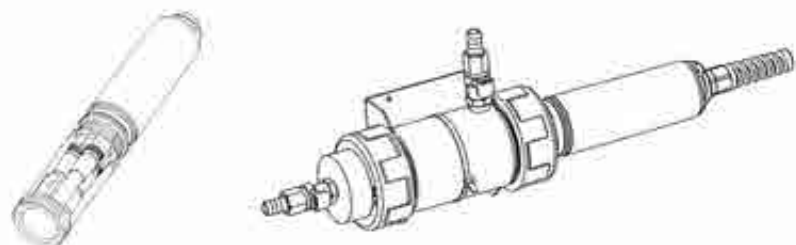


The probe is suitable for measurements in a flow cell. Pumping water to a flow-through monitoring station has obvious pros and cons. Typically a shelter is required to secure a pump, and flow chamber. A power requirement, shelter, pump maintenance and higher installation cost need to be considered. Freeze protection, security, and convenience of calibration and possibility of adding multiple measurement points and antifouling preconditioning systems are advantages to this type of installation.



#### General Guidelines for fixed installation:

- Select a water-sampling site that will allow collection of representative water samples.
- Position the probe so the sensor surfaces face toward the flow. This will minimize air bubble or fluid cavitation. Limit flow rate to moderate.
- Mount Probe 0 to 45° angle from vertical to avoid sensors (pH, pH/ORP) from becoming electrically discontinuous due to internal electrolytes flowing away from their internal cells.
- Install meter and probe where they will be accessible for maintenance as required.
- Regularly visit water sampling sites to: check for damage to sensors, the installation mountings, and the meter battery power.
- Remove aquatic weed growth that may be interfering with water sample collection.
- Set up devices and programs for water monitoring and sampling.
- If the probe is suspended from a pier or bridge ensure that it is protected from debris by positioning behind a support and anchoring the cable / probe to a pipe.
- Have access to spare sensors and proper range standard solutions or buffers.
- Strictly follow the established SOP's.
- Flow cell installation; Avoid trapped air. Maintain constant flow rate.

PROBES packed in carton box, without sensors or protective shield.

Code	Description
HI7698194/4	HI7698194 probe with 4 m (13.1') cable.
HI7698194/10	HI7698194 probe with 10 m (33.0') cable
HI7698194/20	HI7698194 probe with 20 m (65.6') cable
HI7698194/40	HI7698194 probe with 40 m (131.2') cable
HI7698195/4	HI7698195 probe with 4 m (13.1') cable
HI7698195/10	HI7698195 probe with 10 m (33.0') cable
HI7698195/20	HI7698195 probe with 20 m (65.6') cable
HI7698195/40	HI7698195 probe with 40 m (131.2') cable
HI7698196/4	HI7698196 probe with 4 m (13.1') cable
HI7698196/10	HI7698196 probe with 10 m (33.0') cable
HI7698196/20	HI7698196 probe with 20 m (65.6') cable
HI7698196/40	HI7698196 probe with 40 m (131.2') cable

*Note: Probes with different cable length are available upon request.  
Order protective shields separately.*

## METERS WITH PROBES

Code	Description
HI7698194	HI98194 meter, probe with 4 m (13.1') cable, with pH/ORP, EC, D.O. sensors.
HI7698194/10	HI98194 meter, probe with 10 m (33.0') cable, with pH/ORP, EC, D.O. sensors.
HI7698194/20	HI98194 meter, probe with 20 m (65.6') cable, with pH/ORP, EC, D.O. sensors.
HI7698194/40	HI98194 meter, probe with 40 m (131.2') cable, with pH/ORP, EC, D.O. sensors.
HI7698195	HI98195 meter, probe with 4 m (13.1') cable, with pH/ORP, EC sensors.
HI7698195/10	HI98195 meter, probe with 10 m (33.0') cable, with pH/ORP, EC sensors.
HI7698195/20	HI98195 meter, probe with 20 m (65.6') cable, with pH/ORP, EC sensors.
HI7698195/40	HI98195 meter, probe with 40 m (131.2') cable, with pH/ORP, EC sensors.
HI7698196	HI98196 meter, probe with 4 m (13.1') cable, with pH/ORP, D.O. sensors.
HI7698196/10	HI98196 meter, probe with 10 m (33.0') cable, with pH/ORP, D.O. sensors.
HI7698196/20	HI98196 meter, probe with 20 m (65.6') cable, with pH/ORP, D.O. sensors.
HI7698196/40	HI98196 meter, probe with 40 m (131.2') cable, with pH/ORP, D.O. sensors.

## SENSORS

Code	Description
HI7698194-0	pH sensor
HI7698194-1	pH/ORP sensor
HI7698194-2	Dissolved Oxygen sensor
HI7698194-3	EC sensor

## CABLES, CONNECTORS, ACCESSORIES

Code	Description
HI7698290	Short calibration beaker
HI7698295	Short protective shield
HI7698297	Long, quick release flow cell
HI7698292	Probe maintenance kit with HI7042S (electrolyte solution for D.O. sensor), small brush, small hex key, O-Rings for D.O. sensor (5 pcs.), O-Rings for probe (5 pcs.) and syringe with grease to lubricate the O-Rings
HI76981952	Probe maintenance kit with small brush, small hex key, O-Rings for probe (5 pcs.) and syringe with grease to lubricate the O-Rings
HI9298194	PC application software
HI920015	Micro USB cable, PC to meter

## QUICK CALIBRATION SOLUTIONS

Code	Description
HI9828-20	Quick calibration solution, 230 mL
HI9828-25	Quick calibration solution, 500 mL
HI9828-27	Quick calibration solution, 1 gal.

