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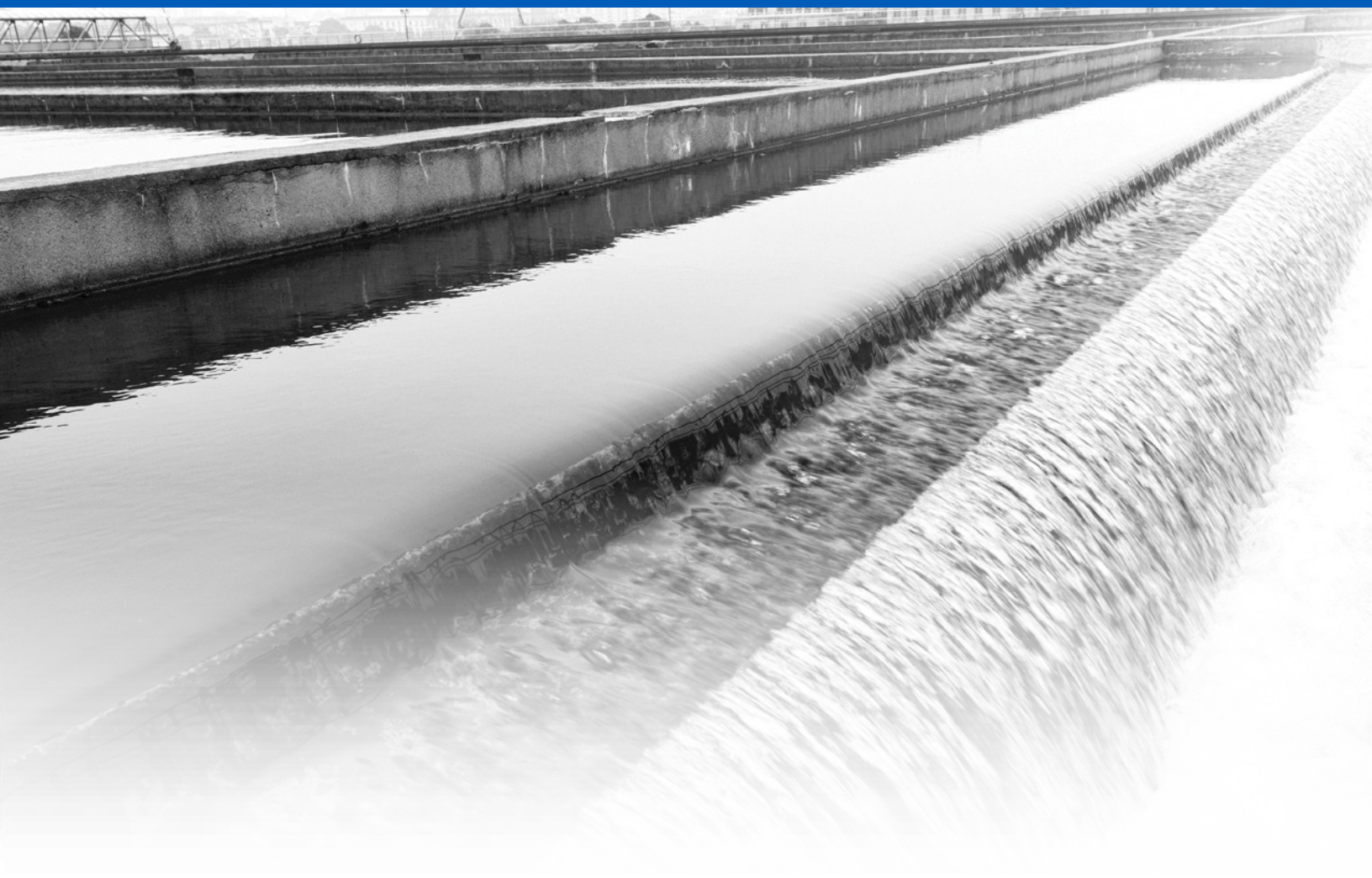


Water and Wastewater Analysis Catalog

HANNA® instruments

Hanna Design and Manufacturing

In a short time, Hanna has reached its target to produce all of its instrumentation in-house. Since the introduction of its industrial science park located in Romania, the facility is equipped to support all phases of production such as product research and design, plastic injection molding, electronic assembly, glass blowing for electrodes, standards production and final assembly of product. Hanna oversees all aspects of its products from conception to the final quality check and packaging.

Our Woonsocket and Smithfield, RI facilities house our primary research and development centers and assemble select products such as titrators, ISEs, and HI921 autosampler.

Hanna also produces the packaging for all product lines. Each package is carefully designed for safety and practicality. The in-house control of all research, design and production steps provides continual quality control at all phases to assure the highest level of quality.

After continuous validation and testing, Hanna products undergo a final quality check before they are packaged and released to consumers.

