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Conductivity/TDS Meters Introduction

Definition of Conductivity

Electrolytic conductivity, abbreviated as EC, is a measurement made in which electrical charges on atomic or larger sized particles in a medium are moved under the influence of a potential difference. EC is a measure of concentration however it is non-specific for ion type. An ion is a charged particle present in the solution that contributes to the current flow. Ions are formed when a salt such as sodium chloride is dissolved in water to form particles having electrical charges. Sodium chloride for example, separates into Na^+ and Cl^-. This is a simplified definition for the measurement is affected by many things such as the type of ionic compound(s) dissolved in the water; the ions mobility, the solution viscosity, temperature as well as concentration.

Electrical conductance, the ability of a substance to conduct an electrical current is the reciprocal of electrical resistance. "Conductance" and "resistance" depend on the geometrical dimensions of the substance being measured. Conductivity and resistivity are "normalized" terms that are used to denote a bulk intrinsic property of a substance. This is the measurement a standardized EC probe on a conductivity or resistivity meter provides. Conductivity measurements can be used to provide additional industry specific measurements; TDS, Salinity and USP compliant conductivity. Many of Hanna's meters provide these measurements also.

Units of Measurement

Electrical Resistivity ρ (Greek rho), also called Specific Resistance (1cm cube) uses units of Ohm.cm. For example, ultrapure water is said to have a value of 18.16 Mohm.cm.at 25°C.

Electrical Conductivity σ (Greek sigma and other symbols used also, is the reciprocal of resistivity and uses units of Siemens/cm (S/cm, mS/cm, µS/cm, dS/m). For example, ultrapure water is said to have a conductivity of: .055µS/cm at 25°C.

The IUPAC convension

1000 microSiemens/cm (µS/cm) = 1.0 milliSiemen/cm (mS/cm).

Note: Prior to 1971 mho/cm was the unit used for conductivity. This unit can still be found in some older literature.

Conductivity versus Resistivity

Although conductivity and resistivity are reciprocal units that may be converted easily, convention uses resistivity for very low electrolyte concentrations or trace contaminants i.e. ultrapure water, and conductivity for expressing meaningful salt levels i.e. seawater; electroplating baths, acid concentrations. Electrode style and measurement techniques also contribute to success in making conductivity or resistivity measurements reliably. Conductivity measurements can be used to provide useful industry specific measurements such as TDS, Salinity and USP compliant conductivity and many of Hanna's conductivity meters provide the computing power to provide these measurements automatically.

TDS

TDS (total dissolved solids), is a method used to determine solid content in a solution. To determine TDS, the solution whose volume is known is evaporated and the residue weighed. A conductivity measurement is commonly used to estimate TDS (Total Dissolved Solids) based on the assumption the solids are predominately ionic in nature and the relationship between the dissolved ions and conductivity is known. TDS uses units of mg/L (ppm), or g/L. On some meters the user can input the TDS factor for the conversion. On more basic units the factor is automatically set to 0.50 A typical

TDS factor for strong ionic solutions is 0.5, while for weak ionic solutions (e.g. fertilizers) is 0.7.

TDS = factor x EC_{25}

For example: 100µS/cm conductivity is a TDS of 50ppm when the factor is 0.5.

Conductivity/Resistivity/TDS of Commonly Measured Substances

Sample at 25°C	MΩ•cm	µS/cm	mS/cm	TDS
Ultrapure Water	18.16	.055		
Power Plant Boiler Water	1.0	1.0		0.5 ppm
Drinking Water		500-800	0.5 to 0.8	250 to 400 ppm
Ocean Water		53000	53.0	9.24 g/L
1M NaCl		85000	85.0	42.5 g/L
5% NaOH		223000	223	
50% NaOH		150000	150	
1M HCl		332000	332	
10% HCl		700000	700	
32% HCl		700000	700	
31% HNO_3		865000	865	

Salinity

Conductivity measurements can be used for determining salinity as it relates to general oceanographic

use. Three measurement scales are in use and depending on the sophistication of the meter, are available for salinity measurement in Seawater. The 3 scales are Practical Salinity Scale (PSU); 1978, Percent Scale (%);and Natural Seawater Scale(g/L); 1966.

Practical salinity and the Natural Seawater require a conductivity calibration. The meters have the algorithms to convert the measurement to the desired scale. NaCl % requires a calibration in HI70371 standard. Portable meters with this measurement make it easy to measure salinity in salt water aquariums and brackish waters.

Conductivity and Temperature

Conductivity changes with ion concentration and with temperature. For example, a standard potassium chloride solution used for calibration of a cell constant and conductivity bridge, changes conductivity as tabulated at right.

Conductivity 0.01m KCl	
°C	uS/cm
21	1305
22	1332
23	1359
24	1386
25	1413
26	1441
27	1468
28	1496

Having two variables changing would make it near impossible to take useful conductivity measurements. If the temperature was held constant, the conductivity measurement would only have the variable of ion concentration. Absolute conductivity is a conductivity measurement without temperature compensation. If the conductivity change with temperature change of a solution is a known characteristic, the Conductivity measurements can be corrected to a reference temperature (typically 20 or 25°C) by carefully measuring the solution temperature. Fortunately, Hanna EC sensors incorporate an integral temperature sensor to measure solution temperature. Compensation corrects the measured conductivity to a reference temperature by applying a fixed factor β for linear compensation. High end meters allow adjustment of β to compensate for various solutions and permit adjustment of a reference temperature over a wider range of temperatures. β for neutral salts is typically between 1.5 to 2.2%/°C.

$$EC_{25} = \frac{EC_x}{(1 + \beta_{25}(T_x - 25))}$$

Typical Temperature Coefficients of Various Solutions

Sample	Percent / °C	Sample	Percent / °C
Ultrapure Water	4.55	10% HCl	1.32
NaCl	2.12	5% H_2SO_4	0.96
5% NaOH	1.72	98% H_2SO_4	2.84

Non- linear temperature compensation for Natural waters is found some high end bench meters.

(USP) United States Pharmacopeia Compliant Conductivity

Conductivity measurements are used for the preparation of pharmaceutical water for injection (WFI) worldwide. Hanna EC probes and meters can permit you to meet USP<645> Water Conductivity Requirements and European Pharmacopoeia 2.2.38 Conductivity Test for USP & EP Purified Water and Water for Injection. USP<645> with three stage compliance uses conductivity as a basis of ionic contaminants. Factors such as accuracy, resolution, cell constant certainty and ability to measure absolute conductivity are required. Stage 1 uses in-line conductivity measurements for compliance and a temperature/conductivity limit for compliance. Water that does not pass the Stage 1 limits must then be tested to Stage 2 requirements. This is a laboratory based technique that is streamlined using our meters with USP application firmware. They offer programmable set points to exceed the minimum meet USP and EP requirements and prompts to guide the technician. Water that does not pass at Stage 2 must be tested for pH.

Using Hanna conductivity will help to meet the goals of the USP Purified Water and WFI requirements that include improved water quality, improved equipment reliability and reduction in the number of required tests.

Conductivity Calibration

Conductivity standards are salt solutions for which the conductivity and temperature dependence are known. A well-defined relationship between Potassium Chloride concentration and electrolytic conductivity exists so KCl solutions are typically used as standards. A standard is used to determine the cell constant, in theory a defined geometric constant volume. Standards of 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, or 12.88 mS/cm, 80 mS/cm and 111.8 mS/cm are manufactured by Hanna. Calibration is conducted with a value close to the samples conductivity. If the exact cell constant is known, some meters permit the manual input of the factor. This ensures maximum flexibility and measurement accuracy. Our research grade bench meters allow several points values to be calibrated for improved accuracy over a wider measurement range.

Types of Conductivity

Three types of conductivity probes are manufactured by Hanna, The simplest design is a 2-Electrode Probe that utilizes an amperometric approach to make the measurement; a known AC voltage is applied at a specific frequency between a pair of electrodes in solution. The current produced is measured and reported in conductivity units referenced to a calibrated standard. Electrodes are made of graphite or metal. Fouling due mineral deposits and polarization at high concentration are drawbacks of this technology. Two electrodes probes are best used in clean water applications when conductivities remain less than 5 mS/cm.

Four electrode conductivity (four-ring conductivity) utilizes a potentionmetric approach to make the measurement; an alternating current is applied to the outer two "drive" electrodes to induce a current in the solution. The voltage is measured between the inner pair of electrodes in solution. The voltage is proportional the conductivity This technology extends the linear range of measurement over three decades. Electrodes are made of graphite, stainless steel or Platinum. Polarization effects are reduced.

Both two and four electrode probes may incorporate a outer sleeve over the cell channel. The sleeve must stay in place during the measurement as this defines the volume of solution measured and the cell factor of the probe.

The third type of conductivity probe manufactured by Hanna is often found in industrial processes connected to a controller. An Inductive, Electrodeless or Toroidal conductivity probe uses two or more toroidal transformers which are inductively coupled side by side and encased in an inert plastic sheath. By applying a high frequency voltage to the drive toroid, a magnetic field develops that induces a current in the surrounding solution. A receiver toroid on the other side of the sensor measures the strength of the induced current. The strength depends on the conductivity of the solution. The benefits of this technology are no polarization effects, choice of material encapsulation can produce chemical resistant and relative immunity to fouling, and solutions are not needed for calibration.

Product Spotlights

edge®EC

edge EC is thin and lightweight, measuring just 1/2" thick and weighing less than 9 ounces. edge EC has an incredibly wide viewing angle, 5.5" LCD and a sensitive capacitive touch keypad.

edge EC measures conductivity through its unique digital conductivity probes that connect with an easy to plug-in 3.5mm connector. edge EC's versatile design is equally at home in your hand, on a lab bench or mounted on a wall. edge EC simplifies measurement, configuration, calibration, diagnostics, logging and transferring data to a computer or a USB drive.

See page 5.10

HI5321

Research Grade EC/ TDS/ Resistivity/Salinity and Temperature Meter with USP <645>

The HI5321 is a research-grade EC/Resistivity/TDS/Salinity benchtop meter with a large, color, graphic LCD, capacitive touch keypad and an extended range from 0.001 µS/cm to 1 S/cm.

The HI5321 can be used for conductivity measurement for USP <645> compliant stages 1 and 2 testing for water for injection (WFI). The instrument provides clear directions on how to perform each testing step and automatically monitors the temperature, conductivity and stability during testing and determines whether a sample is within USP limits.

See page 5.14

HI98192

Graphic Display EC/ Resistivity/TDS/NaCl Meter

The HI98192 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.001 µS/cm to 400 mS/cm, as well as TDS, resistivity and three salinity scales. This meter automatically recognizes the probe type (two or four ring) and allows the user to adjust the nominal cell constant. The HI98192 is also ready to perform required conductivity measurements for USP <645> method compliance for water for injection (WFI).

This new meter features a 50% smaller body and is 33% lighter than previous models.

See page 5.19

Benchtop Meters

	EC Range	pH Range	ISE Range	DO Range	Resistivity Range	ORP Range	TDS Range	Salinity Range	Temperature Range(s)	EC Calibration Points	EC Calibration Solutions	ATC (Automatic Temperature Compensation)	Logging	GLP	Capacitive Touch Buttons	Auto End Feature	PC Connectivity	AutoRanging	Benchtop, Portable & Wall-Mount	Page
edge®	•	•*		•*			•	•	°C/°F	1	6	•	•	•	•		•	•	•	5.6
edge EC	•						•	•	°C/°F	1	6	•	•	•	•		•	•	•	5.10
HI5321	•				•		•	•	°C/°F K	4	†	•	•	•	•	•	•	•		5.14
HI2300	•						•		°C	1	6	•		•			•	•		5.16
HI2315	•									1		•								5.18

† auto standard recognition, custom calibration solution
* Using compatible pH or DO probes respectively

Portable Meters

	EC Range	pH Range	Resistivity Range	ORP Range	TDS Range	Salinity Range	Temperature Range(s)	EC Calibration Points	EC Calibration Solutions	ATC (Automatic Temperature Compensation)	BEPS	Logging	GLP	HOLD Feature	PC Connectivity	AutoRanging	AutoEnd	Waterproof	Flow Cell for WFI Applications	Page
HI98192	•		•		•	•	°C	5	7	•	•	•	•		•	•	•	•		5.19
HI98197	•		•		•	•	°C	5	7	•	•	•	•		•	•	•	•	•	5.22
HI9835	•				•	•	°C/°F	1	6	•	•		•			•	•			5.26
HI99300	•				•		°C/°F	1	1	•	•			•				•		5.27
HI99301	•				•		°C/°F	1	1	•	•			•				•		5.27
HI993310	•							1		•	•									5.28
HI9033	•							1		•	•							•		5.29
HI8633	•							1		•								•		5.30
HI8733	•							1		•								•		5.30
HI87314	•		•					1		•										5.31
HI8734					•													•		5.32
HI8033	•				•			1												5.33

edge®

pH • EC • DO

The world's most innovative pH, EC and DO meter

edge's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. The edge is rich in features to accommodate the needs of a vast amount of customers. For those that prefer very simplistic operation there is a basic mode operation with simplified menu and options while for those who require advanced features there is the full featured standard operating mode. edge is available as a pH, conductivity or dissolved oxygen kit and any edge kit can be upgraded with additional probes to measure pH, conductivity and dissolved oxygen.

edge® technical features

Rechargeable Battery

edge has a built in rechargeable battery that is charged when the meter is in the plugged in benchtop or wall mount cradle. The battery can also be recharged through the micro USB port with either a USB port from a computer or directly to the power supply.

Two USB ports

edge includes one standard USB for exporting data to a flash drive. edge also includes one micro USB port for exporting files to your computer as well as for charging when the cradle is not available.

Clear, full text readout

edge features clear, full text guides displayed on the bottom of the screen. There is no need to decipher scrambled abbreviations or symbols; these helpful messages guide you through every process quickly and easily.

Data logging

edge allows you to store up to 1000 log records of data. Data sets include readings, GLP data, date and time.

* Using edge compatible pH electrodes

GLP

Data of the last calibration you perform is stored in the sensor including the date, time, and buffers used. When the sensor is connected to edge, GLP data is automatically transferred.

Two Operating Modes

edge can be used in Extended or Basic Operating Modes. Extended Mode enables all edge features while Basic Mode reduces features–ideal for routine measurements by displaying a simplified screen and features.

edge pH Features*

CAL Check™ (pH only)

Hanna's exclusive CAL Check feature analyzes the pH electrode response in the pH buffers during the calibration process to alert the user of potential problems such as a contaminated buffer or dirty electrode. After calibration, indicators for probe condition are displayed on the measurement screen. The probe condition is based on offset and slope characteristics of the pH electrode.

Sensor Check™ (pH only)

When used with Hanna's electrodes equipped with a matching pin, edge constantly checks the impedance of the pH measuring electrode to notify you in real time in the event of glass breakage. During calibration, Sensor Check checks the state of the junction. The reference junction is also evaluated and reported on the display.

ORP Measurement

edge measures ORP with edge compatible ORP probes.

edge design features

Capacitive touch keypad

edge features sensitive capacitive touch buttons for accurate keystrokes when navigating edge's menus and screens. Since they are part of the screen, the buttons can never get clogged with sample residue.

Easy to read LCD

edge features a 5.5" (14 cm) LCD display that you can clearly view from over 5 m (16.4'). The large display, with its wide 150° viewing angle, provides one of the easiest to read LCDs in the industry.

Zero footprint

Using the wall mount cradle (included), edge can be placed on a wall, leaving zero footprint on the benchtop space. The cradle has a built-in connector to power and charge the batteries.

Hybrid meters that can be used in portable, wall-mount and benchtop configurations

The versatile design of edge® enables it to be used as a portable, wall-mount or benchtop meter. edge simplifies measurement, configuration, calibration, diagnostics, logging and transferring data directly to a computer or USB drive.

Portable field unit

edge is ideal for field use due to its light weight, large screen, and thin design. It can easily be slipped into a backpack or messenger bag. The battery life lasts up to 8 hours when used as a portable device.

Wall-mount cradle

The included wall-mount cradle makes it easy to conserve space on the benchtop while also charging edge with the AC adapter. The cradle is ideal for continuous monitoring applications.

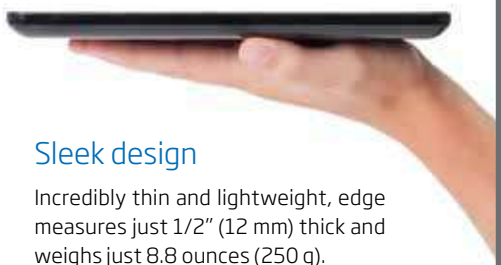
Electrode holder with built-in cradle

The electrode holder features a swivel, adjustable arm with a built-in cradle to hold edge securely in place at the optimum viewing angle.

Digital electrodes

edge® measures pH, conductivity and dissolved oxygen through its unique digital electrodes. These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge by an easy to plug-in 3.5mm connector.

- Simply connect each probe via the 3.5 mm jack, Digital Smart Electrodes are automatically recognized
- Digital four-ring conductivity probe
  - Covers all ranges from 0.00 µS/cm to 500 mS/cm (absolute EC)
- Accuracy
  - ± 1% of the reading (±0.05 µS/cm or 1 digit, whichever is greater)
- Calibration
  - Offset (0 µS/cm) and cell factor calibration
  - Choice of five standards (auto-recognition)
- Data logging
  - Manual log-on-demand
  - Manual log-on-stability
  - Interval logging
- Auto-ranging or manual range selection
- EC, TDS and salinity reading modes
- Temperature compensation
  - Automatic
  - NoTC (absolute)
- GLP data
  - Records date, time, offset and cell factor
  - Data of the last performed calibration is stored in the probe: date, time, cell constant, temperature coefficient, reference temperature and battery status. When the probe is connected to edge®EC , GLP data is automatically transferred
- Adjustable EC to TDS conversion factor
- Adjustable temperature correction coefficient
- Seawater salinity units
  - % NaCl
  - PSU
  - g/L



Sleek design

Incredibly thin and lightweight, edge measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

All edge compatible pH, EC and dissolved oxygen digital probes are interchangeable with edge.

Specifications		HI2030 edge
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm absolute EC**
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% of reading (±0.05 µS/cm or 1 digit, whichever is greater)
	Calibration	single cell factor calibration; six standards available: 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm, one point offset: 0.00 µS/cm
	Temperature Coefficient	0.00 to 6.00%/°C (for EC and TDS only), default value is 1.90%/°C
TDS	Range	0.00 to 14.99 mg/L (ppm); 15.0 to 149.9 mg/L (ppm); 150 to 1499 mg/L (ppm); 1.50 to 14.99 g/L; 15.0 to 100.0 g/L; up to 400.0 g/L absolute TDS using 0.80 conversion factor**
	Resolution	0.01 mg/L (ppm); 0.1 mg/L (ppm); 1 (ppm); 0.01 g/L; 0.1 g/L
	Accuracy (@25°C/77°F)	±1% of reading (±0.03 ppm or 1 digit, whichever is greater)
	Calibration	through EC calibration
	TDS Factor	0.40 to 0.80 (default value is 0.50)
Salinity†	Range	0.0 to 400.0 % NaCl; 2.00 to 42.00 PSU; 0.0 to 80.0 g/L
	Resolution	0.1 % NaCl; 0.01 PSU; 0.01 g/L
	Accuracy (@25°C/77°F)	±1% of reading
	Calibration	PSU and g/L through EC calibration; % NaCl – one-point with HI7037 sea water standard
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe (included in EC kit)	HI763100 digital four-ring conductivity probe with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions / Weight	202 x 140 x 12 mm (7.9" x 5.5" x 0.5") / 250 g (8.82 oz.)
Ordering Information	**HI2030-01** (115V) and **HI2030-02** (230V) EC kit also includes: HI763100 Conductivity probe, 1413 µS/cm conductivity standard sachets (4), 12880 µS/cm conductivity standard sachets (2), 5000 µS/cm conductivity standard sachets (2), and electrode rinse solution sachets (2). All edge compatible pH, EC and DO digital probes are interchangeable with HI2030 and can be ordered separately.	

* temperature limits will be reduced to actual probe limits ** with temperature compensation function disabled
† standard mode only

EC, TDS and Salinity solutions begin on page 5.34

edge® EC

edge®EC–Innovation in a Single Parameter

edge EC's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. edge EC is a single meter that can measure EC, TDS, and salinity..

Additional feature information

- Digital four-ring conductivity probe
  - Covers all ranges from 0.00 µS/cm to 500 mS/cm (absolute EC)
- Accuracy
  - ± 1% of the reading (±0.05 µS/cm or 1 digit, whichever is greater)
- Calibration
  - Offset (0 µS/cm) and cell factor calibration
  - Choice of 5 standards (auto-recognition)
- Data logging
  - Manual log-on-demand
  - Manual log-on-stability
  - Interval logging
- GLP data
  - Records date, time, offset and cell factor
  - Data of the last performed calibration is stored in the probe: date, time, cell constant, temperature coefficient, reference temperature and battery status. When the probe is connected to edge®EC, GLP data is automatically transferred
- Auto-ranging or manual range selection
- EC, TDS and salinity reading modes
- Temperature compensation
  - Automatic
  - NoTC (absolute)
- Adjustable EC to TDS conversion factor
- Adjustable temperature correction coefficient
- Seawater salinity units
  - % NaCl
  - PSU
  - g/L

edge®EC technical features

Rechargeable Battery

edge EC has a built in rechargeable battery that is charged when the meter is in the plugged in benchtop or wall mount cradle. The battery can also be recharged through the micro USB port with either a USB port from a computer or directly to the power supply.

Two USB ports

edge EC includes one standard USB for exporting data to a flash drive. edge EC also includes one micro USB port for exporting files to your computer as well as for charging when the cradle is not available.

Clear, full text readout

edge features clear, full text guides displayed on the bottom of the screen. There is no need to decipher scrambled abbreviations or symbols; these helpful messages guide you through every process quickly and easily.

Data logging

edge EC allows you to store up to 1000 log records of data. Logging data sets include readings, GLP data, date and time.

GLP

Data of the last calibration you perform is stored in the sensor including the date, time, and buffers used. When the sensor is connected to edge EC, GLP data is automatically transferred.

Two Operating Modes

edge EC can be used in Extended or Basic Operating Modes. Extended Mode enables all edge features while Basic Mode reduces features–ideal for routine measurements by displaying a simplified screen and features.

edge EC design features

Capacitive touch keypad

edge EC features sensitive capacitive touch buttons for accurate keystrokes when navigating edge's menus and screens. Since they are part of the screen, the buttons can never get clogged with sample residue.

Easy to read LCD

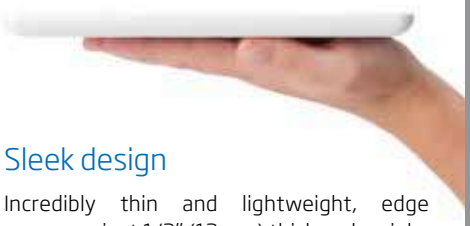
edge EC features a 5.5" (14 cm) LCD display that you can clearly view from over 5 m (16.4'). The large display, with its wide 150° viewing angle, provides one of the easiest to read LCDs in the industry.

Zero footprint

Using the wall mount cradle (included), edge EC can be placed on a wall, leaving zero footprint on the benchtop space. The cradle has a built-in connector to power and charge the batteries.

3.5 mm probe input

Plugging an electrode in has never been simpler; no alignments or broken pins, simply connect the 3.5 mm plug and begin. Digital electrodes are automatically recognized.



Sleek design

Incredibly thin and lightweight, edge measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

Accepts edge EC compatible conductivity probe

A hybrid meter that can be used in portable, wall-mount and benchtop configurations

The versatile design of edge®EC enables it to be used as a portable, wall-mount or benchtop meter. edge EC simplifies measurement, configuration, calibration, diagnostics, logging and transferring data directly to a computer or USB drive.

Portable field unit

edge EC is ideal for field use due to its light weight, large screen, and thin design. It can easily be slipped into a backpack or messenger bag. The battery life lasts up to 8 hours when used as a portable device.

Wall-mount cradle

The included wall-mount cradle makes it easy to conserve space on the benchtop while also charging edge EC with the AC adapter. The cradle is ideal for continuous monitoring applications.

Electrode holder with built-in cradle

The electrode holder features a swivel, adjustable arm with a built-in cradle to hold edge EC securely in place at the optimum viewing angle.

Digital electrodes

edge®EC performs measurements through its unique digital electrodes. These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge EC by an easy to plug-in 3.5 mm connector.

Conductivity probe

HI763100 (included)
Conductivity probe with temperature sensor
Recommended for general purpose

Specifications		HI2003 edge EC
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm absolute EC**
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% of reading (±0.05 µS/cm or 1 digit, whichever is greater)
	Calibration	single cell factor calibration; six standards available: 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm, one point offset: 0.00 µS/cm
	Temperature Coefficient	0.00 to 6.00%/°C (for EC and TDS only), default value is 1.90%/°C
TDS	Range	0.00 to 14.99 mg/L (ppm); 15.0 to 149.9 mg/L (ppm); 150 to 1499 mg/L (ppm); 1.50 to 14.99 g/L; 15.0 to 100.0 g/L; up to 400.0 g/L absolute TDS using 0.80 conversion factor**
	Resolution	0.01 mg/L (ppm); 0.1 mg/L (ppm); 1 (ppm); 0.01 g/L; 0.1 g/L
	Accuracy (@25°C/77°F)	±1% of reading (±0.03 ppm or 1 digit, whichever is greater)
	Calibration	through EC calibration
	TDS Factor	0.40 to 0.80 (default value is 0.50)
Salinity†	Range	0.0 to 400.0 % NaCl; 2.00 to 42.00 PSU; 0.0 to 80.0 g/L
	Resolution	0.1 % NaCl; 0.01 PSU; 0.01 g/L
	Accuracy (@25°C/77°F)	±1% of reading
	Calibration	PSU and g/L through EC calibration; % NaCl – one-point with HI7037 sea water standard
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe	HI763100 digital four-ring conductivity probe with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information		**HI2003-01** (115V) and **HI2003-02** (230V) edge EC includes: HI763100 Conductivity probe, 1413 µS/cm conductivity standard sachets (4), 12880 µS/cm conductivity standard sachets (2), 5000 µS/cm conductivity standard sachets (2), electrode rinse solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.

* temperature limits will be reduced to actual probe limits
** with temperature compensation function disabled
† standard mode only

EC, TDS and Salinity solutions begin on page 5.34

HI5321

Research Grade Conductivity/TDS Meter

EC/TDS/Resistivity/Salinity and Temperature with USP <645>

The HI5321 is an advanced research grade benchtop EC/TDS/Salinity/Resistivity meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity.

Customizable User Interface

The user interface of the HI5321 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

The HI5321 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing.

Capacitive Touch

The HI5321 features sensitive capacitive touch buttons for accurate keystrokes when navigating menus and screens.

Auto-ranging

The meter can be set to auto-ranging in which the meter chooses the appropriate conductivity range from seven ranges or fixed range in which the meter will only display reading in µS/cm or mS/cm.

Automatic Temperature Compensation

All readings are automatically compensated for temperature variations with a built in temperature sensor.

Calibration

The HI5321 can be calibrated up to four points with a choice of six pre-programmed conductivity standards or user defined custom standards. Resistivity, TDS, Practical Salinity (PSU) and Natural Seawater Scale are calibrated through conductivity. The % NaCl is calibrated to single point with the HI7037 salinity standard.

GLP Data

HI5321 includes a GLP Feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data include date, time, standards used for calibration.

Data Logging

Three selectable logging modes are available on the HI5321: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

Contextual Help

Contextual help is always available through a dedicated "HELP" key

Four-ring Conductivity Probe

All readings are performed with the HI76312 four-ring conductivity probe with a built in temperature sensor for automatic temperature correction. The four rings are made with platinum and the body of the electrode is made of Polyetherimide (PEI) plastic that is resistant to many harsh chemicals.

USP <645>

For the measurement of high purity water used in pharmaceutical manufacturing, the HI5321 is programmed with the first two stages of the USP <645> method. Once a stage is met a report is generated and can be saved. Up to 200 reports can be stored and transferred to a Windows® compatible computer using a USB cable and software (sold separately).

Specifications		HI5321
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm actual EC*
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Cell Constant	0.0500 to 200.00/cm
	Cell Type	4 cells
	Calibration	automatic standard recognition, user standard, single point / multi-point calibration
	EC Calibration Solution	84.00 µS/cm, 1.413 mS/cm, 5.000 mS/cm, 12.88 mS/cm, 80.00 mS/cm, 111.8 mS/cm
	Calibration Reminder	yes
	Temperature Coefficient	0.00 to 10.00 %/°C
	Temperature Compensation	disabled, linear and non-linear (natural water)
	Reference Temperature	5.0 to 30.0°C
	Profiles	up to 10
	USP Compliant	yes
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±2% of reading (±1 Ω•cm)
Salinity	Range	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%
	Resolution	0.01 for practical scale/natural sea water scale; 0.1% for percent scale
	Accuracy	±1% of reading
	Calibration	percent scale–one-point (with HI7037 standard); all others through EC
Temperature**	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
Additional Specifications	EC Probe	HI76312 platinum, four-ring EC/TDS probe with and 1 m (3.3') cable (included)
	GLP	cell constant, reference temperature/coefficient, calibration points, cal time stamp, probe offset for conductivity
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points; **interval:** 14 selectable between 1 second and 180 minutes; **type:** Automatic, Log on demand, AutoHold; **additional:** 200 records USP
	PC Connection	USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions / Weight	160 x 231 x 94 mm (6.3 x 9.1 x 3.7") / 1.2 kg (2.64 lbs.)
Ordering Information		**HI5321-01** (115V) and **HI5321-02** (230V) are supplied with HI76312 EC/TDS probe, 1413 µS/cm conductivity standard sachet (4), 12880 µS/cm conductivity standard sachet (2), 5000 µS/cm conductivity standard sachet (2), electrode rinse solution sachet (2), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

(*) Uncompensated conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
(**) Reduced to actual probe limits

EC, TDS and Salinity solutions begin on page 5.34

HI2300

Autoranging Bench Meter

EC, TDS, Salinity and Temperature

The HI2300 is a durable benchtop EC/TDS/Salinity and temperature meter that features a four-ring potentiometric probe, one-point calibration, and a USB port for computer connectivity. The meter is autoranging to choose the appropriate conductivity and total dissolved solids (TDS) range, and can easily be switched to salinity mode to measure from 0.0 to 400.0% NaCl.

Four-ring EC Probe

The HI2300 meter is supplied with the HI76310 platinum, four-ring EC/TDS probe with a built-in temperature sensor that operates over a wide range from 0.00 µS/cm to 500.0 mS/cm*.

Calibration

EC and TDS are calibrated at one point with a choice of six pre-programmed standards. Salinity is calibrated at one point using the HI7037 100% NaCl standard solution.

Temperature Compensation

Temperature can be compensated for automatically (ATC) or manually (MTC) from -20.0 to 120.0°C, or it can be disabled for actual conductivity or TDS measurements. The temperature correction coefficient, also referred to as β, is adjustable from 0.00 to 6.00 %/°C.

Adjustable TDS Factor

The factor that relates conductivity to total dissolved solids is based on the type of sample being measured. For users to get an accurate determination of TDS based on their unique solution, the TDS factor is adjustable from 0.40 to 0.80.

GLP Data

The calibration data including date, time, standards used, offset and cell constant can be accessed at any time along with the current measurement by selecting the Good Laboratory Practice (GLP) display option.

Data Logging

The log-on-demand feature allows up to 500 data points to be recorded and exported to a computer for data review and storage.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

On-screen Features

Last calibration date

Last calibration year

Last calibration time

Cell constant value (K)

Offset value

Specifications		HI2300
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm (actual EC)*
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading ± (0.05 µS/cm or 1 digit)
TDS	Range	0.00 to 14.99 mg/L (ppm); 15.0 to 149.9 mg/L (ppm); 150 to 1499 mg/L (ppm); 1.50 to 14.99 g/L (ppt); 15.0 to 100.0 g/L (ppt); up to 400.0 g/L (actual TDS)*, with 0.80 conversion factor
	Resolution	0.01 mg/L; 0.1 mg/L; 1 mg/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading ± (0.03 mg/L or 1 digit)
Salinity	Range	0.0 to 400.0% NaCl
	Resolution	0.1%
	Accuracy	±1% of reading
Temperature**	Range	-20.0 to 120.0°C
	Resolution	0.1°C
	Accuracy	±0.4°C
Additional Specifications	EC Calibration	automatic, one point with six memorized values (84, 1413, 5000, 12880, 80000, 111800 µS/cm)
	NaCl Calibration	one point, with HI7037 calibration solution (optional)
	Temperature Calibration	two point, at 0 and 50°C
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C, disabled
	Temperature Coefficient	selectable from 0.00 to 6.00%/°C (EC and TDS only)
	TDS Conversion Factor	selectable from 0.40 to 0.80 (default value: 0.50)
	Probe	HI76310 platinum, four ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable (included)
	PC Connectivity	opto-isolated USB
	Logging	log on demand, 500 samples
	Auto-off	after five minutes of non-use (can be disabled)
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	235 x 222 x 109 mm (9.2 x 8.7 x 4.3")
	Weight	1.3 kg (2.9 lbs.)
Ordering Information		**HI2300-01** (115V) and **HI2300-02** (230V) is supplied with HI76310 conductivity probe, 12 VDC adapter and instructions.

* with temperature compensation function disabled
(**) Reduced to actual sensor limits

EC, TDS and Salinity solutions begin on page 5.34

HI2315

Conductivity Meter

The HI2315 is a basic and affordable conductivity benchtop meter that comes with a four-ring potentiometric EC probe with a built-in temperature sensor. Operation of the meter is simplified to calibration, range selection, and adjustment of the temperature compensation coefficient.

EC calibration is made simple through the easy-to-operate front panel knobs for adjustment. A front knob is also provided to manually set the temperature compensation coefficient of EC from 0 to 2.5 %/°C.

Simple User Interface

Operation is simple with limited features that only require the use of a couple of buttons. Readings are easy to view on the large, clear display.

Calibration

Manual EC calibration can be performed at 1 point. A large front panel knob allows for simple, user-friendly calibration of the HI2315 benchtop meter.

Four-ring EC Probe

The HI2315 meter is supplied with the HI76303 platinum, four-ring EC probe with a built-in temperature sensor that operates over a wide range from 0.00 µS/cm to 199.9 mS/cm with a full-scale accuracy of ±1%.

Temperature Compensation

Temperature is automatically compensated for from 0 to 50°C. The temperature correction coefficient, also referred to as β, is adjustable from 0 to 2.5 %/°C for EC measurements.

Built-in Solution Holders

The HI2315 benchtop meter features four solution holders built directly into the casing. This convenient feature saves valuable benchtop space and maintains solution bottles in an upright position, avoiding any potential spills.

Specifications		HI2315
EC	Range	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm; 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm
	Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Additional Specifications	Calibration	manual, one point
	Temperature Compensation	automatic, 0 to 50°C (32 to 122°F) with β adjustable coefficient from 0 to 2.5%/°C
	Probe	HI76303, platinum four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions	235 x 222 x 109 mm (9.2 x 8.7 x 4.3")
	Weight	1.3 kg (2.9 lbs)
Ordering Information		**HI2315-01** (115V) and **HI2315-02** (230V) are supplied with HI76303 conductivity probe, 12 VDC adapter and instruction manual.

EC solutions begin on page 5.34

HI98192

Professional Waterproof Meters

EC/TDS/Resistivity/Salinity Meter with USP <645>

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Salinity readings
  - Salinity can be displayed as % NaCl, seawater scale (ppt) or practical salinity scale (PSU)
- Calibration
  - Perform up to a five point calibration for enhanced accuracy
- Temperature compensation
  - Automatic Temperature Compensation
  - Configurable temperature coefficient range from 0.00 to 10.00%.°C
- Four-ring stainless steel probe
  - This probe can cover low EC samples to 1000 mS/cm (actual EC)
- Approximately 100 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Dot matrix display with multifunction virtual keys
- AutoHold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Most of the available options such as GLP information, help, range, calibration and backlight have a dedicated button
- Supplied complete
  - Each meter is supplied complete with sensor, calibration solution, beakers, PC software and connection cable, instruction manual, quick start guide and batteries in a rugged, custom carrying case.

For Universal Applications

HI98192 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.000 µS/cm to 400 mS/cm, as well as TDS, resistivity and three salinity scales. This meter offers a quick connect four-ring probe and allows the user to adjust the nominal cell constant. HI98192 is also ready to perform all three stages of USP <645> method required for EC measurement of ultrapure water.

Backlit Graphic LCD Display

The HI98192 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick connect probe

The HI763133 four-ring stainless steel conductivity probe features a quick connect DIN connector to make attaching and removing the probe simple and easy.

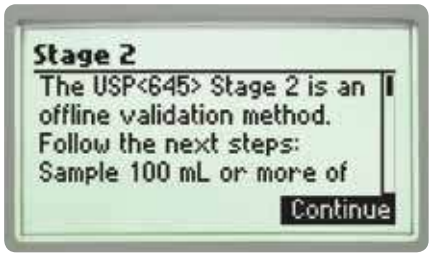
Calibration

Choose from seven memorized standards and obtain up to a five point conductivity calibration. For salinity (% range), HI7037 standard allows users to perform a one point calibration.

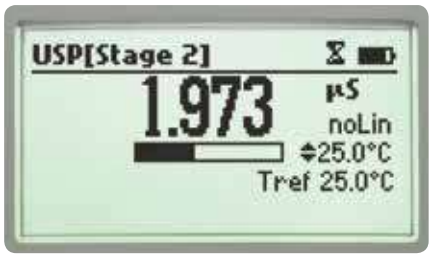
USP <645>

HI98192 can be used to perform all three stages of USP method required for EC measurement of ultrapure water and generates a report when the any of the three stages are met.

- Three stages of conformity
  - Performs all 3 stages of USP <645> water quality testing requirements



- On-screen guide
  - Users are provided with on-screen instructions for each USP stage



- Progress bar
  - Displays reading stability progress towards meeting stage 2 requirements

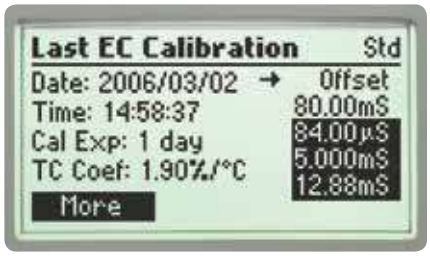
Measurement

EC and TDS measurements are fully customizable and include: cell constant selection between 0.010 and 10.000, selection of linear or natural water (non-linear) or no temperature compensation (for actual conductivity reading), configurable temperature compensation coefficient range from 0.00 to 10.00%/°C, choice of reference temperatures of 15°C, 20°C and 25°C, and a selectable TDS factor between 0.40 and 1.00.

Ten sets of customized measurement parameters can be stored as a user profile and later recalled.

Data Logging

The HI98192's allows storage of up to 400 log-on-demand samples or 1000 lot logging samples that can be later transferred to a PC with the supplied HI920015 USB cable and HI92000 software.



GLP

Comprehensive GLP functions are directly accessible by pressing the GLP key. Calibration data, including date, time and calibration values are stored for retrieval at a later time

Intuitive Keypad

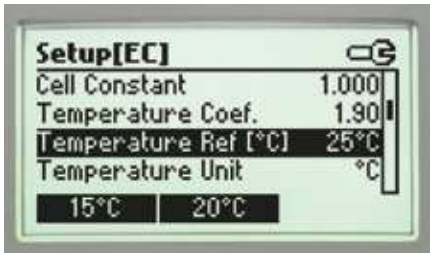
The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.

AutoHold

Pressing AutoHold during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.



Setup screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides

PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI920015 micro USB cable and HI92000 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 100 hours of battery life.

Rugged custom carrying case

The HI98192 meter, probe, and all accessories are supplied in the HI720192 rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

Specifications		HI98192
EC	Range	0 to 400 mS/cm (shows values up to 1000 mS/cm actual conductivity)** 0.001 to 9.999 µS/cm*; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (autoranging)
	Resolution	0.001 µS/cm*; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 µS/cm, 84.0 µS/cm, 1.413 mS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
TDS	Range	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm* (autoranging)
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 KΩ•cm; 0.1 KΩ•cm; 1 KΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm*
	Accuracy	±1% of reading (±10 Ω or 1 digit, whichever is greater)
Salinity	Range	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
	Calibration	max. one point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Temperature †	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two points
Additional Specifications	Cell Constant Setup	0.010 to 10.000
	Temperature Compensation	NoTC, linear (-20.0 to 120.0°C (-4.0 to 248.0°F)), non linear (0 to 36°C (32 to 98.6°F)) ISO/DIS 7888 std
	Reference Temperature	15°C, 20°C and 25°C
	Temperature Coefficient	0.00 to 10.00 %/°C
	TDS Factor	0.40 to 1.00
	Probe	HI763133 stainless steel, four-ring conductivity/TDS probe with internal temperature sensor and 1.5 m (4.9') cable (included)
	Logging	log-on-demand: 400 samples; lot logging: 5, 10, 30 sec, 1, 2, 5, 10, 15, 30, 60, 120, 180 min (max 1000 samples)
	Memorized Profiles	up to 10
	Measurement Modes	autorange, autoend, lock and fixed range
	PC Connectivity	opto-isolated sealed USB (with HI92000 software and micro USB cable)
	Battery Type / Life	1.5V AA batteries (4) / approximately 100 hours of continuous use (without backlight), 25 hours with backlight;
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions/Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information		**HI98192** is supplied with HI763133 stainless steel, four-ring conductivity/TDS probe, HI7031M 1413 µS/cm calibration solution (230 mL), HI7035M 111.8 mS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720192 rugged carrying case with custom insert.

* The 0.000 µS/cm EC range and 0.1 MΩ•cm resistivity range are not available with the optional 4m cable probe
**Uncompensated temperature reading
(†) Reduced to actual sensor limits

EC, TDS and Salinity solutions begin on page 5.34

HI98197

Professional Waterproof Meter

for Ultrapure Water

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Conductivity and resistivity
  - High resolution of 0.001 µS/cm for conductivity and 0.1 MΩ•cm for resistivity
- Calibration
  - Perform up to a five point calibration for enhanced accuracy
- Temperature compensation
  - Automatic Temperature Compensation
  - Configurable temperature coefficient range from 0.00 to 10.00%/°C
- Four-ring platinum probe
  - This probe can cover low EC samples to 1000 mS/cm (actual EC)
- Approximately 100 hour battery life
  - Powered by (4) 1.5V AA batteries
- Clear display
  - Graphic LCD display with multifunction virtual keys
- AutoHold
  - Automatically holds the first stable reading on the display
- Enhanced calibration
  - An "out of calibration range" warning blinks if the measurement range is not covered by the current calibration
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- Data logging
  - The HI98197 allows storage of up to 400 log-on-demand samples or 1000 lot logging samples that can be later transferred to a PC with the supplied USB cable and software
- GLP
  - GLP data provides information from previous calibration to ensure Good Laboratory Practices are met
- Intuitive keypad
  - Most of the available options such as GLP information, help, range, calibration, and backlight have a dedicated button

For Ultrapure Water Applications

HI98197 is a waterproof, portable EC (conductivity) meter that has an expanded conductivity range from 0.000 µS/cm to 400 mS/cm, as well as TDS (total dissolved solids), resistivity, and three salinity scales. This meter offers a quick connect four-ring platinum probe and allows the user to adjust the nominal cell constant. HI98197 is also ready to perform all three stages of USP <645> method required for EC measurement of water for injection.

Backlit Graphic LCD Display

The HI98197 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick connect probe

The HI763123 four-ring platinum conductivity probe with a threaded connection features a quick connect DIN connector to make attaching and removing the probe simple and easy.

Calibration

Choose from seven memorized standards and obtain up to a five point conductivity calibration. For salinity (% range), HI7037 standard allows users to perform a one point calibration.

Measurement

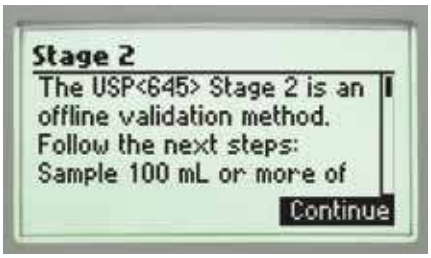
EC and TDS measurements are fully customizable and include: cell constant selection between 0.010 and 10.000, selection of linear or natural water (non-linear) or no temperature compensation (for actual conductivity reading), configurable temperature compensation coefficient range from 0.00 to 10.00%/°C, choice of reference temperatures of 15°C, 20°C and 25°C, and a selectable TDS factor between 0.40 and 1.00.

Ten sets of customized measurement parameters can be stored as a user profile and later recalled.

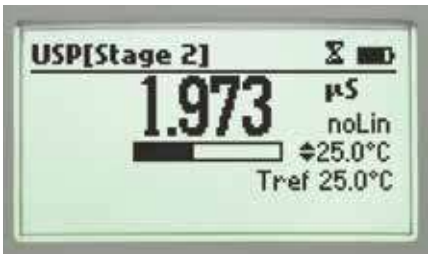
USP <645>

HI98197 can be used to perform all three stages of USP <645> method required for EC measurement of water for injection and generates a report when the any of the three stages are met.

- Three stages of conformity
  - Performs all 3 stages of USP <645> water quality testing requirements



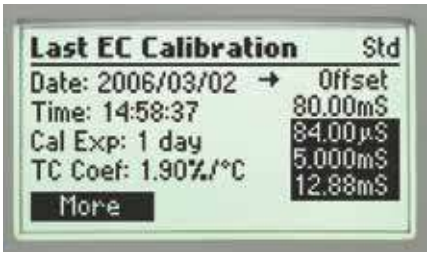
- On-screen guide
  - Users are provided with on-screen instructions for each USP stage



- Progress bar
  - Displays reading stability progress towards meeting stage 2 requirements

Data Logging

The HI98197's allows storage of up to 400 log-on-demand samples or 1000 lot logging samples that can be later transferred to a PC with the supplied HI920015 USB cable and HI92000 software.



GLP

Comprehensive GLP functions are directly accessible by pressing the GLP key. Calibration data, including date, time and calibration values are stored for retrieval at a later time

Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.

AutoHold

Pressing AutoHold during measurement will automatically hold the first stable reading on the display.

Dedicated Help Key

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

Setup screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides

PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI920015 micro USB cable and HI92000 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 200 hours of battery life.

* The 0.000 µS/cm EC range and 0.1 MΩ•cm resistivity range are not available with the optional 4m cable probe
**Uncompensated temperature reading

Designed for Water Professionals

High purity water used in power generation, semiconductor manufacturing, and other industries can be difficult to measure due to the ability of carbon dioxide (CO_2) to diffuse into water and form carbonic acid (H_2CO_3). Carbonic acid quickly dissociates into hydrogen ions (H^+) and bicarbonate ions (HCO_3^-). These ions will increase the conductivity and decrease the resistivity of the water. In order to measure high purity water accurately it is necessary to perform a continuous flow measurement. HI98197 uses the HI763123 platinum, four-ring probe with a threaded connection that is screwed into a stainless steel body flow cell. The flow cell is then connected to a water source to more accurately determine the conductivity or resistivity without exposure to air. HI98197 is an ideal meter for monitoring the efficiency of a mixed bed resin or equivalent system that produces high purity water of 18.2 MΩ•cm at 25°C.

HI605453 flow cell
for ultrapure water

Supplied complete

HI98197 is supplied complete with sensor, flow cell, tubing, calibration solution, beakers, PC software and connection cable, instruction manual, quick start guide and batteries in the HI720197 rugged, custom carrying case.

Specifications		HI98197
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (actual conductivity*; temperature compensated to 400 mS/cm)
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 µS/cm, 84.0 µS/cm, 1.413 mS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
TDS	Range	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm (autoranging)
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 KΩ•cm; 0.1 KΩ•cm; 1 KΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±1% of reading (±10 Ω or 1 digit, whichever is greater)
Salinity	Range	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
	Calibration	max. one point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Temperature †	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two points
Additional Specifications	Cell Constant Setup	0.010 to 10.000
	Temperature Compensation	NoTC, linear (-20.0 to 120.0°C; -4.0 to 248.0°F), non linear (0 to 36°C; 32 to 98.6°F) ISO/DIS 7888 std
	Reference Temperature	15°C, 20°C, and 25°C
	Temperature Coefficient	0.00 to 10.00 %/°C
	TDS Factor	0.40 to 1.00
	Probe	HI763123 platinum, four-ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable (included)
	Logging	log-on-demand: 400 samples; lot logging: 5, 10, 30 sec, 1, 2, 5, 10, 15, 30, 60, 120, 180 min (max 1000 samples)
	Memorized Profiles	up to 10
	Measurement Modes	autorange, autoend, lock, and fixed range
	PC Connectivity	opto-isolated sealed USB (with HI92000 software and micro USB cable)
	Battery Type / Life	1.5V AA batteries (4) / approximately 100 hours of continuous use (without backlight), 25 hours with backlight
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions/Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	**HI98197** is supplied with HI763123 platinum, four-ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable, HI605453 stainless steel flow cell for ultrapure water, tubing, HI7031M 1413 µS/cm calibration solution (230 mL), HI7033M 84 µS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V batteries (4), quality certificate, instruction manual and quick start guide in an HI720197 rugged carrying case with custom insert.	

*Uncompensated temperature reading
(†) Reduced to actual sensor limits

EC, TDS and Salinity solutions begin on page 5.34

HI9835

EC/TDS/Salinity/°C Meters

- ATC
  - Automatic temperature compensation
- Methods
  - Measures EC/TDS/Salinity/ Temperature
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Battery indicator
  - Battery life indicator at startup
- Help feature
  - On-screen user guides
- Backlight
  - Backlit, graphic LCD display

The HI9835 is a handheld EC/TDS/salinity/ temperature meter. Users are provided with a series of diagnostic features and messages on the LCD which help guide through calibration, operation and troubleshooting.

Conductivity and TDS measurement parameters are selectable such as: cell constant range from 0.500 to 1.700, temperature coefficient from 0.00 to 6.00%/°C, temperature reference from 20 to 25°C and a selectable TDS factor of 0.40 to 0.80.

The autoranging feature of the EC and TDS modes automatically sets the meter to the scale with the highest possible resolution. The auto endpoint feature automatically freezes the display once a stable reading is reached.

HI76309 conductivity probe

The HI76309 conductivity and temperature probe features a PVC body with a stainless steel, four ring design. This design offers highly accurate readings over the entire conductivity range.

- Four-ring design
  - Immune to polarization and fouling for longer periods of time

Specifications		HI9835
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm (actual EC)*
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1 % of reading (±0.05 µS/cm or 1 digit)
TDS	Range	0.00 to 14.99 mg/L (ppm); 15.0 to 149.9 mg/L (ppm); 150 to 1499 mg/L (ppm); 1.50 to 14.99 g/L (ppt); 15.0 to 100.0 g/L (ppt); up to 400.0 g/L (ppt) (actual TDS)* with 0.80 conversion factor
	Resolution	0.01 mg/L (ppm); 0.1 mg/L (ppm); 1 mg/L (ppm); 0.01 g/L (ppt); 0.1 g/L (ppt)
	Accuracy	±1 % of reading (±0.03 mg/L (ppm) or 1 digit, whichever greater)
Salinity	Range	0.0 to 400.0% NaCl
	Resolution	0.1%
	Accuracy	±1% of reading
Temperature	Range	-20.0 to 120.0 °C (-4.0 to 248.0°F)
	Resolution	0.1°C
	Accuracy	±0.2°C (excluding probe error)
Calibration	EC	automatic, one point with six memorized values (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
	Salinity	one point with HI7037 calibration solution
	Temperature	two point, at 0 and 50°C (32 and 122°F)
Additional Specifications	Temperature Compensation	automatic or manual from -20.0 to 120.0 °C (-4.0 to 248.0°F) (can be disabled for measuring conductivity activity)
	Temperature Coefficient	selectable from 0.00 to 6.00%/°C (EC and TDS only); default value is 1.90%/°C
	Reference Temperature	20°C or 25°C
	TDS Conversion Factor	selectable from 0.40 to 0.80 (default value is 0.50)
	Probe	HI76309 EC/TDS probe four-ring conductivity probe with internal temperature sensor, DIN connector with 1m cable
	Battery Type / Life	1.5V AAA batteries (3) /approximately 200 hours of continuous use without backlight (50 hours with backlight on); auto-off after 5, 10, 20 and 60 minutes (can be disabled)
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
	Weight	300 g (10.6 oz)
Ordering Information	**HI9835** is supplied with HI76309 conductivity probe, batteries, instructions and rugged carrying case.	

**Uncompensated temperature reading

EC, TDS and Salinity solutions begin on page 5.34

HI99300 · HI99301

Portable EC Meters

EC/TDS and Temperature

- ATC
  - Automatic temperature compensation
- Methods
  - Measures EC/TDS and Temperature
- Battery Error Prevention System (BEPS)
  - Alerts the user of low battery power that could adversely affect readings
- Battery indicator
  - Battery life indicator at startup
- One-point calibration
  - One-point EC/TDS calibration
- Waterproof

The HI99300 and HI99301 are portable EC/TDS and temperature meters. HI99300 measures low range conductivity in µS/cm and TDS in ppm while the HI99301 measures high range conductivity in mS/cm and TDS in ppt. Both instruments are housed in a case rated for IP67 conditions.

These instruments offer single point, automatic calibration with automatic temperature compensated measurements. The compensation coefficient and EC/TDS conversion factor are user-selectable from 0.45 to 1.00 and temperature coefficient is selectable from 0.0 to 2.4%/°C.

These instruments easily fit in the palm of your hand and the bottom probe connection ensures the electrode cable doesn't get in your way. The large, multi-level LCD displays the primary reading, temperature and calibration guides simultaneously. Symbols and messages on the LCD indicate meter status and guides users through operations.

At start-up, the meter shows the remaining battery percentage; when a low battery condition is detected, a battery symbol appears on the LCD to advise the user that only a few hours of working time is left.

The HI76306 EC/TDS and temperature probe resists clogging and is easy to clean.

Specifications		HI99300	HI99301
EC	Range	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C/32.0 to 140.0°F	0.0 to 60.0°C/32.0 to 140.0°F
	Resolution	0.1°C/0.1°F	0.1°C/0.1°F
	Accuracy	±0.5°C/±1°F	±0.5°C/±1°F
Additional Specifications	Calibration	automatic, one point at 1413 µS/cm, 1382 ppm (CONV 0.5) or 1500 ppm (CONV 0.7)	automatic, one point at 12.88 mS/cm, 6.44 ppt (CONV 0.5) or 9.02 ppt (CONV 0.7)
	EC/TDS Temperature Compensation	automatic, 0 to 60°C (32 to 140°F) with β adjustable from 0.0 to 2.4%/°C with 0.1% step	
	EC/TDS Factor	adjustable from 0.45 to 1.00 with 0.01 step (default 0.50)	
	Probe	HI76306 EC/TDS probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)	
	Battery Type / Life	1.5V AAA (3) / approximately 500 hours of continuous use	
	Environment	0 to 50°C (32 to 122°F); RH max. 100%	
	Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")	
	Weight	205 g (7.2 oz)	
Ordering Information		**HI99300** and **HI99301** are supplied with HI76306 EC/TDS probe, batteries, instructions and rugged carrying case.	

EC and TDS solutions begin on page 5.34

HI993310

Direct Soil Activity and Solution Conductivity Measurement Kit

- Automatic temperature compensation (ATC)
- Battery Error Prevention System (BEPS)
  - Alerts the user when the battery is low

The HI993310 is an instrument that has been designed to address the need for fast and accurate conductivity measurements in soil and liquids. It is supplied with two probes: HI76305 with stainless steel, conical tip for direct soil measurement and HI76304 for fertilizer enriched solutions.

The HI993310 measures the soil conductivity in EC (mS/cm) as well as soil activity (g/L). The different scales can be selected through two keys on the front panel and two separate LEDs indicate which parameter is being tested. In addition, HI993310 is equipped with an alarm LED that illuminates if the soil is too dry or nutritive substances such as potassium or nitrogen are lacking. Demineralized water can be added to the soil prior to proceeding with further tests.

Direct soil measurement is facilitated by the stainless steel HI76305 probe. Once inserted into the ground, the user simply waits until the meter displays the value read by the auger-like probe.

Why this meter is so important...

Conductivity is an important factor in greenhouses and hydroponics and is measured in soil as well as in fertilizer solutions since it is an excellent indication of the presence of nutritive salts. Soil conductivity is checked before and after fertilization to establish its effectiveness as well as ensuring that the soil is not too saline or damaging to the plant roots.

Conductivity of the irrigation water and fertilizer mixes is checked to make sure values are within an acceptable range and a correct fertilizer concentration strength is being applied.

Specifications		HI993310
EC	Range	0.00 to 19.99 mS/cm
	Resolution	0.01 mS/cm
	Accuracy (@25°C/77°F)	±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Soil Activity	Range	0.00 to 1.00 g/L
	Resolution	0.01 g/L
	Accuracy (@25°C/77°F)	±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Additional Specifications	Calibration	Conductivity: Manual, one-point through knob Soil Activity: calibrated through the conductivity range calibration
	Temperature Compensation	automatic from 0 to 50°C (32 to 122°F), β=2%/°C
	Probes	HI76305 stainless steel conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for direct soil measurement (included); HI76304 conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for measurement in soil slurry or water sample (included)
	Battery Type / Life	9V / approximately 100 hours of continuous use
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions	185 x 82 x 52 mm (7.3 x 3.2 x 2.0")
	Weight	275 g (9.7 oz.)
Ordering Information	**HI993310** is supplied with HI76304 conductivity probe, HI76305 direct soil conductivity probe, battery, instructions and rugged carrying case.	

EC solutions begin on page 5.34

HI9033

Multi-range EC Meter

- Four-ring Probe
  - The four-ring probe that comes with the HI9033 offers a versatile and accurate solution for conductivity readings. Four ring technology allows for a larger range of measurement within a single probe, whereas other meters with two probe technology is somewhat limited in the range in which they can measure.
- Four Measurement Ranges
  - HI9033 offers four conductivity measurement ranges. Each range has a dedicated button on the face of the meter, allowing users to easily switch between ranges when necessary. The meter is programmed to let the user know when their current reading is out of range, and a new range should then be selected.
- Automatic Temperature Compensation
  - Since temperature has such a dramatic effect on conductivity readings, having a meter that offers temperature compensated readings is invaluable. The probe of the HI9033 features a built-in temperature sensor that automatically accounts for the effects of temperature on a sample's conductivity reading in the range of 0 to 50°C (32 to 122°F). The temperature compensation coefficient, also known as β, is set at 2%/°C; this factor corrects the conductivity reading 2% for each degree Celsius change in the sample.
- One-point Calibration
  - The HI9033 can be calibrated at one point in a standard conductivity solution. The calibration trimmer located on the top of the meter is easily adjusted to the correct calibration standard.
- Battery Error Prevention System (BEPS)
  - The Battery Error Prevention System detects when the batteries become too weak to ensure reliable measurements.

Specifications	HI9033 (EC)
Range	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm; 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm
Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Calibration	manual, one point
TDS Factor	–
Temperature Compensation	automatic, 10 to 50°C (50 to 122°F) with β = 2%/°C
Probe	HI76302W conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	1.5V AA (3) / approximately 400 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
Weight	300 g (10.6 oz.)
Ordering Information	**HI9033** is supplied with HI76302W conductivity probe, battery, instructions and rugged carrying case.

The portable HI9033 EC meter is suitable for use in a variety of applications. It offers four measurement ranges from 0.0 µS/cm to 199.9 mS/cm with a ±1% FS accuracy. The HI76302W four-ring conductivity probe that is supplied with the meter allows for a wide range of measurements with a single sensor. The four ring technology also eliminates the polarization effect that is common with standard two pole versions. The probe also features a built-in temperature sensor to allow for Automatic Temperature Compensation from 0 to 50°C (32 to 122°F).

EC and TDS solutions begin on page 5.34

HI8633 · HI8733

Multi-range EC Meters

- Automatic temperature compensation (ATC) (HI8733)
- Help feature
  - On-screen user guides
- One-point calibration
  - One-point calibration
- Waterproof

The HI8633 and HI8733 conductivity meters have been designed for use in areas of production and quality control.

These meters utilize four ring potentiometric probes that offer greater versatility over typical amperometric designs. These rugged probes are made of PVC and are ideal for indoor as well as outdoor measurements.

HI8733's conductivity measurements can be automatically temperature compensated by using the HI76302W probe with built-in temperature sensor.

Temperature compensation for HI8633 is performed by manual adjustment.

Specifications	HI8633	HI8733
Range	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm
Resolution	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)	±1% F.S. (excluding probe error)
Calibration	manual, one-point through EC knob	manual, one-point through EC knob
Temperature Compensation	manual, 0 to 50°C (32 to 122°F) with β = 2%/°C	automatic, 0 to 50°C (32 to 122°F) with β adjustable from 0 to 2.5%/°C
Probe	HI76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)	HI76302W four-ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 100 hours of continuous use	9V / approximately 100 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
Weight	230 g (8.1 oz.)	230 g (8.1 oz.)
Ordering Information	**HI8633** is supplied with HI76301D conductivity probe, 12880 µS/cm HI70030 calibration solution sachets (5), battery, instructions and rugged carrying case. **HI8733** is supplied with HI76302W conductivity probe, 12880 µS/cm HI70030 calibration solution sachets (5), battery, instructions and rugged carrying case.	

EC solutions begin on page 5.34

HI87314

EC and Resistivity Meter

- Automatic temperature compensation (ATC)
- One-point calibration
- Help feature
  - On-screen user guides
- Waterproof

The HI87314 is a combination, portable meter that can read conductivity in four different ranges and resistivity.

For conductivity measurements, a one-point calibration is performed via a trimmer located in the battery compartment. The supplied probe does not require recalibration when switching from one range to another. The four-ring stainless steel probe has a built-in temperature sensor that automatically compensates for temperature changes. The temperature coefficient can be adjusted from 0 to 2.5%/°C using a knob on the front panel.

For resistivity measurements, the meter is factory calibrated and, if necessary, calibration can be adjusted. The HI3316D resistivity probe is easy to clean and requires little maintenance. It also features a built-in temperature sensor to automatically compensate for temperature variations. The temperature coefficient is user-selectable from 2 to 7%/°C.

Specifications		HI87314
EC	Range	199.9 µS/cm; 1999 µS/cm; 19.99 mS/cm; 199.9 mS/cm
	Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% F.S.
Resistivity	Range	0 to 19.90 MΩ•cm
	Resolution	0.10 MΩ•cm
	Accuracy (@25°C/77°F)	±2% F.S.
Additional Specifications	Calibration	manual, one point, for both EC and resistivity
	Temperature Compensation	automatic from 0 to 50°C with β selectable from 0 to 2.5%/°C for EC and from 2 to 7%/°C for resistivity
	Probes	HI76302W conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable; HI3316D resistivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable
	Battery Type / Life	9V / approximately 100 hours of use
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
	Weight	230 g (8.1 oz.)
Ordering Information	**HI87314** is supplied with HI76302W conductivity probe, HI3316D resistivity probe, HI70030 calibration solution sachet, calibration screwdriver, battery, instructions and hard carrying case.	

EC solutions begin on page 5.34

HI8734

TDS Meter

- One-point calibration
- Waterproof

The HI8734 has not only been specifically designed for the water conditioning industry, but particularly in the softening, demineralization, reverse osmosis and drinking water applications.

Three ranges of measurement ensure the highest accuracy possible. All three ranges can be executed at the touch of a button, without having to change the conductivity probe. This makes it very easy to switch applications without having to worry about recalibration.

To enhance accuracy and efficiency, MTC (Manual Temperature Compensation) is available using a knob on the front panel.

For the best protection in the field, the four-ring potentiometric probe is made of rugged PVC. To access difficult areas, the probe is supplied with a 1 m (3.3') cable.

The ratio between conductivity and TDS is factory set at 0.5.

Specifications	HI8734
Range	0.0 to 199.9 mg/L (ppm); 0 to 1999 mg/L (ppm); 0.00 to 19.99 g/L (ppt)
Resolution	0.1 mg/L (ppm); 1 mg/L (ppm); 0.01 g/L (ppt)
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Calibration	manual, one-point through TDS knob
Temperature Compensation	manual from 0 to 50°C (32 to 122°F) with β = 2%/°C
TDS Factor	0.5
Probe	HI76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 100 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
Weight	230 g (8.1 oz.)
Ordering Information	**HI8734** is supplied with HI76301D conductivity probe, HI70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.

TDS solutions begin on page 5.39

HI8033

EC/TDS Meter

- One-point calibration
- Manual temperature compensation

HI8033 is a handheld conductivity meter with the ability to take measurements in three different ranges.

The included HI76301W probe utilizes the four-ring potentiom etric method which measures conductivity with the utmost accuracy and reliability.

The four stainless steel rings are embedded in the resin shaft of the probe to create a smooth surface for fast and easy cleaning.

To improve accuracy in measurements, temperature compensation can be achieved with a knob on the front panel of the meter.

The dial on the front of the HI8033 easily indicates which range you are working in.

Specifications		HI8033
EC	Ranges	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm; 0.00 to 19.99 mS/cm
	Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm
TDS	Range	0 to 19990 mg/L (ppm)
	Resolution	10 mg/L (ppm)
	Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Additional Specifications	Calibration	manual, one-point
	Temperature Compensation	manual from 0 to 50°C (32 to 122°F) with β=2%/°C
	Probe	HI76301W conductivity probe with 1 m (3.3') cable (included)
	Battery Type / Life	9V / approximately 100 hours of continuous use
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	185 x 82 x 47 mm (7.3 x 3.2 x 1.9")
	Weight	270 g (9.5 oz.)
Ordering Information	**HI8033** is supplied with HI76301W conductivity probe, battery and instructions.	

EC and TDS solutions begin on page 5.34

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.
- High Accuracy Solutions (HI60xx)
  - HI60xx high accuracy solutions are also available and are supplied with a certificate of analysis.

84 µS/cm Calibration Solution

This 84 µS/cm conductivity solution makes it possible to calibrate instruments with a conductivity scale of up to 200 µS/cm, in the measurement of pure or distilled water.

84 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI6033	84 µS/cm	500 mL	1 bottle		•
HI7033/1L	84 µS/cm	1 L	1 bottle		
HI7033L	84 µS/cm	500 mL	1 bottle		
HI7033M	84 µS/cm	230 mL	1 bottle		
HI5033-12	84 µS/cm	120 mL	1 bottle		
HI8033L	84 µS/cm	500 mL	1 bottle	•	•

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.
- High Accuracy Solutions (HI60xx)
  - HI60xx high accuracy solutions are also available and are supplied with a certificate of analysis.

1413 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI6031	1413 µS/cm	500 mL	1 bottle		•
HI7031/1G	1413 µS/cm	1 G (3.78 L)	1 bottle		
HI7031/1L	1413 µS/cm	1 L	1 bottle		
HI7031L	1413 µS/cm	500 mL	1 bottle		
HI7031L/C	1413 µS/cm	500 mL	1 bottle		•
HI7031M	1413 µS/cm	230 mL	1 bottle		
HI5031-12	1413 µS/cm	120 mL	1 bottle		
HI7031-023	1.41 mS/cm	230 mL (GroLine)	1 bottle		•
HI7031-012	1.41 mS/cm	120 mL (GroLine)	1 bottle		•
HI8031L	1413 µS/cm	500 mL	1 bottle	•	•

1413 µS/cm Calibration Solution

The 1413 µS/cm calibration solution is best suited for general use. This solution is also available in combined sachet kits with Hanna pH 7 buffer for easy calibration of multiparameter instruments.

1413 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70031C	1413 µS/cm	20 mL	25 sachets	•
HI70031G-25	1.41 mS/cm	20 mL (GroLine)	25 sachets	•
HI70031P	1413 µS/cm	20 mL	25 sachets	
HI77100C	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	•
HI77100P	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

5000 µS/cm Calibration Solution

This calibration solution is ideal for applications that need to achieve higher reading accuracies in a conductivity scale between 2,000 µS/cm and 10000 µS/cm. This solution is widely used in agriculture for monitoring and preparing nutrient solutions for proper crop production.

5000 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7039/1L	5000 µS/cm	1 L	1 bottle		
HI7039L	5000 µS/cm	500 mL	1 bottle		
HI7039M	5000 µS/cm	230 mL	1 bottle		
HI7039-023	5000 µS/cm	230 mL (GroLine)	1 bottle		•
HI7039-012	5000 µS/cm	120 mL (GroLine)	1 bottle		•
HI8039L	5000 µS/cm	500 mL	1 bottle	•	•

5000 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70039C	5000 µS/cm	20 mL	25 sachets	•
HI70039G-25	5000 µS/cm	20 mL (GroLine)	25 sachets	•
HI70039P	5000 µS/cm	20 mL	25 sachets	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

12880 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7030/1G	12880 µS/cm	1 G (3.78 L)	1 bottle		
HI7030/1L	12880 µS/cm	1 L	1 bottle		
HI7030L	12880 µS/cm	500 mL	1 bottle		
HI7030M	12880 µS/cm	230 mL	1 bottle		
HI5030-12	12880 µS/cm	120 mL	1 bottle		
HI8030L	12880 µS/cm	500 mL	1 bottle	•	•

12880 µS/cm Calibration Solution

The 12880 µS/cm (12.88 mS/cm) calibration solution is widely used to assure the proper performance of conductivity meters with a scale higher than 10 mS/cm.

12880 µS/cm Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70030C	12880 µS/cm	20 mL	25 sachets	•
HI70030P	12880 µS/cm	20 mL	25 sachets	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- FDA compliant bottles (HI80xx)
  - Hanna solutions are offered in opaque, light-tight bottles that meet FDA requirements.

80000 µS/cm Calibration Solution

The 80,000 µS/cm calibration solution is needed for the proper calibration of instrumentation used to measure high conductivity samples such as wastewater, solutions with suspended solids and plating baths.

This calibration solution is also ideal for use in the agroalimentary sector.

111800 µS/cm Calibration Solution

This calibration solution is useful to calibrate instrumentation used to measure samples with conductivity higher than 100 mS/cm (100,000 µS/cm).

In fact, this solution makes it possible to calibrate instruments that perform under conditions of high salt concentrations.

This calibration solution is ideal for use in systems where phase limits have to be detected (e.g. separation of a substance from water), monitoring of bottle washing plants, beverage controls, check of acids or bases in electrodeposition processes and some plating baths.

80000 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7034/1L	80000 µS/cm	1 L	1 bottle		
HI7034L	80000 µS/cm	500 mL	1 bottle		
HI7034M	80000 µS/cm	230 mL	1 bottle		
HI5034-12	80000 µS/cm	120 mL	1 bottle		
HI8034L	80000 µS/cm	500 mL	1 bottle	•	•

111800 µS/cm Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7035/1L	111800 µS/cm	1 L	1 bottle		
HI7035L	111800 µS/cm	500 mL	1 bottle		
HI7035M	111800 µS/cm	230 mL	1 bottle		
HI8035L	111800 µS/cm	500 mL	1 bottle	•	•

TDS Calibration Solutions

Quality Solutions for Laboratory Applications

- Safety data sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.

TDS Bottles

Code	TDS Value @25°C	Size	Package	Certificate of Analysis
HI6032	1382 mg/L (ppm)	500 mL	1 bottle	•
HI7032/1L	1382 mg/L (ppm)	1 L	1 bottle	
HI7032L	1382 mg/L (ppm)	500 mL	1 bottle	
HI7032M	1382 mg/L (ppm)	230 mL	1 bottle	
HI7036/1L	12.41 g/L (ppt)	1 L	1 bottle	
HI7036L	12.41 g/L (ppt)	500 mL	1 bottle	
HI70442/1L*	1500 mg/L (ppm)	500 mL	1 bottle	
HI70442L*	1500 mg/L (ppm)	500 mL	1 bottle	
HI70442M*	1500 mg/L (ppm)	230 mL	1 bottle	

TDS Solutions

Hanna TDS calibration solutions are prepared against a NIST traceable potassium chloride solution.

Hanna TDS solutions have the lot number and expiration date clearly marked on the label and are air tight with a tamper-proof seal to ensure the quality of the solution. Hanna's line of TDS calibration solutions have been specially formulated to have an expiration of 5 years from the date of manufacture for an unopened bottle.

TDS Sachets

Code	TDS Value @25°C	Size	Package	Certificate of Analysis
HI70032C	1382 mg/L (ppm)	20 mL	25 sachets	•
HI70032P	1382 mg/L (ppm)	20 mL	25 sachets	
HI70038C	6.44 g/L (ppt)	20 mL	25 sachets	•
HI70038P	6.44 g/L (ppt)	20 mL	25 sachets	
HI70080C	800 mg/L (ppm)	20 mL	25 sachets	•
HI70080P	800 mg/L (ppm)	20 mL	25 sachets	
HI70442P*	1500 mg/L (ppm)	20 mL	25 sachets	
HI77200P*	1500 mg/L (ppm) & pH 7.01	20 mL	20 sachets (10 ea)	

* TDS Conversion Factor 4-4-2: 0.65 ppm = 1 µS/cm (approximately).

Quick Cal

pH/EC Quick Cal Calibration Solution

Quick Cal is for use with Hanna's GroLine pH and/or EC/TDS meters. Using the Quick Cal function found in compatible meters allows for single-point calibration for pH and/or conductivity sensors.

- Calibration solution for Gro line pH and EC/TDS meters
- pH calibration buffer value of pH 6.86
- EC calibration standard value of 5,000 µS/cm (5.00 mS/cm)
- Safety Data Sheets
  - Safety data sheets for all Hanna solutions are available at hannainst.com or upon request.
- Expiration date
  - The production batch number, expiration date, and temperature correlation table are reported on all Hanna calibration solutions.
- NIST traceability
  - Standardized using a pH meter calibrated by means of two standard solutions prepared from NIST standard reference materials. A conductivity meter and probe calibrated against NIST primary standard solutions or primary standard solutions prepared following NIST guidelines.
- Air-tight bottles
  - Air tight bottle with tamper-proof seal of freshness to ensure quality.
- Single use sachets
  - Light block packaging prevents oxidation from UV light that could alter the value. Every sachet is as fresh as the day it was packaged.

GroLine

Quick Cal pH/EC Bottles

Code	Size	Certificate of Analysis
HI5036-050	500 mL (GroLine)	•
HI5036-023	230 mL (GroLine)	•
HI5036-012	120 mL (GroLine)	•

Quick Cal pH/EC Sachets

Code	Size	Certificate of Analysis
HI50036P	20 mL sachets, 25 pcs. (GroLine)	–

Seawater Salinity Calibration Solutions

HI7037 is a premium quality calibration solution for seawater salinity according to the 1902 International Council for the Exploration of the Sea (ICES) percent scale. Hanna calibration solutions have the lot number and expiration date clearly marked on the label. All bottles are air tight with a tamper-proof seal to ensure the quality of the solution. Hanna's line of calibration solutions have been specially formulated to have an expiration of 5 years from the date of manufacture for an unopened bottle.

- NaCl calibration solution for % readings of salinity.
- Air tight bottle with tamper-proof seal to ensure quality.
- Lot number and expiration date printed on each label.

Salinity Bottles

Code	Description	Size	Package
HI7037L	100% NaCl	500 mL	1 bottle
HI7037M	100% NaCl	230 mL	1 bottle

Table of Contents

Dissolved Oxygen Meters

Professional Instruments for a Variety of Applications

Dissolved Oxygen Theory and Measurement

Dissolved oxygen (DO) is a measure of how much oxygen is dissolved in a system. Measurements are usually taken in water using a DO probe and meter. Henry's Law states that the concentration of gas in a solution is directly proportional to the partial pressure of that gas above the solution. Henry's Law constant is a factor of proportionality, and so is specific to the gas in the solvent being measured.

The partial pressure of oxygen is in fact a measurement of the thermodynamic activity of its molecules. The rate at which oxygen dissolves, diffuses, and reacts is not determined by its concentration, but by its partial pressure. The Earth's atmosphere is composed of 20.9% oxygen, and at sea level the atmosphere is 100% saturated with oxygen.