## pH BUFFERS

HI5004	pH 4.01 buffer solution, 500 mL
HI5005	pH 5.00 buffer solution, 500 mL
HI5006	pH 6.00 buffer solution, 500 mL
HI5068	pH 6.86 buffer solution, 500 mL
HI5007	pH 7.01 buffer solution, 500 mL
HI5074	pH 7.41 buffer solution, 500 mL
HI5008	pH 8.00 buffer solution, 500 mL
HI5009	pH 9.00 buffer solution, 500 mL
HI5091	pH 9.18 buffer solution, 500 mL
HI5010	pH 10.01 buffer solution, 500 mL

## ORP SOLUTIONS

Code	Description
HI7021L	ORP test solution, 240 mV @ 25 °C, 500 mL
HI7022L	ORP test solution, 470 mV @ 25 °C, 500 mL
HI7091L	Reducing pretreatment solution
HI7092L	Oxidizing pretreatment solution, 500 mL

## pH/ORP MAINTENANCE SOLUTIONS

Code	Description
HI70670L	pH/ORP cleaning solution for salt deposits, 500 mL
HI70671L	pH/ORP cleaning and disinfecting solution for algae, fungi and bacteria, 500 mL
HI70300L	pH/ORP electrode storage solution, 500 mL

## D.O. SOLUTIONS

Code	Description
HI7040L	Zero oxygen solution
HI7042S	Electrolyte solution for D.O. sensor, 30 mL
HI76409A/P	Spare membrane with O-Ring (5 pcs.)



## CONDUCTIVITY STANDARD SOLUTIONS

Code	Description
HI7030L	12880 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL
HI7031L	1413 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL
HI7033L	84 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL
HI7034L	80000 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL
HI7035L	111800 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL
HI7039L	5000 $\mu\text{S}/\text{cm}$ calibration solution, 500 mL

## 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 meters' performance. For yours and the meter's safety do not use or store the meter in hazardous environments.

## Warranty

HI98194, HI98195 and HI98196 meters are warranted for two years (sensors, electrodes and probes for six months) against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

This warranty is limited to repair or replacement free of charge. Damages due to accidents, misuse, tampering or lack of prescribed maintenance are 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.

**Dear Customer,**

Thank you for choosing a Hanna Instruments product.  
 Please read this instruction manual carefully before using the instrument.  
 This manual will provide you with the necessary information for correct use of the instrument, as well as a precise idea of its versatility.  
 If you need additional technical information, do not hesitate to e-mail us at [tech@hannainst.com](mailto:tech@hannainst.com) or view our worldwide contact list at [www.hannainst.com](http://www.hannainst.com).

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## Chapter 1 - INTRODUCTION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any damage, please contact your local Hanna Instruments Office.

**METERS WITH PROBES** - packaged together in a sturdy carrying case with:

- HI9298194 PC Application Software
- HI7698290 calibration beaker
- HI9828-20 calibration solution (230 mL)
- USB cable
- 1.5V AA batteries (4 pcs.)
- probe maintenance kit
- appropriate probe shield
- specified sensors
- Instruction Manual and Quick Reference Guide
- Certificate

*Note: Save all packing materials until you are sure that the instrument functions correctly. Any damaged or defective items must be returned in their original packing material with the supplied accessories.*

HI98194	pH/mV, ORP, EC, TDS, Resistivity, Salinity, Seawater $\sigma$ , Dissolved Oxygen, Atmospheric Pressure and Temperature Multiparameter meter with HI7698194 probe.
HI98195	pH/mV, ORP, EC, TDS, Resistivity, Salinity, Seawater $\sigma$ , Atmospheric Pressure and Temperature Multiparameter meter with HI7698195 probe.
HI98196	pH/mV, ORP, Dissolved Oxygen, Atmospheric Pressure and Temperature Multiparameter meter with HI7698196 probe.



HI9819X is a portable logging multiparameter system (instrument, probe) that monitors up to 14 different water quality parameters (7 measured, 7 calculated).

The microprocessor-based intelligent multisensor probes allows measurement of many water quality parameters such as pH, ORP, dissolved oxygen, conductivity and temperature with data logging. The system is easy to setup and easy to use.

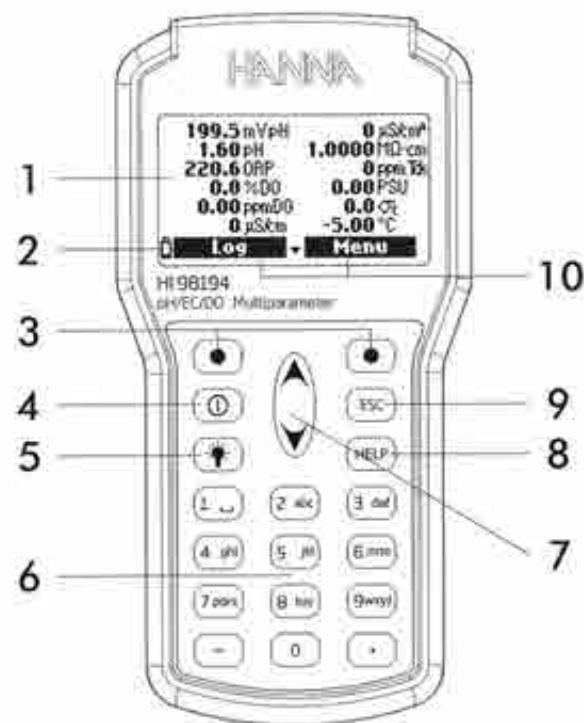
The HI9819X features a graphic, backlit display that automatically sizes the digits to fit the screen with on-screen graphing capability. Each parameter is fully configurable.

HI9819X was designed to withstand harsh environments and is the ideal solution for field measurements of lakes, rivers and sea.

The meter meets IP67 standards (30 minute immersion at a depth of 1 m) and the multisensor probe meets IP68 standards (continuous immersion in water).

Main features of the HI9819X systems:

