saturated fresh water.
- **Percent saturation** measurements (suitable for measurement in samples other than air-saturated fresh water)
 - » based upon the partial pressure of oxygen
- Logging of measurement data using manual log-on-demand, manual log-on-stability, or interval logs.
- Export of logged data to a thumb drive or a PC.

9.1.2. Basic Mode

The Basic Mode permits:

- Salinity configuration for DO measurement
- **Concentration** measurements expressed in ppm or mg/L
 - » based upon oxygen solubility in air-saturated fresh water.
- **Percent saturation** measurements (suitable for measurement in samples other than air-saturated fresh water)
 - » based upon the partial pressure of oxygen
- Logging of measurement data using manual log-on-demand and manual log-on-stability (Medium)

Note: Always check material compatibility of the probe with the sample.

9.2. DISSOLVED OXYGEN METER CONFIGURATION

- Connect the DO probe to the meter.
- Tap  to configure DO meter operation.

The parameter-specific options will be seen inserted into the menu.

Parameter	Description	Choices	Default
Pressure	<ul style="list-style-type: none"> • Concentration measurements are pressure dependent 	Automatic	On
Salinity (g/L)	<ul style="list-style-type: none"> • Dissolved oxygen solubility decreases if water contains salts. • Select salinity to be close to known salt level to improve concentration calibration accuracy and measurement. 	0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40 g/L	0
DO units	<ul style="list-style-type: none"> • Select preferred measurement units for DO concentration. 	mg/L or ppm	ppm

9.2.1. Pressure & Salinity Compensation Explained

Temperature, pressure, and salinity compensation are used for DO concentration measurements.

Temperature

- Colder water holds more dissolved oxygen.
- Warmer water holds less dissolved oxygen.
- Compensation for temperature-related solubility is done using probe's built-in temperature sensor.

Pressure

Pressure has a direct and proportional relationship with DO levels.

- Higher pressure increases the amount of oxygen that can dissolve in the water.
- Lower pressure decreases the amount of oxygen that can dissolve in the water.

Salinity

- Oxygen solubility in water is influenced by the amount of salt in the water.
Seawater has a salinity of 35 g/L. The oxygen solubility is 18 % less compared to fresh water at 25 °C.
- Enter the approximate salinity value to have the calibration and subsequent concentration measurement display the correct (compensated) oxygen concentration.
An 18 % error would result if the salinity value is not entered.

Note: *Salinity and altitude have no effect on % oxygen solubility range.*

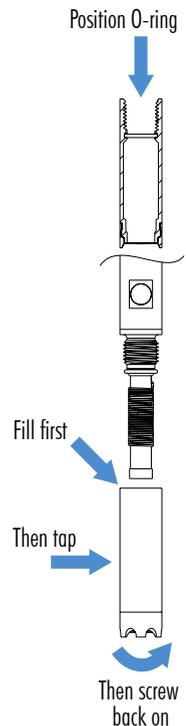
- In fresh water oxygen concentration is at a maximum.
- The solubility of the oxygen dissolved in water is decreased when water is brackish or seawater; or when measurements are made at elevations above sea level.

9.3. PROBE PREPARATION

Note: *The HI764080 contains a glass insulator. Handle with care!*

Probes from Hanna Instruments® are shipped dry.

1. Remove the protective shipping cap.
Save the cap for storage.
2. Open membrane package and remove one O-ring and one membrane cap.
3. Rinse the membrane cap with a small amount of HI7041 electrolyte then discard.
4. Position the o-ring in the cap as indicated.
5. Refill membrane cap 3/4 full with electrolyte solution.
The o-ring should be fully immersed in solution.
6. Hold the membrane cap by the top and tap the side walls to dislodge gas bubbles.
Do not tap on the membrane directly!
7. With the probe facing down, slowly screw the cap counterclockwise until completely tightened.
Some electrolyte will overflow!



8. Rinse the probe outer body and inspect membrane for entrapped gas bubbles.
9. Connect the DO probe to the meter then turn meter on.
10. Allow time for probe polarization.

“DISSOLVED OXYGEN PROBE CONDITIONING” is displayed for \approx 60 seconds.

Non-polarized probes cause inaccuracy.

Note: When not in use and during polarization, use the protective transparent cap.



9.4. CALIBRATION

The accuracy of dissolved oxygen measurements is directly related to the sensing-surface cleanliness and calibration technique. Oily coatings and biological contaminations are the primary cause of calibration drift. A standard solution or a reference DO meter may be used to compare readings during calibration.

HI2600 supports:

- **Two-point calibration** at 100.0 % saturation (slope calibration) and 0.0 % saturation (0.00 mg/L)
- **Single-point calibration** at 100.0 % saturation or 0.0 % saturation (0.00 mg/L).

9.4.1. Calibration Guidelines

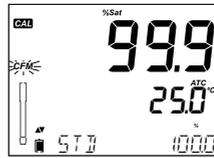
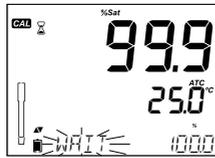
- Set up a routine service schedule where measurement integrity is validated.
- Do not handle the sensing surface of the sensor.
- Avoid rough handling and abrasive environments that can scratch the reactive surface of the sensor.
- Do not return the used standard to the bottle of “fresh” solution.
- For measurements across a temperature gradient (when water temperature is drastically different from the standard), allow the sensor to reach thermal equilibrium before conducting calibrations or making measurements.
- When calibrating in water-saturated air ensure there are no droplets on the DO sensor sensing surface.
- When a user calibration is performed it is assumed that the standard value is the DO value at the current temperature and salinity.