Percent saturation is the amount of DO present per amount of DO possible at a given temperature and pressure. Percent saturation is a common unit for DO measurement since it is based upon the partial pressure of a gas; thus it is correct for determination in any solvent.

Concentration measurements of DO can also use the units of parts per million (ppm) or milligrams per liter (mg/L). In meters that report DO concentration in ppm or mg/L, the solvent is always assumed to be water. In other solvents such as oils or acids, the Henry's Law constant would be different. In those cases, percent saturation should be used as it is incorrect to use ppm or mg/L.

Effects of Temperature and Pressure

As the temperature of a solution increases, the particle movement within that solution increases. With greater particle motion, dissolved gases escape more readily from solution. In warm water, oxygen is less soluble while in cold water, oxygen is more soluble. DO concentration in air saturated waters decreases with increasing temperature.

Atmospheric pressure decreases as altitude increases. Since there is lower partial pressure, oxygen is less soluble at higher altitudes. DO concentration in air saturated waters decreases with increasing elevations.

Applications

Water quality measurements are vital to environmental monitoring. In quiescent lakes and rivers, the decay of organic matter can cause bacteria levels to increase. The aerobic bacteria consume oxygen, triggering a deficiency that can cause a water body "to die," killing aquatic plants and animals.

Aquaculture is the breeding, rearing, and harvesting of plants and animals in all types of water environments. Dissolved oxygen is needed by fish, zooplankton, and plants to survive and reproduce. DO measurements are used to monitor and control the environment required for success.

Wastewater treatment plants rely on bacteria to break down the organic compounds found in water. If the amount of dissolved oxygen in the wastewater is too low, these bacteria will die and septic conditions will occur. The amount of DO must be consistently monitored to ensure proper waste treatment.

Wine and beer are both affected by oxygen at various stages during production and storage. DO is an important parameter to monitor for those who wish to produce consistent, high quality products.

Laboratory Monitoring of BOD, OUR and SOUR

BOD (Biochemical Oxygen Demand) is a measurement that indicates the concentration of biodegradable organic matter present in a water sample. It can be used to determine the general quality of water and its degree of pollution. BOD measures the rate of oxygen uptake by microorganisms in a water sample at a fixed temperature over a given period of time. To ensure that all other conditions are equal, a very small amount of microorganism seed is added to each sample being tested. The samples are kept at 20°C in the dark for five days. The loss of dissolved oxygen during incubation is called the BOD5. BOD is an empirical test that determines the relative oxygen requirements of wastewater, effluent, and polluted waters.

OUR (Oxygen Uptake Rate) is used to determine the biological activity of a system in terms of oxygen consumption or respiration rate. It is defined as the milligrams per liter of oxygen consumed per hour. This measurement indicates the rate of metabolic processes in sludge treatment, helping operators determine the stability of solids after digestion.

SOUR (Specific Oxygen Uptake Rate) also determines the oxygen consumption of a system, but is defined as the milligrams of oxygen consumed per gram of volatile suspended solids (VSS) per hour. This quick measurement has many advantages: rapid measure of influent organic load and biodegradability, indication of the presence of toxic or inhibitory wastes, degree of stability and condition of a sample, and calculation of oxygen demand rates at various points in the aeration basin.

Types of Dissolved Oxygen Probes

Hanna's dissolved oxygen meters utilize one of two common types of sensing probes: polarographic sensors and galvanic sensors.

Polarographic DO probes consist of a working electrode (cathode) and a counter electrode (anode). A polarizing voltage is applied to these electrodes that is specific for the reduction of oxygen. A thin, gas permeable membrane isolates the sensor elements from the water sample but allows oxygen to pass through. The oxygen that passes through the membrane is reduced at the cathode, causing a current from which the oxygen concentration is determined. Two-electrode polarographic probes use the anode as a reference electrode.

Galvanic DO probes consist of a working electrode (cathode) and a counter electrode (anode) that act as a battery to produce a voltage specific for the reduction of oxygen. A thin, gas permeable membrane isolates the sensor elements from the water sample but allows oxygen to pass through. The oxygen that passes through the membrane is reduced at the cathode, causing a current from which the oxygen concentration is determined.

Product Spotlights

HI98193

Professional Waterproof Meters

Dissolved Oxygen and BOD

For Universal Applications

The HI98193 is a portable DO meter with extended ranges of up to 50 ppm and 600% saturation. HI98193 features compensations for pressure, temperature and salinity, which are essential for an accurate dissolved oxygen reading. HI98193 is supplied with the HI764073 polarographic dissolved oxygen probe that utilizes field replaceable PTFE membrane caps.

See page 6.16

HI9147

Dissolved Oxygen Meter for Aquaculture

The HI9147 is designed for aquaculture applications. This unit is unique among our family of DO meters as it is supplied with a galvanic probe.

See page 6.19

Comparison Guide

	Dissolved Oxygen Range	Barometric Pressure	% Saturation O_2	Salinity Compensation	Altitude Compensation	Temperature Range(s)	DO Calibration Points	Barometric Pressure Calibration Points	ATC	Hold Feature	BEPS	PC Connectivity	Logging	Alarm	GLP	Capacitive Touch Buttons	Benchtop, Portable & Wall-Mount	Page
Bench Meters																		
edge	•			•	•	•	2		•			•	•		•	•	•	6.4
edge®DO	•			•	•	•	2		•			•	•		•	•	•	6.8
HI5421	•	•	•	•		°C/°F/K	2	1	•	•		•	•	•	•			6.12
HI2400	•		•	•	•	°C	2		•			•	•		•			6.14
Portable Meters																		
HI98193	•	•	•	•		°C/°F	2	1	•	•	•	•	•		•			6.16
HI9147	•		•	•	•	°C/°F	1		•		•							6.19
HI9146	•		•	•	•	°C	2		•		•				•			6.20
HI9142	•					°C/°F	2		•		•							6.22

edge®

pH • EC • DO

The world's most innovative pH, EC and DO meter

edge's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. The edge is rich in features to accommodate the needs of a vast amount of customers. For those that prefer very simplistic operation there is a basic mode operation with simplified menu and options while for those who require advanced features there is the full featured standard operating mode. edge is available as a pH, conductivity or dissolved oxygen kit and any edge kit can be upgraded with additional probes to measure pH, conductivity and dissolved oxygen.

edge® technical features

Rechargeable Battery

edge has a built in rechargeable battery that is charged when the meter is in the plugged in benchtop or wall mount cradle. The battery can also be recharged through the micro USB port with either a USB port from a computer or directly to the power supply.

Two USB ports

edge includes one standard USB for exporting data to a flash drive. edge also includes one micro USB port for exporting files to your computer as well as for charging when the cradle is not available.

Clear, full text readout

edge features clear, full text guides displayed on the bottom of the screen. There is no need to decipher scrambled abbreviations or symbols; these helpful messages guide you through every process quickly and easily.

Data logging

edge allows you to store up to 1000 log records of data. Data sets include readings, GLP data, date and time.

* Using edge compatible pH electrodes

GLP

Data of the last calibration you perform is stored in the sensor including the date, time, and buffers used. When the sensor is connected to edge, GLP data is automatically transferred.

Two Operating Modes

edge can be used in Extended or Basic Operating Modes. Extended Mode enables all edge features while Basic Mode reduces features–ideal for routine measurements by displaying a simplified screen and features.

edge pH Features*

CAL Check™ (pH only)

Hanna's exclusive CAL Check feature analyzes the pH electrode response in the pH buffers during the calibration process to alert the user of potential problems such as a contaminated buffer or dirty electrode. After calibration, indicators for probe condition are displayed on the measurement screen. The probe condition is based on offset and slope characteristics of the pH electrode.

Sensor Check™ (pH only)

When used with Hanna's electrodes equipped with a matching pin, edge constantly checks the impedance of the pH measuring electrode to notify you in real time in the event of glass breakage. During calibration, Sensor Check checks the state of the junction. The reference junction is also evaluated and reported on the display.

ORP Measurement

edge measures ORP with edge compatible ORP probes.

edge design features

Capacitive touch keypad

edge features sensitive capacitive touch buttons for accurate keystrokes when navigating edge's menus and screens. Since they are part of the screen, the buttons can never get clogged with sample residue.

Easy to read LCD

edge features a 5.5" (14 cm) LCD display that you can clearly view from over 5 m (16.4'). The large display, with its wide 150° viewing angle, provides one of the easiest to read LCDs in the industry.

Zero footprint

Using the wall mount cradle (included), edge can be placed on a wall, leaving zero footprint on the benchtop space. The cradle has a built-in connector to power and charge the batteries.

Hybrid meters that can be used in portable, wall-mount and benchtop configurations

The versatile design of edge® enables it to be used as a portable, wall-mount or benchtop meter. edge simplifies measurement, configuration, calibration, diagnostics, logging and transferring data directly to a computer or USB drive.

Portable field unit

edge is ideal for field use due to its light weight, large screen, and thin design. It can easily be slipped into a backpack or messenger bag. The battery life lasts up to 8 hours when used as a portable device.

Wall-mount cradle

The included wall-mount cradle makes it easy to conserve space on the benchtop while also charging edge with the AC adapter. The cradle is ideal for continuous monitoring applications.

Electrode holder with built-in cradle

The electrode holder features a swivel, adjustable arm with a built-in cradle to hold edge securely in place at the optimum viewing angle.

Digital electrodes

edge® measures pH, conductivity and dissolved oxygen through its unique digital electrodes. These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge by an easy to plug-in 3.5mm connector.

- Simply connect each probe via the 3.5 mm jack, Digital Smart Electrodes are automatically recognized
- Clark type digital polarographic probe with easy-to-replace membrane cap
  - Covers all ranges from 0.00 to 45.00 mg/L (ppm); 0.0 to 300% saturation
- Accuracy ±1.5% full scale
- One or two-point calibration (HI7040), 0% (solution) and 100% (air)
- Data logging
  - Manual log-on-demand
  - Manual log-on-stability
  - Interval logging
- Automatic Temperature Compensation from 0 to 50 °C
- GLP data
  - Records date, time, calibration standards, altitude value and salinity value
- Altitude compensation from -500 to 4000 meters (-1640 to 13,123')
- Salinity compensation from 0 to 40g/L

Sleek design

Incredibly thin and lightweight, edge measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

All edge compatible pH, EC and dissolved oxygen digital probes are interchangeable with edge.

Specifications		HI2040 edge
Dissolved Oxygen	Range	0.00 to 45.00 ppm (mg/L); 0.0 to 300.0 % saturation
	Resolution	0.01 ppm (mg/L); 0.1 % saturation
	Accuracy	± 1.5% of reading ±1 digit
	Calibration	one or two-point at 0% (HI7040 solution) and 100% (in air)
	Temperature Compensation	ATC (0 to 50°C; 32.0 to 122.0°F)*
	Salinity Compensation	0 to 40 g/L (with 1 g/L resolution)
	Altitude Compensation	-500 to 4000 m (-1640 to 13120') (with 100 m (328') resolution)
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe (included in DO kit)	HI764080 digital dissolved oxygen electrode with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000 records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions / Weight	202 x 140 x 12 mm (7.9" x 5.5" x 0.5") / 250 g (8.82 oz.)
Ordering Information	**HI2040-01** (115V) and **HI2040-02** (230V) DO kit also includes: HI764080 dissolved oxygen electrode, HI7041S refill electrolyte solution, DO membrane caps (2), o-rings (2) All edge compatible pH, EC and DO digital probes are interchangeable with HI2040 and can be ordered separately.	

* temperature limits will be reduced to actual probe limits

See page 6.27 for DO solutions and accessories

edge® DO

edge DO–Innovation in a Single Parameter

edge DO's groundbreaking design is the culmination of Hanna's vision, design capabilities, integrated production and world class R&D. edge DO is a single meter that can measure pH and ORP and is incredibly easy to use.

Additional feature information

- Clark type digital polarographic probe with easy-to-replace membrane cap
  - Covers all ranges from 0.00 to 45.00 mg/L (ppm); 0.0 to 300% saturation
- Accuracy ±1.5% full scale
- One or two-point calibration (HI7040), 0% (solution) and 100% (air)
- Data logging
  - Manual log-on-demand
  - Manual log-on-stability
  - Interval logging
- Automatic Temperature Compensation from 0 to 50 °C
- GLP data
  - Records date, time, calibration standards, altitude value and salinity value
- Altitude compensation from -500 to 4000 meters (-1640 to 13,123')
- Salinity compensation from 0 to 40g/L

edge®DO technical features

Rechargeable Battery

edge DO has a built in rechargeable battery that is charged when the meter is in the plugged in benchtop or wall mount cradle. The battery can also be recharged through the micro USB port with either a USB port from a computer or directly to the power supply.

Two USB ports

edge DO includes one standard USB for exporting data to a flash drive. edge also includes one micro USB port for exporting files to your computer as well as for charging when the cradle is not available.

Clear, full text readout

edge DO features clear, full text guides displayed on the bottom of the screen. There is no need to decipher scrambled abbreviations or symbols; these helpful messages guide you through every process quickly and easily.

Data logging

edge DO allows you to store up to 1000 log records of data. Logging data sets include readings, GLP data, date and time.

GLP

Data of the last calibration you perform is stored in the sensor including the date, time, and buffers used. When the sensor is connected to edge DO, GLP data is automatically transferred.

edge DO design features

Capacitive touch keypad

edge DO features sensitive capacitive touch buttons for accurate keystrokes when navigating edge's menus and screens. Since they are part of the screen, the buttons can never get clogged with sample residue.

Easy to read LCD

edge DO features a 5.5" (14 cm) LCD display that you can clearly view from over 5 m (16.4'). The large display, with its wide 150° viewing angle, provides one of the easiest to read LCDs in the industry.

Zero footprint

Using the wall mount cradle (included), edge DO can be placed on a wall, leaving zero footprint on the benchtop space. The cradle has a built-in connector to power and charge the batteries.

3.5 mm probe input

Plugging an electrode in has never been simpler; no alignments or broken pins, simply connect the 3.5 mm plug and begin. Digital electrodes are automatically recognized.

Sleek design

Incredibly thin and lightweight, edge measures just 1/2" (12 mm) thick and weighs just 8.8 ounces (250 g).

Accepts edge DO compatible dissolved oxygen probe

A hybrid meter that can be used in portable, wall-mount and benchtop configurations

The versatile design of edge DO enables it to be used as a portable, wall-mount or benchtop meter. edge DO simplifies measurement, configuration, calibration, diagnostics, logging and transferring data directly to a computer or USB drive.

Portable field unit

edge DO is ideal for field use due to its light weight, large screen, and thin design. It can easily be slipped into a backpack or messenger bag. The battery life lasts up to 8 hours when used as a portable device.

Wall-mount cradle

The included wall-mount cradle makes it easy to conserve space on the benchtop while also charging edge DO with the AC adapter. The cradle is ideal for continuous monitoring applications.

Electrode holder with built-in cradle

The electrode holder features a swivel, adjustable arm with a built-in cradle to hold edge pH securely in place at the optimum viewing angle.

Digital electrodes

edge®DO performs measurements through its unique digital electrodes. These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge DO by an easy to plug-in 3.5 mm connector.

Dissolved oxygen electrode

HI764080 (included)

Dissolved oxygen electrode with temperature sensor

Recommended for general purpose

Specifications		HI2004 edge DO
Dissolved Oxygen	Range	0.00 to 45.00 ppm (mg/L); 0.0 to 300.0 % saturation
	Resolution	0.01 ppm (mg/L); 0.1 % saturation
	Accuracy	± 1.5% of reading ±1 digit
	Calibration	one or two-point at 0% (HI7040 solution) and 100% (in air)
	Temperature Compensation	ATC (0 to 50°C; 32.0 to 122.0°F)*
	Salinity Compensation	0 to 40 g/L (with 1 g/L resolution)
	Altitude Compensation	-500 to 4000 m (-1640 to 13120') (with 100 m (328') resolution)
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe	HI764080 digital dissolved oxygen electrode with 3.5 mm (1/8") connector and 1 m (3.3') cable (included)
	Logging	up to 1000 records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information	**HI2004-01** (115V) and **HI2004-02** (230V) edge DO includes: HI764080 dissolved oxygen electrode, HI7041S refill electrolyte solution, DO membrane caps (2), o-rings (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.	

* temperature limits will be reduced to actual probe limits
** with temperature compensation function disabled
† standard mode only

See page 6.27 for DO solutions and accessories

HI5421

Research Grade Bench Meter

Dissolved Oxygen and BOD

The HI5421 is an advanced research grade benchtop Dissolved Oxygen and BOD meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity. The HI5421 is rich in features including data logging, alarm limits, comprehensive GLP, and many more while retaining simplicity in use with both dedicated keys for routine operation and virtual keys that guide the user through setup options.

Customizable User Interface

The user interface of the HI5421 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

The HI5421 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.

Capacitive Touch

The HI5421 features sensitive capacitive touch buttons for accurate keystrokes when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching measurement modes and four virtual keys that change based upon use. The capacitive touch technology ensures the buttons never get clogged with sample residue.

Built in Barometer

Readings are compensated for barometric pressure by a built in pressure transducer located in the meter. Calibration of the barometric pressure is single point with manual entry of current value obtained from local weather service or other device. Barometric pressure is displayed in a multiple choice of units including mmHg, mbar, kPa, mHg, psi, and atm.

Choice of Calibration

Automatic standard recognition is available for two points at 0% and 100% saturation or 0 mg/L and 8.26 mg/L. A user standard option is available for a user defined value.

BOD, OUR and Sour Measurement Modes

An additional three measurement modes are available to measure Biological Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR). Simply enter values and take readings at appropriate times and the meter will automatically calculate the values.

Automatic Salinity Compensation

The HI5421 allows for automatic salinity compensation with a selectable salinity range of 0 to 45 g/L.

GLP Data

View calibration data and calibration expiration information by selecting the Good Laboratory Practice (GLP) display option. Calibration data include date, time, and calibration points.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

Data Logging

Three selectable logging modes are available on the HI5421: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Contextual Help

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

DO probe included

The HI5421 is supplied with the HI76483 Clark-Type Polarographic probe. This probe is only 12 mm in diameter and has a built in thermistor temperature sensor that compensates for temperature variations from 0 to 50°C.

On-screen Features

BOD (Biological Oxygen Demand)

OUR (Oxygen Uptake Rate)

SOUR (Specific Oxygen Uptake Rate)

Specifications		HI5421
Dissolved Oxygen	Range	0.00 to 90.00 ppm (mg/L); 0.0 to 600.0 % saturation
	Resolution	0.01 ppm; 0.1% saturation
	Accuracy	±1.5% of reading ±1 LSD
	Calibration	automatic using single or two-point calibration; user calibration single point
Barometric Pressure	Range	450 to 850 mmHg; 600 to 1133 mBar; 60 to 133 KPa; 17 to 33 inHg; 8.7 to 16.4 psi; 0.592 to 1.118 atm
	Resolution	1 mmHg; 1 mBar; 1 kPa; 1 inHg; 0.1 psi; 0.001 atm
	Accuracy	±3 mm Hg + 1 least significant digit
Temperature	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
Additional Specifications	Measurement Modes	direct DO; BOD (biochemical oxygen demand); OUR (oxygen uptake rate); SOUR (specific oxygen uptake rate)
	Temperature Compensation	0.0 to 50.0°C; 32.0 to 122.0°F; 237.1 to 323.1 K
	Salinity Compensation	0 to 45 ppt
	Barometric Pressure Calibration	single point calibration
	Probe	HI76483 thin body, polarographic dissolved oxygen probe with internal temperature sensor and 1 m (3.3') cable (included)
	Record Samples Logging	Up to 100 lots; 50,000 records max./lot, maximum 100,000 data points; 5000 samples/lot for Manual Logging
	Interval Logging	14 selectable between 1 second and 180 minutes
	Logging Type	manual AutoHOLD, automatic
	Alarm (DO, BOD, OUR, SOUR)	inside and outside limits
	PC Connection	opto-isolated USB
	Display	graphic color LCD with 240x340 pixels
	Power Supply	12 VDC adapter (included)
	Dimensions	160 x 231 x 94 mm (6.3 x 9.1 x 3.7")
	Weight	1.2 kg (2.6 lbs.)
Ordering Information	**HI5421-01** (115V) and **HI5421-02** (230V) is supplied with HI76483 DO probe, HI7041S electrolyte solution (30 mL), DO membrane caps (2), O-rings for DO membrane cap, HI76404W electrode holder, 12 VDC adapter, quality certificates, quick start guide and instruction manual.	

See page 6.28 for DO solutions and accessories

HI2400

Dissolved Oxygen Meter

Dissolved Oxygen and Temperature

- Automatic temperature compensation (ATC)
- Calibration
  - One or two-point calibration at 0% or 100%
- GLP Features
  - Meets Good Laboratory Practices
- Connectivity
  - PC compatible via USB
- Interval logging
- Data logging and storage up to 8000 samples

Accurate, Repeatable Measurements

The HI2400 is a dissolved oxygen benchtop meter with automatic calibration and % or mg/L (ppm) measurement range. The measurement is automatically compensated for altitude and salinity based on the user settings for altitude up to 4000 m and salinity up to 40 g/L.

Measurements are automatically temperature compensated by using the polarographic DO probe with built-in temperature sensor. This probe features screw cap membranes for easy replacement.

Calibration is performed at one or two points at 0% using Hanna's HI7040 solution or 100% in air.

Data Logging

With a built-in logging function, measurements are stored in non-volatile memory, and can be transferred to a PC through the USB port using the optional HI92000 software and HI920013 USB cable. The software is provided with an exclusive online guide of all the commands available and allows data printing, plotting and exporting.

The 8000 record logging interval allows the possibility of process and experimental monitoring of DO. The logging interval is automatic with user-selectable intervals from 5 seconds to 180 minutes.

GLP Capabilities

The HI2400 also provides users with GLP (Good Laboratory Practice) capabilities. GLP is a set of functions that allow the storage and retrieval of data regarding calibration. The GLP feature provides data consistency and a calibration reminder which can be set to alert the user that too much time has elapsed since the last calibration and a new one should be performed.

HI76407

Standard DO Probe

The HI76407 dissolved oxygen probe is extremely rugged, making it ideal for both laboratory and field applications. Calibration is fast and simple, while all DO measurements are temperature compensated. The pre-tensioned, ready-made PTFE membrane can be changed in a matter of seconds without the need to stretch and cut replacements.

Several cable lengths are available.

HI76408

Thinner DO Probe for Laboratories

The HI76408 DO probe is rugged and perfect for both laboratory and field applications. Calibration is fast and simple, and measurements are temperature compensated. The sensitive PTFE membrane can be changed in a few seconds.

Available in 1 m (3.3') cable length..

HI76407A/P

Easy, Screw Cap DO Membranes

Carry Extras for Assurance

Pretensioned PTFE membranes are easily replaced using these screw on cap replacements. Should a pin hole or stretching occur, have replacements on hand.

Specifications		HI2400
Dissolved Oxygen	Range	0.00 to 45.00 mg/L (ppm); 0.0 to 300.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy	±1.5% FS
	Calibration	one or two points at 0% (HI7040 solution) and 100% (in air)
Temperature	Range	0.0 to 50.0°C
	Resolution	0.1°C
	Accuracy	±0.2°C (excluding probe error)
	Altitude Compensation	0 to 4000 m (with 100 m resolution)
	Salinity Compensation	0 to 40 g/L (ppt) (with 1 g/L resolution)
	Temperature Compensation	automatic from 0.0 to 50.0°C (32.0 to 122°F)
	Probe	HI76407/2 polarographic DO probe with internal temperature sensor, DIN connector and 2 m (6.6') cable (included)
	Logging Interval	5, 10, 30 seconds or 1, 2, 5, 10, 15, 30, 60, 120, 180 minutes
	PC Connection	opto-isolated USB
	Power Supply	12 VDC adapter
	Environment	0 to 50°C; RH max 95%
	Dimensions	235 x 222 x 109 mm (9.2 x 8.7 x 4.3")
	Weight	1.3 kg (2.9 lbs.)
Ordering Information	**HI2400-01** (115V) and **HI2400-02** (230V) are supplied with HI76407/2 dissolved oxygen probe, HI76407A membrane caps (2), HI7041S electrolyte solution (30 mL), 12 VDC adapter and instructions.	

See page 6.23 and 6.25 for DO solutions and accessories

HI98193

Professional Waterproof Meters

Dissolved Oxygen and BOD

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Choice of units
  - Display units in % saturation or mg/L (ppm)
- Salinity compensation
  - Salinity compensation allows for direct determination of dissolved oxygen in saline waters.
  - Users can set the salinity value
- Built-in temperature sensor
  - Automatic temperature compensation with one or two-point temperature calibration
  - Displays temperature in °C or °F
- Built-in barometer
  - Automatic barometric pressure compensation with 1 point calibration
  - Displays pressure in user-selectable units (mmHg, inHg, atm, psi, kPa, mbar)
- Built-in calculations
  - Determination of Biochemical Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR)
- Polarization
  - Automatic polarization of probe at startup
- Membrane caps
  - Ready-to-use preformed PTFE membrane caps
- 200 hour battery life
  - Approximately 200 hours of continuous use
- Clear display
  - Dot matrix display with multifunction virtual keys
- AutoHold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- PC Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- Log-on-demand
  - Store measurement data at the press of a button
- GLP
  - GLP data provides calibration data including date, time, pressure, calibrated value, temperature and salinity value of the last calibration

For Universal Applications

The HI98193 is a portable DO meter with extended ranges of up to 50 ppm and 600% saturation. HI98193 features compensations for pressure, temperature and salinity, which are essential for an accurate dissolved oxygen reading. HI98193 is supplied with the HI764073 polarographic dissolved oxygen probe that utilizes field replaceable PTFE membrane caps.

Backlit Graphic LCD Display

The HI98193 features a backlit graphic LCD with on-screen help. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick connect probe

The HI764073 DO probe features a quick connect DIN connector to make attaching and removing the probe simple and easy.

The HI764073's built-in temperature sensor allows for automatic temperature compensation. The temperature sensor can be calibrated to one or two points. Manual entry of salinity values allows for the salinity compensation of dissolved oxygen readings in saline waters.

Measurement

The HI98193 has extended ranges of up to 50 ppm and 600% saturation. When measuring dissolved oxygen, compensations for salinity, temperature and pressure are essential to improve the accuracy and precision of readings.

BOD, OUR and SOUR

- BOD results
  - BOD is calculated in mg per liter from the difference between the initial and final dissolved oxygen

- BOD parameters and records
  - All necessary parameters for BOD testing can be set and displayed at once.
  - A list of all saved BOD data can be easily retrieved and shown on the LCD display.

- OUR results
  - Measured in mg of oxygen consumed per L per hour.

- SOUR results
  - Measured in mg of oxygen consumed per g of volatile suspended solids per hour.

AutoHold

Pressing AutoHold during measurement will automatically hold the first stable reading on the display.

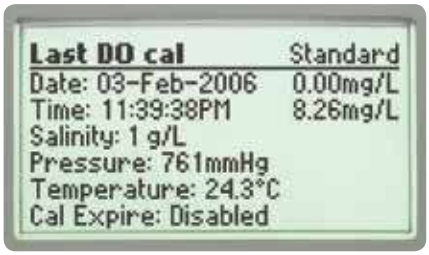
Built-in Barometer

With the internal barometer, the HI98193 is able to compensate for changes in barometric pressure so there is no need for charts, altitude information or external barometric pressure information.

Pressure compensation with the meter's built-in barometer can be validated against a reference barometer, and if needed, can be recalibrated in user-selectable units (mmHg, inHg, atm, psi, kPa, mbar).

Data Logging

The HI98193's log on-demand feature allows users to store up to 400 readings. This data can then be transferred to a PC with the HI920015 USB cable and HI92000 software.



GLP

Comprehensive GLP functions are directly accessible by pressing the GLP key. This data includes date, time, pressure, calibrated value, temperature and salinity value of the last calibration.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.

Dedicated Help Key

Access help at any time at the press of a dedicated button and view content specific information based on the screen that is currently being viewed.

Setup screen

Our extensive setup screen features a host of configurable options such as time, date, temperature units and language for help screens and guides

PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI920015 micro USB cable and HI92000 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 200 hours of battery life.

Rugged custom carrying case

The HI98193 meter, probe, and all accessories are supplied in the HI720193 rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

Specifications		HI98193
Dissolved Oxygen	Range	0.00 to 50.00 mg/L (ppm); 0.0 to 600.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@25°C/77°F)	±1.5% of reading ±1 digit
	Calibration	automatic one or two point at 100 % (8.26 mg/L) and 0 % (0 mg/L).; manual one point using a value entered by the user in % saturation or mg/L
Atmospheric Pressure	Range	450 to 850 mmHg
	Resolution	1 mmHg
	Accuracy (@25°C/77°F)	± 3 mmHg within ±15% from the calibration point
	Calibration	one point at any in range pressure value
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy (@25°C/77°F)	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two point at any in range temperature value
Additional Specifications	Measurement Modes	direct DO; BOD (biochemical oxygen demand); OUR (oxygen uptake rate); SOUR (specific oxygen uptake rate)
	Barometric Compensation	automatic from 450 to 850 mmHg
	Salinity Compensation	automatic from 0 to 70 g/L
	Temperature Compensation	automatic from 0.0 to 50.0 °C (32.0 to 122.0 °F)
	Probe	HI764073 polarographic DO probe with protective sleeve, internal temperature sensor, DIN connector and 4m (13') cable (included)
	Logging	log-on-demand up to 400 samples
	PC Connectivity	opto-isolated USB (with HI92000 software)
	Battery Type / Life	1.5V (4) AA batteries / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user-selectable: 5, 10, 30, 60 min or can be disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4")
	Weight	400 g (14.2 oz.)
Ordering Information	**HI98193** is supplied with HI764073 polarographic DO probe with protective sleeve, HI7040 bi-component zero oxygen solution (230 mL + 30 mL), HI7041S electrolyte solution (30 mL), preformed PTFE membrane caps (2), DO protective cap, O-rings (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720193 rugged carrying case with custom insert.	

See page 6.24 for DO solutions and accessories

HI9147

Dissolved Oxygen Meter for Aquaculture

- Automatic Temperature Compensation (ATC)
- Waterpoof
- Backlit LCD

The HI9147 is designed for aquaculture applications. This unit is unique among our family of DO meters as it is supplied with a galvanic probe.

Unlike polarographic probes, galvanic DO probes require no conditioning time. When you need to measure multiple samples in a given period of time, simply turn the meter on and start taking measurements.

The HI9147 is a must have for DO sensitive organisms or high bio-load environments.

DO Levels at 100% Saturation

	Salinity (ppt)				
Temperature	0	10	20	30	40
10°C / 50°F	13.0	12.2	11.4	10.6	9.8
15°C / 59°F	10.3	9.7	9.2	8.6	8.1
20°C / 68°F	9.4	8.8	8.4	7.9	7.4
25°C / 77°F	8.5	8.0	7.6	7.2	6.7
30°C / 86°F	7.8	7.4	7.0	6.6	6.2

Specifications		HI9147
Dissolved Oxygen	Range	0.0 to 50.0 mg/L (ppm); 0 to 600% saturation
	Resolution	0.1 mg/L (ppm); 1% saturation
	Accuracy (@ 20°C/68°F)	±1% of reading
Temperature	Range	-5.0 to 50.0°C; 23.0 to 122.0°F
	Resolution	0.1°C; 1°F
	Accuracy (@ 20°C/68°F)	±0.2°C; ±1°F (excluding probe error)
Additional Specifications	Calibration	manual, in saturated air
	Temperature Compensation	automatic, 0° to 50°C (32°F to 122°F)
	Altitude Compensation	0 to 4000 m (resolution 100 m)
	Salinity Compensation	0 to 51 g/L (ppt) (1 g/L resolution)
	Probe	HI76409/4 galvanic DO probe (fixed) with internal temperature sensor, DIN connector and 4 m (13') cable (HI9147-04), 10 m (33') cable (HI9147-10), or 15 m (49') cable (HI9147-15)
	Battery Type / Life	1.5V AAA (3) / approx. 1000 hours of continuous use without backlight
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions / Weight	185 x 72 x 36 mm (7.3 x 2.8 x 1.4") / 450 g (15.9 oz.)
Ordering Information	**HI9147-04** is supplied with HI76409/4 probe with 4 m (13') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	
	HI9147-10 is supplied with HI76409/10 probe with 10 m (32.8') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	
	HI9147-15 is supplied with HI76409/15 probe with 15 m (49.2') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	

See page 6.26 for DO solutions and accessories

HI9146

Dissolved Oxygen Meter

Dissolved oxygen is a commonly measured parameter in aquaculture, wastewater treatment, environmental studies, and wine analysis. The HI9146 is a rugged, portable dissolved oxygen (DO) meter designed to provide high accuracy measurements whether in the field or in the lab. The meter features automatic calibration performed at one or two points in saturated air and/or zero oxygen solution. All readings are automatically compensated for temperature variations and can be frozen on the display upon stability using the auto-end feature. Salinity and altitude compensation are user adjustable based on the environmental conditions that are present. The HI9146 features a Battery Error Prevention System (BEPS) that detects when the batteries become too weak to ensure reliable measurements. The HI9146 is supplied complete and ready to use.

Polarographic Measuring System

The meter and probe use polarographic sensor technology based on the Ross and Clark polarographic measurement method. The probe is comprised of a platinum cathode and silver anode in an electrolyte solution held in place over the surfaces of the electrodes by a polymer membrane. An external voltage applied across the system establishes a current proportional to the concentration of dissolved oxygen.

Replaceable Membrane Caps

The pretensioned thin polytetrafluoroethylene (PTFE) membranes employ a screw cap design that can be changed quickly by simply filling with the HI7041 electrolyte fill solution and screw on the DO probe.

Automatic Calibration

Calibration can be performed at one or two points to 100% and/or 0% saturation. The 100% saturation is done in air while the 0% is done with the HI7040 bicomponent zero oxygen solution.

Good Laboratory Practice (GLP)

The Good Laboratory Practice feature allows the user to recall calibration information including date, time and calibrations points.

Automatic Temperature Compensation

All readings are automatically compensated for temperature variations with a high accuracy, built in linearized thermistor temperature sensor behind a stainless steel cover.

Altitude Compensation

The HI9146 allows for altitude compensation for up to 4000 meters with a 100 meter resolution.

Salinity Compensation

Salinity compensation is adjustable from 0 to 80 g/L (ppt) with a 1 g/L resolution for the measurement of DO is brackish and seawater.

Auto End Point

The HI9146 features an auto endpoint mode in which when selected the reading will frozen on the display once a stable measurement is obtained. The auto-end feature allows for consistency among various users by ensuring that stability has been achieved before recording a measurement.

Backlit LCD

The HI9146 has a display with a backlight for easy viewing of readings in poor lighting conditions.

Battery Error Prevention System (BEPS)

The Battery Error Prevention System detects when the batteries become too weak to ensure reliable measurements. The backlight feature is automatically disabled when batteries are getting low and a clear indication is displayed to warn the user of this condition.

Specifications		HI9146
Dissolved Oxygen	Range	0.00 to 45.00 mg/L (ppm); 0.0 to 300.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@ 25°C/77°F)	±1.5% F.S. or ±1 digit, whichever is grater
Temperature	Range	0.0 to 50.0°C; 32.0 to 122.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy (@ 25°C/77°F)	±0.2°C ; ±0.4°F (excluding probe error)
Additional Specifications	Dissolved Oxygen Calibration	one or two points at 0% (HI7040 solution) and 100% (in air)
	Temperature Compensation	automatic from 0 to 50°C (32 to 122°F)
	Altitude Compensation	0 to 4000 m (resolution 100 m)
	Salinity Compensation	0 to 80 g/L (ppt) (resolution 1 g/L)
	Probe	HI76407/4F polarographic DO probe, internal temperature sensor, DIN connector and 2 m (6.6') cable (included)
	Battery Type / Life	1.5V AAA (3) /approximately 200 hours of continuous use without backlight (50 hours with backlight on)
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
	Weight	300 g (10.6 oz.)
Ordering Information	**HI9146-04** is supplied complete with HI76407/4F probe with 4 m (13.1') cable, HI76407A membranes (2), HI7041S electrolyte solution (30 mL), batteries, instructions and rugged carrying case. **HI9146-10** is supplied complete with HI76407/10F probe with 10 m (32.8') cable, HI76407A membranes (2), HI7041S electrolyte solution (30 mL), batteries, instructions and rugged carrying case.	

See page 6.24 for DO solutions and accessories

HI9142

Manual Calibration Dissolved Oxygen Meter

- Automatic Temperature Compensation (ATC)
- One or two-point calibration
- Waterproof

The ever increasing demand for instant on-site analysis results has created a need for innovative, rugged, portable and waterproof meters.

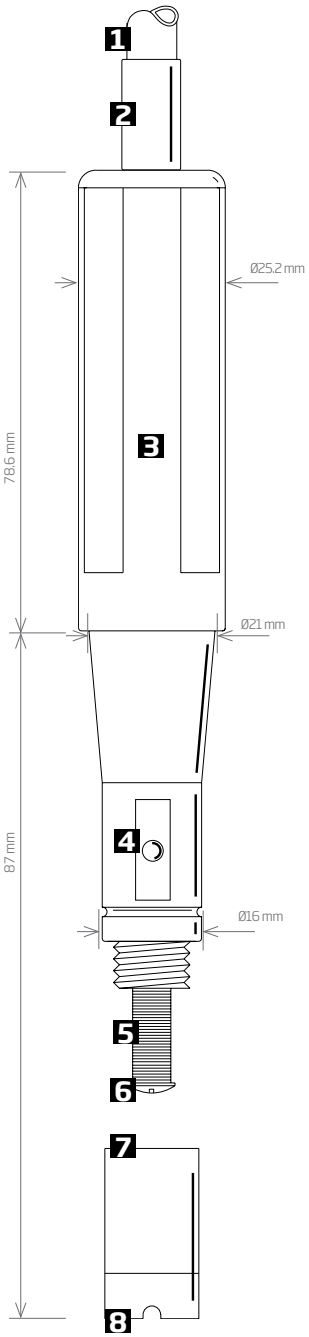
Field work can subject instrumentation to the inclemency of weather. Cold, rain, snow, dust and humidity can cause condensation to breech the housing. Once the housing has been compromised, the meter is susceptible to diminishing performance and life span. The rugged, waterproof housing of the HI9142 solves many of the problems of field use.

Calibration is performed with HI7040 zero oxygen solution, while 100% calibration is done in air.

The polarographic probe (HI76407/4) is accurate to 0.3 ppm and is supplied with a 4 m (13') cable that allows measurements to be taken even in hard to reach places.

Specifications		HI9142
Dissolved Oxygen	Range	0.0 to 19.9 mg/L (ppm)
	Resolution	0.1 mg/L (ppm)
	Accuracy (@ 25°C/77°F)	±1.5% F.S.
Temperature	Range	-5.0 to 50.0°C (23.0 to 122.0°F)
	Resolution	0.1°C (1°F)
	Accuracy (@ 25°C/77°F)	±0.2°C (±1°F) (excluding probe error)
Additional Specifications	Calibration	automatic in zero oxygen solution; manual in 100% water saturated air
	Temperature Compensation	automatic, 0 to 50°C (32 to 122°F)
	Probe	HI76407/4 polarographic DO probe with internal temperature sensor, DIN connector and 4 m (13') cable
	Battery Type / Life	1.5V AAA (3) / approximately 1,000 hours of continuous use
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
	Weight	300 g (10.6 oz.)
Ordering Information	**HI9142** is supplied with HI 76407/4 probe with 4 m (13') cable, 2 spare membranes, HI7041S electrolyte solution (30 mL), calibration screwdriver, batteries, instructions and rugged carrying case.	

See page 6.23 for DO solutions and accessories



HI76407

HI76407

Standard DO Probe

The HI76407 is a standard Clark-type polarographic dissolved oxygen probe for Hanna's benchtop and portable dissolved oxygen meters. The probe is constructed of durable ABS plastic and contains an integrated temperature sensor for temperature compensated measurements. It is compatible with our HI76407A/P PTFE membrane caps. Each membrane separates the probe's platinum cathode and silver anode from the water sample being measured. Oxygen diffuses across the membrane and interacts with the polarographic system to produce a current proportional to oxygen concentration. Each cap is easily filled with HI7041 electrolyte and screwed onto the probe. The probe's tapered design makes it ideal for BOD measurements.

1. Shielded, waterproof cable
2. Protective sleeve
3. PEI probe for best field protection
4. Linearized and accurate thermistor temperature sensor protected behind a stainless steel cover
5. Silver wire anode element
6. Glass encapsulated platinum cathode
7. Screw cap membrane that holds potassium chloride electrolyte solution (HI7041S)
8. Thin, permeable PTFE membrane isolates the sensor elements from the testing solution, but allows oxygen to enter (HI76407A/P)

Probe	Cable Length	Recommended Meter
HI76407/2	2 m (6.6')	HI2400 HI9142
HI76407/4	4 m (13')	
HI76407/10	10 m (33')	
HI76407/20	20 m (33')	

HI76407A/P

Easy, Screw Cap DO Membranes

When the PTFE (polytetrafluoroethylene) membrane of the protective cap wears, it is always good to have a back-up.

HI76407A/P	contains 5 ready-to-use, replacement membranes.

HI7041

Electrolyte Solution

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance. For this purpose, Hanna has developed HI7041 electrolyte solution to refill the membrane cap.

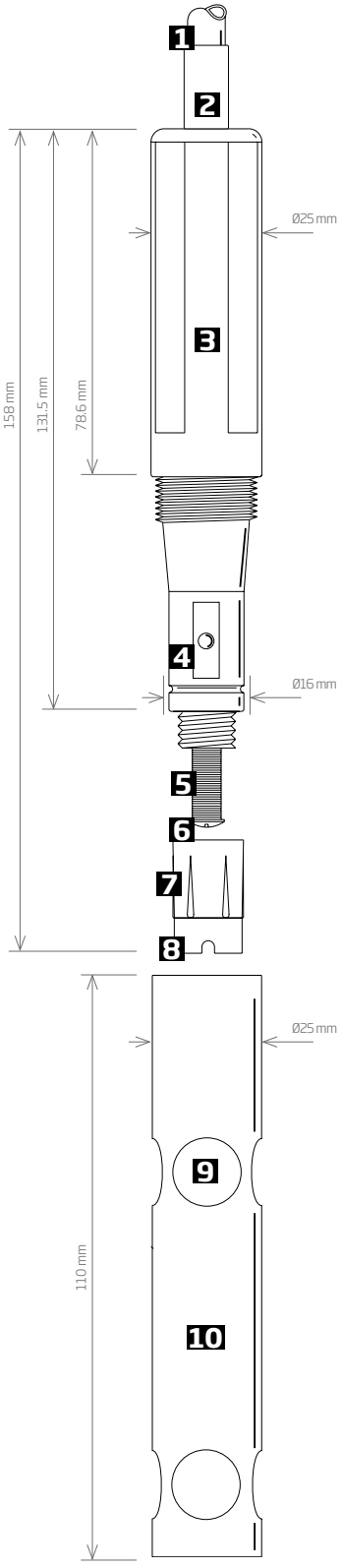
HI7041S	refilling electrolyte solution (30 mL)
HI7041	refilling electrolyte solution (6 x 30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)

HI76407 · HI764073 Protected Sleeve Series

DO Probe

with Protective Sleeve

The HI76407/F is a standard Clark-type polarographic dissolved oxygen probe for Hanna's benchtop and portable dissolved oxygen meters. The probe is constructed of durable ABS plastic and contains an integrated temperature sensor for temperature compensated measurements. It is compatible with our HI76407A/P PTFE membrane caps. Each membrane separates the probe's platinum cathode and silver anode from the water sample being measured. Oxygen diffuses across the membrane and interacts with the polarographic system to produce a current proportional to oxygen concentration. Each cap is easily filled with HI7041 electrolyte and screwed on to the probe. The probe's protective sleeve makes it ideal for use in rugged or demanding environments.



1. Shielded, waterproof cable
2. Protective sleeve
3. PEI probe for best field protection
4. Linearized and accurate thermistor temperature sensor protected behind a stainless steel cover
5. Silver wire anode element
6. Glass encapsulated platinum cathode
7. Screw cap membrane that holds potassium chloride electrolyte solution (HI7041S)
8. Thin, permeable PTFE membrane isolates the sensor elements from the testing solution, but allows oxygen to enter (HI76407A/P)
9. Hole for solution cycling
10. Protective sleeve for field applications

Probe	Cable Length	Recommended Meter
HI76407/4F	4 m (13')	HI9146
HI76407/10F	10 m (33')	
HI76407/20F	20 m (66')	
HI764073	4 m (13')	HI98193

HI76407A/P

Easy, Screw Cap DO Membranes

When the PTFE (polytetrafluoroethylene) membrane of the protective cap wears, it is always good to have a back-up.

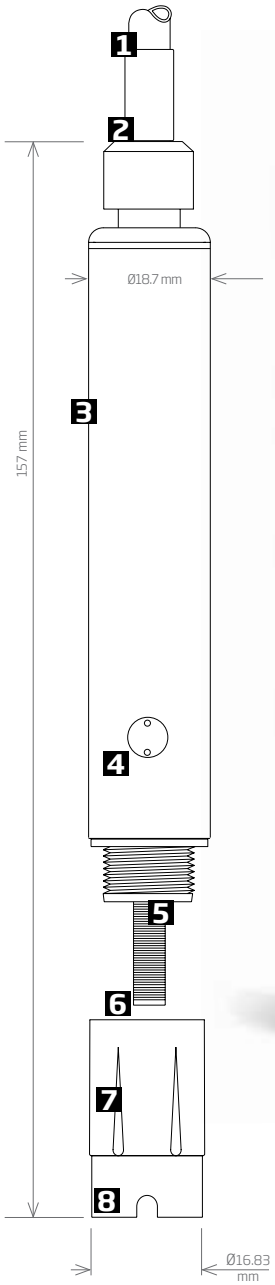
HI76407A/P	contains 5 ready-to-use, replacement membranes.

HI7040 • HI7041

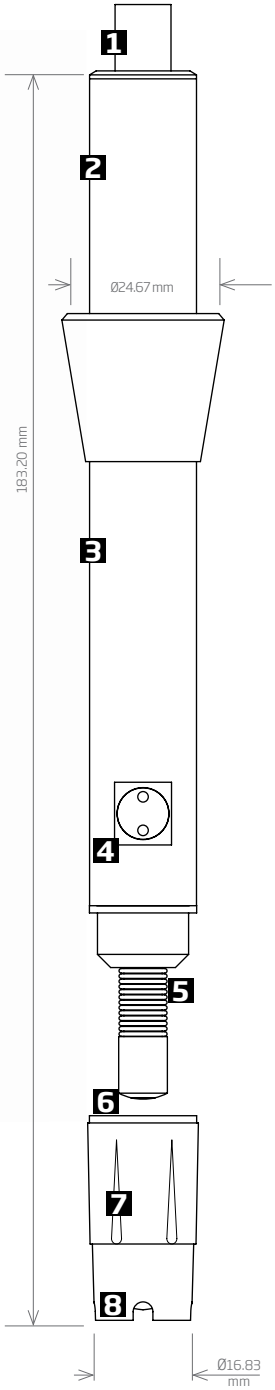
DO Solutions

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance.

HI7040L	zero oxygen solution set, 500 mL + 12g
HI7041S	refilling electrolyte solution (30 mL)
HI7041	refilling electrolyte solution (6 x 30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)



HI76408



HI76408W

HI76408 · HI76408W

Thinner, Lighter Probe

for Laboratories

The HI76408 is a thinner polarographic dissolved oxygen probe for Hanna's benchtop and portable dissolved oxygen meters. It contains a platinum cathode and silver anode and is for use with HI76407A/P PTFE membrane caps. The probe's thin design makes it ideal for wine packaging measurements.

The HI76408W is a thin polarographic dissolved oxygen probe for Hanna's portable dissolved oxygen meters designed to be used when performing a BOD test. Calibration is fast and simple, and measurements are temperature compensated. The sensitive PTFE membrane can be changed in a few seconds for continued use in the field.

1. Shielded, waterproof cable
2. Protective sleeve
3. PEI probe for best field protection
4. Linearized and accurate thermistor temperature sensor protected behind a stainless steel cover
5. Silver wire anode element
6. Glass-encapsulated platinum cathode
7. Screw cap membrane that holds potassium chloride electrolyte solution (HI7041S)
8. Thin permeable PTFE membrane isolates the sensor elements from the testing solution, but allows oxygen to enter (HI76407A/P)

Probe	Cable Length	Recommended Meter
HI76408	1 m (3.3')	HI2400
HI76408W	1 m (3.3')	HI2400

HI76407A/P

Easy, Screw Cap DO Membranes

When the PTFE (polytetrafluoroethylene) membrane of the protective cap wears, it is always good to have a back-up.

HI76407A/P	contains 5 ready-to-use, replacement membranes.

HI7040 • HI7041

DO Solutions

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance.

HI7040L	zero oxygen solution set, 500 mL + 12g
HI7041S	refilling electrolyte solution (30 mL)
HI7041	refilling electrolyte solution (6 x 30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)

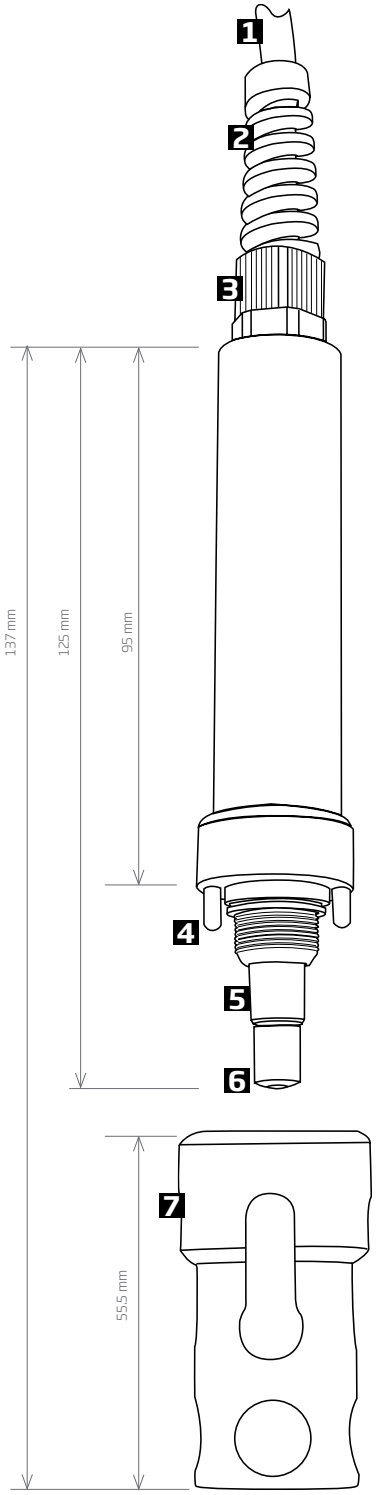
HI76409

Galvanic DO Probe

with Protective Cap

The HI76409 is a standard galvanic dissolved oxygen probe for use with the HI9147 portable dissolved oxygen meter. Galvanic probes require no conditioning time and therefore allow the ability to measure instantaneously. With extreme portability and a straightforward design, this probe is ideal for both field and lab use.

The D.O. probe is provided with a membrane covering the galvanic sensors and a built-in thermistor for temperature measurement and compensation. The thin permeable membrane isolates the sensor elements from the testing solution but allows oxygen to enter. Oxygen that passes through the membrane causes a current flow, from which the oxygen concentration is determined.



1. Shielded, waterproof cable
2. Flex protect
3. Strain relief for cable
4. Temperature sensors
5. Zinc (Zn) anode
6. Ag^+ cathode (3.5 mm), pure silver
7. Protective cap

Probe	Cable Length	Recommended Meter
HI76409/4	4 m (13')	HI9147 (meter specific, fixed probe)
HI76409/10	10 m (33')	

HI76409A/P

Easy, Screw Cap DO Membranes

When the HDPE (High Density Polyethylene) membrane of the protective cap wears, it is always good to have a back-up.

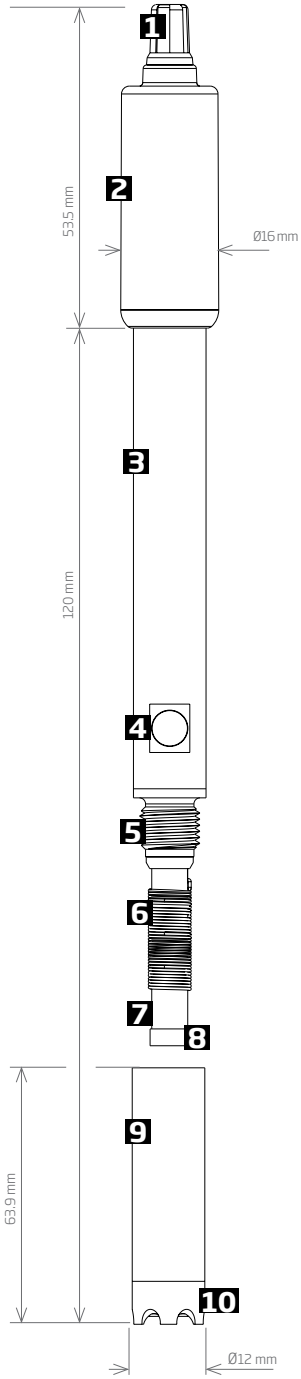
HI76409A/P	Contains 5 ready-to-use, replacement membranes

HI7040 • HI7042

DO Solutions

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance.

HI7040L	Zero oxygen solution set, 500 mL + 12g
HI7042S	Refilling electrolyte solution (30 mL)



HI764080

edge® Compatible Digital DO Probe

The HI 764080 is a digital dissolved oxygen electrode with built-in temperature sensor. This ultra-thin, Clark-type polarographic electrode is designed for measuring DO in aqueous solutions and contains a built-in microchip that stores sensor type, serial number, and calibration information. The sensor features a platinum cathode with a silver/silver chloride anode, an integrated temperature sensor, and easily replaceable PTFE membrane caps. The HI 764080 is designed for use with Hanna's edge® pH/EC/DO meter.

- Digital Microprocessor
- Ultra-thin design – 12mm body for convenience
- Replaceable membranes – easy screw on for easy maintenance
- Polarographic sensor
- Built-in temperature sensor
- 3.5mm digital plug – easy to plug in, no alignment necessary

1 Strain relief
2 Probe cap
3 PEI probe body
4 Temperature sensor
5 Threads for membrane cap
6 Ag/AgCl anode and reference
7 Glass insulator
8 Platinum cathode
9 Disposable membrane cap
10 Oxygen permeable PTFE membrane

Probe	Cable Length	Compatible edge™ meters
HI764080	1 m (3.3')	HI2020 HI2030 HI2040 HI2004

HI764080A/P

Easy, Screw Cap DO Membranes

When the HDPE (High Density Polyethylene) membrane of the protective cap wears, it is always good to have a back-up.

HI764080A/P	Contains 5 ready-to-use, replacement membranes

HI7041

Electrolyte Solution

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance. For this purpose, Hanna has developed HI7041 electrolyte solution to refill the membrane cap.

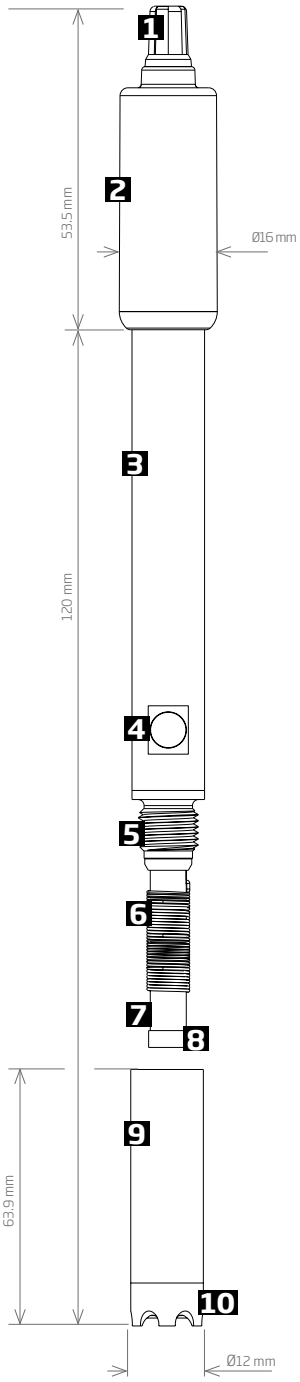
HI7041S	refilling electrolyte solution (30 mL)
HI7041	refilling electrolyte solution (6 x 30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)

HI76483

Polarographic DO Probe

The HI76483 Clark-Type Polarographic probe measures a wide range of dissolved oxygen from 0.0 to 600% saturation and 0.00 to 90.00 mg/L (ppm). The HI76483 has a slim design measuring only 12 mm in diameter and has a built-in thermistor temperature sensor that compensates for temperature variations from 0 to 50°C.The HI76483 is a spare DO probe for use with the HI5421 Laboratory Research Grade Benchtop Dissolved Oxygen and BOD Meter.

- Polarographic DO probe with analog signal
- 12 mm design that incorporates integral temperature
- Durable PEI (polyetherimide) body and membrane cap has outstanding chemical resistance
- Incorporated 1 m cable and DIN connector



1 Strain relief
2 Probe cap
3 PEI probe body
4 Temperature sensor
5 Threads for membrane cap
6 Ag/AgCl anode and reference
7 Glass insulator
8 Platinum cathode
9 Disposable membrane cap
10 Oxygen permeable PTFE membrane

Probe	Cable Length	Recommended meters
HI76483	1 m (3.3')	HI5421

HI76483A/P

Easy, Screw Cap DO Membranes

When the HDPE (High Density Polyethylene) membrane of the protective cap wears, it is always good to have a back-up.

HI76483A/P	Contains 5 ready-to-use, replacement membranes

HI7041

Electrolyte Solution

It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance. For this purpose, Hanna has developed HI7041 electrolyte solution to refill the membrane cap.

HI7041S	refilling electrolyte solution (30 mL)
HI7041	refilling electrolyte solution (6 x 30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)

Table of Contents

Product Spotlights

HI9829

GPS Multiparameter Meter with Autonomously Logging Probe

Rugged, waterproof and easy to use, the HI9829 is the ideal meter for field measurements of lakes, rivers and seas. The HI9829 meter displays 1 to 12 parameters simultaneously from up to 15 user selectable parameters.

Combined with one of the HI76x9829 series probes, the HI9829 can measure water quality parameters such as pH, ORP, conductivity, turbidity, temperature, ions ammonium, nitrate, chloride (as NH_4^+–N, NO_3^-–N or Cl^-), dissolved oxygen (as % saturation or concentration), resistivity, TDS, salinity, and seawater σ. Atmospheric pressure is measured for DO concentration compensation.

See page 7.16

Multiparameter Guide

	(B) Benchtop, (P) Portable	pH	ORP	ISE	EC	TDS	Resistivity	Salinity	Temperature	Ammonium	Chloride	Nitrate	Seawater σ	Turbidity	Dissolved Oxygen	Atmospheric Pressure	GPS	Fast Tracker™	Logging	Page
HI5522	B	•	•	•	•	•	•	•	•										•	7.4
HI5521	B	•	•		•	•	•	•	•										•	7.10
HI2550	B	•	•	•	•	•		•	•										•	7.14
HI9829	P	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•[1]	•	•	7.16
HI98194	P	•	•		•	•	•	•	•				•		•	•			•	7.30
HI98195	P	•	•		•	•	•	•	•				•						•	7.34
HI98196	P	•	•						•						•	•			•	7.38
HI991300	P	•			•	•			•											7.42
HI991301	P	•			•	•			•											7.42
HI9814	P	•			•	•			•											7.44
HI9813-5	P	•			•	•			•											7.46
HI9813-6	P	•			•	•			•											7.46
HI9811-5	P	•			•	•			•											7.48
HI9812-5	P	•			•	•			•											7.48

[1] Select Models

HI98194 • HI98195 • HI 98196

Multiparameter Meters

pH / mV, ORP, EC, TDS, Resistivity, Salinity, Seawater σ, Dissolved Oxygen Atmospheric Pressure and Temperature

These meters provide multiparameter measurement in a compact and rugged, IP67 waterproof body. Ideal for demanding applications, each meter features our rugged, easy connect multi-function probe with field replaceable sensors.

Continuous logging and log-on-demand allows users to record and save up to 44,000 samples. This data can later be transferred to a PC with Hanna's HI920015 micro USB cable and HI92000 software.

Comprehensive GLP data are directly accessible by pressing the GLP key to display last calibration data. The contextual Help Menu can be accesssed to obtain on-screen information and assistance about each feature at the touch of a button.

A backlit, graphic LCD provides easy to read resolution even in low-lit areas. A combination of dedicated and soft keys allows easy, intuitive operation in a choice of languages.

See pages 7.30, 7.34 and 7.38

HI9814

GroLine pH / EC / TDS / Temperature Meter

with Multiparameter Probe

The HI9814 is a versatile pH, conductivity (EC), total dissolved solids (TDS), and temperature meter designed for hydroponics, greenhouse and agriculture applications. All operations and settings, including calibration buffers and temperature scale selections, are made through only two buttons. The housing is waterproof and rated for IP67 conditions.

See page 7.44

HI5522

Research Grade Meter

pH/ORP/ISE and EC/TDS/Resistivity/Salinity and Temperature

The HI5522 is an advanced research grade benchtop pH/ORP/ISE and EC/TDS/Salinity/Resistivity meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity.

The HI5522 is a two-channel meter that allows for simultaneous measure of pH, ORP, or ISE on one channel and EC, TDS, Salinity, or Resistivity on the other. Channel one has a BNC connection for use with the expansive line of pH, ORP, and ISE electrodes that Hanna Instruments offers. The meter is supplied with the HI1131B glass body, double junction, combination pH electrode that operates over a wide temperature range from 0 to 100°C. All readings are automatically compensated for temperature variations with the separate HI7662-T temperature probe or from the built in temperature sensor of the conductivity probe on Channel Two. The HI5522 is supplied with the HI76312 four-ring conductivity probe that operates over a wide range from 0.000 µS/cm to 1000.0 mS/cm*. The meter can be set to auto-ranging in which the meter chooses the appropriate conductivity range from seven ranges or fixed range in which the meter will only display reading in µS/cm or mS/cm. All readings are automatically compensated for temperature variations with a built in temperature sensor. The temperature correction coefficient is adjustable from 0.00 to 10.00 %/°C.

As a pH meter the HI5522 can be calibrated up to five points with a choice of eight pre-programmed buffers or five custom buffers. The HI5522 features Hanna's exclusive CAL Check™ to alert the user of potential problems during the pH calibration process. Indicators displayed during calibration include "Electrode Dirty/Broken" and "Buffer Contaminated." The overall probe condition based on the offset

and slope characteristic of the electrode is displayed as a percentage after calibration is complete.

In ISE mode the HI5522 can be calibrated up to five points with a choice of five fixed standards or five user defined in any concentration unit. The calibration data including date, time, standards used and slope can be viewed at any time along with the current measurement by selecting the Good Laboratory Practice (GLP) display option.

As an EC/TDS/Salinity/Resistivity meter the HI5522 can be calibrated up to four points with a choice of six pre-programmed conductivity standards or user defined custom standards. Resistivity, TDS, Practical Salinity (PSU) and Natural Seawater Scale are calibrated through conductivity. The % NaCl is calibrated to single point with the HI7037 salinity standard. The calibration data including date, time, and standards used, offset and cell factor can be accessed at any time along with the current measurement by selecting the Good Laboratory Practice (GLP) display option.

For the measurement of high purity water used in pharmaceutical manufacturing, the HI5522 is programmed with the three stages of the USP <645> method. Once a stage is met a report is generated and can be saved. Up to 200 reports can be stored and transferred to a Windows® compatible computer using the supplied USB cable and software.

Three selectable logging modes are available: automatic, manual and AutoHold logging. Up to 100,000 data points can be recorded in 100 lots with 50,000 records max/lot on each channel and exported to a computer for data review and storage.

Customizable User Interface

The user interface of the HI5522 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

The HI5522 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.

Capacitive Touch

The HI5522 features sensitive capacitive touch buttons for accurate keystrokes when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching measurement modes and four virtual keys that change based upon use. The capacitive touch technology ensures the buttons never get clogged with sample residue.

Four Ring Conductivity Probe

All readings are performed with the HI76312 four-ring conductivity probe that has a built in temperature sensor for automatic temperature correction. The four rings are made with platinum and the body of the electrode is made of Polyetherimide (PEI) plastic that is resistant to many harsh chemicals. The four-ring design allows for this probe to be used over a wide range of measurements.

Choice of Calibration

Automatic buffer recognition, semiautomatic, and direct manual entry pH calibration options are available for calibrating up to five points, from a selection of eight standard buffers and up to five custom buffers. For the conductivity channel the calibration can be set to automatic standard recognition or user entry along with a choice of single or multi-point. Calibration can be performed up to four points when multi-point is selected.

CAL Check™

CAL Check alerts users to potential problems during the calibration of the pH electrode. Indicators include "Electrode Dirty/Broken," "Buffer Contaminated," electrode response time and the overall probe condition as a percentage that is based on the offset and slope characteristics.

GLP Data

HI5522 includes a GLP Feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data include date, time, standards used for calibration.

ISE Measurement with Choice of Concentration Units

The HI5522 allows for calibration and readings in choice of concentration units. The choices of concentration units include ppt, g/L, mg/mL, ppm, mg/L, µg/L, ppb, µg/L, mg/mL, M, mol/L, mmol/L, %w/v and a user-defined unit.

ISE Measurement with Incremental Methods

The known addition, known subtraction, analyte addition, and analyte subtraction incremental methods are pre-programmed into the HI5522. Simply follow the on screen guided procedure and the meter will perform the calculation automatically allowing for a higher level of accuracy to be obtained as compared to a direct ISE measurement.

Data Logging

Three selectable logging modes are available on the HI5522: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

Contextual Help

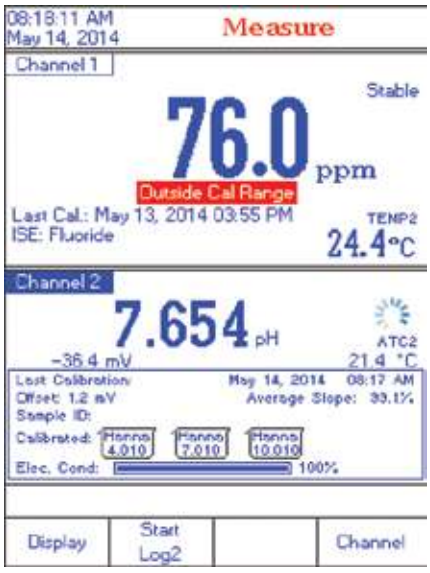
Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

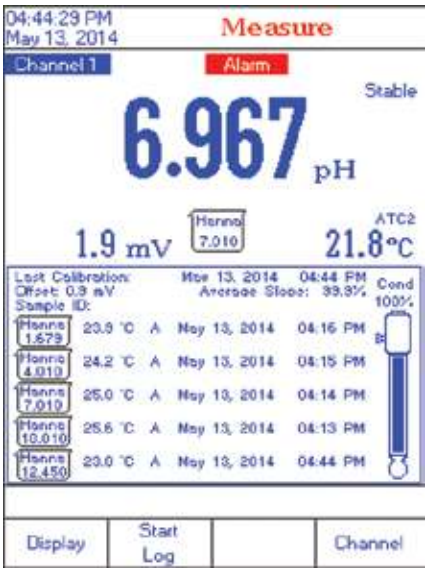
pH and EC Features

pH CAL Check™

Proper calibration of the pH electrode system is critical in order to achieve reliable results. Hanna's exclusive CAL Check system includes several features to help users reach that goal.

- Each time a pH calibration is performed, the instrument compares the new calibration with the previous one. When this comparison indicates a significant difference, the message alerts the user to either clean the electrode, check the buffer or both.
- When measurements are taken too far from the calibration points, the instrument will warn the user with a message on the LCD.
- The condition of the pH electrode after calibration is shown on the display, as well as the date and time.
- To avoid taking readings with old calibrations, the instrument automatically reminds the user when the calibration has expired.





EC USP Mode

Hanna's HI5522 and HI5521 together with EC probes can be used for conductivity measurements required to prepare water for injection (WFI) according to USP <645>.

The instruments give clear instructions on how to perform each stage and automatically check that the temperature, conductivity and stability are within USP limits.

Comprehensive results are shown on a single screen at the end of the test. Up to 200 reports can be saved for future recall.

ISE Features

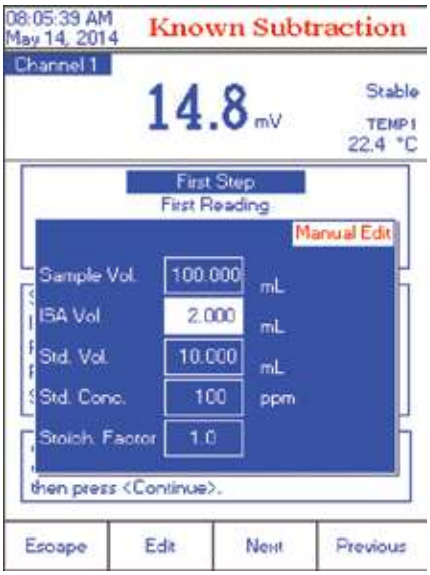
ISE Incremental Methods

Ion concentration determinations with ISEs can be made faster and easier using the streamlined incremental methods.

Incremental methods involve adding a standard to a sample or sample to a standard and detecting the mV change that occurs due to the addition, and this difference determines the concentration. Historically the user would use mathematical equations to determine the ion concentration of the sample; the HI5522, sample concentrations are calculated automatically and then logged into an ISE method report; up to 200 reports can be saved for future recall. The entire process can be repeated on multiple samples without reentering sets of parameters. Reports can be printed using HI92000 PC software.

Incremental method techniques can reduce errors from variables such as temperature, viscosity, pH or ionic strength. The electrodes remain immersed throughout the process, thus reducing measurement time as well as eliminating sample carry over and its associated errors.

Known Addition, Known Subtraction, Analyte Addition, and Analyte Subtraction methods are standard method choices provided by the HI5522.



First Step

The first step in performing an incremental method analysis is to enter the required parameters including sample, ISA and standard volumes, as well as standard concentration and stoichiometric factor.

When repeating the analysis on another sample, the parameters do not need to be reentered.

Sequence of Readings

Once the variables are entered, the user is guided step-by-step through the measurement process.

The initial mV measurement is made before the addition; next is the addition, followed by the second mV measurement.

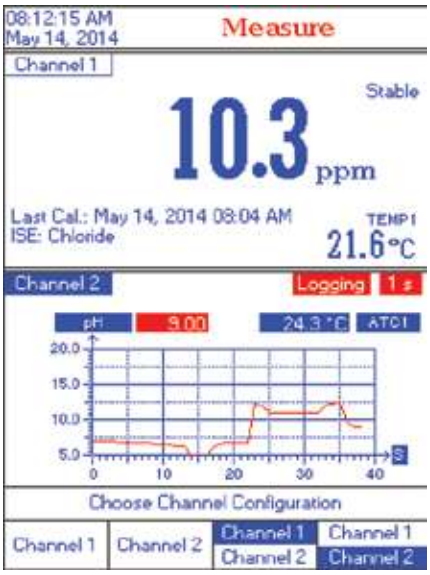
Results

The results are automatically calculated and shown together with all the parameters used.

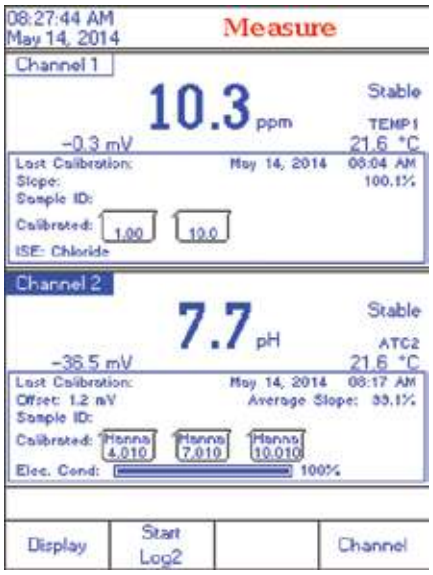
At this time, results can be saved into an ISE Methods Report and printed using the HI92000 PC software.

- Low Profile
  - HI5522 features a low profile with an ideal viewing angle

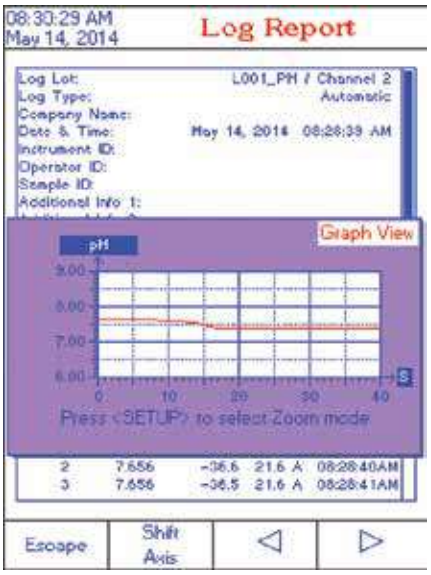
Additional Features by Screen



Channel Configuration



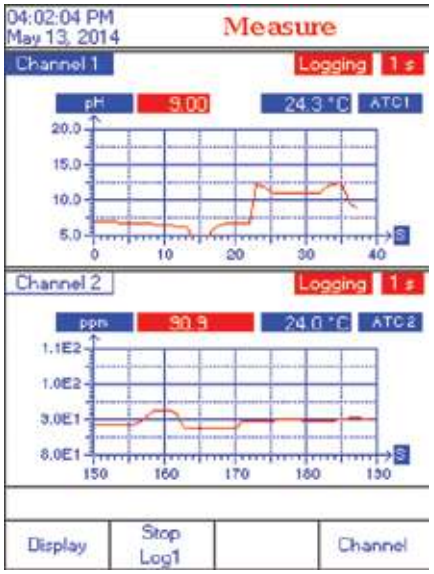
Good Laboratory Practices



Log Recall

Basic Display

Real-Time Logging



Simultaneous Dual-Channel Graphing

Dual Channels

The two measurement channels of the HI5522 are galvanically isolated to eliminate noise and instability.

In ISE mode, this instrument provides a choice of several incremental methods. Communication is via opto-isolated USB.

Specifications		HI5522
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five-point calibration, eight standard buffers available (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01,12.45), and five custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C/-4.0 to 248.0°F/253.15 to 393.15K
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
ISE	Range	1×10^{-6} to 9.99×10^{10} concentration
	Resolution	1; 0.1; 0.01; 0.001 concentration
	Accuracy	±0.5% (monovalent ions); ±1% (divalent ions)
	Calibration	automatic, up to five-point calibration, five fixed standard solutions available for each measurement unit, and five user defined standards
Temperature**	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm absolute EC*
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Cell Constant	0.0500 to 200.00
	Cell Type	4-pole cell
	Calibration	automatic standard recognition, user standard single point / multi-point calibration
	Calibration Reminder	yes
	Temperature Coefficient	0.00 to 10.00 %/°C
	Temperature Compensation	disabled, linear and non-linear (natural water)
	Reference Temperature	5.0 to 30.0°C
	Profiles	up to 10, 5 each channel
	USP Compliant	yes
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±2% of reading (±1 Ω•cm)
Salinity	Range	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%
	Resolution	0.01 for practical scale/natural sea water scale; 0.1% for percent scale
	Accuracy	±1% of reading
	Calibration	percent scale–one-point (with HI7037 standard); all others through EC
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	EC Probe	HI76312 platinum, four-ring EC/TDS probe with and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-W stainless steel temperature probe with 1 m (3.3') cable (included)
	Input Channel(s)	1 pH/ORP/ISE + 1 EC
	GLP	cell constant, reference temperature/coefficient, calibration points, cal time stamp, probe offset for conductivity
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points/channel; **interval:** 14 selectable between 1 second and 180 minutes; **type:** automatic, manual, AutoHOLD; **additional:** 200 records USP; 200 records incremental methods
	PC Connection	USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions / Weight	160 x 231 x 94 mm (6.3 x 9.1 x 3.7") / 1.2 kg (2.64 lbs.)
Ordering Information		**HI5522-01** (115V) and **HI5522-02** (230V) are supplied with HI1131B pH electrode, HI76312 EC/TDS probe, HI7662-W temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (2), pH 10.01 buffer solution sachet (2), 1413 µS/cm conductivity standard sachet (2), 12880 µS/cm conductivity standard sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

(*) Uncompensated conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
(**) Reduced to actual probe limits

pH and ORP electrodes begin on page 2.122; pH and ORP solutions begin on page 2.142;
ISE electrodes and solutions begin on page 3.22; EC, TDS and salinity solutions begin on page 5.34

HI5521

Research Grade Meter

pH/ORP and EC/TDS/Resistivity/Salinity and Temperature

The HI5521 is an advanced, two channel research grade benchtop pH/ORP and EC/TDS/Salinity/Resistivity meter that is completely customizable with a large color LCD, capacitive touch keys, and USB port for computer connectivity.