In-house production affords Hanna the freedom to efficiently bring new and innovative products to market while continuously improving the quality and features of existing products to meet the needs of customers.

HANNA is the largest family-owned manufacturer of analytical instrumentation in the world.

For over 35 years, HANNA has delivered fresh and innovative products to its customers.

Contents

ISO 9001:2008 CERTIFIED

These instruments are manufactured in our European state-of-the-art ISO 9001:2008 production facility and is CE compliant to EN 61326-1 and EN 61010-1 standards.

Alkalinity & Volatile Acidity

Anaerobic digestion is a common two-stage treatment process for breaking down wastewater sludge. In the first stage, saprophytic bacteria consume organic matter present in the sludge and convert it to volatile acids; in the second stage, methane-forming bacteria convert the volatile acids to carbon dioxide and methane. In a healthy digester, the volatile acids formed by the saprophytic bacteria are consumed as an energy source by the methane producers at the rate in which they are being formed. The alkalinity of the sludge buffers the pH from drastically changing as volatile acids are produced.

In wastewater treatment plants with high incoming BOD levels, the production of volatile acids is faster than the production of methane, resulting in an accumulation of the volatile acid intermediate. If the ratio of volatile acidity to alkalinity is too high, the volatile acids will cause the pH of the sludge to become strongly acidic. This will reduce the efficiency or even kill the anaerobic bacteria, resulting in a sour digester.

Volatile acidity and alkalinity measurements can be performed by titration (p.28).

HI3811

Alkalinity Test Kit

Alkalinity can be measured as phenolphthalein alkalinity and total alkalinity.

Specifications

Method	titration
Range	0-100 mg/L (ppm) 0-300 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 3 mg/L (ppm)
Chemical Method	phenolphthalein/ bromphenol blue
# Tests	110 avg.
Order Info	**HI3811** test kit comes with 10 mL phenolphthalein indicator, 10 mL bromophenol blue indicator, 120 mL alkalinity titrant, 10 mL calibrated vessel, 50 mL calibrated vessel, and calibrated syringe with tip.

HI84531

Titratable Alkalinity Titrator and pH Meter

for Water Analysis

- Piston driven pump with dynamic dosing
  - For highly accurate, repeatable results
- CAL Check™
  - Alerts users to potential problems during calibration such as contaminated buffers or dirty/broken pH electrodes
- Log-on-demand
  - Log data up to 400 samples (200 for titration; 200 for pH/mV)
- Graphic mode/exportable data
  - Displays in-depth data on titration, which can then be stored and exported to either a USB drive or PC using the USB connection
- Automatic stirrer speed control
  - Maintains stirrer speed at approximately 600 rpm regardless of viscosity of solution
- GLP features
- Dedicated HELP key for content sensitive help

This mini titrator and pH meter is designed for low to high levels of alkalinity. It performs a potentiometric titration with a pH electrode to determine total titratable alkalinity or strong alkalinity in water.

The CAL Check™ function not only ensures an accurate pH reading when the HI84531 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

Specifications		HI84531
Titrator	Range (as $CaCO_3$)*	Low Range: 30.0 to 400.0 mg/L; 0.6 to 8.0 meq/L High Range: 300 to 4000 mg/L; 6.0 to 80.0 meq/L
	Resolution	Low Range: 0.1 mg/L (ppm); 0.1 meq/L High Range: 1 mg/L (ppm); 1 meq/L
	Accuracy (@25°C/77°F)	Low Range: ±1 mg/L or 3% of reading, whichever is greater High Range: ±10 mg/L or 3% of reading, whichever is greater
pH	Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
	Resolution	0.1 pH / 0.01 pH
	Accuracy (@25°C/77°F)	± 0.01 pH
	Calibration	one, two or three-point calibration; four available buffers (4.01, 7.01, 8.30, 10.01)
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	± 1.0 mV
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F; 253.2 to 393.2 K
	Resolution	0.1°C; 0.1°F; 0.1 K
	Accuracy	±0.4°C; ±0.8°F; ±0.4 K
Ordering Info	**HI84531** is supplied with HI1131B pH electrode, HI7662-T temperature probe, HI84531-70 reagent kit for water analysis, 100 mL beakers (2), dosing pump valve, 5 mL syringe, 1 mL plastic pipette, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, power adapter, instruction manual and quality certificate.	
Reagents and Accessories	**HI84531-50** titrant solution for low range, 120 mL	**HI740236** 5 mL syringe for mini titrator
	HI84531-51 titrant solution for high range, 120 mL	**HI70500** tube set with cap for titrant bottle, tip and valve
	HI84531-55 pump calibration standard, 230 mL	**HI920013** PC connection cable

* 1 gpg = 17 ppm $CaCO_3$

HI96700C • HI96715C

Ammonia Portable Photometers

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96700C and HI96715C meters measure the ammonia-nitrogen (NH_3–N) content in water samples.