9.4.2. Procedure

Calibrate at 100% Saturation

- Rinse the polarized probe with clean water.
- Dry the probe tip and allow a few seconds for the reading to stabilize (probe in air).
- Suspend the probe with membrane just over beaker of water.
Do not put the sensor in a sealed container!
- Allow for the reading to stabilize.
The standard value is automatically recognized.
- Tap **CAL**.
The “” indicator is displayed along with “WFI T” message blinking.
- When the reading is stable, **EFM** tag is displayed blinking.

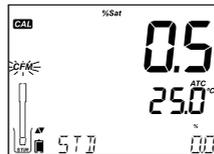
- Press **GLP** **CFM** to confirm calibration.



- Tap **CAL** to exit calibration after the first point.
- "SAVING" message is displayed and the meter returns to measurement mode.

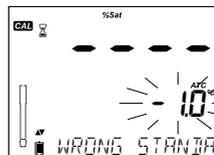
Calibrate at 0 % saturation (0 mg/L)

- Prepare a fresh bottle of **HI7040** Zero Oxygen Solution.
Follow printed packaging instructions
- Fill the calibration beaker 2/3 full with **HI7040** Zero Oxygen solution.
- Slowly place the probe in the solution.
- Dislodge bubbles that may adhere to the sensor.
- Stir gently for 2-3 minutes.
- Tap **CAL** or continue with calibration after confirming first point.
- "WAIT" message is displayed along with "00%".
- Wait for **CFM** tag to start blinking before confirming standard.
- Press **GLP** **CFM** to confirm.
"SAVING" message is displayed then the meter returns to measurement mode.
- Rinse probe tip off in water before sample measurements.



9.4.3. DO Calibration Error Messages

- "WRONG STANDARD" indicates reading outside limits.
- "WRONG STANDARD TEMPERATURE" indicates temperature outside 0.0 - 50.0 °C range during calibration.



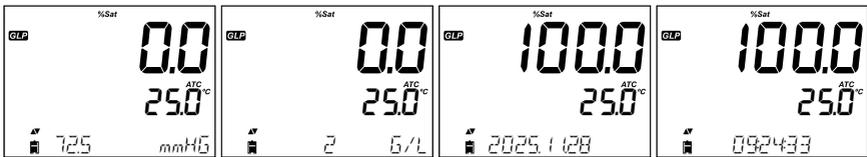
9.5. GLP INFORMATION

Good Laboratory Practice (GLP) is a quality control function used to ensure uniformity of sensor calibrations. GLP information is available in Basic and Standard Modes, and is included with every data log.

- Tap  from measurement mode to open latest calibration file information.
Newest calibration points are reported as a solid number whereas older calibration data (still used) is displayed blinking.
- Use   to scroll through GLP information.

“NO CAL” message displayed blinking if calibration has not been performed

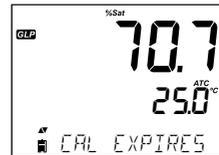
Temperature, pressure, salinity settings and calibration date and time



“EXPIRATION WARNING DISABLED” message if warning disabled.



Number of days until the “CAL BLE” alarm is displayed i.e. “CAL EXPIRES IN 2 DAYS”.
Standard mode only.



Number of days since the calibration expired i.e. “CAL EXPIRED 2 DAYS AGO”
Standard mode only.



Probe serial number



9.6. DO MEASUREMENTS

- Verify the temperature sensor is submerged in sample during measurement.
- Allow the probe to reach thermal equilibrium with the sample.
- Verify if temperature measurements are reading correctly.
- Verify the probe is calibrated in accordance with sampling protocols.
- The probe should be measuring the partial pressure of the dissolved oxygen in water. Gas bubbles have a greater partial pressure due to the surface tension of the bubble. Noisy (erratic) measurement or even higher measurements are possible.
- Set Salinity value if measuring ocean or brackish water samples.
- Carefully lower the probe into sample so no trapped air bubbles at the cap.
- Routinely inspect the probe for biofouling.
- Routinely clean off the probe with clean water (between measurements). Biologically active waters may require more frequent cleaning.
- For good sample circulation make sure the optical window/membrane is clean, without any coating.
- Only work with recently calibrated probes.
- Use the [HI764026](#) holder for easy transfer in and out of containers during sample measurement.
- To limit sample contamination, pour 2 beakers of sample. Use one beaker to rinse the sensor, and another one for measurement.
- To ensure accuracy, the membrane needs constant oxygen replenishment.

Note: Ensure adequate water movement either manually or by use of a stirrer.

- The Dissolved Oxygen value (in %) is displayed on the first LCD line.
- Tap  to change from % to ppm (mg/L) and vice versa.



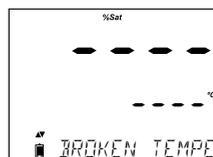
9.6.1. Error Messages During Measurement

- "PROBE OUT OF SPEC" scrolled on the third LCD line, indicates that the DO, pressure, salinity, or temperature measurements exceeds probe limits.
- "120 °C" displayed blinking, indicates that the temperature exceeds the meter specification of 120 °.
- When logging, if the DO, pressure, salinity, or temperature exceeds probe limits, "OUT OF SPEC" message is displayed.