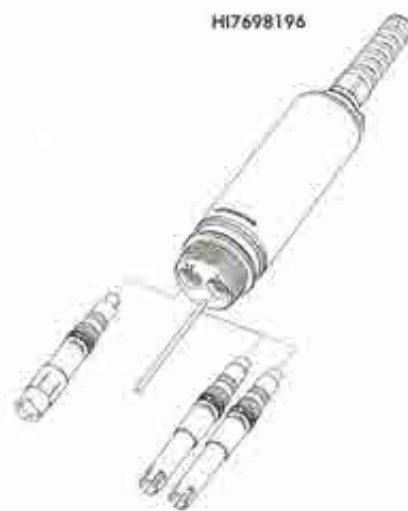
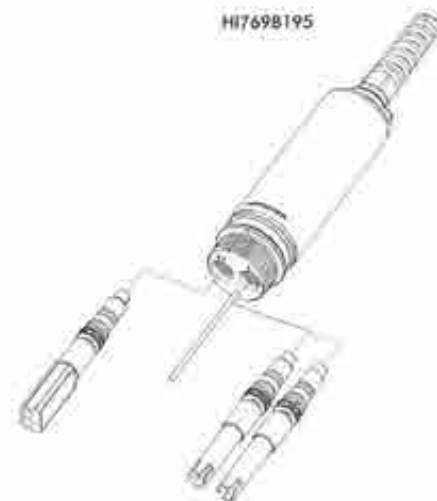
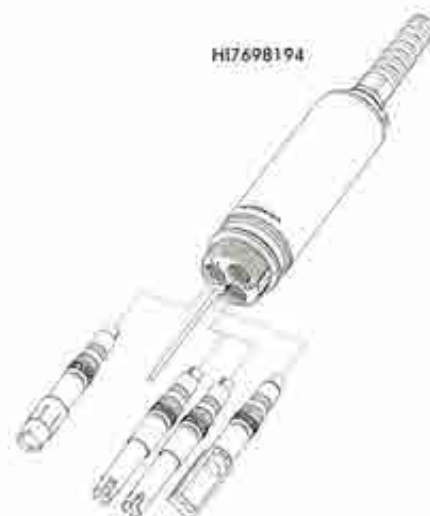
- Rugged meter and probe
- Easy to use
- Measure up to 14 parameters and display of up to 12 parameters
- Waterproof protection (IP67 for the meter and IP68 for the probe)
- Graphic LCD with backlight
- Built-in barometer for D.O. concentration compensation (HI98194, HI98196 only)
- Quick calibration feature
- Measurement check to eliminate any erroneous readings
- Auto recognition of probe and sensors
- Log-on-demand and automatic logging (up to 45,000 samples) on meter for all parameters
- Graphical display of logged data
- USB interface for PC communication
- Auto-ranging for EC readings (HI98194, HI98195 only)
- Good Laboratory Practice feature, the last 5 calibrations are automatically stored
- Field-replaceable sensors with color coded caps
- Meter is powered with alkaline batteries



1. Graphic LCD
2. Battery level indicator
3. Softkeys
4. On/Off key: turn the meter on and off
5. Lamp key: turn the backlight on and off
6. Alphanumeric keyboard: insert alphanumeric codes
7. Arrow keys: scroll the displayed options/message
8. HELP key: obtain information about the displayed screen
9. ESC key: return to the previous screen
10. Softkey functions defined on display

## Chapter 2 - QUICK START

- Sensor O-Rings must be lubricated with the supplied grease prior to installation.
- HI769819X probes have 2 or 3 sensor connectors sockets identified with color-coded triangles.
- Connector 1 (red): For either pH/ORP, pH sensor
- Connector 2 (white): For dissolved oxygen sensor (HI98194, HI98196 only)
- Connector 3 (blue): For EC sensor (HI98194, HI98195 only)
- Position the connector key towards the center of the probe, make sure the connector is seated correctly (the sensor will no longer move freely) before tightening the locking threads.
- To protect the sensors, screw the protective shield onto the probe body.
- With the meter off, connect the probe to the instrument input on the top of the meter. Align the pins and key then push the plug into the socket and tighten the thread.
- Turn the meter on by pressing the **On/Off** key. The meter will automatically recognize the probe and the installed sensors and identify them on the probe status screen.
- Press **Measure** to view the measurement screen.





The main operating modes for HI9819X are measurement, logging and setup.

The measurement screen can be configured to display a single measurement or up to 12 simultaneous measurements by using the numbers 1-7 on the keypad. Use the  $\blacktriangle/\blacktriangledown$  keys to scroll through the measurements not being displayed. See page 24 for more details.

The measurement units will blink if the system has not been calibrated and the measurement number will blink when the reading is out of range.

Press **Log** to display the logging menu. You can either log a single sample on the meter or start an interval log on the meter. See **Chapter 10** for more details.

Press **Menu** to enter setup mode. You can configure which parameters you want to measure, calibrate the sensors, change system settings and view the meter and probe status.

HI9819X features context sensitive **HELP**, which provides useful information regarding the displayed screen.

Simply press the **HELP** key to access this function, then use the  $\blacktriangle/\blacktriangledown$  keys to scroll through the message.

To escape from the **HELP** window, press the **HELP** key again or **ESC**.

## Chapter 3 - SPECIFICATIONS

### Temperature

Range	-5.00 to 55.00 °C; 23.00 to 131.00 °F; 268.15 to 328.15 K
Resolution	0.01 °C; 0.01 °F; 0.01 K
Accuracy	$\pm 0.15$ °C; $\pm 0.27$ °F; $\pm 0.15$ K
Calibration	Automatic at 1 custom point

### pH/mV

Range	0.00 to 14.00 pH; $\pm 600.0$ mV
Resolution	0.01 pH; 0.1 mV
Accuracy	$\pm 0.02$ pH; $\pm 0.5$ mV
Calibration	Automatic at 1, 2 or 3 points with automatic recognition of 5 standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) and 1 custom buffer

### ORP

Range	$\pm 2000.0$ mV
Resolution	0.1 mV
Accuracy	$\pm 1.0$ mV
Calibration	Automatic at 1 custom point (relative mV)

### DISSOLVED OXYGEN (HI98194, HI98196 only)

Range	0.0 to 500.0 %; 0.00 to 50.00 ppm (mg/L)
Resolution	0.1 %; 0.01 ppm (mg/L)
Accuracy	0.0 to 300.0 %: $\pm 1.5$ % of reading or $\pm 1.0$ % whichever is greater; 300.0 to 500.0 %: $\pm 3$ % of reading 0.00 to 30.00 ppm (mg/L): $\pm 1.5$ % of reading or $\pm 0.10$ ppm (mg/L) whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): $\pm 3$ % of reading
Calibration	Automatic 1 or 2 points at 0, 100 % or 1 custom point

## CONDUCTIVITY (HI98194, HI98195 only)

Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
Resolution	Manual: 1 $\mu$ S/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm Automatic: 1 $\mu$ S/cm from 0 to 9999 $\mu$ S/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm Automatic (mS/cm): 0.001 mS/cm from 0.000 to 9.999 mS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm
Accuracy	$\pm 1\%$ of reading or $\pm 1$ $\mu$ S/cm whichever is greater
Calibration	Automatic single point, with 6 standard solutions (84 $\mu$ S/cm, 1413 $\mu$ S/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point

## RESISTIVITY (HI98194, HI98195 only)

Range	0 to 999999 $\Omega$ -cm; 0 to 1000.0 k $\Omega$ -cm; 0 to 1.0000 M $\Omega$ -cm
Resolution	Depending on resistivity reading
Calibration	Based on conductivity or salinity calibration