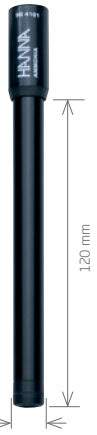
Specifications	HI96700C Ammonia LR		HI96715C Ammonia MR
Range	0.00 to 3.00 mg/L (ppm) (as NH_3–N)		0.00 to 9.99 mg/L (ppm) (as NH_3–N)
Resolution	0.01 mg/L		0.01 mg/L
Accuracy @ 25°C (77°F)	±0.04 mg/L ±4% of reading		±0.05 mg/L ±5% of reading
Ordering Info	**HI96700C** and **HI96715C** is supplied with 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)

HI4101

Ammonia Ion Selective Electrode

ISE

For use with compatible ISE meters



Specifications	
Measurement Range	1M to 1•10^{-6}M 17000 to 0.02 mg/L (ppm) 14000 to 0.016 mg/L as N
Optimum pH Range	>11
Temperature Range	0 to 40°C
Approximate Slope	-56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	Delrin®
Ordering Info	**HI4101** gas-sensing; combination ISE with 1m coaxial cable and BNC connection

HI3815

Chloride Test Kit

Specifications	
Method	titration
Range	0-100 mg/L (ppm) 0-1000 mg/L (ppm)
Smallest Increment	1 mg/L (ppm) 10 mg/L (ppm)
Chemical Method	mercuric nitrate
# Tests	110 avg.
Ordering Info	**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.

HI4107

Chloride Ion Selective Electrode

ISE

For use with compatible ISE meters

Specifications	
Measurement Range	1M to 5•10^{-5}M 35000 to 1.8 mg/L (ppm)
Optimum pH Range	2 to 11
Temperature Range	0 to 80°C
Approximate Slope	-56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI
Ordering Info	**HI4107** solid-state; combination ISE with 1m coaxial cable and BNC connection

Ammonia

Ammonia - nitrogen, in the form of NH_3 and NH_4^+, is often present in water as a component of the nitrogen cycle. In the metabolism of proteins and amino acids, many heterotrophic bacteria, actinomycetes, and fungi (occurring in both soil and water) excrete what for them is excess nitrogen: ammonia. Generally, in unpolluted waters, ammonia and ammonium compounds occur in relatively small quantities, on the order of 0.1 mg/L, while higher levels usually indicate organic pollution. Ammonia is also recognized to be toxic to diatoms in the 7.4 to 8.5 pH range at a level of 1.1 mg/L and to fish in the same pH range, at a level of 2.5 mg/L.

In nature, the ammonia level in water can vary. Ground water normally contains ammonia due to bacterial decay of plants and animals. However, the presence of ammonia in surface water may be evidence of sanitary pollution due to waste discharges or natural causes.

Ammonia is commercially used as a fertilizer, either as such or in the form of compounds. Its presence in raw surface waters indicates animal or plant microbiological decay, and it is toxic to fish above certain critical levels.

Chloride

Chloride ions are one of the major inorganic anions in water and wastewater.

A normal adult human body contains approximately 81.7 g chloride. On the basis of a total obligatory loss of chloride of approximately 530 mg/day, a dietary intake of 9 mg of chloride per kg of body weight for adults has been recommended (equivalent to slightly more than 1 g of table salt per person per day).

Chloride toxicity has not been observed in humans except in the special case of impaired sodium chloride metabolism, e.g. in congestive heart failure. Healthy individuals can tolerate the intake of large quantities of chloride provided that there is an accompanying intake of fresh water.

Chloride concentrations in excess of about 250 mg/L can be detected by taste in water, but the threshold depends upon the associated cations. Consumers can, however, become accustomed to concentrations in excess of 250 mg/L.

Chloride increases the electrical conductivity of water and thus increases its corrosivity. In metal pipes, chloride reacts with metal ions to form soluble salts, thus increasing levels of metals in drinking-water. In lead pipes, a protective oxide layer is built up, but chloride enhances galvanic corrosion. It can also increase the rate of pitting corrosion of metal pipes.

Chlorine

Free Chlorine

Free chlorine reacts with ammonium ions and organic compounds to form chlorine compounds resulting in diminished disinfecting capabilities compared with free chlorine. These chlorine compounds together with chloramines form combined chlorine. Combined chlorine and excess free chlorine together result in total chlorine. While free chlorine has a much higher disinfectant potential, combined chlorine has a much higher stability and has a lesser volatility. There should be sufficient levels of unreacted free chlorine for adequate disinfection, but not so much as to become harmful.

Total Chlorine

The chlorination of water supplies and polluted waters is used mainly to destroy or deactivate disease-producing microorganisms. It also serves to improve the quality of drinking waters as chlorine reacts with ammonia, iron, manganese, sulfide and some organic substances.