Note: The log file indicates "°C!" next to the data.

- "BROKEN TEMPERATURE SENSOR" scrolled along with unit tag blinking.

Note: The log file will indicate "°C!!" next to the data.



10. LOGGING

The instrument holds a maximum number of 1000 records divided as:

- Manual log-on-demand (maximum 200 logs)
- Manual log-on-stability (maximum 200 logs)
- Interval logging (maximum 600 samples organized in 100 lots)

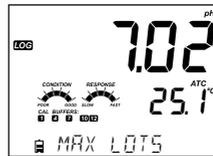
Note: A record is a stored reading and a lot is a group of records.

When operating in Standard Mode users can select between any of the three supported options and can set any of the three stability criteria i.e. fast, medium, accurate.

When operating in Basic Mode users can select between manual log on demand and manual log on stability and can set medium stability criteria only.

Stored data

- Manual log-on-demand and manual log-on-stability are stored in a single lot.
- The maximum number of records that may be stored in a manual or stability lot is 200 records.
- If the log memory is full during logging, the “LOG FULL” message is displayed and logging ceases. The display will return to the measurement screen.
- The maximum number of Interval lots that may be stored is 100.
If a 101st lot is attempted, “MAX LOTS” will be displayed and some lots will need to be deleted.



- The lot numbering is up to 999 and restarts if all lot logs are deleted.

10.1. TYPES OF LOGGING

Logging type is configured in setup.

Interval logging

A continuous log is recorded using a user-selected time interval.

Note: Interval logging is not available when operating in Basic Mode.

Manual log-on-demand

Readings are logged each time **LOG** is used.

All records are stored in a single manual lot for the measurement type.

New records made on different days are stored in the same manual lot.

Manual log-on-stability

Stability criteria may be set to fast, medium, or accurate.

Note: When operating in Basic Mode only medium stability criteria may be set.

A log on demand is made each time **LOG** is used and the stability criteria is reached.

- In Setup mode, choose log parameter.
- Tap **RCL MODIFY** key.
- Use the **RANGE** key to select between Interval, Manual, or Stability.
- When Interval is displayed, use **▲** **▼** to select the setting for the timed interval.
- When Stability is displayed, use **▲** **▼** to select the measurement stability setting.

A complete set of GLP information including date, time, range selection, temperature reading, calibration information and probe serial number is stored with each log made.

10.1.1. Interval Logging

- Configure interval and sampling period in the setup menu.
 - Tap **LOG** while the instrument is in measurement mode.
- “PLEASE WAIT” message is displayed followed by the number of free spaces.

During active interval logging, lot information is displayed on the third LCD line.

It indicates in which lot the data will be placed and keeps track of the number of logged records taken.

The **LOG** tag is on continuously during active logging.

- Tap **RANGE** during logging to display the number of logs available.
- Tap **LOG** again to stop logging.

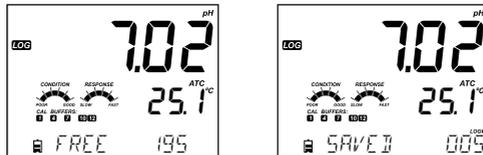
The “LOG STOPPED” message will be displayed for a few seconds.



Note: If a sensor failure occurs during interval logging, “OUT OF SPEC.” message will alternate with logging information.

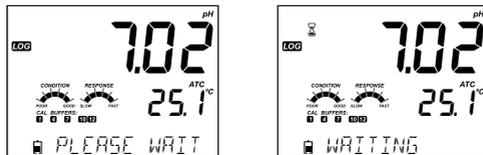
10.1.2. Manual Log-On-Demand

- Select Manual in the setup menu.
- Tap **LOG** while the instrument is in measurement mode.
 “PLEASE WAIT” message is displayed followed by saved measurement confirmation screen and the number of available (free) spaces.
 The **LOG** tag is kept on display.

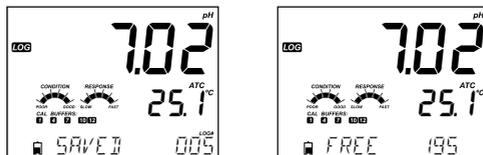


10.1.3. Manual Log-On-Stability

- Select Stability in the setup menu.
- Choose measurement stability criteria in the setup menu.
Note: In Basic Mode, Stability Medium is available only.
- Tap **LOG** while the instrument is in measurement mode.
- “PLEASE WAIT” message is displayed followed by a screen displaying the stability tag, **LOG** tag.
 “WAITING” message is displayed next.
- Tap **LOG** again while “WAITING” message is on display to stop logging.



- When selected stability criteria has been met, “SAVE” message is displayed followed by a screen indicating how much log space is available (**FREE**).
 The **LOG** tag is kept on display.



10.2. VIEW LOGGED DATA

- Tap **RCL MODIFY** to view all log records stored on the meter.
The log records are grouped by measured parameter:
 - » pH
 - » EC
 - » DO
- The parameter displayed first depends on the probe/sensor connected.
The display also indicates the percentage of log memory used.
- Tap **GLP CFM** to display saved logs.
- If no sensor or probe is connected, tap **RANGE** to select measurement type.
- Tap **GLP CFM** to display those logs.