## TDS (Total Dissolved Solids) (HI98194, HI98195 only)

Range	0 to 400000 ppm (mg/L); (the maximum value depends on the TDS factor)
Resolution	Manual: 1 ppm (mg/L); 0.001 ppt (g/L); 0.01 ppt (g/L); 0.1 ppt (g/L); 1 ppt (g/L) Automatic: 1 ppm (mg/L) from 0 to 9999 ppm (mg/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L); Automatic ppt (g/L): 0.001 ppt (g/L) from 0.000 to 9.999 ppt (g/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L)
Accuracy	$\pm 1\%$ of reading or $\pm 1$ ppm (mg/L) whichever is greater
Calibration	Based on conductivity or salinity calibration

## SALINITY (HI98194, HI98195 only)

Range	0.00 to 70.00 PSU
Resolution	0.01 PSU
Accuracy	$\pm 2\%$ of reading or $\pm 0.01$ PSU whichever is greater
Calibration	Based on conductivity calibration

Note: For HI98196 Salinity can be set from 0.00 to 70.00 PSU in setup menu.

## SEAWATER SIGMA (HI98194, HI98195 only)

Range	0.0 to 50.0 $\sigma_t$ , $\sigma_\theta$ , $\sigma_{15}$
Resolution	0.1 $\sigma_t$ , $\sigma_\theta$ , $\sigma_{15}$
Accuracy	$\pm 1.0$ $\sigma_t$ , $\sigma_\theta$ , $\sigma_{15}$
Calibration	Based on conductivity or salinity calibration

## ATMOSPHERIC PRESSURE

Range	450.0 to 850.0 mmHg; 17.72 to 33.46 inHg; 600.0 to 1133.2 mbar; 8.702 to 16.436 psi; 0.5921 to 1.1184 atm; 60.00 to 113.32 kPa
Resolution	0.1 mmHg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa
Accuracy	$\pm 3.0$ mmHg within $\pm 15^\circ\text{C}$ from calibration temperature
Calibration	Automatic or 1 custom point

## METER SPECIFICATIONS

Temperature Compensation	Automatic from -5 to 55 °C (23 to 131 °F)
Logging Memory	45,000 records (continuous logging or log-on-demand of all parameters)
Logging Interval	1 second to 3 hours
PC Interface	USB (with HI9298194 software)
Waterproof Protection	IP67
Environment	0 to 50 °C (32 to 122 °F); RH 100 %
Battery Type	1.5V, AA alkaline batteries (4 pcs.)
Battery Life	360 hours of continuous use without backlight / 50 hours with backlight
Dimensions/Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)

## METER BATTERY LIFE

The power consumption of the HI9819X multiparameter systems are dependent on two things:

1. The measurement system configuration (sensor configuration)
2. The meter configuration (logging interval and backlight use)

The following table estimates the meter's battery life connected to a HI769819X probe with backlight off.

*Note: Backlighting use consume the most power. The table variables, battery selection and parameter selection.*

	pH/ ORP, D.O., EC
Backlight OFF, 1 s log	280 hours
Backlight OFF, 4 min log	360 hours
Backlight OFF, 10 min log	400 hours
Backlight ON, 4 min log	50 minutes
Backlight ON, 10 min log	50 minutes

Sensor Inputs	3 for HI7698194 2 for HI7698195 and HI7698196
Sample Environment	Fresh, brackish, seawater
Waterproof protection	IP68
Operating Temperature	-5 to 55 °C
Storage Temperature	-20 to 70 °C
Maximum Depth	20 m (66')
Dimensions (without cable)	342 mm (13.5"), dia = 46 mm (1.8")
Weight (with batteries and sensors)	570 g (20.1 oz.)
Cable Specification	Multistrand-multiconductor shielded cable with internal strength member rated for 68 kg (150 lb) intermittent use
Wetted Materials	Body: ABS Threads: Nylon Shield: ABS/316 SS Temp probe: 316 SS O-Rings: EPDM



	HI7698194-0	HI7698194-1	HI7698194-2	HI7698194-3
Description	pH	pH/ORP	Dissolved Oxygen	EC
Measure Type Primary Unit	pH, mV (pH)	pH, mV (pH/ORP)	D.O. (% sat. & conc.)	EC
Measure Range	0.00 to 13.00 pH ±600.0 mV	0.00 to 13.00 pH ±600.0 mV ±2000.0 mV	0.0 to 500.0 % 0.00 to 50.00 mg/L	0.0 to 200.0 mS/cm 0.0 to 400 mS/cm (absolute)
Temperature Range	-5 to 55 °C	-5 to 55 °C	-5 to 55 °C	-5 to 55 °C
Color Code	Red	Red	White	Blue
Materials	Tip: glass (pH) Junction: ceramic Body: PEI Electrolyte: gel Reference: double	Tip: glass (pH); Pt (ORP) Junction: ceramic Body: PEI Electrolyte: gel Reference: double	Cat/An: Ag/Zn Membrane: HDPE Body: white top ABS CAP	Stainless steel electrodes AISI 316 Body: ABS/EPOXY
Maintenance Solution	HI70300 (storage solution)	HI70300 (storage solution)	HI70425 (D.O. electrolyte)	none
Dimensions	118 x 15 mm	118 x 15 mm	99 x 17 mm	111 x 17 mm
Depth	20 m (65')	20 m (65')	20 m (65')	20 m (65')

## Chapter 4 - PROBE INSTALLATION

**HI7698194-0** Combination pH sensor features a glass pH sensitive bulb and a silver/silver chloride double junction reference with gelled electrolyte.



**HI7698194-1** Combination pH/ORP sensor features a glass sensitive bulb for pH readings, a platinum sensor for redox measurements and a silver/silver chloride double junction reference with gelled electrolyte.

*Note: See page 18 for pH preparation.  
See page 18 for ORP activation.*

**HI7698194-2** Galvanic dissolved oxygen (D.O.) sensor. The thin gas permeable membrane isolates the sensor elements from the testing solution but allows oxygen to pass through. The oxygen that passes through the membrane is reduced at the cathode and causes a current, from which the oxygen concentration is determined. The D.O. sensor conforms to Standard Methods 4500-AG, EPA 360.1.