The HI5521 allows for simultaneous measure of pH or ORP on one channel and EC or related parameters on the other. Channel one has a BNC connection for use with the expansive line of pH and ORP electrodes that Hanna Instruments offers. The meter is supplied with the HI1131B glass body, double junction, combination pH electrode that operates over a wide temperature range from 0 to 100°C. All readings are automatically compensated for temperature variations with the separate HI7662-T temperature probe or from the built in temperature sensor of the conductivity probe on Channel two. The HI5521 is supplied with the HI76312 four-ring conductivity probe that operates over a wide range from 0.000 µS/cm to 1000.0 mS/cm*. The meter can be set to auto-ranging in which the meter chooses the appropriate conductivity range from seven ranges or fixed range in which the meter will only display reading in µS/cm or mS/cm. All readings are automatically compensated for temperature variations with a built in temperature sensor. The temperature correction coefficient is adjustable from 0.00 to 10.00 %/°C.

As a pH meter the HI5521 can be calibrated up to five points with a choice of eight pre-programmed buffers or five custom buffers. The HI5521 features Hanna's exclusive CAL Check™ to alert the user of potential problems during the pH calibration process. Indicators displayed during calibration include "Electrode Dirty/Broken" and

"Buffer Contaminated." The overall probe condition based on the offset and slope characteristic of the electrode is displayed as a percentage after calibration is complete. The calibration data including date, time, buffers used, offset and slope can be accessed at any time along with the current measurement by selecting the Good Laboratory Practice (GLP) display option.

As an EC/TDS/Salinity/Resistivity meter the HI5521 can be calibrated up to four points with a choice of six pre-programmed conductivity standards or user defined custom standards. Resistivity, TDS, Practical Salinity (PSU) and Natural Seawater Scale are calibrated through conductivity. The % NaCl is calibrated to single point with the HI7037 salinity standard. The calibration data including date, time, and standards used, offset and cell factor can be accessed at any time along with the current measurement by selecting the Good Laboratory Practice (GLP) display option.

For the measurement of high purity water used in pharmaceutical manufacturing, the HI5521 is programmed with the three stages of the USP <645> method. Once a stage is met a report is generated and can be saved. Up to 200 reports can be stored and with the USB port be transferred to a Windows® compatible computer.

Three selectable logging modes are available: automatic, manual and AutoHold logging. Up to 100,000 data points can be recorded in 100 lots with 50,000 records max/lot on each channel and exported to a computer for data review and storage.

Customizable User Interface

The user interface of the HI5521 allows the user to show measurements in various modes: basic measurement with or without GLP information, real-time graphing, and logging data. Calibration stability criteria can be adjusted from fast, moderate, and accurate. Programmable alarm limits can be set to inside or outside allowable limits.

Color Graphic LCD

The HI5521 features a color graphic LCD with on-screen help, graphic, and custom color configurations. The display allows for real-time graphing and the use of virtual keys provide for an intuitive user interface.

Capacitive Touch

The HI5521 features sensitive capacitive touch buttons for accurate keystrokes when navigating menus and screens. There are four dedicated keys that are used for routine operations including calibration and switching measurement modes and four virtual keys that change based upon use. The capacitive touch technology ensures the buttons never get clogged with sample residue.

Four Ring Conductivity Probe

All readings are performed with the HI76312 four-ring conductivity probe that has a built in temperature sensor for automatic temperature correction. The four rings are made with platinum and the body of the electrode is made of Polyetherimide (PEI) plastic that is resistant to many harsh chemicals. The four-ring design allows for this probe to be used over a wide range of measurements.

Choice of Calibration

Automatic buffer recognition, semiautomatic, and direct manual entry pH calibration options are available for calibrating up to five points, from a selection of eight standard buffers and up to five custom buffers. For the conductivity channel the calibration can be set to automatic standard recognition or user entry along with a choice of single or multi-point. Calibration can be performed up to four points when multi-point is selected.

CAL Check™

CAL Check alerts users to potential problems during the calibration of the pH electrode. Indicators include "Electrode Dirty/Broken," "Buffer Contaminated," electrode response time and the overall probe condition as a percentage that is based on the offset and slope characteristics.

GLP Data

HI5521 includes a GLP Feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data include date, time, standards used for calibration.

Data Logging

Three selectable logging modes are available on the HI5521: automatic, manual, and AutoHold logging. Automatic and manual logs up to 100 lots with 50,000 records max/lot, with up to 100,000 total data points. Automatic logging features the option to save data according to sampling period and interval.

Data Transfer

Data can be transferred to a PC with USB cable and HI92000 software (both sold separately).

Contextual Help

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

Dual Channels

The two measurement channels of the HI5521 are galvanically isolated to eliminate noise and instability.

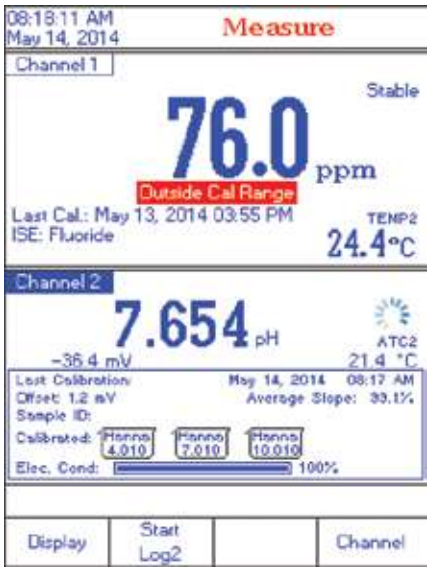
Communication is via opto-isolated USB.

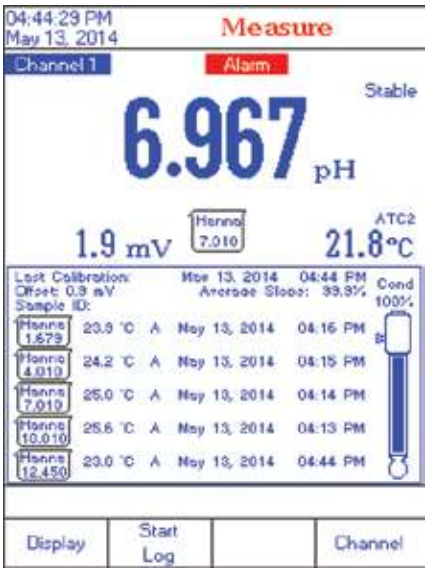
pH and EC Features

pH CAL Check™

Proper calibration of the pH electrode system is critical in order to achieve reliable results. Hanna's exclusive CAL Check system includes several features to help users reach that goal.

- Each time a pH calibration is performed, the instrument compares the new calibration with the previous one. When this comparison indicates a significant difference, the message alerts the user to either clean the electrode, check the buffer or both.
- When measurements are taken too far from the calibration points, the instrument will warn the user with a message on the LCD.
- The condition of the pH electrode after calibration is shown on the display, as well as the date and time.
- To avoid taking readings with old calibrations, the instrument automatically reminds the user when the calibration has expired.





EC USP Mode

Hanna's HI5522 and HI5521 together with EC probes can be used for conductivity measurements required to prepare water for injection (WFI) according to USP <645>.

The instruments give clear instructions on how to perform each stage and automatically check that the temperature, conductivity and stability are within USP limits.

Comprehensive results are shown on a single screen at the end of the test. Up to 200 reports can be saved for future recall.

Specifications		HI5521
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD
	Calibration	automatic, up to five-point calibration, eight standard buffers available (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01,12.45), and five custom buffers
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C/-4.0 to 248.0°F/253.15 to 393.15K
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
Temperature**	Range	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy	±0.2°C ; ±0.4°F; ±0.2K (without probe)
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm absolute EC*
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Cell Constant	0.0500 to 200.00
	Cell Type	4-pole cell
	Calibration	automatic standard recognition, user standard single point / multi-point calibration
	Calibration Reminder	yes
	Temperature Coefficient	0.00 to 10.00 %/°C
	Temperature Compensation	disabled, linear and non-linear (natural water)
	Reference Temperature	5.0 to 30.0°C
	Profiles	up to 10, 5 each channel
	USP Compliant	yes
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS* (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±2% of reading (±1 Ω•cm)
Salinity	Range	practical scale: 0.00 to 42.00 psu; natural sea water scale: 0.00 to 80.00 ppt; percent scale: 0.0 to 400.0%
	Resolution	0.01 for practical scale/natural sea water scale; 0.1% for percent scale
	Accuracy	±1% of reading
	Calibration	percent scale–one-point (with HI7037 standard); all others through EC
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	EC Probe	HI76312 platinum, four-ring EC/TDS probe with and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-W stainless steel temperature probe with 1 m (3.3') cable (included)
	Input Channel(s)	1 pH/ORP + 1 EC
	GLP	cell constant, reference temperature/coefficient, calibration points, cal time stamp, probe offset for conductivity
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points/channel; **interval:** 14 selectable between 1 second and 180 minutes; **type:** automatic, manual, AutoHOLD;
	PC Connection	USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions / Weight	160 x 231 x 94 mm (6.3 x 9.1 x 3.7") / 1.2 kg (2.64 lbs.)
Ordering Information	**HI5521-01** (115V) and **HI5521-02** (230V) are supplied with HI1131B pH electrode, HI76312 EC/TDS probe, HI7662-W temperature probe, pH 4.01 buffer solution sachet (2), pH 7.01 buffer solution sachet (4), pH 10.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.	

(*) Absolute conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
(**) Reduced to actual probe limits

pH and ORP electrodes begin on page 2.122; pH and ORP solutions begin on page 2.142;
EC, TDS and salinity solutions begin on page 5.34

HI2550

Multiparameter Meter

pH/ORP/ISE and EC/TDS/Salinity

- Five-point Calibration
  - Up to five point pH calibration
- Hold feature
  - Hold button to freeze readings on the display
- ATC
  - Automatic temperature compensation for pH and EC
- Connectivity
  - PC interface via USB
- Multiple input channels
  - Two input channels: pH/ORP/ISE and EC/TDS/Resistivity/Salinity

Dual-Channel, with Up to Seven Parameters

HI2550 is a dual-channel instrument that measures up to seven parameters. With this single laboratory bench meter you can measure pH, ORP or ISE, conductivity (EC), TDS or salinity, and temperature.

Utilizing an external temperature probe, pH readings are automatically compensated for temperature. To ensure a higher level of precision, pH calibrations can use up to five calibration points, chosen from the seven available memorized buffers.

This instrument can take measurements using ORP electrodes (pH channel input), due to its capability to measure mV with a resolution up to 0.1 mV, as well as ISE electrodes on the mV scale (pH channel input).

EC measurements can be compensated relative to a selected reference temperature. The EC calibration mode allows you to chose from among six recognized conductivity standards and perform a single-point calibration. The most suitable EC and TDS range for your application is automatically selected. The HI2550 also includes the ability to set and lock the range manually.

Good Laboratory Practice

This instrument provides GLP capabilities that allow for the storage and retrieval of all data regarding pH, ORP, EC and salinity calibration and sample measurement as well as data regarding the maintenance and status of the electrode.

Data Logging

With a built-in logging function, measurements are stored in non-volatile memory, and can be transferred to a PC through the USB port. Users can manually log up to 200 records and interval log up to 500 records.

Specifications		HI2550
pH**	Range	-2.0 to 16.0 pH; -2.00 to 16.00 pH; -2.000 to 16.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	± 0.01 pH; ± 0.002 pH
	Calibration	up to five point calibration, seven standard buffers available (1.68, 4.01, 6.86, 7.01, 9.18, 10.01, 12.45), and two custom buffers
	Temperature Compensation	automatic or manual from: -20.0 to 120.0 °C
	Input Impedance	10^{12} ohms
ISE and ORP	Range	±999.9 mV; ±2000 mV
	Resolution	0.1 mV (±1000.0 mV); 1 mV (± 2000 mV)
	Accuracy	± 0.2 mV (±999.9 mV); ± 1 mV (±2000 mV)
Temperature**	Range	-20.0 to 120.0 °C (4.0 to 248.0°F)
	Resolution	0.1 °C (0.1°F)
	Accuracy	± 0.4 °C (excluding probe error)
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm actual* conductivity
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	± 1 % reading (±0.05 µS/cm or 1 digit, whichever is greater)
	Calibration	one point slope calibration; six buffers available: 84.0, 1413 µS/cm; 5.00, 12.88, 80.0, 111.8 mS/cm; one point offset: 0.00 µS/cm
	Temperature Compensation	automatic or manual from -20.0 to 120.0 °C, or disabled
	Temperature Coefficient	0.00 to 6.00 %/°C (for EC and TDS only; default value is 1.90 %/°C
TDS	Range	0.00 to 14.99 ppm; 15.0 to 149.9 ppm; 150 to 1499 ppm; 1.50 to 14.99 g/L; 15.0 to 100.0 g/L; up to 400.0 g/L actual* TDS (with 0.80 factor)
	Resolution	0.01 ppm; 0.1 ppm; 1 ppm; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.03 ppm or 1 digit, whichever is greater)
	TDS Factor	0.40 to 0.80 (default value is 0.50)
Salinity	Range	0.0 to 400.0% NaCl
	Resolution	0.1% NaCl
	Accuracy	±1% of reading (excluding probe error)
	Calibration	one point with HI7037 standard (optional)
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	EC Probe	HI76310 platinum four-ring EC/TDS probe and 1 m (3.3') cable (included)
	Temperature Probe	HI7662 temperature probe with 1 m (3.3') cable (included)
	Relative mV Offset Range	±2000 mV
	PC Connectivity	opto-isolated USB
	Log-on-demand	200 samples
	Interval Logging	500 records; 5, 10, 30 sec and 1, 2, 5, 10, 15, 30, 60, 120, 180 min stability logging
	Power Supply	12 VDC (included)
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions	235 x 222 x 109 mm (9.2 x 8.7 x 4.3")
	Weight	1.3 Kg (2.9 lb); kit with holder 2.1 Kg (4.6 lb.)
Ordering Information	**HI2550-01** (115V) and **HI2550-02** (230V) are supplied with HI1131B pH electrode, HI76310 EC/TDS probe, HI7662 temperature probe, HI76404N electrode holder, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI7082 3.5M KCL electrolyte solution (30 mL), 12 VDC adapter and instruction manual.	

(*) Uncompensated conductivity (or TDS) is the conductivity (or TDS) value without temperature compensation.
(**) Reduced to actual sensor limits

pH and ORP electrodes begin on page 2.122; pH and ORP solutions begin on page 2.142;
ISE electrodes and solutions begin on page 3.22; EC, TDS and salinity solutions begin on page 5.34

HI9829

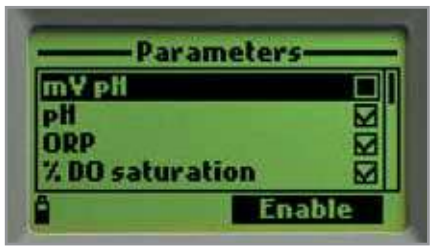
GPS Multiparameter Meters

pH/ORP/ISE, EC/TDS/Resistivity/ Salinity/Seawater σ, Turbidity, DO, Temperature and Atmospheric Pressure

- Logging
  - Logging from probe or meter
- Fast Tracker
  - Tag Identification System
- Sensor Check™
  - Auto-recognition of all sensors
- GLP features
  - Meets Good Laboratory Practices
- Connectivity
  - PC compatible via USB
- Help feature
  - On-screen user guides
- Backlight
  - Backlit, graphic LCD display
- Waterpoof
  - Waterproof casing

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.



Backlit Dot Matrix LCD Display

The HI9829 features a backlit graphic LCD with on-screen help and the capability to display up to twelve parameters simultaneously. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.

Auto-sensor Recognition

The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

Integrated temperature sensor allows for automatic temperature compensation of pH, conductivity, and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

The meter features a built-in barometer with user-selectable units for dissolved oxygen pressure compensation.

Quick Calibration

Quick Calibration provides a speedy, single point calibration for pH, conductivity, and dissolved oxygen. Standard calibration options are available including pH up to three points, conductivity at one point and dissolved oxygen up to two points.

Dedicated Help Key

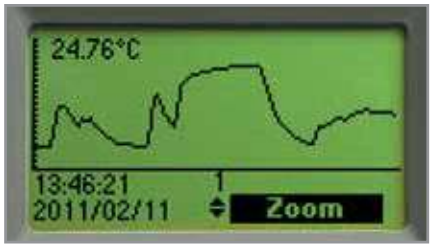
Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

GLP Data

HI9829 includes a GLP feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data includes date, time, buffers/standards used for calibration, and slope characteristics.

Data Logging

The HI9829 allows users to store up to 44,000 continuous or log-on-demand samples with logging intervals from one second to three hours.



Graphing Capability

Trend graphing with sample date and time stamp may be viewed on the display or transferred to a PC.

PC Connectivity

Logged data can be transferred to a Windows compatible PC with the included HI7698291 USB adapter and HI929829 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter is supplied with four 1.5V "C " NiMH rechargeable batteries that provide up to 140 hours of battery life*

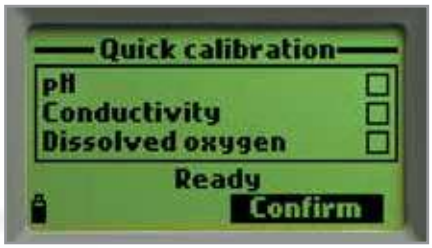
* Without GPS or turbidity measurements

Rugged Custom Carrying Case

The HI9829 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

HI7698297 Quick Release Flow Cell (optional)

The HI7698297 is an optional quick release flow cell designed for low flow sampling of environmental groundwater. The flow cell features a threaded collar for the HI9829 probe and two quick release fittings for inlet and outlet flow. The HI7698297 includes a wall mount kit for continuous monitoring option.



- Field Ready
  - For field calibration, our quick calibration solution allows standardization of pH and conductivity with one calibration solution.
- Quick Calibration
  - Simply screw the calibration beaker filled with HI9828-25 solution onto the probe, select "Quick calibration" from the menu and press OK. Individual calibration may also be performed using multiple calibration points.
- Auto-sensor Recognition
  - In this example, the HI9829 is identifying a pH, dissolved oxygen and EC/turbidity sensor.

Probes

The use of Hanna's microprocessor-based multiparameter intelligent probes with HI9829 will provide reliable data collection that can lead to an improved scientific understanding of the interconnections between natural, chemical and geological processes and manmade pollution to effectively evaluate applications for waste discharge permits, remediate contaminated sites and to protect or restore biological resources.

Reliable temperature measurements are a critical parameter of aquatic system monitoring. Temperature and temperature changes due to water releases can affect the ability of water to hold oxygen as well as the ability of organisms to resist certain pollutants. The intelligent probes incorporate an accurate thermistor that changes predictably with temperature changes. Accurate temperature reading in degrees Celsius, Fahrenheit and kelvin are displayed and utilized by other detectors for temperature correction.

The HI76x9829 probes utilize field replaceable sensors with auto-recognition. The sensors are housed with the probe electronics in a rugged housing and a water-tight cable connection. The HI76909829 probe allows conductivity, pH/ORP (or an ISE), and dissolved oxygen measurement. Other probe models allow turbidity and logging.

Probes with the logging function have a logging memory that allows storage of up to 140,000 individual samples or 35,000 complete sample data sets with date and time stamp thus permitting up to a 70 day deployment with all channels logging at 10 minute intervals. The probe incorporates a temperature sensor for temperature compensation of all parameters.

The probes are available with a choice of cable lengths such as 4m, 10 m and 20 m (13', 33', 65') that utilize a DIN connection to interface with the meters. Logging probes can be connected directly to a PC with the HI76982910 USB adapter cable, and HI929829 PC application software to download log files directly from the probes.

Sensors

Hanna offers a selection of seven sensors to be used on the intelligent probes. Sensor replacement is quick and easy with screw type connectors and are color coded for easy identification. The HI9829 automatically recognizes sensor presence.

The HI7609829-4 EC/turbidity sensor is field replaceable and offers readings from both parameters at the same time.

All potentiometric sensors feature a double junction design and are gel filled to increase resistance to contamination. One of the ISE sensors can be used in place of the pH sensor and is automatically recognized. pH in mV readings are also displayed –which is useful for troubleshooting.

HI7609829
for pH/ORP, Dissolved Oxygen, EC

HI7629829
for pH/ORP, Dissolved Oxygen, EC, Logging

With two probes to choose from, these digital probes provide stable, noise-free sensor signal management without the need for pre-amplified pH sensors.

Specifications		HI7609829	HI7629829	
Supported Configuration	Connector 1	pH, pH/ORP, ammonium ISE, chloride ISE, nitrate ISE	pH, pH/ORP, ammonium ISE, chloride ISE, nitrate ISE	
	Connector 2	dissolved oxygen	dissolved oxygen	
	Connector 3	EC	EC	
Temperature sensor		built-in	built-in	
Autonomous Logging		–	yes	
Logging Interval		–	1 second to 3 hours	
Computer Interface		–	USB (HI76982910)	
Memory		–	140,000 measurements (single parameter logged); 35,000 measurements (all parameters logged)	
Operating Temperature		-5 to 55°C*	-5 to 55°C*	
Maximum Depth		20 m (66')*	20 m (66')*	
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; temperature probe: 316 SS; O-rings: EPDM		
Logging Probe Internal Battery Type		–	1.5V (4) AA alkaline	
Logging Probe Battery Life Note: Log space must be available for continuous logging		–	Interval	all channels logging (no averaging)
			1-5 seconds	72 hours
			1 minute	22 days
			10 minutes	70 days
Sample Environment		fresh, brackish, seawater	fresh, brackish, seawater	
Waterproof Protection		IP68	IP68	
Dimensions (without cable)		342 mm (13.5"), dia=46 mm (1.8")	442 mm (17.4"), dia 46 mm (1.8")	
Weight (with batteries and sensors)		570 g (20.1 oz.)	775 g (27.3 oz.)	

* Reduced for ISE sensors

Sensor Configurations

Both probes can accommodate a multitude of sensor configurations. The long sensor cap fits all configurations while the short sensor cap fits configurations not requiring the turbidity/EC sensor.

or

Dissolved Oxygen

HI7609829-2 DO

The dissolved oxygen in lakes, rivers, and oceans is crucial for the organisms and creatures living in it. If dissolved oxygen concentrations drop below normal levels in water bodies, the water quality degrades and the organisms begin to die off. The HI7609829-2 galvanic DO sensor does not require long polarization times so is ready for measurement at a moment's notice. This sensor also utilizes a replaceable cap design for ease of maintenance and a safe, non-toxic electrolyte. DO readings are compensated for the effects of temperature (using the probe's built-in temperature sensor) and atmospheric pressure (using the HI 9829's internal atmospheric pressure sensor). The DO measurement complies with standard methods 4500-O G and EPA article 360.1.

pH

HI7609829-0 pH
HI7609829-1 pH/ORP

The HI7609829-0 and -1 feature a double junction design and are gel filled to increase resistance to contamination. These pH or pH/ORP sensors incorporate the technology that has made Hanna so successful as a pH manufacturer. Reliable pH measurements are one of the most important indicators of water chemistry indicating the relative amount of free hydrogen and hydroxyl ions in the water. Hanna's pH sensors utilize a resilient PEI body to protect them from solid particulates found in water samples. Consistency and quality are the hallmarks of these sensors. Our differential measurement system further enhances the measurement reliability, providing temperature corrected pH.

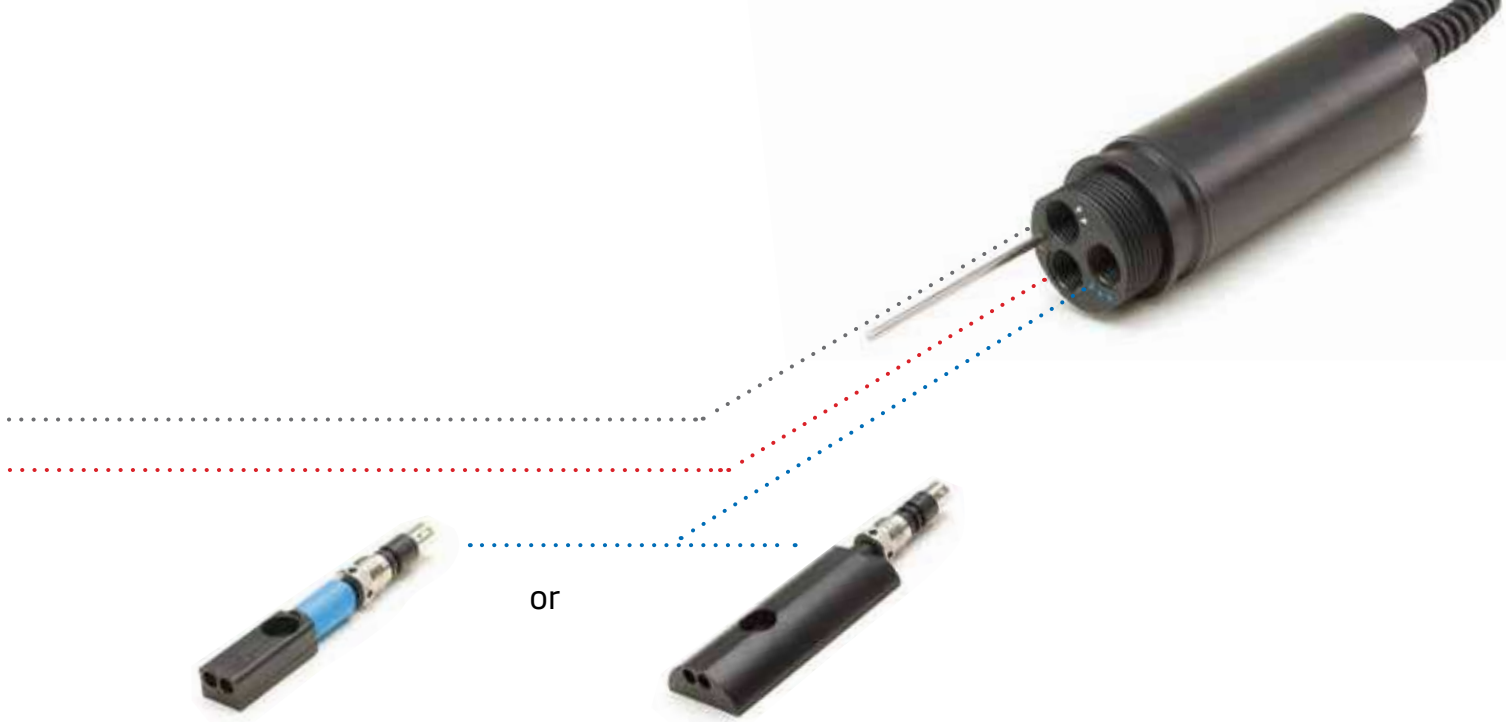
ISE

HI7609829-10 Ammonium ISE
HI7609829-11 Chloride ISE
HI7609829-12 Nitrate ISE

A choice of three ion selective electrodes (ISE) is available for constant reporting of common surface water contaminants. Nitrate, ammonium and chloride ISEs are available. Each ISE is a combination electrode incorporating an extremely constant reference spiral; all potentionmetric probes feature a double junction and solid gel reference design. The HI9829 displays measurements of ion activity as ppm ammonium-nitrogen, ppm chloride, and ppm nitrate-nitrogen.

HI7698295

Short cap for probes without EC/turbidity sensor



or

Conductivity

HI7609829-3 EC

The HI7609829-3 4-electrode conductivity sensor using the polarographic measurement principal ensures stable conductivity readings. Electrolytic conductivity measures the ability of water to conduct an electrical current. It is highly dependent on the amount of dissolved solids (such as salt) in the water. Absolute conductivity, temperature-corrected conductivity, salinity. Seawater and water hardness (TDS) determinations are possible with measurements from this sensor.

Conductivity and Turbidity

HI7609829-4 EC/Turbidity

The HI7609829-4 combined EC/turbidity sensor is a replaceable design for instantaneous conductivity and turbidity measurements that conform to ISO 7027 standards. It provides measurements from 0.0 to 1000 FNU. Turbidity is the amount of particulate matter that is suspended in water. Turbidity measures the scattering effect that suspended solids have on light: the higher the intensity of scattered light, the higher the turbidity. Material that causes water to be turbid include: clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton and microscopic organisms. Conductivity measurement is the same as in the HI7609829-3.

HI7698296

Long cap for probes with EC/turbidity sensor

FastTracker™
location traceability

Fast Tracker™–Tag Identification System

HANNA's Fast Tracker™–Tag Identification System simplifies test logging. iButton®s with a unique ID can be installed at various sampling sites. When the matching connector on the meter contacts the location button, measurements are logged and labeled with the alphanumeric user-entered location ID. Location, date, time and measurements are logged into the meter which can be transferred to a PC. The Fast Tracker™ system complements the GPS for ultimate tracking.

iButton® Tags are Easy to Install

Install the optional TAGs near your sampling points for quick and easy iButton® readings. Each TAG contains a computer chip with a unique identification code encased in stainless steel. You can install a practically unlimited amount of TAGs. Additional TAGs can be ordered for all of your traceability requirements.

*Google™ is a registered trademark of Google™, inc. HANNA Instruments® has no affiliation with Google™.

Monitoring and Tracking

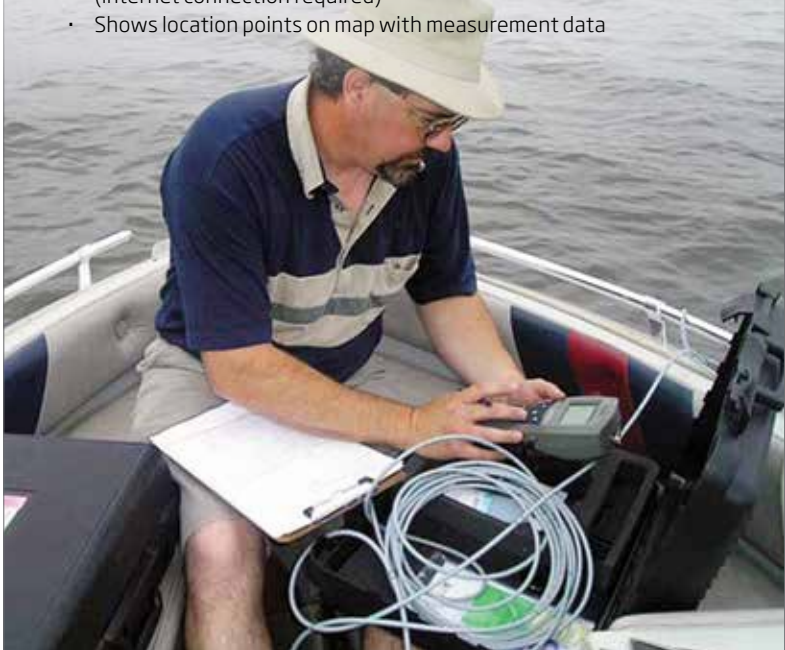
The HI9829 with GPS module can track measurement locations with detailed coordinate information. All models of the HI9829 are equipped with the Fast Tracker™ TAG ID system which is an invaluable tool for associating measurements with their locations. The HI9829 also incorporates a real-time clock which stamps all logged data with a time and date in addition to location information.

GPS (Global Positioning System)

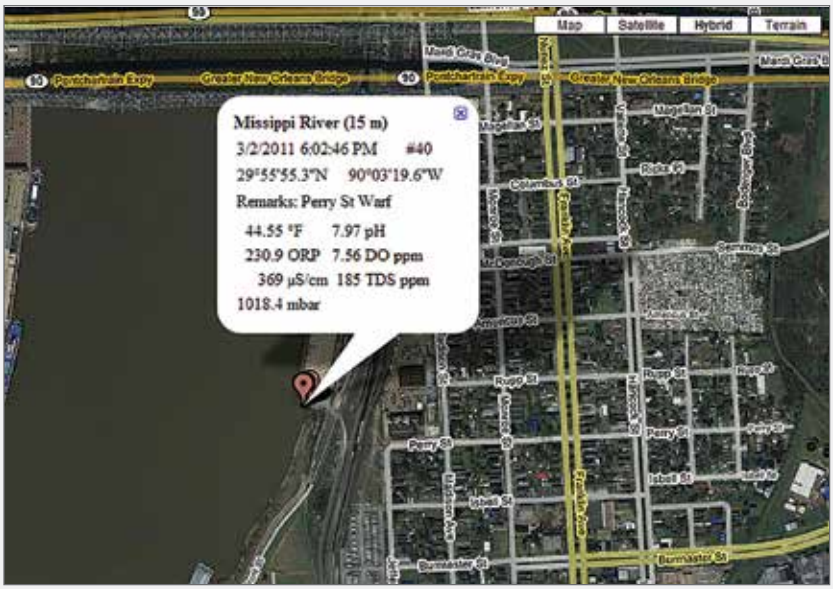
The HI9829 with GPS features an internal 12 channel GPS receiver and antenna that calculates its position to track locations along with measurement data. The GPS tracks your location using satellites to within 30 ft (10 m) so you can be sure that you return to the same location for repeated measurements. The GPS coordinates can be shown on the LCD together with up to 10 measurement parameters and are recorded with logged data. Users can connect to GPS tracking software such as Google™ Maps* to view locations where samples have been taken. Measurement information is shown right on the map.

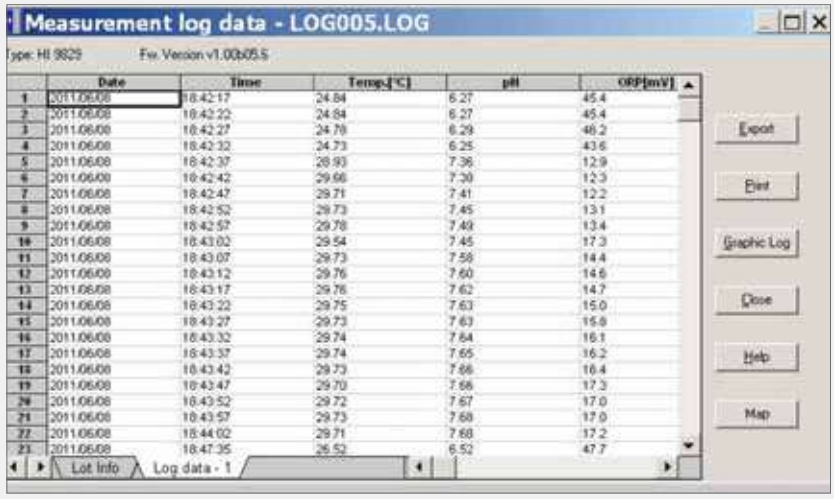
Features

- Basic GPS Features
  - GPS coordinates shown on the LCD with up to 10 measurement parameters
  - GPS signal strength shown on LCD
  - Logged data is embedded with GPS coordinates
  - GPS status screen
- Advanced GPS Features
  - Users can associate GPS coordinates with alphanumeric locations
  - Distances between current location and predefined locations are displayed arranged by distance
  - Memorizes last location and time should signal be lost
- HI929829 PC Application Software
  - Manages logged data from the HI9829
  - Displays GPS coordinates with logged data
  - Automatically maps samples on your PC (internet connection required)
  - Shows location points on map with measurement data



GPS Screen Features





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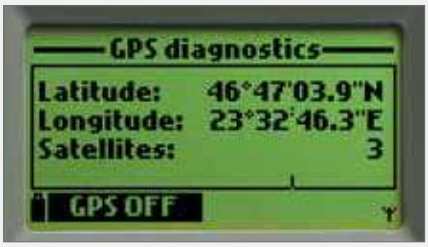
- GPS data can be customized to meet specific requirement

- Displays distances between current and predefined locations

- Display current readings along with GPS coordinates



- Shows current position and number of satellites

Specifications	HI9829	HI9829 with GPS
Temperature Compensation	automatic from -5 to 55°C (23 to 131°F)	automatic from -5 to 55°C (23 to 131°F)
GPS	–	12 channel receiver, 10 m (30 ft) range
Logging Memory from Meter	44,000 records	44,000 records
Logging Interval	1 second to 3 hours	1 second to 3 hours
Computer Interface	USB (with HI 929829 software)	USB (with HI929829 software)
FastTracker™ TAG ID	Yes	Yes
Waterproof Protection	IP67	IP67
Environment	0 to 50°C (32 to 122°F); RH 100%	0 to 50°C (32 to 122°F); RH 100%
Power Supply	1.5V alkaline C cells (4) / 1.2V NiMH rechargeable C cells (4), USB, 12V power adapter	1.5V alkaline C cells (4) / 1.2V NiMH rechargeable C cells (4), USB, 12V power adapter
Dimensions	221 x 115 x 55 mm (8.7 x 4.5 x 2.2")	221 x 115 x 55 mm (8.7 x 4.5 x 2.2")
Weight	750g (26.5 oz.)	750g (26.5 oz.)

HI9829 Parameter Specifications

	pH / mV of pH input	ORP mV	Ammonium-Nitrogen	Chloride	Nitrate-Nitrogen
Range	0.00 to 14.00 pH / ±600.0 mV	±2000.0 mV	0.02 to 200 ppm (as N)	0.6 to 200 ppm	0.62 to 200 ppm (as N)
Resolution	0.01 pH / 0.1 mV	0.1 mV	0.01 ppm to 1 ppm; 0.1 ppm to 200 ppm		
Accuracy	±0.02 pH / ±0.5 mV	±1.0 mV	±5% of reading or 2 ppm, whichever is greater		
Calibration	automatic one, two, or three points with five memorized standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer	automatic at one custom point	1 or 2 point, 10 ppm and 100 ppm		

	Conductivity	TDS	Resistivity	Salinity	Seawater σ
Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)	0 to 400000 mg/L or ppm (the maximum value depends on the TDS factor)	0 to 999999 Ω•cm; 0 to 1000.0 kΩ•cm; 0 to 1.0000 MΩ•cm	0.00 to 70.00 PSU	0 to 50.0 σt, σ0, σ15
Resolution	**manual:** 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; **automatic:** 1 µS/cm from 0 to 9999 µS/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	**manual:** 1 mg/L (ppm); 0.001 g/L (ppt); 0.01g/L (ppt); 0.1 g/L (ppt); 1 g/L (ppt); **automatic:** 1 mg/L (ppm) from 0 to 9999 mg/L (ppm); 0.01 g/L (ppt) from 10.00 to 99.99 g/L (ppt); 0.1 g/L (ppt) from 100.0 to 400.0 g/L (ppt); **autorange g/L (ppt) scales:** 0.001 g/L (ppt) from 0.000 to 9.999 g/L (ppt); 0.01 g/L (ppt) from 10.00 to 99.99 g/L (ppt); 0.1 g/L (ppt) from 100.0 to 400.0 g/L (ppt)	dependent on resistivity reading	0.01 PSU	0.1 σt, σ0, σ15
Accuracy	±1% of reading or ±1 µS/cm, whichever is greater	±1% of reading or ±1 mg/L, whichever is greater	–	±2% of reading or ±0.01 PSU, whichever is greater	±1 σt, σ0, σ15
Calibration	automatic one point with six memorized standards (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point	based on conductivity or salinity calibration		one custom point	based on conductivity or salinity calibration

	Turbidity	Dissolved Oxygen	Atm. Pressure	Temperature
Range	0.0 to 99.9 FNU; 100 to 1000 FNU	0.0 to 500.0%; 0.00 to 50.00 ppm	450 to 850 mm Hg; 17.72 to 33.46 in Hg; 600.0 to 1133.2 mbar; 8.702 to 16.436 psi; 0.5921 to 1.1184 atm; 60.00 to 113.32 kPa	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
Resolution	0.1 FNU from 0.0 to 99.9 FNU; 1 FNU from 100 to 1000 FNU	0.1%; 0.01 ppm	0.1 mm Hg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa	0.01°C; 0.01°F; 0.01K
Accuracy	±0.3 FNU or ±2% of reading, whichever is greater	0.0 to 300.0%: ±1.5% of reading or ±1.0% whichever is greater; 300.0 to 500.0%: ±3% of reading; 0.00 to 30.00 ppm: ±1.5% of reading or 0.10 ppm, whichever is greater; 30.00 ppm to 50.00 ppm: ±3% of reading	±3 mm Hg within ±15°C from the temperature during calibration	±0.15°C; ±0.27°F; ±0.15K
Calibration	Automatic 1, 2 or 3 points at 0, 20 and 200 FNU, or custom	automatic one or two points at 0, 100% or one custom point	automatic at one custom point	Automatic at one custom point

solutions and accessories begin on page 7.28

Ordering Information

Meter and Probe with Rugged Carrying Case

HI9829 – w x y z

w=	0	Basic meter, no GPS
	1	Meter with GPS
x=	0	No turbidity basic probe
	1	Turbidity basic probe
	2	Autonomously logging probe, no turbidity
	3	Autonomously logging probe with turbidity
y=	04	4 meter cable length
	10	10 meter cable length
	20	20 meter cable length
z=	1	115V
	2	230V

z=1 is supplied with 115V AC to 12V DC Adapter
z=2 is supplied with 230V AC to 12V DC Adapter

All HI9829 Kits Include:

HI9829 or HI 98290 (GPS Model)
HI710140 Hard carrying case
HI710005/8 (115V) or HI710006/8 (230V)
Mulitiparameter Probe (see table)
HI7698292 Probe Maintenance Kit
HI929829 Application Software
HI7698291 USB cable (PC to meter)
HI710045 Power supply cable
HI710046 Cigarette lighter cable
HI7609829-1 pH/ORP sensor
HI7609829-2 Galvanic DO Sensor
HI920005 iButton® with holder (5 pcs)
HI9828-25 Calibration solution
Instruction Manual

Optional Kit Components:

HI7609829-12 Nitrate sensor
HI7609829-11 Chloride ISE sensor
HI7609829-10 Ammonium ISE sensor
HI7698297 Long quick release flow cell
Spare Solution (see below)

Spare Solution

HI9829-10	25 sachets 10ppm ammonia-nitrogen calibration solution
HI9829-10/11	10 sachets each of 10ppm and 100ppm ammonia-nitrogen calibration solution
HI9829-11	25 sachets 100ppm ammonia-nitrogen calibration solution
HI9829-12	25 sachets 10ppm chloride calibration solution
HI9829-12/13	10 sachets each of 10ppm and 100ppm chloride calibration solution
HI9829-13	25 sachets 100ppm chloride calibration solution
HI9829-14	25 sachets 10ppm nitrate-nitrogen calibration solution
HI9829-14/15	10 sachets each of 10ppm and 100ppm nitrate-nitrogen calibration solution
HI9829-15	25 sachets 100ppm nitrate-nitrogen calibration solution

Kit Specific Components:

Kit Number	Probe	HI7609829-3 EC Sensor	HI7698290 Short calibration beaker	HI7609829-4 EC/Turbidity Sensor	HI7698293 Long calibration beaker	HI9829-16 0 FNU calibration solution	HI9829-17 20 FNU calibration solution	HI9829-18 200 FNU calibration solution	HI76982910 USB cable (PC to Probe)	HI7698295 Short protective sleeve	HI7698296 long protective sleeve
HI9829-0004Z	HI7609829/4	•	•							•	
HI9829-0010Z	HI7609829/10	•	•							•	
HI9829-0020Z	HI7609829/20	•	•							•	
HI9829-0104Z	HI7609829/4			•	•	•	•	•			•
HI9829-0110Z	HI7609829/10			•	•	•	•	•			•
HI9829-0120Z	HI7609829/20			•	•	•	•	•			•
HI9829-0204Z	HI7629829/4	•	•						•	•	
HI9829-0210Z	HI7629829/10	•	•						•	•	
HI9829-0220Z	HI7629829/20	•	•						•	•	
HI9829-0304Z	HI7629829/4			•	•	•	•	•	•		•
HI9829-0310Z	HI7629829/10			•	•	•	•	•	•		•
HI9829-0320Z	HI7629829/20			•	•	•	•	•	•		•
HI9829-1004Z	HI7609829/4	•	•							•	
HI9829-1010Z	HI7609829/10	•	•							•	
HI9829-1020Z	HI7609829/20	•	•							•	
HI9829-1104Z	HI7609829/4			•	•	•	•	•			•
HI9829-1110Z	HI7609829/10			•	•	•	•	•			•
HI9829-1120Z	HI7609829/20			•	•	•	•	•			•
HI9829-1204Z	HI7629829/4	•	•						•	•	
HI9829-1210Z	HI7629829/10	•	•						•	•	
HI9829-1220Z	HI7629829/20	•	•						•	•	
HI9829-1304Z	HI7629829/4			•	•	•	•	•	•		•
HI9829-1310Z	HI7629829/10			•	•	•	•	•	•		•
HI9829-1320Z	HI7629829/20			•	•	•	•	•	•		•

solutions and accessories begin on page 7.28

Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Probe with Rugged Carrying Case

Basic	**HI9829-00041** (115V) **HI9829-00042** (230V)	HI9829 meter, HI7609829/4 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-00101 (115V) **HI9829-00102** (230V)	HI9829 meter, HI7609829/10 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-00201 (115V) **HI9829-00202** (230V)	HI9829 meter, HI7609829/20 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
GPS	**HI9829-10041** (115V) **HI9829-10042** (230V)	HI9829 meter with GPS, HI7609829/4 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-10101 (115V) **HI9829-10102** (230V)	HI9829 meter with GPS, HI7609829/10 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-10201 (115V) **HI9829-10202** (230V)	HI9829 meter with GPS, HI7609829/20 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
Basic & Turbidity	**HI9829-01041** (115V) **HI9829-01042** (230V)	HI9829 meter, HI7609829/4 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-01101 (115V) **HI9829-01102** (230V)	HI9829 meter, HI7609829/10 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable,HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-01201 (115V) **HI9829-01202** (230V)	HI9829 meter, HI7609829/20 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable,HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
GPS & Turbidity	**HI9829-11041** (115V) **HI9829-11042** (230V)	HI9829 meter with GPS, HI7609829/4 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-11101 (115V) **HI9829-11102** (230V)	HI9829 meter with GPS, HI7609829/10 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-11201 (115V) **HI9829-11202** (230V)	HI9829 meter with GPS, HI7609829/20 probe, HI7698291 USB cable (PC to meter), HI920005 iButton® with holder (5 pcs), HI929829 PC application software, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.

Mulitiparameter Probe (Cable length: 4m, 10m, 20m)

solutions and accessories begin on page 7.28

Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Logging Probe with Rugged Carrying Case

Basic with Autonomously Logging Probe	**HI9829-02041** (115V) **HI9829-02042** (230V)	HI9829 meter, HI7629829/4 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-02101 (115V) **HI9829-02102** (230V)	HI9829 meter, HI7629829/10 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-02201 (115V) **HI9829-02202** (230V)	HI9829 meter, HI7629829/20 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
GPS with Autonomously Logging Probe	**HI9829-12041** (115V) **HI9829-12042** (230V)	HI9829 meter with GPS, HI7629829/4 probe, HI76982910 USB cable, (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-12101 (115V) **HI9829-12102** (230V)	HI9829 meter with GPS, HI7629829/10 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-12201 (115V) **HI9829-12202** (230V)	HI9829 meter with GPS, HI7629829/20 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-3 EC sensor, HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI710045 power supply cable, HI7698290 short calibration beaker, HI9828-25 calibration solution (500 mL), HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
Basic with Autonomously Logging Probe & Turbidity	**HI9829-03041** (115V) **HI9829-03042** (230V)	HI9829 meter, HI7629829/4 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-03101 (115V) **HI9829-03102** (230V)	HI9829 meter, HI7629829/10 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-03201 (115V) **HI9829-03202** (230V)	HI9829 meter, HI7629829/20 probe, HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/98(230V), instruction manual.
GPS with Autonomously Logging Probe & Turbidity	**HI9829-13041** (115V) **HI9829-13042** (230V)	HI9829 meter with GPS, HI7629829/4 probe,HI76982910 USB cable, (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.
	HI9829-13101 (115V) **HI9829-13102** (230V)	HI9829 meter with GPS, HI7629829/10 probe,HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable,HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V),instruction manual.
	HI9829-13201 (115V) **HI9829-13202** (230V)	HI9829 meter with GPS, HI7629829/20 probe,HI76982910 USB cable (PC to Probe), HI7698291 USB cable (PC to meter), HI929829 PC application software, HI920005 iButton® with holder (5 pcs), HI7609829-2 DO sensor, HI7609829-1 pH/ORP sensor, HI7609829-4 EC/Turbidity sensor, HI710045 power supply cable, HI7698292 probe maintenance kit, HI9829-16 0 FNU calibration solution (230 mL), HI9829-17 20 FNU calibration solution (230 mL), HI9829-18 200 FNU calibration solution (230 mL), HI7698293 long calibration beaker, HI9828-25 calibration solution (500 mL), HI710046 cigarette lighter cable, HI710005/8 (115V) or HI710006/8 (230V), instruction manual.

solutions and accessories begin on page 7.28

Solutions & Accessories Ordering Information

HI9828-27
Quick calibration solution, 1 gallon

Probe Only, No Sensors

HI7609829/4	Probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 4 m (13.1') cable
HI7609829/10	Probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 10 m (33') cable
HI7609829/20	Probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 20 m (65.6') cable
HI7629829/4	Logging probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 4 m (13.1') cable
HI7629829/10	Logging probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 10 m (33') cable
HI7629829/20	Logging probe for pH/pH+ORP/ISE, DO, EC, temperature with HI7698295 short protective shield and 20 m (65.6') cable

Sensors with O-Ring

HI7609829-1	pH/ORP
HI7609829-2	Dissolved Oxygen
HI7609829-3	EC
HI7609829-4	EC/Turbidity
HI7609829-10	Ammonium ISE
HI7609829-11	Chloride ISE
HI7609829-12	Nitrate ISE

Quick Calibration Solutions

HI9828-25	Quick calibration solution, 500 mL
HI9828-27	Quick calibration solution, 1 gal

pH Calibration Solutions

HI7004L	pH 4.01 buffer solution, 500 mL
HI7007L	pH 7.01 buffer solution, 500 mL
HI7010L	pH 10.01 buffer solution, 500 mL

ORP Calibration Solutions

HI7021L	ORP test solution @240 mV, 500 mL
HI7022L	ORP test solution @470 mV, 500 mL

EC Calibration Solutions

HI7030L	12880 µS/cm cal. sol., 500 mL
HI7031L	1413 µS/cm cal. sol., 500 mL
HI7033L	84 µS/cm cal. sol., 500 mL
HI7034L	80000 µS/cm cal. sol., 500 mL
HI7035L	111800 µS/cm cal. sol., 500 mL
HI7039L	5000 µS/cm cal. sol., 500 mL

Dissolved Oxygen Solutions

HI7040L	Zero oxygen solution, 500 mL
HI7042S	Electrolyte solution, 30 mL

Solutions & Accessories Ordering Information

Turbidity Calibration Solutions

HI9829-16	0 FNU calibration solution, 230 mL
HI9829-17	20 FNU calibration solution, 230 mL
HI9829-18	200 FNU calibration solution, 230 mL

ISE Standards

HI9829-10/11	Kit containing 10 sachets each of 10 ppm and 100 ppm standard for HI7609829-10 ammonium ISE
HI9829-10	10 ppm standard sachet for HI7609829-10 ammonium ISE, 25 mL (25)
HI9829-11	100 ppm standard sachet for HI7609829-10 ammonium ISE, 25 mL (25)
HI9829-12/13	Kit containing 10 sachets each of 10 ppm and 100 ppm standard for HI7609829-11 chloride ISE
HI9829-12	10 ppm standard sachet for HI7609829-11 chloride ISE, 25 mL (25)
HI9829-13	100 ppm standard sachet for HI7609829-11 chloride ISE, 25 mL (25)
HI9829-14/15	Kit containing 10 sachets each of 10 ppm and 100 ppm standard for HI7609829-12 nitrate ISE
HI9829-14	10 ppm standard sachet for HI7609829-12 nitrate ISE, 25 mL (25)
HI9829-15	100 ppm standard sachet for HI7609829-12 nitrate ISE, 25 mL (25)

Probe Maintenance Kit

HI7698292	Probe maintenance kit consisting of HI7042S (electrolyte solution for DO sensor), O-rings for DO sensor (5), small brush, O-rings for probe (5), and syringe with grease to lubricate the O-rings.

pH/ORP Cleaning and Storage Solutions

HI70300L	pH/ORP electrode storage sol., 500 mL
HI7061L	pH/ORP electrode cleaning sol., 500 mL

Accessories

HI929829	PC application software
HI7698291	USB cable, PC to meter
HI76982910	USB cable, PC to probe
HI710046	Car accessory port cable
HI7698290	Short calibration beaker
HI7698293	Long calibration beaker
HI7698297	Quick Release Flow Cell
HI7698294	Short flow cell
HI7698297	Long, quick release flow cell
HI7698295	Short protective shield
HI7698296	Long protective shield
HI920005	iButton® with holder (5 pcs)
HI710140	Hard carrying case
HI710045	Power supply cable

HI76982910
USB cable, PC to probe

HI710046
Car accessory port cable

HI7698292
Probe maintenance kit

HI7698297
Long, quick release flow cell

HI98194

Multiparameter Waterproof Meter

pH, ORP, EC, TDS, Resistivity, Salinity, Seawater σ, Dissolved Oxygen, Atmospheric Pressure and Temperature

pH Features

- Calibration
  - Up to a three-point calibration with five standard buffers and one custom buffer available
- pH in mV option
  - Useful for diagnostics
- GLP data
  - Offset, slope, date, time and buffers used
- Automatically temperature compensated readings
- pH or pH/ORP field replaceable sensors
  - Gel filled and maintenance free
  - Double junction for reduced contamination of reference cell

Dissolved Oxygen Features

- Choice of units
  - Display units in % saturation or ppm (mg/L)
- Salinity compensation for saline waters
  - Manual entry of salinity values
  - Readings compensated for salinity effects
- Built-in barometer
  - Automatic compensation for changes in atmospheric pressure
  - User selectable units
- Temperature compensation
- Polarization
  - Automatic polarization of probe at startup
- Membrane caps
  - Ready-to-use HDPE pre-tensioned membrane caps are easy to replace

EC/TDS/Resistivity Features

- Calibration
  - Single-point calibration from six standards
- Temperature compensation
  - Automatic Temperature Compensation
  - Configurable temperature coefficient range from 0.00 to 6.00%/°C
  - Choice of reference temperatures at 20 or 25°C
  - Absolute conductivity can be displayed along with the temperature compensated value
- Auto-ranging
- Salinity readings
  - Practical Salinity Scale (PSU) based on conductivity calibration

The HI98194 is a waterproof portable logging multiparameter meter that monitors up to 12 different water quality parameters. It's multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, dissolved oxygen, and temperature. The probe transmits readings digitally to the meter, where data points can be displayed and logged. The complete system is simple to setup and easy to use.

Backlit Graphic LCD Display

The HI98194 features a backlit graphic LCD with on-screen help and the capability to display up to twelve parameters simultaneously. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

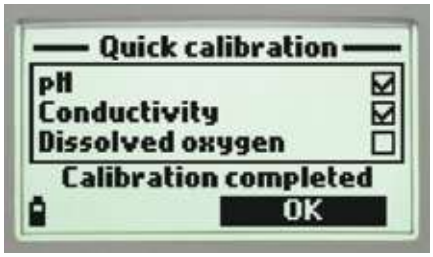
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Digital Probe

The HI7698194 probe features a Quick Connect DIN connector that makes a waterproof connection with the meter.

Color Coded, Field Replaceable Sensors

Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor port identification.



Standard or Quick Calibration

Quick Calibration provides a speedy, single-point calibration for pH, conductivity, and dissolved oxygen. Standard pH calibration options are available for calibrating up to three points from a selection of five standard buffers and one custom buffer. Conductivity calibration is a single point from six standard selections or one custom standard. Dissolved oxygen calibration is up to two standard points or a single custom point.

Auto-sensor Recognition

The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

Integrated temperature sensor allows for automatic temperature compensation of pH, conductivity, and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

The meter features a built-in barometer with user-selectable units for dissolved oxygen pressure compensation.

GLP Data

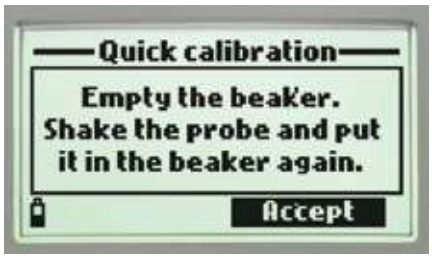
HI98194 includes a GLP feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data includes date, time, buffers/standards used for calibration, and slope characteristics.

Data Logging

The HI98194 allows users to store up to 45,000 continuous or log-on-demand samples with logging intervals from one second to three hours.

Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.



Dedicated Help Key

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

PC Connectivity

Logged data can be transferred to a Window's compatible PC with the included HI920015 micro USB cable and HI9298194 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 360 hours of battery life.

Rugged Custom Carrying Case

The HI98194 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

Probe and Sensors

The HI7698194 is a multiparameter pH/EC/DO/Temperature probe for use with the HI98194 portable meter. It features a Quick Connect DIN that makes a waterproof connection with the meter. Sensors are automatically recognized by the probe and meter when connected. Any ports not used on the probe will not have the parameter displayed on the meter. Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor identification. The probe features a multistrand-multiconductor shielded cable with 4m, 10m, 20m, and 40m lengths available. It's rugged, waterproof design makes it ideal for field use.

Probe Specifications	HI7698194	
Sensor Inputs	three (pH or pH/ORP, DO, EC)	
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"); 46 mm (1.8") dia	
Weight (without 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
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

- Quick sensor replacement
  - Sensor replacement is quick and easy with field replaceable, screw type connectors and are color coded for easy identification. These meters automatically recognize sensors.

HI9828-25
Quick Calibration solution

or

Sensor Specifications		HI7698194-0	HI7698194-1	HI7698194-3	HI7698194-2
Description		pH sensor	pH/ORP sensor	EC sensor	DO sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	EC	DO (% saturation and concentration)
Measurement 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 200.0 mS/cm; 0.0 to 400 mS/cm (absolute)	0.0 to 500.0 %; 0.00 to 50.00 mg/L
Temperature Range		-5 to 55°C	-5 to 55°C	-5 to 55°C	-5 to 55°C
Color Code		red	red	blue	white
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	stainless steel electrodes AISI 316	cat/an: Ag/Zn
	Junction	ceramic	ceramic		membrane: HDPE
	Body	PEI	PEI	ABS/epoxy	white top ABS
	Electrolyte	gel	gel		
	Reference	double	double		
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	none	HI7042S (DO electrolyte)
Dimensions		118 x 15 mm	118 x 15 mm	111 x 17 mm	99 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')	20 m (65')

Specifications		HI98194
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic one, two, or three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
EC	Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
	Resolution	**manual:** 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; **automatic:** 1 µS/cm from 0 to 9999 µS/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	±1% of reading or ±1 µS/cm whichever is greater
	Calibration	automatic single point, with six standard solutions (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point
TDS	Range	0.0 to 400.0 ppt (g/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	±1% of reading or ±1 ppm (mg/L) whichever is greater
	Calibration	based on conductivity calibration
Resistivity	Range	0 to 999999 Ω•cm; 0 to 1000.0 kΩ•cm; 0 to 1.0000 MΩ•cm
	Resolution	dependent on resistivity reading
	Calibration	based on conductivity calibration
Salinity	Range	0.00 to 70.00 PSU
	Resolution	0.01 PSU
	Accuracy	±2% of reading or ±0.01 PSU whichever is greater
	Calibration	based on conductivity calibration
Seawater σ	Range	0.0 to 50.0 σ_t, σ_0, σ_{15}
	Resolution	0.1 σ_t, σ_0, σ_{15}
	Accuracy	±1 σ_t, σ_0, σ_{15}
	Calibration	based on conductivity calibration
Dissolved Oxygen	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%: ±1.5% of reading or ±1.0% whichever is greater; 300.0 to 500.0%: ±3% of reading; 0.00 to 30.00 ppm (mg/L): ±1.5% of reading or ±0.10 ppm (mg/L), whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): ±3% of reading
	Calibration	automatic one or two points at 0, 100% or one custom point
Atmospheric Pressure	Range	450 to 850 mm Hg; 17.72 to 33.46 in Hg; 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 mm Hg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa
	Accuracy	±3 mm Hg within ±15°C from the temperature during calibration
	Calibration	automatic at one custom point
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional 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	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 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.)
Ordering Information	**HI98194** is supplied with HI7698194/4 multiparameter probe, HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor, HI7698194-2 DO sensor, HI9828-20 quick calibration solution, HI76981942 probe maintenance kit, HI76981943 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert.	

pH and ORP solutions begin on page 2.142; EC, TDS and salinity solutions begin on page 5.34;
for DO accessories see HI7042S, HI7040L and HI76409A/P page 6.26

HI98195

Multiparameter Waterproof Meter

pH, ORP, EC, TDS, Resistivity, Salinity, Seawater σ and Temperature

pH Features

- Calibration
  - Up to a three-point calibration with five standard buffers and one custom buffer available
- pH in mV option
  - Useful for diagnostics
- GLP data
  - Offset, slope, date, time and buffers used
- Automatically temperature compensated readings
- pH or pH/ORP field replaceable sensors
  - Gel filled and maintenance free
  - Double junction for reduced contamination of reference cell

EC/TDS/Resistivity Features

- Calibration
  - Single-point calibration from six standards
- Temperature compensation
  - Automatic Temperature Compensation
  - Configurable temperature coefficient range from 0.00 to 6.00%/°C
  - Choice of reference temperatures at 20 or 25°C
  - Absolute conductivity can be displayed along with the temperature compensated value
- Auto-ranging
- Salinity readings
  - Practical Salinity Scale (PSU) based on conductivity calibration

The HI98195 is a waterproof portable logging multiparameter meter that monitors up to nine different water quality parameters. It's multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, barometric pressure, and temperature. The probe transmits readings digitally to the meter, where data points can be displayed and logged. The complete system is simple to setup and easy to use.

Backlit Graphic LCD Display

The HI98195 features a backlit graphic LCD with on-screen help and the capability to display up to nine parameters simultaneously. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

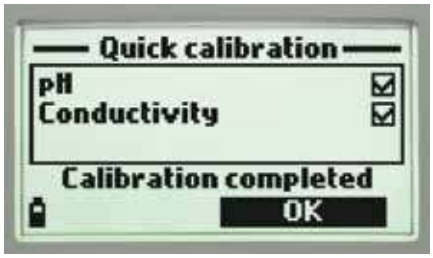
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Digital Probe

The HI7698195 probe features a Quick Connect DIN connector that makes a waterproof connection with the meter.

Color Coded, Field Replaceable Sensors

Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor port identification.



Standard or Quick Calibration

Quick Calibration provides a speedy, single point calibration for pH and conductivity. Standard pH calibration options are available for calibrating up to three points from a selection of five standard buffers and one custom buffer. Conductivity calibration is a single point from six standard selections or one custom standard.

Auto-sensor Recognition

The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

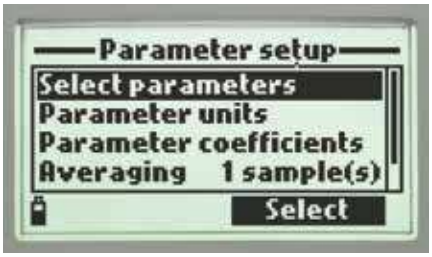
Integrated temperature sensor allows for automatic temperature compensation of pH and conductivity measurements.

GLP Data

HI98195 includes a GLP feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data includes date, time, buffers/standards used for calibration, and slope characteristics.

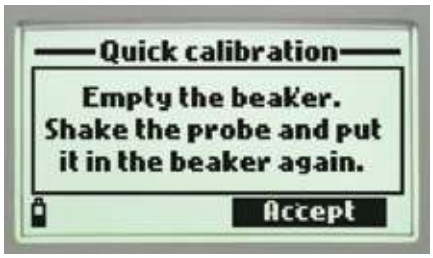
Data Logging

The HI98195 allows users to store up to 45,000 continuous or log-on-demand samples with logging intervals from one second to three hours.



Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.



Dedicated Help Key

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

PC Connectivity

Logged data can be transferred to a Window's compatible PC with the included HI920015 micro USB cable and HI9298194 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 360 hours of battery life.

Rugged Custom Carrying Case

The HI98195 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

Probe and Sensors

The HI7698195 is a multiparameter pH/EC/Temperature probe for use with the HI98195 portable meter. It features a Quick Connect DIN that makes a waterproof connection with the meter. Sensors are automatically recognized by the probe and meter when connected. Any ports not used on the probe will not have the parameter displayed on the meter. Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor identification. The probe features a multistrand-multiconductor shielded cable with 4m, 10m, 20m, and 40m lengths available. It's rugged, waterproof design makes it ideal for field use.

Specifications	HI7698195	
Sensor Inputs	two (pH or pH/ORP, EC)	
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"); 46 mm (1.8") dia	
Weight (without 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
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

- Quick sensor replacement
  - Sensor replacement is quick and easy with field replaceable, screw type connectors and are color coded for easy identification. These meters automatically recognize sensors

HI9828-25
Quick Calibration solution

or

Sensor Specifications		HI7698194-0	HI7698194-1	HI7698194-3
Description		pH sensor	pH/ORP sensor	EC sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	EC
Measurement 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 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
Color Code		red	red	blue
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	stainless steel electrodes AISI 316
	Junction	ceramic	ceramic	
	Body	PEI	PEI	ABS/epoxy
	Electrolyte	gel	gel	
	Reference	double	double	
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	none
Dimensions		118 x 15 mm	118 x 15 mm	111 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')

Specifications		HI98195
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic one, two, or three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
EC	Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
	Resolution	**manual:** 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; **automatic:** 1 µS/cm from 0 to 9999 µS/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	±1% of reading or ±1 µS/cm whichever is greater
	Calibration	automatic single point, with six standard solutions (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point
TDS	Range	0.0 to 400.0 ppt (g/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	±1% of reading or ±1 ppm (mg/L) whichever is greater
	Calibration	based on conductivity or salinity calibration
Resistivity	Range	0 to 999999 Ω•cm; 0 to 1000.0 kΩ•cm; 0 to 1.0000 MΩ•cm
	Resolution	dependent on resistivity reading
	Calibration	based on conductivity or salinity calibration
Salinity	Range	0.00 to 70.00 PSU
	Resolution	0.01 PSU
	Accuracy	±2% of reading or ±0.01 PSU whichever is greater
	Calibration	based on conductivity calibration
Seawater σ	Range	0.0 to 50.0 σ_t, σ_0, σ_{15}
	Resolution	0.1 σ_t, σ_0, σ_{15}
	Accuracy	±1 σ_t, σ_0, σ_{15}
	Calibration	based on conductivity or salinity calibration
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional 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	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 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.)
Ordering Information	**HI98195** is supplied with HI7698195/4 multiparameter probe, HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor, HI9828-20 quick calibration solution, HI76981952 probe maintenance kit, HI76981943 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert.	

pH and ORP solutions begin on page 2.142; EC, TDS and salinity solutions begin on page 5.34;

HI98196

Multiparameter Waterproof Meter

pH, ORP, Dissolved Oxygen, Atmospheric Pressure and Temperature

pH Features

- Calibration
  - Up to a three-point calibration with five standard buffers and one custom buffer available
- pH in mV option
  - Useful for diagnostics
- GLP data
  - Offset, slope, date, time and buffers used
- Automatically temperature compensated readings
- pH or pH/ORP field replaceable sensors
  - Gel filled and maintenance free
  - Double junction for reduced contamination of reference cell

Dissolved Oxygen Features

- Choice of units
  - Display units in % saturation or ppm (mg/L)
- Salinity compensation for saline waters
  - Manual entry of salinity values
  - Readings compensated for salinity effects
- Built-in barometer
  - Automatic compensation for changes in atmospheric pressure
  - User selectable units
- Temperature compensation
- Polarization
  - Automatic polarization of probe at startup
- Membrane caps
  - Ready-to-use HDPE pre-tensioned membrane caps are easy to replace

The HI98196 is a waterproof portable logging multiparameter meter that monitors up to 6 different water quality parameters. It's multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, dissolved oxygen, and temperature. The probe transmits readings digitally to the meter, where data points can be displayed and logged. The complete system is simple to setup and easy to use.

Backlit Graphic LCD Display

The HI98196 features a backlit graphic LCD with on-screen help and the capability to display up to twelve parameters simultaneously. The graphic display allows for the use of virtual keys to provide for an intuitive user interface.

Waterproof Protection

The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Digital Probe

The HI7698196 probe features a Quick Connect DIN connector that makes a waterproof connection with the meter.

Color Coded, Field Replaceable Sensors

Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor port identification.

Standard Calibration

Standard pH calibration options are available for calibrating up to three points from a selection of five standard buffers and one custom buffer. Dissolved oxygen calibration is up to two standard points or a single custom point.

Auto-sensor Recognition

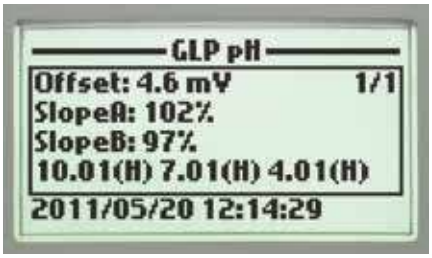
The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

Integrated temperature sensor allows for automatic temperature compensation of pH and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

The meter features a built-in barometer with user-selectable units for dissolved oxygen pressure compensation.



GLP Data

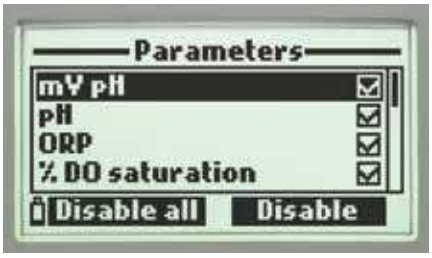
HI98196 includes a GLP feature that allows users to view calibration data and calibration expiration information at the touch of a key. Calibration data includes date, time, buffers/standards used for calibration, and slope characteristics.

Data Logging

The HI98196 allows users to store up to 45,000 continuous or log-on-demand samples with logging intervals from one second to three hours.

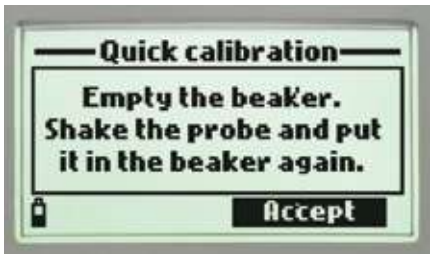
Intuitive Keypad

The fitted rubber keypad has dedicated keys for power, backlight, up/down arrows, help and alphanumeric characters. The meter also features two virtual soft keys that navigate the user through the configuration of each parameter, meter setup, and logging of data. The interface is intuitive for any user's level of experience.



Setup

Extensive setup screen features



Dedicated Help Key

Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

PC Connectivity

Logged data can be transferred to a Window's compatible PC with the included HI920015 micro USB cable and HI9298194 software.

Long Battery Life

The display of the meter has a battery icon indicator to show the remaining power. The meter uses four 1.5V AA batteries that provide up to 360 hours of battery life.

Rugged custom carrying case

The HI98196 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

Probe and Sensors

The HI7698196 is a multiparameter pH/DO/Temperature probe for use with the HI98196 portable meter. It features a Quick Connect DIN that makes a waterproof connection with the meter. Sensors are automatically recognized by the probe and meter when connected. Any ports not used on the probe will not have the parameter displayed on the meter. Sensor replacement is quick and easy with field replaceable, screw type connectors that are color coded for easy sensor identification. The probe features a multistrand-multiconductor shielded cable with 4m, 10m, 20m, and 40m lengths available. It's rugged, waterproof design makes it ideal for field use.

Specifications	HI7698196	
Sensor Inputs	two (pH or pH/ORP, DO)	
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"); 46 mm (1.8") dia	
Weight (without 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
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

- Quick sensor replacement
  - Sensor replacement is quick and easy with field replaceable, screw type connectors and are color coded for easy identification. These meters automatically recognize sensors

Sensor Specifications		HI7698194-0	HI7698194-1	HI7698194-2
Description		pH sensor	pH/ORP sensor	DO sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	DO (% saturation and concentration)
Measurement 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
Temperature Range		-5 to 55°C	-5 to 55°C	-5 to 55°C
Color Code		red	red	white
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	cat/an: Ag/Zn
	Junction	ceramic	ceramic	membrane: HDPE
	Body	PEI	PEI	white top ABS
	Electrolyte	gel	gel	
	Reference	double	double	
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	HI7042S (DO electrolyte)
Dimensions		118 x 15 mm	118 x 15 mm	99 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')

Specifications		HI98196
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic up to three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
Dissolved Oxygen	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%: ±1.5% of reading or ±1.0% whichever is greater; 300.0 to 500.0%: ±3% of reading; 0.00 to 30.00 ppm (mg/L): ±1.5% of reading or ±0.10 ppm (mg/L), whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): ±3% of reading
	Calibration	automatic one or two points at 0, 100% or one custom point
Atmospheric Pressure	Range	450 to 850 mm Hg; 17.72 to 33.46 in Hg; 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 mm Hg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa
	Accuracy	±3 mm Hg within ±15°C from the temperature during calibration
	Calibration	automatic at one custom point
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional 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	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 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.)
Ordering Information	**HI98196** is supplied with HI7698196/4 multiparameter probe, HI7698194-1 pH/ORP sensor, HI7698194-2 DO sensor, HI9828-20 quick calibration solution, HI76981942 probe maintenance kit, HI76981943 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert.	

pH and ORP solutions begin on page 2.142;
for DO accessories see HI7042S, HI7040L and HI76409A/P page 6.26

HI991300 · HI991301

pH/EC/TDS/ Temperature Meters

- Waterproof
  - Designed to float if accidentally dropped in a tank
- Expanded pH range
  - pH range is from -2.00 to 16.00 pH
- Adjustable EC to TDS conversion factor
  - Factor is adjustable from 0.45 to 1.00
- Adjustable EC/TDS temperature correction factor
  - Coefficient (β) is adjustable from 0.0 to 2.4%/°C
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature
  - Temperature displayed in °C or °F along with pH, EC or TDS reading
- Stability indicator
  - Meter displays a clock tag that will disappear when the reading has achieved stability
- HOLD button
  - Freezes reading on the display to allow recording of measurement
- BEPS (Battery Error Prevention System
  - Meter will automatically shut off if there is not enough power to get an accurate measurement
- Battery % level at startup
- Low battery indicator
  - When the level is below 5%, the battery symbol on the LCD blinks to indicate a low battery condition.
- Auto-off
  - Meter automatically shuts off after 8 minutes of non-use to maximize battery life

These instruments have many advanced features that are found in more expensive portable instrumentation including automatic calibration, buffer/standard recognition and temperature compensation. The LCD screen has indicators for calibration status and stability, as well as on-screen tutorial messages. The battery percent level is displayed at start up alerting the user to the remaining battery power that is available. The supplied HI1288D is a polypropylene body, amplified pH electrode with a built-in EC/TDS and temperature sensors. The amplifier for the pH electrode prevents interference from humidity and electrical noise from common sources including from motors, ballasts or rectifiers. Both meters are versatile for many industries including plating, environmental, [illegible] and hydroponics.