- Once a parameter is selected, use **▲** **▼** to select parameter log to view.
Option to select from:
 - » Manual log-on-demand lot
 - » Manual log-on-stability lot
 - » Individual Interval logging lots
- If no data was logged for the selected measurement range, the instrument displays "NO MANUAL LOGS", "NO STABILITY LOGS" messages.



- Tap **GLP CFM** to access lot information and view recorded data.
- Use **▲** **▼** to toggle between different records.
- Tap **RANGE** to display GLP data, including calibration information, date, time.
- Tap **SETUP CLR** then **GLP CFM** when deleting records or lots.
- Tap **RCL MODIFY** to:
 - » exit the logging type
 - » exit the parameter selection screen
 - » return to the measurement screen

10.3. DELETE LOGGED DATA

Users can opt between:

- Delete logging type/lot
- Delete records (manual log on demand or manual log on stability)
- Delete all

Procedure

- Tap .
- Select the parameter log.
- Use   to select data to be deleted.
- Tap .

The instrument displays:

- » “CLEAR MANUAL” if Manual Records was selected
- » “CLEAR STAB” if Stability Records was selected
- » If interval lots was selected, the “CLEAR” message is displayed followed by the selected lot, with *CFM* tag blinking.

- Use   to select a different lot.
- Tap .

“PLEASE WAIT” message is displayed.

“CLEAR NONE” is displayed for a few seconds after the selected Interval lot is deleted.

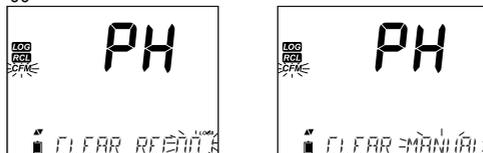


10.3.1. Delete Records (Manual Log-on-Demand & Manual Log-on-Stability)

- Tap  when Manual (Stability) is displayed, to enter Manual (Stability) log.
- Use   to select record to be deleted.
- Tap . “CLEAR RECORD” message is displayed along with record number and *CFM* tag blinking.
- Use   to select another record if necessary. Tap .

“PLEASE WAIT” then “CLEAR NONE” messages are displayed.

When individual logs are deleted within saved Manual or Stability logs, the logs will renumber, filling in the deleted data but staying in chronological order. See [10.3. Delete Logged Data](#) section to delete all Manual (Stability) logged records.



- Select the Manual (Stability) lot.
- Tap **SETUP CLR**. "CLEAR" message is displayed along with "MANUAL" or "STABILITY". CFM tag is displayed blinking.
- Tap **GLP CFM** to confirm deleting selected lot or all records.
- Tap **SETUP CLR** to exit without deleting.

A lot number is used to identify particular sets of data.

Lot numbers are allocated successively until 100, even if some lots were deleted. The total number of lots that can be saved is 100.

If some are deleted (for example 1-50), fifty additional logs may be stored. These will be numbered 101-150. The lots are allocated successively (if enough memory space) until 999 is reached.

After number 999 is reached, delete all the lot logs to restart numbering.

10.3.2. Delete All

All logs (all parameters) can be deleted in a single clear.

This function will delete all Manual, Stability, and Interval logs for the measurement type selected.

- Tap **RCL MODIFY**. The pH, EC, or DO type will be blinking.
- Use **RANGE** to select desired measurement parameter log data to delete.
- With measurement type blinking and displayed message reading "LOG RECALL", tap **SETUP CLR**.



"CLEAR ALL" message and measurement type are displayed. CFM tag is displayed blinking.

- Tap **GLP CFM**.
- "PLEASE WAIT" along with percent cleared will be displayed until completed.



Note: If **SETUP CLR** is wrongly tapped, tap the key again to exit without deleting.

10.4. PC & STORAGE INTERFACE

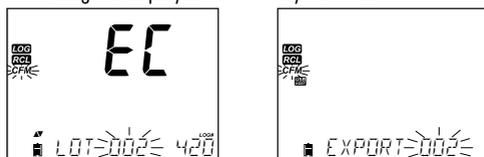
10.4.1. Meter to USB transfer

Data logged on meter can be transferred to a USB flash drive via log recall function. The minimum requirement for the drive is USB 2.0.

1. Connect USB flash drive to the USB port.
2. Tap **RCL MODIFY** and select the parameter to view:
 - » pH
 - » EC
 - » DO
3. Tap **GLP CFM**.
4. Use **▲** **▼** to Select Manual, Stability, or interval lots.
5. Tap **LOG** (not **GLP CFM**).

The **USB HOST** tag should come on.

“PLEASE WAIT” message is displayed followed by “EXPORT”.

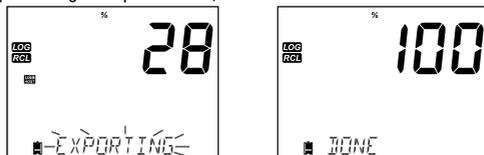


- Tap **GLP CFM** to export the selected record or lot.

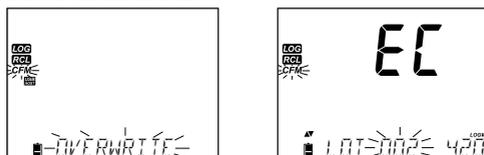
Note: If the key is not pressed within the next 10 seconds, the USB host becomes inactive.