*Note: The D.O. sensor needs to be activated before installation.  
See page 18 for details.*

**HI7698194-3** four ring-electrode conductivity (EC/TDS/Resistivity/Salinity) sensor. The sensor is immune to polarization or surface coatings.



### pH Preparation

Remove the shipping cap from the pH sensor. If the shipping cap does not contain any liquid, pour HI70300 into shipping cap, place it back on the sensor and soak for at least 1/2 hour before use. If HI70300 is not available, pH 4.01 buffer may be substituted.

### ORP Activation

For improved redox measurements, the surface of the sensor must be clean and smooth. A pretreatment procedure should be performed to ensure quick response.

The pretreatment of the sensor is determined by the pH and the ORP potential values of the sample. Use the table below to determine the treatment required.

First locate the typical sample pH. If the corresponding ORP value (mV) is higher than the values in the table below, an oxidizing pretreatment is necessary. If the value is lower, a reducing pretreatment is necessary.

pH	mV	pH	mV	pH	mV	pH	mV	pH	mV
0	990	1	920	2	860	3	800	4	740
5	680	6	640	7	580	8	520	9	460
10	400	11	340	12	280	13	220	14	160

**For reducing pretreatment:** immerse the electrode for at least five minutes in HI7091.

**For oxidizing pretreatment:** immerse the electrode for at least five minutes in HI7092.

### D.O. Sensor Activation

The D.O. probe is shipped dry. To prepare the sensor for use:

- Remove the black & red plastic cap. This cap is used for shipping purposes only and can be thrown away.
- Insert the supplied O-Ring in to the membrane cap.
- Rinse the membrane with some electrolyte solution. Refill with clean electrolyte. Gently tap the membrane cap to dislodge air bubbles. To avoid damaging the membrane, do not touch it with your fingers or directly tap the membrane.
- With the sensor facing down screw the membrane cap counterclockwise to the end of the threads. Some electrolyte will overflow.
- Rinse outside of sensor with deionized water.
- Invert sensor and inspect. There should be no bubbles or debris between the membrane and sensor body.

### EC Sensor Preparation

The EC sensor does not need to be soaked or hydrated before use. Use the small brush included in the probe maintenance kit to clean and loosen any debris before using.

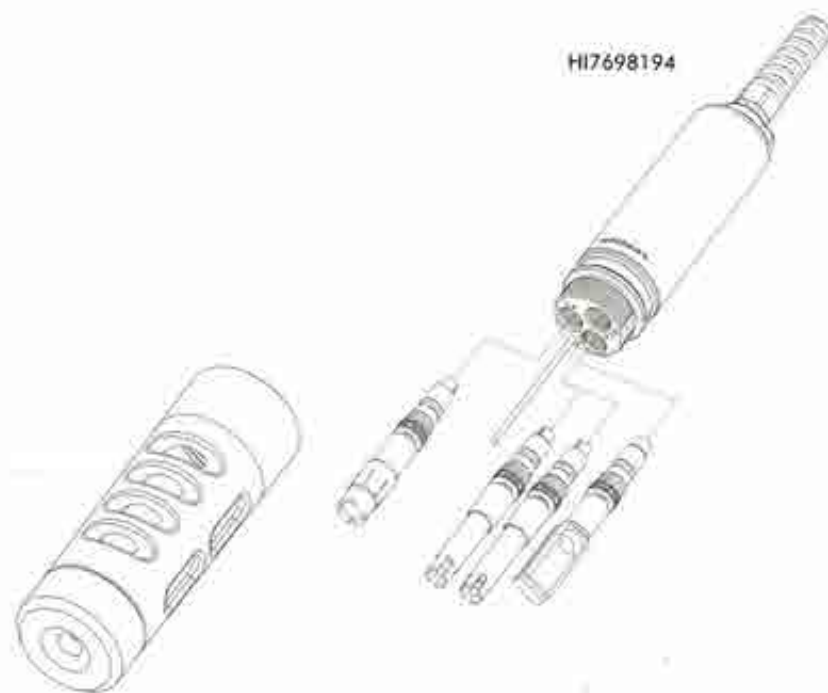
The HI7698194 can support three different sensors:

Connector 1: pH, pH/ORP

Connector 2: D.O.

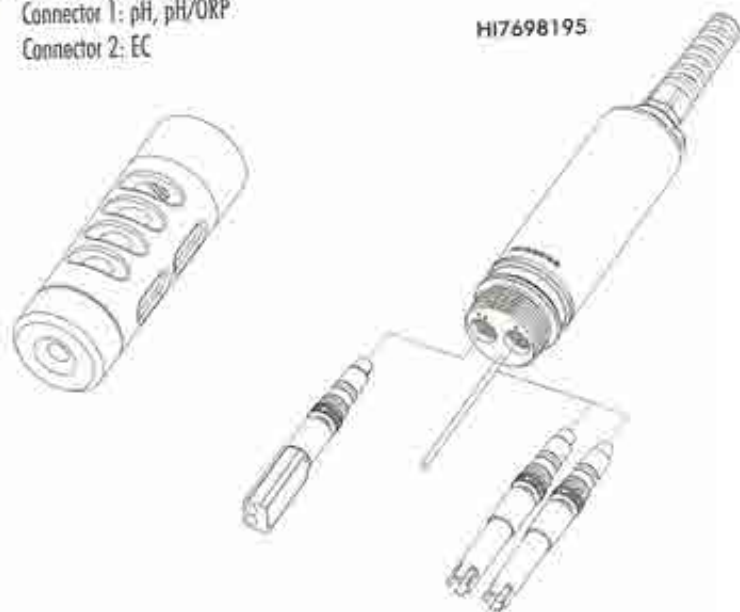
Connector 3: EC.

To make installation easier, the sensors have color-coded caps and the sockets are identified with colored triangles, corresponding to the colors of the sensors (pH - red; EC - blue; D.O. - white).