HI1288 amplified pH electrode

- 3 sensors in a single probe
- Pre-amplified pH electrode for resistance to electrical noise
- Extractable cloth junction to clear any clogging
- Graphite EC/TDS sensor

The HI991301 and HI991300 are supplied with an amplified polypropylene body pH/EC/TDS/temperature probe. The built in amplifier will reduce the effects of electrical noise on the high impedance pH measurement. Examples of sources of electrical noise include rectifiers, motors and ballasts.

The HI1288 pH electrode also features an extractable cloth junction. Every pH electrode has a junction. Many use a single ceramic frit which acts as a barrier between the inside reference cell to the outside sample. This barrier allows for a diffusion electrolyte that is necessary for the pH measurement. Any clogging of the junction will result in a reduced diffusion and as a result the readings will become erratic. Most probes will have to have this junction cleaned and if not possible then the probe has to be replaced. The extractable cloth junction of the HI1288 allows for the renewing of the junction. Simply extract ⅛" of the junction by pulling on the junction will expose a new portion. Any clogging that was present will be cleared and the response time will be back to normal extending the life of the pH electrode.

The EC/TDS sensor is made of graphite. A common problem with amperometric sensors is a polarization effect. With amperometric sensors there are two poles in which a voltage is alternated. The positive and negative ions in the solution migrate to one of the negative or positive poles. When the charges build up on one of these poles a polarization effect occurs. Having a conductivity sensor made of graphite reduces the polarization effect.

Specifications		HI991300	HI991301
pH	Range	0 to 14.00 pH	0 to 14.00 pH
	Resolution	0.01 pH	0.01 pH
	Accuracy	±0.01 pH	±0.01 pH
EC	Range	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C/32.0 to 140.0°F	0.0 to 60.0°C/32.0 to 140.0°F
	Resolution	0.1°C/0.1°F	0.1°C/0.1°F
	Accuracy	±0.5°C/±1°F	±0.5°C/±1°F
Additional Specifications	pH Calibration	automatic, one or two point calibration with two sets of memorized buffers (Standard 4.01, 7.01, 10.01 or NIST 4.01, 6.86, 9.18)	
	EC/TDS Calibration	automatic one point at: 1382 ppm (CONV=0.5) or 1500 ppm(CONV=0.7) or 1413 µS/cm	automatic one point at: 6.44 ppt (CONV=0.5) or 9.02 ppt (CONV=0.7) or 12880 µS/cm
	pH Temp. Compensaiton	automatic	automatic
	EC/TDS Temperature Compenation	automatic with β selectable from 0.0-2.4%/°C with 0.1 increments	
	TDS Conversion Factor	selectable from 0.45 to 1.00 with 0.01 increments (default 0.50)	
	Probe (included)	HI1288 polypropylene body, pre-amplified multiparameter probe with internal temperature sensor, DIN connector and 1m cable	
	Battery Type/Life	1.5V AAA (3) /approximately 500 hours of continuous use. auto-off after 8 minutes of inactivity	
	Environment	0 to 50°C (32 to 122°F); RH max. 100%	
	Dimensions	152 x 58 x 30 mm (6.0 x 2.3 x 1.2")	
	Weight	205g (7.2 oz.)	
Ordering Information	**HI991300** is supplied with HI1288 multiparameter probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI70032 1382 mg/L (ppm) calibration solution sachet, HI700601 electrode cleaning solution sachet, batteries, instructions and rugged carrying case. **HI991301** is supplied with HI1288 multiparameter probe, HI70004 pH 4.01 buffer sachet, HI70007 pH 7.01 buffer sachet, HI70030 12880 µS/cm calibration solution sachet, HI70038 6.44 g/L (ppt) calibration solution sachet, HI700601 electrode cleaning solution sachet, batteries, instructions and rugged carrying case.		

- Our optional HI710020 orange shockproof rubber boot offers maximum impact protection.

pH solutions begin on page 2.142; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

HI9814

GroLine pH / EC / TDS / Temperature Meter

with Multiparameter Probe

- Waterproof
  - Designed to withstand the humidity of a growing environment
- Wide pH range
  - pH range is from 0.00 to 14.00 pH
- One-point quick calibration solution
- Selectable EC to TDS conversion factor
  - Choice of either a 0.5 or 0.7 conversion factor
  - 0.5 (500 CF) conversion factor is for an EC reading of 1000 µS/cm = 500 ppm
  - 0.7 (700 CF) conversion factor is for an EC reading of 1000 µS/cm = 700 ppm
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature
  - Temperature displayed in °C or °F along with pH, EC or TDS reading
- Stability indicator
  - Meter displays a clock tag that will disappear when the reading has achieved stability
- HOLD button
  - Freezes reading on the display to allow recording of measurement
- BEPS (Battery Error Prevention System
  - Meter will automatically shut off if there is not enough power to get an accurate measurement
- Battery % level at startup
- Low battery indicator
  - When the level is below 5%, the battery symbol on the LCD blinks to indicate a low battery condition.
- Auto-off
  - Selectable time before meter will automatically shuts off to conserve battery life. Options are after 8 minutes, 60 minutes , or disabled.
- Help feature and tutorial messages

The HI9814 is a versatile pH, conductivity (EC), total dissolved solids (TDS), and temperature meter designed for hydroponics, greenhouse and agriculture applications. All operations and settings, including calibration buffers and temperature scale selections, are made through only two buttons. The housing is waterproof and rated for IP67 conditions.

Measure nutrient solutions with one probe

pH and EC/TDS are two of the most common parameters measured in hydroponic nutrient solutions. With the HI9814 there is no need to switch between meters or change probes. The HI9814 uses a single specialized probe design to accurately measure both key parameters at the same time.

User-selectable features include selectable TDS factors of 0.5 and 0.7 as well as auto-off after 8 minutes, 60 minutes, or disabled.

Calibrate pH and EC with one solution

The HI9814 offers a quick calibration feature that allows for calibration of both parameters with a single solution. Simply enter calibration mode and the meter will automatically detect and calibrate pH and EC sensors. EC calibration is automatically applied to TDS readings.

HI1285-7 Multiparameter Probe

- 3 sensors in a single probe
- Gel filled maintenance free pH electrode
- Amplified pH electrode
- Polypropylene body
  - The polypropylene body houses all the sensors in a single body design and is durable. The probe is gel filled for maintenance free operation. It does not have to be refilled periodically.

The specially engineered HI1285-7 pH/EC/TDS/temperature probe utilizes a fiber junction and gel electrolyte which provides a fast response and reduced potential for contamination. These features make this probe ideal for use in fertilizer solutions.

A solid-state preamplifier is integrated into the probe to protect the pH measurement from transient electrical noise. Sources of electrical noise include ballasts used in lighting and pumps to circulate water and nutrient solutions.

Specifications		HI9814
pH	Range*	0.00 to 14.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 pH
	Calibration	automatic, one or two-point calibration (using pH 4.01, 7.01, 10.01 buffers); one-point calibration using quick calibration solution
	Temperature Compensation	automatic
EC	Range	0.00 to 6.00 mS/cm
	Resolution	0.01 mS/cm
	Accuracy	±2% F.S.
	Calibration	automatic, one-point at 1.41 mS/cm or 5.00 mS/cm; one-point calibration using quick calibration solution
	Temperature Compensation	automatic, with β = 1.9%/°C
TDS	Range	0 to 3000 ppm (500 CF); 0 to 3999 ppm (700 CF)
	Resolution	10 ppm (mg/L)
	Accuracy	±2% F.S.
	Conversion Factor (CF)**	0.5 (500 ppm) or 0.7 (700 ppm)
Temperature	Range*	0.0 to 60.0°C/32.0 to 140.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C/±1°F
Additional Specifications	Typical EMC Deviation	±0.02 pH; ±0.2°C or ±0.4°F
	Probe (included)	HI1285-7 pH/EC/TDS/temperature with Quick Connect DIN connector and 1 m (3.3') cable
	Battery Type/Life	1.5V AAA (3) /approximately 500 hours of continuous use
	Auto-off	after 8 minutes, 60 minutes, or disabled
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Dimensions / Weight	152 x 58 x 30 mm (6.0 x 2.3 x 1.2") / 205 g (7.2 oz)
Ordering Information	**HI9814** is supplied with HI1285-7 multiparameter probe, Quick Cal quick calibration solution sachets (3), HI700661 electrode cleaning solution sachets (3), batteries, visual quick start guide, and instructions.	

* The sensor is rated 0 to 12 pH and -5 to 30°C
**1000 µS/cm = 500 ppm with 0.5 CF

pH and Quick Cal solutions begin on page 2.142; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

Quick Connect Digital Probe

The H1285-7 probe features a Quick Connect DIN connector that makes a waterproof connection with the meter.

Significance of Use

Hydroponics is a method of growing plants in the absence of soil, fulfilling the notion that mineral nutrients can be delivered to plants more effectively through the use of a nutrient solution. Hydroponic solutions must be carefully monitored for both pH and EC, as the amount of nutrients delivered to the plant will dictate its fertility and longevity.

EC readings can be expressed TDS; in terms of hydroponics, TDS specifies the salt concentration and strength of a nutrient solution. Since TDS is not a direct measurement, the conversion factor used is based on the type of solution being measured. Offering the conversion factors of 0.5 and 0.7 allows hydroponics growers to more accurately measure their unique nutrient solutions.

- Our optional HI710025 green shockproof rubber boot offers maximum impact protection.

HI9813-5 · HI9813-6

pH/EC/TDS/ Temperature Portable Meter

- Waterproof
- CAL Check™ (HI9813-6)
  - Allows the user to easily check the probe calibration status at any time.
- Variable EC to TDS conversion factor
  - Factor automatically adjusts from 0.56 to 0.78 based on actual EC readings
  - Factor based on 442 curve for natural water
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature
- Low Battery Indicator

The HI9813-6 and HI9813-5 portable meters feature a large LCD which displays either pH, EC, TDS or temperature readings along with tutorial instructions. The pH readings are displayed with a 0.1 resolution and an accuracy of ±0.1 pH while the EC and TDS readings are displayed with a 0.01 mS/cm and 1 ppm (mg/L) resolution and 2% full scale accuracy. The EC range of both meters is from 0.00 to 4.00 mS/cm and TDS is from 0 to 1999 ppm. The temperature correction coefficient (β) is fixed at 2 %/°C and allows for automatic temperature compensated measurements of EC and TDS. These meters are calibrated manually to a single point with the use of two trimmers. pH is calibrated to pH 7.01 while EC/TDS is calibrated to either 1.41 mS/cm (1413 µS/cm) or 1500 ppm. The LCD screen has battery life indicator as well as on-screen tutorial messages.

No probe changes are required when switching your measured parameter between pH, conductivity and TDS. These multiparameter meters reduce the number of instruments required for daily water quality analysis.

The supplied probe on both models feature a polypropylene body, amplified pH electrode with a built-in EC/TDS and temperature sensors. The amplifier for the pH electrode prevents interference from humidity and electrical noise from common sources including from motors, ballasts or pumps. The HI9813-6 and HI9813-5 are versatile meters for the agriculture, greenhouse and hydroponics industries.

HI9813-6 CAL Check™ Feature

The HI9813-6's CAL Check feature alerts users if there is a problem with the pH electrode. This feature is important for customers that calibrate only to pH 7.0; if there is a fracture on the pH glass of the electrode, the pH meter will always display pH 7.0 regardless of the solution being measured. This can be disastrous for the person that calibrates at pH 7.0 and takes readings of samples with an expected pH of 7.0. The user will never be aware that there is a problem. Placing the HI1285-6 pH/EC electrode in HI50021 CAL Check solution and pressing the "Check" button helps users determine if the probe needs to be calibrated, cleaned or replaced. The meter runs CAL Check diagnostics and will display either "Probe is OK" or "Clean Probe and Calibrate". If the reading is around pH 4.0 when the probe is placed in the solution then the probe is broken and needs to be replaced.

HI1285 series probes

These meters are supplied with a polypropylene body pH/EC/TDS/temperature probe. The pH, EC, TDS, and temperature sensor are housed in a single body that connects to the meter with a DIN connector.

- 3 sensors in a single probe
- Amplified pH electrode
  - The pH electrode circuit has a built-in amplifier that will reduce the effects of electrical noise on the high impedance pH measurement. Examples of sources of electrical noise include motors, ballasts, and pumps which are common in greenhouses.
- Amperometric EC/TDS sensor
  - The EC/TDS readings are performed by an amperometric sensor. An alternating voltage is applied to the sensor and the amount of current that passes between the two stainless steel pins is dependent upon the amount of salts (fertilizer) present. A greater amount of salt present results in an increase in conductance.
- Polypropylene body
  - The polypropylene body houses all the sensors in a single body design and is durable. The probe is gel filled for maintenance free operation. It does not have to be refilled periodically.

Specifications		HI9813-5	HI9813-6 (with CAL Check)
pH	Range	0.0 to 14.0 pH	0.0 to 14.0 pH
	Resolution	0.1 pH	0.1 pH
	Accuracy	±0.1 pH	±0.1 pH
EC	Range	0.00 to 4.00 mS/cm	0.00 to 4.00 mS/cm
	Resolution	0.01 mS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 1999 ppm (mg/L)	0 to 1999 ppm (mg/L)
	Resolution	1 ppm (mg/L)	1 ppm (mg/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C	0.0 to 60.0°C
	Resolution	0.1°C	0.1°C
	Accuracy	±0.5°C	±0.5°C
Additional Specifications	TDS Conversion Factor	0.56 to 0.78 ppm = 1 µS/cm (according to TDS 442 curve)	0.56 to 0.78 ppm = 1 µS/cm (according to TDS 442 curve)
	pH & EC/TDS Calibration	manual, one point (all parameters except temperature)	manual, one point (all parameters except temperature)
	Temp. Compensation	automatic 0 to 70°C (32 to 158°F) with β=2%/°C (EC/TDS only)	automatic 0 to 70°C (32 to 158°F) with β=2%/°C (EC/TDS only)
	Probe	HI1285-5 polypropylene body, pre-amplified multiparameter probe with internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable (included)	HI1285-6 polypropylene body, pre-amplified multiparameter probe with CAL Check compatibilty, internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	9V / approximately 450 hours of continuous use	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	
	Weight	230 g (8.1 oz.)	
Ordering Information		**HI9813-5** is supplied with HI1285-5 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70442 1500 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI700661 electrode cleaning solution sachets (2), battery and instructions. **HI9813-6** is supplied with HI1285-6 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70442 1500 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI50021 calibration check solution sachets (2), HI700661 electrode cleaning solution sachets (2), 9v battery (1), instructions and rugged carrying case.	

pH solutions begin on page 2.142; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

HI9811-5 · HI9812-5

pH/EC/TDS/ Temperature Portable Meters

- Waterproof
- Automatic Temperature Compensation
  - All readings are compensated for variations in temperature
- Low battery indicator

The HI9812-5 and HI9811-5 portable meters feature a large LCD which displays either pH, EC, TDS or temperature readings along with tutorial instructions. The pH readings are displayed with a 0.1 resolution and an accuracy of +/-0.1 pH while the EC and TDS readings are displayed with a 10 mS/cm and 10 ppm (mg/L) resolution and 2% full scale accuracy. The temperature correction coefficient (β) is fixed at 2 %/°C and allows for automatic temperature compensated measurements of EC and TDS. These meters are calibrated manually to a single point with the use of two trimmers. pH is calibrated to pH 7.01 while EC/TDS is calibrated to either 1.41 mS/cm (1413 µS/cm) or 1500 ppm. The LCD screen has battery life indicator as well as on-screen tutorial messages.

No probe changes are required when switching your measured parameter between pH, conductivity and TDS. These multiparameter meters reduce the number of instruments required for daily water quality analysis.

The supplied probe on both models feature a polypropylene body, amplified pH electrode with a built-in EC/TDS and temperature sensors. The amplifier for the pH electrode prevents interference from humidity and electrical noise from common sources including from motors, ballasts or pumps. The HI9812-5 and HI9811-5 are versatile meters for the agriculture, greenhouse and hydroponics industries.

HI1285-5 probe

These meters are supplied with an HI1285-5 polypropylene body pH/EC/TDS/temperature probe. The pH, EC, TDS, and temperature sensor are housed in a single body that connects to the meter with a DIN connector.

- Amplified pH electrode
  - The pH electrode circuit has a built in amplifier that will reduce the effects of electrical noise on the high impedance pH measurement. Examples of sources of electrical noise include motors, ballasts, and pumps which are common in greenhouses.
- Amperometric EC/TDS sensor
  - The EC/TDS readings are performed by an amperometric sensor. An alternating voltage is applied to the sensor and the amount of current that passes between the two stainless steel pins is dependent upon the amount of salts (fertilizer) present. A greater amount of salt present results in an increase in conductance.
- Polypropylene body
  - The polypropylene body houses all the sensors in a single body design and is durable. The probe is gel filled for maintenance free operation. It does not have to be refilled periodically.
- 3 sensors in a single probe
- Gel filled maintenance free pH electrode

Specifications		HI9811-5	HI9812-5
pH	Range	0.0 to 14.0 pH	0.0 to 14.0 pH
	Resolution	0.1 pH	0.1 pH
	Accuracy	±0.1 pH	±0.1 pH
EC	Range	0 to 6000 µS/cm	0 to 1990 µS/cm
	Resolution	10 µS/cm	10 µS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 3000 ppm (mg/L)	0 to 1990 ppm (mg/L)
	Resolution	10 ppm (mg/L)	10 ppm (mg/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0 to 70°C	0 to 60°C
	Resolution	0.1°C	10°C
	Accuracy	±0.5°C	±1°C
Additional Specifications	TDS Conversion Factor	0.5 ppm (mg/L) = 1 µS/cm	
	Calibration	manual, one point (all parameters except temperature)	
	Temperature Compensation	automatic from 0 to 70°C (32 to 158°F) with β = 2% /°C (EC/TDS only)	
	Probe (included)	HI1285-5 polypropylene body, pre-amplified multiparameter probe with internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable	
	Battery Type / Life	9V / approximately 450 hours of continuous use	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	
	Weight	230 g (8.1 oz.)	
Ordering Information		**HI9811-5** and **HI9812-5** are supplied with HI1285-5 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70032 1382 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI700661 electrode cleaning solution sachets (2), 9v battery (1), instructions and rugged carrying case.	

pH solutions begin on page 2.142; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

Replacement Probes

Code	HI1285-7	HI1285-6	HI1285-5	HI1288
Description	pre-amplified pH and EC probe	pre-amplified pH and EC probe	pre-amplified pH and EC probe	pre-amplified pH and EC probe
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	cloth	cloth	cloth	cloth
Electrolyte	gel	gel	gel	gel
Max Pressure	0.1 bar	0.1 bar	0.1 bar	1 bar
Range	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT
Tip /Shape	spheric (dia: 8.0 mm)	spheric (dia: 8.0 mm)	spheric (dia: 8.0 mm)	spheric (dia: 8.5 mm)
Temperature Sensor	yes	yes	yes	yes
Amplifier	yes	yes	yes	yes
Body Material	polypropylene	polypropylene	polypropylene	polypropylene
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m cable (3.3')
Recommended Use	greenhouses, hydroponics	greenhouses, hydroponics, environmental monitoring, water treatment, boilers, cooling towers	greenhouses, hydroponics, environmental monitoring, water treatment, boilers, cooling towers	general purpose, water treatment, agriculture, boilers, cooling towers
Plug	Quick Connect DIN To be used with HI9814	DIN with CAL Check™ To be used with HI9813-6 series	DIN To be used with HI9811, HI9812 and HI9813 series	DIN To be used with HI991300 and HI991301

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Magnetic Stirrers

Speedsafe™ from Hanna

There are two types of magnetic stirrers; mechanical and electronic. Most manufacturers of magnetic stirrers use the mechanical approach, using steel and aluminum for the structural material and outdated methods of speed control. These units are not only very heavy, but also very inaccurate. The use of these materials and methods appear to make the units rugged and strong, but they are instead cumbersome and obsolete.

Something as simple as completely dissolving salts in a medium is, in reality, a science. Often this cannot be achieved with simple mechanical processes. The only choice that the user has with mechanical products is to increase the stirring time or the temperature. With electronics, you can do more... the Hanna approach is electronic.

Speed sensor and limiter: Each Hanna stirrer is equipped with a speed sensing device (opto-sensor) coupled with an FVC (frequency voltage converter), which monitors the speed. As the speed reaches a preset maximum level, the speed limiter shuts down the VCO (voltage-controlled oscillator) to slow down the motor speed. This ensures that when the load is suddenly removed from the stirrer, the motor will not accelerate to such a high speed that will be hazardous to both the user and the stirrer; a feature not commonly found in conventional stirrers.

Sophisticated Engineering

Parts are engineered and manufactured to strict specifications to ensure absolute reliability. All components are mounted into a molded casing covered with either ABS plastic or a stainless steel plate, which are splash-proof and chemically-resistant. Minimal vibration and a well-balanced rotating arm provide years of trouble-free operation.

- ABS plastic cover
- Stainless steel cover

Speedsafe™

HI190M • HI190M-0 • HI200M

Our Most Popular Magnetic Mini-Stirrers

- Compact size
  - The compact size of these stirrers allow users to maximize bench space for efficiency and safety
- Safety
  - Speedsafe™ limits the maximum speed to 1000 rpm even if a load is suddenly removed
- Built to last
  - The ABS housing of HI190M and HI190 M-0 resists most harmful chemicals in the lab

The HI190M, HI190M-0 and HI200M are compact and lightweight, so that lack of laboratory bench space is no longer a concern.

These stirrers incorporate electronic controls that allow the user to regulate the speed with greater precision. Often, in the lab, a sample is removed from the stirrer before reducing the speed. This would cause the motor of conventional equipment to accelerate until it is destroyed. This does not pose a problem with Hanna mini-stirrers, as the Speedsafe™ mechanism ensures that the maximum speed is never exceeded.

HI190M and HI190M-0 come supplied with an ABS cover that will resist the harmful effects of chemicals that are accidentally spilled.

HI200M has an AISI 316 stainless steel cover. This model is ideal for applications that create exothermic reactions.

Specifications	HI190M	HI190M-0	HI200M
Maximum Stirring Capacity	1 liter (0.26 gallons)	1 liter (0.26 gallons)	1 liter (0.26 gallons)
Min. Speed Range	100 rpm	100 rpm	100 rpm
Max. Speed Range	1000 rpm	1000 rpm	1000 rpm
Power Supply	110/115 VAC or 220/240 VAC, 50/60Hz	12 VDC (sold separately)	110/115 VAC or 230/240 VAC, 50/60Hz
Installation Category	II	II	II
Cover Material	ABS plastic	ABS plastic	AISI 316 stainless steel
Environment	0 to 50°C (32 to 122°F); RH max 95%	0 to 50°C (32 to 122°F); RH max 95%	0 to 50°C (32 to 122°F); RH max 95%
Dimensions	120 x 120 x 45 mm (4.8 x 4.8 x 1.8")	120 x 120 x 45 mm (4.8 x 4.8 x 1.8")	120 x 120 x 45 mm (4.8 x 4.8 x 1.8")
Weight	640 g (1.4 lbs.)	610 g (1.3 lbs.)	710 g (1.6 lbs.)
Ordering Information	**HI190M-1** (110/115 Vac), **HI190M-2** (230/240 Vac), **HI190M-0** (12 VDC), **HI200M-1** (110/115 Vac) and **HI200M-2** (230/240 Vac) mini-stirrers are supplied with micro stir bar and instructions.		
Accessories	**HI731319** Magnetic micro stir bar (10)		

HI300N • HI310N

Heavy-duty Magnetic Stirrers

- Stainless steel cover

HI300N and HI310N are heavy-duty stirrers. HI300N can stir up to 2.5 liters (0.66 gallons) of liquid and the HI310N can stir up to 5.0 liters (1.3 gallons). This makes them perfect for laboratory use as well as for use in production. Electronic controls are incorporated into these stirrers that allow the user to regulate the speed with greater precision. With Hanna's Speedsafe™, a limiter will assure that the maximum speed will never be exceeded.

HI310N also has an automatic feedback feature. The motor is electronically controlled to maintain the chosen speed as the load changes. If the viscosity or the level (fluid weight) increases or decreases, the circuitry will adjust the output power to keep the speed constant.

Specifications	HI300N	HI310N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)	5 liters (1.3 gallons)
Min. Speed Range	100 rpm	
Max. Speed Range	800 to 1000 rpm	
Auto-Feedback	-	standard
Power Supply	110/115 VAC or 230/240 VAC, 50/60 Hz	
Installation Category	II	
Cover Material	AISI 316 stainless steel	
Environment	0 to 50°C (32 to 122°F); RH max 95%	
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")	
Weight	1.4 kg (3.1 lbs.)	
Ordering Information	**HI300N-1** (115V), **HI300N-2** (230V), **HI310N-1** (115V), and**HI310N-2** (230V)are supplied with micro stir bar and instructions.	
Accessories	**HI731320** Magnetic stir bar (10)	

HI302N

Auto-reverse Magnetic Stirrers

- Stainless steel cover

The HI302N model can stir up to 2.5 liters (0.66 gallons). It is often desirable to stir your samples in two directions. This will achieve maximum homogeneity and solubility. An advanced circuit allows HI302N to reverse the direction of the stirring at a user-selected interval. The interval can be adjusted from 30 seconds up to 3 minutes. In addition to precision speed control, a limiter will also assure that the maximum speed will never be exceeded.

Hanna stirrers incorporate a VCO device that stops the motor from accelerating as soon as a load is removed (Speedsafe™).

Specifications	HI302N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)
Low Speed Range	100 rpm
High Speed Range	800 to 1000 rpm
Reverse Interval	from 30 seconds to 3 minutes
Power Supply	110/115 VAC or 220/240V, 50/60 Hz
Installation Category	II
Cover Material	AISI 316 stainless steel
Environment	0 to 50°C (32 to 122°F); RH max 95%
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")
Weight	1.4 kg (3.1 lb.)
Ordering Information	**HI302N-1** (115V) and **HI302N-2** (230V) are supplied with magnetic stir bar and instructions.
Accessories	**HI731320** Magnetic stir bar (10)

HI304N

Auto-reverse Magnetic Stirrers

with Tachometer

- Stainless steel cover

When stirring a solution, to work with a constant speed is an important factor in ensuring that the best repeatability in tests and processes is achieved. Without a tachometer, there is no way of knowing the RPMs.

HI304N is a heavy-duty stirrer with a built-in tachometer. It is often desirable to stir in two directions in order to achieve maximum homogeneity. An advanced circuit allows HI304N to reverse the direction of the stir at a user-selected interval. The interval can be adjusted from 30 seconds up to 3 minutes. In addition to precision speed control, a limiter will also assure that the maximum speed will never be exceeded (Speedsafe™). Often, a sample is removed from the stirrer before the user reduces the speed. This can cause the motor to accelerate until it is destroyed. Hanna stirrers incorporate a VCO device that will stop the motor from accelerating as soon as the load is removed.

Specifications	HI304N
Maximum Stirring Capacity	2.5 liters (0.66 gallons)
Low Speed Range	100 rpm
High Speed Range	800 to 1000 rpm
Tachometer	four-digit LCD
Reverse Interval	from 30 seconds to 3 minutes
Power Supply	110/115 VAC or 220/240 VAC, 50/60 Hz
Installation Category	II
Cover Material	AISI 316 stainless steel
Environment	0 to 50°C (32 to 122°F); RH max 95%
Dimensions / Weight	180 x 180 x 70 mm (7.1 x 7.1 x 2.8") / 1.4 kg (3.1 lbs.)
Ordering Information	**HI304N-1** (115V) and **HI304N-2** (230V) is supplied with magnetic stir bar and instructions
Accessories	**HI731320** Magnetic stir bar (10)

HI324N

Timer Controlled Magnetic Stirrers

- Stainless steel cover

HI324N is a heavy-duty stirrers that incorporate a timer control that will turn the motor off after a selected amount of time. The time is adjustable from 5 minutes to 2 hours. This feature allows the user to carry out other tasks without worrying about over or under stirring. HI324N can stir up to 5.0 liters (1.3 gallons), making it ideal for laboratory and production use.

This stirrer allows regulated speed control. A limiter will assure the maximum speed is never exceeded (Speedsafe™).

HI324N has an automatic feedback feature and incorporates an LCD tachometer. The motor is electronically-controlled to maintain the chosen speed as the load changes. If the viscosity or the level increases or decreases, the circuitry will adjust the output power. The HI324N's RPM display guarantees repeatability in QC tests and research by constantly displaying the RPMs.

Specifications	HI324N
Maximum Stirring Capacity	5 liters (1.3 gallons)
Low Speed Range	100 rpm
High Speed Range	800 to 1000 rpm
Auto-Feedback	standard
Timer Range	from 5 minutes to 2 hours
Tachometer	four-digit LCD
Power Supply	110/115 VAC or 220/240 VAC, 50/60 Hz
Installation Category	II
Cover Material	AISI 316 stainless steel
Environment	0 to 50°C (32 to 122°F); RH max 95%
Dimensions	180 x 180 x 70 mm (7.1 x 7.1 x 2.8")
Weight	1.4 kg (3.1 lb.)
Ordering Information	**HI324N-1** (115V) and **HI324N-2** (230V) are supplied with magnetic stir bar and instructions
Accessories	**HI731320** Magnetic stir bar (10)

HI181

Compact Magnetic Mini-Stirrers

with Electrode Holder

- Electrode holder
  - The HI181 series features an electrode holder that fits into the base.
- Round edge
- Dynamic design
  - Easy to handle, these lightweight and compact stirrers need little room and are quickly recognizable on busy benches
- Built to last
  - Chemical resistant housing resists damage by accidental falls

Common stirrers are manufactured with steel and aluminum components. These units are often too large and heavy to fit in the limited space of a laboratory. Hanna HI181 series is compact, lightweight and inexpensive.

Often, in the lab, a sample is removed from a stirrer before reducing the speed. Normally, this would cause the motor to accelerate until it is destroyed. Hanna stirrers incorporate electronic controls that allow the user to regulate the speed with greater precision. In addition to speed control, the Speedsafe™ mechanism will assure that the maximum speed is never exceeded. HI181 mini-stirrers are available in eleven colors. The various colors can allow easy sample identification at a distance.

Speedsafe™

11 colors to choose from


HI181 - Black


HI181W - Arctic White


HI181F - Blue


HI181K - Orange


HI181J - Charcoal


HI181I - Ivory


HI181C - Glacier Blue


HI181A - Yellow


HI181M - Moss Green


HI181E - Green


HI181L - Lavender

Specifications	HI181
Maximum Stirring Capacity	1 liter (0.26 gallons)
Min. Speed Range	100 rpm
Max. Speed Range	1000 rpm
Power Supply	110/115 VAC or 220/240 VAC, 50/60 Hz
Installation Category	II
Cover Material	ABS plastic
Environment	0 to 50°C (32 to 122°F) ; RH max 95%
Dimensions	137 mm (dia) x 51 mm (h)
Weight	640 g (1.4 lbs.)
Accessories	**HI731319** Magnetic micro stir bar (10)

Ordering Information

All models include electrode holder, micro stir bar and instructions

HI181-1	Black mini-stirrer (115V)
HI181-2	Black mini-stirrer (230V)
HI181W-1	Arctic White mini-stirrer (115V)
HI181W-2	Arctic White mini-stirrer (230V)
HI181F-1	Blue mini-stirrer (115V)
HI181F-2	Blue mini-stirrer (230V)
HI181F-3	Blue mini-stirrer (AUS plug)
HI181K-1	Orange mini-stirrer (115V)
HI181K-2	Orange mini-stirrer (230V)
HI181J-1	Charcoal mini-stirrer (115V)
HI181J-2	Charcoal mini-stirrer (230V)
HI181I-1	Ivory mini-stirrer (115V)
HI181I-2	Ivory mini-stirrer (230V)
HI181C-1	Glacier Blue mini-stirrer (115V)
HI181C-2	Glacier Blue mini-stirrer (230V)
HI181A-1	Yellow mini-stirrer (115V)
HI181A-2	Yellow mini-stirrer (230V)
HI181M-1	Moss Green mini-stirrer(115V)
HI181M-2	Moss Green mini-stirrer (230V)
HI181E-1	Green mini-stirrer(115V)
HI181E-2	Green mini-stirrer (230V)
HI181L-1	Lavender mini-stirrer(115V)
HI181L-2	Lavender mini-stirrer (230V)

HI180

Compact Magnetic Mini-Stirrers

- Round edge
- Dynamic design
  - Easy to handle, these lightweight and compact stirrers need little room and are quickly recognizable on busy benches
- Built to last
  - Chemical resistant housing resists damage by accidental falls

Hanna HI180 series is compact, lightweight and inexpensive.

Often, in the lab, a sample is removed from a stirrer before reducing the speed. Normally, this would cause the motor to accelerate until it is destroyed. Hanna stirrers incorporate electronic controls that allow the user to regulate the speed with greater precision. In addition to speed control, the Speedsafe™ mechanism will assure that the maximum speed is never exceeded. HI180 mini-stirrers are available in eleven colors. The various colors can allow easy sample identification at a distance.

11 colors to choose from


HI180 - Black


HI180W - Arctic White


HI180F - Blue


HI180K - Orange


HI180J - Charcoal


HI180I - Ivory


HI180C - Glacier Blue


HI180A - Yellow


HI180M - Moss Green


HI180E - Green


HI180L - Lavender

Specifications	HI180
Maximum Stirring Capacity	1 liter (0.26 gallons)
Min. Speed Range	100 rpm
Max. Speed Range	1000 rpm
Power Supply	110/115 VAC or 220/240 VAC, 50/60 Hz
Installation Category	II
Cover Material	ABS plastic
Environment	0 to 50°C (32 to 122°F) ; RH max 95%
Dimensions	137 mm (dia) x 51 mm (h)
Weight	640 g (1.4 lbs.)
Accessories	**HI731319** Magnetic micro stir bar (10)

Ordering Information

All models are supplied with micro stir bar and instructions

HI180-1	Black mini-stirrer (115V)
HI180-2	Black mini-stirrer (230V)
HI180W-1	Arctic White mini-stirrer (115V)
HI180W-2	Arctic White mini-stirrer (230V)
HI180F-1	Blue mini-stirrer (115V)
HI180F-2	Blue mini-stirrer (230V)
HI180K-1	Orange mini-stirrer (115V)
HI180K-2	Orange mini-stirrer (230V)
HI180J-1	Charcoal mini-stirrer (115V)
HI180J-2	Charcoal mini-stirrer (230V)
HI180I-1	Ivory mini-stirrer (115V)
HI180I-2	Ivory mini-stirrer (230V)
HI180C-1	Glacier Blue mini-stirrer (115V)
HI180C-2	Glacier Blue mini-stirrer (230V)
HI180A-1	Yellow mini-stirrer (115V)
HI180A-2	Yellow mini-stirrer (230V)
HI180M-1	Moss Green mini-stirrer(115V)
HI180M-2	Moss Green mini-stirrer (230V)
HI180E-1	Green mini-stirrer(115V)
HI180E-2	Green mini-stirrer (230V)
HI180L-1	Lavender mini-stirrer(115V)
HI180L-2	Lavender mini-stirrer (230V)

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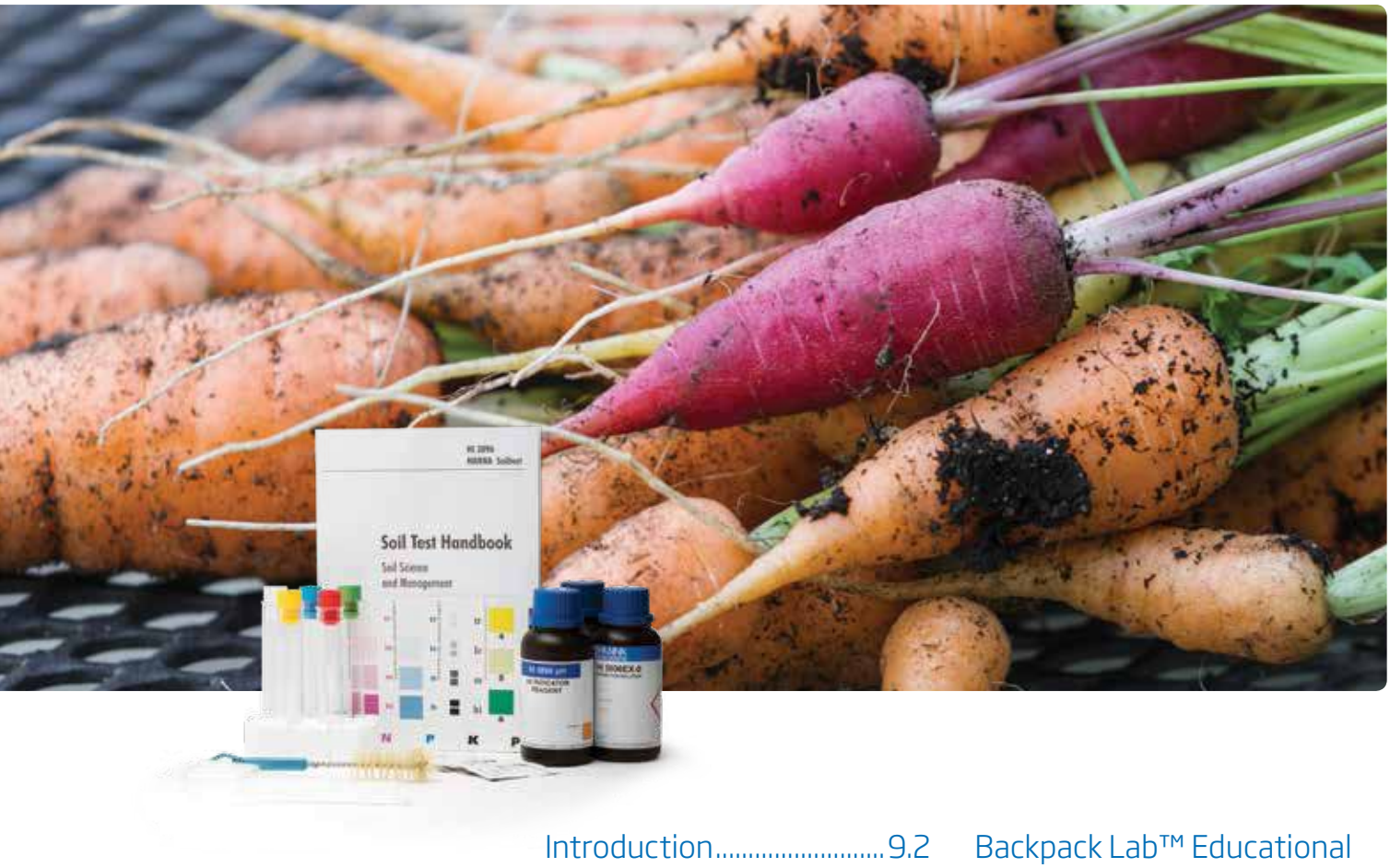

Hanna Chemical Test Kits

Single or Combination Kits

Hanna test kits are a simple way to perform an accurate chemical analysis. The wide variety of single parameter test kits presented in this section includes colorimetric, checker disc, titration and turbidimetric methods.

Quick and easy to use, Hanna colorimetric chemical test kits are the ideal solution for water analysis of many chemical parameters. The kits are equipped with a transparent container which has the color scale right next to the sample being tested. This makes the color comparison process simple and error free. The reagents are either liquid or powder, depending on the parameter to be measured.

Hanna Checker® Disc test kits use the technology of colorimetric kits to provide greater accuracy and resolution. The Checker® Disc is a color comparison wheel shaded from dark to light in proportion to the concentration of the chemical parameter being tested. The user just needs to put both the blank and the reacted cuvettes inside the Checker® Disc. By turning the wheel, the user can then visually find the concentration that best equals the reacted sample. This technique enhances resolution and accuracy.

Titration test kits are easy to use without any loss of resolution and accuracy. To determine the concentration of the chemical parameter, these kits utilize a titration technique which consists of counting the number of drops of titrant necessary to cause a color change in the sample. Dropper bottles make titration extremely quick and easy without compromising accuracy. The endpoint can be determined with enhanced accuracy and simplicity.

Hanna test kits are supplied ready to use, complete with all the necessary accessories. They are designed to help you to work better, faster and safer. All Hanna chemical test kits use color-coded dropper bottles which are easy to recognize during analysis.

With some kits, a plastic beaker is provided featuring a ported cap to prevent spills and waste.

Every kit is manufactured according to the highest quality standards and a Safety Data Sheet (SDS) is available for each product, online.

Designed for Specific Applications

Hanna combination chemical test kits are tailor made for specific applications:

Includes all you need

Hanna test kits include all the necessary reagents and accessories for their specific application.

Ideal for field measurements

Multiparameter test kits from Hanna are equipped with a hard carrying case helps to keep your equipment neat, organized and easy to carry around in the field. Our carrying cases are rugged, built to last, and easily refilled with replacement reagents as needed.

Comprehensive Instructions

Every chemical test kit is supplied with a comprehensive, easy-to-understand instruction manual. The manuals guide you through the analysis step-by-step, making it easy for even non-technical personnel to perform tests.

One more advantage: Hanna's exclusive pHep® for pH measurements

For those kits that offer pH measurements, Hanna has included the exclusive pHep® electronic tester so that your pH analysis will always be quick and reliable. Traditional pH test strips have limited accuracy and do not cover the entire pH range. Due to the pHep®'s long life, high accuracy and extended range, these problems are avoided.

HI3814

Environmental Monitoring Test Kit

Ideal for Professionals and Students

The HI3814 is a chemical test kit that determines that uses titration and direct measurement to measure six parameters common in environmental testing: acidity, alkalinity, carbon dioxide, hardness, dissolved oxygen, and pH. The HI3814 is supplied with all of the necessary reagents and equipment to perform each analysis, and all reagents are individually available as they run out.

See page 9.34

HI3896

Hanna Soil Test Kit

The chemical composition of soil includes pH and chemical elements. Soil analysis is necessary for better management of fertilization and to know the residues of fertilizers in relation to the crop, tillage and the most suitable plant choice for soil composition. An analysis can highlight shortages and help the understanding of the causes of an abnormal growth. By using the Hanna soil test, it is possible to measure pH and the most important elements for plant growth: nitrogen (N), phosphorus (P) and potassium (K).

Testing the soil during each crop cycle and comparing the results with plant growth can be a useful information for subsequent cultivations.

See page 9.31

HI3899BP

Backpack Lab® Marine Science Educational Test Kit

Backpack Lab® is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, this durable backpack is great to take to the field for accurate on-site measurements.

This kit is designed to provide a complete unit for teachers to introduce students to important marine science topics. The teacher's guide provides detailed background information for marine science lessons and activities that can be adapted to various grade levels. Field tests are included to complement classroom lessons. All materials fit easily into the supplied backpack for easy transport.

See page 9.42

Single Parameter Test Kits

	Parameter	Method	Range	# of Tests	Code	Page
Acidity	Acidity (as % Oleic acid)	titration	0.00 - 1.00 % acidity	6	HI3897	9.8
	Acidity (as $CaCO_3$) Methyl/Orange and Total	titration	0-100 mg/L (ppm); 0-500 mg/L (ppm)	110 avg.	HI3820	9.10
Alkalinity	Alkalinity (as $CaCO_3$) Phenolphthalein and Total	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	HI3811	9.10
Ammonia	Ammonia (as NH_3–N) (Fresh Water)	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.	HI3824	9.11
	Ammonia (as NH_3–N) (Saltwater)	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.	HI3826	9.11
Boron	Boron	titration	0.0-5.0 mg/L (ppm)	100	HI38074	9.12
Bromine	Bromine	colorimetric	0.0-3.0 mg/L (ppm)	60 avg.	HI3830	9.12
Carbon Dioxide	Carbon Dioxide	titration	0.0-10.0 mg/L (ppm); 0.0-50.0 mg/L (ppm); 0-100 mg/L (ppm)	110 avg.	HI3818	9.13
Chloride	Chloride (as Cl^-)	titration	0-100 mg/L (ppm); 0-1000 mg/L (ppm)	110 avg.	HI3815	9.13
Chlorine	Chlorine Free	colorimetric	0.0-2.0 mg/L (ppm)	50 avg.	HI3829F	9.14
	Chlorine Free	colorimetric	0.0-2.5 mg/L (ppm)	50 avg.	HI3831F	9.14
	Chlorine Free	checker disc	0.0-3.5 mg/L (ppm)	100	HI3875	9.15
	Chlorine Free	checker disc	0.00-0.70 mg/L (ppm); 0.0-3.5 mg/L (ppm)	200	HI38018	9.15
	Chlorine Free & Total	checker disc	0.00-0.70 mg/L (ppm); 0.0-3.5 mg/L (ppm)	200	HI38017	9.16
	Chlorine Free & Total	checker disc	0.00-0.70 mg/L (ppm); 0.0-3.5 mg/L (ppm); 0.0-10.0 mg/L (ppm)	200	HI38020	9.16
	Chlorine Total	colorimetric	0.0-2.5 mg/L (ppm)	50 avg.	HI3831T	9.17
		titration	10-200 mg/L (ppm)	100	HI38023	9.17
Chromium	Chromium (as CrVI)	colorimetric	0.0-1.0 mg/L (ppm)	100 avg.	HI3846	9.18
Copper	Copper	colorimetric	0.0-2.5 mg/L (ppm)	100	HI3847	9.18
Formaldehyde	Formaldehyde	titration	0-1%; 0-10%	110 avg.	HI3838	9.19
Glycol	Glycol	visual	Present/Absent	25	HI3859	9.19
Hardness	Hardness (as $CaCO_3$) Total	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	HI3812	9.20
	Hardness (as $CaCO_3$) Total	titration	0-30 gpg	100	HI38033	9.20
	Hardness (as $CaCO_3$) Total	titration	0-150 mg/L (ppm)	50 avg.	HI3840	9.21
	Hardness (as $CaCO_3$) Total	titration	40-500 mg/L (ppm)	50 avg.	HI3841	9.21
	Hardness (as $CaCO_3$) Total	titration	400-3000 mg/L (ppm)	50 avg.	HI3842	9.21
Hydrogen Peroxide	Hydrogen Peroxide	titration	0.00-2.00 mg/L; 0.0-10.0 mg/L	100 avg.	HI3844	9.22
Hypochlorite	Hypochlorite (as Cl_2)	titration	50-150 g/L (ppt)	100 avg.	HI3843	9.22
Iron	Iron	colorimetric	0-5 mg/L (ppm)	50 avg.	HI3834	9.23
	Iron	checker disc	0.00-1.00 mg/L (ppm)	100	HI38039	9.23
	Iron	checker disc	0.0-5.0 mg/L (ppm)	100	HI38040	9.23
	Iron	checker disc	0.0-10.0 mg/L (ppm)	100	HI38041	9.23
Nitrate	Nitrate (as NO_3^-–N)	colorimetric	0-50 mg/L (ppm)	100	HI3874	9.25
	Nitrate (as NO_3^-–N) (Irrigation Water and Soil)	checker disc	water: 0-50 mg/L (ppm); soil: 0-60 mg/L (ppm)	100 100	HI38050	9.25
Nitrite	Nitrite (as NO_2^-–N)	colorimetric	0.0-1.0 mg/L (ppm)	100	HI3873	9.26

	Parameter	Method	Range	# of Tests	Code	Page
Oxygen, Dissolved	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	HI3810	9.26
Ozone	Ozone	checker disc	0.0-2.3 mg/L (ppm)	100	HI38054	9.27
Phosphate	Phosphate (PO_4^{3-})	colorimetric	0-5 mg/L (ppm)	50	HI3833	9.27
	Phosphate (PO_4^{3-})	checker disc	0.00-1.00 mg/L (ppm); 0.0-5.0 mg/L (ppm); 0-50 mg/L (ppm)	100	HI38061	9.28
Salinity	Salinity	titration	0.0-40.0 g/kg (ppt)	110 avg.	HI3835	9.28
Silica, HR	Silica as (SiO_2)	checker disc	0-40 mg/L (ppm); 0-800 mg/L (ppm)	100	HI38067	9.29
Sulfate	Sulfate (as SO_4^{2-})	turbidimetric	20-100 mg/L (ppm)	100	HI38000	9.29
	Sulfate (as SO_4^{2-})	titration	100-1000 mg/L (ppm); 1000-10000 mg/L (ppm)	200	HI38001	9.30
Sulfite	Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm); 0-200 mg/L (ppm)	110 avg.	HI3822	9.30

Multiparameter Test Kits

	Parameter	Method	Range	# of Tests	Page
HI3895 Agriculture Test Kit, Basic	Nitrogen	colorimetric	traces, low, medium, high	10	9.31
	Phosphorus	colorimetric	traces, low, medium, high	10	
	pH	colorimetric	4 to 9 pH	10	
	Potassium	turbidimetric	traces, low, medium, high	10	
HI3896 Agriculture Test Kit, Professional	Nitrogen	colorimetric	traces, low, medium, high	25	9.31
	Phosphorus	colorimetric	traces, low, medium, high	25	
	pH	colorimetric	4 to 9 pH	25	
	Potassium	turbidimetric	traces, low, medium, high	25	
HI3827 Boiler and Feedwater Test Kit	Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	9.32
	Chloride (as Cl^-)	titration	0-100 mg/L (ppm); 0-1000 mg/L (ppm)	110 avg.	
	Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	
	Phosphate	colorimetric	0-5 mg/L (ppm)	50	
	pH	electronic pH tester	0.0-14.0 pH	life of the meter	
	Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm); 0-200 mg/L (ppm)	110 avg.	
HI3821 Cooling and Boiler Combination Test Kit	Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	9.33
	Chloride (as Cl^-)	titration	0-100 mg/L (ppm); 0-1000 mg/L (ppm)	110 avg.	
	Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	
	Phosphate	colorimetric	0-5 mg/L (ppm)	50 avg.	
	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	
	Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm); 0-200 mg/L (ppm)	110 avg.	
HI3814 Environmental Monitoring Test Kit	Acidity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-500 mg/L (ppm)	110 avg.	9.34
	Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	
	Carbon Dioxide	titration	0.0-10.0 mg/L (ppm); 0.0-50.0 mg/L (ppm); 0-100 mg/L (ppm)	110 avg.	
	Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	
	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	
	pH	electronic pH tester	0.0-14.0 pH	life of the meter	
HI3823 Marine Test Kit	Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	9.35
	Carbon Dioxide	titration	0.0-10.0 mg/L (ppm); 0.0-50.0 mg/L (ppm); 0-100 mg/L (ppm)	110 avg.	
	Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	
	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	
	pH	electronic pH tester	0.0-14.0 pH	life of the meter	
	Salinity	titration	0.0-40.0 g/kg	110 avg.	
HI3887 Quick-check Swimming Pool Test Kit	Free Chlorine	colorimetric	0-2.5 mg/L (ppm)	50 avg.	9.36
	pH	colorimetric	6.0-8.5 pH	100 avg.	
HI3817 Water Quality Test Kit	Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	9.37
	Chloride (as Cl^-)	titration	0-100 mg/L (ppm); 0-1000 mg/L (ppm)	110 avg.	
	Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100 avg.	
	Iron	colorimetric	0-5 mg/L (ppm)	50	
	pH	electronic pH tester	0.0-14.0 pH	life of the meter	
	Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm); 0-200 mg/L (ppm)	110 avg.	

Backpack Lab® Multiparameter Test Kits

	Parameter	Method	Range	# of Tests	Page
HI3817BP Backpack Lab® Water Quality Educational Test Kit	Acidity ($CaCO_3$)	titration	0-100 mg/L (ppm); 0-500 mg/L (ppm)	110	9.39
	Alkalinity ($CaCO_3$) Phenolphthalein & Total	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110	
	Carbon Dioxide	titration	0.0-10.0 mg/L (ppm); 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	110	
	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110	
	Hardness ($CaCO_3$)	titration	0.0-30.0 mg/L (ppm); 0-300 mg/L (ppm)	100	
	Nitrate (NO_3^-–N)	colorimetric	0-50 mg/L (ppm)	100	
	Phosphate	colorimetric	0-5 mg/L (ppm)	50	
	pH	Hanna electronic Combo tester	-2 to 16 pH	life of meter	
	EC	Hanna electronic Combo tester	0-3999 µS/cm	life of meter	
	TDS	Hanna electronic Combo tester	0-2000 ppm	life of meter	
	Temperature	Hanna electronic Combo tester	-5-60.0°C	life of meter	
	Turbidity	secchi disc	-	-	
HI3896BP Backpack Lab® Soil Quality Educational Test Kit	Nitrogen	colorimetric	traces, low, medium, high	50	9.41
	Phosphorus	colorimetric	traces, low, medium, high	50	
	Potassium	turbidimetric	traces, low, medium, high	50	
	pH	colorimetric	4 to 9 pH (1 pH increments)	50	
		Hanna electronic Combo tester	-2 to 16 pH	life of meter	
	EC	Hanna electronic Combo tester	0 to 3999 µS/cm	life of meter	
	TDS	Hanna electronic Combo tester	0 to 2000 ppm	life of meter	
	Temperature	Hanna electronic Combo tester	-50.0 to 220°C	life of meter	
HI3899BP Backpack Lab® Marine Science Educational Test Kit	Acidity ($CaCO_3$)	titration	0-100 mg/L (ppm); 0-500 mg/L (ppm)	110 avg.	9.43
	Alkalinity ($CaCO_3$) Phenolphthalein & Total	titration	0-100 mg/L (ppm); 0-300 mg/L (ppm)	110 avg.	
	Ammonia (as NH_3–N)	colorimetric	0.0-2.5 mg/L (ppm)	25 avg.	
	Carbon Dioxide (CO_2)	titration	0.0-10.0 mg/L (ppm); 0.0-50.0 mg/L (ppm)	110 avg.	
	Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	110 avg.	
	Nitrite	colorimetric	0.0-9.0 mg/L (ppm)	100	
	Nitrate (NO_3^-–N)	colorimetric	0-50 mg/L (ppm)	100	
	Phosphate (PO_4^{3-})	colorimetric	0-5 mg/L (ppm)	50	
	Salinity	titration	0.0-40.0 g/kg	110 avg.	
	pH	Hanna electronic Combo tester	-2 to 16 pH	life of meter	
	EC	Hanna electronic Combo tester	0-3999 µS/cm	life of meter	
	TDS	Hanna electronic Combo tester	0-2000 ppm	life of meter	
	Temperature	Hanna electronic Combo tester	-5-60.0°C	life of meter	
	Turbidity	secchi disc	-	-	

HI3897

Olive Oil Acidity Test Kit

Now there is an easy, affordable and accurate way to determine the quality, classification and freshness of your olive oil.

Acidity (as % oleic acid) is the most fundamental measurement of olive oil. It is the primary indicator of olive oil purity and freshness.

The quality of olive oil is directly related to the degree of breakdown of the fatty acids in the oil. As the bound fatty acids break down, free fatty acids are formed, which increase the % acidity of the oil. Acidity, is a measure of the free fatty acid present in the oil, which is directly related to its purity.

The quality of olive oil can be adversely affected during either maturation or by environmental conditions. Mishandling, processing and bruising during harvesting can also contribute to a breakdown of fatty acids and an increase in free acidity. Improper and/or long-term storage can cause olive oil to break down and become rancid. Regular acidity testing is the best way to ensure and maintain quality and freshness.

Normally, testing acidity is a complicated process requiring the use of various chemicals in a laboratory environment. Hanna has simplified this process in an easy-to-understand test kit that can be used by almost anyone to produce quick and accurate results.

Studies have shown that the quality of olive oil has a direct impact on its health benefits. Extra Virgin Olive Oil contains higher levels of antioxidants, particularly phenols and vitamin E (because it is less processed). Antioxidants can help prevent oxidation damage to body tissue caused by free radicals. Studies have also shown that the oxidation of LDL (bad) cholesterol is associated with the hardening of arteries that can lead to heart disease.

With the HI3897 test kit, it is possible to easily and accurately test the quality of olive oil at various stages of processing and storage to monitor and maintain the highest quality.

Acidity, defined as percent oleic acid, is a parameter that indicates olive oil freshness. A high acidity value indicates the oil quality has diminished and is at risk of becoming rancid.

Acidity is used to discriminate an extra virgin olive oil from all other olive oils. According to the CEE 2568/91 regulation, olive oil is considered extra virgin when its acidity level is below 1%. A low acidity value also indicates a natural extraction process occurred soon after olive harvesting.

The HI3897 kit utilizes a titration method where the endpoint is visually determined when the color changes from yellow-green to pink.

The HI180 is a compact and lightweight magnetic stirrer which incorporates electronic controls that allow the user to regulate the speed with precision. In addition to speed control, Hanna's Speedsafe™ system will assure that the maximum speed is never exceeded.

Chemical Parameters

Olive Storage Period (between harvesting and extraction)	within 48 hours	2 to 4 days	over 4 days
Acidity (as % oleic acid)	0.3	0.4	0.5

Sensory Quality of Olive Oil

The sensory analysis of virgin olive oil is based on a panel test, developed by the International Olive Oil Council. The rating is awarded on the basis of a scale of points running from 0, which indicates that the oil has extreme defects, to 9, which indicates that the oil has no defects at all. See the following chart for sensory ratings of each grade of olive oil.

- Extra Virgin Oil >6.5
- Virgin >5.5
- Ordinary Virgin >3.5
- Virgin Lampante <3.5

Specifications	HI3897
Range	0.00 to 1.00 % acidity
Smallest Increment	0.01 mL = 0.01%
Method	titration
Sample Size	4.6 mL or 4 g
Number of Tests	6
Dimensions (kit)	112 x 390 x 318 mm (4.4 x 15.4 x 12.5")

Specifications	HI180 Magnetic Stirrer (included)
Maximum Stirring Capacity	1 L (0.26 g)
Speed Range	100 rpm min.; 1000 rpm max
Installation Category	II
Cover Material	ABS plastic
Environment	0 to 50°C (32 to 122°F) 95% RH max
Dimensions	dia. 137 mm x 51 mm (h) (5.39 x 2")
Weight	640 g (1.4 lbs.)
Ordering Information	**HI3897** is supplied with 6 ready-to-use bottles of organic solvent, HI180I/MB magnetic stirrer, calibrated syringe for oil dosing, calibrated syringe for titrant dosing with tip, titrant (20 mL bottle), rugged carrying case and instructions.
Reagents	**HI3897-010** Replacement reagents for 10 tests.

In accordance with the European Community (EC) reg. CEE2568/91 quality classification of olive oil based on acidity (expressed as percent oleic acid) is as follows:

- Extra Virgin Olive Oil: Acidity ≤ 1%
  - "Perfect flavor and odor", with a maximum acidity, expressed as oleic acid, of 1 g/100 g
- Virgin Olive Oil: Acidity 1 - 2%
  - "Perfect flavor and odor", with a maximum acidity, expressed as oleic acid, of 2 g/100 g
- Ordinary Virgin Olive Oil: Acidity 2 - 3.3% (tolerance of 10%)
  - "Good flavor and odor", with a maximum acidity, expressed as oleic acid, of 3.3 g/100 g
- Virgin Lampante Olive Oil: + 3.3%. Not fit for human consumption
  - "Off flavor and odor", with a maximum acidity, expressed as oleic acid, > 3.3 g/100 g

Additional Technical Information:

Olive oil is a complex compound made of fatty acids, vitamins, volatile components, water soluble components and microscopic bits of olive. The three primary fatty acids (triglycerides) are oleic, linoleic, and linolenic.

- Palmitic Acid (16:0) = 7.5 - 20%
- Oleic Acid (18:1) = 55 - 85% olive oil composition
- Linoleic Acid (18:2) = 3.5 - 21.00% olive oil composition
- Linolenic Acid (18:3) = 0.0 - 1.5% olive oil composition

Oleic acid makes up 55to 85% of olive oil. Oleic acid is the most abundant fatty acid found in nature.

Studies show that high concentrations of oleic acid can lower blood levels of total and LDL (bad) cholesterol, reducing the long term risk of heart disease.

Olive Oil Acid Composition

- Palmitic Acid (16:0) = 7.5 - 20%
- Palmitoleic Acid (16:1) = 0.3 - 3.5%
- Stearic Acid (18:0) = 0.5 - 5.0%
- Oleic Acid (18:1) = 55.0 - 83.0 %
- Linoleic Acid (18:2) = 3.5 - 21.0%
- Linolenic Acid (18:3) = 0.0 - 1.5%
- Others = 1.5 - 3.2%

Chemical test kit reagents begin on page 9.44

HI3820

Acidity Test Kit

The HI3820 is a titration-based chemical test kit that determines the acidity concentration in two ranges: 0 to 100 mg/L and 0 to 500 mg/L $CaCO_3$. The HI3820 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles, and calibrated syringe.
- High resolution
  - Readings from 0 to 100 mg/L are determined to 1 mg/L resolution.
  - Readings from 0 to 500 mg/L are determined to 5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3820-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Acidity is the quantitative capacity of a water sample to neutralize a base to a predetermined pH value. Therefore, the greater acidity, the more potentially corrosive the water. Acidity can be caused by mineral acids, organic acids, and carbon dioxide in the form of carbonic acid. Today, our water supplies are becoming more contaminated with corrosive chemicals from industrial dumping and ever-growing amounts of carbon dioxide in the atmosphere. Acidity measurements are an essential monitoring device to define and control pollution in sewers, lakes, and rivers. Acidity of water is equally important to monitor in soils and fish farming to ensure an adequate growing environment.

Specifications	HI3820 Acidity (as $CaCO_3$*)
Type	titration
Range	0-100 mg/L (ppm) 0-500 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 5 mg/L (ppm)
Method	methyl-orange/phenolphthalein
Number of Tests	110 avg.
Ordering Information	**HI3820** test kit comes with 10 mL dechlorinating reagent, 10 mL bromophenol blue indicator, 10 mL phenolphthalein indicator, 120 mL acidity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe with tip.
Reagent	**HI3820-100** Acidity (as $CaCO_3$), 110 tests avg

HI3811

Alkalinity Test Kit

The HI3811 is a titration-based chemical test kit that determines the alkalinity concentration in samples within a 0 to 100 mg/L (ppm) $CaCO_3$ or 0 to 300 mg/L $CaCO_3$ range. The HI3811 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beakers, plastic syringe, phenolphthalein indicator, and bromophenol blue indicator.
- High resolution
  - Readings from 0 to 100 mg/L are determined to 1 mg/L resolution
  - Readings from 0 to 300 mg/L are determined to 3 mg/L resolution
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3811-100 can be ordered to replace the reagents supplied with the kit

Significance of Use

Alkalinity is the quantitative capacity of a water sample to neutralize an acid to a set pH. This measurement is very important in determining the corrosive characteristics of water due primarily to hydroxide, carbonate, and bicarbonate ions. Other sources of alkalinity can be from anions that can be hydrolyzed such as phosphates, silicates, borates, fluoride, and salts of some organic acids. Alkalinity is critical in the treatments of drinking water, wastewater, boiler and cooling systems, and soils.

Alkalinity can be measured as Phenolphthalein Alkalinity and Total Alkalinity. The Phenolphthalein Alkalinity is determined by neutralizing the sample to a pH of 8.3 using a dilute hydrochloric acid solution and a phenolphthalein indicator. This process converts hydroxide ions to water, and carbonate ions to bicarbonate ions:

$OH^- + HCl \rightarrow H_2O + Cl^-$ $CO_3^{2-} + HCl \rightarrow HCO_3^- + Cl^-$

Since bicarbonate ions can be converted to carbonic acid with additional hydrochloric acid, the Phenolphthalein Alkalinity measures total hydroxide ions, but only half of the bicarbonate contribution. To completely convert the carbonate ions, hydrochloric acid is added until the sample pH is 4.5, which is known as Total Alkalinity:

$HCO_3^- + HCl \rightarrow H_2CO_3 + Cl^-$

Specifications	HI3811 Alkalinity (as $CaCO_3$*)
Type	titration
Range	0-100 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 3 mg/L (ppm)
Method	phenolphthalein/bromphenol blue
Number of Tests	110 avg.
Ordering Information	**HI3811** test kit comes with 10 mL phenolpthalein indicator, 10 mL bromophenol blue indicator, 120 mL alkalinity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe with tip.
Reagent	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg

* 1 gpg = 17 ppm $CaCO_3$

Chemical test kit reagents begin on page 9.44

HI3824

Ammonia Test Kit

for Fresh Water

The HI3824 is a colorimetric chemical test kit that determines the ammonia concentration in fresh water within a 0.0 to 2.5 mg/L (ppm) range as NH_3-N. The HI3824 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 25 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent dropper bottles.
- High resolution
  - Readings from 0.0 to 2.5 mg/L NH_3-N are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3824-025 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Groundwater normally contains ammonia due to bacterial decay of plants and animals. However, concentrations of ammonia in rivers and drinking water reservoirs may indicate the presence of agricultural runoff or urban pollution. When the concentration of ammonia is high enough, it can alter the smell and taste of water. In industrial applications, high concentrations of ammonia can cause corrosion in pipes. Ammonia is also monitored in fresh water aquariums and fish farming applications because of its toxicity to fish.

Specifications	HI3824 Ammonia (as NH_3–N) in fresh water
Type	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	Nessler
Number of Tests	25 avg.
Ordering Information	**HI3824** test kit comes with 20 mL plastic beaker, color comparison cube, 20 mL ammonia reagent 1 (for fresh water) and 20 mL Nessler reagent.
Reagent	**HI3824-025** Ammonia (fresh water) (as NH_3–N), 25 tests avg

HI3826

Ammonia Test Kit

for Seawater

The HI3826 is a colorimetric chemical test kit that determines the ammonia concentration in seawater within a 0.0 to 2.5 mg/L (ppm) range as NH_3-N. The HI3826 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 25 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent dropper bottles.
- High resolution
  - Readings from 0.0 to 2.5 mg/L NH_3-N are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3826-025 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Concentrations of ammonia in rivers, estuaries, and bays may indicate the presence of agricultural runoff or urban pollution. When the concentration of ammonia is high enough, it can prove toxic to aquatic life, affecting the survival, growth, and reproduction rates of various marine species. In industrial applications, high concentrations of ammonia can cause corrosion in pipes.

Specifications	HI3826 Ammonia (as NH_3–N) in saltwater
Type	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	Nessler
Number of Tests	25 avg.
Ordering Information	**HI3826** test kit comes with 20 mL plastic beaker, color comparison cube, 20 mL ammonia reagent 1 (for seawater) and 20 mL Nessler reagent.
Reagent	**HI3826-025** Ammonia (seawater) (as NH_3–N), 25 tests avg

Chemical test kit reagents begin on page 9.44

HI38074

Boron Test Kit

The HI38074 is a titration-based chemical test kit that determines the boron concentration in irrigation water within a 0 to 5 mg/L (ppm) range. The HI38074 is supplied with all of the necessary reagents and equipment to perform the analysis, including the HI98103 Checker pH meter. The HI 98103 Checker pH meter is used for sample preparation and for the determination of the pH titration endpoint. The HI38074 contains enough reagents for perform 100 tests.

Complete setup

- All required materials are included with the test kit, such as the sample beaker, plastic pipettes, pH adjustment reagents, and pocket pH meter.

- High resolution
  - Readings from 0 to 5 mg/L are determined to 0.2 mg/L resolution.

- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38074-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Boron is one of the micronutrients essential for plant growth. It may be present naturally in water, or it may find its way into a watercourse through industrial waste effluents. Boron in excess of 2.0 mg/L in irrigation water can be detrimental to plant growth, and some plants may even be adversely affected by concentrations lower than 1.0 mg/L.

The United States Department of Agriculture (USDA) reports the following classification:

Boron (ppm)	Effect on crops
< 0.5	good (except for very sensitive crops)
0.5 to 2.0	some risks (many crops must be excluded)}
> 2.0	dangerous (may only be used for very tolerant crops)

Specifications	HI38074 Boron
Type	titration
Range	0.0-5.0 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm)
Method	boric acid
Number of Tests	100 avg.
Ordering Information	**HI38074** test kit comes with reagent for 100 tests, HI98103 Checker pocket pH meter, pH 4.01 (1 sachet), pH 7.01 (1 sachet), screwdriver, 120 mL bottle with cap, 50 mL calibrated vessel, and 1 mL plastic pipettes (2).
Reagent	**HI38074-100** Boron, 100 tests avg

HI3830

Bromine Test Kit

The HI3830 is a colorimetric chemical test kit that determines the bromine concentration in samples within a 0.0 to 3.0 mg/L (ppm) Br_2 range. The HI3830 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 60 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent dropper bottles.

- High resolution
  - Readings from 0.0 to 3.0 mg/L Br_2 are
  - determined to 0.6 mg/L resolution.

- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3830-060 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Bromine is less volatile and more stable than chlorine, making it a good choice as a disinfectant in pools, spas, and hot tubs, and a sanitizing agent in drinking water systems. Like chlorine, excess amounts of bromine in water can be dangerous to health and can cause eye irritation. Daily monitoring of bromine concentration prevents damage to equipment and contributes to the optimization and efficiency of the process while providing for increased user safety.

Specifications	HI3830 Bromine (as Br_2)
Type	colorimetric
Range	0.0-3.0 mg/L (ppm)
Smallest Increment	0.6 mg/L (ppm)
Method	DPD
Number of Tests	60 avg.
Ordering Information	**HI3830** test kit comes with 30 mL reagent 1, 20 mL reagent 2, color comparison cube, and plastic vessel.
Reagent	**HI3830-060** Bromine, 60 tests avg

Chemical test kit reagents begin on page 9.44

HI3818

Carbon Dioxide Test Kit

The HI3818 is a titration-based chemical test kit that determines the carbon dioxide concentration in three ranges: 0.0 to 10.0 mg/L CO_2, 0.0 to 50.0 mg/L CO_2, and 0 to 100 mg/L CO_2. The HI3818 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as two sample beakers, reagent dropper bottles, and calibrated syringe.
- High resolution
  - Readings from 0.0 to 10.0 mg/L CO_2 are determined to 0.1 mg/L resolution.
  - Readings from 0.0 to 50.0 mg/L CO_2 are determined to 0.5 mg/L resolution.
  - Readings from 0 to 100 mg/L CO_2 are determined to 1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3818-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Lakes and rivers naturally contain carbon dioxide concentrations less than 10 mg/L. However, stagnant or polluted water can generate large amounts of carbon dioxide due to organic or mineral decomposition. Higher amounts of carbon dioxide can make the water corrosive and toxic to aquatic organisms. Monitoring carbon dioxide levels is also critical in the manmade environment. Carbon dioxide is added to drinking water during the final stages of the purification process. In water softening systems, a delicate balance of carbon dioxide must be maintained to prevent corrosion or encrustation of pipes and storage tanks.

Specifications	HI3818 Carbon Dioxide (as CO_2)
Type	titration
Range	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm) 0.5 mg/L (ppm) 1 mg/L (ppm)
Method	phenolphthalein
Number of Tests	100 avg.
Ordering Information	**HI3818** test kit comes with 10 mL phenolphthalein indicator, 120 mL carbon dioxide reagent, 10 mL calibrated vessel, 50 mL calibrated vessel and calibrated syringe with tip.
Reagent	**HI3818-100** Carbon Dioxide, 110 tests avg

HI3815

Chloride Test Kit

The HI3815 is a titration-based chemical test kit that determines the chloride concentration within two ranges: 0 to 100 mg/L Cl^- and 0 to 1000 mg/L Cl^-. The HI3815 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent solutions, and calibrated syringe.
- High resolution
  - Readings from 0 to 100 mg/L are determined to 1 mg/L resolution.
  - Readings from 0 to 1000 mg/L are detemined to 10 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3815-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chloride ions are one of the major inorganic anions in water and wastewater. Although high concentrations of chloride in water are not known to be toxic to humans, its regulation is mainly due to taste. It is essential to monitor chloride concentration in boiler systems to prevent damage of metal parts. In high levels, chloride can corrode stainless steel and be toxic to plant life.

Specifications	HI3815 Chloride (as Cl^-)
Type	titration
Range	0-100 mg/L (ppm) 0-1000 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 10 mg/L (ppm)
Method	mercuric nitrate
Number of Tests	110 avg.
Ordering Information	**HI3815** test kit comes with 15 mL diphenylcarbazone indicator, 30 mL nitric acid solution, 120 mL mercuric nitrate solution, 50 mL calibrated vessel, 10 mL calibrated vessel, calibrated syringe with tip.
Reagent	**HI3815-100** Chloride, 110 tests avg

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HI3829F

Free Chlorine Test Kit

With Color Cube

The HI3829F is a colorimetric chemical test kit that determines the free chlorine concentration within a 0.0 to 2.0 mg/L (ppm) range. The HI3829F is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- High resolution
  - Readings from 0.0 to 2.0 mg/L are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3829F-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual.

Specifications	HI3829F Free Chlorine (as Cl_2)
Type	colorimetric
Range	0.0 to 2.0 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	**HI3829F** test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2
Reagent	**HI3829F-050** free chlorine, 50 tests avg.

HI3831F

Free Chlorine Test Kit

With Color Cube

The HI3831F is a colorimetric chemical test kit that determines the free chlorine concentration within a 0.0 to 2.5 mg/L (ppm) range. The HI3831F is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- High resolution
  - Readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3831F-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.

Specifications	HI3831F Free Chlorine (as Cl_2)
Type	colorimetric
Range	0.0 to 2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	**HI3831F** test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2.
Reagent	**HI3831F-050** free chlorine, 50 tests avg.

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HI3875

Free Chlorine Test Kit

Medium Range with Checker® Disc

The HI3875 is a chemical test kit that determines the free chlorine concentration within a 0.0 to 3.5 mg/L (ppm) range. The HI3875 is supplied with all of the necessary reagents and equipment to perform the analysis, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3875-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.

Specifications	HI3875 Free Chlorine (as Cl_2)
Type	checker disc
Range	0.0-3.5 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	DPD
Number of Tests	100 avg.
Ordering Information	**HI3875** test kit comes with HI93701-0 free Cl reagent (100 packets), 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI3875-100** free chlorine, 100 tests avg.

HI38018

Free Chlorine Test Kit

Low and Medium Range with Checker® Disc

The HI38018 is a chemical test kit that determines the free chlorine concentration in two ranges: 0.00 to 0.70 mg/L and 0.0 to 3.5 mg/L. The HI38018 is supplied with all of the necessary reagents and equipment to perform the analysis, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 200 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
  - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38018-200 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Disinfection is a process of killing disease-causing organisms (or pathogens). Chlorine (Cl_2) is a very desirable disinfectant because, when mixed with pure water, it reacts to form hypochlorous acid (HOCl) and hydrochloric acid (HCl). HOCl (free active chlorine) is the most effective form of chlorine for disinfection of pools, spas, and drinking water.

Drinking water municipalities add elemental chlorine to the water supply as chlorine gas, liquid sodium hypochlorite, or dry calcium hypochlorite. In water these form free chlorine ions, which destroy disease-causing pathogens, reduce odor, eliminate bacteria and help to remove unwanted elements. The USEPA requires that residual disinfectant is present in finished drinking water to ensure there is disinfectant available throughout the distribution system, with chlorine acting as one of the disinfectants that provides said residual. However, the EPA has also set a maximum contaminant level of 4.0 mg/L for free chlorine due to potential health effects above this level.

Specifications	HI38018 Free Chlorine (as Cl_2)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	**HI38018** test kit comes with HI93701-0 free chlorine reagent (200 packets), demineralizer bottle with cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes.
Reagent	**HI38018-200** free chlorine, 200 tests avg.

Chemical test kit reagents begin on page 9.44

HI38017

Free & Total Chlorine Test Kit

Low and Medium Range with Checker® Disc

The HI38017 is a chemical test kit that determines the free and total chlorine concentration in two ranges: 0.00 to 0.70 mg/L and 0.0 to 3.5 mg/L. The HI38017 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 200 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
  - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38017-200 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chlorine is the most commonly used water disinfectant in applications such as drinking water and wastewater treatment, pool and spa sanitization, and food processing and sterilization. Chlorine present in water binds with bacteria, leaving only a part of the original quantity (free chlorine) to continue its disinfecting action. If the free chlorine level is improper with respect to pH, water will have an unpleasant taste and odor and the disinfecting potential of the chlorine will be diminished.