The meter will display the percentage (%) of data being exported.

Once the exporting percentage is up to 100%, remove USB flash drive.



- If the selected file is already saved on the flash drive, the meter will ask to overwrite the existing file. “OVERWRITE” message is shown and the **CFM** tag is displayed blinking.
- Tap **GLP CFM** to overwrite the existing file. After export, the display returns to the selected file.
- Tap **RCL MODIFY** twice to return to measurements.



Note: Do not remove USB flash drive during an active export transfer.

10.4.2. Meter to PC transfer

1. Connect the meter to the PC using the supplied USB cable.
2. Power the meter
3. Tap  and select "LOG ON METER".
4. Tap  then use   to change to "EXPORT TO PC".
5. Tap . The *USB/PC* tag is displayed.
6. Tap  to exit.

The PC detects the USB as a removable drive. Open the drive to view the stored files.

Log files are formatted as Comma Separated Values (*.CSV) and can be opened with any text editor or spreadsheet program.

Notes:

- » *Western Europe (ISO-8859-1) character set and English language are suggested settings.*
- » *Other files may be visible depending upon computer settings. All files stored will appear in this folder.*
- » *Adjust font (column) width appropriately. Adjust the decimal places if the pH was logged with 0.001 resolution.*
- » *Conductivity measurements are displayed as $\mu\text{S}/\text{cm}$.*

Lot	Interval log	Manual log-on-demand	Manual log-on-stability
pH lot	PHLOT###	PHLOTMAN	PHLOTSTA
EC lot	ECLOT###	ECLOTMAN	ECLOTSTA
DO lot	DOLOT###	DOLOTMAN	DOLOTSTA

All stability logs, regardless of configured stability criteria, are located in the same stability file for that measurement. Click on the desired log to view data.

Notes:

- » *"°C!" displayed in log data indicates that the probe (electrode) was used beyond it's operation specifications. Logged data should not be considered reliable!*
- » *"°C!!" displayed in log data indicates a broken temperature sensor. The probe/electrode should be replaced. Logged data should not be considered reliable!*

11. MAINTENANCE

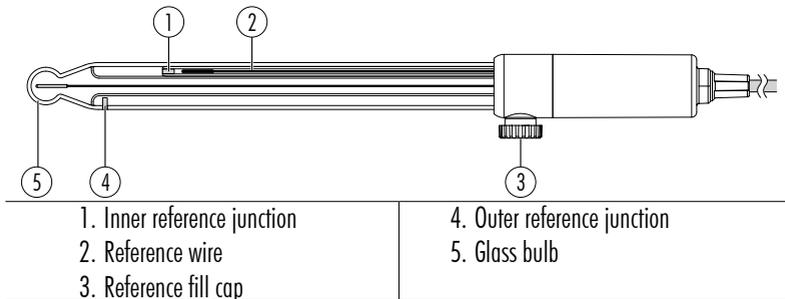
11.1. METER

The following steps outline the process to ensure users keep the meter clean and disinfected while limiting the risk of damage from unsuitable cleaners.

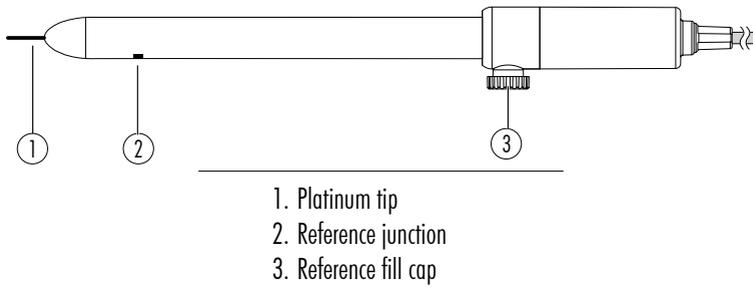
- Disinfect the screen using commercially available, non-ammonia glass or disinfectant cleaner.
- Apply a small amount of cleaner directly to a microfiber or lint-free disposable cloth. Make sure the cloth is damp and not wet.
- Wipe the glass screen clean with the cloth. Do not apply cleaner directly to the interface.

11.2. pH ELECTRODE/ORP PROBE

HI11310



HI36180



Electrode Maintenance

- Soak the pH bulb and reference junction in [HI70300 Storage Solution](#) for a minimum of 30 minutes to refresh the electrode (before calibration).
- Calibrate the electrode after prolonged storage or cleaning.
- After use, rinse the electrode with purified water and blot excess moisture with a lint free tissue.
- Inspect all sensor connectors for corrosion and replace if necessary.

pH Sensor Maintenance

- Remove the sensor protective cap.
- Do not be alarmed if any salt deposits are present. This is normal with pH/ORP probes and they will disappear when rinsed with water.
- Shake the probe down gently to eliminate any trapped air bubbles.
- If the bulb and/or junction are dry, soak the electrode in [HI70300](#) Storage solution for at least 30 minutes.
- To ensure a quick response, the glass bulb and the junction should be kept moist and not allowed to dry. This can be achieved by storing the sensor with a few drops of [HI70300](#) Storage solution or pH 4.01 in the protective cap.

Note: *Never use distilled or deionized water to store the electrode.*

- If the electrolyte is more than 2½ cm (1") below the fill hole, add [HI7082](#) or [HI8082](#) 3.5M KCl Electrolyte Solution for double junction electrodes.