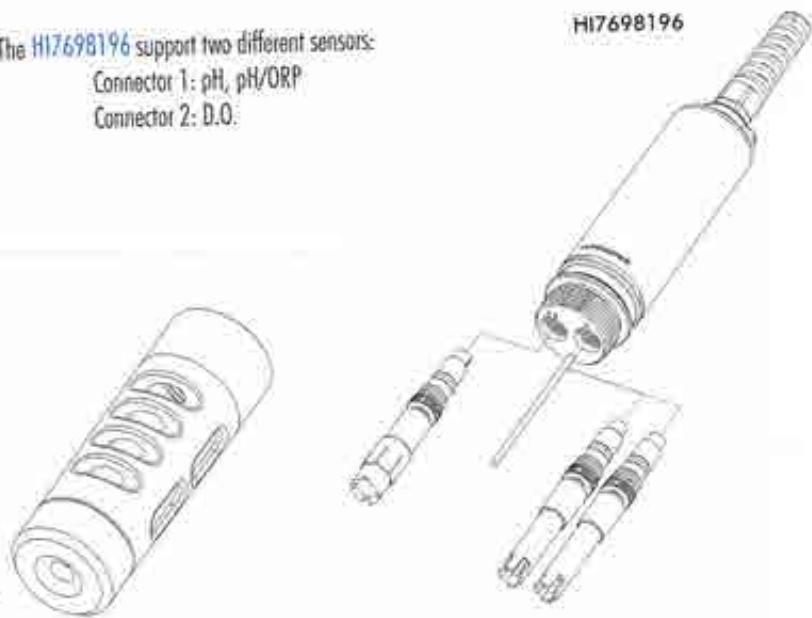
The HI7698195 support two different sensors:

Connector 1: pH, pH/ORP  
Connector 2: EC



The HI7698196 support two different sensors:

Connector 1: pH, pH/ORP  
Connector 2: D.O.



For a correct installation:

- Grease the sensor O-Ring with the lubricant found in the probe maintenance kit. **DO NOT SUBSTITUTE** other grease/lubricants as it may cause the O-Ring to swell.
- Insert the sensor into the correctly color coded opening while positioning the connector key toward the center of the probe. Make sure the connector is seated correctly (the sensor will no longer move freely) before tightening the locking threads with your fingers.
- Continue to tighten the locking threads with the tool supplied in the maintenance kit until the sensor is secured tightly against the probe body.
- To protect the sensors, screw the protective shield onto the probe body.
- With the meter off, connect the probe to the DIN socket on the bottom of the meter. Align the pins and key then push the plug into the socket. Secure the probe by attaching the carabinier of the probe to the meter piston.
- Turn on the meter by pressing the **On/OFF** key. The meter should automatically recognize the installed sensors and identify them on the probe status screen. If you have an error message or the sensor is not recognized, reconnect the sensor(s) or probe and try again.

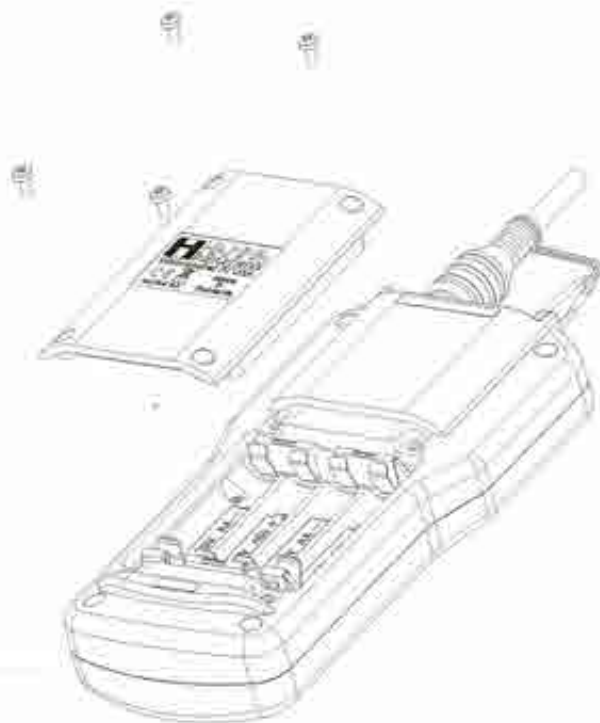




## Chapter 5 - INITIALIZATION AND MEASUREMENT

HI9819X are supplied with 4 alkaline, size AA batteries.

The battery symbol on the LCD indicates the remaining battery life. The meter has a low battery warning, and when the symbol starts blinking, batteries should be replaced with new ones. When the batteries are discharged the meter will automatically shut off to avoid erroneous readings.



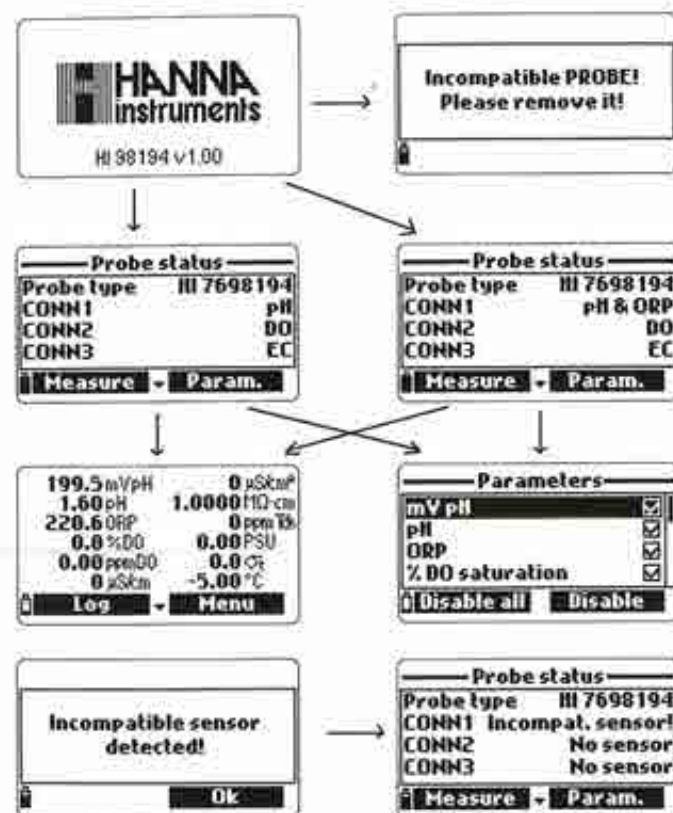
Replace batteries in safe areas only.  
Remove the 4 screws on the rear of the instrument and insert the batteries observing polarity.

*Note: Do not mix old and new alkaline batteries.*

After connecting the desired sensors to the probe and connecting the probe to the meter (see previous chapter), turn the meter on by pressing **On/Off** key.