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds; this results in diminished disinfecting capabilities compared with free chlorine. Chlorine compounds together with chloramines form combined chlorine. Combined chlorine and free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and lower volatility.

Specifications	HI38017 Free & Total Chlorine (as Cl_2)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	**HI38017** test kit comes with HI93701-0 free chlorine reagent (100 packets), HI93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes
Reagent	**HI38017-200** free & total chlorine, 200 tests avg.

HI38020

Free & Total Chlorine Test Kit

Low, Medium and High Range with Checker® Disc

The HI38020 is a chemical test kit that determines the free and total chlorine concentration in three ranges: 0.00 to 0.70 mg/L, 0.0 to 3.5 mg/L, and 0.0 to 10.0 mg/L. The HI38020 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 200 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 0.70 mg/L are determined to 0.02 mg/L resolution.
  - Readings from 0.0 to 3.5 mg/L are determined to 0.1 mg/L resolution.
  - Readings from 0.0 to 10.0 mg/L are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38020-200 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chlorine is the most commonly used water disinfectant in applications such as drinking water and wastewater treatment, pool and spa sanitization, and food processing and sterilization. Chlorine present in water binds with bacteria, leaving only a part of the original quantity (free chlorine) to continue its disinfecting action. If the free chlorine level is improper with respect to pH, water will have an unpleasant taste and odor and the disinfecting potential of the chlorine will be diminished.

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds; this results in diminished disinfecting capabilities compared with free chlorine. Chlorine compounds together with chloramines form combined chlorine. Combined chlorine and free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and lower volatility.

Specifications	HI38020 Free & Total Chlorine (as Cl_2)
Type	checker disc
Range	0.00-0.70 mg/L (ppm) 0.0-3.5 mg/L (ppm) 0.0-10.0 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm) 0.5 mg/L (ppm)
Method	DPD
Number of Tests	200 avg.
Ordering Information	**HI38020** test kit comes with HI93701-0 free chlorine reagent (100 packets), HI93711-0 total chlorine reagent (100 packets), demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2) and 3 mL plastic pipettes
Reagent	**HI38020-200** free & total chlorine, 200 tests avg.

Chemical test kit reagents begin on page 9.44

HI3831T

Total Chlorine Test Kit

with Color Cube

The HI3831T is a colorimetric chemical test kit that determines the total chlorine concentration within a 0.0 to 2.5 mg/L (ppm) range. The HI3831T is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets and dropper bottles.
- High resolution
  - Readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3831T-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing microorganisms. Chlorine also serves to improve the quality of drinking waters, as it reacts with ammonia, iron, manganese, sulfide, and some organic substances. Nevertheless, high amounts of chlorine will produce adverse effects like the formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). It remains essential to control the amount of added chlorine in order to fulfill the primary purpose of disinfecting while also minimizing any adverse effects.

Specifications	HI3831T Total Chlorine (as Cl_2)
Type	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	DPD
Number of Tests	50 avg.
Ordering Information	**HI3831T** test kits comes with color comparison cube, 20 mL chlorine reagent 1, 15 mL chlorine reagent 2 and 15 mL chlorine reagent 3
Reagent	**HI3831T-050** total chlorine, 50 tests avg.

HI38023

Total Chlorine Test Kit

Extended Range

The HI38023 is a titration-based chemical test kit that determines the total chlorine concentration within a 10 to 200 mg/L (ppm) range. The HI38023 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles and packets, spoon, and plastic syringe.
- High resolution
  - Readings from 10 to 200 mg/L are determined to 10 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38023-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing microorganisms. Chlorine also serves to improve the quality of drinking waters, as it reacts with ammonia, iron, manganese, sulfide, and some organic substances. Nevertheless, high amounts of chlorine will produce adverse effects like the formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). It remains essential to control the amount of added chlorine in order to fulfill the primary purpose of disinfecting while also minimizing any adverse effects.

Specifications	HI38023 Total Chlorine (as Cl_2)
Type	titration
Range	10-200 mg/L (ppm)
Smallest Increment	10 mg/L (ppm)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	**HI38023** test kit comes with 30 mL potassium iodide solution, sulfamic reagent (100 packets), 25 mL starch indicator, 100 mL thiosulfate reagent, 50 mL calibrated vessel, 1 mL syringe with tip, 1 mL plastic pipette and spoon.
Reagent	**HI38023-100** total chlorine extended range, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI3846

Chromium Test Kit

The HI3846 is a colorimetric chemical test kit that determines the chromium concentration in samples within a 0.0 to 1.0 mg/L (ppm) range as CrVI. The HI3846 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the color comparison cube and reagent packets.
- High resolution
  - Readings from 0.0 to 1.0 mg/L CrVI are determined to 0.2 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3846-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Chromium salts are widely used in industrial processes such as metal finishing and plating, as well as in the leather industry as a tanning agent, and in the manufacture of paints, dyes, explosives, and ceramics. Chromium may enter a water supply through the discharge of waste from these industries or from chromate-treated cooling waters, where it is frequently added for corrosion control. The hexavalent state of chromium, CrVI, is toxic to humans, animals, and aquatic life; it can produce lung tumors when inhaled and readily induces skin sensitization.

HI3847

Copper Test Kit

The HI3847 is a colorimetric chemical test kit that determines the copper concentration in samples within a 0 to 2.5 mg/L (ppm) range. The HI3847 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the color comparison cube and reagent packets.
- High resolution
  - Readings from 0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3847-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Copper is an essential trace element in for plant metabolism as well as the human diet, with a daily requirement of around 2.0 mg. Due to its malleability, thermal and electrical conductivity, and corrosion resistance, copper is also used in a variety of industrial and technological applications. Copper may also be present in natural water and effluents due to widespread use to control biological growths in reservoirs and distribution pipes.

Specifications	HI3846 Chromium (as CrVI)
Type	colorimetric
Range	0.0-1.0 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm)
Method	diphenylcarbohydrazide
Number of Tests	100 avg.
Ordering Information	**HI3846** test kit comes with HI3846-0 reagent (100 packets) and color comparison cube.
Reagent	**HI3846-100** chromium VI, 100 tests avg.

Specifications	HI3847 Copper
Type	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Method	bicinchoninic acid
Number of Tests	100 avg.
Ordering Information	**HI3847** test kit comes with HI3847-0 reagent (100 packets) and color comparison cube.
Reagent	**HI3847-100** copper, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI3838

Formaldehyde Test Kit

The HI3838 is a titration-based chemical test kit that determines the formaldehyde concentration in two ranges: 0.00 to 1.00% and 0.0 to 10.0%. The HI3838 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles, and calibrated syringe.
- High resolution
  - Readings from 0.00 to 1.00% are determined to 0.01% resolution.
  - Readings from 0.00 to 10.0% are determined to 0.1% resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3838-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Formaldehyde is an important organic compound used to make many materials and chemical compounds. Its role in many industries varies from holding dyes onto fabrics, to assisting in the electroplating of metals. Formaldehyde is also used in biological preservation, drug testing, and photograph development. Each application uses different levels of formaldehyde and requires monitoring to optimize its given purpose. Formaldehyde is also a large consideration for human health. Due to its widespread use, there are regulations in place for formaldehyde limits within workplaces to avoid overexposure.

Specifications	HI3838 Formaldehyde (as CH_2O)
Type	titration
Range	0.0 to 1.0% Formaldehyde; 0 to 10% Formaldehyde
Smallest Increment	0.1% (0.0 to 1.0% range); 1% (0 to 10% range)
Method	sodium sulfite / hydrochloric acid
Number of Tests	110 avg.
Ordering Information	**HI3838** test kit comes with 15 mL Alizarin Yellow R indicator, 30 g sodium sulfite, 120 mL titrant solution, plastic spoon, plastic bottle, 10 mL calibrated vessel, filter cartridge, calibrated titration syringe with tip and plungers
Reagent	**HI3838-100** formaldehyde, 110 tests avg.

HI3859

Glycol Yes/No Test Kit

Use the HI3859 glycol standard 0.025% included in the kit to easily recognize a positive result in the form of an intense purple color. Ethylene glycol and other glycols are determined by a two-step reaction:

Step One: Glycol is oxidized to two carbonyl groups under acidic conditions.

Step Two: The carbonyl groups react with the indicator to give a highly colored solution.

The test detects traces of glycol above 30 ppm.

Specifications	HI3859 Glycol
Type	visual
Range	present/absent
Smallest Increment	–
Method	oxidation of glycolic group
Number of Tests	25 avg.
Ordering Information	**HI3859** test kit comes with 125 mL glycol reagent A, 25 packets glycol reagent B, 25 packets glycol reagent C, 25 mL glycol standard 0.025%, 3 mL plastic pipette, 1 mL plastic pipettes (25), 10 mL glass vials with caps (2) and brush.
Reagent	**HI3859-025** glycol, 25 tests avg.

Chemical test kit reagents begin on page 9.44

HI3812

Total Hardness Test Kit

The HI3812 is a titration-based chemical test kit that determines the total hardness concentration in two ranges: 0.0 to 30.0 mg/L and 0 to 300 mg/L. The HI3812 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles, and plastic syringe.
- High resolution
  - Readings from 0.0 to 30.0 mg/L are determined to 0.3 mg/L resolution.
  - Readings from 0 to 300 mg/L are determined to 3 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3812-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Water hardness has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. Thus, water hardness is actually a quantitative measure of these ions in the water. It is also now known that certain other ion species, such as iron, zinc, and manganese contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

Specifications	HI3812 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	0.3 mg/L (ppm) 3 mg/L (ppm)
Method	EDTA
Number of Tests	100 avg.
Ordering Information	**HI3812** test kit comes with 30 mL hardness buffer, 10 mL calmagite indicator, 120 mL EDTA solution, 20 mL plastic beaker with cap, 50 mL plastic beaker with cap and 1 mL syringe with tip.
Reagent	**HI3812-100** total hardness (*as $CaCO_3$), 100 tests avg.

HI38033

Total Hardness Test Kit

The HI38033 is a titration-based chemical test kit that determines the total hardness concentration within the 0 to 30 grains per gallon (gpg) range. The HI38033 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, plastic pipette, and reagent dropper bottles.
- High resolution
  - Readings from 0 to 30 gpg are determined to 1 gpg resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38033-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Water hardness has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. Thus, water hardness is actually a quantitative measure of these ions in the water. It is also now known that certain other ion species, such as iron, zinc, and manganese contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

Specifications	HI38033 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0-30 gpg
Smallest Increment	1 gpg
Method	EDTA
Number of Tests	100 avg.
Ordering Information	**HI38033** test kit comes with 30 mL buffer solution, 10 mL calmagite indicator, 75 mL EDTA solution (2), 20 mL plastic beaker with cap and 1 mL plastic pipette.
Reagent	**HI38033-100** total hardness (*as $CaCO_3$), 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI3840

Total Hardness Test Kit

Low Range

The HI3840 is a titration-based chemical test kit that determines the total hardness concentration within the 0 to 150 mg/L range. The HI3840 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker and reagent dropper bottle.
- High resolution
  - Readings from 0 to 150 mg/L are determined to 5 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3840-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Water hardness has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. Thus, water hardness is actually a quantitative measure of these ions in the water. It is also now known that certain other ion species, such as iron, zinc, and manganese contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

Specifications	HI3840 Total Hardness (*as $CaCO_3$)
Type	titration
Range	0-150 mg/L (ppm)
Smallest Increment	5 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3840 t**est kit comes with 30 mL hardness LR reagent and 50 mL calibrated vessel.
Reagent	**HI3840-050** total hardness LR (*as $CaCO_3$), 50 tests avg.

HI3841

Total Hardness Test Kit

Medium Range

The HI3841 is a titration-based chemical test kit that determines the total hardness concentration within the 40 to 500 mg/L range. The HI3841 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker and reagent dropper bottle.
- High resolution
  - Readings from 40 to 500 mg/L are determined to 20 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3841-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Water hardness has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. Thus, water hardness is actually a quantitative measure of these ions in the water. It is also now known that certain other ion species, such as iron, zinc, and manganese contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

Specifications	HI3841 Total Hardness (*as $CaCO_3$)
Type	titration
Range	40-500 mg/L (ppm)
Smallest Increment	20 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3841** test kit comes with 30 mL hardness MR reagent and 50 mL calibrated vessel.
Reagent	**HI3841-050** total hardness MR (*as $CaCO_3$), 50 tests avg.

HI3842

Total Hardness Test Kit

High Range

The HI3842 is a titration-based chemical test kit that determines the total hardness concentration within the 400 to 3000 mg/L range. The HI3842 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker and reagent dropper bottle.
- High resolution
  - Readings from 400 to 3000 mg/L are determined to 100 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3842-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Water hardness has traditionally been defined as the capacity of water to precipitate soap. The ionic species in the water causing the precipitation was later found to be primarily calcium and magnesium. Thus, water hardness is actually a quantitative measure of these ions in the water. It is also now known that certain other ion species, such as iron, zinc, and manganese contribute to the overall water hardness. The measure and subsequent control of water hardness is essential to prevent scaling and clogging in water pipes.

Specifications	HI3842 Total Hardness (*as $CaCO_3$)
Type	titration
Range	400-3000 mg/L (ppm)
Smallest Increment	100 mg/L (ppm)
Method	EDTA
Number of Tests	50 avg.
Ordering Information	**HI3842** test kit comes with 30 mL hardness HR reagent and 50 mL calibrated vessel.
Reagent	**HI3842-050** total hardness HR (*as $CaCO_3$), 50 tests avg.

Chemical test kit reagents begin on page 9.44

HI3844

Hydrogen Peroxide Test Kit

The HI3844 is a titration-based chemical test kit that determines the hydrogen peroxide concentration in two ranges: 0.00 to 2.00 mg/L and 0.0 to 10.0 mg/L. The HI3844 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, indicator and reagent bottles, spoon, and plastic pipettes.
- High resolution
  - Readings from 0.00 to 2.00 mg/L are determined to 0.25 mg/L resolution.
  - Readings from 0.0 to 10.0 mg/L are determined to 1.0 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3844-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Hydrogen peroxide (H_2O_2) is widely used as a disinfectant and as a bleach for textiles, wood pulp, and hair, just to name a few. It is also used as a substitute for chlorine in water and sewage treatment. Most common commercial forms are aqueous solutions containing about 6, 12 and 30% hydrogen peroxide and are referred to as "20-volume," "40-volume," and "100-volume" respectively, referring to the value of oxygen liberated when the solution is boiled. The Hanna test kit can quickly and easily determine concentration in water up to 10 mg/L of hydrogen peroxide. This is due to the fact that it is not affected by stabilizers, which are sometimes added to commercial hydrogen peroxide solutions.

In the HI3844 test kit, hydrogen peroxide reacts slowly with iodide in acid solution (Step 1); thus a 15 minute interval is required to allow the reaction to occur completely. The amount of iodine generated is equivalent to the hydrogen peroxide in the sample. The liberated iodine is then titrated with standard sodium thiosulfate solution that reduces the iodine back to iodide ions (Step 2).

Step 1: $H_2O_2 + 2H^+ + 2I^- \rightarrow I_2 + 2H_2O$

Step 2: $I_2 + 2(S_2O_3)^{2-} \rightarrow 2I^- + (S_4O_6)^{2-}$

Specifications	HI3844 Hydrogen Peroxide (as H_2O_2)
Type	titration
Range	0.00-2.00 mg/L (ppm) 0.0-10.0 mg/L (ppm)
Smallest Increment	0.25 mg/L (ppm) 1.0 mg/L (ppm)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	**HI3844** test kit comes with 100 mL hydrogen peroxide reagent A, 17 g hydrogen peroxide reagent B, 30 mL hydrogen peroxide reagent C, 25 mL hydrogen peroxide reagent D, graduated plastic test tube with cap, 50 mL calibrated plastic vessel, 3 mL plastic pipette, 1 mL plastic pipette and plastic spoon.
Reagent	**HI3844-100** hydrogen peroxide, 100 tests avg.

HI3843

Bleach Test Kit

The HI3843 is a titration-based chemical test kit that determines the hypochlorite concentration within the 50 to 150 g/L Cl_2 range. The HI3843 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the Erlenmeyer flask, indicator and reagent bottles and packets, and plastic pipettes.
- High resolution
  - Readings from 50 to 150 g/L are determined to 5 g/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3843-100 can be ordered to replace the reagents supplied with the kit.

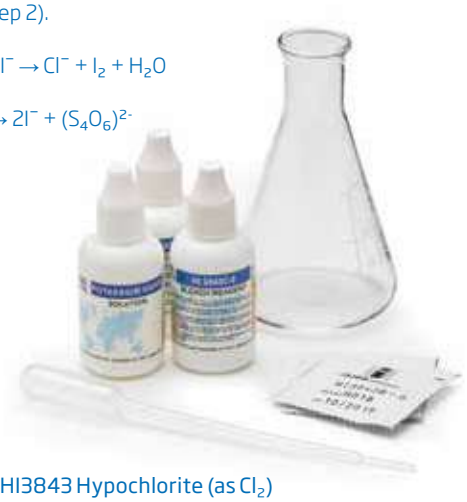
Significance of Use

Hypochlorites are common bleaching agents used to whiten textiles and paper and to disinfect solutions. Sodium hypochlorite solution has been traditionally used for the treatment of pool water since it is an inexpensive and readily available form of chlorine. The solution usually contains 10 to 15% available chlorine (equivalent to 100 to 150 g/L), but it rapidly loses its strength during storage. In addition, since it is greatly affected by heat, light, pH, and heavy metals, it needs to be monitored regularly.

An iodometric titration method is used in the HI3843 test kit. The hypochlorite solution is treated with potassium iodide and strongly acidified with acid (Step 1). The amount of iodine generated is equivalent to the chlorine in the sample. The concentration of iodine is then calculated by titration of thiosulfate ions that reduce the iodine back to iodide ions (Step 2).

Step 1: $OCl^- + 2H^+ + 2I^- \rightarrow Cl^- + I_2 + H_2O$

Step 2: $I_2 + 2(S_2O_3)^{2-} \rightarrow 2I^- + (S_4O_6)^{2-}$



Specifications	HI3843 Hypochlorite (as Cl_2)
Type	titration
Range	50-150 g/L (ppt)
Smallest Increment	5 g/L (ppt)
Method	iodometric
Number of Tests	100 avg.
Ordering Information	**HI3843** test kit comes with 30 mL potassium iodide solution, 100 packets bleach reagent B, 60 mL bleach reagent C (2), 125 mL glass Erlenmeyer flask and 1 mL plastic pipettes (25).
Reagent	**HI3843-100** hypochlorite (bleach), 100 tests avg.

* 1 gpg = 17 ppm $CaCO_3$

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HI3834

Iron Test Kit

Medium Range with Color Cube

The HI3834 is a colorimetric chemical test kit that determines the total iron concentration within a 0 to 5 mg/L (ppm) range. The HI3834 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets.
- High resolution
  - Readings from 0 to 5 mg/L are determined to 1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3834-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels. In domestic water, for instance, iron can stain laundry, damage kitchenware, favor the growth of certain bacteria, and unpleasantly alter the taste of water. Iron is also an indicator of ongoing corrosion in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Specifications	HI3834 Iron (Fe^{2+} & Fe^{3+})
Type	colorimetric
Range	0-5 mg/L (ppm)
Smallest Increment	1 mg/L (ppm)
Method	phenanthroline
Number of Tests	50 avg.
Ordering Information	**HI3834** test kit comes with 50 packets iron reagent, color comparison cube and 20 mL plastic vessel.
Reagent	**HI3834-050** iron, 50 tests avg.

HI38039

Iron Test Kit

Low Range with Checker® Disc

The HI38039 is a colorimetric chemical test kit that determines the total iron concentration within a 0.00 to 1.00 mg/L (ppm) range. The HI38039 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 1.00 mg/L are determined to 0.02 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38039-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels. In domestic water, for instance, iron can stain laundry, damage kitchenware, favor the growth of certain bacteria, and unpleasantly alter the taste of water. Iron is also an indicator of ongoing corrosion in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Specifications	HI38039 Iron (Fe^{2+} & Fe^{3+})
Type	checker disc
Range	0.00-1.00 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm)
Method	phenanthroline
Number of Tests	100 avg.
Ordering Information	**HI38039** test kit comes with 100 packets iron reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI38039-100** iron LR, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI38040

Iron Test Kit

Medium Range with Checker® Disc

The HI38040 is a colorimetric chemical test kit that determines the total iron concentration within a 0.0 to 5.0 mg/L (ppm) range. The HI38040 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.0 to 5.0 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38040-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels. In domestic water, for instance, iron can stain laundry, damage kitchenware, favor the growth of certain bacteria, and unpleasantly alter the taste of water. Iron is also an indicator of ongoing corrosion in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Specifications	HI38040 Iron (Fe^{2+} & Fe^{3+})
Type	checker disc
Range	0.0-5.0 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	phenanthroline
Number of Tests	100 avg.
Ordering Information	**HI38040** test kit comes with 100 packets iron reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI38040-100** iron MR, 100 tests avg.

HI38041

Iron Test Kit

High Range with Checker® Disc

The HI38041 is a colorimetric chemical test kit that determines the total iron concentration within a 0.0 to 10.0 mg/L (ppm) range. The HI38041 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.0 to 10.0 mg/L are determined to 0.2 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38041-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels. In domestic water, for instance, iron can stain laundry, damage kitchenware, favor the growth of certain bacteria, and unpleasantly alter the taste of water. Iron is also an indicator of ongoing corrosion in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Specifications	HI38041 Iron (Fe^{2+} & Fe^{3+})
Type	checker disc
Range	0.0-10.0 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm)
Method	phenanthroline
Number of Tests	100 avg.
Ordering Information	**HI38041** test kit comes with 100 packets iron reagent, 500 mL deionized water, checker disc, glass vials with caps (2), 3 mL plastic pipettes and long plastic pipette.
Reagent	**HI38041-100** iron HR, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI3874

Nitrate Test Kit

The HI3874 is a colorimetric chemical test kit that determines the nitrate concentration in samples within a 0 to 50 mg/L (ppm) range as nitrate-nitrogen (NO_3^-–N). The HI3874 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass cuvette, color comparison cube, and reagent packets.
- High resolution
  - Readings from 0 to 50 mg/L are determined to 10 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3874-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Nitrogen is abundant in the Earth's atmosphere and is present in water in the form of nitrate, nitrite, and ammonia. Plants use nitrogen as a nutrient to build proteins by tracking it in through their root system. Nitrate is formed in water mainly through rainfall, decomposition of organic matter, and runoff from manmade pollutants such as sewage waste and fertilizers. Almost all surface waters have a measurable level of nitrate, and a moderate amount is considered beneficial. Large amounts of nitrate, however, can lead to eutrophication which may result in decreased levels of dissolved oxygen in the water.

Specifications	HI3874 Nitrate (as NO_3^-–N)
Type	colorimetric
Range	0-50 mg/L (ppm)
Smallest Increment	10 mg/L (ppm)
Method	cadmium reduction
Number of Tests	100 avg.
Ordering Information	**HI3874** test kit comes with 100 packets nitrate reagent, glass cuvette and color comparison cube.
Reagent	**HI3874-100** nitrate (as NO_3^-–N), 100 tests avg.

HI38050

Nitrate Test Kit

for Soil and Irrigation Water

The Hanna HI38050 nitrate test kit for soil and irrigation water makes it possible to determine the need for nitrogen fertilization. It also obtains the best crop response and avoids over-fertilization.

Nitrate is reduced to nitrite in the presence of cadmium. The nitrite thus produced reacts with the reagent to yield an orange compound. The amount of color developed is proportional to the concentration of nitrate present in the aqueous sample.

The Hanna nitrate-nitrogen test can be performed the whole year round, but testing is particularly recommended during spring and late spring, when rainfall and temperature-related bursts of microbiological activity often have great influence on the availability of nitrate-nitrogen.

Specifications	HI38050 Nitrate (as NO_3^-–N) in irrigation water and soil
Type	checker disc
Range	water: 0-50 mg/L (ppm) soil: 0-60 mg/L (ppm)
Smallest Increment	water: 1 mg/L (ppm) soil: 2 mg/L (ppm)
Method	cadmium reduction
Number of Tests	water: 100 avg. soil: 100 avg.
Ordering Information	**HI38050** test kit comes with 200 packets nitrogen reagent, checker disc, glass vials with caps (2), 10 g calcium sulfate, demineralizer bottle with filter cap for 12 L, soil sieve, 50 mL plastic test tube with screw cap, large funnel, 100 paper filter discs, brush, 50 mL calibrated vessels (2), 2 g sample cup, 3 mL plastic pipette and spoons (2).
Reagent	**HI38050-200** nitrate, soil and irrigation (as NO_3^-–N), 200 tests avg.

Chemical test kit reagents begin on page 9.44

HI3873

Nitrite Test Kit

The HI3873 is a colorimetric chemical test kit that determines the nitrite concentration in samples within a 0.0 to 1.0 mg/L (ppm) range as nitrite-nitrogen (NO_2^-–N). The HI3873 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass cuvette, color comparison cube, and reagent packets.
- High resolution
  - Readings from 0.0 to 1.0 mg/L are determined to 0.2 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3873-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Nitrites can be harmful to aquatic organisms even in low concentrations and for this reason, they are closely monitored in aquaculture facilities. In cooling towers, however, an adequate amount of nitrites is necessary to prevent corrosion. In high concentrations, they can be harmful to the environment and to humans. They are, therefore, normally monitored to verify the quality of water for domestic use, as well as lakes and ponds.

Nitrites are an intermediate product in the nitrogen cycle and are produced by ammonia oxidation with water, or even originate in industrial waste directly. They must not be present in drinking water.

Specifications	HI3873 Nitrite (as NO_2^-–N)
Type	colorimetric
Range	0.0-1.0 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm)
Method	chromotropic acid
Number of Tests	100 avg.
Ordering Information	**HI3873** test kit comes with 100 packets nitrite reagent, glass cuvette and color comparison cube.
Reagent	**HI3873-100** nitrite (as NO_2^-–N), 100 tests avg.

HI3810

Dissolved Oxygen Test Kit

The HI3810 is a titration-based chemical test kit that determines the dissolved oxygen concentration within the 0 to 10 mg/L O_2 range. The HI3810 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass stoppered bottle, indicator and reagent bottles, and calibrated syringe.
- High resolution
  - Readings from 0 to 10 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3810-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

The concentration of dissolved oxygen in water is extremely important in nature as well in man's environment. In oceans, lakes, rivers, and other surface water bodies, dissolved oxygen is essential to the growth and development of aquatic life. Without oxygen, water can become toxic due to the anaerobic decaying of organic matter. In man's environment, water must contain at least 2 mg/L of oxygen to protect water pipes from corrosion. However, boiler system water, in many cases, cannot contain greater than 10 mg/L oxygen.

A modified Winkler method is used in the HI3810 test kit. Manganous ions react with oxygen in the presence of potassium hydroxide to form a manganese oxide precipitate (Step 1). An azide is present to prevent any nitrite ions from interfering with the test. With addition of acid, manganese oxide hydroxide oxidizes the iodide to iodine (Step 2). Since the amount of iodine generated is equivalent to the oxygen in the sample, the concentration of iodine is calculated by titration of thiosulfate ions that reduce the iodine back to iodide ions (Step 3).

Step 1: $2Mn^{2+} + O_2 + 4OH^- \rightarrow 2MnO(OH)_2$

Step 2: $MnO(OH)_2 + 2I^- + 4H^+ \rightarrow Mn^{2+} + I_2 + 3H_2O$

Step 3: $I_2 + 2S_2O_3^{2-} \rightarrow 2I^- + S_4O_6^{2-}$

Specifications	HI3810 Dissolved Oxygen
Type	titration
Range	0.0-10.0 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	modified Winkler
Number of Tests	110 avg.
Ordering Information	**HI3810** test kit comes with 30 mL manganous sulfate solution, 30 mL alkali-azide reagent, 60 mL sulfuric acid solution (2), 10 mL starch indicator, 120 mL titrant solution, glass bottle with stopper, 10 mL calibrated vessel and calibrated syringe with tip.
Reagent	**HI3810-100** dissolved oxygen, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI38054

Ozone Test Kit

The HI38054 is a chemical test kit that determines the ozone concentration in samples withing the 0.0 to 2.3 mg/L range. The HI38054 is supplied with all of the necessary reagents and equipment to perform both analyses, including the Checker® disc for accurate determination. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.0 to 2.3 mg/L are determined to 0.1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38054-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Ozone is an oxidizing agent used in many industrial and consumer applications. In drinking water, ozone is used for manganese removal, forming a precipitate that can be filtered out in the purification process. Additional organic matter present in drinking water that is responsible for producing odor and color can also be removed by ozone. Ozone also acts as a germicide and is used to manufacture pharmaceuticals, as a deodorizer, and bleaching agent.

Specifications	HI38054 Ozone
Type	checker disc
Range	0.0-2.3 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Method	DPD
Number of Tests	100 avg.
Ordering Information	**HI38054** test kit comes with 100 packets ozone reagent, 500 mL deionized water, checker disc, glass vials with caps (2) and 3 mL plastic pipette.
Reagent	**HI38054-100** ozone, 100 tests avg.

HI3833

Phosphate Test Kits

with Color Cube

The HI3833 is a colorimetric chemical test kit that determines the phosphate concentration in samples within a 0 to 5 mg/L (ppm) range. The HI3833 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beaker, color comparison cube, and reagent packets.
- High resolution
  - Readings from 0 to 5 mg/L are determined to 1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3833-050 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Phosphates are present in a number of products that are used by humans everyday. Some examples of the effects of phosphates are enhancing the flavor and tartness of cola drinks, as a buffering agent in controlling pH in antifreeze and delaying darkening of cut potatoes used in making french fries. Phosphates are also extensively used in detergents and cleaning fluids because of their ability to soften water and remove soil deposits.

Phosphates are particularly important for the growth and development of plant roots, and hence are one of the most common fertilizers used in agriculture. However, high concentrations of phosphates in agricultural runoff can cause environmental pollution, as they are a primary cause of eutrophication. Local laws govern the use of phosphates and the discharge levels into streams.

Specifications	HI3833 Phosphate (as PO_4^{3-})
Type	colorimetric
Range	0-5 mg/L (ppm)
Smallest Increment	1 mg/L (ppm)
Method	ascorbic acid
Number of Tests	50 avg.
Ordering Information	**HI3833** test kit comes with 20 mL plastic beaker, color comparison cube and 50 packets phosphate reagent.
Reagent	**HI3833-050** phosphate, 50 tests avg.

Chemical test kit reagents begin on page 9.44

HI38061

Phosphate Test Kits

with Checker® Disc

The HI38061 is a chemical test kit that determines the phosphate concentration in three ranges: 0.00 to 1.00 mg/L, 0.0 to 5.0 mg/L, and 0 to 50 mg/L. The HI38061 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent packets, and Checker® disc.
- High resolution
  - Readings from 0.00 to 1.00 mg/L are determined to 0.02 mg/L resolution.
  - Readings from 0.0 to 5.0 mg/L are determined to 0.1 mg/L resolution.
  - Readings from 0 to 50 mg/L are determined to 1 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38061-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Phosphates are present in a number of products that are used by humans everyday. Some examples of the effects of phosphates are enhancing the flavor and tartness of cola drinks, as a buffering agent in controlling pH in antifreeze and delaying darkening of cut potatoes used in making french fries. Phosphates are also extensively used in detergents and cleaning fluids because of their ability to soften water and remove soil deposits.

Phosphates are particularly important for the growth and development of plant roots, and hence are one of the most common fertilizers used in agriculture. However, high concentrations of phosphates in agricultural runoff can cause environmental pollution, as they are a primary cause of eutrophication. Local laws govern the use of phosphates and the discharge levels into streams.

Specifications	HI38061 Phosphate (as PO_4^{3-})
Type	checker disc
Range	0.00-1.00 mg/L (ppm) 0.0-5.0 mg/L (ppm) 0-50 mg/L (ppm)
Smallest Increment	0.02 mg/L (ppm) 0.1 mg/L (ppm) 1 mg/L (ppm)
Method	ascorbic acid
Number of Tests	100 avg.
Ordering Information	**HI38061** test kit comes with 100 packets phosphate reagent, 500 mL deionized water, checker disc, glass vials with caps (2), 3 mL plastic pipette and long plastic pipette.
Reagent	**HI38061-100** phosphate, 100 tests avg.

HI3835

Salinity Test Kit

The HI3835 is a titration-based chemical test kit that measures salinity within the 0.0 to 40.0 g/kg range. The HI3835 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample vial, indicator and reagent bottles, and calibrated syringe.
- High resolution
  - Readings from 0.0 to 40.0 g/kg are determined to 0.4 g/kg resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3835-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Salinity is defined as the total solids in water after all carbonates have been converted to oxides, all bromide and iodide have been replaced by chloride, and all organic matter has been oxidized. The salinity value is in g/kg or ppt (parts per thousand). The monitoring of salinity is essential for industrial waste and seawater, as different species of plants and animals thrive varying salinity levels.

Specifications	HI3835 Salinity
Type	titration
Range	0 to 40 g/kg (ppt)
Smallest Increment	4 g/kg for each 0.1 ml of titrant
Method	mercuric nitrate
Number of Tests	110 avg.
Ordering Information	**HI3835** test kit comes with 15 mL diphenylcarbazone indicator, 30 mL nitric acid solution, 120 mL titrant solution, plastic vial with cap and 1 mL calibrated syringe with tip.
Reagent	**HI3835-100** salinity, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI38067

Silica Test Kit

High Range

The HI38067 is a chemical test kit that determines the silica concentration in two ranges: 0 to 40 mg/L and 0 to 800 mg/L. The HI38067 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test kit, such as the glass vials, plastic pipette, reagent bottles and packets, and Checker®disc.
- High resolution
  - Readings from 0 to 40 mg/L are determined to 1 mg/L resolution.
  - Readings from 0 to 800 mg/L are determined to 40 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38067-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Silica is found in all natural waters in the dissolved mineral form. Silica is only slightly soluble in water and can be found as ionic silica, silicates, or colloidal or suspended particles. The solubility of silica is highly dependent on pH, temperature and pressure. Silica's presence in industrial applications, particularly high pressure turbines, is undesirable because of the scaling caused by the elevated temperature and pressure. Heating systems and reverse osmosis plants also require monitoring of silica to ensure process efficiency.

Specifications	HI38067 Silica (as SiO_2)
Type	checker disc
Range	0-40 mg/L (ppm) 0-800 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 40 mg/L (ppm)
Method	heteropoly blue
Number of Tests	100 avg.
Ordering Information	**HI38067** test kit comes with 25 mL silica reagent A, 100 packets silica reagent B, 100 packets silica reagent C, demineralizer bottle with filter cap for 12 L, checker disc, glass vials with caps (2), 3 mL plastic pipette and 1 mL syringe with tip.
Reagent	**HI38067-100** silica HR (as SiO_2), 100 tests avg.

HI38000

Sulfate Test Kits

The HI38000 is a chemical test kit that determines the sulfate concentration in two ranges: 20 to 30 mg/L and 30 to 100 mg/L. The HI38000 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 100 tests.

- Complete setup
  - All required materials are included with the test
  - kit, such as the glass test tube. plastic pipette, spoon, and reagent bottles and packets.
- High resolution
  - Readings from 20 to 30 mg/L are determined to 5 mg/L resolution.
  - Readings from 30 to 100 mg/L are determined to 10 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38000-10 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Sulfate is widely present within natural waters in different concentrations. Sulfate concentration is to be kept within a strict range for drinking water, especially since this value can be high near mine drainage points. Sulfate is also rigorously tested in the production of beverages such as beer, due to its significant effect upon odor and taste.

Specifications	HI38000 Sulfate (as SO_4^{2-})
Type	turbidimetric
Range	20-30 mg/L (ppm) 30-100 mg/L (ppm)
Smallest Increment	5 mg/L (ppm) 10 mg/L (ppm)
Method	barium chloride
Number of Tests	100 avg.
Ordering Information	**HI38000** test kit comes with 100 packets sulfate reagent A, 53 g sulfate reagent B, 10 mL complexing agent, 50 mL glass test tube, 50 mL plastic vessel, 3 mL plastic pipette and spoon.
Reagent	**HI38000-10** sulfate, 100 tests avg.

Chemical test kit reagents begin on page 9.44

HI38001

Sulfate Test Kits

Low and High Range

The HI38001 is a chemical test kit that determines the sulfate concentration in two ranges: 100 to 1000 mg/L and 1000 to 10000 mg/L. The HI38001 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 200 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beakers, syringes, and reagent bottles and packets.
- High resolution
  - Readings from 100 to 1000 mg/L are determined to 10 mg/L resolution.
  - Readings from 1000 to 10000 mg/L are determined to 100 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI38000-10 can be ordered to replace the reagents supplied with the kit.

Significance of Use

Sulfate is widely present within natural waters in different concentrations. Sulfate concentration is to be kept within a strict range for drinking water, especially since this value can be high near mine drainage points. Sulfate is also rigorously tested in the production of beverages such as beer, due to its significant effect upon odor and taste.

Specifications	HI38001 Sulfate (as SO_4^{2-})
Type	titration
Range	100-1000 mg/L (ppm) 1000-10000 mg/L (ppm)
Smallest Increment	10 mg/L (ppm) 100 mg/L (ppm)
Method	barium chloride
Number of Tests	200 avg.
Ordering Information	**HI38001** test kit comes with 100 packets sulfate reagent A (2 sets), 100 mL LR sulfate reagent B, 100 mL HR sulfate reagent B, 10 mL sulfate reagent C, 20 mL complexing agent, 30 mL sulfate solution, 50 mL plastic vessels (2) and 1 mL syringes (2).
Reagent	**HI38001-10** sulfate LR/HR, 100 tests avg.

HI3822

Sulfite Test Kit

The HI3822 is a chemical test kit that determines the sulfite concentration in two ranges: 0 to 20 mg/L and 0 to 200 mg/L Na_2SO_3. The HI3822 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 110 tests.

- Complete setup
  - All required materials are included with the test kit, such as the sample beakers, indicator and reagent bottles, and calibrated syringe.
- High resolution
  - Readings from 0 to 20 mg/L are determined to 0.2 mg/L resolution.
  - Readings from 0 to 200 mg/L are determined to 2 mg/L resolution.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The HI3822-100 can be ordered to replace the reagents supplied with the kit.

Significance of Use

There are many reasons to monitor the concentration of sulfite in water. In boiler feed and effluent waters, a sulfite concentration of approximately 20 mg/L must be maintained to prevent pitting and oxidation of metal components. A high level of sulfite results in a lowered pH, thus promoting corrosion. The monitoring of sulfite is important in environmental control as well. Sulfite ions are toxic to aquatic lifeforms; the chemical demand that sulfide produces on oxygen in water can destroy the delicate ecological balance of lakes, rivers and ponds.

Specifications	HI3822 Sulfite (as Na_2SO_3)
Type	titration
Range	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm) 2 mg/L (ppm)
Method	iodometric
Number of Tests	110 avg.
Ordering Information	**HI3822** test kit comes with 30 mL sulfamic acid solution, 30 mL EDTA reagent, 15 mL sulfuric acid solution, 10 mL starch indicator, 120 mL titrant solution, 20 mL calibrated vessel, 50 mL calibrated vessel and calibrated syringe with tip.
Reagent	**HI3822-100** sulfite (as Na_2SO_3), 110 tests avg.

Chemical test kit reagents begin on page 9.44

HI3896

Hanna Soil Test Kit

The chemical composition of soil includes pH and chemical elements. Soil analysis is necessary for better management of fertilization and to know the residues of fertilizers in relation to the crop, tillage and the most suitable plant choice for soil composition. An analysis can highlight shortages and help the understanding of the causes of an abnormal growth. By using the Hanna soil test, it is possible to measure pH and the most important elements for plant growth: nitrogen (N), phosphorus (P) and potassium (K).

Testing the soil during each crop cycle and comparing the results with plant growth can be a useful information for subsequent cultivations.

Specifications	HI3896 Professional Agriculture Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Nitrogen	colorimetric	traces, low, medium, high	–	Ned	25 avg.
Phosphorus	colorimetric	traces, low, medium, high	–	ascorbic acid	25 avg.
pH	colorimetric	4 to 9 pH; 1 pH	–	pH indicator	25 avg.
Potassium	turbidimetric	traces, low, medium, high	–	tetraphenyl-borate	25 avg.
Ordering Information	**HI3896** test kit includes 120 mL extraction solution (2), 70 mL pH indicator, 75 powder packets (25 each for N,P & K), 1 mL pipettes (3), test tubes (5), test tube stand, spoon, brush, color cards (4), graduated card and handbook.				
Reagents	**HI3896-025** nitrogen, phosphorus, potassium and pH, 25 tests each				

HI3895

Quick Soil Test Kit

Hanna's quick soil test kit provides growers with an economical way to quickly test pH as well as the three basic elements needed for a healthier plant: nitrogen (N), phosphorus (P) and potassium (K).

Specifications	HI3895 Basic Agriculture Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Nitrogen	colorimetric	traces, low, medium, high	–	Ned	10 avg.
Phosphorus	colorimetric	traces, low, medium, high	–	ascorbic acid	10 avg.
pH	colorimetric	4 to 9 pH; 1 pH	–	pH indicator	10 avg.
Potassium	turbidimetric	traces, low, medium, high	–	tetraphenyl-borate	10 avg.
Ordering Information	**HI3895** test kit includes 40 powder packets (10 each for pH, N, P & K), 1 mL plastic pipette, test tubes (4), color cards (4) and one graduated card.				
Reagents	**HI3895-010** nitrogen, phosphorus, potassium and pH, 10 tests each				

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HI3827

Boiler & Feedwater Test Kit

The HI3827 is a chemical test kit that determines that uses titration, colorimetry, and direct measurement to measure six parameters common to boilers and feedwater testing: alkalinity, chloride, hardness, phosphate, pH, and sulfite. The HI3827 is supplied with all of the necessary reagents and equipment to perform each analysis, and all reagents are individually available as they run out.

- Complete setup
  - All required materials are included with the test kit, such as the pH tester, sample beaker, indicator and reagent bottles and packets, and color comparison cube.
- High resolution
  - All tests provide a high resolution based on the expected range of measurement.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The reagents for each parameter can be ordered individually.

Significance of Use

Monitoring the alkalinity, chloride, hardness, phosphate, pH, and sulfite concentrations in boiler and feedwater is essential in preventing hazardous or costly situations. These parameters are important in determining the corrosive characteristics of water due to carbonates and chloride. Sulfite is also critical to prevent pitting and oxidation of metal components. A high level of sulfite results in a lowered pH, which can also promote corrosion.

Specifications	HI3827 Test Kit for Boilers				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride (as Cl^-)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Phosphate (as PO_4^{3-})	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	ascorbic acid	50 avg
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	–	life of the meter
Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.
Dimensions	440 x 330 x 100 mm (17.3 x 13.0 x 3.9")				
Ordering Information	**HI3827** test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, with the exception of phosphate, which includes reagents for 50 tests, hard carrying cases and instructions.				
Reagents	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3815-100** Chloride, 110 tests avg. **HI3812-100** Hardness, total (as $CaCO_3$), 100 tests avg. **HI3833-050** Phosphate, 50 tests avg.		**HI70004P** pH 4.01 buffer solution, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution, 20 mL sachets (25) **HI3822-100** Sulfite (as Na_2SO_3), 110 tests avg.		

Chemical test kit reagents begin on page 9.44

HI3821

Cooling and Boiler Test Kit

The HI3821 is a chemical test kit that determines that uses titration and colorimetry to measure six parameters common to cooling and boiler systems: alkalinity, chloride, hardness, dissolved oxygen, phosphate, and sulfite. The HI3821 is supplied with all of the necessary reagents and equipment to perform each analysis, and all reagents are individually available as they run out.

- Complete setup
  - All required materials are included with the test kit, such as the dissolved oxygen glass bottle, sample beaker, indicator and reagent bottles and packets, and color comparison cube.
- High resolution
  - All tests provide a high resolution based on the expected range of measurement.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The reagents for each parameter can be ordered individually.

Significance of Use

Corrosion can occur in many key areas of a boiler. It can shorten the life of a boiler, or at the very least, increase the costs associated with maintaining a boiler. Corrosion can form in water heaters, deaerators, superheater tubes, and economizers, among other places. Monitoring the alkalinity, chloride, hardness, dissolved oxygen, phosphate, and sulfite concentrations in cooling and boiler systems is essential in preventing hazardous or costly situations.

Specifications	HI3821 Cooling and Boiler Combination Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride (as Cl^-)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Phosphate (as PO_4^{3-})	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	ascorbic acid	50 avg
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.
Dimensions	440 x 330 x 100 mm (17.3 x 13.0 x 3.9")				
Ordering Information	**HI3821** test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, with the exception of phosphate, which includes reagents for 50 tests, hard carrying case and instructions.				
Reagents	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3815-100** Chloride, 110 tests avg. **HI3812-100** Hardness, total (as $CaCO_3$), 100 tests avg.		**HI3833-050** Phosphate, 50 tests avg. **HI3810-100** Dissolved Oxygen, 110 tests avg. **HI3822-100** Sulfite (as Na_2SO_3), 110 tests avg.		

Chemical test kit reagents begin on page 9.44

HI3814

Environmental Monitoring Test Kit

Ideal for Professionals and Students

The HI3814 is a chemical test kit that determines that uses titration and direct measurement to measure six parameters common in environmental testing: acidity, alkalinity, carbon dioxide, hardness, dissolved oxygen, and pH. The HI3814 is supplied with all of the necessary reagents and equipment to perform each analysis, and all reagents are individually available as they run out.

- Complete setup
  - All required materials are included with the test kit, such as the pH tester, sample beaker, indicator and reagent bottles and packets, and glass bottle for dissolved oxygen.
- High resolution
  - All tests provide a high resolution based on the expected range of measurement.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The reagents for each parameter can be ordered individually.

Significance of Use

The six most important parameters in environmental applications can be monitored with this combination chemical test kit. They include: acidity, alkalinity, carbon dioxide, dissolved oxygen, hardness, and pH. This kit is ideal not only for professionals, but also for students studying environmental science, as it offers great performance and ease of use. HI3814 is equipped with all the accessories and reagents to perform over 100 tests for each parameter. The pHep®, our popular pH electronic tester, is included for your convenience. This small and easy to use pH meter will provide more accurate and reliable pH readings than conventional litmus paper. The pHep® also has the added benefit of introducing students to the use of a pH meter.

Specifications	HI3814 Environmental Monitoring Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Acidity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	1 mg/L (ppm) 5 mg/L (ppm)	methyl-orange/ phenolphthalein	110 avg.
Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	0.1 mg/L (ppm) 0.5 mg/L (ppm) 1 mg/L (ppm)	phenolphthalein	110 avg.
Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	–	life of the meter
Dimensions	440 x 330 x 100 mm (17.3 x 13.0 x 3.9")				
Ordering Information	**HI3814** test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, electronic pH tester, hard carrying case and instructions.				
Reagents	**HI3820-100** Acidity (as $CaCO_3$), 110 tests avg. **HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3818-100** Carbon Dioxide, 110 tests avg. **HI3812-100** Hardness, total (as $CaCO_3$), 100 tests avg.		**HI3810-100** Dissolved Oxygen, 110 tests avg. **HI70004P** pH 4.01 buffer solution, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution, 20 mL sachets (25)		

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HI3823

Marine Test Kit

HI 3823 provides users with the most important test parameters for aquaculture applications: alkalinity, carbon dioxide, dissolved oxygen, hardness, pH and salinity.

Each of these parameters plays a critical role in the delicate balance of the aquatic environment: alkalinity acts as a stabilizer for pH; carbon dioxide must be monitored because of its toxic effects on fish (every species can tolerate different levels of CO_2); oxygen levels affect fish respiration and incorrect concentrations can slow down their growth rate; hardness is monitored because it diminishes the toxicity level of ammonia; pH also is measured to determine the toxicity level of the water; salinity is important because of its relation to dissolved oxygen.

- Complete setup
  - All required materials are included with the test kit, such as the pH tester, sample beaker, indicator and reagent bottles and packets, and glass bottle for dissolved oxygen.
- High resolution
  - All tests provide a high resolution based on the expected range of measurement.
- Replacement reagents available
  - There is no need to buy a new kit when reagents are exhausted. The reagents for each parameter can be ordered individually.

Specifications	HI3823 Marine Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	0.1 mg/L (ppm) 0.5 mg/L (ppm) 1 mg/L (ppm)	phenolphthalein	110 avg.
Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	0.1 mg/L (ppm)	modified Winkler	110 avg.
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	–	life of the meter
Salinity	titration	0.0-40.0 g/kg	0.4 g/kg	mercuric nitrate	110 avg.
Dimensions	440 x 330 x 100 mm (17.3 x 13.0 x 3.9")				
Ordering Information	**HI3823** test kit includes all reagents and accessories necessary to perform over 100 tests for each parameter, electronic pH tester, hard carrying case and instructions.				
Reagents	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3818-100** Carbon Dioxide, 110 tests avg. **HI3812-100** Hardness, total (as $CaCO_3$), 100 tests avg. **HI3810-100** Dissolved Oxygen, 110 tests avg.		**HI70004P** pH 4.01 buffer solution, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution, 20 mL sachets (25) **HI3835-100** Salinity, 100 tests avg.		

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HI3887

Quick-Check Swimming Pool Test Kit

Free Chlorine and pH

The HI3887 is a colorimetric chemical test kit that determines the free chlorine concentration and pH level in samples within a 0.0 to 2.5 mg/L (ppm) Cl^- range and 6.0 to 8.5 pH range. The HI3887 is supplied with all of the necessary reagents and equipment to perform the analysis. The test kit contains enough reagents for perform approximately 50 tests for free chlorine and 100 tests for pH.

- Complete setup
  - All required materials are included with the test kit, such as the color comparison cubes and reagent dropper bottles.
- High resolution
  - Free chlorine readings from 0.0 to 2.5 mg/L are determined to 0.5 mg/L resolution.
  - pH readings from 6.0 to 8.5 pH are determined to 0.5 pH resolution.

Significance of Use

Chlorine is one of the most commonly used disinfectants for drinking water, wastewater, and water used for pools and spas. It can be added to in various forms including calcium hypochlorite, sodium hypochlorite, or in some instances, chlorine gas. When added to water, chlorine creates hypochlorous acid (HOCl) which dissociates into hypochlorite ion (OCl^-).

$HOCl \leftrightarrow H^+ + OCl^-$

hypochlorous acid ↔ hydrogen ion + hypochlorite ion

HOCl is the form of chlorine that acts as a stronger disinfectant as compared to OCl^-. To ensure the added chlorine is effective at sanitizing, the pH of the water must be taken into account. Around pH 7.5, HOCl and OCl^- are present in relatively equal amounts. Below pH 7.5, the equilibrium shifts to favor HOCl; above pH 7.5, the equilibrium shifts to favor OCl^-. Depending on the application, addition of chlorine is effective when added to water with a neutral or slightly acidic pH value.

When chlorine is first added to water, it is available as free chlorine. The measurement of free chlorine signifies the amount available for disinfection. Once chlorine begins to sanitize bacteria and pathogens present in the water, it becomes combined chlorine; combined chlorine is no longer available to act as a disinfectant.

Specifications	HI3887 Quick-Check Swimming Pool Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Free Chlorine	colorimetric	0-2.5 mg/L (ppm)	0.5 mg/L (ppm)	DPD	50 avg.
pH	colorimetric	6.0-8.5 pH	0.5 pH	pH indicator	100 avg.
Ordering Information	**HI3887** test kit includes color comparison cubes (2), 20 mL reagent 1, 12 mL reagent 2, 25 mL pH reagent and instructions.				
Reagents	**HI3831F-050** free chlorine, 50 tests avg.				

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HI3817

Water Quality Test Kit

Accurate and Reliable Water Quality Tests

Monitor the most important chemical parameters in water: alkalinity, chloride, hardness, iron, pH and sulfite with this combination test kit.

The kit has all the reagents needed to perform over 100 tests for each parameter, with the exception of iron, which includes reagents for 50 tests. Reagents may also be purchased individually as they run out (please see our reagent section for a complete listing).

pH measurements are performed with our electronic pHep® pH tester which guarantees more accurate and repeatable readings than litmus paper.

The chemical reagents to perform each test are provided in numerically labeled bottles and are easy to identify.

The kit is supplied with a convenient hard carrying case designed with field applications in mind. It will also keep your test kit neat and organized.

The Hanna HI3817 combination test kit offers all the necessary equipment for accurate and reliable water quality testing.

Specifications	HI3817 Water Quality Test Kit				
Test	Type	Range	Smallest Increment	Method	Number of Tests
Alkalinity (as $CaCO_3$)	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	1 mg/L (ppm) 3 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.
Chloride (as Cl^-)	titration	0-100 mg/L (ppm) 0-1000 mg/L (ppm)	1 mg/L (ppm) 10 mg/L (ppm)	mercuric nitrate	110 avg.
Hardness (as $CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	0.3 mg/L (ppm) 3 mg/L (ppm)	EDTA	100 avg.
Iron	colorimetric	0-5 mg/L (ppm)	1 mg/L (ppm)	phenanthroline	50 avg
pH	electronic pH tester	0.0-14.0 pH	0.1 pH	–	life of the meter
Sulfite (as Na_2SO_3)	titration	0.0-20.0 mg/L (ppm) 0-200 mg/L (ppm)	0.2 mg/L (ppm) 2 mg/L (ppm)	iodometric	110 avg.
Dimensions	440 x 330 x 100 mm (17.3 x 13.0 x 3.9")				
Ordering Information	**HI3817** test kit includes all of the necessary reagents and accessories to perform over 100 tests for every parameter, with the exception of iron, which include reagents for 50 tests, electronic pH tester, hard carrying case and instructions.				
Reagents	**HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3815-100** Chloride, 110 tests avg. **HI3812-100** Hardness, total (as $CaCO_3$), 100 tests avg. **HI3834-050** iron, 50 tests avg.		**HI70004P** pH 4.01 buffer solution, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution, 20 mL sachets (25) **HI3822-100** Sulfite (as Na_2SO_3), 110 tests avg.		

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Backpack Lab® By HANNA

backpacklab.com

Test kits can be replaced individually

A Classroom in a Backpack!

HI3817BP

Backpack Lab® Water Quality Educational Test Kit

Backpack Lab Water Quality Educational Test Kit Includes:

- 110 tests each for acidity and alkalinity, 100 tests for carbon dioxide, dissolved oxygen, hardness, nitrate and phosphate
- Hanna's HI98129 Combo pH/EC/TDS/temperature tester
- Secchi disk for turbidity
- Backpack carrying case which holds all components of the kit
- Teacher's manual with a curriculum that meets National Science Teachers Association Standards
- Parameter summary in PDF and PowerPoint format (on included CD)
- Laminated, laboratory instruction cards with step-by-step field test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis, and testing procedure results/observations (on included CD)
- A glossary of key terms in PDF format (on included CD)

Hanna offers a series of test kits specifically designed for educators and environmental science students. These portable kits contain well-constructed lessons and activities, and will allow the teacher to get the most out of their classroom time.

Backpack Lab is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, take this durable backpack to the field for on-site measurements.

The lesson plan and components are tied together by a comprehensive teacher's manual that includes information about each parameter, classroom activities designed to introduce students to each parameter, and detailed field-testing procedures. Hanna chemical test kits and pocket testers provide teachers with a valuable tool in helping students assess the water quality of streams, rivers and lakes.

Specifications	HI3817BP Backpack Lab Water Quality Test Kit				
Test	Type	Range	Method	Number of Tests	Individual Kit Reorder Code
Acidity ($CaCO_3$)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	methyl-orange phenolphthalein	110 avg.	HI3820
Alkalinity ($CaCO_3$) Phenolphthalein & Total	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.	HI3811
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	phenolphthalein	110 avg.	HI3818
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	modified Winkler	110 avg.	HI3810
Hardness ($CaCO_3$)	titration	0.0-30.0 mg/L (ppm) 0-300 mg/L (ppm)	EDTA	100 avg.	HI3812
Nitrate (NO_3^-–N)	colorimetric	0-50 mg/L (ppm)	cadmium reduction	100	HI3874
Phosphate	colorimetric	0-5 mg/L (ppm)	ascorbic acid	50	HI3833

Specifications	HI98129 Combo pH/EC/TDS/Temperature Tester			
Type	Range	Resolution	Accuracy	Calibration
pH	0.00 to 14.00 pH	0.01 pH	±0.05 pH	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)
Conductivity	0 to 3999 µS/cm	1 µS/cm	±2% F.S.	automatic, one point at 1413 µS/cm
TDS	0 to 2000 mg/L (ppm)	1 mg/L (ppm)	±2% F.S.	automatic, one point at 1382 mg/L (ppm)
Temperature	0.0 to 60.0°C / 32.0 to 140.0°F	0.1°C / 0.1°F	±0.5°C /±1°F	–

Ordering Information

HI3817BP Backpack Lab includes HI98129 Combo pH/EC/TDS/temperature tester, acidity test kit, alkalinity test kit, carbon dioxide test kit, dissolved oxygen test kit, hardness test kit, nitrate test kit, phosphate test kit, set of 10 field test procedures, teacher's resource CD, teacher's guide and backpack.

Reagents and Solutions only

HI3820-100 Acidity (as $CaCO_3$), 110 tests avg.
HI3811-100 Alkalinity (as $CaCO_3$), 110 tests avg.
HI3818-100 Carbon Dioxide, 110 tests avg.
HI3810-100 Dissolved Oxygen, 110 tests avg.
HI3812-100 Hardness, total (as $CaCO_3$), 100 tests avg.
HI3874-100 nitrate (as NO_3^-–N), 100 tests avg.
HI3833-050 Phosphate, 50 tests avg.
HI70004P pH 4.01 buffer solution for HI98129, 20 mL sachets (25)
HI70007P pH 7.01 buffer solution for HI98129, 20 mL sachets (25)
HI70010P pH 10.01 buffer solution for HI98129, 20 mL sachets (25)
HI70031P 1413 µS/cm conductivity calibration solution for HI98129, 20 mL sachets (25)
HI70032P 1382 mg/L (ppm) TDS calibration solution for HI98129, 20 mL sachets (25)

Backpack Lab™ contents subject to change

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Backpack Lab® By HANNA

backpacklab.com

Test kits can be replaced individually

A Classroom in a Backpack!

HI3896BP

Backpack Lab® Soil Quality Educational Test Kit

Backpack Lab Soil Quality Educational Test Kit Includes:

- Agriculture combination test kit for testing nitrogen, phosphorus, potassium (N,P,K) with enough materials for 50 tests of each parameter
- Hanna's HI98129 Combo pH/EC/TDS/temperature tester
- Hanna's HI145 digital thermometer
- Backpack carrying case which holds all components of the kit
- Teacher's manual with a curriculum that meets National Science Teachers Association Standards
- Parameter summary in PDF and PowerPoint format (on included CD)
- Laminated, laboratory instruction cards with step-by-step field test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis and testing procedure results/observations (on included CD)
- A glossary of key terms in PDF format (on included CD)

Hanna introduces a kit specifically assembled for the educator and environmental science student. Using the popular Hanna Agricultural Combination Test Kit (HI3896) as its foundation, the Soil Quality Education Test Kit is designed to provide a complete lesson plan for teachers. Teachers are able to introduce students to important chemical tests for evaluating soil quality and fertility, and relate these measurements to the principles of plant metabolism. Tied together by an extensive teacher's guide, this kit includes in-depth background information about each parameter, classroom activities designed to introduce students to each parameter and field-testing procedures.

The Hanna Agricultural Combination Test Kit addresses important issues related to soil quality and modern agriculture practices. Real-world examples help students understand the relevance of macronutrients and other parameters in everyday life. This kit introduces the student to all major soil quality topics, and is presented in an easy-to-use format that makes lessons accessible, understandable and memorable.

Specifications	HI3896BP Backpack Lab Soil Quality Test Kit				
Test	Type	Range	Method	Number of Tests	Individual Kit Reorder Code
Nitrogen	colorimetric	traces, low, medium, high	Ned	25	HI3896-025
Phosphorus	colorimetric	traces, low, medium, high	ascorbic acid	25	HI3896-025
Potassium	turbidimetric	traces, low, medium, high	tetraphenylborate	25	HI3896-025
pH	colorimetric	4 to 9 pH (1 pH increments)	pH indicators	25	HI3896-025
Specifications	**HI98129 Combo pH/EC/TDS/Temperature Tester**				
Type	Range	Resolution	Accuracy	Calibration	
pH	0.00 to 14.00 pH	0.01 pH	±0.05 pH	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)	
Conductivity	0 to 3999 µS/cm	1 µS/cm	±2% F.S.	automatic, one point at 1413 µS/cm	
TDS	0 to 2000 mg/L (ppm)	1 mg/L (ppm)	±2% F.S.	automatic, one point at 1382 mg/L (ppm)	
Temperature	0.0 to 60.0°C / 32.0 to 140.0°F	0.1°C / 0.1°F	±0.5°C /±1°F	–	
Specifications	**HI145-00 T-Shaped Thermometer**				
Type	Range	Resolution	Accuracy	Probe	
Temperature	-50.0 to 220°C	0.1°C (-50.0 to 199.9°C); 1°C (200 to 220°C)	±0.3°C (-20 to 90°C); ±0.4% F.S. (outside)	stainless steel probe; 125 mm x dia 5 mm (4.9 x dia 0.2")	
Ordering Information	**HI3896BP** Backpack Lab test kit includes agriculture test kit pro, HI98129 Combo pH/EC/TDS/temperature tester, HI145 digital thermometer, set of 6 field test procedures, teacher's resource CD, teacher's guide and backpack				
Reagents and Solutions only	**HI3896-025** nitrogen, phosphorus, potassium and pH, 25 tests each **HI70004P** pH 4.01 buffer solution for HI98129, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution for HI98129, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution for HI98129, 20 mL sachets (25) **HI70031P** 1413 µS/cm conductivity calibration solution for HI98129, 20 mL sachets (25) **HI70032P** 1382 mg/L (ppm) TDS calibration solution for HI98129, 20 mL sachets (25)				

Backpack Lab™ contents subject to change

Chemical test kit reagents begin on page 9.44

Backpack Lab® By HANNA

backpacklab.com

Test kits can be replaced individually

A Classroom in a Backpack!

HI3899BP

Backpack Lab® Marine Science Educational Test Kit

Backpack Lab® Includes:

- 110 tests each for acidity and alkalinity, 100 tests for ammonia, carbon dioxide, dissolved oxygen, hardness, nitrate, nitrogen, phosphate and salinity
- Hanna's HI98129 Combo pH/EC/TDS/temperature tester
- Hydrometer for salinity
- Secchi disk for turbidity
- Backpack-style carrying case which holds all components of the kit
- Teacher's manual with a curriculum that meets National Science Teachers Association Standards
- Parameter summary in PDF and PowerPoint format (on included CD)
- Laminated, laboratory instruction cards with step-by-step field-test procedures
- Reproducible lab activity worksheets with instructions, goals, hypothesis, and testing procedure results/observations (on included CD)
- A glossary of key terms in PDF format(on included CD)

Backpack Lab is designed with all the necessary components in one place, reducing the chance of misplacing an item. Ideal for transporting, take this durable backpack to the field for on-site measurements.

This kit is designed to provide a complete unit for teachers to introduce students to important marine science topics. The teacher's guide provides detailed background information for marine science lessons and activities that can be adapted to various grade levels. Field tests are included to complement classroom lessons. All materials fit easily into the supplied backpack for convenient transport.

Specifications	HI3899BP Backpack Lab Marine Science Educational Test Kit				
Test	Type	Range	Method	Number of Tests	Individual Kit Reorder Code
Acidity ($CaCO_3$)	titration	0-100 mg/L (ppm) 0-500 mg/L (ppm)	methyl-orange phenolphthalein	110 avg.	HI3820
Alkalinity ($CaCO_3$) Phenolphthalein & Total	titration	0-100 mg/L (ppm) 0-300 mg/L (ppm)	phenolphthalein/ bromphenol blue	110 avg.	HI3811
Ammonia (as NH_3–N) in saltwater	colorimetric	0.0-2.5 mg/L (ppm)	Nessler	25 avg.	HI3826
Carbon Dioxide	titration	0.0-10.0 mg/L (ppm) 0.0-50.0 mg/L (ppm) 0-100 mg/L (ppm)	phenolphthalein	110 avg.	HI3818
Oxygen, Dissolved	titration	0.0-10.0 mg/L (ppm)	modified Winkler	110 avg.	HI3810
Nitrite	colorimetric	0.0-1.0 mg/L (ppm)	chromotropic acid	100	HI3873
Nitrate (NO_3^-–N)	colorimetric	0-50 mg/L (ppm)	cadmium reduction	100	HI3874
Phosphate	colorimetric	0-5 mg/L (ppm)	ascorbic acid	50	HI3833
Salinity	titration	0.0-40.0 g/kg	mercuric nitrate	110 avg.	HI3835

Specifications	HI98129 Combo pH/EC/TDS/Temperature Tester			
Type	Range	Resolution	Accuracy	Calibration
pH	0.00 to 14.00 pH	0.01 pH	±0.05 pH	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or 4.01 / 6.86 / 9.18)
Conductivity	0 to 3999 µS/cm	1 µS/cm	±2% F.S.	automatic, one point at 1413 µS/cm
TDS	0 to 2000 mg/L (ppm)	1 mg/L (ppm)	±2% F.S.	automatic, one point at 1382 mg/L (ppm)
Temperature	0.0 to 60.0°C / 32.0 to 140.0°F	0.1°C / 0.1°F	±0.5°C /±1°F	–

Ordering Information	**HI3899BP** Backpack Lab includes acidity test kit, alkalinity test kit, carbon dioxide test kit, ammonia test kit, dissolved oxygen test kit, nitrate test kit, nitrite test kit, phosphate test kit, salinity test kit, secchi disc, hydrometer, HI98129 Combo pH/EC/TDS/temperature tester, set of 6 field test procedures, teacher's resource CD, teacher's guide and backpack.
Reagents and Solutions only	**HI3820-100** Acidity (as $CaCO_3$), 110 tests avg. **HI3811-100** Alkalinity (as $CaCO_3$), 110 tests avg. **HI3826-025** Ammonia, seawater (as NH_3-N), 25 tests avg. **HI3818-100** Carbon Dioxide, 110 tests avg. **HI3810-100** Dissolved Oxygen, 110 tests avg. **HI3874-100** nitrate (as NO_3^-–N), 100 tests avg. **HI3873-100** nitrite (as NO_2^-–N), 100 tests avg. **HI3833-050** Phosphate, 50 tests avg. **HI3835-100** salinity, 100 tests avg. **HI70004P** pH 4.01 buffer solution for HI98129, 20 mL sachets (25) **HI70007P** pH 7.01 buffer solution for HI98129, 20 mL sachets (25) **HI70010P** pH 10.01 buffer solution for HI98129, 20 mL sachets (25) **HI70031P** 1413 µS/cm conductivity calibration solution for HI98129, 20 mL sachets (25) **HI70032P** 1382 mg/L (ppm) TDS calibration solution for HI98129, 20 mL sachets (25)

Backpack Lab™ contents subject to change

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Chemical Test Kit Reagents

CTK Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests
HI3810	Dissolved Oxygen	Winkler	**HI3810-100**	110 avg.
HI3811	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
HI3812	Hardness, total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
HI3814	Dissolved Oxygen	Winkler	**HI3810-100**	110 avg.
	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
	Hardness, Total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
	Carbon Dioxide	phenolphthalein titration	**HI3818-100**	110 avg.
	Acidity (as $CaCO_3$)	methyl-orange/phenolphthalein	**HI3820-100**	110 avg.
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25
HI3815	Chloride	mercuric nitrate titration	**HI3815-100**	110 avg.
HI3817	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
	Hardness, total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
	Chloride	mercuric nitrate titration	**HI3815-100**	110 avg.
	Sulfite (as Na_2SO_3)	titration	**HI3822-100**	110 avg.
	Iron	phenanthroline	**HI3834-050**	50 avg.
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25
HI3817BP	Dissolved Oxygen	Winkler	**HI3810-100**	110 avg.
	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
	Hardness, total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
	Carbon Dioxide	phenolphthalein titration	**HI3818-100**	110
	Acidity (as $CaCO_3$)	methyl orange/phenolphthalein	**HI3820-100**	110
	Phosphate	ascorbic acid	**HI3833-050**	50
	Nitrate (as NO_3^-–N)	cadmium reduction	**HI3874-100**	100
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25
	EC Calibration Standard	–	**HI70031P**	25
	EC Calibration Standard	–	**HI7033M**	1 bottle (230 mL)
HI3818	Carbon Dioxide	phenolphthalein titration	**HI3818-100**	110 avg.
HI3820	Acidity (as $CaCO_3$)	methyl orange/phenolphthalein	**HI3820-100**	110 avg.
HI3821	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
	Chloride	mercuric nitrate titration	**HI3815-100**	110 avg.
	Hardness, total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
	Dissolved Oxygen	Winkler	**HI3810-100**	110 avg.
	Phosphate	ascorbic acid	**HI3833-050**	50
	Sulfite (as Na_2SO_3)	titration	**HI3822-100**	110 avg.
HI3822	Sulfite (as Na_2SO_3)	titration	**HI3822-100**	110 avg.
HI3824	Ammonia (fresh water) (as NH_3–N)	Nessler colorimetric	**HI3824-025**	25 avg.
HI3826	Ammonia (seawater) (as NH_3–N)	Nessler colorimetric	**HI3826-025**	25 avg.

Chemical Test Kit Reagents

CTK Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests
HI3829F	Chlorine, free	DPD colorimetric	**HI3829F-050**	50 avg
HI3830	Bromine	DPD colorimetric	**HI3830-060**	60 avg.
HI3831F	Chlorine, free	DPD colorimetric	**HI3831F-050**	50 avg
HI3831T	Chlorine, total	DPD colorimetric	**HI3831T-050**	50 avg
HI3833	Phosphate	ascorbic acid	**HI3833-050**	50
HI3834	Iron	phenanthroline	**HI3834-050**	50 avg.
HI3835	Chloride	mercuric nitrate	**HI3835-100**	110 avg.
HI3838	Formaldehyde	acid titration	**HI3838-100**	110 avg
HI3840	Hardness LR (as $CaCO_3$)	EDTA titration	**HI3840-050**	50 avg
HI3841	Hardness MR (as $CaCO_3$)	EDTA titration	**HI3841-050**	50 avg
HI3842	Hardness HR (as $CaCO_3$)	EDTA titration	**HI3842-050**	50 avg
HI3843	Hypochlorite (bleach)	iodometric	**HI3843-100**	100 avg
HI3844	Hydrogen Peroxide	iodometric	**HI3844-100**	100 avg
HI3846	Chromium VI	diphenylcarbohydrazide	**HI3846-100**	100 avg
HI3847	Copper	bicinchoninate	**HI3847-100**	100
HI3859	Glycol	oxidation	**HI3859-025**	25
HI3873	Nitrite (as NO_2^-–N)	chromotropic acid	**HI3873-100**	100
HI3874	Nitrate (as NO_3^-–N)	cadmium reduction	**HI3874-100**	100
HI3875	Chlorine, free	DPD colorimetric	**HI3875-100**	100
HI3887	Chlorine, free	DPD colorimetric	**HI3831F-050**	50 avg
HI3895	Nitrogen	Ned	**HI3895-010**	10
	Phosphorus	ascorbic acid	**HI3895-010**	10
	Potassium	tetraphenylborate	**HI3895-010**	10
	pH	pH indicators	**HI3895-010**	10
HI3896	Nitrogen	Ned	**HI3896-025**	25
	Phosphorus	ascorbic acid	**HI3896-025**	25
	Potassium	tetraphenylborate	**HI3896-025**	25
	pH	pH indicators	**HI3896-025**	25
HI3896BP	Nitrogen	Ned	**HI3896-025**	25
	Phosphorus	ascorbic acid	**HI3896-025**	25
	Potassium	tetraphenylborate	**HI3896-025**	25
	pH	pH indicators	**HI3896-025**	25
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25
	EC Calibration Standard	–	**HI70031P**	25
	TDS Calibration Standard	–	**HI70032P**	25
HI3897	Acidity, olive oil	titration with hydroxide	**HI3897-010**	10
HI3827	Alkalinity (as $CaCO_3$)	acid titration	**HI3811-100**	110 avg.
	Hardness, total (as $CaCO_3$)	EDTA titration	**HI3812-100**	100 avg.
	Chloride	mercuric nitrate titration	**HI3815-100**	110 avg.
	Sulfite (as Na_2SO_3)	titration	**HI3822-100**	110 avg.
	Phosphate	ascorbic acid	**HI3833-050**	50
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25

Chemical Test Kit Reagents

CTK Code	Test Kit Parameter	Chemical Method	Reagent Code	# Tests
HI3899BP	Dissolved Oxygen	Winkler	**HI3810-100**	110 avg
	Alkalinity (as $CaCO_3$)	phenolphthalein/bromphenol blue	**HI3811-100**	110 avg.
	Carbon Dioxide	phenolphthalein titration	**HI3818-100**	110 avg
	Acidity (as $CaCO_3$)	methyl-orange/phenolphthalein	**HI3820-100**	110 avg
	Ammonia, Seawater (as NH_3–N)	Nessler colorimetric	**HI3826-025**	25 avg
	Phosphate	ascorbic acid	**HI3833-050**	50
	Salinity	mercuric nitrate titration	**HI3835-100**	110 avg
	Nitrite (as NO_2^-–N)	chromotropic acid	**HI3873-100**	100
	Nitrate (as NO_3^-–N)	cadmium reduction	**HI3874-100**	100
	Buffer solution	–	**HI70004P**	25
	Buffer solution	–	**HI70007P**	25
	Buffer solution	–	**HI70010P**	25
	EC Calibration Standard	–	**HI70031P**	25
	EC Calibration Standard	–	**HI7033M**	1 bottle (230 mL)
HI38000	Sulfate	barium chloride	**HI38000-10**	100
HI38001	Sulfate LR/HR	barium chloride	**HI38001-10**	100
HI38017	Chlorine, free and total	DPD colorimetric	**HI38017-200**	200
HI38018	Chlorine, free	DPD colorimetric	**HI38018-200**	200
HI38020	Chlorine, free and total	DPD colorimetric	**HI38020-200**	200
HI38023	Chlorine, total, extended range	iodometric	**HI38023-100**	100
HI38033	Hardness, total (as $CaCO_3$)	EDTA titration	**HI38033-100**	100
HI38039	Iron LR	phenanthroline colorimetric	**HI38039-100**	100
HI38040	Iron MR	phenanthroline colorimetric	**HI38040-100**	100
HI38041	Iron HR	phenanthroline colorimetric	**HI38041-100**	100
HI38050	Nitrate (soil + irrigation) (as NO_3^-–N)	cadmium reduction	**HI38050-200**	200
HI38054	Ozone	DPD	**HI38054-100**	100
HI38061	Phosphate	ascorbic acid	**HI38061-100**	100
HI38067	Silica HR (as SiO_2)	heteropoly blue	**HI38067-100**	100
HI38074	Boron	boric acid	**HI38074-100**	100

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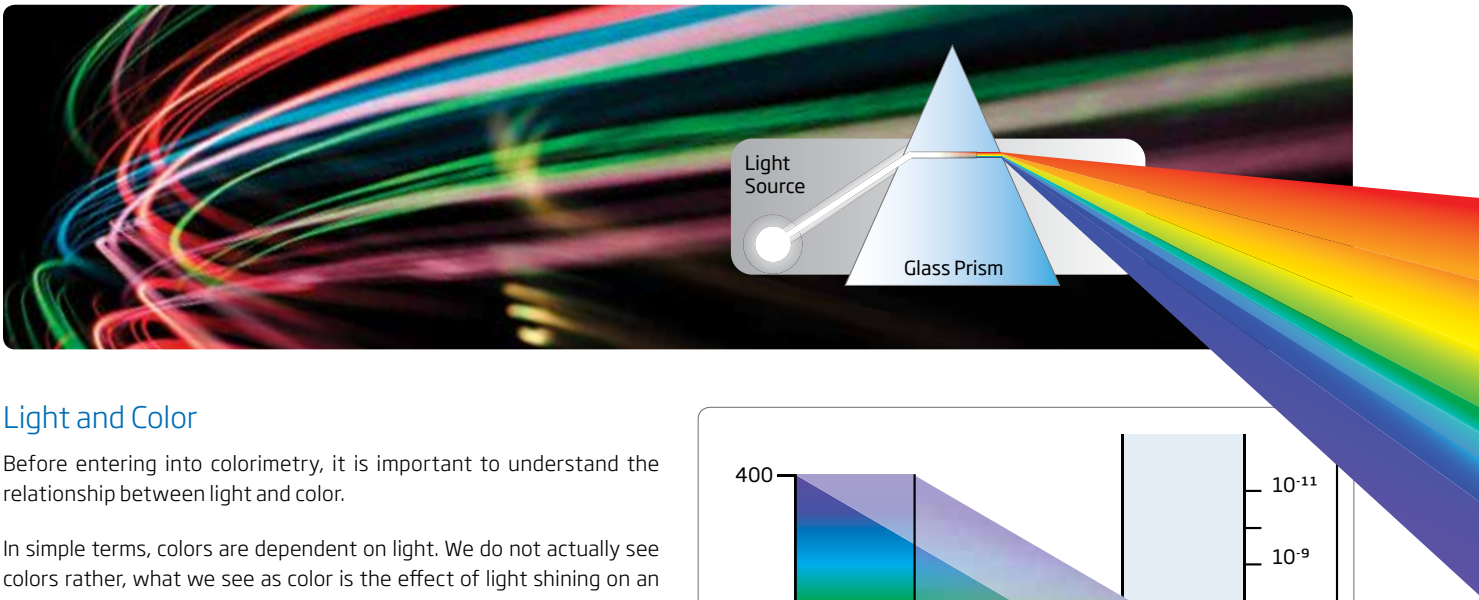


Light and Color

Before entering into colorimetry, it is important to understand the relationship between light and color.