Note: *Unscrew the reference fill cap during measurements so the liquid reference junction maintains an outward electrolyte flow.*

Periodic Maintenance

- Inspect the electrode for any scratches or cracks. If any are present, replace the electrode.
- Inspect the cable. The connection cable must be intact.
- Rinse off any salt deposits with water.

pH Cleaning Procedure

1. Soak the sensor in [HI7061](#) Electrode cleaning solution for general use or application-specific cleaning solution for 15 minutes.
2. Rinse with water.
3. Soak the electrode in [HI70300](#) Storage solution for at least 30 minutes, rinse with water and calibrate before using.

Protein, Inorganic, Oil, or Grease Cleaning Procedure

1. Soak the sensor in application-specific electrode cleaning solution (e.g. [HI7073](#) Protein cleaning, [HI7074](#) Inorganic cleaning for 15 minutes or [HI7077](#) Oil and Fat cleaning solution).
2. Rinse the sensor with water.

Note: *After performing any of the cleaning procedures, rinse the electrode thoroughly with water and soak in [HI70300](#) Storage solution for at least 30 minutes before calibrating it.*

3. Soak the electrode in [HI70300](#) Storage solution for at least 1 hour, rinse with water, and calibrate before using.

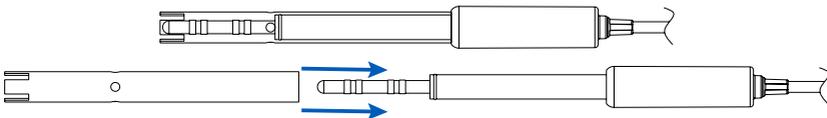
11.3. EC PROBE

Rinse the probe thoroughly as water residue may not be visible.

Cleaning

Dirty or improperly cleaned probes can result in erratic and inaccurate readings.

- Clean off the external sheath with a soft cloth and surfactant solution.
- Rinse the probe under a stream of running tap water to remove salt or minerals. Jet the tap water stream through the opening to dislodge any debris.
- Only if strictly necessary, carefully remove the outer plastic sheath to disassemble the probe. Clean off with a warm water (surfactant) mixture and follow with a through rinsing with purified water. Allow pieces to dry and reassemble.



Maintenance

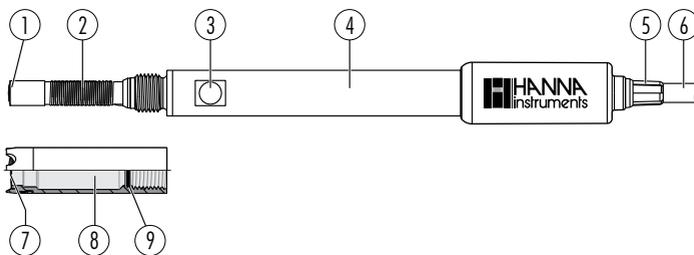
Calibrate the probe with the appropriate standard solution for the intended application.

Storage

- Store the probe dry, after cleaning in distilled water.
- Clean the probe and calibrate after long-term storage.

Note: The insulator used to support the platinum rings is made of glass. Use extreme caution when handling this probe.

11.4. DISSOLVED OXYGEN PROBE



1. Glass insulator/platinum cathode
2. Ag/AgCl anode and reference
3. Temperature sensor
4. Probe body
5. Cable relief

6. Cable
7. Oxygen permeable PTFE membrane
8. Screw cap
9. O-ring seal

General Maintenance

- Inspect membrane surface to ensure it is in good condition.
- Rinse carefully with distilled or deionized water to clean.
- Damaged membranes need to be replaced.
- Verify no bubbles are trapped between the cathode and membrane.

Cathode Cleaning

1. Remove cap and inspect platinum cathode is bright and untarnished. If tarnished, clean with a clean lint-free cardboard or cloth. Gently polish off any stains.
2. Rinse the probe with deionized or distilled water.
3. Install a new membrane cap using fresh electrolyte.

Note: Use care when handling the probe tip.

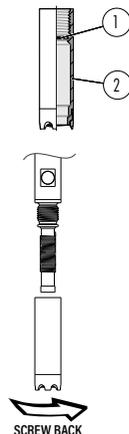
Inspect that the insulator has not been cracked.

Membrane Cap Replacement

New probe: unscrew the shipping cap and save.

Probe in use: unscrew the old cap.

1. Take one O-ring and one membrane cap and position the O-ring (1) in the cap (2).
2. Rinse the membrane cap with electrolyte and discard.
3. Fill the cap, above the O-ring, with electrolyte and tap the side walls to dislodge bubbles that may adhere to the threads.
4. Over a sink, with the cathode facing down, screw the cap counterclockwise until the threads are fully engaged.
5. Rinse the probe and inspect the membrane for trapped bubbles. If any, discard the electrolyte, refill, and tap the sides. Reinstall.



Storage

Store with protective cap on.

Conditioning

Before proceeding with the calibration make sure the probe is ready for measurements.

1. Reinstall the plastic protective cap over membrane end.
2. Reconnect probe to meter and allow probe to polarize.

11.5. TROUBLESHOOTING GUIDE

The meter gives warning messages:

- when erroneous conditions appear
- while logging
- when measured values are outside the expected range
- for invalid temperature values

Note: See notifications area at the bottom of the screen.