After the initialization has been completed if the probe is connected, the meter displays the **PROBE STATUS SCREEN**. The probe status screen identifies the probe and attached sensors. If an incompatible probe was connected the following message appears and the probe has to be replaced. The compatible meter-probe pairs are: **HI98194 - HI7698194; HI98195 - HI7698195; HI98196 - HI7698196.**

If an incompatible sensor was connected to the probe, "Incompat. sensor!" will be displayed according to the respective connector. If the sensor was placed in a wrong connector, "Wrong input" will be displayed for that connector.

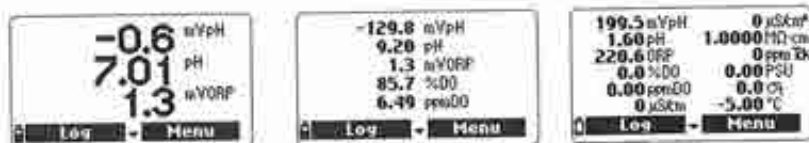


Two active soft keys are found at the bottom of the status screen.

- Press **Measure** to access the measurement mode.
- Press **Param** to access the "Select Parameter" menu.  
(This screen can also be accessed from the main menu, see **Chapter 6** for a detailed description.)
- Press the **DOWN** arrow to view additional information about the probe.

Measurement mode is one of the three main operating modes of **HI9819X** (along with logging mode and setup mode). During measurement mode **HI9819X** will simultaneously measure data for all enabled parameters.

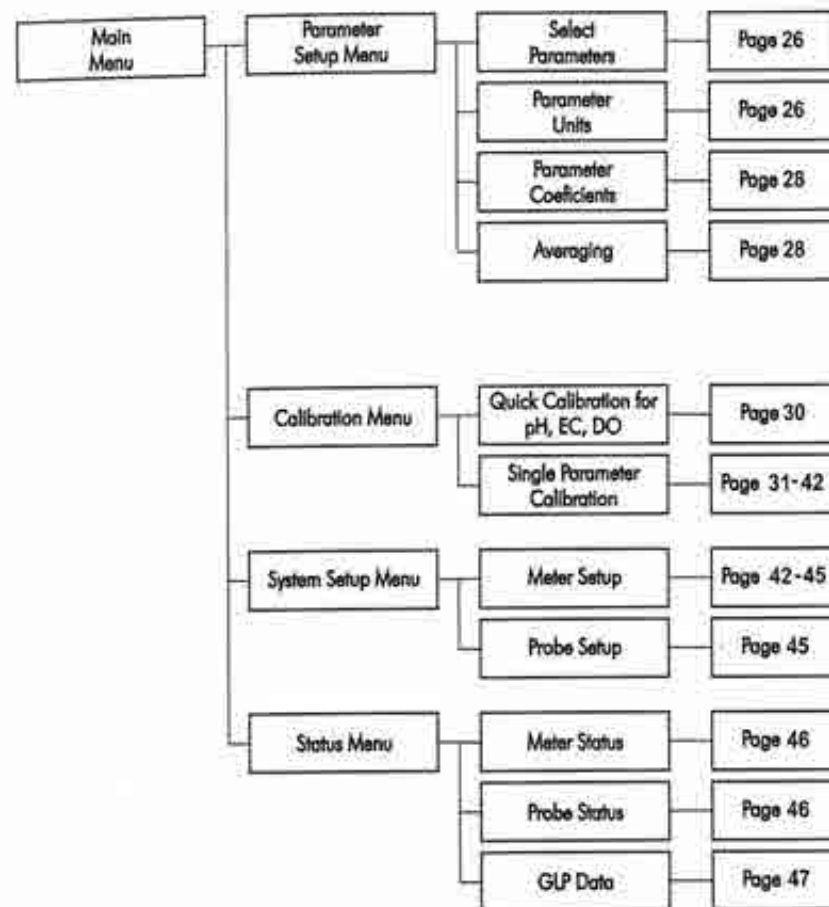
- Use the numbers on the keyboard to select the number of parameters that are shown on the screen at one time. The display will automatically resize the font.



- Press the **▲/▼** keys to scroll through the enabled parameters if they do not fit on one screen.

*Notes: A flashing measurement value indicates that the measurement is out of range.  
A flashing measurement unit indicates that the user calibration has not been done and is needed for accurate readings.*

- Press **Log** to enter the log menu. See **Chapter 11** for details.
- Press **Menu** to enter the main setup menu. The main menu accesses the parameter setup, calibration, system setup and status options. See the following chapters for details.





## Chapter 6 - PARAMETER SETUP MENU

From the main menu, use the  $\blacktriangle/\blacktriangledown$  keys to highlight **Parameter Setup** and then press **Select**.

The following options will be displayed:

Warning: Logged data saved on this meter will be changed to selected parameter units or coefficients.



Use the  $\blacktriangle/\blacktriangledown$  keys to scroll through the menu. Press the right softkey to enable or disable a single parameter, or the left softkey to enable or disable all parameters. A checked box means that the parameter is enabled.

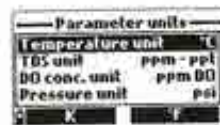


Only the available parameters are present in the list.

*Note: If the password protection is enabled, you will be required to enter the password before any parameters can be modified.*

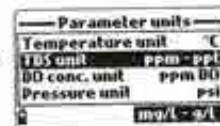
### Temperature Unit

The user can select the measurement unit: °C, °F or K. The default value is °C.



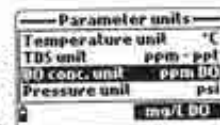
### TDS Unit (HI98194, HI98195 only)

The user can select ppm - ppt or mg/L - g/L measurement unit. The default value is ppm - ppt.



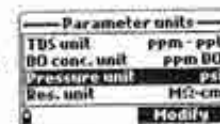
### D.O. Concentration Unit (HI98194, HI98196 only)

The user can select ppm or mg/L. Dissolved Oxygen concentration is calculated using % saturation, conductivity (HI98194) or salinity constant (HI98196) and atmospheric pressure. The default value is ppm.



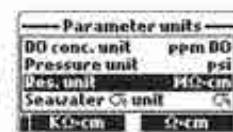
### Pressure Unit

The user can select one of the following measurement units: psi, mmHg, inHg, mbar, atm, kPa. The default value is psi.