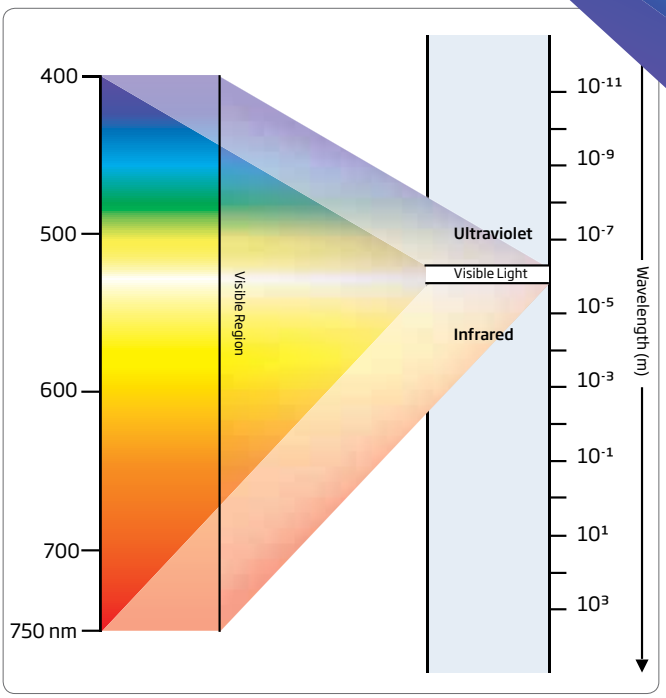
In simple terms, colors are dependent on light. We do not actually see colors rather, what we see as color is the effect of light shining on an object. When white light shines on an object, it may be reflected, absorbed, or transmitted. Glass transmits most of the light that comes into contact with it, thus it appears colorless. Snow reflects all of the light and appears white. A black cloth absorbs all light, and so appears black. A red piece of paper reflects red light better than it reflects other colors. Most objects appear colored because their chemical structure absorbs certain wavelengths of light and reflects others.

When discussing light, we are usually referring to white light. A thin line of light is called a ray; a beam is made up of many rays of light. When white light passes through a prism (a triangular transparent object) the colors that make up white light disperse into seven bands of color. These bands of color are called a spectrum. Seven colors constitute white light: red, orange, yellow, green, blue, indigo, and violet. In any spectrum, the bands of color are always organized in this order from left to right.

Suppose we shine a beam of white light at a substance that absorbs blue light. Since the blue component of the white light gets absorbed by the substance, the light that is transmitted is mostly yellow, the complementary color of blue. This yellow light reaches our eyes, and we "see" the substance as a yellow colored substance.

The color variation of a system that undergoes a change in concentration of some component is the basis of colorimetric analysis.

Wavelength (nm)	Color Absorbed	Color Observed
400	Violet	Yellow-green
435	Blue	Yellow
495	Green	Purple
560	Yellow	Blue
650	Orange	Greenish blue
800	Red	Bluish green



Colorimetry

Colorimetry is simply the measurement of color. Colorimetry is the determination of the concentration of a substance by measurement of the relative absorption of light with respect to a known concentration of the substance. In visual colorimetry, natural or artificial white light is generally used as a light source and determinations are usually made with a simple instrument termed a colorimeter, or color comparator. When the eye is replaced by a photoelectric cell, the instrument is termed a photoelectric colorimeter.

A colorimetric analysis is based on the principle that many substances react with each other and form a color which can indicate the concentration of the substance to be measured. When a substance is exposed to a beam of light of intensity ($\mathbf{I}_o$) a portion of the radiation is absorbed by the substance's molecules and a radiation of intensity ($\mathbf{I}$) is emitted. This difference in intensity is used for the colorimetric determination.

The quantity of radiation absorbed is given by the Beer-Lambert Law: $\mathbf{A = \log \frac{I_0}{I}}$

Absorbance is also given by: $\mathbf{A = \varepsilon_\lambda \bullet C \bullet l}$ where:

A is a dimensionless number

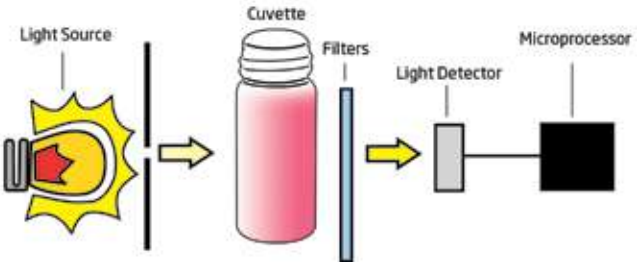
$\boldsymbol{\varepsilon_\lambda}$ the proportionality constant, is called the molar extinction coefficient or molar absorptivity; it is a constant for a given substance, provided the temperature and wavelength are constant [L/(mol•cm)]

C concentration of the substance (mol/liter)

l optical distance light travels through sample (cm)

Therefore, the concentration (**C**) can be calculated from the absorbance of the substance determined by the emitted radiation (**I**), as the other factors are known.

A typical block diagram of a photometer is shown below:



Sources of light used by Hanna colorimeters:

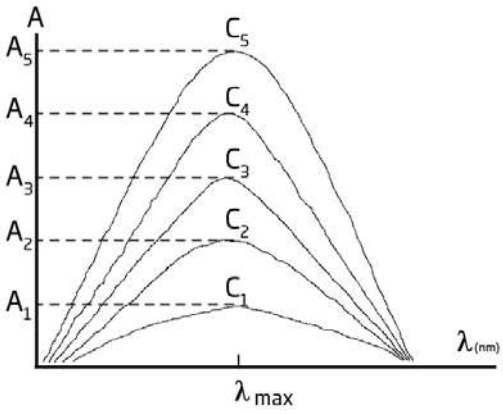
Tungsten lamp an incandescent lamp having a tungsten filament

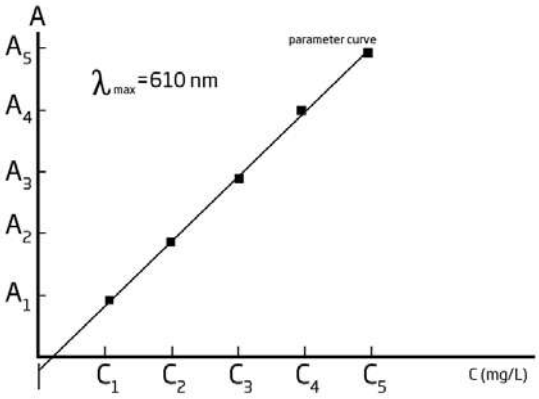
LED light emitting diode

The optical distance is measured by the dimension of the cuvette containing the sample. The photoelectric cell collects the radiation (**I**) emitted by the sample and converts it into an electric current, producing a potential in the mV range. The microprocessor uses this potential to convert the incoming value into the desired measuring unit and display it on the LCD.

In fact, the preparation of the solution to be measured occurs under known conditions, which are programmed into the meters microprocessor in the form of a calibration curve. This curve is used as a reference for each measurement. It is then possible to determine unknown concentrations of a sample by using a colorimetric reaction and the mV signal separated by a sensor in relation to the emitted intensity (**I**) (the color of the sample). By employing the calibration curve, one can determine the concentration of the sample that corresponds to the mV value.

Supposing that for one chemical substance there is a maximum absorbance at 610 nm. With the following graphs, you have one example of how the colorimeters are working to determine concentration:





One example of an early colorimetric analysis is Nessler's method for ammonia, which was first proposed in 1856. Nessler found that adding an alkaline solution of HgI_2 and KI to a dilute solution of ammonia produced a yellow to reddish brown colloid with the color intensity proportional to the concentration of ammonia present. A comparison of the samples color for a series of standards was used to determine the concentration of ammonia. Equal volumes of the sample and standards were transferred to a set of tubes with flat bottoms. The tubes were placed in a rack equipped at the bottom with a reflecting surface, allowing light to pass through the solution. The colors of the samples and standards were compared by looking down through the solutions. A modified form of this method is used for the analysis of ammonia in water and wastewater.

Product Spotlights

HI801 iris

Spectrophotometer

with split beam optical system, customizable methods and rechargeable battery

iris portable spectrophotometer is unlike any of the products we have created in the past. It is different from our photometers as it allows for measurement in the spectrum of all wavelengths of visible light and not just pre-specified wavelengths. Spectrophotometers work by isolating light at specific wavelengths from white light. This compact meter incorporates a number of features that facilitate both fantastic performance and exceptional usability.

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HI83300

Multiparameter Photometer

with Digital pH Electrode Input for Laboratories

HI83300 is a compact, multiparameter photometer for use in the lab or in the field. The meter is one of the most advanced photometers available with a innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette. This meter has 60 different programmed methods measuring 37 key water quality parameters and also offers an absorbance measurement mode for performance verification and for users that would like to develop their own concentration versus absorbance curves.

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HI83303

Multiparameter Photometer

with Digital pH Electrode Input for Aquaculture

The HI83303 benchtop photometer measures 12 different key water quality parameters using 20 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

See page 10.26

HI96785

Honey Color Portable Analyzer

The HI96785 portable analyzer is for the determination of honey color. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path 10 mm path length.

See page 10.59

HI755 · HI775 · HI772

Seawater and Fresh Water Alkalinity

Handheld Colorimeters

Alkalinity is one of the most important parameters to measure in aquariums. It helps to maintain a stable pH, an important factor for most aquatic life. In seawater, bicarbonate is the largest contributor to alkalinity and is a critical element needed for healthy corals. Corals need bicarbonate and carbonate available to form their skeletons.

The HI755, HI775 and HI772 Checker®HC's are simple, accurate, and cost effective ways to measure alkalinity in seawater and fresh water. Designed as a more accurate alternative to chemical test kits, these handheld colorimeters provide quick, accurate alkalinity testing results in four easy steps.

See page 10.99

HI759

Maple Syrup Digital Grader

Handheld Colorimeter

The HI759 Checker®HC Maple Syrup Digital Grader is a handheld colorimeter designed for quick, accurate determination of Grade A maple syrup. The HI759 is designed as a more accurate alternative to temporary and permanent visual grading kits, providing quick, accurate results in four easy steps.

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Multiparameter Benchtop Photometers Comparison Guide

Parameter	HI83300 Laboratory	HI83303 Aquaculture	HI83305 Boilers/Cooling Towers	HI83306 Environmental Analysis	HI83308 Water Conditioning	HI83325 Nutrient Analysis	HI83326 Pools and Spas
Alkalinity	•	•					•
Alkalinity, Marine	•	•					
Aluminum	•		•				
Ammonia Low Range	•	•	•	•	•	•	
Ammonia Medium Range	•	•	•	•	•	•	
Ammonia High Range	•	•	•	•	•	•	
Bromine	•		•				•
Calcium	•	•				•	
Calcium, Marine	•	•					
Chloride	•						
Chlorine Dioxide	•		•				
Chlorine, Free	•	•	•	•	•		•
Chlorine, Free Ultra Low Range	•						
Chlorine, Total	•	•	•	•	•		•
Chlorine, Total Ultra Low Range	•						
Chlorine, Total Ultra High Range	•						
Chromium(VI) Low Range	•		•	•			
Chromium(VI) High Range	•		•	•			
Color of Water	•			•			
Copper Low Range	•	•	•	•	•		
Copper High Range	•	•	•	•	•		•
Cyanuric Acid	•			•			•
Fluoride Low Range	•				•		
Fluoride High Range	•						
Hardness, Calcium	•						•
Hardness, Magnesium	•						
Hardness, Total Low Range	•						
Hardness, Total Medium Range	•						
Hardness, Total High Range	•						
Hydrazine	•		•				
Iodine	•						
Iron Low Range	•		•		•		
Iron High Range	•		•		•		•
Magnesium	•					•	
Manganese Low Range	•				•		
Manganese High Range	•				•		
Molybdenum	•		•	•	•		
Nickel Low Range	•			•	•		
Nickel High Range	•			•	•		
Nitrate	•	•	•	•	•	•	•
Nitrite Ultra Low Range, Marine	•	•					
Nitrite Low Range	•	•	•				
Nitrite High Range	•	•	•	•			
Oxygen, Dissolved	•	•	•	•	•		
Oxygen Scavengers (as Carbohydrazide)	•		•				
Oxygen Scavengers (as DEHA)	•		•				
Oxygen Scavengers (as Hydroquinone)	•		•				
Oxygen Scavengers (as Iso-ascorbic acid)	•		•				
Ozone	•						•
pH	•	•	•	•	•		•
Phosphate Ultra Low Range, Marine	•	•					
Phosphate Low Range	•	•	•	•	•		•
Phosphate High Range	•	•	•	•	•	•	
Potassium	•					•	
Silica Low Range	•		•	•	•		
Silica High Range	•		•				
Silver	•			•	•		
Sulfate	•					•	
Surfactants, Anionic	•						
Zinc	•		•	•	•		
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Multiparameter Portable Photometers Comparison Guides

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Bromine	•												
Calcium HR												•	
Chlorine, Free	•	•	•	•	•	•					•		•
Chlorine, Free HR							•						
Chlorine, Free UHR													•
Chlorine, Total	•	•	•	•	•	•					•		
Chlorine, Total HR							•						
Cyanuric Acid	•	•				•							
Hardness, Ca								•	•		•		
Hardness, Mg								•	•		•		
Hardness, Total								•	•		•		
Iodine	•												
Iron LR	•								•	•	•		
Magnesium HR												•	
Manganese LR										•			
pH	•	•	•			•		•			•		
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Phosphate LR	HI96713	10.70
Phosphorus	HI96706	10.71
Potassium	HI96750	10.72
Silica HR	HI96770	10.73
Silica LR	HI96705	10.73
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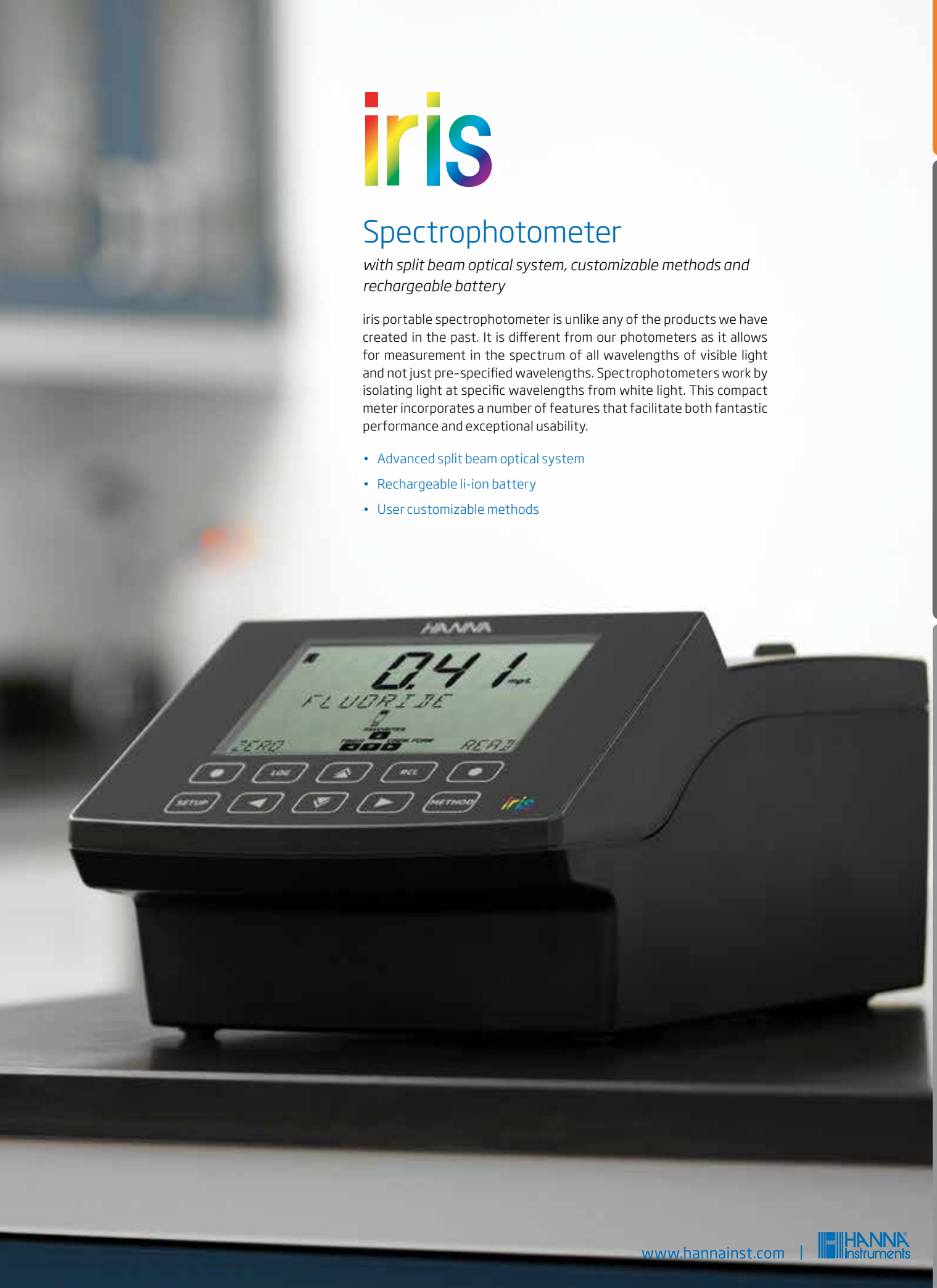
iris

Spectrophotometer

with split beam optical system, customizable methods and rechargeable battery

iris portable spectrophotometer is unlike any of the products we have created in the past. It is different from our photometers as it allows for measurement in the spectrum of all wavelengths of visible light and not just pre-specified wavelengths. Spectrophotometers work by isolating light at specific wavelengths from white light. This compact meter incorporates a number of features that facilitate both fantastic performance and exceptional usability.

- Advanced split beam optical system
- Rechargeable li-ion battery
- User customizable methods



Advanced Split-beam Optical System

In a spectrophotometer the optical system is the heart of the instrument. Ensuring that the optical system is built with the best design and highest quality materials will guarantee accurate readings and a long life for the meter. When developing this meter our research and development team payed special attention to details and combined many small improvements to a typical spectrophotometer design to create a portable meter with unprecedented performance.

Replaceable Tungsten-Halogen Lamp

To be able to measure in a wide variety of wavelengths a broadband light source is necessary. In the iris spectrophotometer this is accomplished by a tungsten-halogen lamp. As these lamps do not last indefinitely, it is necessary to change them throughout the life of the meter. The pre-alignment of the lighting fixture guarantees that the bulb is in the same position every time it is changed. This generates peace of mind as there is no need to worry about realigning the light source.

Beam splitter

The beam splitter is added to the optical system for use with a reference detector to ensure that the measurement compensates for any drift in the light source. It works by splitting the light emitted by the tungsten lamp into two beams and sending one beam of light to the reference detector that measures intensity. If there are any fluctuations in the light source the meter detects this and compensates through a mathematical calculation. The reference detector also saves battery life and leads to improved speed of the meter as the lamp doesn't have to warm up prior to use.

Concave grating

This element of the optical system is what generates the spectrum of light. When the light from the tungsten lamp hits the grating it is met with interference coatings that turn the polychromatic white light into a rainbow. This rainbow contains dispersed light at all wavelengths in the visible spectrum. The rotation of this grating is what allows for a specific wavelength to be selected. This ability is one of the biggest differences between a spectrophotometer and a photometer. The concave grating which accomplishes this is superior to other types of diffraction, such as prisms, as it minimizes stray light generated and has constant bandwidth. It also combines elements of the optical system that would typically be separate, for example if a flat grating was used a concave mirror would need to be added in order to refocus the light. The combination of these two pieces creates greater efficiency and a smaller optical system to yield a more compact portable meter.

Narrow Bandwidth and High Resolution

Having a small bandwidth is necessary to accurately measure narrow peaks. The iris spectrophotometer maintains a narrow bandwidth of 5nm resulting in good spectral resolution. This leads to accurate measurement of sharp, narrow absorbance peaks. Additionally, the high resolution of 1nm generates greater sensitivity as the wavelength is closer to where the sample absorbs the most light.

Low stray light

A common problem in spectrophotometers is stray light. Stray light can be light which is outside the wavelength the meter is measuring or also light at the proper wavelength but from outside the meter. This leads to inaccurate readings as this light would not be absorbed by the sample but would still be detected by the meter. This is a problem that is typically hard to control. Due to the design of the optical system we are able to keep this potential issue to a minimum to improve the linearity and accuracy of readings.

System Check

Upon turning on the meter a performance check occurs to confirm that the light source is working properly and to calibrate the position of the grating. The grating calibration works by scanning for the "zero order" light reflecting off the grating. If any mechanical problems are present, the meter will display an alert. This feature establishes confidence in measurements knowing that the meter is always working properly without needing to run any additional tests.

Universal Cuvette Holder and Auto-Recognition

The cuvette holder built into the meter holds both 22 mm round cuvettes and rectangular cuvettes with a 5cm path length. Adapters for the cuvette holder are available to hold other 13 and 16mm round cuvettes, and 10mm square cuvettes. Rectangular cuvettes have longer path lengths which result in higher sensitivity in readings of low absorbance samples. Additionally, the meter permits the selection of the size of the cuvette used in custom user methods from the available sizes. For all methods, the programmed cuvette size is displayed on the screen to ensure the correct cuvette size is used, ensuring that the proper path length is being used by the meter when calculating measurements.


HANNA
0.82
mg/L
ZINC
22
FAVORITES
TIMER
CHEM. FORM
ZERO
READ
LOG
RCL
SETUP
METHOD
iris

Customized Methods

- Step-By-Step Method Creation
- Up to 10 calibration points
- Flexible calculations for multi wavelength methods

Creating a customized method is easy and intuitive. The HI801 guides you step-by-step through the process of creating your own custom method. The intuitive user interface will guide you through naming your method, setting the measurement wavelengths, creating reaction timers, and calibrating the method. Up to 10 points can be used to calibrate methods.

User Interface

No one likes to work with difficult equipment, which is why we have worked hard to create an interface that makes the meter's operation seamless. The intuitive menu design and large LCD screen all make working with the meter a breeze. Get ready for your new favorite piece of lab equipment.

Favorite Methods

Always have your most frequently used methods readily available with the favorite methods feature. Directly from the home screen is access to user-programmed favorite methods, saving time.

Large High Contrast Custom LCD display

With a 6" display, the screen is large and easy to read. The high contrast makes every character on the display stand out even during outdoor use. The wide viewing angle allows for measurements to be seen from far away, so while working around the lab it is not necessary to hover over the meter to see the measurements.

Capacitive touchpad

Maneuvering the menus and using the meter is effortless with the capacitive touchpad. Featuring dedicated buttons specifically for setup, logging data, recalling data, and methods allows for quick and easy access to these functions. There is a key beep feature that can be enabled or disabled, for audible feedback that the key was pressed. Additionally, the meter also still recognizes key touches even through gloves.

General Features

When choosing a piece of equipment making sure the product has all required features for the intended purposes is critical. When building the iris we included as many features as we could to aid in making this meter exceedingly versatile and convenient. From bare necessities such as long battery life and easy data logging and transfer, we have pushed the limits on seemingly basic features to make your life as easy as possible.

Spectral range

The meter features a spectral range of 340nm to 900nm allowing for a wide selection of analytical methods. The flexibility of this range permits compliance with many methods from regulatory organizations and associations for a variety of applications.

Pre-programmed Methods

Programmed in the meter are more than 80 commonly used methods for chemical analysis. Methods can easily be updated by transferring the file from a computer to the meter or by a flash drive. Up to 150 factory methods can be saved in the meter and some chemical parameters have the option to switch between different chemical forms. Finding the product codes to order additional reagents is easy as the meter provides the appropriate reagent codes for each programmed method.

User methods

The ability to program up to 100 personal methods into the meter creates both versatility and customization. Methods can include up to 10 calibration points, 5 different wavelengths (which can be used simultaneously), and permits the use of 5 reaction timers. These features allow for many variations to be implemented into methods. Compared to a photometer there is no longer a limitation by factory methods. If a certain parameter is not offered or a modification to a pre-programmed method is required, the meter can be customized to suit your needs.

Battery operated

The meter features a rechargeable lithium ion battery that lasts for approximately 3,000 measurements. Lasting well over a day of use in the field there is no need to worry about the battery life while out working without a power supply. The meter can be quickly recharged with a dedicated fast charging adapter.

Data Logging and Transfer

Transferring data from a meter should always be simple and straightforward. Impressively the meter can store up to 14,000 measurements in the memory. At any time data can be transferred to a PC or Mac as either a CSV or PDF file. No software is required, simply plug in a flash drive or plug it into a computer and export the data. The ability to save data as a PDF ensures higher integrity of the data as it cannot be easily changed. Additionally, a meter ID and a sample ID can be programmed to be saved along with logged measurements. With technical equipment wide-spread connection compatibility can often be an issue, which is why the iris features USB ports for both flash drive and a direct computer connection. Connectivity with a USB-A port to a flash drive can be used to transfer logged measurements from the meter and also to transfer method updates onto the meter. The USB-B port is used for a direct connection to a computer specifically for transferring logged data.

Cuvette Adapters

General Specifications	HI801 iris
Wavelength Range	340-900 nm
Wavelength Resolution	1 nm
Wavelength Accuracy	±1.5 nm
Photometric Range	0.000-3.000 Abs
Photometric Accuracy	5 mAbs at 0.000-0.500 Abs; 1% at 0.500-3.000 Abs
Measurement Mode	transmittance (%), absorbance and concentration
Sample Cell	10 mm square, 50 mm rectangular, 16 mm round, 22 mm round, 13 mm round (vial)
Wavelength Selection	automatic, based on the selected method (editable for user methods only)
Light Source	tungsten halogen lamp
Optical System	split beam
Wavelength Calibration	internal, automatic at power-on with visual feedback
Stray Light	<0.1 % T at 340 nm with $NaNO_2$
Spectral Bandwidth	5 nm
Number of Methods	150 Factory / 100 User
Data Points Stored	9999 measured values
Export Capability	csv file format, pdf file format
Connectivity	1x USB A (mass storage host); 1x USB B (mass storage device)
Battery Life	3000 measurements or 8 hours
Power Supply	15 VDC power adapter; 10.8 VDC Li-Ion rechargeable battery
Environment	0 to 50 °C (32 to 122 °F); 0 to 95% RH
Dimensions	155 x 205 x 322 mm (6.1 x 8.0 x 12.6")
Weight	3 kg (6.6 lbs.)
Ordering Information	**HI801-01** (115V) and **HI801-02** (230V) is supplied with sample cuvettes and Caps (22 mm, 4 pcs.), cloth for wiping cuvettes, scissors, USB cable, USB flash drive, 15 VDC power adapter, instruction manual and instrument quality certificate.

HI801 iris Parameter Specifications

Parameter	Range	Accuracy (@25°C)	Method	λ (nm)	Reagent	Cuvette
Alkalinity	0-500 mg/L $CaCO_3$	±5 mg/L ±5% of reading	Bromocresol green	610	HI775-26	R-22
Alkalinity, Marine	0-300 mg/L $CaCO_3$	±5 mg/L ±5% of reading	Bromocresol green	610	HI755-26	R-22
Aluminum	0.00-1.00 mg/L Al^{3+}	±0.02 mg/L ±4% of reading	Aluminon	530	HI93712-01	R-22
Ammonia LR	0.00-3.00 mg/L NH_3-N	±0.04 mg/L ±4% of reading	Nessler	425	HI93700-01	R-16
Ammonia LR	0.00-3.00 mg/L NH_3-N	±0.10 mg/L or 5% of reading	Nessler	425	HI93764A-25	R-13
Ammonia MR	0.00-10.00 mg/L NH_3-N	±0.05 mg/L ±5% of reading	Nessler	425	HI93715-01	R-16
Ammonia HR	0.0-100 mg/L NH_4+	±0.5 mg/L ±5% of reading	Nessler	425	HI93733-01	R-16
Ammonia HR	0.0-100 mg/L NH_3-N	±1 mg/L or 5% of reading	Nessler	430	HI93764B-25	R-13
Bromine	0.00-10.00 mg/L (mg/L)	±0.08 mg/L ±3% of reading	DPD	525	HI93716-01	R-22
Calcium	0-400 mg/L Ca^{2+}	±10 mg/L ±5% of reading	Oxalate	466	HI937521-01	R-22
Calcium, Marine	200-600 mg/L Ca^{2+}	±5% of reading	Zincon	610	HI758-26	R-16
Chloride	0.0-20.0 mg/L Cl^-	±0.5 mg/L ±5% of reading	Mercury thiocyanate	455	HI93753-01	R-22
Chlorine Dioxide	0.00-2.00 mg/L ClO_2	±0.10 mg/L ±5% of reading	Chlorophenol Red	575	HI93738-01	R-22
Chlorine Free ULR	0.000-0.500 mg/L Cl_2	±0.020 mg/L ±3% of reading	DPD	525	HI95762-01	R-22
Chlorine, Free LR (powder reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-01	R-22
Chlorine, Free LR (liquid reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-F	R-22
Chlorine, Free HR	0.00-10.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93734-01	R-22
Chlorine, Total ULR	0.000-0.500 mg/L Cl_2	±0.020 mg/L ±3% of reading	DPD	525	HI95761-01	R-22
Chlorine, Total LR (powder reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93711-01	R-22
Chlorine, Total LR (liquid reagent)	0.00-5.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93701-T	R-22
Chlorine, Total HR	0.00-10.00 mg/L Cl_2	±0.03 mg/L ±3% of reading	DPD	525	HI93734-01	R-22
Chlorine UHR	0-500 mg/L Cl_2	±3 mg/L ±3% of reading	DPD	525	HI95771-01	R-22
Chromium(VI) LR	0-300 µg/L Cr^{6+}	±2 µg/L ±4% of reading	Diphenylcarbohydrazide	535	HI93749-01	R-22
Chromium(VI) HR	0-1000 µg/L Cr^{6+}	±5 µg/L ±4% of reading	Diphenylcarbohydrazide	535	HI93723-01	R-22
COD LR EPA	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate EPA	420	HI93754A-25	R-13
COD LR Hg free	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate EPA	420	HI93754D-25	R-13
COD LR ISO	0-150 mg/L O_2	±5 mg/L or 5% of reading	Dichromate ISO	420	HI93754F-25	R-13
COD MR EPA	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate EPA	610	HI93754B-25	R-13
COD MR Hg free	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate EPA	610	HI93754E-25	R-13
COD MR ISO	0-1500 mg/L O_2	±15 mg/L or 4% of reading	Dichromate ISO	610	HI93754G-25	R-13
COD HR EPA	0-15000 mg/L O_2	±150 mg/L or 2% of reading	Dichromate EPA	610	HI93754C-25	R-13
Color of Water	0-500 PCU	±10 PCU ±5% of reading	Platinum Cobalt	460		R-22
Copper LR	0-1500 µg/L Cu^{2+}	±10 µg/L ±5% of reading	Bicinchoninate	575	HI95747-01	R-22
Copper HR	0.00-5.00 mg/L Cu^{2+}	±0.02 mg/L or 4% of reading	Bicinchoninate	560	HI93702-01	R-22
Cyanide	0.000-0.200 mg/L CN^-	±0.005 mg/L ±3% of reading	Pyridine-Pyrazalone	610	HI93714-01	R-22
Cyanuric Acid	0-100 mg/L CYA	±1 mg/L ±15% of reading	SPADNS	525	HI93722-01	R-22
Fluoride LR	0.00-2.00 mg/L F^-	±0.03 mg/L ±3% of reading	SPADNS	575	HI93729-01	R-22
Fluoride HR	0.0-20.0 mg/L F^-	±0.5 mg/L ±3% of reading	SPADNS	575	HI93739-01	R-22
Hardness Calcium	0.00-2.70 mg/L $CaCO_3$	±0.08mg/L ±4% of reading	Calmagite	523	HI93720-01	R-22
Hardness Magnesium	0.00-2.00 mg/L $CaCO_3$	±0.11 mg/L ±5% of reading	EDTA	523	HI93719-01	R-22
Hardness Total LR	0-250 mg/L $CaCO_3$	±5 mg/L ±4% of reading	Calmagite	466	HI93735-00	R-22
Hardness Total MR	200-500 mg/L $CaCO_3$	±7 mg/L ±3% of reading	Calmagite	466	HI93735-01	R-22
Hardness Total HR	400-750 mg/L $CaCO_3$	±10 mg/L ±2% of reading	Calmagite	466	HI93735-02	R-22
Hydrazine	0-400 µg/L N_2H_4	±3 µg/L ±3% of reading	Dimethylaminobenzaldehyde	466	HI93704-01	R-22
Iodine	0.0-12.5 mg/L I_2	±0.1 mg/L ±5% of reading	DPD	525	HI93718-01	R-22
Iron LR	0.00-1.60 mg/L Fe	±0.01 mg/L ±8% of reading	TPTZ	575	HI93746-01	R-22

Parameter	Range	Accuracy (@25°C)	Method	λ (nm)	Reagent	Cuvette
Iron HR	0.00-5.00 mg/L Fe	±0.04 mg/L ±2% of reading	Phenanthroline	525	HI93721-01	R-22
Magnesium	0-150 mg/L Mg^{2+}	±3 mg/L ±3% of reading	Calmagite	466	HI937520-01	R-22
Manganese LR	0-300 µg/L Mn	±7 µg/L ±3% of reading	PAN	560	HI93748-01	R-22
Manganese HR	0.0-20.0 mg/L Mn	±0.2 mg/L ±3% of reading	Periodate	525	HI93709-01	R-22
Maple Syrup	0.0-100.0%T	±3% @75 %T	Direct measure	560	HI93703-57	S-10
Molybdenum	0.0-40.0 mg/L Mo^{6+}	±0.3 mg/L ±5% of reading	Mercaptoacetic acid	420	HI93730-01	R-22
Nickel LR	0.000-1.000 mg/L Ni	±0.010 mg/L ±7% of reading	PAN	565	HI93740-01	R-16
Nickel HR	0.00-7.00 ppt Ni	±0.07 ppt ±4% of reading	photometric	575	HI93726-01	R-22
Nitrate	0.0-30.0 mg/L $N-NO_3$	±0.5 mg/L ±10% of reading	Cadmium reduction	525	HI93728-01	R-22
Nitrate (Chromotropic acid)	0.0-30.0 mg/L $N-NO_3$	±1.0 mg/L ±3% of reading	Chromotropic acid	410	HI93766-50	R-13
Nitrite Marine ULR	0-200 µg/L $N-NO_2$	±8 µg/L ±4% of reading	Diazotization	480	HI764-25	R-22
Nitrite LR	0-600 µg/L $N-NO_2$	10 µg/L ±4% of reading	Diazotization	480	HI93707-01	R-22
Nitrite HR	0-150 mg/L $N-NO_2$	±4 mg/L ±4% of reading	Ferrous sulfate	575	HI93708-01	R-22
Nitrogen Total LR	0.0-25.0 mg/L N	±1 mg/L or 5% of reading	Chromotropic acid	420	HI93767A-50	R-13
Nitrogen Total HR	10-150 mg/L N	±3 mg/L or 4% of reading	Chromotropic acid	420	HI93767B-50	R-13
Oxygen Dissolved	0.0-10.0 mg/L O_2	±0.4 mg/L ±3% of reading	Winkler	466	HI93732-01	R-22
Oxygen Scavengers (Carbohydrazide)	0.00-1.50 mg/L	±0.02 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (DEHA)	0-1000 µg/L	±5 µg/L ±5% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (ISO-Ascorbic Acid)	0.00-4.50 mg/L	±0.03 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Oxygen Scavengers (Hydroquinone)	0.00-2.50 mg/L	±0.04 mg/L ±3% of reading	Iron reduction	575nm	HI96773-01	R-22
Ozone	0.00-2.00 mg/L O_3	±0.02 mg/L ±3% of reading	DPD	525	HI93757-01	R-22
pH	6.5-8.5 pH	±0.1 pH	Phenol red	525	HI93710-01	R-22
Phosphorus Marine ULR	0-200 µg/L P	±5 µg/L ±5% of reading	Ascorbic acid	610	HI736-25	R-22
Phosphate LR	0.00-2.50 mg/L PO_4^{3-}	±0.04 mg/L ±4% of reading	Ascorbic Acid	610	HI93713-01	R-22
Phosphate HR	0.0-30.0 mg/L PO_4^{3-}	±1 mg/L ±4% of reading	Amino Acid	525	HI93717 -01	R-22
Phosphorus Acid Hydrolyzable	0.00-1.60 mg/L P	±0.05 mg/L or 5% of reading	Ascorbic acid	610	HI93758B-50	R-13
Phosphorus , Reactive LR	0.00-1.60 mg/L P	±0.05 mg/L or 4% of reading	Ascorbic acid	610	HI93758A-50	R-13
Phosphorus , Reactive HR	0.0-32.6 mg/L P	±0.5 mg/L or 4% of reading	Vanadomolybdophosphoric acid	420	HI93763A-50	R-13
Phosphorous, Total LR	0.00-1.60 mg/L P	±0.05 mg/L or 5% of reading	Adenosine 5'-monophosphate monohidrat	610	HI93758C-50	R-13
Phosphorous, Total HR	0.0-32.6 mg/L P	±0.5 mg/L or 5% of reading	Adenosine 5'-monophosphate monohidrat	420	HI93763B-50	R-13
Potassium LR	0.0-20.0 mg/L K	2 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Potassium MR	10-100 mg/L K	±10 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Potassium HR	20-200 mg/L K	±20 mg/L ±7% of reading	Turbidimetric tetraphenylborate	466	HI93750-01	R-22
Silica LR	0.00-2.00 mg/L SiO_2	±0.03 mg/L ±5% of reading	Heteropoly Blue	610	HI93705-01	R-22
Silica HR	0-200 mg/L SiO_2	±1 mg/L ±5% of reading	Molybdosilicate	466	HI96770-01	R-22
Silver	0.000-1.000 mg/L Ag	±0.02 mg/L ±5% of reading	PAN	570	HI93737-01	R-22
Sulfate	0-150 mg/L SO_4^{2-}	±5 mg/L ±3% of reading	Turbidimetric	466	HI93751-01	R-22
Surfactants Anionic	0.0-3.50 mg/L SDBS	±0.04 mg/L ±3% of reading	Methylene blue	610	HI96769-01	R-22
Zinc	0.00-3.00 mg/L Zn	±0.03 mg/L ±3% of reading	Zincon	620	HI93731-01	R-22

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.120 for general accessories

HI83300 Family

Multiparameter Photometers

with Digital pH Electrode Input

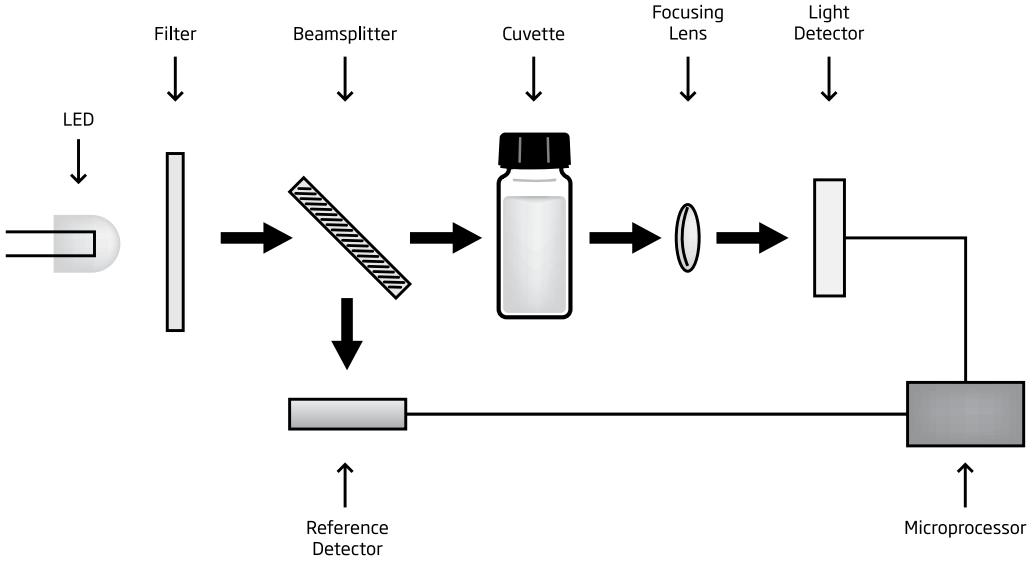
The HI83300 family of multiparameter photometers features seven models to cover a wide variety of applications. These meters are compact and versatile making them ideal for both benchtop or portable operation.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Up to 73 different programmed methods measuring 40 key water and wastewater quality parameters.
- Absorbance mode
  - Absorbance measurement mode for performance verification and can also be used to plot a custom concentration versus absorbance curve useful for user-supplied chemistry and for teaching students about photometry.
- High performance pH meter that uses advanced digital pH/ temperature electrodes.

ADP
Application Designed Photometers

Since 1978, Hanna has introduced instruments that tailor to the needs of a specific application or industry. From this philosophy we have created Application Designed Photometers to satisfy the needs of your specific application or industry.

Aquaculture	HI83303
Boilers & Cooling Towers	HI83305
Environmental Analysis	HI83306
Laboratory Analyses	HI83300
Nutrient Analyses	HI83225
Pool and Spa Applications	HI83326
Water Conditioning	HI83308



Improved Optical System

HI83300 family is designed with an innovative optical system that incorporates a beam splitter so that light can be used for absorbance readings and for a reference detector. The reference detector monitors the intensity of light and modulates when there is drift due to power fluctuation or the heating of the optical components. Each part has an important role in providing unparalleled performance from a photometer.

High Efficiency LED Light Source

An LED light source offers superior performance as compared to a tungsten lamp. LEDs have a much higher luminous efficiency, providing more light while using less power. They also produce very little heat, which could otherwise affect the optical components an electronic stability.

Quality Narrow Band Interference Filters

The narrow band interference filter not only ensures greater wavelength accuracy (±1 nm) but is also extremely efficient, allowing a brighter, stronger signal to be transmitted. The end result is increased measurement stability and less wavelength error.

Reference Detector for a Stable Light Source

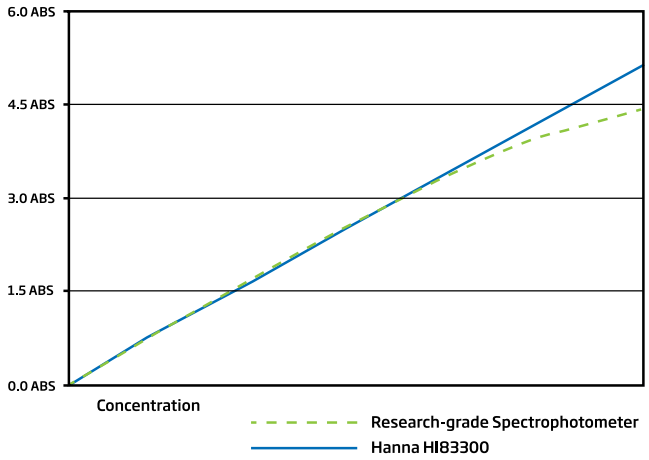
A beam splitter is used as part of the internal reference system of the HI83300 photometer. The reference detector compensates for any drift due to power fluctuations or ambient temperature changes. Now you can rely on a stable source of light.

Large Cuvette Size

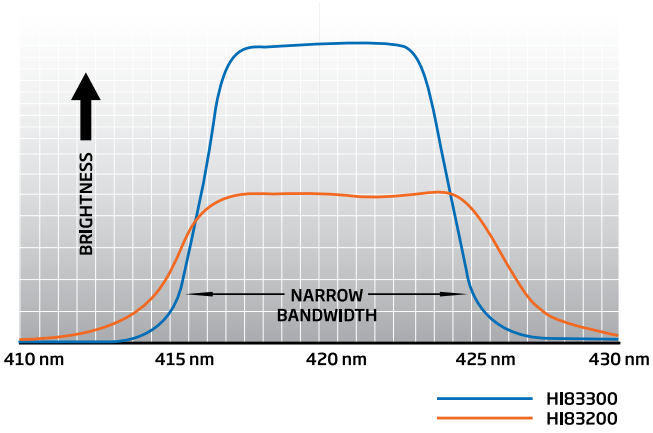
The sample cell of the HI83300 fits a round, glass cuvette with a 25 mm path length. Along with the advanced optical components, the larger size of the cuvette greatly reduces errors in rotation from the indexing mark of the cuvettes. The relatively long path length of the sample cuvette allows the light to pass through more of the sample solution, ensuring accurate measurements even in low absorbance samples.

Focusing Lens for Greater Light Yield

Adding a focusing lens to the optical path allows for the collection of all of the light that exits the cuvette and focusing the light on the silicon photo detector. This innovative approach to photometric measurements cancels the errors from imperfections and scratches present in the glass cuvette eliminating the need to index the cuvette.



- Better linearity than research-grade spectrophotometers



- Improved optical filters – higher wavelength accuracy and light throughput

Connectivity

① pH Connectivity

Any of our digital pH electrodes can be connected to the HI83300 family by a 3.5 mm input. Plugging in an electrode has never been easier; there are no alignment issues or broken pins. Simply connect the electrode and start taking measurements.

② Dual Power Supply

What makes the HI83300 family such versatile meters is their ability to be used as a portable or benchtop meter. Equipped with a rechargeable lithium ion battery, these meters can easily be brought on the production room floor or taken for measurements on the move. This long-lasting battery lasts up to 500 photometer measurements or 50 hours of continuous pH measurements. To further preserve battery life, the auto-off feature automatically shuts off the meter after 15 minutes of inactivity. If being used on a benchtop, a power supply can be plugged into the micro USB port at the back of the meter.

② ③ USB Connectivity

Both a USB and micro USB port are located on the meters. Each of these ports can be used to transfer data via flash drive or direct connection to a PC or MAC. Data is transferred as CSV files for easy processing and widespread compatibility.

Photometer Capabilities

Concentration Measurement Function

Users can access the menu of measurement methods with the simple press of a button. Low, medium, and high range methods of several parameters are available for users to obtain a high accuracy reading. Each method is assigned a concentration unit of measure. Parameters can be expressed in different chemical forms based on their preference.

CAL Check™ Functionality

Hanna's exclusive CAL Check feature allows for performance verification of the independent measuring channels. Our CAL Check standard vials are developed to simulate a specific absorbance value at each wavelength to verify its accuracy.

Built-in Reaction Timer

Reaction time is of key importance when performing colorimetric measurements, which is why the built-in timer of the HI83300 is an ideal feature. The countdown timer displays the time remaining until a measurement will be taken, ensuring consistent results between measurements and users.

pH Measurement

The HI83300 family offers the ability to connect a digital pH electrode. Users can connect any sensor from our extensive line of digital pH electrodes. Whether a user requires a glass or plastic body, a spheric or conical tip shape, or the ability for safe use with food samples, our digital electrode offering is suitable for nearly everyone.

Large Cuvettes

The sample cell of these meters fits a round, glass cuvette with a 25 mm path length. The relatively long path length of the sample cuvette allows the light to pass through more of the sample solution, ensuring accurate measurements even in low absorbance samples. This cuvette size also provides a larger opening, making it easier for users to dispense ready-made liquid or powder reagents into the sample.

An affixed, light-blocking cover panel closes over the sample cell, reducing stray light from affecting any measurement readings.

Absorbance Measurement Mode

Users can select to calibrate and measure samples in absorbance mode for each wavelength used by the meter. This mode is a convenient way for users to develop their own calibration curves and measure samples with customized chemistries.

Data Management Capabilities

User ID and Sample ID

An alphanumeric keypad can be used to enter sample ID and user ID to be stored with the measurement reading. The recall key allows the user to review the data along with the date and time that the reading was taken.

Data Management

The HI83300 family can store up to 1000 photometer and pH electrode readings, which can be logged by pressing the LOG key on the face of the meter. pH readings are logged along with comprehensive GLP (Good Laboratory Practice) information such as date, time, calibration buffers, and electrode offset and slope.

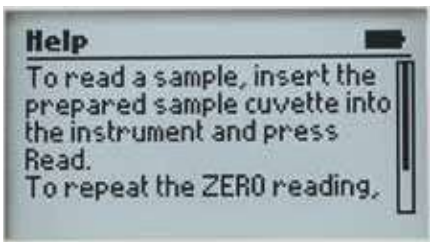
USB for Data Transfer

Two USB ports are provided for transferring data. One port allows the data to be transferred to a flash drive while the other USB is used for direct connection to a computer. All data is transferred as a .csv file that can be used with many spreadsheet programs for documentation.

Display Features

Backlit Graphic LCD Display

A backlit, graphic LCD display provides an easy to read, user-friendly interface.



Intuitive Display

With virtual keys, a battery status indicator, and practical error messages, users will find the meter interface intuitive. On-screen guides provide information relating to the current meter operation, and can be used at any stage in the setup or measurement process to show contextual help.

General Specifications for all Models

Measurement Channels		5 x optical channels; 1 x digital electrode channel (pH measurement)
Absorbance	Range	0.000 to 4.000 Abs
	Resolution	0.001 Abs
	Accuracy	±0.003 Abs (at 1.000 Abs)
	Light Source	light-emitting diode
	Bandpass Filter Bandwidth	8 nm
	Bandpass Filter Wavelength Accuracy	± 1.0 nm
	Light Detector	silicon photocell
	Cuvette Type	round, 24.6 mm diameter and 16 mm diameter
	Number of Methods	128 max
pH	Range	-2.00 to 16.00 pH (±1000 mV)*
	Resolution	0.01 pH (0.1 mV)
	Temperature Compensation	Automatic (-5.0 to 100.0°C; 23.0 to 212.0°F)*
Temperature	Range	-20 to 120°C (-4.0 to 248.0 °F)
	Resolution	0.1 °C (0.1 °F)
Additional Specifications	pH electrode	digital pH electrode (not included)
	Logging	1000 readings (mixed photometer and electrode); log on demand with user name and sample ID optional input
	Display	128 x 64 pixel LCD with backlight
	Connectivity	USB-A host for flash drive; micro-USB-B for power and computer connectivity
	Battery Life	3.7 VDC Li-polymer rechargeable battery / >500 photometric measurements or 50 hours of continuous pH measurement
	Power Supply	5 VDC USB 2.0 power adapter with USB-A to micro-USB-B cable (included)
	Environment	0 to 50°C (32 to 122°F); 0 to 95% RH, non-condensing
	Dimensions	206 x 177 x 97 mm (8.1 x 7.0 x 3.8 in.)
	Weight	1.0 kg (2.2 lbs.)

* Limits will be reduced to actual sensor limits

HI83300-100 sample preparation kit consisting of activated carbon for 50 tests, demineralizer for preparation of 10 L deionized water (100 g), 170 mL graduated beaker, 100 mL beaker, 3 mL pipette, 60 mL syringe, 5 mL syringe, graduated cylinder, spoon, funnel, paper filters (25)

HI72083300 carrying case for HI83300 family

HI920015 USB to micro USB cable connector

HI740224 plastic beaker 170 mL (6)

HI731318 cuvette cleaning cloth (4)

HI740225 60 mL graduated syringe

HI76404A electrode holder for HI83300 family

HI740226 5 mL graduated syringe

HI731331 cuvette (4)
HI731335N caps for cuvette (4)

HI93703-55 activated carbon for 50 tests

HI11310 digital combination pH electrode

HI740036P beaker, plastic 100 mL (10)
HI740034P cap for 100 mL plastic beaker (10)

HI75110/230 USB power supply

HI83300

Multiparameter Photometer

with Digital pH Electrode Input for Laboratories

Application Designed Photometers

HI83300 is a compact, multiparameter photometer for use in the lab or in the field. The meter is one of the most advanced photometers available with an innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette. This meter has 60 different programmed methods measuring 37 key water quality parameters and also offers an absorbance measurement mode for performance verification and for users that would like to develop their own concentration versus absorbance curves.

To save valuable laboratory benchtop space, the HI83300 doubles as a professional pH meter with its digital pH/temperature electrode input. Now one meter can be used for both photometric and pH measurements.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe

HI83300-11

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Alkalinity	0 to 500 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±5% of reading at 25 °C	@ 610 nm	Bromocresol green
Alkalinity, Marine	0 to 300 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±5% of reading at 25 °C	@ 610 nm	Bromocresol green
Aluminum	0.00 to 1.00 mg/L (as Al^{3+})	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 525 nm	aluminon
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Bromine	0.00 to 8.00 mg/L (as Br_2)	0.01 mg/L	±0.08 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Calcium	0 to 400 mg/L (as Ca^{2+})	1 mg/L	±10 mg/L ±5% of reading at 25 °C	@ 466 nm	oxalate
Calcium, Marine	200 to 600 mg/L (as Ca^{2+})	1 mg/L	±6% of reading at 25 °C	@ 610 nm	zincon
Chloride	0.0 to 20.0 mg/L (as Cl^-)	0.1 mg/L	±0.5 mg/L ±6% of reading at 25 °C	@ 466 nm	mercury (II) thiocyanate
Chlorine Dioxide	0.00 to 2.00 mg/L (as ClO_2)	0.01 mg/L	±0.10 mg/L ±5% of reading at 25 °C	@ 575 nm	chlorophenol red
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Free Ultra Low Range	0.000 to 0.500 mg/L (as Cl_2)	0.001 mg/L	±0.020 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total Ultra Low Range	0.000 to 0.500 mg/L (as Cl_2)	0.001 mg/L	±0.020 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total Ultra High Range	0 to 500 mg/L (as Cl_2)	1 mg/L	±3 mg/L ±3% of reading at 25 °C	@ 525 nm	iodometric
Chromium(VI) Low Range	0 to 300 µg/L (as Cr^{6+})	1 µg/L	±1 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Chromium(VI) High Range	0 to 1000 µg/L (as Cr^{6+})	1 µg/L	±5 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Color of Water	0 to 500 PCU (Platinum Cobalt Units)	1 PCU	±10 PCU ±5% of reading at 25 °C	@ 420 nm	colorimetric platinum cobalt
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})	0.001 mg/L	±0.01 mg/L ±5% of reading at 25 °C	@ 575 nm	bicinchoninate
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Cyanuric Acid	0 to 80 mg/L (as CYA)	1 mg/L	±1 mg/L ±15% of reading at 25 °C	@ 525 nm	turbidimetric
Fluoride Low Range	0.00 to 2.00 mg/L (as F^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	SPADNS
Fluoride High Range	0.0 to 20.0 mg/L (as F^-)	0.1 mg/L	±0.5 mg/L ±3% of reading at 25 °C	@ 575 nm	SPADNS
Hardness, Calcium	0.00 to 2.70 mg/L (as $CaCO_3$)	0.01 mg/L	±0.11 mg/L ±5% of reading at 25 °C	@ 525 nm	calmagite
Hardness, Magnesium	0.00 to 2.00 mg/L (ppm) (as $CaCO_3$)	0.01 mg/L	±0.11 mg/L ±5% of reading at 25 °C	@ 525 nm	calmagite
Hardness, Total Low Range	0 to 250 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±4% of reading at 25 °C	@ 466 nm	calmagite
Hardness, Total Medium Range	200 to 500 mg/L (as $CaCO_3$)	1 mg/L	±7 mg/L ±3% of reading at 25 °C	@ 466 nm	calmagite
Hardness, Total High Range	400 to 750 mg/L (as $CaCO_3$)	1 mg/L	±10 mg/L ±2% of reading at 25 °C	@ 466 nm	calmagite
Hydrazine	0 to 400 µg/L (as N_2H_4)	1 µg/L	±4% of full scale reading at 25 °C	@ 466 nm	p-Dimethylaminobenzaldehyde
Iodine	0.0 to 12.5 mg/L (as I_2)	0.1 mg/L	±0.1 mg/L ±5% of reading at 25 °C	@ 525 nm	DPD
Iron Low Range	0.000 to 1.600 mg/L (as Fe)	0.001 mg/L	±0.01 mg/L ±8% of reading at 25 °C	@ 575 nm	TPTZ
Iron High Range	0.00 to 5.00 mg/L (as Fe)	0.01 mg/L	±0.04 mg/L ±2% of reading at 25 °C	@ 525 nm	phenanthroline
Magnesium	0 to 150 mg/L (as Mg^{2+})	1 mg/L	±5 mg/L ±3% of reading at 25 °C	@ 466 nm	calmagite
Manganese Low Range	0 to 300 µg/L (as Mn)	1 µg/L	±10 µg/L ±3% of reading at 25 °C	@ 575 nm	PAN
Manganese High Range	0.0 to 20.0 mg/L (as Mn)	0.1 mg/L	±0.2 mg/L ±3% of reading at 25 °C	@ 525 nm	periodate
Molybdenum	0.0 to 40.0 mg/L (as Mo^{6+})	0.1 mg/L	±0.3 mg/L ±5% of reading at 25 °C	@ 420 nm	mercaptoacetic acid
Nickel Low Range	0.000 to 1.000 mg/L (as Ni)	0.001 mg/L	±0.010 mg/L ±7% of reading at 25 °C	@ 575 nm	PAN
Nickel High Range	0.00 to 7.00 g/L (as Ni)	0.01 g/L	±0.07g/L ±4% of reading at 25 °C	@ 575 nm	EDTA
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Nitrite Ultra Low Range, Marine	0 to 200 µg/L (as NO_2^-- N)	1 µg/L	±10 µg/L ±4% of reading at 25 °C	@ 466 nm	diazotization
Nitrite Low Range	0 to 600 µg/L (as NO_2^-- N)	1 µg/L	±20 µg/L ±4% of reading at 25 °C	@ 466 nm	diazotization
Nitrite High Range	0 to 150 mg/L (as NO_2^-- N)	1 mg/L	±4 mg/L ±4% of reading at 25 °C	@ 575 nm	ferrous sulfate
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)	0.1 mg/L	±0.4 mg/L ±3% of reading at 25 °C	@ 420 nm	Winkler
Oxygen Scavengers	0.00 to 1.50 mg/L (as Carbohydrazide)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0 to 1000 µg/L (as DEHA)	1 µg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0.00 to 2.50 mg/L (as Hydroquinone)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0.00 to 4.50 mg/L (as Iso-ascorbic acid)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Ozone	0.00 to 2.00 mg/L (as O_3)	0.01 mg/L	±0.02 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Ultra Low Range, Marine	0 to 200 µg/L (as P)	1 µg/L	±5 µg/L ±5% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid
Potassium	0.0 to 20.0 mg/L (as K)	0.1 mg/L	±3.0 mg/L ±7% of reading at 25 °C	@ 466 nm	turbidimetric tetraphenylborate
Silica Low Range	0.00 to 2.00 mg/L (as SiO_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 610 nm	heteropoly blue
Silica High range	0 to 200 mg/L (as SiO_2)	1 mg/L	±1 mg/L ±5% of reading at 25 °C	@ 466 nm	molybdosilicate
Silver	0.000 to 1.000 mg/L (as Ag)	0.001 mg/L	±0.020 mg/L ±5% of reading at 25 °C	@ 575 nm	PAN
Sulfate	0 to 150 mg/L (as SO_4^{2-})	1 mg/L	±5 mg/L ±3% of reading at 25 °C	@ 466 nm	turbidimetric
Surfactants, Anionic	0.00 to 3.50 mg/L (as SDBS)	0.01 mg/L	±0.04 mg/L ±3% of reading at 25 °C	@ 610 nm	methylene blue
Zinc	0.00 to 3.00 mg/L (as Zn)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	zincon

Ordering Information	**HI83300-01** (115V) and **HI83300-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83300-11** CAL Check Cuvette Kit for HI83300

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83303

Multiparameter Photometer

with Digital pH Electrode Input for Aquaculture

Application Designed Photometers

The HI83303 benchtop photometer measures 12 different key water quality parameters using 20 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

Made with the aquaculture industry in mind, the HI83303 is a comprehensive solution to maintaining optimal chemical and environmental conditions, preventing disease and increasing production. The HI83303 measures vital parameters such as alkalinity, calcium, nitrite, and phosphate. Alkalinity plays a part in a dynamic relationship with pH and CO_2 concentrations, high alkalinity water lowers fluctuations in pH. The buffering capacity acts to store extra CO_2 essential for photosynthesis in the ponds to produce oxygen. Maintaining calcium at certain levels is vital to proper fish growth and development. Excessive nitrite can be toxic to fish. When nitrite interacts with hemoglobin the iron becomes oxidized and the blood cell can no longer carry oxygen. Phosphate is essential to plant growth; too much phosphate in an aquaculture system can contribute to algal blooms decreasing dissolved oxygen vital for a successful ecosystem.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe

HI83303-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Alkalinity	0 to 500 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±5% of reading at 25 °C	@ 610 nm	Bromocresol green
Alkalinity, Marine	0 to 300 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±5% of reading at 25 °C	@ 610 nm	Bromocresol green
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Calcium	0 to 400 mg/L (as Ca^{2+})	1 mg/L	±10 mg/L ±5% of reading at 25 °C	@ 466 nm	oxalate
Calcium, Marine	200 to 600 mg/L (as Ca^{2+})	1 mg/L	±6% of reading at 25 °C	@ 610 nm	zincon
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})	0.001 mg/L	±0.01 mg/L ±5% of reading at 25 °C	@ 575 nm	bicinchoninate
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Nitrite Ultra Low Range, Marine	0 to 200 µg/L (as NO_2^-- N)	1 µg/L	±10 µg/L ±4% of reading at 25 °C	@ 466 nm	diazotization
Nitrite Low Range	0 to 600 µg/L (as NO_2^-- N)	1 µg/L	±20 µg/L ±4% of reading at 25 °C	@ 466 nm	diazotization
Nitrite High Range	0 to 150 mg/L (as NO_2^-- N)	1 mg/L	±4 mg/L ±4% of reading at 25 °C	@ 575 nm	ferrous sulfate
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)	0.1 mg/L	±0.4 mg/L ±3% of reading at 25 °C	@ 420 nm	Winkler
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Ultra Low Range, Marine	0 to 200 µg/L (as P)	1 µg/L	±5 µg/L ±5% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid

Ordering Information	**HI83303-01** (115V) and **HI83303-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83303-11** CAL Check Cuvette Kit for HI83303

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83305

Multiparameter Photometer

with Digital pH Electrode Input for Boilers and Cooling Towers

Application Designed Photometers

The HI83305 benchtop photometer measures 18 different key water quality parameters using 30 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

Specially designed for use with boilers and cooling towers, the HI83305 is a comprehensive way to maintain precise water conditions in systems. Problems such as corrosion, deposition, and microbial growth can occur if these key parameters, such as oxygen scavengers and silica, aren't maintained. Oxygen scavengers are added to remove residual dissolved oxygen in boiler feed water that can cause corrosion in a steam generating plant. It is important that levels of oxygen scavengers be routinely checked to prevent against corrosion and ensure that equipment is working efficiently. Boiler water maintenance is necessary to prevent or control deposit formation as seen with silica. Silica contamination can reduce system efficiency and increase maintenance of equipment due to scaling.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe


HI83305-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Aluminum	0.00 to 1.00 mg/L (as Al^{3+})	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 525 nm	aluminon
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Bromine	0.00 to 8.00 mg/L (as Br_2)	0.01 mg/L	±0.08 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine Dioxide	0.00 to 2.00 mg/L (as ClO_2)	0.01 mg/L	±0.10 mg/L ±5% of reading at 25 °C	@ 575 nm	chlorophenol red
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chromium(VI) Low Range	0 to 300 µg/L (as Cr^{6+})	1 µg/L	±1 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Chromium(VI) High Range	0 to 1000 µg/L (as Cr^{6+})	1 µg/L	±5 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})	0.001 mg/L	±0.01 mg/L ±5% of reading at 25 °C	@ 575 nm	bicinchoninate
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Hydrazine	0 to 400 µg/L (as N_2H_4)	1 µg/L	±4% of full scale reading at 25 °C	@ 466 nm	p-Dimethylaminobenzaldehyde
Iron Low Range	0.000 to 1.600 mg/L (as Fe)	0.001 mg/L	±0.01 mg/L ±8% of reading at 25 °C	@ 575 nm	TPTZ
Iron High Range	0.00 to 5.00 mg/L (as Fe)	0.01 mg/L	±0.04 mg/L ±2% of reading at 25 °C	@ 525 nm	phenanthroline
Molybdenum	0.0 to 40.0 mg/L (as Mo^{6+})	0.1 mg/L	±0.3 mg/L ±5% of reading at 25 °C	@ 420 nm	mercaptoacetic acid
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Nitrite Low Range	0 to 600 µg/L (as NO_2^-- N)	1 µg/L	±20 µg/L ±4% of reading at 25 °C	@ 466 nm	diazotization
Nitrite High Range	0 to 150 mg/L (as NO_2^-- N)	1 mg/L	±4 mg/L ±4% of reading at 25 °C	@ 575 nm	ferrous sulfate
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)	0.1 mg/L	±0.4 mg/L ±3% of reading at 25 °C	@ 420 nm	Winkler
Oxygen Scavengers	0.00 to 1.50 mg/L (as Carbohydrazide)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0 to 1000 µg/L (as DEHA)	1 µg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0.00 to 2.50 mg/L (as Hydroquinone)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
Oxygen Scavengers	0.00 to 4.50 mg/L (as Iso-ascorbic acid)	0.01 mg/L	±5 µg/L ±5% of reading at 25 °C	@ 575 nm	iron reduction
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid
Silica Low Range	0.00 to 2.00 mg/L (as SiO_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 610 nm	heteropoly blue
Silica High range	0 to 200 mg/L (as SiO_2)	1 mg/L	±1 mg/L ±5% of reading at 25 °C	@ 466 nm	molybdosilicate
Zinc	0.00 to 3.00 mg/L (as Zn)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	zincon

Ordering Information	**HI83305-01** (115V) and **HI83305-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83305-11** CAL Check Cuvette Kit for HI83305

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83306

Multiparameter Photometer

with Digital pH Electrode Input
for Environmental Analysis

Application Designed Photometers

The HI83306 benchtop photometer measures 16 different key water quality parameters using 23 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

The HI83306 was developed to measure the most common parameters in environmental water quality monitoring. Nutrients such as nitrates and phosphates are key indicators of nutrient pollution from agricultural sources and are considered dangerous to environmental waters. Too few nutrients and waters will be unable to sustain healthy ecosystems; too many nutrients and algal blooms can form, which can be detrimental to water quality and aquatic health. Dissolved oxygen is an essential to performing biological processes for many forms of aquatic life, such as fish, plants and microorganisms.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe


HI83306-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chromium(VI) Low Range	0 to 300 µg/L (as Cr^{6+})	1 µg/L	±1 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Chromium(VI) High Range	0 to 1000 µg/L (as Cr^{6+})	1 µg/L	±5 µg/L ±4% of reading at 25 °C	@ 525 nm	diphenylcarbohydrazide
Color of Water	0 to 500 PCU (Platinum Cobalt Units)	1 PCU	±10 PCU ±5% of reading at 25 °C	@ 420 nm	colorimetric platinum cobalt
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})	0.001 mg/L	±0.01 mg/L ±5% of reading at 25 °C	@ 575 nm	bicinchoninate
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Cyanuric Acid	0 to 80 mg/L (as CYA)	1 mg/L	±1 mg/L ±15% of reading at 25 °C	@ 525 nm	turbidimetric
Molybdenum	0.0 to 40.0 mg/L (as Mo^{6+})	0.1 mg/L	±0.3 mg/L ±5% of reading at 25 °C	@ 420 nm	mercaptoacetic acid
Nickel Low Range	0.000 to 1.000 mg/L (as Ni)	0.001 mg/L	±0.010 mg/L ±7% of reading at 25 °C	@ 575 nm	PAN
Nickel High Range	0.00 to 7.00 g/L (as Ni)	0.01 g/L	±0.07g/L ±4% of reading at 25 °C	@ 575 nm	EDTA
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Nitrite High Range	0 to 150 mg/L (as NO_2^-- N)	1 mg/L	±4 mg/L ±4% of reading at 25 °C	@ 575 nm	ferrous sulfate
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)	0.1 mg/L	±0.4 mg/L ±3% of reading at 25 °C	@ 420 nm	Winkler
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid
Silica Low Range	0.00 to 2.00 mg/L (as SiO_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 610 nm	heteropoly blue
Silver	0.000 to 1.000 mg/L (as Ag)	0.001 mg/L	±0.020 mg/L ±5% of reading at 25 °C	@ 575 nm	PAN
Zinc	0.00 to 3.00 mg/L (as Zn)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	zincon

Ordering Information	**HI83306-01** (115V) and **HI83306-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83306-11** CAL Check Cuvette Kit for HI83306

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83325

Multiparameter Photometer

with Digital pH Electrode Input for Nutrient Analysis

Application Designed Photometers

The HI83325 benchtop photometer measures 8 different key water quality parameters using 9 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

Consistent and thorough monitoring of plant nutrients is essential to maintaining healthy growth and reproduction. This is easy with the HI83325, a comprehensive way to monitor vital plant nutrients such as potassium, calcium and magnesium. Required in large quantities, potassium plays a vital role in water uptake and enzyme regulation. Calcium helps to strengthen plant cell walls protecting against heat stress while magnesium helps build a strong immune system.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe

HI83325-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Supplied Complete

HI83225 is supplied with the HI83300-100 in a rugged carrying case.

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Calcium	0 to 400 mg/L (as Ca^{2+})	1 mg/L	±10 mg/L ±5% of reading at 25 °C	@ 466 nm	oxalate
Magnesium	0 to 150 mg/L (as Mg^{2+})	1 mg/L	±5 mg/L ±3% of reading at 25 °C	@ 466 nm	calmagite
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid
Potassium	0.0 to 20.0 mg/L (as K)	0.1 mg/L	±3.0 mg/L ±7% of reading at 25 °C	@ 466 nm	turbidimetric tetraphenylborate
Sulfate	0 to 150 mg/L (as SO_4^{2-})	1 mg/L	±5 mg/L ±3% of reading at 25 °C	@ 466 nm	turbidimetric

Ordering Information	**HI83325-01** (115V) and **HI83325-02** (230V) is supplied with sample cuvettes and caps (4 ea.), activated carbon for 50 tests, demineralizer for preparation of 10 L deionized water (100g), 100 mL graduated beaker with caps (10), 3 mL pipette, 60 mL syringe, 5 mL syringe, graduated cylinder, spoon, funnel, paper filters (100), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instruction manual, instrument quality certificate, and carrying case.
Standards	**HI83325-11** CAL Check Cuvette Kit for HI83325

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83900

Suction Lysimeter

for Root Level Soil Monitoring

- The perfect companion to the HI83325
- Monitor soil nutrients at the roots

The HI83900 suction lysimeter is built with a porous ceramic cap connected to a transparent tube for soil solution extraction. A rubber capillary is inserted in the tube passing through a rubber cap and reaching the ceramic tip.

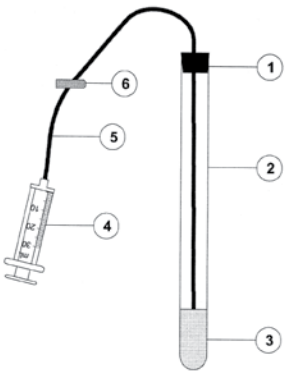
The HI83900 series lysimeter is an ideal tool for collecting soil solution samples and then performing quantitative chemical analysis. In this way, the operator can easily monitor the level of nutrients such as ammonia, nitrate, phosphorous, potassium, sulfate, calcium and magnesium.

The ceramic tip of the lysimeter can be used in all types of soil. It is made of a sinterized material that does not react with the nutrients in the soil. Therefore, the soil solution collected is not affected by the chemical composition of the ceramic cap resulting in precise and reliable tests.

The HI83900 allows the extraction of a solution from the soil by creating a vacuum inside the sampler tube, that exceeds the soil water tension. This will establish an hydraulic gradient for the solution to flow through the porous ceramic cap and into the lysimeter tube. Typically, a vacuum of about -60 cb (centibar) should be drawn.

For better monitoring of soil solution composition throughout an entire growth period of crops, at least two lysimeters should be installed in the root zone of a representative plant, one at the upper part and one in the lower part of the root zone.

For better measurement accuracy and repeatability, it is recommended to replicate installations in at least two more locations.



1. Rubber cap
2. Soil solution sampler tube
3. Porous ceramic tip
4. 30 mL syringe (pump)
5. Rubber suction capillary
6. Finger clamp

HI83900-30
30 cm (0.98')

HI83900-60
60 cm (1.97')

HI83900-90
90 cm (2.95')

Plant Nutrition

The three elements that are most needed by plants are nitrogen (N), phosphorous (P) and potassium (K).

Nitrogen is indispensable for the plant's life and is a key factor in fertilization. Nitrogen allows the development of the vegetative growth of the plant; in particular, it contributes to lengthening of trunks and sprouts and increases the production of foliage and fruits. An excess of nitrogen weakens the plants structure creating an unbalanced relationship between the leaves and the stalks. In addition, the plant becomes less resistant to diseases.

Phosphorous is an important element in the composition of DNA and RNA, the regulators of the energetic exchange (ATP and ADP), as well as the reserve substances in seeds and bulbs. It contributes to the formation of buds, roots, blooming, and lignification. A lack of phosphorous results in: stifling of plants, slow growth, a reduction of production, smaller fruits and a lower expansion of the roots.

Even though potassium is not a constituent of important compounds, it plays a remarkable role in many physiological activities in plants like the control of cellular turgor and the accumulation of carbohydrates. It increases the size of fruits, their flavor, as well as yielding a positive effect on the color and fragrance of flowers. Potassium also makes plants more resistant to disease.

Ordering Information	All include capillary rubber tube with rubber cap and finger clamp, cleaning solution starter kit (120 mL), 30 mL syringe and instructions **HI83900-30** is comprised of 30 cm (0.98') sampler tube ending with porous ceramic tip. **HI83900-60** is comprised of 60 cm (1.97') sampler tube ending with porous ceramic tip. **HI83900-90** is comprised of 90 cm (2.95') sampler tube ending with porous ceramic tip.
Accessories	**HI83900-25** cleaning solution kit, 500 mL

The Significance of Pool and Spa Water Testing

Residual Disinfection and pH Control

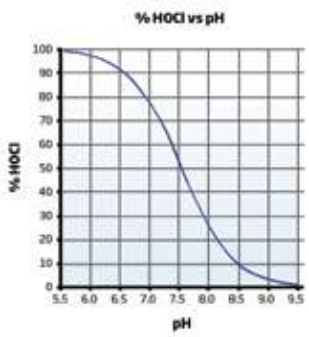
In swimming pool treatment, disinfection or sanitizing is essential to rid the pool of bacteria and control nuisance organisms like algae which may occur in the pool, filtration equipment, and piping.