The information below provides an explanation of the errors and warnings, and recommended action(s) to be taken.

Symptoms	Problem(s)	Solution(s)
Slow response Excessive drift	Dirty pH electrode	Clean the electrode. Soak the tip in HI7061 or HI8061 for 30 minutes.
Readings fluctuate up and down (noise)	pH Clogged/dirty junction. Low electrolyte level (refillable electrodes).	Clean the electrode. Refill with fresh solution. Check connection cable and connectors.
	EC Probe sleeve not properly inserted. Trapped air bubbles	Reinstall the sleeve. Tap the probe to remove air bubbles. Move probe to center of beaker. Verify sleeve's top hole is submerged in solution.
	DO Probe electrolyte contains entrapped gas.	Remove the cap. Refill, tap, and reinstall.
Meter does not accept calibration buffer/standard solution	pH Dirty electrode Contaminated buffer	Clean the electrode. If no results, replace the electrode. Replace the buffer.
	EC Damaged probe	Clean the probe. If no results, replace the probe. Verify correct standard is selected.
"H" and "--EEO" or "EEO" displayed blinking	Out of range	Verify no shipping cap. Verify pH sample is within specified range. Check electrolyte level.
EC, TDS, Salinity readings displayed blinking	Out of range	Verify no shipping spacer. Recalibrate the probe. Make sure the solution is within specified range. Make sure the range is not locked. Select Auto range.

Symptoms	Problem(s)	Solution(s)
DO reading displayed blinking	Out of range	Verify no trapped bubbles inside cap. Verify solution movement past membrane. Remove cap, inspect, and clean if necessary. Install new cap, refill with fresh electrolyte (no bubbles) to allow longer polarization. Stir or increase flow rate.
"mV" and "-- 0.00" or "0.00" displayed blinking	Out of range	Verify no shipping cap. Verify sample pH is within specified range. Verify electrolyte level is topped up. Verify no trapped bubbles inside pH membrane.
Meter does not measure temperature	Broken temperature sensor	Replace the probe.
Meter fails to calibrate NaCl	Incorrect EC calibration	Recalibrate the meter. Set cell constant to 1.
Meter fails to calibrate Meter gives faulty readings	Broken pH electrode	Replace the electrode.
At startup meter displays all LCD tags continuously		Contact local Hanna Instruments office.
CAL "Prod" message at startup.	Meter not factory calibrated	Contact local Hanna Instruments office.

12. METER ERROR CODES

Error Code	Message	Description
ERR_MSG_FACT_CAL_CORRUPTED	FACTORY CALIBRATION CORRUPTED	Factory calibration data is invalid or damaged. Device accuracy cannot be guaranteed.
ERR_MSG_UCAL_CORRUPTED	USER CALIBRATION CORRUPTED	User calibration data is corrupted and must be redone.
ERR_MSG_RTC_INTERFACE	RTC INTERFACE	Communication error with the Real-Time Clock interface.
ERR_MSG_FLASH_INTERFACE	FLASH INTERFACE	Error on the flash memory communication interface.
ERR_MSG_LCD_INTERFACE	LCD INTERFACE	LCD interface communication error; display may not update correctly.
ERR_MSG_RS232	RS232	Serial communication error on the RS232 interface.
ERR_MSG_RTC	RTC	Real-Time Clock malfunction or invalid data.
ERR_MSG_FLASH	FLASH	Flash memory read/write failure.
ERR_MSG_FS_FACTORY	FS FACTORY	Factory file system area is corrupted.
ERR_MSG_FS_CORRUPTED	FS CORRUPTED – PERFORM FLASH FORMAT	Main file system is corrupted; requires a full flash format.
ERR_MSG_DISK_FULL_FACTORY	DISK FULL FACTORY	Factory storage area is full.
ERR_MSG_DISK_FULL	DISK FULL	User storage memory is full.
ERR_MSG_NO_FLASH	NO FLASH	No flash memory detected.
ERR_MSG_UNSUPP_FLASH	FLASH NOT SUPPORTED	Detected flash type is not supported by the firmware.
ERR_MSG_PRESSURE_ERROR	PRESSURE	Pressure sensor error or out-of-range reading.

13. ACCESSORIES

Electrodes & Probes

Ordering Info	Description
HI10530	Triple ceramic, double junction, glass body, refillable pH electrode with conical tip and temperature sensor
HI10430	Triple ceramic, double junction, glass body, refillable pH electrode with temperature sensor
HI11310	Glass body, double junction, refillable pH/temperature electrode
HI11311	Glass body, double junction, refillable pH/temperature electrode with enhanced diagnostics
HI12300	Plastic body, double junction, gel filled, non refillable pH/temperature electrode
HI12301	Plastic body, double junction, gel filled, non refillable pH/temperature electrode with enhanced diagnostics
HI36180	Glass body, double junction, refillable ORP/temperature probe
HI763100	Digital EC/temperature probe
HI764080	Digital DO/temperature probe