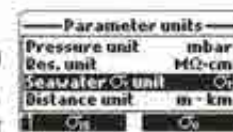
### Resistivity Unit (HI98194, HI98195 only)

The user can select resistivity from one of the following measurement units:  $\Omega$ -cm, k $\Omega$ -cm or M $\Omega$ -cm. Resistivity is calculated from the conductivity measurement. The default unit is M $\Omega$ -cm.



### Seawater Sigma Unit (HI98194, HI98195 only)

This parameter is used for seawater analysis. It is calculated from the conductivity measurement and depends on water pressure, temperature and salinity. The default value is  $\sigma_t$ . Users can select the reference temperature:  $\sigma_t$ ,  $\sigma_{15}$  and  $\sigma_{25}$  (i.e. current temperature, 0 °C or 15 °C).



### EC Resolution Unit (HI98194, HI98195 only)

The user can configure the conductivity resolution with one of the following options:

**Auto:** the meter automatically chooses the range to optimize the measurement. Readings can be in  $\mu$ S/cm or mS/cm.

**Auto mS/cm:** the meter automatically chooses the range to optimize the measurement, readings will be in mS/cm only.

**1 $\mu$ S/cm, 0.001 mS/cm, 0.01 mS/cm, 0.1 mS/cm or 1 mS/cm:** the meter will not autorange, the measurement will be displayed with the selected resolution. The default value is Auto.



### Absolute EC Resolution Unit (HI98194, HI98195 only)

Absolute conductivity displays the conductivity without temperature compensation. See EC resolution for resolution details.

*Note: A small letter "A" added to the  $\mu$ S/cm or mS/cm unit refers to an absolute conductivity value (i.e. a conductivity reading with no temperature compensation).*

### TDS Resolution Unit (HI98194, HI98195 only)

The user can configure the TDS resolution with one of the following options:

**Auto:** the meter automatically chooses the range to optimize the measurement, readings can be in ppt or ppm.

**Auto ppt:** the meter automatically chooses the range to optimize the measurement, readings will be in ppt only.

**1 ppm, 0.001 ppt, 0.01 ppt, 0.1 ppt or 1 ppt:** the meter will display the measurement with selected resolution. The default value is Auto.



**EC Reference Temperature (HI98194, HI98195 only)**

This value is used for temperature compensated conductivity. All EC measurements will be referenced to the conductivity of a sample at this temperature. Press the softkey to select the desired option; 20 °C or at 25 °C. The default value is 25 °C.

Parameter coefficients	
EC ref. temp.	25 °C
EC temp. coeff.	1.90 %/°C
TDS factor	0.50
20 °C	

**EC Temperature Coefficient (HI98194, HI98195 only)**

The temperature coefficient Beta ( $\beta$ ) is defined by the following equation (using 25 °C as an example):  $EC_{25} = EC / (1 + \beta(T - 25))$ . Beta is a function of the solution being measured. For freshwater samples Beta is approximately 1.90%/°C. If the actual temperature coefficient of your sample is known, press **Modify** to enter the value.

To confirm press **Accept**. The value can be within 0.00 and 6.00%/°C. The default value is 1.90%/°C.

Parameter coefficients	
EC ref. temp.	25 °C
EC temp. coeff.	1.90 %/°C
TDS factor	0.50
Modify	

**TDS Factor (HI98194, HI98195 only)**

TDS stands for total dissolved solids, and it is a calculated value based on the conductivity of the solution ( $TDS = \text{factor} \times EC_{25}$ ). The TDS conversion factor can be set from 0.00 to 1.00. A typical TDS factor for strong ionic solutions is 0.50, while for weak ionic solutions (e.g. fertilizers) is 0.70.

Press **Modify** to enter the value, press **Accept** to confirm. The default value is 0.50.

TDS factor	
0.50	
0.00...1.00	
Accept	

**Salinity (HI98196 only)**

This value is used to calculate the D.O. concentration where the EC sensor is not available for the meter. To set the value, press **Modify** and enter the desired value between 00.00 to 70.00 PSU. Press **Accept** to save the modification.

Salinity	
30.00	
00.00...70.00 PSU	
Accept	

**Averaging**

Averaging is a software filter to minimize sensor noise and provide more stable readings. Averaging is particularly useful to get a representative reading of the "average" value from flowing water. Averaging will affect all measurements.

Parameter setup	
Select parameters	
Parameter units	
Parameter coefficients	
Averaging	1 sample(s)
Modify	

This value should be kept low if you want a fast response. Press **Modify** to select the desired number of samples to average. This value can be set from 1 to 20 samples. The default value is 1.

*Note: Each reading takes 1 second, so when logging the first sample will be delayed by a few seconds if averaging is used.*

Averaging	
01	
01...20 sample(s)	
Accept	

**Chapter 7 - CALIBRATION MODE**

HI9819X's calibration routines are accessed by highlighting "Calibration" and pressing **Select** from the main menu. Calibration is the process that standardizes the electrical signal from the sensors to reagent standards of known value.

Calibrations are intuitive and menu driven. All calibration data is stored in the non volatile probe memory, allowing probes to be connected to different meters without recalibration. There are two types of calibrations available: the "Quick calibration", which is used for a single point calibration of pH, conductivity, and/or dissolved oxygen and is handy for field work; and the **Single param. calibration** that allows each parameter to be calibrated individually. The user may also restore each parameter to a factory default calibration.

*Note: The password will be required if password protection is enabled.*

To optimize measurements, it is advisable to establish the optimum calibration period required for the measurement environment. Calibration requirements vary with deployment conditions, for example very turbid biologically-active waters may require more frequent cleanings and calibrations than cleaner waters. General calibration guidelines are listed below:

- Set up a routine service schedule where measurement integrity is validated. This is especially important for new installation sites or long deployments.
- Inspect sensor connectors for corrosion and replace damaged sensors.
- Inspect sensor O-Rings for damage and if necessary replace and lubricate with the grease found in the probe maintenance kit.
- Do not handle the sensing surfaces of the sensors.
- Avoid rough handling and abrasive environments that can scratch the reactive surfaces of the sensors.
- Avoid long-term exposure of sensors to bright sunlight. If possible, calibrate in a shaded area.
- Discard standards after use. Do not return the used standards to the bottles of "fresh" solution.
- For measurements across a temperature gradient (when water temperature is drastically different from the standards), permit the sensors to reach thermal equilibrium before conducting calibrations or making measurements. The heat capacity of the probe is much greater than the air and the small beakers of calibration standards.

Menu	
Parameter setup	
Calibration	
System setup	
Status	
Select	