There are a number of available disinfectant compounds, including chlorine, bromine and ozone dosing systems, of which chlorine is the most common.

Chlorine

Chlorine is a strong oxidizing agent that destroys organic pollutants and bacteria. Chlorine combines with compounds containing nitrogen to form chloramines, during which only part of the chlorine will be used while the rest remains active, continuing it's disinfecting action.

Combined chlorine is the quantity of chlorine that has already combined with nitrogen containing compounds. It is much less effective as a disinfectant than free chlorine. The addition of combined chlorine, and free chlorine gives total chlorine. A pool manager needs to aim for the perfect balance where free and total chlorine are proportionally equal, and thus to keep the combined chlorine levels near zero. The presence of chloramines is undesirable because of the distinctive 'swimming pool smell' as well as irritation to the eyes and mucous membranes caused by combined chlorines like dichloramines.



Commercial chlorine for disinfection may be available as a gas (Cl_2), a liquid like sodium hypochlorite or bleach (NaOCl) or in a solid state like calcium hypochlorite, chlorohydantoins or chlorocyanuric acid compounds. These compounds, once dissolved in water, establish equilibrium between the hypochlorous acid (HOCl) and the hypochlorite ions (OCl^-). Although both forms are considered free chlorine, it is the hypochlorous acid that provides the strongest disinfecting and oxidizing characteristic of chlorine solutions. The amount of hypochlorous acid in chlorinated water depends upon the pH value of the solution. Changes in pH value will effect the HOCl equilibrium in relation to the hydrogen and hypochlorite ions.

As depicted by the graph, HOCl decreases and OCl^- increases as pH increases. At a low pH, almost all the free chlorine is in the molecular form HOCl, and at a pH of around 7.5, the ratio between HOCl and OCl^- is 50:50. Since the ionic form OCl^- is a slow acting sanitizer while the molecular HOCl is a fast acting, it is important to measure pH regularly. As a general rule a pH of about 7.2 is recommended to maintain fast acting disinfection conditions.

Bromine

In many countries bromine sanitizing has been introduced as an alternative for chlorine, although it is not as strong. The advantage of bromine lies in its stability at higher temperatures (advantageous for heated pools and hot tubs), and its maintained disinfection power at a higher pH. Furthermore, there is very little reaction between bromine and nitrogen compounds, reducing the unpleasant odor, and eye irritation problems. The main disadvantage of bromine is the slower acting disinfecting power, making it less suitable for larger pools.

Ozone

Ozone is a very strong oxidizing agent that destroys organic compounds that are especially difficult to oxidize. It allows the pool manager to very efficiently remove combined chlorine without frequently refreshing large amounts of pool water. By the time the water passes through the filter units, ozone has already completed sanitizing, and it is not effected by the pH level.

Mainly because of its strong oxidizing power, the return water may contain trace concentrations of ozone. It imperative to know that ozone is very unstable, so to ensure thorough sanitization of the water, low-level chlorination remains necessary.

The Water Balance and Langelier Index

Pool water characteristics need to be maintained in a balanced state to avoid numerous issues. Measuring certain variables is extremely important to predict if the water is corrosive or will cause scaling.

A saturation index developed by Dr. Wilfred Langelier is widely used to predict the balance of swimming pool waters. It represents the estimation of a solutions ability to dissolve or precipitate calcium carbonate deposits. A certain level of this precipitation (filming) is desired to insulate pipes and boilers from contact with water. When no protective filming is formed, water is considered to be corrosive. On the other hand, too much filming can develop into scaling and incrustation of the pipes.

In the treatment and monitoring of pool water, the pool manager must ensure that related parameters such as alkalinity, hardness and pH are carefully monitored in addition to sanitizing chemicals.

Calcium

The presence of calcium in the system is desired to ensure filming on those places where the temperature is relatively high, like in boilers and pipes transporting warm water. Scaling must be avoided because it reduces heat transfer and pump capacity, and causes cloudiness in the water.

It is recommended to maintain the calcium hardness value within the range from 200 to 400 ppm as calcium carbonate ($CaCO_3$).

Alkalinity

Alkalinity is the measure of the total concentration of alkaline substances, mostly bicarbonates, dissolved in the water. The higher the alkalinity, the more resistant the water is to pH change. At the same time, high alkaline water is a major contributor to scaling problems like incrustation in filtration equipment, pumps, and piping.

It is recommended to maintain the alkalinity value within the range from 80 to 125 ppm as calcium carbonate ($CaCO_3$).

pH

The pH of the water is an important factor since at lower pH levels the corrosion rate increases. If the alkalinity values are sufficiently high, it will not be difficult to control the pH. Most pool managers prefer to keep the pH between 7.2 and 7.4 to best maintain low corrosion rates and a sufficient activity of chlorine.

Langelier Index

The Langelier Index is a powerful tool to calculate the water balance, and to predict corrosion or scaling problems. Theoretically, a LI of zero indicates perfect water condition for swimming pools. If LI>0, scaling and staining of the water is present, and if LI<0 the water is corrosive and highly irritating. A tolerance of ±0.4 is normally acceptable.

The Langelier formula is expressed as: **LI = pH + TF + HF + AF - 12.5**

Where:

LI = Langelier Index (also called Saturation Index)

pH = pH of the water

TF = temperature factor

HF = hardness factor, log (Ca hardness, ppm as $CaCO_3$)

AF = alkalinity factor, log (alkalinity, ppm as $CaCO_3$)

To calculate the exact Langelier Index of your water please use the **WATER INDEX** reference tables.

For most pools, water is balanced if:

- The pH value is maintained within the recommended ranges of pH 7.2 - 7.6
- Ideally, the Alkalinity should be maintained within a range of 80 - 125 ppm
- The Calcium Hardness should be maintained within a range of 200 - 400 ppm.

To calculate your water balance, three parameters must be measured; calcium hardness, alkalinity and pH. Find the hardness and alkalinity factor in the reference tables below.

The water temperature is, in general, maintained between 24°C (76°F) and 34°C (94°F). Assuming the temperature is kept within those ranges, an average value or 0.7 may be used.

Water balance = pH+TF+HF+AF

Water Balance	Condition	Recommendation
11.0-12.0	Corrosive	Increase pH and/or alkalinity
12.1-12.3	Acceptable Balance	Retest water frequently
12.4-12.6	Ideal Balance	Maintain
12.7-12.9	Acceptable Balance	Retest water frequently
13.0-14.0	Scale Forming	Reduce pH and/or alkalinity

Water Index Reference Table

Temperature			Calcium Hardness		Alkalinity	
°C	°F	TF	mg/L (as $CaCO_3$)	HF	mg/L (as $CaCO_3$)	AF
0	32	0	5	0.7	5	0.7
4	39	0.1	25	1.4	25	1.4
8	46	0.2	50	1.7	50	1.7
12	54	0.3	75	1.9	75	1.9
16	60	0.4	100	2.0	100	2.0
20	68	0.5	150	2.2	150	2.2
24	75	0.6	200	2.3	200	2.3
28	82	0.7	250	2.4	250	2.4
32	90	0.7	300	2.5	300	2.5
36	97	0.8	400	2.6	400	2.6
40	104	0.9	500	2.7	500	2.7
50	122	1.0	1000	3.0	1000	3.0

HI83326

Multiparameter Photometer

with Digital pH Electrode Input for Pool and Spa Applications

Application Designed Photometers

The HI83326 benchtop photometer measures 11 different key water quality parameters using 12 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

Made with the pool and spa industry in mind, a basic necessity of pool water treatment is to maintain the water in a safe and pleasant condition for the swimmers. In pool and spa water treatment, disinfection is essential to rid the pool of bacteria and control nuisance organisms like algae which may occur in the pool, spa, filtration equipment, or piping. There are a number of available disinfectant compounds including chlorine, bromine, and ozone. In order to achieve ideal water conditions, water requires testing on a daily and sometimes hourly basis to ensure there is enough residual disinfectant and to maintain pH levels. Equally important is calcium hardness and alkalinity; these levels should be monitored weekly to ensure the pool or spa water is well balanced to avoid corrosion and scale formation.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe

HI83326-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Alkalinity	0 to 500 mg/L (as $CaCO_3$)	1 mg/L	±5 mg/L ±5% of reading at 25 °C	@ 610 nm	Bromocresol green
Bromine	0.00 to 8.00 mg/L (as Br_2)	0.01 mg/L	±0.08 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Cyanuric Acid	0 to 80 mg/L (as CYA)	1 mg/L	±1 mg/L ±15% of reading at 25 °C	@ 525 nm	turbidimetric
Hardness, Calcium	0.00 to 2.70 mg/L (as $CaCO_3$)	0.01 mg/L	±0.11 mg/L ±5% of reading at 25 °C	@ 525 nm	calmagite
Iron High Range	0.00 to 5.00 mg/L (as Fe)	0.01 mg/L	±0.04 mg/L ±2% of reading at 25 °C	@ 525 nm	phenanthroline
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Ozone	0.00 to 2.00 mg/L (as O_3)	0.01 mg/L	±0.02 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid

Ordering Information	**HI83326-01** (115V) and **HI83326-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83326-11** CAL Check Cuvette Kit for HI83326

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI83308

Multiparameter Photometer

with Digital pH Electrode Input for Water Conditioning

Application Designed Photometers

The HI83308 benchtop photometer measures 15 different key water quality parameters using 23 different methods. This photometer features an innovative optical system that uses LEDs, narrow band interference filters, focusing lens and both a silicon photodetector for absorbance measurement and a reference detector to maintain a consistent light source ensures accurate and repeatable photometric readings every time.

The HI83308 was developed to measure the most common parameters in water quality monitoring. One important parameter to test water quality is iron since it can affect color, odor, and turbidity and can also be the most troublesome factor for appliances and surfaces in contact with water. High levels of iron in water can result in clogged water pipes or heat exchangers. Also, ammonia detection in water treatment systems is particularly important for aquarium owners and fish farm operators since ammonia is highly soluble in water and extremely toxic to fish. One other important parameter in water quality monitoring is fluoride. Fluoride is best known for preventing tooth decay. While it does help prevent tooth decay, too little fluoride can be ineffective while too much can cause staining of teeth.

- Advanced optical system
  - Innovative optical design that utilizes a reference detector and focusing lens to eliminate errors from changes in the light source and from imperfections in the glass cuvette.
- Backlit 128 x 64 Pixel Graphic LCD Display
  - Backlit graphic display allows for easy viewing in low light conditions
  - The 128 x 64 Pixel LCD allows for a simplified user interface with virtual keys and on-screen help to guide the user through use of the meter
- Built-in Reaction Timer for Photometric Measurements
  - The measurement is taken after the countdown timer expires.
  - Countdown timer ensures that all readings are taken at the appropriate reaction intervals regardless of user for better consistency in measurements
- Absorbance mode
  - Hanna's exclusive CAL Check™ cuvettes for validation of light source and detector
  - Allows for the user to plot concentration versus absorbance for a specific wavelength for use with user supplied chemistry or for teaching principles of photometry
- Units of Measure
  - Appropriate unit of measure along with chemical form is displayed along with reading
- Result Conversion
  - Automatically convert readings to other chemical forms with the touch of a button
- Cuvette Cover
  - Aids in preventing stray light from affecting measurements
- Data Logging
  - Up to 1000 photometric and pH readings can be stored by simply pressing the dedicated LOG button. Logged readings are just as easily recalled by pressing the RCL button
  - Sample ID and User ID information can be added to a logged reading using alphanumeric keypad
- Connectivity
  - Logged readings can be quickly and easily transferred to a flash drive using the USB-A host port or to a computer using the micro USB-B port
  - Data is exported as a .CSV file for use with common spreadsheet programs
- Rechargeable Battery
  - Li-polymer rechargeable battery lasts for 500 measurements or 50 hours of pH measurement
- Battery Status Indicator
  - Indicates the amount of battery life left
- Error Messages
  - Photometric error messages
  - pH calibration messages include clean electrode, check buffer and check probe

HI83308-11

- Digital pH Electrode Input
  - Measure pH and temperature with a single probe
  - Good Laboratory Practice (GLP) to track calibration information including date, time, buffers used, offset and slope for traceability
  - pH CAL Check™ alerts user to potential problems during the calibration process
  - Space saving having a pH meter and photometer built into one meter

Parameter	Range	Resolution	Accuracy	LED (λ nm) with Narrow Band Interference Filter	Method
Ammonia Low Range	0.00 to 3.00 mg/L (as NH_3-N)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 420 nm	Nessler
Ammonia Medium Range	0.00 to 10.00 mg/L (as NH_3-N)	0.01 mg/L	±0.05 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Ammonia High Range	0.0 to 100.0 mg/L (as NH_3-N)	0.1 mg/L	±0.5 mg/L ±5% of reading at 25 °C	@ 420 nm	Nessler
Chlorine, Free	0.00 to 5.00 mg/L (as Cl_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Chlorine, Total	0.00 to 5.00 mg/L (as Cl^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 525 nm	DPD
Copper Low Range	0.000 to 1.500 mg/L (as Cu^{2+})	0.001 mg/L	±0.01 mg/L ±5% of reading at 25 °C	@ 575 nm	bicinchoninate
Copper High Range	0.00 to 5.00 mg/L (as Cu^{2+})	0.01 mg/L	±0.02 mg/L ±4% of reading at 25 °C	@ 575 nm	bicinchoninate
Fluoride Low Range	0.00 to 2.00 mg/L (as F^-)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	SPADNS
Iron Low Range	0.000 to 1.600 mg/L (as Fe)	0.001 mg/L	±0.01 mg/L ±8% of reading at 25 °C	@ 575 nm	TPTZ
Iron High Range	0.00 to 5.00 mg/L (as Fe)	0.01 mg/L	±0.04 mg/L ±2% of reading at 25 °C	@ 525 nm	phenanthroline
Manganese Low Range	0 to 300 µg/L (as Mn)	1 µg/L	±10 µg/L ±3% of reading at 25 °C	@ 575 nm	PAN
Manganese High Range	0.0 to 20.0 mg/L (as Mn)	0.1 mg/L	±0.2 mg/L ±3% of reading at 25 °C	@ 525 nm	periodate
Molybdenum	0.0 to 40.0 mg/L (as Mo^{6+})	0.1 mg/L	±0.3 mg/L ±5% of reading at 25 °C	@ 420 nm	mercaptoacetic acid
Nickel Low Range	0.000 to 1.000 mg/L (as Ni)	0.001 mg/L	±0.010 mg/L ±7% of reading at 25 °C	@ 575 nm	PAN
Nickel High Range	0.00 to 7.00 g/L (as Ni)	0.01 g/L	±0.07g/L ±4% of reading at 25 °C	@ 575 nm	EDTA
Nitrate	0.0 to 30.0 mg/L (as NO_3^-- N)	0.1 mg/L	±0.5 mg/L ±10% of reading at 25 °C	@ 525 nm	cadmium reduction
Oxygen, Dissolved	0.0 to 10.0 mg/L (as O_2)	0.1 mg/L	±0.4 mg/L ±3% of reading at 25 °C	@ 420 nm	Winkler
pH	6.5 to 8.5 pH	0.1 pH	±0.1 pH at 25 °C	@ 525 nm	phenol red
Phosphate Low Range	0.00 to 2.50 mg/L (ppm)	0.01 mg/L	±0.04 mg/L ±4% of reading at 25 °C	@ 610 nm	ascorbic acid
Phosphate High Range	0.0 to 30.0 mg/L (as PO_4^{3-})	0.1 mg/L	±1 mg/L ±4% of reading at 25 °C	@ 525 nm	amino acid
Silica Low Range	0.00 to 2.00 mg/L (as SiO_2)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 610 nm	heteropoly blue
Silver	0.000 to 1.000 mg/L (as Ag)	0.001 mg/L	±0.020 mg/L ±5% of reading at 25 °C	@ 575 nm	PAN
Zinc	0.00 to 3.00 mg/L (as Zn)	0.01 mg/L	±0.03 mg/L ±3% of reading at 25 °C	@ 575 nm	zincon

Ordering Information	**HI83308-01** (115V) and **HI83308-02** (230V) is supplied with sample cuvettes and caps (4 ea.), cloth for wiping cuvettes, USB to micro USB cable connector, power adapter, instrument quality certificate, and instruction manual.
Standards	**HI83308-11** CAL Check Cuvette Kit for HI83308

See page 10.90 for standard reagents; see page 10.23 for general accessories

HI96000 Series

Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

"C" versions include CAL Check standards and a rigid carrying case

CAL Check Validation*

Two-step validation procedure for proper calibration.

Zero the meter prior to validation... Place the CAL Check Standard A into the cuvette holder and press ZERO/CFM button. The lamp, cuvette and detector icons will appear on the display followed by "-0.0-". The meter is now zeroed and ready for validation.

... and compare accuracy against a known standard. Place the CAL Check standard B into the cuvette holder and press CAL Check. The lamp, cuvette and detector icons together with "CAL Check" will appear on the display. At the end of the measurement the display will show the validation standard value.

CAL Check Calibration*

Calibrate your instrument quickly and easily.

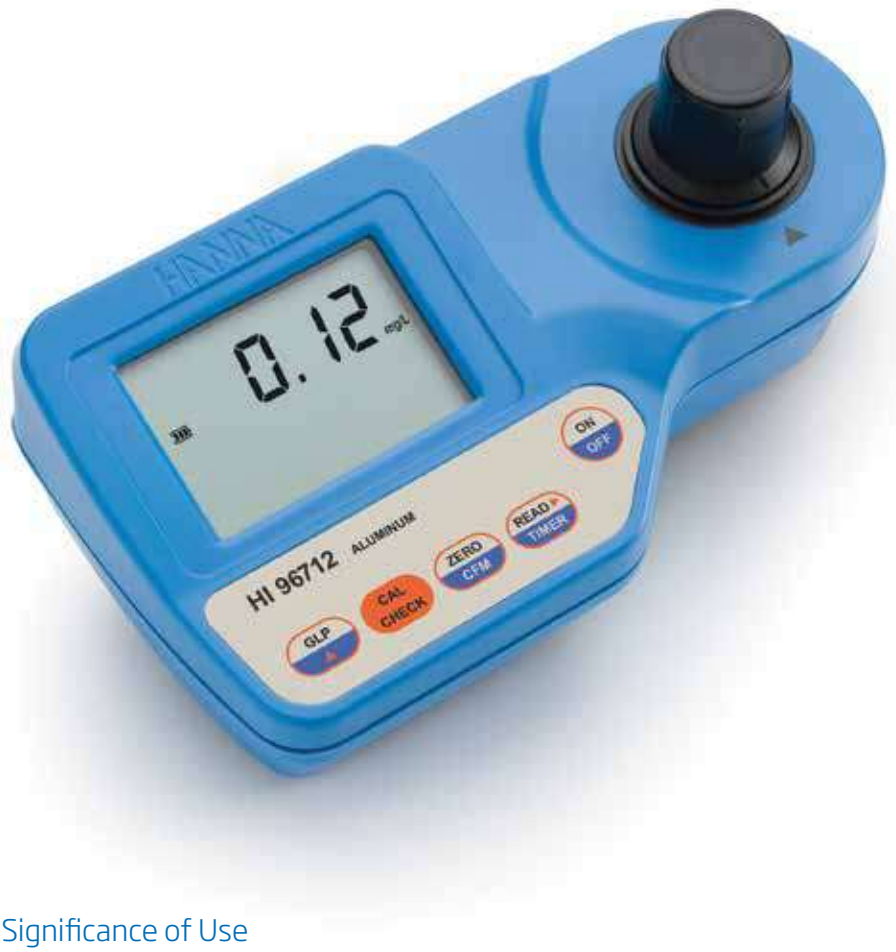
Zero the meter prior to calibration... Press and hold CAL Check for three seconds to enter calibration mode. Place the CAL Check Standard A into the cuvette holder and press ZERO/CFM. The lamp, cuvette and detector icons will appear on the display followed by "-0.0-". The meter is now zeroed and ready for calibration.

... and calibrate to a known standard. Place the CAL Check Standard B into the cuvette holder. Press READ/TIMER and the lamp, cuvette and detector icons will appear on the display. After measurement the instrument will show the CAL Check Standard value.

Solutions and Accessories

HI93703-50	Cuvette cleaning solution, 230 mL	**HI731335**	Cuvette caps (4)
HI731318	Cuvette cleaning cloth (4)	**HI740318**	Carrying case for HI96 series
HI731331	Measuring cuvettes (4)		

*Each CAL Check cuvette is clearly labeled with its respective measurement. Please read the full instruction manual before validation/calibration.



HI96712

Aluminum Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Due to its vast occurrence in minerals, rocks and clays, aluminum is present in nearly all natural water as a soluble salt, colloid, or an insoluble compound. These forms of aluminum may also appear in treated water and wastewater due to its use during coagulation processes. When concentrations are greater than 0.2 mg/L, water will be colored, but cause no significant human health effects.

Specifications	HI96712 Aluminum	
Range	0.00 to 1.00 mg/L (ppm)	
Resolution	0.01 mg/L (ppm)	
Accuracy @ 25°C (77°F)	±0.02 mg/L ±4% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the aluminon method	
Ordering Information	**HI96712** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96712C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96712-11**	CAL Check standard cuvettes
	HI93712-01	reagents for 100 tests
	HI93712-03	reagents for 300 tests

The HI96712 portable photometer is for the measurement of aluminum. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96700 · HI96715 · HI96733

Ammonia Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

These photometers are for the measurement of ammonia nitrogen in freshwater samples.

Significance of Use

Present naturally in surface and wastewaters, ammonia mainly results from the deamination of organic nitrogen-containing compounds and hydrolysis of urea. Ammonia may also be present from water treatment processes that utilize chloramines for disinfection, where ammonia is added to the water to react with chlorine. Ammonia is less likely to appear in groundwater due to adsorption to soil particles.

Specifications	HI96700 Ammonia LR	HI96715 Ammonia MR	HI96733 Ammonia HR
Range	0.00 to 3.00 mg/L (ppm) (as NH_3–N)	0.00 to 9.99 mg/L (ppm) (as NH_3–N)	0.0 to 50.0 mg/L (ppm) (as NH_4^+)
Resolution	0.01 mg/L	0.01 mg/L	0.01 mg/L
Accuracy @ 25°C (77°F)	±0.04 mg/L ±4% of reading	±0.05 mg/L ±5% of reading	±0.5 mg/L ±5% of reading
Light Source	tungsten lamp	light emitting diode	tungsten lamp
Light Detector	silicon photocell with narrow band interference filter @ 420 nm	silicon photocell with narrow band interference filter @ 466	silicon photocell with narrow band interference filter @ 420 nm
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the ASTM Manual of Water and Environmental Technology, D1426-93, Nessler method		
Ordering Information	**HI96700**, **HI96715** and **HI96733** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96700C**, **HI96715C** and **HI96733C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		

Reagents and Standards			
	HI96700	**HI96700-11**	CAL Check standard cuvettes
		HI93700-01	reagents for 100 tests (N-NH_3 LR)
		HI93700-03	reagents for 300 tests (N-NH_3 LR)
	HI96715	**HI96715-11**	CAL Check standard cuvettes
		HI93715-01	reagents for 100 tests (N-NH_3 MR)
		HI93715-03	reagents for 300 tests (N-NH_3 MR)
	HI96733	**HI96733-11**	CAL Check standard cuvettes
		HI93733-01	reagents for 100 tests (NH_4^+ HR)
		HI93733-03	reagents for 300 tests (NH_4^+ HR)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96769

Anionic Surfactants Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Present in waters and wastewaters, surfactants are discharged via aqueous waste from households, industrial laundering, and other cleansing operations. Generally present in detergents and other cleaning agents, a surfactant molecule consists of a strongly hydrophobic group and a strongly hydrophilic group, permitting solubility in both aqueous and nonaqueous media. When the hydrophilic group is negatively charged, it is deemed an anionic surfactant; when the hydrophilic group is positively charged, it is deemed a cationic surfactant.

Specifications	HI96769 Anionic Surfactants	
Range	0.00 to 3.50 mg/L (ppm) as SDBS	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.04 mg/L ±3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 610 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the USEPA method 425.1 and Standard Methods for the Examination of Water and Wastewater, 20th edition, 5540C, Anionic Surfactants as MBAS	
Ordering Information	**HI96769** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96769C** kit includes photometer, CAL Check standards, sample cuvettes (2) with caps, 25 mL glass vial with cap, plastic pipettes (3), 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96769-11**	CAL Check standard cuvettes
	HI95769-01	reagent for 40 anionic surfactants tests

The HI96769 portable photometer is for the measurement of anionic surfactants. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96716

Bromine Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96716 portable photometer is for the measurement of bromine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

In some areas around the world, bromine is replacing other more common sanitizers, such as chlorine. Due to its stability at higher temperatures and higher pH levels, bromine is most often used in sanitization of pools and spas, and cooling towers.

Specifications	HI96716 Bromine	
Range	0.00 to 10.00 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.08 mg/L ± 3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 20th edition, DPD method	
Ordering Information	**HI96716** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96716C** includes photometer, CAL Check standards, sample cuvettes (2) and caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96716-11**	CAL Check standard cuvettes
	HI93716-01	reagents for 100 tests
	HI93716-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96753

Chloride Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

As one of the major inorganic anions in water and wastewater, chloride is often measured in a variety of industries. Due to its corrosive nature, chloride levels are monitored in boiler systems and cooling towers to prevent metal parts from being damaged. Not known to be toxic to humans, chloride is monitored in drinking water for aesthetic purposes due to its negative affect on taste. However, chloride can be toxic to plant life. Chloride may be monitored in agricultural applications in certain areas of the world where salinity levels are known to be naturally high.

Specifications	HI96753 Chloride	
Range	0.0 to 20.0 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	±0.5 mg/L ±6% of reading	
Light Source	light emitting diode	
Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the mercury (II) thiocyanate method	
Ordering Information	**HI96753** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96753C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96753-11**	CAL Check standard cuvettes
	HI93753-01	reagents for 100 tests
	HI93753-03	reagents for 300 tests

The HI96753 portable photometer is for the measurement of chloride. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96738

Chlorine Dioxide Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96738 portable photometer is for the measurement of chlorine dioxide. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Used primarily as a disinfectant in drinking water and in various industrial processes, chlorine dioxide is a highly effective, environmentally friendly microbiocide. Chlorine dioxide is safe, potent, and does not produce trihalomethanes, the disinfection byproduct characteristic of chlorine use.

Specifications	HI96738 Chlorine Dioxide	
Range	0.00 to 2.00 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.10 mg/L ±5% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 575 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of chlorophenol red method	
Ordering Information	**HI96738** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96738C** includes HI96738 photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Accessories	**HI96738-11**	CAL Check standard cuvettes
	HI93738-01	reagents for 100 tests
	HI93738-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96701 • HI96762

Free Chlorine Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms, and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection byproducts.

Specifications	HI96701 Free Chlorine		HI96762 Free Chlorine ULR
Range	0.00 to 5.00 mg/L (ppm)		0.000 to 0.500 mg/L (ppm)
Resolution	0.01 mg/L from 0.00 to 3.50 mg/L; 0.10 mg/L above 3.50 mg/L		0.001 mg/L
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading		±0.020 mg/L ±3% of reading
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 525 nm		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the USEPA method 330.5 and Standard Method 4500-Cl G		adaptation of the Standard Method 4500-Cl G
Ordering Information	**HI96701** and **HI96762** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96701C** and **HI96762C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96701	**HI96701-11**	CAL Check Standard Cuvettes
		HI93701-01	reagents for 100 tests
		HI93701-03	reagents for 300 tests
	HI96762	**HI96762-11**	CAL Check Standard Cuvettes
		HI95762-01	reagents for 100 tests
		HI95762-03	reagents for 300 tests

The HI96701 portable photometer is for the measurement of free chlorine while the HI96762 measures free chlorine ultra low range in a wide variety of water samples. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits;
see page 10.42 for general accessories

HI96761

Chlorine, Total Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96761 portable photometer is for the measurement of total chlorine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms, and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection byproducts.

Specifications	HI96761 Chlorine, Total Low Range	
Range	0.000 to 0.500 mg/L (ppm)	
Resolution	0.001 mg/L	
Accuracy @ 25°C (77°F)	±0.020 mg/L ±3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the USEPA method 330.5	
Ordering Information	**HI96761** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96761C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96761-11**	CAL Check Standard cuvettes
	HI95761-01	reagents for 100 tests
	HI95761-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96723 · HI96749

Chromium VI HR and LR Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Hexavalent chromium salts are used in various industrial applications, such as in the manufacture of paints, dyes, explosives, and ceramics, and extensively in the metal finishing and plating industries. Due to its toxicity to humans, animals, and aquatic life, hexavalent chromium is actively monitored and neutralized in wastewater from the above industries.

Specifications	HI96723 Chromium VI HR	HI96749 Chromium VI LR
Range	0 to 1000 µg/L (ppb)	0 to 300 µg/L (ppb)
Resolution	1 µg/L	1 µg/L
Accuracy @ 25°C (77°F)	±5 µg/L ±4% of reading	±1 µg/L ±4% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the ASTM Manual of Water and Environmental Technology, D1687-92, diphenylcarbohyzide method.	
Ordering Information	**HI96723** and **HI96749** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96723-11**	CAL Check standard cuvettes
	HI96749-11	CAL Check standard cuvettes
	HI93723-01	reagents for 100 tests
	HI93723-03	reagents for 300 tests
	HI93749-01	reagents for 100 tests
	HI93749-03	reagents for 300 tests

The HI96723 and HI96749 portable photometers are for the measurement of chromium VI. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96727

Color of Water Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96727 portable photometer is for the measurement of color of water. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Used in natural water based applications, such as drinking water and municipal wastewater treatment, the color of water may dictate the presence of both unwanted inorganic and organic material; removal results in more suitable water for general and industrial applications. "Color" is applied in this context to represent "true color", where turbidity is removed. Where turbidity removal has been omitted, the term "apparent color" is then applied.

Specifications	HI96727 Color of Water	
Range	0 to 500 PCU (Platinum Cobalt Units)	
Resolution	10 PCU	
Accuracy @ 25°C (77°F)	±10 PCU ±5% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 420 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	Adaptation of the Standard Method for the Examination of Water and Wastewater 18th Edition, colorimetric platinum cobalt method	
Ordering Information	**HI96727** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96727C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96727-11**	CAL Check standard cuvettes
Accessories	**HI740227**	filter assembly
	HI740228	filter disc

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96747 · HI96702

Copper, Low and High Range Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Due to its malleability, thermal and electrical conductivity, and corrosion resistance, copper is used in a variety of industrial and technological applications. Copper may also be present in natural water and effluents due to widespread use to control biological growths in reservoirs and distribution pipes.

Specifications	HI96747 Copper, LR		HI96702 Copper, HR
Range	0.000 to 1.500 mg/L (ppm)		0.00 to 5.00 mg/L (ppm)
Resolution	0.001 mg/L		0.01 mg/L (ppm)
Accuracy @ 25°C (77°F)	±0.010 mg/L ±5% of reading		±0.02 mg/L ±4% of reading
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 560 nm		silicon photocell with narrow band interference filter @ 575 nm
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the USEPA approved bicinchoninate method		adaptation of the USEPA approved bicinchoninate method
Ordering Information	**HI96747** and **HI96702** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate, and instruction manual. CAL Check standards and testing reagents sold separately **HI96747C** and **HI96702C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96747	**HI96747-11**	CAL Check standard cuvettes
		HI95747-01	reagents for 100 tests
		HI95747-03	reagents for 300 tests
	HI96702	**HI96702-11**	CAL Check standard cuvettes
		HI93702-01	reagents for 100 tests
		HI93702-03	reagents for 300 tests

The HI96747 and HI96702 portable photometers are for the measurement of copper in a wide variety of water samples. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96714

Cyanide Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96714 portable photometer is for the measurement of cyanide. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

The term "cyanide" refers to all of the CN groups in cyanide compounds that can be determined as the cyanide ion, CN^-. Originating in water primarily from metallurgical and galvanic industrial plants, cyanide is highly toxic to the human nervous system.

Specifications	HI96714 Cyanide	
Range	0.000 to 0.200 mg/L (ppm)	
Resolution	0.001 mg/L	
Accuracy @ 25°C (77°F)	±0.005 mg/L ±3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 610 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Pyridine-Pyrazolone method	
Ordering Information	**HI96714** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96714-11**	CAL Check standard cuvettes
	HI93714-01	reagents for 100 tests
	HI93714-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96722

Cyanuric Acid Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Cyanuric acid (CYA) is best known as a stabilizing reagent for chlorine. It is widely applied in swimming pool and spa treatment programs to slow down the decomposition of hypochlorous acid. In outside pool areas, this process is accelerated by the effects of UV rays. When applied properly it can save up to 80% of normal chlorine consumption in pools during peak months.

Cyanuric acid is also used in chlorinated beaches, selective herbicides and whitening agents.

The HI96722 portable photometer is for the measurement of cyanuric. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Specifications	HI96722 Cyanuric Acid	
Range	0 to 80 mg/L (ppm)	
Resolution	1 mg/L (ppm)	
Accuracy @ 25°C (77°F)	±1 mg/L ±15% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the turbidimetric method	
Ordering Information	**HI96722** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96722-11**	CAL Check standard cuvettes
	HI93722-01	reagents for 100 tests
	HI93722-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96729 · HI96739

Fluoride Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96729 portable photometer is for the low range measurement of fluoride while the HI96739 measures fluoride in the high range. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Fluoride is best known for preventing tooth decay. Water authorities often add fluoride to drinking water to maintain approximately a 1.0 mg/L (ppm) concentration. Fluoride can be found naturally in groundwater, particularly if a reservoir is in close proximity to seawater. While fluoride does help prevent tooth decay, too little can be ineffective while too much can cause staining of teeth.

Specifications	HI96729 Fluoride LR	HI96739 Fluoride HR
Range	0.00 to 2.00 mg/L (ppm)	0.0 to 20.0 mg/L (ppm)
Resolution	0.01 mg/L	0.1 mg/L
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	±0.5 mg/L ±3% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 575 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the EPA method 340.1 and SPADNS method	adaptation of the SPADNS method
Ordering Information	**HI96729** and **HI96739** is supplied sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96729C** and **HI96739C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 2000 µL automatic pipette with instruction sheet, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	

Reagents and Standards			
	HI96729	**HI93703-53**	reagent for reducing chlorine concentration
		HI96729-11	CAL Check standard cuvettes
		HI93729-01	reagents for 100 tests
		HI93729-03	reagents for 300 tests
	HI96739	**HI96739-11**	CAL Check standard cuvettes
		HI93739-01	reagents for 100 tests
		HI93739-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96720 · HI96719

Hardness Standard Method Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Water, with exception to distilled water, contains dissolved salts (magnesium and calcium carbonates). The concentration of these salts determines the water hardness, which can be expressed in calcium carbonate or magnesium carbonate. The sum of these two represents the total hardness level. In addition, water hardness is also related to the phenomenon of pipe rusting in water heating and cooling systems, reverse osmosis, and demineralization plants.

Specifications	HI96720 Ca Hardness		HI96719 Mg Hardness
Range	0.00 to 2.70 mg/L (ppm)		0.00 to 2.00 mg/L (ppm)
Resolution	0.01 mg/L		
Accuracy @ 25°C (77°F)	±0.11 mg/L ±5% of reading		
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 525nm		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	194 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th ed. Calmagite method		adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th ed. EDTA colorimetric method.
Ordering Information	**HI96720** and **HI96719** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96720C** and **HI96719C** include photometer, CAL Check standards,sample cuvettes (2) with caps, 9V battery, 1 mL syringe with tip, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96720	**HI96720-11**	CAL Check standard cuvettes
		HI93720-01	reagents for 100 tests
		HI93720-03	reagents for 300 tests
	HI96719	**HI96719-11**	CAL Check standard cuvettes
		HI93719-01	reagents for 100 tests
		HI93719-03	reagents for 300 tests

The HI96720 portable photometer is for the measurement of calcium hardness while the HI96719 measures magnesium hardness. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Chec feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96735

Hardness, EPA Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Choice of units of measure
  - Appropriate unit of measure (mg/L, °F, °D, °E) is displayed along with reading.

The HI96735 portable photometer is for the measurement of total hardness. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Total hardness refers to the presence of magnesium and calcium. Hardness from magnesium and calcium is due mainly to runoff water dissolving these salts as it flows or filters through different layers of strata. Hardness can also cause scaling of pipes in cooling and heating systems.

Specifications	HI96735 Hardness, Total		
	Hardness LR (P1)	Hardness MR (P2)	Hardness HR (P3)
Range	0 to 250 mg/L (ppm)	200 to 500 mg/L (ppm)	400 to 750 mg/L (ppm)
Resolution	1 mg/L from 0 to 100 mg/L ; 5 mg/L from 100 to 750 mg/L		
Accuracy @ 25°C (77°F)	±5 mg/L ±4% of reading	±7 mg/L ±3% of reading	±10 mg/L ±2% of reading
Light Source	light emitting diode		
Light Detector	silicon photocell with narrow band interference filter @ 466		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the EPA recommended method 130.1		
Ordering Information	**HI96735** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96735C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	**HI96735-11**	CAL Check standard cuvettes	
	HI93735-00	reagents for 100 tests (0-250 mg/L)	
	HI93735-01	reagents for 100 tests (200-500 mg/L)	
	HI93735-02	reagents for 100 tests (400-750 mg/L)	
	HI93735-0	reagents for 100 tests (0-750 mg/L)	

*The reagents are in liquid and powder form and are supplied in bottles and in packets. The amount of reagent is precisely dosed to ensure maximum repeatability.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

Application Designed Photometers

HI96785

Honey Color Portable Analyzer

- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator

The HI96785 portable analyzer is for the determination of honey color. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path 10 mm path length.

Significance of Use

The primary characteristic for commercial honey classification is color. Color classes are expressed in millimeters (mm) Pfund as compared to an analytical grade glycerol standard reference.

The natural color of honey presents many tonalities: from straw yellow to amber, from dark amber to almost black with a hint of red. The color of untreated honey originates from the botanical varieties used by the bees; for this reason, its coloration allows one to commercially identify the original floral type.

The color of honey tends to darken with age or change according to the method of conservation or production used by beekeepers. These practices can include the use of old beehives, contact with metals, the temperature of conservation, and exposure to light.

The HI96785 uses direct measurement to determine honey coloration ranging from 0 to 150 mm Pfund. This photometer has a tungsten lamp with a narrow band interference filter to isolate the 420 nm and 525 nm wavelength. All samples are measured in a square cuvette having a 10 mm light path and are compared to a glycerol standard. The percent light transmittance readings are directly displayed as mm Pfund. With its advanced optical system, the highly precise meter eliminates subjectivity to provide readings that are accurate and repeatable.

The table upper left reports the USDA classification for honey samples and the related mm Pfund values.

USDA Color Standards Designations	Color Range Pfund Scales (mm)
Water White	8 or less
Extra White	Over 8 to and including 17
White	Over 17 to and including 34
Extra Light Amber	Over 34 to and including 50
Light Amber	Over 50 to and including 85
Amber	Over 85 to and including 114
Dark Amber	Over 114

Specifications	HI96785	
Range	0 to 150 mm Pfund	
Resolution	1 mm Pfund	
Accuracy @ 25°C (77°F)	±2 mm Pfund @ 80mm Pfund	
Light Source	tungsten lamps	
Light Detector	silicon photocells with narrow band interference filter @ 420 nm and 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	direct measure	
Ordering Information	**HI96785** is supplied with sample cuvettes (5), 9V battery, light shield cap, cuvette wiping cloth, rigid carrying case, instrument quality certificate and instruction manual.	
Accessories	**HI93703-57**	glycerol, (4) 30 mL
	HI93703-56	consists of 90 matched square cuvettes, 30 mL of glycerol and (2) 5 mL syringes (75 tests average)
	HI70662	cleaning solution for honey meter (30 mL)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96704

Hydrazine Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96704 portable photometer is for the measurement of hydrazine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Hydrazine is a liquid chemical substance normally used in high pressure heating plants because of its properties as an oxygen inhibitor, helping to avoid scaling and corrosion in the plant itself. Hydrazine reacts with dissolved oxygen to yield nitrogen and water; this is an advantage over the sulfite treatment because it does not produce any dissolved solids in the boiled water. Hydrazine is also used as an energy source in fuel elements, as a reducing agent for metal recovery, and as an intermediate in the production of insecticides, herbicides, pharmaceuticals, and many other chemical products.

Specifications	HI96704 Hydrazine	
Range	0 to 400 µg/L (ppb)	
Resolution	1 µg/L	
Accuracy @ 25°C (77°F)	±3% of full scale	
Light Source	light emitting diode	
Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the ASTM Manual of Water and Environmental Technology, method D1385-88 for natural and treated water	
Ordering Information	**HI96704** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96704C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96704-11**	CAL Check standard cuvettes
	HI93704-01	reagents for 100 tests
	HI93704-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96718

Iodine Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

The disinfectant properties of iodine have led to its use as an alternative to chlorine and bromine. Unlike chlorinated pools, water treated with iodine decreases eye irritation among swimmers and provides a level of disinfection more stable to adverse conditions. However, its toxic and corrosive properties, along with the difficulties of dissolving it in water, have limited its widespread acceptance. One of the most common applications of iodine is in poultry industry process water.

Specifications	HI96718 Iodine	
Range	0.0 to 12.5 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	±0.1 mg/L ±5% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method	
Ordering Information	**HI96718** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96718C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96718-11**	CAL Check standard cuvettes
	HI93718-01	reagents for 100 tests
	HI93718-03	reagents for 300 tests

The HI96718 portable photometer is for the measurement of iodine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96746 · HI96721

Iron Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96746 and HI96721 portable photometers are for the measurement of iron in freshwater samples. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Iron is naturally present in water in low concentrations, but it reaches high concentrations in wastewater effluents. The iron concentration in water needs to be monitored because it becomes harmful above certain levels. In domestic water, for instance, iron can unpleasantly alter the taste, stain laundry, damage kitchenware and favor the growth of certain bacteria. Iron is also an indicator of ongoing corrosion in water cooling and heating systems. Moreover, iron is normally monitored in mining wastewater to avoid contamination.

Specifications	HI96746 Iron LR	HI96721 Iron HR
Range	0.00 to 1.60 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)
Resolution	0.01 mg/L	0.01 mg/L
Accuracy @ 25°C (77°F)	±0.01 mg/L ±8% of reading	±0.04 mg/L ±2% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the TPTZ method	Adaptation of Standard Method 3500-Fe B, Phenanthroline Method
Ordering Information	**HI96746** and **HI96721** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instructions. CAL Check standards and testing reagents sold separately **HI96746C** and **HI96721C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	HI96746	**HI96746-11** CAL Check standard cuvettes **HI93746-01** reagents for 50 tests **HI93746-03** reagents for 150 tests
	HI96721	**HI96721-11** CAL Check standard cuvettes **HI93721-01** powder reagents for 100 tests **HI93721-03** powder reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96748 · HI96709

Manganese Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Manganese is one of the most common metals present in nature and is used in many industrial applications, for example, the production of fertilizers and in the pharmaceutical industry. Manganese salts are also used in iron alloys (steel manufacturing) and non-iron alloys as it improves their corrosion resistance and hardness.

Specifications	HI96748 Manganese, LR	HI96709 Manganese, HR
Range	0 to 300 µg/L (ppb)	0.0 to 20.0 mg/L (ppm)
Resolution	1 µg/L	0.1 mg/L
Accuracy @ 25°C (77°F)	±10 µg/L ±3% of reading	±0.2 mg/L ±3% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the 1-(2-pyridylazo)-2-naphtol PAN method	adaptation of Standard Methods for the Examination of Water and Wastewater, 18th edition, Periodate method
Ordering Information	**HI96748** and **HI96709** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96748C** and **HI96709C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	

Reagents and Standards			
	HI96748	**HI96748-11**	CAL Check standard cuvettes
		HI93748-01	reagents for 50 tests
		HI93748-03	reagents for 150 tests
	HI96709	**HI96709-11**	CAL Check standard cuvettes
		HI93709-01	reagents for 100 tests
		HI93709-03	reagents for 300 tests

The HI96748 portable photometer is for the low range measurement of manganese while HI96709 measures manganese in the high range. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96759

Maple Syrup Portable Photometer

Application Designed Photometers

- Calibrates 100% transmittance with glycerol reference standard
- Uses 560 nm wavelength
- Disposable 10 mm square cuvettes
- Ideal for new Vermont (IMSI) standards
- Conforms to USDA specifications
- GLP
  - Review of the last calibration date

The HI96759 is a handheld maple syrup transmittance analyzer that has a tungsten lamp with a narrow band interference filter to isolate the 560 nm wavelength. This photometer uses 10 mm disposable sample cuvettes and is calibrated to 100% transmittance with a glycerol standard. All samples are compared to the glycerol standard and readings are displayed as % transmittance. With its advanced optical system, the highly precise meter eliminates subjectivity to provide readings that are accurate and repeatable.

Maple Syrup Quality

When choosing a maple syrup, it is important to consider its clarity along with color and taste. A light, clear syrup has a high level of quality and is indicative of a very pure product; a dark, cloudy syrup is less desirable, owing to the presence of impurities and suspended solids. In Canada and the United States, maple syrup is classified into different standards based on color and clarity. Lighter, clearer syrups are produced earlier in the season while darker syrups are produced later in the season. The lightest grade is characterized by its very pale color and has a light transmittance equal to or greater than 75%. The darkest grade has a light transmittance of less than 25%. The grade of maple syrup can be determined by using color comparators or by an instrument that measures how much light is transmitted through the syrup at a particular wavelength.

Range (% Transmittance)	State of Vermont Grades and Standards (New IMSI (International Maple Syrup Institute) standards)
75.0 to 100.0	grade A golden color/delicate taste
50 to 74.9	grade A amber color/rich taste
25 to 49.9	grade A dark color/robust taste
less than 25	grade A very dark color/strong taste

Specifications	HI96759	
Range	0.0 to 100.0% transmittance	
Resolution	0.1% transmittance	
Accuracy @ 25°C (77°F)	±3% @ 75.0% transmittance	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter 560 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	direct measure	
Ordering Information	**HI96759** are supplied with square sample cuvettes (6), light shield cap, 5 mL syringes (2), 30 mL bottle of glycerol, cuvette wiping cloth, 9V battery, instrument quality certificate, instruction manual and rigid carrying case.	
Solutions and Accessories	**HI93703-57**	glycerol, (4) 30 mL
	HI93703-50	cuvette cleaning solution, 230 mL
	HI93703-56	consists of 82 matched square cuvettes, glycerol standard(30 mL) and 5 mL syringes (2) (75 tests average)

HI96730

Molybdenum Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Molybdenum is commonly used in creating many types of high strength and steel alloys. It has the ability to withstand extremely high temperatures without significant expansion or softening and displays a high resistance to corrosion. Wastewater from industries that use molybdenum must be treated to remove high amounts before discharge into the public collection system.

Specifications	HI96730 Molybdenum	
Range	0.0 to 40.0 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	±0.3 mg/L ±5% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 420 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the mercaptoacetic acid method	
Ordering Information	**HI96730** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96730-11**	CAL Check standard cuvettes
	HI93730-01	reagents for 100 tests
	HI93730-03	reagents for 300 tests

The HI96730 portable photometer is for the measurement of molybdenum. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96740 · HI96726

Nickel Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96740 portable photometer is for low range measurement of nickel while the HI96726 is for high range. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Nickel is commonly utilized by the electroplating industry in processes utilizing stainless steel, cobalt, or nickel alloys. By using nickel in certain alloys, manufacturers can achieve a product that is highly resistant to chemical stress and exhibits a longer lifespan. Nickel is also an essential trace element that is essential for biological processes in livestock health and production. Nickel is also used in batteries, fuel cells, and hydrogenation of vegetable oils in the food industry.

Specifications	HI96740 Nickel LR		HI96726 Nickel HR
Range	0.000 to 1.000 mg/L (ppm)		0.00 to 7.00 g/L
Resolution	0.001 mg/L		0.01 g/L
Accuracy @ 25°C (77°F)	±0.010 mg/L ±7% of reading		±0.07 mg/L ±4% of reading
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 575 nm		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 102 x 67 mm (7.6 x 4.4 x 2.6")		
Weight	320g (11.3 oz.)		
Method	adaptation of the 1-(2-pyridylazo)-2-naphtol PAN method		adaptation of the photometric method
Ordering Information	**HI96726** and **HI96740** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96726C** and **HI96740C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96740	**HI96740-11**	CAL Check tandard cuvettes
		HI93740-01	reagents for 50 tests
		HI93740-03	reagents for 150 tests
	HI96726	**HI96726-11**	CAL Check standard cuvettes
		HI93726-01	reagents for 100 tests
		HI93726-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96728 · HI96786

Nitrate Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Nitrogen is abundant in the Earth's atmosphere and is present in water in the form of nitrate, nitrite, and ammonia. Plants use nitrogen as a nutrient to build proteins by tracking it in through their root system. Nitrate is formed in water mainly through rainfall, decomposition of organic matter, and runoff from manmade pollutants such as sewage waste and fertilizers. Almost all surface waters have a measurable level of nitrate, and a moderate amount is considered beneficial. Large amounts of nitrate, however, can lead to eutrophication which may result in decreased levels of dissolved oxygen in the water.

Specifications	HI96728 Nitrate-Nitrogen		HI96786 Nitrate
Range	0.0 to 30.0 mg/L (ppm)		0 to 100 mg/L (ppm)
Resolution	0.1 mg/L		1 mg/L
Accuracy @ 25°C (77°F)	±0.5 mg/L ±10% of reading		±5 mg/L ±5% of reading
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 525 nm		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of cadmium reduction method causes amber tint in sample		
Ordering Information	**HI96728** and **HI96786** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96728C** and **HI76786C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96728	**HI96728-11**	CAL Check standard cuvettes
		HI93728-01	reagents for 100 tests
		HI93728-03	reagents for 300 tests
	HI96786	**HI96786-11**	CAL Check standard cuvettes
		HI93728-01	reagents for 100 tests
		HI93728-03	reagents for 300 tests

The HI96728 and HI96786 portable photometers are for the measurement of nitrate. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits;
see page 10.42 for general accessories

HI96707 · HI96708

Nitrite Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
- Battery status indicator
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low
- Cooling lamp indicator
- Units of measure
  - Appropriate unit of measure is displayed along with reading

The HI96707 and HI96708 portable photometers are for the measurement of nitrite in a wide variety of water samples. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Nitrites can be harmful to aquatic organisms even in low concentrations and for this reason, they are closely monitored in aquaculture facilities. In cooling towers, however, an adequate amount of nitrites is necessary to prevent corrosion. In high concentrations, they can be harmful to the environment and to humans. They are, therefore, normally monitored to verify the quality of water for domestic use, as well as lakes and ponds.

Nitrites are an intermediate product in the nitrogen cycle and are produced by ammonia oxidation with water, or even originate in industrial waste directly. They must not be present in drinking water.

Specifications	HI96707 Nitrite, LR	HI96708 Nitrite, HR
Range	0.000 to 0.600 mg/L (ppm)	0 to 150 mg/L (ppm)
Resolution	0.001 mg/L	1 mg/L
Accuracy @ 25°C (77°F)	±0.020 mg/L ±4% of reading	±4 mg/L ±4% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	silicon photocell with narrow band interference filter @ 575 nm
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of an EPA approved diazotization method	adaptation of the Ferrous Sulfate method
Ordering Information	**HI96707** and **HI96708** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96707C** and **HI96708C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, Nist traceable, instruction manual and rigid carrying case. Reagents sold separately	

Reagents and Standards			
	HI96707	**HI96707-11**	CAL Check standard cuvettes
		HI93707-01	powder reagents for 100 tests
		HI93707-03	powder reagents for 300 tests
	HI96708	**HI96708-11**	CAL Check standard cuvettes
		HI93708-01	reagents for 100 tests
		HI93708-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96732

Dissolved Oxygen Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Dissolved oxygen analysis measures the amount of gaseous oxygen (O₂) dissolved in an aqueous solution. Dissolved oxygen is one of the most important parameters in aquatic systems. This gas is required for metabolism by aerobic organisms and also influences inorganic chemical reactions. Therefore, knowledge of the solubility and dynamics of oxygen distribution is essential to interpreting both biological and chemical processes within water bodies. Oxygen gets into water by diffusion from the surrounding air by aeration (rapid movement) and as a product of photosynthesis. The amount of oxygen (or any gas) that can dissolve in pure water (saturation point) is inversely proportional to the temperature of the water; the warmer the water, the less dissolved oxygen is present.

Specifications	HI96732 Oxygen, Dissolved	
Range	0.0 to 10.0 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	±0.4 mg/L ±3% of reading	
Light Source	light emitting diode	
Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	Adaptation of Standard Methods for Examination of Water and Wastewater (18th edition) Azide modified Winkler method reaction causes a yellow tint in sample	
Ordering Information	**HI96732** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96732-11**	CAL Check standard cuvettes
	HI93732-01	reagents for 100 tests
	HI93732-03	reagents for 300 tests

The HI96732 portable photometer is for the measurement of dissolved oxygen. Hanna's portable photometers feature an advanced optical system; the combination of a light emitting diode, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96713 · HI96717

Phosphate Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
- Battery status indicator
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low
- Cooling lamp indicator

The HI96713 portable photometer is for the low range measurement of phosphate while the HI96717 measures high range. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Phosphates are present in a number of products that are used by humans everyday. Some examples of the effects of phosphates are enhancing the flavor and tartness of cola drinks, as a buffering agent in controlling pH in antifreeze and delaying darkening of cut potatoes used in making french fries. Phosphates are also extensively used in detergents and cleaning fluids because of their ability to soften water and remove soil deposits.

Phosphates are particularly important for the growth and development of plant roots, and hence are one of the most common fertilizers used in agriculture. However, high concentrations of phosphates in agricultural runoff can cause environmental pollution, as they are a primary cause of eutrophication. Local laws govern the use of phosphates and the discharge levels into streams.

Specifications	HI96713 Phosphate LR	HI96717 Phosphate HR
Range	0.00 to 2.50 mg/L (ppm)	0.0 to 30.0 mg/L (ppm)
Resolution	0.01 mg/L	0.1 mg/L
Accuracy @ 25°C (77°F)	±0.04 mg/L ±4% of reading	±1.0 mg/L ±4% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 610 nm	silicon photocell with narrow band interference filter @ 525 nm
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the ascorbic acid method	Amino Acid Method, adapted from Standard Method for the Examination of Water and Wastewater
Ordering Information	**HI96713** and **HI96717** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96713C** and **HI96717C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	

Reagents and Standards			
	HI96713	**HI96713-11**	CAL Check standard cuvettes
		HI93713-01	reagents for 100 tests
		HI93713-03	reagents for 300 tests
	HI96717	**HI96717-11**	CAL Check standard cuvettes
		HI93717-01	reagents for 100 tests
		HI93717-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96706

Phosphorus Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Common in natural systems, such as lakes, oceans, and soil, phosphorus is an essential element for plant and animal growth. However, when present in large concentrations, phosphorus can cause excessive microorganism and algae growth. For hobbyists with saltwater aquaria, a high amount of phosphorus can problematic to fish and coral. The main source of phosphorus in reef aquaria is through food that is introduced on a daily basis, but it is also produced through the breakdown of plant material and excretion from fish. Replacement water can also be a source of phosphorus in aquaria, where tap water or reverse osmosis water is used to replace evaporated water and control the salt concentration in tanks. Both forms of water contain phosphorus, albeit in varying concentrations, and will have negative effects if the accumulating levels are not controlled. Phosphorus is also responsible for corrosion for corrosion of piping systems if present in high enough amounts.

Specifications	HI96706 Phosphorus	
Range	0.0 to 15.0 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	± 0.3 mg/L ±4% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	Amino Acid Method, adapted from Standard Method for the Examination of Water and Wastewater	
Ordering Information	**HI96706** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual CAL Check standards and testing reagents sold separately **HI96706C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96706-11**	CAL Check standard cuvettes
	HI93706-01	reagents for 100 tests
	HI93706-03	reagents for 300 tests

The HI96706 portable photometer is for the measurement of phosphorus. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96750

Potassium Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96750 portable photometer is for the measurement of potassium. Hanna's portable photometers feature an advanced optical system; the combination of a light emitting diode, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Potassium is a chemical element commonly found in nature. It is present in soil and drinking water and is also an essential element for the growth of plants and animals. Potassium concentration is important in determining the quality of soil in many greenhouse, agriculture, and horticulture applications. Potassium salts are also a common component of fertilizers.

Specifications	HI96750 Potassium	
	Potassium LR (P1)	Potassium MR (P2)
Range	0.0 to 10.0 mg/L (ppm)	10 to 100 mg/L (ppm)
Resolution	0.1 mg/L	1 mg/L
Accuracy @ 25°C (77°F)	±1.5 mg/L ±7% of reading	±15 mg/L ±7% of reading
Light Source	light emitting diode	
Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	Tetraphenylborate method causes turbidity in the sample	
Ordering Information	**HI96750** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96750C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, 1000 mL automatic pipette, tips, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96750-11**	CAL Check standard cuvettes
	HI93750-01	reagents for 100 tests
	HI93750-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96705 · HI96770

Silica Portable Photometers

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- GLP
  - Review of the last calibration date
- Auto-shut off
- Battery status indicator
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low
- Cooling lamp indicator
- Units of measure
  - Appropriate unit of measure is displayed along with reading

Specifications	HI96705 Silica		HI96770 Silica HR
Range	0.00 to 2.00 mg/L (ppm)		0 to 200 mg/L (ppm)
Resolution	0.01 mg/L		1 mg/L
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading		±1 mg/L ±5% of reading
Light Source	tungsten lamp		light emitting diode
Light Detector	silicon photocell with narrow band interference filter @ 610 nm		silicon photocell with narrow band interference filter @ 466 nm
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the ASTM D859, heteropoly blue method		adaptation of the USEPA method 370.1 for drinking, surface and saline waters, domestic and industrial wastes and Standard Method 4500-SiO_2 C
Ordering Information	**HI96705** and **HI96770** are supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instructions. CAL Check standards and testing reagents sold separately **HI96705C** and **HI96770C** include photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96705	**HI96705-11**	CAL Check standard cuvettes
		HI93705-01	reagents for 100 tests
		HI93705-03	reagents for 300 tests
	HI96770	**HI96770-11**	CAL Check standard cuvettes
		HI96770-01	reagents for 100 tests
		HI96770-03	reagents for 300 tests

The HI96705 and HI96770 portable photometers are for the measurement of silica. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Silica is found in all natural waters in the dissolved mineral form. Silica is only slightly soluble in water and can be found as ionic silica, silicates, or colloidal or suspended particles. The solubility of silica is highly dependent on pH, temperature and pressure. Silica's presence in industrial applications, particularly high pressure turbines, is undesirable because of the scaling caused by the elevated temperature and pressure. Heating systems and reverse osmosis plants also require monitoring of silica to ensure process efficiency.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits;
see page 10.42 for general accessories

HI96737

Silver Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96737 portable photometer is for the measurement of silver. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Small quantities of silver are bacteriostatic. At times, silver is used in disinfection of pools and spas, as well as in water filters. The presence of silver in water is generally indicative of pollution, mainly from film manufacturers, film processors, and surface finishers. In fact, silver levels are closely monitored in these sectors since its presence can cause discoloration of the skin, eyes, and mucous membranes.

Specifications	HI96737 Silver	
Range	0.000 to 1.000 mg/L (ppm)	
Resolution	0.001 mg/L	
Accuracy @ 25°C (77°F)	±0.005 mg/L ±10% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 575 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the PAN method	
Ordering Information	**HI96737** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96737-11**	CAL Check standard cuvettes
	HI93737-01	reagents for 50 tests
	HI93737-03	reagents for 150 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96751

Sulfate Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

Significance of Use

Sulfate is widely present within natural waters in different concentrations. Sulfate concentration is to be kept within a strict range for drinking water, especially since this value can be high near mine drainage points. Sulfate is also rigorously tested in the production of beverages such as beer, due to its significant effect upon odor and taste.

Specifications	HI96751 Sulfate	
Range	0 to 150 mg/L (ppm)	
Resolution	1 mg/L	
Accuracy @ 25°C (77°F)	±1 mg/L ±5% of reading	
Light Source	light emitting diode	
Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the turbidimetric method; sulfate is precipitated with barium chloride crystals and light absorbance of the suspension is measured	
Ordering Information	**HI96751** is supplied with sample cuvettes with caps (2), 9V battery, instrument quality certificate and instructions. CAL Check standards and testing reagents sold separately **HI96751C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI96751-11**	CAL Check standard cuvettes
	HI93751-01	reagents for 100 tests
	HI93751-03	reagents for 300 tests

The HI96751 portable photometer is for the measurement of sulfate. Hanna's portable photometers feature an advanced optical system; the combination of a light emitting diode, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96731

Zinc Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards.
- GLP
  - Review of the last calibration date.
- Auto-shut off
  - Automatic shut off after 10 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Cooling lamp indicator
  - To maintain the desirable wavelength to be used for absorbance, it is necessary to ensure components are not overheated from the heat generated by the tungsten lamp. Each photometer is designed to allow a minimal amount of time for components to cool. The cooling lamp indicator is displayed prior to a reading being taken.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI96731 portable photometer is for the measurement of zinc. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Zinc is normally introduced into drinking water through industrial effluents, especially due to dezincification of brass and deterioration of galvanized iron. In addition to drinking water, zinc is measured in surface finishing, boilers and cooling towers, water conditioning, and effluent waters

Specifications	HI96731 Zinc	
Range	0.00 to 3.00 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 575 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 20th edition, Zincon method causes a brownish-green tint in the sample	
Ordering Information	**HI96731** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. **HI96731C** includes HI96731 photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, instruction manual and rigid carrying case. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI96731-11**	CAL Check standard cuvettes
	HI93731-01	reagents for 100 tests
	HI93731-03	reagents for 300 tests

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96101

Bromine, Chlorine, Cyanuric Acid, Iron Iodine and pH Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

Bromine, Free and Total Chlorine, Cyanuric Acid, Iron, Iodine and pH content in water and wastewater samples. The reagents are in powder and liquid form depending on the parameter, and are supplied in dropper bottles and packets.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Specifications

HI96101 Bromine, Chlorine, Cyanuric Acid, Iodine, Iron LR and pH

Parameter Specifications		**pH (P1)**	**Chlorine [Free (P2) & Total (P3)]**
	Range	6.5 to 8.5 pH	0.00 to 5.00 mg/L (ppm)
	Resolution	0.1 pH	0.01 mg/L under 3.50 mg/L; 0.10 mg/L over 3.50 mg/L
	Accuracy @ 25°C (77°F)	±0.1 pH	±0.03 mg/L ±3% of reading
		Cyanuric Acid (P4)	**Iodine (P5)**
	Range	0 to 80 mg/L (ppm)	0.0 to 12.5 mg/L (ppm)
	Resolution	1 mg/L	0.1 mg/L
	Accuracy @ 25°C (77°F)	±1 mg/L ±15% of reading	±0.1 mg/L ±5% of reading
		Bromine (P6)	**Iron LR (P7)**
	Range	0.00 to 10.00 mg/L (ppm)	0.00 to 1.60 mg/L (ppm)
	Resolution	0.01 mg/L	0.01 mg/L
	Accuracy @ 25°C (77°F)	±0.08 mg/L ±3% of reading	±0.01 mg/L ±8% or reading
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Bromine:** adaptation of the EPA, DPD method; **Chlorine:** adaptation of the USEPA method and Standard Method 4500-Cl G; **Cyanuric Acid:** adaptation of the turbidimetric method; **Iodine:** adaptation of the EPA, DPD method; **Iron LR:** adaptation of the TPTZ method; **pH:** Phenol Red method	
Ordering Information	**HI96101** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96101C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, scissors, cuvette wiping cloth, 9V battery, instruction manual and rigid carrying case. Reagents sold separately		

Reagents and Standards

HI96701-11	CAL Check standard cuvettes (free Cl)
HI93701-01	reagents for 100 tests (free Cl)
HI96710-11	CAL Check standard cuvettes (pH)
HI93710-01	reagents for 100 tests (pH)
HI96711-11	CAL Check standard cuvettes (total Cl)
HI93711-01	reagents for 100 tests (total Cl)
HI96716-11	CAL Check standard cuvettes (bromine)
HI93716-01	reagents for 100 tests (bromine)
HI96718-11	CAL Check standard cuvettes (iodine)
HI93718-01	reagents for 100 tests (iodine)
HI96722-11	CAL Check standard cuvettes (cyanuric acid)
HI93722-01	reagents for 100 tests (cyanuric acid)
HI96746-11	CAL Check standard cuvettes (iron)
HI93746-01	reagents for 50 tests (iron)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96104

pH, Free and Total Chlorine and Cyanuric Acid Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

Specifically designed for swimming pool and spa applications, the HI96104 measures pH, free and total chlorine and cyanuric acid content.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Chlorine is the most commonly used water disinfectant used by homeowners, hotels, and commercial businesses. In swimming pools, spas, and similar applications, cyanuric acid helps to stabilize chlorine and prevent its breakdown, especially in sunlight. Frequent testing of both cyanuric acid and pH helps to minimize chlorine consumption.

Reagents and Standards

HI96701-11	CAL Check standard cuvettes (free Cl)
HI93701-01	reagents for 100 tests (free Cl)
HI93701-03	reagents for 300 tests (free Cl)
HI96710-11	CAL Check standard cuvettes (pH)
HI93710-01	reagents for 100 tests (pH)
HI93710-03	reagents for 300 tests (pH)
HI96711-11	CAL Check standard cuvettes (total Cl)
HI93711-01	reagents for 100 tests (total Cl)
HI93711-03	reagents for 300 tests (total Cl)
HI96722-11	CAL Check standard cuvettes (cyanuric acid)
HI93722-01	reagents for 100 tests (cyanuric acid)
HI93722-03	reagents for 300 tests (cyanuric acid)

Specifications

HI96104 pH, Chlorine and Cyanuric Acid

Parameter Specifications		**pH (P1)**	**Cl, Free (P2)**
	Range	6.5 to 8.5 pH	0.00 to 5.00 mg/L (ppm)
	Resolution	0.1 pH	0.01 mg/L under 3.50 mg/L; 0.10 mg/L above 3.50 mg/L
	Accuracy @ 25°C (77°F)	±0.1 pH	±0.03 mg/L (ppm) ±3% of reading
		Chlorine, Total (P3)	**Cyanuric Acid (P4)**
	Range	0.00 to 5.00mg/L (ppm)	0 to 80 mg/L (ppm)
	Resolution	0.01 mg/L under 3.50 mg/L; 0.10 mg/L above 3.50 mg/L	1 mg/L
	Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	±1 mg/L ±15% of reading
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**pH:** phenol red method; **Cl:** adaptation of the EPA recommended DPD method 330.5; **Cyanuric Acid:** adaptation of the Turbidimetric method	

Ordering Information

HI96104 is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual.

CAL Check standards and testing reagents sold separately

HI96104C includes photometer, CAL Check standards, sample cuvettes (2) with caps, scissors, cuvette wiping cloth, 9V battery, instruction manual and rigid carrying case.

Reagents sold separately

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

Since Legionella is especially harmful to people with weakened immune systems, it should be actively checked for in the water systems of hospitals and nursing homes.

HI96725

Chlorine, Cyanuric Acid and pH Portable Photometer

for Legionella Protection

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96725 measures 4 parameters that are crucial in monitoring for preventive maintenance or disinfection.

Significance of Use

Legionella species is the agent that causes human Legionnaires' disease as well as the lesser form, Pontiac Fever. Transmission is facilitated by the inhalation of mist droplets containing the Legionella bacteria.

Common sources of Legionella include cooling towers used in industrial cooling water systems as well as in large central air conditioning systems, domestic hot water systems, fountains, and similar disseminators that draw from a public water supply. Natural sources include freshwater ponds and creeks.

Specifications

		HI96725 Chlorine, Cyanuric Acid and pH	
Parameter Specifications		**Chlorine, Free (P1)**	**Chlorine, Total (P2)**
	Range	0.00 to 5.00 mg/L (ppm)	0.00 to 5.00 mg/L (ppm)
	Resolution	0.01 mg/L under 3.50 mg/L; 0.10 mg/L above 3.50 mg/L	0.01 mg/L under 3.50 mg/L; 0.10 mg/L above 3.50 mg/L
	Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	±0.03 mg/L ±3% of reading
		Cyanuric Acid (P3)	**pH (P4)**
	Range	0 to 80 mg/L (ppm)	6.5 to 8.5 pH
	Resolution	1 mg/L	0.1 pH
	Accuracy @ 25°C (77°F)	±1 mg/L ±15% of reading	±0.1 pH
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Chlorine:** adaptation of the EPA recommended DPD method 330.5 and standard method 4500-CL G; **Cyanuric Acid:** adaptation of the Turbidimetric method; **pH:** Phenol Red method	
Ordering Information		**HI96725** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96725C i**ncludes photometer, CAL Check standards, sample cuvettes (2) with caps, scissors, cuvette cleaning cloth, 9V battery, instruction manual and rigid carrying case. Reagents sold separately	

Reagents and Standards

HI96701-11	CAL Check standard cuvettes (free Cl)
HI93701-01	reagents for 100 tests (free Cl)
HI93701-03	reagents for 300 tests (free Cl)
HI96710-11	CAL Check standard cuvettes (pH)
HI93710-01	reagents for 100 tests (pH)
HI93710-03	reagents for 300 tests (pH)
HI96711-11	CAL Check standard cuvettes (total Cl)
HI93711-01	reagents for 100 tests (total Cl)
HI93711-03	reagents for 300 tests (total Cl)
HI96722-11	CAL Check standard cuvettes (cyanuric acid)
HI93722-01	reagents for 100 tests (cyanuric acid)
HI93722-03	reagents for 300 tests (cyanuric acid)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96710

Free and Total Chlorine and pH Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96710 portable photometer is for the measurement of pH, free chlorine, and total chlorine.

Significance of Use

Three critical parameters that can be tested to ensure good water quality are pH, free chlorine, and total chlorine. Chlorine is one of the most commonly used disinfectants for drinking water, wastewater, and water used for pools and spas. It can be added to in various forms including calcium hypochlorite, sodium hypochlorite, or in some instances, chlorine gas. When added to water, chlorine creates hypochlorous acid (HOCl) which dissociates into hypochlorite ion (OCl^-).

$HOCl \leftrightarrow H^+ + OCl^-$

hypochlorous acid ↔ hydrogen ion + hypochlorite ion

HOCl is the form of chlorine that acts as a stronger disinfectant as compared to OCl^-. To ensure the added chlorine is effective at sanitizing, the pH of the water must be taken into account. Around pH 7.5, HOCl and OCl^- are present in relatively equal amounts. Below pH 7.5, the equilibrium shifts to favor HOCl; above pH 7.5, the equilibrium shifts to favor OCl^-. Depending on the application, addition of chlorine is effective when added to water with a neutral or slightly acidic pH value.

When chlorine is first added to water, it is available as free chlorine. The measurement of free chlorine signifies the amount available for disinfection. Once chlorine begins to sanitize bacteria and pathogens present in the water, it becomes combined chlorine; combined chlorine is no longer available to act as a disinfectant. The measurement of total chlorine signifies the amount of free chlorine and combined chlorine. With both free and total chlorine measurements, a drinking water operator or pool owner can determine if there is enough chlorine available for disinfection.

Specifications — HI96710 Free and Total Chlorine and pH

		pH (P1)	**Chlorine, Free (P2)**	**Chlorine, Total (P3)**
Parameter Specifications	Range	6.5 to 8.5 pH	0.00 to 5.00 mg/L (ppm)	
	Resolution	0.1 pH	0.01 mg/L under 3.50 mg/L 0.10 mg/L above 3.50 mg/L	
	Accuracy @ 25°C (77°F)	±0.1 pH	±0.03 mg/L ±3% of reading	
Additional Specifications	Light Source	tungsten lamp		
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm		
	Power Supply	9V battery		
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
	Weight	320g (11.3 oz.)		
	Method	**pH:** phenol red method; **Chlorine:** adaptation of the EPA recommended DPD method		

Ordering Information

HI96710 is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual.
CAL Check standards and testing reagents sold separately

HI96710C includes photometer, CAL Check standards, sample cuvettes (2) with caps, scissors, cuvette wiping cloth, 9V battery, instruction manual and rigid carrying case.
Reagents sold separately

Reagents and Standards

HI96701-11	CAL Check standard cuvettes (free Cl)	**HI93710-03**	Reagents for 300 tests (pH)
HI93701-01	powder reagents for 100 tests (free Cl)	**HI96711-11**	CAL Check standard cuvettes (total Cl)
HI93701-03	powder reagents for 300 tests (free Cl)	**HI93711-01**	Reagents for 100 tests (total Cl)
HI96710-11	CAL Check standard cuvettes (pH)	**HI93711-03**	Reagents for 300 tests (total Cl)
HI93710-01	reagents for 100 tests (pH)		

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96711

Chlorine, Free and Total Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96711 portable photometer is for the measurement of free and total chlorine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection byproducts.

Specifications	HI96711 Free and Total Chlorine		
Range	**Chlorine, Free (P1)**	**Chlorine, Total (P2)**	
	0.00 to 5.00 mg/L (ppm)		
Resolution	0.01 mg/L from 0.00 to 3.50 mg/L (ppm); 0.10 mg/L above 3.50 mg/L (ppm)		
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading		
Light Source	tungsten lamp		
Light Detector	silicon photocell with narrow band interference filter @ 525 nm		
Power Supply	9V battery		
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")		
Weight	320g (11.3 oz.)		
Method	adaptation of the USEPA method 330.5 and Standard Method 4500-Cl G		
Ordering Information	**HI96711** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96711C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette cleaning cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	HI96711	**HI96701-11**	CAL Check standard cuvettes (free Cl)
		HI93701-01	reagents for 100 tests (free Cl)
		HI93701-03	reagents for 300 tests (free Cl)
		HI96711-11	CAL Check standard cuvettes (total Cl)
		HI93711-01	reagents for 100 tests (total Cl)
		HI93711-03	reagents for 300 tests (total Cl)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96724

Free and Total Chlorine Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96724 measures the free and total chlorine content in water samples in the 0.00 to 5.00 mg/L (ppm) range. The method is an adaptation of the USEPA Method 330.5 for wastewater, and Standard Method 4500-CL G for drinking water, both of which use DPD to react with the sample.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection byproducts.

Specifications	HI96724 Free and Total Chlorine	
Range	0.00 to 5.00 mg/L (ppm)	
Resolution	0.01 mg/L from 0.00 to 3.50 mg/L; 0.10 mg/L above 3.50 mg/L	
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of the USEPA method 330.5 and Standard Method 4500-Cl G	
Ordering Information	**HI96724** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96724C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette cleaning cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI93701-F**	reagents for 300 tests (free Cl)
	HI93701-T	reagents for 300 free or total Cl tests
	HI93711-D3	DPD3 reagent for 200 tests
	HI96724-11	CAL Check Standard Cuvettes

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96734

Free and Total Chlorine, High Range Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96734 portable photometer is for the high range measurement of free chlorine and total chlorine. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Chlorine is one of the most cost-effective disinfectants used in a variety of different applications. Its use varies from light application in surface sanitation, to heavy duty disinfection of medical devices, to removal of microorganism infections in piping systems. The advantage of using chlorine over peroxide-type disinfectants is that chlorine is not only a strong oxidant, it also is capable of breaking tough chemical bonds found in cell walls or biofilms. Correct and effective use of chlorine helps to destroy disease-causing pathogens, reduce odors, and eliminate bacteria.