pH Buffer Solutions

Ordering Info	Description
HI70004P	pH 4.01 buffer solution (25 sachets × 20 mL)
HI70007P	pH 7.01 buffer solution (25 sachets × 20 mL)
HI70010P	pH 10.01 buffer solution (25 sachets × 20 mL)
HI7001L	pH 1.68 buffer solution, 500 mL
HI7004L	pH 4.01 buffer solution, 500 mL
HI7006L	pH 6.86 buffer solution, 500 mL
HI7007L	pH 7.01 buffer solution, 500 mL
HI7009L	pH 9.18 buffer solution, 500 mL
HI7010L	pH 10.01 buffer solution, 500 mL
HI8004L	pH 4.01 buffer solution, 500 mL FDA approved bottle
HI8006L	pH 6.86 buffer solution, 500 mL FDA approved bottle
HI8007L	pH 7.01 buffer solution, 500 mL FDA approved bottle
HI8009L	pH 9.18 buffer solution, 500 mL FDA approved bottle
HI8010L	pH 10.01 buffer solution, 500 mL FDA approved bottle

pH Electrode Storage Solutions

Ordering Info	Description
HI70300L	Storage solution, 500 mL
HI80300L	Storage solution, 500 mL FDA approved bottle

pH Electrode Cleaning Solutions

Ordering Info	Description
HI70000P	Electrode rinse sachets (25 sachets \times 20 mL)
HI7061L	General cleaning solution, 500 mL
HI7073L	Protein cleaning solution, 500 mL
HI7074L	Inorganic cleaning solution, 500 mL
HI7077L	Oil & fat cleaning solution, 500 mL
HI8061L	General cleaning solution, 500 mL FDA approved bottle
HI8073L	Protein cleaning solution, 500 mL FDA approved bottle
HI8077L	Oil & fat cleaning solution, 500 mL FDA approved bottle

Electrode Refill Electrolyte Solutions

HI7071	3.5M KCl + AgCl Electrolyte for single junction electrodes, 4 \times 30 mL
HI7072	1M KNO ₃ Electrolyte, 4 \times 30 mL
HI7082	3.5M KCl Electrolyte for double junction electrodes, 4 \times 30 mL
HI8071	3.5M KCl + AgCl Electrolyte for single junction electrodes, 4 \times 30 mL, FDA approved bottle
HI8082	3.5M KCl Electrolyte for double junction electrodes, 4 \times 30 mL, FDA approved bottle
HI8093	1M KCl + AgCl Electrolyte, 4 \times 30 mL, FDA approved bottle

ORP Pretreatment Solutions

HI7091L	Reducing Pretreatment Solution, 500 mL bottle + 14 g (set)
HI7092L	Oxidizing Pretreatment Solution, 500 mL bottle

ORP Solutions

HI7021L	Test Solution 240 mV, 500 mL bottle
HI7022L	Test Solution 470 mV, 500 mL bottle

EC Conductivity Solutions

Ordering Info	Description
HI70030P	12880 $\mu\text{S}/\text{cm}$ conductivity standard (25 sachets \times 20 mL)
HI70031P	1413 $\mu\text{S}/\text{cm}$ conductivity standard (25 sachets \times 20 mL)
HI70039P	5000 $\mu\text{S}/\text{cm}$ conductivity standard (25 sachets \times 20 mL)
HI7030M	12880 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7031M	1413 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7033M	84 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7034M	80000 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7035M	111800 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7039M	5000 $\mu\text{S}/\text{cm}$ conductivity standard, 230 mL
HI7030L	12880 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7031L	1413 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7033L	84 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7034L	80000 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7035L	111800 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7039L	5000 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL
HI7037L	100% NaCl sea water standard solution, 500 mL
HI8030L	12880 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle
HI8031L	1413 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle
HI8033L	84 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle
HI8034L	80000 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle
HI8035L	111800 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle
HI8039L	5000 $\mu\text{S}/\text{cm}$ conductivity standard, 500 mL FDA approved bottle

Dissolved Oxygen Solutions

Ordering Info	Description
HI7040L	Zero oxygen solution, 500 mL
HI7041S	Polarographic dissolved oxygen electrolyte solution, 30 mL

Other Accessories

Ordering Info	Description
HI764026	Electrode holder for HI2600 family
HI764080A/P	Dissolved oxygen spare screw cap membranes for HI764080 DO probe (5 pcs.)
HI75115U	115 to 230 VAC to 5 VDC USB-C power adapter, US plug
HI75230E	115 to 230 VAC to 5 VDC USB-C power adapter, European plug

CERTIFICATION

All Hanna[®] instruments conform to the CE European Directives.



RoHS
compliant



Disposal of Electrical & Electronic Equipment. The product should not be treated as household waste. Instead, hand it over to the appropriate collection point for the recycling of electrical and electronic equipment, which will conserve natural resources.

Ensuring proper product disposal prevents potential negative consequences for the environment and human health. For more information, contact your city, your local household waste disposal service, or the place of purchase.

RECOMMENDATIONS FOR USERS

Before using this product, make sure it is entirely suitable for your specific application and for the environment in which it is used. Any variation introduced by the user to the supplied equipment may degrade the meter's performance. For you and the meter's safety do not use or store the meter in hazardous environments.

WARRANTY

The benchtop meter is warranted for two years against defects in workmanship and materials when used for its intended purpose and maintained according to instructions.

Electrodes and probes are warranted for six months.

This warranty is limited to repair or replacement free of charge.

Damage due to accidents, misuse, tampering, or lack of prescribed maintenance is not covered.

If service is required, contact your local Hanna Instruments[®] office. 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 (RGA) number from the Technical Service department and then send it with shipping costs prepaid. When shipping any instrument, make sure it is properly packed for complete protection.