Specifications		HI96734 Free and Total Chlorine, HR	
		Chlorine, Free HR (P1)	**Chlorine, Total HR (P2)**
Parameter Specifications	Range	0.00 to 10.00 mg/L	
	Resolution	0.01 mg/L from 0.00 to 3.50 mg/L; 0.10 mg/L above 3.50mg/L	
	Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	adaptation of the USEPA method 330.5 and Standard method 4500-CL G (DPD)	
Ordering Information	**HI96734** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instructions. CAL Check standards and testing reagents sold separately **HI96734C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette cleaning cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately		
Reagents and Standards	**HI93734-01**	reagents for 100 tests	
	HI93734-03	reagents for 300 tests	
	HI96734-11	CAL Check standard cuvettes	

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96771

Free Chlorine Ultra High Range Portable Photometer

- Up to 500 ppm chlorine range
- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96771 portable photometer is for the measurement chlorine over a very wide range. Most chlorine photometers are limited to very low concentrations of chlorine. To measure a concentration outside the measurement range involved performing a dilution. The HI96771 has a unique chemistry that allows for the measurement of samples with chlorine concentrations up to 500 mg/L (ppm) without having to perform a dilution. This portable photometer features an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

As one of the oldest and most common forms of disinfection, chlorine improves water quality by destroying disease-producing microorganisms and by reacting with other organic and inorganic substances. Chlorine levels must be actively monitored to ensure sufficient chlorine is present for disinfection, as well as to control adverse effects such as taste, odor, and potential reactions with organic matter to form harmful disinfection byproducts.

Specifications	HI96771 Free Chlorine and Ultra High Range	
Range	**Free Cl (P1)**	**Cl, UHR (P2)**
	0.00 to 5.00 mg/L (ppm)	0 to 500 mg/L (ppm)
Resolution	0.01 mg/L from 0.00 to 3.50 mg/L; 0.10 mg/L above 3.50 mg/L	1 mg/L from 0 to 200 mg/L; 10 mg/L above 200 mg/L
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	±3 mg/L ±3% of reading
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
Power Supply	9V battery	
Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
Weight	320g (11.3 oz.)	
Method	adaptation of Standard Methods for the Examination of Water and Wastewater, 20th edition, 4500-Cl	
Ordering Information	**HI96771** is supplied with sample cuvettes (2) with caps, 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately **HI96771C** includes photometer, CAL Check standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette cleaning cloth, instrument quality certificate, instruction manual and rigid carrying case. Reagents sold separately	
Reagents and Standards	**HI93701-01**	reagents for 100 tests (free Cl)
	HI93701-03	reagents for 300 tests (free Cl)
	HI95771-01	reagents for 100 tests (UHR)
	HI95771-03	reagents for 300 tests (UHR)
	HI96771-11	CAL Check standards

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96736

Total Hardness and pH Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96736 is a multiparameter portable photometer that measures total hardness and pH.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Specifications		HI96736 Total Hardness and pH	
Parameter Specifications		**Total Hardness (P1)**	**pH (P2)**
	Range	0.00 to 4.70 mg/L (ppm)	6.5 to 8.5 pH
	Resolution	0.01 mg/L	0.1 pH
	Accuracy @ 25°C (77°F)	±0.11 mg/L ±5% of reading	±0.1 pH
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Total Hardness:** adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th Edition, colorimetric method; **pH:** phenol red method	
Ordering Information	**HI96736** is supplied with sample cuvettes with caps (2), 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately		
Reagents and Standards	**HI96710-11**	CAL Check standard cuvettes (pH)	
	HI93710-01	reagents for 100 tests (pH)	
	HI93710-03	reagents for 300 tests (pH)	
	HI96719-11	CAL Check standard cuvettes (hardness)	
	HI93719-01	reagents for 100 tests (hardness)	
	HI93719-03	reagents for 300 tests (hardness)	

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96741

Total Hardness and Iron, Low Range Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96741 can provide critical measurements of low range iron and total hardness (magnesium and calcium).

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

In domestic water, iron can alter taste, making it unpleasant to drink. It can also stain laundry, damage kitchenware and favor the growth of certain bacteria. However, low levels of iron are critical in beverage production.

The iron concentration in water needs to be monitored since it can become harmful above certain levels.

Hardness, on the other hand, is indicative of the presence of calcium and magnesium in water. By passing through various layers of soil and rocks, rain water dissolves some of the mineral substances.

Hardness can cause pipe rusting in water heating and cooling systems, reverse osmosis and demineralization plants. It can also increase the consumption of soaps and detergents in industrial washing machines or laundries.

Specifications — HI96741 Total Hardness and Iron, LR

Parameter Specifications		**Mg Hardness**	**Ca Hardness**
	Range	0.00 to 2.00 mg/L	0.00 to 2.70 mg/L
	Resolution	0.01 mg/L	0.01 mg/L
	Accuracy @ 25°C (77°F)	±0.11 mg/L ±5% of reading	±0.11 mg/L ±5% of reading
		Total Hardness (P1)	**Iron, LR (P2)**
	Range	0.00 to 4.70 mg/L	0 to 1.60 mg/L
	Resolution	0.01 mg/L	0.01 mg/L
	Accuracy @ 25°C (77°F)	±0.11 mg/L ±5% of reading	±0.01 mg/L ±8% of reading
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Total Hardness:** adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th ed. colorimetric method. **Iron LR:** Adaptation of the TPTZ method.	
Ordering Information	**HI96741** is supplied with sample cuvettes with caps (2), 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately		
Reagents and Standards	**HI96719-11**	CAL Check standard cuvettes (hardness)	
	HI93719-01	reagents for 100 tests (hardness)	
	HI93719-03	reagents for 300 tests (hardness)	
	HI96746-11	CAL Check standard cuvettes (iron)	
	HI93746-01	reagents for 50 tests (iron)	
	HI93746-03	reagents for 150 tests (iron)	

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96742

Iron, Low Range and Manganese Low Range Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96742 portable photometer measures low range iron and manganese.

Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Neither iron nor manganese are considered dangerous, but high concentrations of these metals in water can create a bittersweet or astringent taste.

The presence of iron in supplied water is undesirable due to the staining effect on laundry and porcelain.

Manganese, in high concentrations, can produce corrosion and scaling in pipes, which is a serious industrial concern.

Specifications — HI96742 Iron, LR and Manganese

		Iron, LR (P1)	Manganese, LR (P2)
Parameter Specifications	Range	0 to 1.60 mg/L (ppm)	0 to 300 µg/L (ppb)
	Resolution	0.01 mg/L	1 µg/L
	Accuracy @ 25°C (77°F)	±0.01 mg/L ±8% of reading	±2 µg/L ±3% of reading
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder.	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Iron LR:** adaptation of TPTZ method; **Manganese LR:** adaptation of the 1-(2-pyridylazo)-2-naphthol PAN method.	
Ordering Information		**HI96742** are supplied with sample cuvettes with caps (2), 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards		**HI96746-11**	CAL Check standard cuvettes (iron)
		HI93746-01	reagents for 50 Tests (iron)
		HI93746-03	reagents for 150 Tests (iron)
		HI96748-11	CAL Check standard cuvettes (manganese)
		HI93748-01	reagents for 100 Tests (manganese)
		HI93748-03	reagents for 300 Tests (manganese)

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96745

Total Chlorine, Hardness, Iron Low Range and pH Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96745 is a powerful instrument to keep pH, chlorine, total hardness and low range iron parameters under control.

Significance of Use

Chlorine and pH are two of the most closely monitored parameters in water quality tests. Hardness is also an important parameter, attentively regulated to reduce waste or ensure proper functioning of equipment. Iron can cause an unpleasant taste or stain kitchenware or laundry.

Reagents and Standards

HI96701-11	CAL Check standard cuvettes (free Cl)
HI93701-01	reagents for 100 tests (free Cl)
HI93701-03	reagents for 300 tests (free Cl)
HI96710-11	CAL Check standard cuvettes (pH)
HI93710-01	reagents for 100 tests (pH)
HI93710-03	reagents for 300 tests (pH)
HI96711-11	CAL Check standard cuvettes (total Cl)
HI93711-01	reagents for 100 tests (total Cl)
HI93711-03	reagents for 300 tests (total Cl)
HI96719-11	CAL Check standard cuvettes (hardness)
HI93719-01	reagents for 100 tests (hardness)
HI93719-03	reagents for 300 tests (hardness)
HI96746-11	CAL Check standard cuvettes (iron)
HI93746-01	reagents for 50 tests (iron)
HI93746-03	reagents for 150 tests (iron)

Specifications

HI96745 Chlorine, Total Hardness, Iron Low Range and pH

Parameter Specifications		**pH (P1)**	**Chlorine, Free (P2); Chlorine, Total (P3)**
	Range	6.5 to 8.5 pH	0.00 to 5.00 mg/L (ppm)
	Resolution	0.1 pH	0.01 mg/L under 3.50 mg/L; 0.10 mg/L above 3.50 mg/L
	Accuracy @ 25°C (77°F)	±0.1 pH	±0.03 mg/L ±3% of reading
		Total Hardness (P4)	**Iron, Low Range (P5)**
	Range	0.00 to 4.70 mg/L (ppm)	0 to 1.60 mg/L (ppm)
	Resolution	0.01 mg/L	0.01 mg/L
	Accuracy @ 25°C (77°F)	±0.11 mg/L ±5% of reading	±0.01 mg/L ±8% of reading
Additional Specifications	Light Source	tungsten lamp	
	Light Detector	silicon photocell with narrow band interference filter @ 525 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**pH:** phenol red method; **Cl:** Adaptation of the USEPA method and Standard Method 4500-Cl G method; **Total Hardness:** adaptation of the Standard Methods for the examination of Water and Wastewater, 18th ed., calmagite colorimetric method; **Iron LR**: adaptation of the TPTZ method method.	
Ordering Information	**HI96745** is supplied with sample cuvettes (2) with caps, battery, instrument quality certificate and instructions. CAL Check standards and testing reagents sold separately		

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

HI96752

Calcium and Magnesium Portable Photometer

- CAL Check™
  - Allows for performance verification and calibration of the meter using NIST traceable standards
- Auto-shut off
- Built-in timer
  - Display of time remaining before a measurement is taken

The HI96752 portable photometer is for the measurement of calcium and magnesium. Hanna's portable photometers feature an advanced optical system; the combination of a LED light source, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The Hanna exclusive CAL Check feature utilizes ready-made, NIST traceable standards to verify both meter validation and calibration. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Significance of Use

Calcium and magnesium both play important roles in the growth of plants. Calcium helps plant roots develop and increases the resistance and strength of plant tissues and stems. Magnesium is an indispensable mineral that helps in the production of chlorophyll, the light-absorbing green pigment that serves as an energy source for plants. It also increases vitamin concentrations and aids in uptake of phosphorus within the plant body.

Specifications		HI96752 Calcium and Magnesium	
Parameter Specifications		**Calcium (P1)**	**Magnesium (P2)**
	Range	0 to 400 mg/L (ppm)	0 to 150 mg/L (ppm)
	Resolution	1 mg/L	1 mg/L
	Accuracy @ 25°C (77°F)	±10 mg/L ±5% of reading	±3 mg/L ±3% of reading
Additional Specifications	Light Source	light emitting diode	
	Light Detector	silicon photocell with narrow band interference filter @ 466 nm	
	Power Supply	9V battery	
	Auto-off	after ten minutes of non-use in measurement mode; after one hour of non-use in calibration mode; with last reading reminder	
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
	Dimensions	192 x 104 x 69 mm (7.6 x 4.1 x 2.7")	
	Weight	320g (11.3 oz.)	
	Method	**Calcium:** adaptation of oxalate method; **Magnesium:** adaptation of the calmagite method	
Ordering Information		**HI96752** is supplied with sample cuvettes with caps (2), 9V battery, instrument quality certificate and instruction manual. CAL Check standards and testing reagents sold separately	
Reagents and Standards	**HI93752-01**	reagents for 100 Tests (50 each)	
	HI93752-03	reagents for 300 Tests (150 each)	
	HI937520-01	reagents for 100 tests (magnesium)	
	HI937520-03	reagents for 300 tests (magnesium)	
	HI937521-01	reagents for 50 tests (calcium)	
	HI937521-03	reagents for 150 tests (calcium)	
	HI96752-11	CAL Check standard cuvettes (calcium)	
	HI96754-11	CAL Check standard cuvettes (magnesium)	

See page 10.90 for standard reagents; see page 10.91 for CAL Check kits; see page 10.42 for general accessories

Standard Reagents

Test	Reagent Kit	No. of Tests
Alkalinity	**HI93755-01** **HI93755-03**	100 300
Aluminum	**HI93712-01** **HI93712-03**	100 300
Ammonia HR	**HI93733-01** **HI93733-03**	100 300
Ammonia MR	**HI93715-01** **HI93715-03**	100 300
Ammonia LR	**HI93700-01** **HI93700-03**	100 300
Bromine	**HI93716-01** **HI93716-03**	100 300
Calcium	**HI937521-01** **HI937521-03**	50 150
Calcium and Magnesium	**HI93752-01** **HI93752-03**	100 (50 each) 300 (150 each)
Chloride	**HI93753-01** **HI93753-03**	100 300
Chlorine Dioxide	**HI93738-01** **HI93738-03**	100 300
Chlorine UHR	**HI95771-01** **HI95771-03**	100 300
Chlorine, Free	**HI93701-01** **HI93701-03** **HI93701-F** (liquid)	100 300 300
Chlorine, Free and Total HR	**HI93734-01** **HI93734-03**	100 300
Chlorine, Free ULR	**HI95762-01** **HI95762-03**	100 300
Chlorine, Total	**HI93711-01** **HI93711-03** **HI93701-T** (liquid)	100 300 300
Chlorine, Total ULR	**HI95761-01** **HI95761-03**	100 300
Chromium VI HR	**HI93723-01** **HI93723-03**	100 300
Chromium VI LR	**HI93749-01** **HI93749-03**	100 300
Copper HR	**HI93702-01** **HI93702-03** **HI93702T-01** (total) **HI93702T-03** (total)	100 300 100 300
Copper LR	**HI95747-01** **HI95747-03**	100 300
Cyanide	**HI93714-01** **HI93714-03**	100 300
Cyanuric Acid	**HI93722-01** **HI93722-03**	100 300
Detergents, Anionic	**HI95769-01**	40
Fluoride HR	**HI93739-01** **HI93739-03**	100 300
Fluoride LR	**HI93729-01** **HI93729-03**	100 300
Glycine Powder	**HI93703-52**	100
Hardness, Calcium	**HI93720-01** **HI93720-03**	100 300

Test	Reagent Kit	No. of Tests
Hardness (Magnesium) and Total Hardness	**HI93719-01** **HI93719-03**	100 300
Hardness, Total HR Hardness, Total MR Hardness, Total LR Hardness, Total LR+MR+HR	**HI93735-02** **HI93735-01** **HI93735-00** **HI93735-0**	100 100 100 100 ea. (300)
Hydrazine	**HI93704-01** **HI93704-03**	100 300
Iodine	**HI93718-01** **HI93718-03**	100 300
Iron HR	**HI93721-01** **HI93721-03**	100 300
Iron LR	**HI93746-01** **HI93746-03**	50 150
Manganese HR	**HI93709-01** **HI93709-03**	100 300
Manganese LR	**HI93748-01** **HI93748-03**	50 150
Magnesium	**HI937520-01** **HI937520-03**	50 150
Molybdenum	**HI93730-01** **HI93730-03**	100 300
Nickel HR	**HI93726-01** **HI93726-03**	100 300
Nickel LR	**HI93740-01** **HI93740-03**	50 150
Nitrate	**HI93728-01** **HI93728-03**	100 300
Nitrite HR	**HI93708-01** **HI93708-03**	100 300
Nitrite LR	**HI93707-01** **HI93707-03**	100 300
Oxygen, Dissolved (DO)	**HI93732-01** **HI93732-03**	100 300
Ozone	**HI93757-01** **HI93757-03**	100 300
pH	**HI93710-01** **HI93710-03**	100 300
Phosphate HR	**HI93717-01** **HI93717-03**	100 300
Phosphate LR	**HI93713-01** **HI93713-03**	100 300
Phosphorus	**HI93706-01** **HI93706-03**	100 300
Potassium	**HI93750-01** **HI93750-03**	100 300
Silica HR	**HI96770-01** **HI96770-03**	100 300
Silica LR	**HI93705-01** **HI93705-03**	100 300
Silver	**HI93737-01** **HI93737-03**	50 150
Sulfate	**HI93751-01** **HI93751-03**	100 300
Zinc	**HI93731-01** **HI93731-03**	100 300

Single Parameter

Instrument	CAL Check Standards Set	Parameter
HI96700	**HI96700-11**	Ammonia
HI96701	**HI96701-11**	Free Chlorine
HI96702	**HI96702-11**	Copper
HI96704	**HI96704-11**	Hydrazine
HI96705	**HI96705-11**	Silica
HI96706	**HI96706-11**	Phosphorus
HI96707	**HI96707-11**	Nitrite
HI96708	**HI96708-11**	Nitrite
HI96709	**HI96709-11**	Manganese
HI96712	**HI96712-11**	Aluminum
HI96713	**HI96713-11**	Phosphate
HI96714	**HI96714-11**	Cyanide
HI96715	**HI96715-11**	Ammonia
HI96716	**HI96716-11**	Bromine
HI96717	**HI96717-11**	Phosphate
HI96718	**HI96718-11**	Iodine
HI96719	**HI96719-11**	Hardness, Magnesium
HI96720	**HI96720-11**	Hardness, Calcium
HI96721	**HI96721-11**	Iron
HI96722	**HI96722-11**	Cyanuric Acid
HI96723	**HI96723-11**	Chromium VI
HI96724	**HI96724-11**	Free/Total Chlorine
HI96726	**HI96726-11**	Nickel
HI96727	**HI96727-11**	Color of Water
HI96728	**HI96728-11**	Nitrate
HI96729	**HI96729-11**	Fluoride
HI96730	**HI96730-11**	Molybdenum
HI96731	**HI96731-11**	Zinc
HI96732	**HI96732-11**	Dissolved Oxygen
HI96733	**HI96733-11**	Ammonia
HI96737	**HI96737-11**	Silver
HI96738	**HI96738-11**	Chlorine Dioxide
HI96739	**HI96739-11**	Fluoride
HI96740	**HI96740-11**	Nickel
HI96746	**HI96746-11**	Iron
HI96747	**HI96747-11**	Copper
HI98748	**HI96748-11**	Manganese
HI96749	**HI96749-11**	Chromium VI
HI96750	**HI96750-11**	Potassium
HI96751	**HI96751-11**	Sulfate
HI96753	**HI96753-11**	Chloride
HI96761	**HI96761-11**	Total Chlorine
HI96762	**HI96762-11**	Trace Free Chlorine
HI 96769	**HI96769-11**	Anionic Detergents
HI96770	**HI96770-11**	Silica
HI96771	**HI96771-11**	Ultra High Range Free Chlorine
HI96786	**HI96786-11**	Nitrate

Multiparameter

Instrument	CAL Check Standards Set	Parameter
HI96101	**HI96716-11** **HI96701-11** **HI96711-11** **HI96722-11** **HI96718-11** **HI96746-11** **HI96710-11**	Bromine Free Chlorine Total Chlorine Cyanuric Acid Iodine Iron pH
HI96104	**HI96710-11** **HI96701-11** **HI96711-11** **HI96722-11**	pH Free Chlorine Total Chlorine Cyanuric Acid
HI96710	**HI96701-11** **HI96711-11** **HI96710-11**	Free Chlorine Total Chlorine pH
HI96711	**HI96701-11** **HI96711-11**	Free Chlorine Total Chlorine
HI96725	**HI96701-11** **HI96711-11** **HI96722-11** **HI96710-11**	Free Chlorine Total Chlorine Cyanuric Acid pH
HI96734	**HI96734-11**	Free Chlorine Total Chlorine
HI96735	**HI96735-11**	Hardness
HI96736	**HI96719-11** **HI96710-11**	Total Hardness pH
HI96741	**HI96719-11** **HI96746-11**	Total Hardness Iron
HI96742	**HI96746-11** **HI96748-11**	Iron Manganese
HI96743	**HI96746-11** **HI96710-11**	Iron pH
HI96745	**HI96701-11** **HI96711-11** **HI96719-11** **HI96746-11** **HI96710-11**	Free Chlorine Total Chlorine Hardness, Magnesium Iron pH
HI96752	**HI96752-11** **HI96754-11**	Calcium Magnesium

HI83746

Photometer for the Determination of Concentration of Reducing Sugars

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Zero key
  - A simple press of the zero key on the face of the meter will account for the color and imperfections in the oil sample before reagent addition.
- GLP
  - Review of the last calibration date.
- Auto shut-off
  - Automatic shut-off after 15 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI83746 photometer is for the determination of reducing sugars in wine. Hanna's photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Typical content of reducing sugars in must and wine

Must	sweet must	20-25 %	200-250 g/L
	normal	10-20 %	100-200 g/L
	in fermentation	4-12.5 %	40-125 g/L
Wine	sweet	2.5-12.5 %	25-125 g/L
	semi sweet	0.8-2.5 %	8-25 g/L
	almost dry	0.2-0.8 %	2-8 g/L
	dry	0-0.2 %	0-2 g/L

Supplied in a rigid carrying case

Significance of Use

Sugar is an essential component in the production of wine. During alcoholic fermentation, yeast consume sugars found in the grape juice, or must, and converts it to ethyl alcohol and carbon dioxide. In the case of certain styles of wine such as semi-sweet or dessert wines, some sugar is allowed to remain post-fermentation. This residual sugar can serve to provide a sweeter character to the final blend or play a role in microbial stability.

The primary fermentable sugars found in grapes are glucose and fructose. These two simple sugars are also known as reducing sugars because they contain functional groups capable of being oxidized under certain conditions. After reaction with excess alkaline cupric tartrate (Fehling reagents), the content of reducing sugars can be determined colorimetrically. The Fehling method is not an exact determination but an index of the reducing sugar concentration, because the reaction depends upon the amount and type of reducing sugars present. When the reducing sugar content is known at the beginning of fermentation, the potential alcohol degree can be estimated by multiplying the sugar concentration (in g/L) by 0.06.

Specifications	HI83746	
Range	0.00 to 50.00 g/L (ppt)	
Resolution	0.25 g/L	
Accuracy @ 25°C/77°F	± 0.50 g/L ±5% of reading	
Precision	±0.015 @ 0.350 g/L	
Light Source	tungsten lamp	
Light Detector	silicon photocell with narrow band interference filter @ 610 nm	
Method	Fehling	
Environment	0 to 50°C; RH max 95% non-condensing	
Battery Type	1.5V AA batteries (4)/ 12 VDC adapter	
Auto Shut-off	after 15 minutes of non-use	
Dimensions	224 x 87 x 77 mm (8.7 x 3.3 x 3.1")	
Weight	512 g (17.6 oz.)	
Ordering Information	**HI83746-01** (115V) and **HI83746-02** (230V) is supplied with glass cuvettes and caps (4), reagents for about 20 tests (HI83746-20), HI93703-59 Charcoal, 200 µL automatic pipette with two plastic tips, 1000 µL automatic pipette with plastic tips (2), instruction sheet for automatic pipette, spoon, funnel, filter paper (25), cuvette wiping cloth, 12 VDC adapter, batteries, instructions and Instrument quality certificate, rigid carrying case.	
Optional Reagents	**HI83746-20**	reducing sugar reagent set (20 tests)
	HI93703-59	charcoal for decoloration of red wine (about 100 tests)
	HI839800	COD test tube heater (required)

The HI83746 requires the HI839800 Test Tube Heater

HI83746-20

HI83748

Photometer for the Determination of Tartaric Acid in Wine

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Zero key
  - A simple press of the zero key on the face of the meter will account for the color and imperfections in the oil sample before reagent addition.
- GLP
  - Review of the last calibration date.
- Auto shut-off
  - Automatic shut-off after 15 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI83748 photometer is for the determination of tartaric acid in wine. Hanna's photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Supplied in a rigid carrying case

Significance of Use

Tartaric acid and tartrate play an important role in the stability of wines. They can be present in wine and juice in various forms, like tartaric acid (H2T), potassium bitartrate (KHT) or calcium tartrate (CaT). The ratio of these depends mainly on the pH of the wine. The percentage of tartrate present as bitartrate (HT-) is maximum at pH 3.7.

The formation of crystalline deposits (tartrate casse) is a phenomenon of wine aging that does not meet customer acceptance. It is therefore important to test for and reduce the potential for bottle precipitation. For example, by adjusting the pH of the wine, winemakers can significantly influence the potential of casse formation.

Tartaric acid concentrations in wine range normally from 1.5 to 4.0 g/L. This acid concentration should not be confused with total or titratable acidity of wines, which are often expressed as tartaric acid content as well. Although it is the tartaric acid that is the predominant acid present (up to 60% of the total acidity), others like malic, citric, and several volatile acids contribute significantly to total acidity.

Specifications	HI83748
Range	0.0 to 5.0 g/L (ppt)
Resolution	0.1 g/L
Accuracy @ 25°C/77°F	±0.1 g/L ±5% of reading
Light Source	tungsten lamp
Manual Precision	SD ±0.1 g/L @ 2.0 g/L
Light Detector	silicon photocell with narrow band interference filter @ 525 nm
Method	the reaction between tartaric acid and the reagents causes a yellow/orange red tint in the sample.
Environment	0 to 50°C; RH max 95% non-condensing
Battery Type	1.5V AA batteries (4) / 12 VDC adapter
Auto Shut-off	after 15 minutes of non-use
Dimensions	225 x 85 x 80 mm (8.7 x 3.3 x 3.1")
Weight	500 g (17.6 oz.)
Ordering Information	**HI83748-01** (115V) and **HI83748-02** (230V) are supplied with sample cuvettes and caps (2), reagents for 5 manual tests (HI83748A-0, HI83748B-0), 200 µL automatic pipette, plastic tips for 200 µL automatic pipette (2), 5 mL syringe with tip, cuvette wiping cloth, 12 VDC adapter, batteries, instructions, instrument quality certificate and rigid carrying case.
Reagent Sets	**HI83748-20** tartaric acid reagents set for wine (20 tests)

HI83748-20

HI83730

Photometer for the Determination of Peroxide Value in Olive Oils

- Built-in timer
  - Display of time remaining before a measurement is taken. Ensures that all readings are taken at the appropriate reaction intervals for the test being performed.
- Zero key
  - A simple press of the zero key on the face of the meter will account for the color and imperfections in the oil sample before reagent addition.
- GLP
  - Review of the last calibration date.
- Auto shut-off
  - Automatic shut-off after 15 minutes of non-use when the meter is in measurement mode. Prevents wastage of batteries in the event the meter is accidentally left on.
- Battery status indicator
  - Indicates the amount of battery life left.
- Error messages
  - Messages on display alerting to problems including no cap, high zero, and standard too low.
- Units of measure
  - Appropriate unit of measure is displayed along with reading.

The HI83730 portable photometer is for the determination of peroxide value in edible oils. Hanna's portable photometers feature an advanced optical system; the combination of a special tungsten lamp, a narrow band interference filter, and silicon photodetector ensure accurate photometric readings every time. The exclusive cuvette locking system ensures that the cuvette is inserted into the measurement cell in the same position every time to maintain a consistent path length.

Oil Peroxides Content

<10 meq O_2/kg	excellent conservation
10-15 meq O_2/kg	good conservation
<10 meqO_2/kg	refined oil
>20 meqO_2/kg	rancid oil

Supplied in a rigid carrying case

Significance of Use

Over time, edible oils may degrade and spoil. The primary cause of edible oil degradation is oxidation; as oil oxidation occurs, flavors and odors can change, resulting in a product that is undesirable to consumers. The unsaturated fatty acids found in oils react with oxygen, creating peroxide as an unwanted byproduct. This oxidation reaction is more likely to occur under certain conditions, including exposure to light, the presence of metal ions, the introduction of oxygen, or when storage temperatures are not maintained. In order to determine oil quality and the onset of oxidation, peroxide value is determined. Peroxide value is defined as the amount of peroxide oxygen per kilogram of oil, which is reported in units of milliequivalents or meq. A lower peroxide value indicates higher quality edible oil.

Specifications	HI83730
Range	0.0 to 25.0 meq O_2/kg
Resolution	0.5 meq O_2/kg
Accuracy @ 25°C/77°F	±0.5 meq O_2/kg
Light Source	tungsten lamp
Light Detector	silicon photocell with narrow band interference filter @ 466 nm
Method	adaptation of EC 2568/91 method and following amendments
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Power Supply	1.5V AA batteries (4) / 12 VDC adapter
Auto Shut-off	after 15 minutes of non-use
Dimensions	224 x 87 x 77 mm (8.8 x 3.4 x 3")
Weight	512 g (18 oz.)
Ordering Information	**HI83730-01** (115V) and **HI83730-02** (230V) are supplied with reagents for 10 tests, 1 mL syringes (4), scissors, vial wiping cloth, batteries, AC adapter, instructions and a rigid carrying case.
Reagent Sets	**HI83730-20** peroxide in olive oil reagents kit (21 manual tests)

HI83730-20

Checker hc® handheld colorimeter

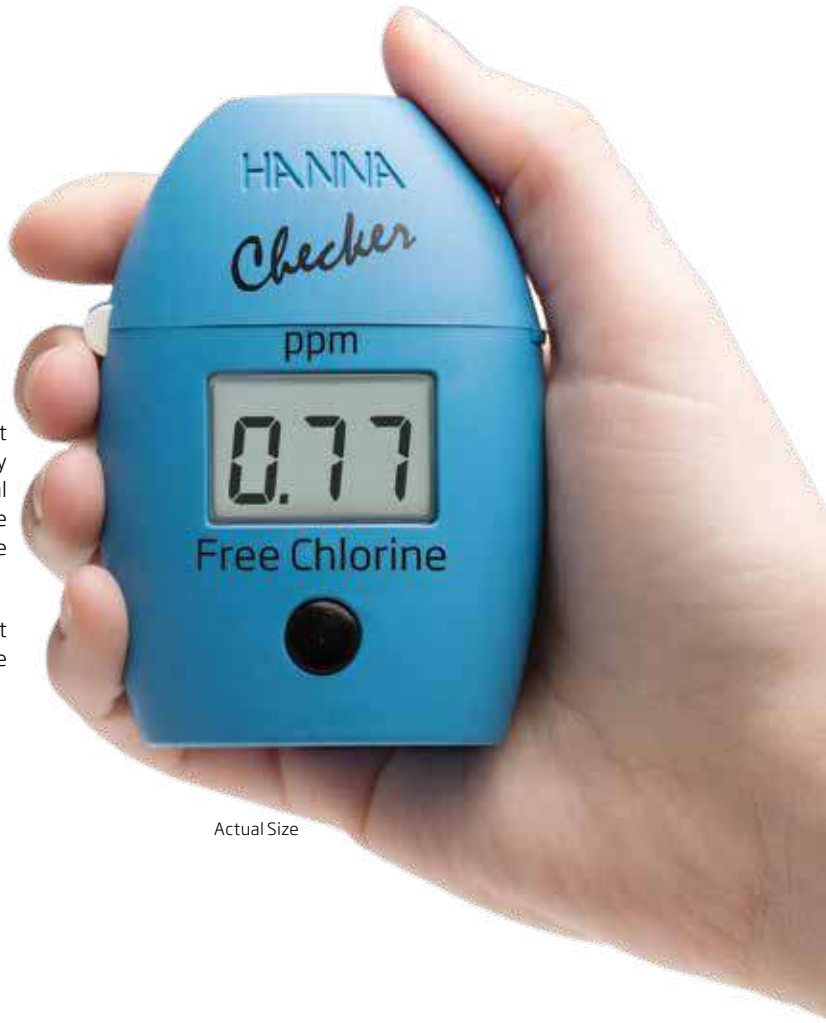
Hanna Checker®HC Series

Handheld Colorimeters

The Hanna Checker HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. The Checker HC is both accurate and affordable.

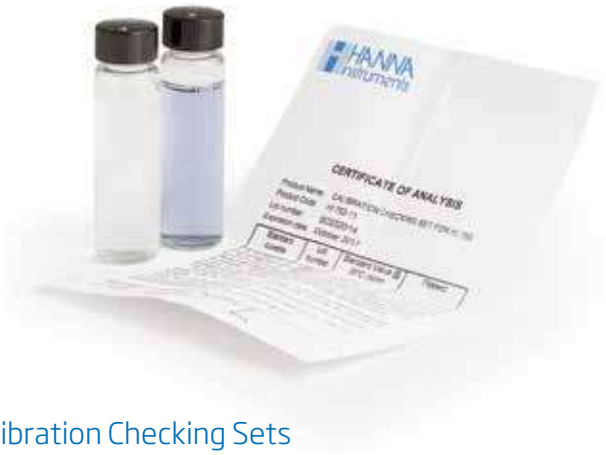
The contoured style of the Checker HC fits in your palm and pocket perfectly, while the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

- Easier to use and more accurate than chemical test kits
  - High accuracy
  - Large, easy-to-read digits
  - Auto shut-off
- Dedicated to a single parameter
  - Designed to work with Hanna's reagents
  - Uses 10 mL glass cuvettes
- Small size, big convenience
  - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits in your palm or pocket
- Use for quick and accurate on-the-spot analysis
- Single-button operation: zero and measure
- Operated by a single AAA battery



Actual Size

Checker HC's are supplied in a case with custom insert



Calibration Checking Sets

Our optional Checker HC Calibration Sets provide a simple solution to validating your Checker HC. Each high quality set of standards is manufactured in our state-of-the-art facility and comes supplied with a Certificate of Analysis. The Certificate of Analysis provides the lot number, reference values and expiration date to provide traceability when certifying the Checker HC.

General Specifications for All Models

Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Dimensions	86 x 59.8 x 36.6 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.25 oz.)

Seawater and Fresh Water Alkalinity

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for
  - Saltwater aquariums (HI755)
  - Fresh water aquariums (HI775)

Alkalinity is one of the most important parameters to measure in aquariums. It helps to maintain a stable pH, an important factor for most aquatic life. In seawater, bicarbonate is the largest contributor to alkalinity and is a critical element needed for healthy corals. Corals need bicarbonate and carbonate available to form their skeletons. Without an adequate level, healthy coral growth is not possible. Since bicarbonate levels can be difficult to determine, total alkalinity is measured instead. The alkalinity of natural seawater is typically 125 ppm $CaCO_3$ (equivalent to 7 degrees of carbonate hardness, or dKH). In saltwater aquariums, typical alkalinity values can range from 125 to 200 ppm $CaCO_3$ (7 to 11.2 dKH).

The HI755, HI775 and HI772 Checker®HC's are simple, accurate, and cost effective ways to measure alkalinity in seawater and fresh water. Designed as a more accurate alternative to chemical test kits, these handheld colorimeters provide quick, accurate alkalinity testing results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press the button to zero.

Step Three - Remove sample and add reagent as stated in the manual.

Step Four – Reinsert sample and press the button to measure your results.

The contoured style of these Checker HCs fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

Specifications	HI755 (Seawater)	HI775 (Fresh water)	HI772 (Seawater)
Range	0 to 300 ppm $CaCO_3$	0 to 500 ppm $CaCO_3$	0.0 to 20.0 dKH
Resolution	1 ppm	1 ppm	0.1 dKH
Accuracy @ 25°C/77°F	±5 ppm ±5% of reading		±0.3 dKH ±5% of reading
Light Source	LED @ 610 nm		
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	colorimetric method. The reaction causes a distinctive range of colors from yellow to green to blue to develop		
Ordering Information	**HI755** Checker®HC is supplied with sample cuvettes with caps (2), seawater alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide. **HI775** Checker®HC is supplied with sample cuvettes with caps (2), alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide. **HI772** Checker®HC is supplied with sample cuvettes with caps (2), seawater alkalinity reagent starter kit (reagents for 25 tests), syringe with tip, battery, instructions and quick start guide.		
Reagent Set	**HI755-26** (25 tests)	**HI775-26** (25 tests)	**HI772-26** (25 tests)
Calibration Set	**HI755-11**	**HI775-11**	**HI772-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI700 · HI715 · HI733

Ammonia Low, Medium and High Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for
  - Water quality
  - Aquariums
  - Environmental

The HI700, HI715, and HI733 Checker®HC's are simple, accurate, and cost effective ways to measure ranges of ammonia in fresh water. The all new HI700 Checker HC Ammonia LR for fresh water can be used to replace the usage of of HI3824 or HI38049 fresh water test kits.

Designed as a more accurate alternative to chemical test kits, the HI700, HI715, and the HI733* provides quick, accurate results.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press the button to zero.

Step Three - Remove sample and add reagents as the manual states.

Step Four – Reinsert sample, press and hold the button for 3 seconds to start reaction timer. reading will be taken automatically and the results displayed.

* HI733 uses a different procedure

All three models use an adaptation of the ASTM Manual of Water and Environmental Technology, D1426-92, Nessler method. The reaction between ammonia and reagents causes a yellow tint in the sample.

Specifications	HI700 (LR)	HI715 (MR)	HI733 (HR)
Range	0.00 to 3.00 ppm NH_3-N	0.00 to 9.99 ppm NH_3-N	0.0 to 99.9 ppm as NH_4^+
Resolution	0.01 ppm	0.01 ppm	0.1 ppm
Accuracy @ 25°C/77°F	±0.05 ppm ±5% of reading	±0.05 ppm ±5% of reading	±1.0 ppm ±5% of reading
Light Source	LED @ 470 nm		
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after ten minutes of non-use		
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	adaptation of the ASTM Manual of Water and Environmental Technology D1426-92, Nessler Method. The reaction between ammonia and reagents causes a yellow tint in the sample		
Ordering Information	**HI700** Checker®HC is supplied with sample cuvettes with caps (2), ammonia LR reagent starter kit (reagents for 25 tests), battery, instructions and quick start guide. **HI715** Checker®HC is supplied with sample cuvettes with caps (2), ammonia MR reagent starter kit (reagents for 25 tests), battery, instructions and quick start guide. **HI733** Checker®HC is supplied with sample cuvettes with caps (2), ammonia HR reagent starter kit (reagents for 10 tests), syringe with tip, plastic pipette, battery, instructions and quick start guide.		
Reagent Set	**HI700-25** (25 tests)	**HI715-26** (25 tests)	**HI733-25** (20 tests)
Calibration Set	**HI700-11**	**HI715-11**	**HI733-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI716

Bromine

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
  - DPD method
  - Accuracy ±0.08 ppm ±5% of reading
  - 0.01 ppm resolution
  - Large, easy-to-read digits
  - Auto shut-off
- Dedicated to a single parameter
  - Designed to work with Hanna's powder reagents
  - Uses 10 mL glass cuvettes
- Small size, big convenience
  - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
  - Built- in reaction timer
  - Operated by a single AAA battery
- Ideal for
  - Water quality
  - Education
  - Swimming pools/hot tub sanitization
  - Environmental

The HI716 Checker HC is a simple, accurate, and cost effective way to measure Bromine. Designed as a more accurate alternative to chemical test kits, the HI716 provides quick, accurate results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press button to zero.

Step Three - Remove sample and add reagent packet.

Step Four – Reinsert sample, press and hold the button for 3 seconds to start reaction timer. reading will be taken automatically and the results displayed.

The HI716 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between bromine and the reagent causes a pink tint in the sample.

Specifications	HI716
Range	0.00 to 8.00 ppm
Resolution	0.01 ppm
Accuracy @ 25°C/77°F	±0.08 ppm ±5% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method. The reaction between bromine and the reagent causes a pink tint in the sample
Ordering Information	**HI716** Checker®HC is supplied with sample cuvettes with caps (2), bromine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI716-25** (25 tests)
Calibration Set	**HI716-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI758

Marine Calcium

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
  - Zincon method adaptation
  - ±6 % of reading
  - 1 ppm resolution
  - Large, easy-to-read digits
  - Auto shut-off
- Dedicated to a single parameter
  - Uses 10 mL glass cuvettes
- Small size, big convenience
  - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
  - Use for quick and accurate on-the-spot analysis
  - Single-button operation: zero and measure
  - Operated by a single AAA battery
- Ideal for
  - Aquaculture
  - Aquariums

HI758 includes HI731339 100µL pipette and 1 mL syringe

Calcium presence in water supplies results from passage over deposits of limestone, dolomite, gypsum and gypsiferous shale. The concentration may extend from 0 to several hundred milligrams per liter, depending on its source and treatment. Calcium is necessary in plant and animal nutrition since it is an essential constituent of bones, shells and plant structures. Calcium in water as carbonate is one of the primary components of water hardness which can cause pipe or tube scaling.

The HI758 Calcium Checker HC is extremely simple to use. First, zero with Reagent A and deionized water. Next, remove the vial and add sample and Reagent B and shake to dissolve. Reinsert into the Checker HC and press the button to read the calcium concentration in ppm on the display.

Weighing a mere 64 g (2.25 oz.), the Checker HC easily fits into your hand or pocket.

The HI731339 is a volumetric pipette designed to measure and transfer exactly 100 µL of solution to a cuvette. To obtain the highest accuracy and precision from the HI758 marine calcium Checker it is necessary to add exactly 100 µL of aquarium saltwater to the cuvette. Any variation will result in an inaccurate reading.

Specifications	HI758
Range	200 to 600 ppm
Resolution	1 ppm
Accuracy @ 25°C/77°F	±6% of reading
Light Source	LED @ 610 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Zincon method
Ordering Information	**HI758** Checker®HC is supplied with sample cuvettes with caps (2), marine calcium reagent starter kit (reagents for 25 tests), HI731339 100 µL pipette, syringe with HI731349 tip, plastic pipette, battery, instructions and quick start guide.
Reagent Set	**HI758-26** (25 tests)
Calibration Set	**HI758-11**
Accessories	**HI731349** pipette tips

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI753

Chloride

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Drinking water
  - Waste water
  - Boiler and cooling towers

The HI753 Checker®HC is a simple, accurate, and cost effective way to measure chloride. Designed as a more accurate alternative to chemical test kits, the HI753 provides quick, accurate results in three easy steps.

Step One - Prepare samples according to the manual.

Step Two - Insert zero cuvette into the Checker HC, press and hold the button for 3 seconds to start reaction timer. Meter will zero automatically.

Step Three - Remove zero cuvette and insert sample. Press the button to measure your results.

The HI753 uses an adaptation of the mercury(II) thiocyanate method.

Specifications	HI753
Range	0.0 to 20.0 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	± 0.5 ppm ± 6% of reading
Light Source	LED @ 470 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the mercury(II) thiocyanate method
Ordering Information	**HI753** Checker®HC is supplied with sample cuvettes with caps (2), chloride reagent starter kit (reagents for 25 tests), syringes with tips (2), battery, instructions and quick start guide.
Reagent Set	**HI753-25** (25 tests)
Calibration Set	**HI753-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI701 · HI762

Free Chlorine and Ultra Low Range Free Chlorine

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
  - EPA approved DPD method
  - Large, easy-to-read digits
  - Auto shut off
- Dedicated to a single parameter
- Small size, big convenience
  - The Checker®HC easily fits into the palm of your hand or pocket
  - Use for quick and accurate on-the-spot analysis
  - Single-button operation: zero and measure
- Ideal for:
  - Swimming pools and spas
  - Fruit and vegetable sanitation
  - Disinfection
  - Drinking water and quality control checks

The HI701 and HI762 Checker®HC bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. These meters are accurate and affordable.

The HI701 features a resolution of 0.01 ppm and ±0.03 ppm ±3% of reading accuracy while the HI762 features a resolution of 1 ppb and ±20 ppb ±4% of reading accuracy. Both meters use an EPA approved DPD method.

The contoured style of the Checker HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

These meters are extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker HC, press the button and read the results. It's that easy.

Specifications	HI701	HI762 (ULR)
Range	0.00 to 2.50 ppm	0 to 500 ppb
Resolution	0.01 ppm	1 ppb
Accuracy @ 25°C/77°F	±0.03 ppm ±3% of reading	±20 ppb ±4% of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of USEPA method 330.5, DPD method	
Ordering Information	**HI701** Checker®HC is supplied with sample cuvettes with caps (2), free chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI762** Checker®HC is supplied with sample cuvettes with caps (2), free chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.	
Reagent Set	**HI701-25** (25 tests)	**HI762-25** (25 tests)
Calibration Set	**HI701-11**	**HI762-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI711 · HI761 · HI771

Total, Total Ultra Low Range and Ultra High Range Chlorine

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Swimming pools and spas
  - Fruit and vegetable sanitation/disinfection
  - Drinking water
  - Quality control checks
  - Environmental
  - Hospitality
  - Food processing

Chlorine is the most common water disinfectant. The monitoring of chlorine is crucial in applications such as swimming pools and spas, fruit and vegetable sanitation, disinfection and drinking water. By monitoring this crucial parameter, serious health and safety risks can be avoided.

The HI711, HI761, and HI771 Checker®HC Handheld Colorimeters bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time consuming to calibrate and maintain. Hanna's Checker HC's are an accurate and affordable alternative.

The contoured style of these Checkers fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

These Checker HC's are designed to be portable and easy to use, providing quick, accurate results in four easy steps.

Specifications	HI711 (Total)	HI761 (Total ULR)	HI771 (UHR)
Range	0.00 to 3.50 ppm	0 to 500 ppb	0 to 500 ppm
Resolution	0.01 ppm	1 ppb	1 ppm
Accuracy @ 25°C/77°F	±0.03 ppm ±3% of reading	±5 ppb ±5% of reading	±3 ppm ±5% of reading
Light Source	LED @ 525 nm		
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	adaptation of USEPA method 330.5, DPD method		adaptation of the Standard Methods for Water and Wastewater, 20th Edition 4500-Cl
Ordering Information	**HI711** Checker®HC is supplied with sample cuvettes with caps (2), total chlorine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI761** Checker®HC is supplied with sample cuvettes with caps (2), total chlorine ULR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI771** Checker®HC is supplied with sample cuvettes with caps (2), Chlorine UHR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.		
Reagent Set	**HI711-25** (25 tests)	**HI761-25** (25 tests)	**HI771-25** (25 tests)
Calibration Set	**HI711-11**	**HI761-11**	**HI771-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI749 · HI723

Chromium VI Low Range and High Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for
  - Water quality
  - Environmental
  - Plating
  - Education

There are two natural forms of ionic chromium: the hexavalent Cr(VI) and the trivalent Cr(III). Cr(III) is much less toxic than Cr(VI) and seldom found in potable waters. Cr(VI), however, is toxic to humans and is found in water. Even though the toxic effects from Cr(VI) in drinking water are not well documented, it is a suspected carcinogen.

There are many industries that use chromic acid and other forms of Cr(VI) that could be a possible source of Cr(VI) pollution in either water, air, or both. One industry that can introduce Cr(VI) to water sources is the chrome-plating industry. Chromic acid is used in the electroplating process and can be present in industrial waste waters. Cr(VI) also can enter water supplies from industrial cooling towers where chromic acid is added to the water to inhibit metal corrosion.

The maximum permissible level of Cr(VI) allowed to be released into the waterways is 50 ppb. Its level in drinking water is normally much lower, and a level higher than 3 ppb is suggestive of industrial pollution.

The HI723 and HI749 Checker®HC Handheld Colorimeters are a simple, accurate, and cost effective way to measure Cr(VI). Each model is designed for a specific range (low or high) in order to provide high levels of accuracy.

The contoured style of these Checker HC's fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

Specifications	HI749 (LR)	HI723 (HR)
Range	0 to 300 ppb	0 to 999 ppb
Resolution	1 ppb	1 ppb
Accuracy @ 25°C/77°F	±3 ppb ±5% of reading	±5 ppb ±4% of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the ASTM, Manual of Water and Enviornmental Technology, D 1687-92, Diphenylcarbohydrazide method	
Ordering Information	**HI749** Checker®HC is supplied with sample cuvettes with caps (2), chromium LR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI723** Checker®HC is supplied with sample cuvettes with caps (2), chromium HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.	
Reagent Set	**HI749-25** (25 tests)	**HI723-25** (25 tests)
Calibration Set	**HI749-11**	**HI723-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI727

Color of Water

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for water quality

True color is caused by dissolved compounds in water and can be both natural or artificial. Apparent color is caused by both dissolved and suspended solids. Color is measured in Platinum-Cobalt units (PCU). The AWWA recommends ≤ 15 PCU.

The term "true color" is defined as the color of water from which turbidity has been removed. The term "apparent color" includes not only color due to substances in solution, but also color that is due to suspended matter. Apparent color is determined on the original sample without filtration or centrifugation. In some highly-colored industrial wastewaters, color is contributed principally by colloidal or suspended material. In such cases, both true color and apparent color should be determined.

To determine true color, turbidity must be removed before analysis. Methods for removing turbidity without removing color vary. Filtration yields results that are reproducible from day to day among laboratories, however, some filtration procedures may also remove some true color. Centrifugation avoids interaction of color with filter materials, but results vary with the sample nature, size, and speed of the centrifuge. When sample dilution is necessary, whether it precedes or follows turbidity removal, it can alter the measured color. Acceptable pretreatment procedures are included with each method. The pretreatment method should be stated when reporting the results.

The HI727 Checker®HC is very simple to use. First, zero the instrument with deionized water. Next, prepare the sample according to the Apparent/True color measurement. Place the second vial with prepared sample into the Checker HC, press the operational button and the HI727 Checker® displays the color of water in PCU.

Specifications	HI727
Range	0 to 500 PCU
Resolution	5 PCU
Accuracy @ 25°C/77°F	±10 PCU ±5% of reading
Light Source	LED @ 470 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 21st edition, Colorimetric Platinum Cobalt method
Ordering Information	**HI727** Checker®HC is supplied with sample cuvettes with caps (2), battery, instructions and quick start guide.
Calibration Set	**HI727-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI759

Maple Syrup Digital Grader

Handheld Colorimeter

- Easy to use
- Results are displayed % transmittance
- Small size, big convenience

The season of maple syrup production spans several months between winter and spring each year. As the days get longer and warmer and the nights stay below freezing, the sap from maple trees begins to flow and tapping begins. At the beginning of production season, the sap produces a lighter, sweeter syrup comprised of sucrose as the main sugar content. As the season progresses and temperatures rise, microorganisms grow and colonize the sap as it is collected. These bacteria, while not harmful, convert part of the sucrose present into invert sugars, glucose and fructose. The level of invert sugars in the sap, as well as the chemical processes that occur during boiling, are responsible for creating a darker and stronger flavored syrup product.

Maple syrup grading standards for the United States and Canada allow consumers to easily distinguish between the different grades of syrup, regardless of the place of origin.

The HI759 Maple Syrup Digital Grader is a handheld colorimeter designed for quick, accurate determination of maple syrup. The HI759 is designed as a more accurate alternative to temporary and permanent visual grading kits, providing quick, accurate results in four easy steps.

Step One - Add a sample tothe included cuvette(s).

Step Two - Insert the glycerol reference cuvette, close the lid, and press the button to zero.

Step Three - Remove the glycerol reference cuvette and replace with a sample cuvette.

Step Four - Close the lid and press the button. Reading will be taken automatically and the results displayed.

This Maple Syrup Digital Grader measures the percent light transmittance of the syrup and directly displays the percentage results on the large, easy to read LCD display. Located on the back of the meter is a chart referencing the percent light transmittance to the grade. Eliminating the subjectivity of grading by eye and the potential for mislabeling, the HI759 is grading made simple.

State of Vermont Grades and Standards

(New IMSI* standards)

Grade A Color Classes	Taste	Light Transmittance
Grade A Golden	Delicate	≥ 75
Grade A Amber	Rich	50 to 74
Grade A Dark	Robust	25 to 49
Grade A Very Dark	Strong	< 25

* International Maple Syrup Institute

Specifications	HI759
Range	0 to 100% transmittance
Resolution	1% transmittance
Accuracy	±4% transmittance
Light Source	light emitting diode @ 560 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Ordering Information	**HI759** Checker®HC is supplied with sample cuvettes with caps (3), glycerol standard cuvette, plastic beakers (3), battery, instructions and quick reference guide.
Accessories	**HI759-11** glycerol reference cuvettes (2 pcs) **HI731359** round glass cuvettes with plastic inserts (25)

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI747 · HI702

Copper Low Range and High Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Water Quality
  - Education
  - Aquarium
  - Wastewater
  - Environmental

The HI702 and HI747 Checker®HC are simple, accurate, and cost effective way to measure high and low ranges of copper. Designed as a more accurate alternative to chemical test kits, the HI702 and HI747 provide quick, accurate results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press button to zero.

Step Three - Remove sample and add reagent packet.

Step Four - Reinsert sample, press and hold the button for 3 seconds to start reaction timer. Reading will be taken automatically and the results displayed.

The HI702 and HI747 uses an adaptation of the EPA method. The reaction between copper and the bicinchoninate reagent causes a purple tint in the sample.

Specifications	HI747 (LR)	HI702 (HR)
Range	0 to 999 ppb	0.00 to 5.00 ppm
Resolution	1 ppb	0.01 ppm
Accuracy @ 25°C/77°F	± 10 ppb ± 5% of reading	± 0.05 ppm ±5% of reading
Light Source	LED @ 575 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the EPA method. The reaction between copper and the bicinchoninate reagent causes a purple tint in the sample	
Ordering Information	**HI747** Checker®HC is supplied with sample cuvettes with caps (2), copper LR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI702** Checker®HC is supplied with sample cuvettes with caps (2), copper HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.	
Reagent Set	**HI747-25** (25 tests)	**HI702-25** (25 tests)
Calibration Set	**HI747-11**	**HI702-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI729 · HI739

Fluoride Low Range and High Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for water quality

Fluoride is one of the very few chemicals that have been shown to cause significant effects in people through drinking water. Fluoride has beneficial effects on teeth at low concentrations in drinking water, but excessive exposure to fluoride in drinking water, or in combination with exposure to fluoride from other sources, can give rise to a number of adverse effects.

A 1994 World Health Organization expert committee suggested a level of fluoride from 0.5 to 1.0 ppm, depending on climate. Bottled water typically has unknown fluoride levels, and some domestic water filters remove some or all fluoride.

Specifications	HI729 (LR)	HI739 (HR)
Range	0.00 to 2.00 ppm	0.0 to 20.0 ppm
Resolution	0.01 ppm	0.1 ppm
Accuracy* @ 25°C/77°F	±0.10 ppm ±5% of reading	±0.5 ppm ± 5% of reading
Light Source	LED @ 575 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, SPADNS method	
Ordering Information	**HI729** Checker®HC is supplied with sample cuvettes with caps (2), fluoride LR reagent starter kit (reagents for 5 tests), syringe with tip, battery, instructions and quick start guide. **HI739** Checker®HC is supplied with sample cuvettes with caps (2), fluoride HR reagent starter kit (reagents for 15 tests), syringe with tip, plastic pipette, battery, instructions and quick start guide.	
Reagent Set	**HI729-26** (20 tests)	**HI739-26** (30 tests)
Calibration Set	**HI729-11**	**HI739-11**

* Excluding sample volume error

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI719 · HI720

Magnesium and Calcium Hardness

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Water purification systems
  - Heating and cooling systems
  - Drinking water
  - Wastewater

The HI719 Checker®HC is a simple, accurate, and cost effective way to measure magnesium hardness. The HI720 Checker HC is a simple, accurate, and cost effective way to measure calcium hardness.

The HI719 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, EDTA colorimetric method. The reaction between magnesium and reagents causes a reddish-violet tint in the sample.

The HI720 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Calmagite method. The reaction between calcium and reagents causes a reddish-violet tint in the sample.

Specifications	HI719 (Magnesium Hardness)	HI720 (Calcium Hardness)
Range	0.00 to 2.00 ppm	0.00 to 2.70 ppm
Resolution	0.01 ppm	0.01 ppm
Accuracy @ 25°C/77°F	± 0.20 ppm ± 5% of reading	± 0.20 ppm ± 5% of reading
Light Source	LED @ 525 nm	
Light Detector	Silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, EDTA colorimetric method. The reaction between magnesium and reagents causes a reddish-violet tint in the sample	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Calmagite method. The reaction between calcium and reagents causes a reddish-violet tint in the sample
Ordering Information	**HI719** Checker®HC is supplied with sample cuvettes with caps (2), magnesium hardness reagent starter kit (reagents for 25 tests), syringes with tips (2), plastic beaker, battery, instructions and quick start guide. **HI720** Checker®HC is supplied with sample cuvettes with caps (2), calcium hardness reagent starter kit (reagents for 25 tests), syringes with tips (2), plastic beaker, battery, instructions and quick start guide.	
Reagent Set	**HI719-25** (25 tests)	**HI720-25** (25 tests)
Calibration Set	**HI719-11**	**HI720-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI718

Iodine

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
  - DPD method
  - ±0.1 ppm ±5% of reading accuracy
  - Large, easy-to-read digits
  - Auto shut-off
- Dedicated to a single parameter
  - Designed to work with Hanna's powder reagents
- Small size, big convenience
  - Weighing a mere 64 g (2.25 oz.), the Checker®HC easily fits into the palm of your hand or pocket
  - Use for quick and accurate on-the-spot analysis
  - Single-button operation: zero and measure
- Ideal for:
  - Swimming pools and spas
  - Industrial processes and disinfection

Iodine is sometimes used as a disinfectant for swimming pools, spas and potable water. It has also found use as a disinfectant in the poultry industry. The rapid determination of iodine is required for adequate control of this bactericide.

The Hanna Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time-consuming to calibrate and maintain. The HI718 Checker HC is accurate and affordable.

The HI718 Checker HC portable handheld colorimeter features a resolution of 0.1 ppm and accuracy of ±0.1 ppm ±5% of reading. This Checker HC uses a modification of the DPD method used for residual chlorine.

The contoured style of this Checker HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

Specifications	HI718
Range	0.0 to 12.5 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	±0.1 ppm ±5% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, DPD method
Ordering Information	**HI718** Checker®HC is supplied with sample cuvettes with caps (2), iodine reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI718-25** (25 tests)
Calibration Set	**HI718-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI746 · HI721

Iron Low Range and High Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Industrial ground and treated waters
  - Mining leachate monitoring
  - Agricultural irrigation water

About 6.3% of the earth's crust is made of iron, of which 43% is in soils. The analysis of iron is often performed to monitor ground water and irrigation waters as a gauge of corrosion from industrial settling, and as an indication of the effectiveness of treatment from mining leachate.

The Hanna HI746 and HI721 Checker®HC bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give 5 to 10 points resolution, while professional instrumentation can cost hundreds of dollars and can be time-consuming to calibrate and maintain. these meters are accurate, affordable and produce immediate results.

The HI721 features a resolution of 0.01 ppm and ±0.04 ppm ±2% of reading accuracy while the HI746 features 1 ppb resolution and ±20 ppb ±5% of reading accuracy.

The contoured style of these meters fit in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures battery life will not be drained if you forget to turn it off.

Specifications	HI746 (LR)	HI721 (HR)
Range	0 to 999 ppb	0.00 to 5.00 ppm
Resolution	1 ppb	0.01 ppm
Accuracy @ 25°C/77°F	±20 ppb ±5% of reading	±0.04 ppm ±2% of reading
Light Source	LED @ 575 nm	LED @ 525 nm
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	after three minutes of non-use and two minutes after reading
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the TPTZ method	Adaptation of Standard Method 3500-Fe B, Phenanthroline Method
Ordering Information	**HI746** Checker®HC is supplied with sample cuvettes with caps (2), iron LR reagent starter kit (reagents for 25 tests), 25 mL glass cylinders with rubber cap (2), battery, instructions and quick start guide. **HI721** Checker®HC is supplied with sample cuvettes with caps (2), iron HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.	
Reagent Set	**HI746-25** (25 tests)	**HI721-25** (25 tests)
Calibration Set	**HI746-11**	**HI721-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI709

Manganese High Range

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Water Quality
  - Education
  - Aquarium
  - Wastewater
  - Environmental

The HI709 Checker®HC is a simple, accurate, and cost effective way to measure high ranges of manganese. Designed as a more accurate alternative to chemical test kits, the HI709 provides quick, accurate results in four easy steps.

Step One - Add a sample to the included cuvette(s).

Step Two - Insert sample into the Checker HC and press the button to zero.

Step Three - Remove sample and add reagent.

Step Four – Reinsert sample, press and hold the button for 3 seconds to start reaction timer. Reading will be taken automatically and the results displayed.

The HI 709 uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Periodate method. The reaction between manganese and reagents causes a pink tint in the sample.

Specifications	HI709 (HR)
Range	0.0 to 20.0 ppm
Resolution	0.1 ppm
Accuracy @ 25°C/77°F	± 0.2 ppm ± 5% of reading
Light Source	LED @ 525 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Periodate method. The reaction between manganese and reagents causes a pink tint in the sample
Ordering Information	**HI709** Checker®HC is supplied with sample cuvettes with caps (2), manganese HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI709-25** (25 tests)
Calibration Set	**HI709-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI726

Nickel High Range

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Steel manufacturing
  - Electroplating and electronics production

Nickel is extensively used in electroplating, the manufacturing of steel, electronic devices, ceramics and colored glasses. It plays a vital role in many processes of applied sciences and fundamental sciences.

Nickel is seldom found in natural waters, but is often present in industrial wastewater as a direct by-product of metal plating baths, and as a corrosion by-product of stainless steel, nickel or cobalt alloys.

The most serious effects of nickel exposure include lung cancer and nasal sinus in people who have breathed nickel dust while working in nickel refineries or in nickel processing plants. Other lung effects including chronic bronchitis and reduced lung function have been observed in workers breathing nickel. The levels of nickel in the workplace were much higher than background levels. The International Agency for Research on Cancer (IARC) has determined that some nickel compounds are carcinogenic to humans and that metallic nickel may possibly be carcinogenic to humans. The EPA has determined that nickel refinery dust and nickel subsulfide are human carcinogens.

The HI726 Checker®HC is extremely simple to use. First, zero the instrument with your water sample. Next, add the reagent, shake gently until complete dissolution. Last, place the vial into the Checker HC, press the button for 3 seconds. The display will show the countdown prior to the measurement. When the timer ends the meter will perform the reading and display concentration in g/L of nickel. It's that easy.

Specifications	HI726 (HR)
Range	0.00 to 7.00 g/L
Resolution	0.01 g/L
Accuracy @ 25°C/77°F	±0.10 g/L ±5% of reading
Light Source	LED @ 575 nm
Light Detector	silicon photocell
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
Battery Type	(1) 1.5V AAA
Auto-off	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")
Weight	64 g (2.3 oz)
Method	adaptation of the photometric method
Ordering Information	**HI726** Checker®HC is supplied with sample cuvettes with caps (2), nickel HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.
Reagent Set	**HI726-25** (25 tests)
Calibration Set	**HI726-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI764 · HI707 · HI708

Nitrite Low Range, High Range and Marine Nitrite Ultra Low Range

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Aquaculture
  - Aquariums
  - Education
  - Environmental
  - Water quality
  - Wastewater

Nitrification is the biological oxidation of ammonia (ammonium ion) into nitrite, followed by the oxidation of nitrite to nitrate. The first step of this two-step process is carried out in an aquarium by nitrifying bacteria. During this quick process, the ammonium levels drop while the nitrite levels increase. Since nitrite is just as harmful as ammonia, nitrite levels should be maintained at immeasurable levels. A mature biological filter should be able to keep nitrite levels low.

The HI707, HI708 and HI764 Checker®HC Handheld Colorimeters bridge the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate, while professional instrumentation can cost hundreds of dollars and can be time-consuming to calibrate and maintain. Hanna Checker HC's are accurate, affordable and easy to use.

To begin measurements, first zero the instrument with your water sample. Next, add the reagent. Last, place the vial into the Checker HC, press and hold the button for 3 seconds to start reaction timer. reading will be taken automatically and the results displayed. It's that easy.

The contoured style of the Checker HC fits in your palm and pocket perfectly and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

Specifications	HI764 (Marine ULR)	HI707 (LR)	HI708 (HR)
Range	0 to 200 ppb NO_2^-–N	0 to 600 ppb NO_2^-	0 to 150 ppm NO_2^-
Resolution	1 ppb	1 ppb	1 ppm
Accuracy @ 25°C/77°F	±10 ppb ±4% of reading	±20 ppb ±5% of reading	±3 ppm ±5% of reading
Light Source	LED @ 525 nm	LED @ 470 nm	LED @ 575 nm
Light Detector	silicon photocell		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Battery Type	(1) 1.5V AAA		
Auto-off	after two minutes of non-use	after ten minutes of non-use	
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")		
Weight	64 g (2.3 oz)		
Method	adaptation of the EPA Diazotization method 354.1		adaptation of the Ferrous Sulfate method
Ordering Information	**HI764** Checker®HC is supplied with sample cuvettes with caps (2), marine nitrite ULR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI707** Checker®HC is supplied with sample cuvettes with caps (2), nitrite LR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI708** Checker®HC is supplied with sample cuvettes with caps (2), nitrite HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide.		
Reagent Set	**HI764-25** (25 tests)	**HI707-25** (25 tests)	**HI708-25** (25 tests)
Calibration Set	**HI764-11**	**HI707-11**	**HI708-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI713 · HI717

Phosphate

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Aquaculture
  - natural, waste, agricultural and drinking waters

Orthophosphates are found in natural waters and wastewaters. They are commonly added to drinking water as a corrosion inhibitor. The instantaneous analysis of orthophosphates by colorimetric determination provides rapid results using a standard analysis technique.

The Hanna HI713 and HI717 Checker®HC bridges the gap between simple chemical test kits and professional instrumentation. Chemical test kits are not very accurate and only give only some points resolution, while professional instrumentation can cost hundreds of dollars and can be time-consuming to calibrate and maintain. The Hanna HI713 and HI717 Checker HC's are accurate and affordable.

The HI713 Checker HC portable handheld colorimeter features a resolution of 0.01 ppm and ±0.04 ppm ±4% of reading accuracy. The HI713 Checker HC uses an adaptation of the Ascorbic Acid method.

The HI717 Checker HC portable handheld colorimeter features a resolution of 0.1 ppm and ±1.0 ppm ±5% of reading accuracy. The HI717 Checker HC uses an adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method.

Specifications	HI713 (LR)	HI717 (HR)
Range	0.00 to 2.50 ppm	0.0 to 30.0 ppm
Resolution	0.01 ppm	0.1 ppm
Accuracy @ 25°C/77°F	±0.04 ppm ±4% of reading	±1.0 ppm ±5% of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the Ascorbic Acid method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Amino Acid method
Ordering Information	**HI713** Checker®HC is supplied with sample cuvettes with caps (2), phosphate LR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI717** Checker®HC is supplied with sample cuvettes with caps (2), phosphate HR reagent starter kit (reagents for 20 tests), battery, instructions and quick start guide.	
Reagent Set	**HI713-25** (25 tests)	**HI717-25** (40 tests)
Calibration Set	**HI713-11**	**HI717-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI736 · HI706

Phosphorus

Handheld Colorimeters

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for aquaculture

Plants, algae and phytoplankton require phosphorus for nourishment and utilize phosphorous as a component of cell tissue. When organic matter such as plant tissue, dead fish, algae, or uneaten food breaks down aerobically (with oxygen), phosphate is produced, This results in rapid oxygen depletion of aquarium water, which in turn suffocates aquatic life and compounds the problem.

Phosphorus concentration in water is monitored because it causes corrosion when present in levels too high.

Both the Hanna HI736 and HI706 Checker®HC's bridge the gap between simple chemical test kits and professional instrumentation. The Hanna HI736 (for marine applications) and HI706 (for fresh water applications) are both accurate and affordable.

The HI736 Checker HC portable handheld colorimeter features a resolution of 1 ppb and ±5 ppb ±5% of reading accuracy and uses an adaptation of the Ascorbic Acid.

SPECIFICATIONS	HI736 (Marine ULR)	HI706 (HR)
Range	0 to 200 ppb	0.0 to 15.0 ppm
Resolution	1 ppb	0.1 ppm
Accuracy @ 25°C/77°F	±5 ppb ±5% of reading	±0.3 ppm ±5% of reading
Light Source	LED @ 525 nm	
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after three minutes of non-use and two minutes after reading	after ten minutes of non-use
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the Ascorbic Acid method	adaptation of the Standard Methods for the Examination of Water and Wastewater, 18th edition, Heteropolymolybdenum Blue method.
ORDERING INFORMATION	**HI736** Checker®HC is supplied with sample cuvettes with caps (2), marine phosphorus ULR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI706** Checker®HC is supplied with sample cuvettes with caps (2), phosphorus HR reagent starter kit (reagents for 20 tests), battery, instructions and quick start guide.	
Reagent Set	**HI736-25** (25 tests)	**HI706-25** (40 tests)
Calibration Set	**HI736-11**	**HI706-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

HI770 · HI705

Silica High Range and Low Range

Handheld Colorimeter

- Easier to use and more accurate than chemical test kits
- Dedicated to a single parameter
- Small size, big convenience
- Ideal for:
  - Aquaculture, water quality
  - Environmental, water treatment

Silica is the name given to silicon dioxide, SiO_2. Silicon (Si), is the most abundant element in the Earth's crust, 28% of it by weight. Silicon is never found free form in nature. In crystallized form it is only reactive under conditions of extremely high temperatures. Water and water vapor have little influence upon silicon solubility, because a protective surface layer of silicon dioxide is rapidly formed. Silicon binds with other elements to form various species of silica and silicate. The concentration of the soluble silica molecules are important to aquaculture because they influence (and limit) the growth of diatoms. In most waters, the predominant form of dissolved silica is monosilicic acid, which incorporates two water molecules.

The HI705 and HI770 Checker®HC Handheld Colorimeters are a simple, accurate, and cost effective way to measure silica. Each model is designed for a specific range (low or high) in order to provide high levels of accuracy.

The contoured style of these Checkers HC fit easily in the palm of your hand or pocket and the large LCD is easy to read. The auto shut-off feature assures the battery life will not be drained if you forget to turn it off.

SPECIFICATIONS	HI770 (HR)	HI705 (LR)
Range	0 to 200 ppm	0.00 to 2.00 ppm
Resolution	1 ppm	0.01 ppm
Accuracy @ 25°C/77°F	±2 ppm ±5% of reading	±0.03 ppm ±5% of reading
Light Source	LED @ 470 nm	LED @ 610 nm
Light Detector	silicon photocell	
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing	
Battery Type	(1) 1.5V AAA	
Auto-off	after ten minutes of non-use	after three minutes of non-use and two minutes after reading
Dimensions	86.0 x 61.0 x 37.5 mm (3.4 x 2.4 x 1.5")	
Weight	64 g (2.3 oz)	
Method	adaptation of the USEPA method 370.1 for drinking, surface and saline waters and Standard Method 4500-SiO_2 C for domestic and industrial waters	adaptation of the ASTM D859, heteropoly blue method
ORDERING INFORMATION	**HI770** Checker®HC is supplied with sample cuvettes with caps (2), silica HR reagent starter kit (reagents for 6 tests), battery, instructions and quick start guide. **HI705** Checker®HC is supplied with sample cuvettes with caps (2), silica LR reagent starter kit (reagents for 12 tests), battery, instructions and quick start guide.	
Reagent Set	**HI770-25** (25 tests)	**HI705-25** (25 tests)
Calibration Set	**HI770-11**	**HI705-11**

See page 10.120 for Checker HC reagents, calibration sets and accessories

Checker®HC Reagents and Calibration Check Sets

Meter Code	Parameter	Chemical Method	Reagent Code	Calibration Checking Set	# of Tests
HI700	Ammonia LR	Nessler*	**HI700-25**	**HI700-11**	25
HI701	Chlorine, Free	DPD*	**HI701-25**	**HI701-11**	25
HI702	Copper HR	Bicinchoninate*	**HI702-25**	**HI702-11**	25
HI705	Silica LR	Heteropoly Blue*	**HI705-25**	**HI705-11**	25
HI706	Phosphorus HR	Amino Acid*	**HI706-25**	**HI706-11**	40
HI707	Nitrite LR	Diazotization*	**HI707-25**	**HI707-11**	25
HI708	Nitrite HR	Ferrous Sulfate*	**HI708-25**	**HI708-11**	25
HI709	Manganese HR	Periodate*	**HI709-25**	**HI709-11**	25
HI711	Chlorine, Total	DPD*	**HI711-25**	**HI711-11**	25
HI713	Phosphate LR	Ascorbic Acid*	**HI713-25**	**HI713-11**	25
HI715	Ammonia MR	Nessler*	**HI715-25**	**HI715-11**	25
HI716	Bromine	DPD*	**HI716-25**	**HI716-11**	25
HI717	Phosphate HR	Amino Acid*	**HI717-25**	**HI717-11**	40
HI718	Iodine	DPD*	**HI718-25**	**HI718-11**	25
HI719	Magnesium Hardness	EDTA*	**HI719-25**	**HI719-11**	25
HI720	Calcium Hardness	Calmagite*	**HI720-25**	**HI720-11**	25
HI721	Iron HR	Phenantroline*	**HI721-25**	**HI721-11**	25
HI723	Chromium VI HR	Diphenylcarbohydrazide*	**HI723-25**	**HI723-11**	25
HI726	Nickel HR	Photometric*	**HI726-25**	**HI726-11**	25
HI727	Color of Water	Colorimetric Platinum Cobalt*	–	**HI727-11**	–
HI729	Fluoride LR	SPADNS*	**HI729-26**	**HI729-11**	20
HI733	Ammonia HR	Nessler*	**HI733-25**	**HI733-11**	20
HI736	Phosphorus, Marine ULR	Ascorbic Acid*	**HI736-25**	**HI736-11**	25
HI739	Fluoride HR	SPADNS*	**HI739-26**	**HI739-11**	30
HI746	Iron LR	TPTZ*	**HI746-25**	**HI746-11**	25
HI747	Copper LR	Bicinchoninate*	**HI747-25**	**HI747-11**	25
HI749	Chromium LR	Diphenylcarbohydrazide*	**HI749-25**	**HI749-11**	25
HI753	Chloride	Mercury(II) Thiocyanate	**HI753-25**	**HI753-11**	25
HI755	Alkalinity, Marine	Colorimetric	**HI755-26**	**HI755-11**	25
HI758	Calcium, Marine	Zincon*	**HI758-26**	**HI758-11**	25
HI761	Chlorine, Total ULR	DPD*	**HI761-25**	**HI761-11**	25
HI762	Chlorine, Free ULR	DPD*	**HI762-25**	**HI762-11**	25
HI764	Nitrite, Marine ULR	Diazotization*	**HI764-25**	**HI764-11**	25
HI770	Silica HR	USEPA 370.1*/Std. Mtd. 4500-SiO_2C*	**HI770-25**	**HI770-11**	25
HI771	Chlorine, Total UHR	4500-Cl*	**HI771-25**	**HI771-11**	25
HI772	Alkalinity, Marine	Colorimetric	**HI772-26**	**HI772-11**	25
HI775	Alkalinity	Colorimetric	**HI775-26**	**HI775-11**	25

*adaptation

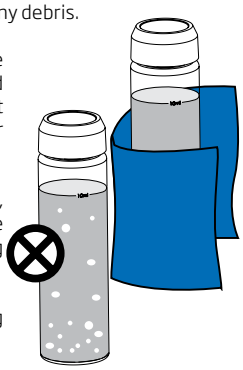
Checker HC Accessories

Code	Description
HI731318	cuvette cleaning cloth (4)
HI731315	glass cuvettes and caps (2)
HI731321	glass cuvettes (4)
HI731225	cuvette cap for Checker®HC (4)
HI93703-50	cuvette cleaning solution
HI740226	5 mL graduated syringe
HI740157P	plastic refilling pipette (20)
HI740144P	pipette tip (6)
HI740143	1 mL graduated syringe (6)
HI740036P	100 mL plastic beaker (10)
HI70436M	deionized water (230 mL)
HI70436	deionized water (1G)

Tips for an accurate measurement

It is important that the sample does not contain any debris.

Whenever the cuvette is placed into the measurement cell, it must be dry outside and completely free of fingerprints, oil or dirt. Wipe it thoroughly with HI731318 or a lint-free cloth prior to insertion.



Shaking the cuvette can generate bubbles, causing higher readings. To obtain accurate measurements, remove such bubbles by swirling or by gently tapping the cuvette.

Do not let the reacted sample stand for too long after reagent is added, or accuracy will be lost.

After the reading, it is important to discard the sample immediately, otherwise the glass might become permanently stained.