Nevertheless, high amounts of chlorine will produce adverse effects, like formation of compounds which are potentially carcinogenic (e.g. chloroform) or harmful to aquatic life (e.g. chloramines). It is essential to ensure that the proper amount of chlorine has been added in order to fulfill the primary purpose of disinfecting and to minimize any adverse effects.

HI96711C

Chlorine, Free and Total Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96711C measures the free and total chlorine (Cl_2) content in water and wastewater.

Specifications	HI96711C Free and Total Chlorine	
Range	**Chlorine, Free (P1):** 0.00 to 5.00 mg/L (ppm); **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	
Ordering Info	**HI96711C** is supplied with 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	**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)

HI96701C

Free Chlorine Portable Photometers

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96701C measures the free chlorine (Cl_2) content in water samples.

Specifications	HI96701C Free 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	
Ordering Info	**HI96701C** is supplied with 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	**HI96701-11**	CAL Check™ Standard Cuvettes
	HI93701-01	reagents for 100 tests
	HI93701-03	reagents for 300 tests

HI38017

Free & Total Chlorine Test Kit

Low and Medium Range with Checker® Disc

Specifications	
Method	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)
Chemical Method	DPD
# Tests	200
Ordering Info	**HI38017** test kit is supplied 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

Kit versions end in a "C"

Our 96 series photometers that end with a "C" in the part number include CAL Check™ standard cuvettes, cuvette cleaning cloth and scissors (when applicable) bundled in a hardshell carrying case

HI3831T

Total Chlorine Test Kit

with Color Cube

Specifications	
Method	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Chemical Method	DPD
# Tests	50
Ordering Info	**HI3831T** test kits comes with color comparison cube, 20 mL chlorine reagent 1, 15 mL chlorine reagent 2 and 15 mL chlorine reagent 3

HI96738C

Chlorine Dioxide Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96738C meter measures the chlorine dioxide content in water samples. This meter uses an exclusive positive-locking system to ensure that the cuvette is in the same place every time it is placed into the measurement cell.

Specifications	HI96738C 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	
Ordering Info	**HI96738C** is supplied with 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

HI3829F

Free Chlorine Test Kits

With Color Cube

Specifications	
Method	colorimetric
Range	0.0-2.0 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Chemical Method	DPD
# Tests	50
Ordering Info	**HI3829F** test kit comes with color comparison cube, 20 mL reagent 1 and 15 mL reagent 2

HI96723

Chromium VI HR Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96723 measures the hexavalent chromium (Cr VI) content in water and wastewater samples.

Specifications	HI96723 Chromium VI HR	
Range	0 to 1000 µg/L (ppb)	
Resolution	1 µg/L	
Accuracy @ 25°C (77°F)	±5 µg/L ±4% of reading	
Ordering Info	**HI96723** 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	**HI96723-11**	CAL Check™ standard cuvettes
	HI93723-01	reagents for 100 tests
	HI93723-03	reagents for 300 tests

Chlorine Dioxide

Chlorine Dioxide is used primarily as a disinfectant in drinking water and also in various industrial processes. In drinking water applications, it is gaining popularity over chlorine, considering that it does not generate trihalomethanes when reacting with organic compounds. In industrial applications, it is used as a bleaching agent in such applications as pulp and paper.

Chlorine Dioxide is considered a highly-effective, eco-friendly microbiocide that carries a number of important regulatory approvals from several international organizations, including the US EPA, FDA and UK Government for many of its uses.

Chlorine and bromine react rapidly with microbiological species and chemicals in water. This reactivity is both their strength and weakness. Since chemical reactions are usually the first to take place, only the small residual of the product remaining after the chemical reaction is completed is available for microbiological control.

Chlorine dioxide is a very safe and potent biocide. It is effective over a wide pH range in both hard and soft water and does not react with most other water treatment chemicals.

Chromium

All compounds of chromium are colored; the most important are the chromates of sodium and potassium and the dichromates of potassium and ammonium. The dichromates are used as oxidizing agents in quantitative analysis, they are also used in tanning leather.

Another compound of industrial value is lead chromate, which is chrome yellow, a valuable pigment.

Chromium compounds are used in the textile industry as mordants, and by the aircraft and other industries for anodizing aluminum.

At normal temperatures, chromium is corrosion-resistant. For this reason, it plays an important role in the plating industry as well

as cooling towers. In addition, it has certain qualities that make it useful in the production processes of the textile industry.

Chromium is very useful in industry, but the by-product hexavalent chromium is produced, which is a known carcinogen, and must be removed from wastewater.

Conductivity

Electrical conductivity is the ability of a solution to conduct an electrical current. In metals, current flow is carried by free electrons; in liquids, the current is carried by ions. Ions are formed when a solid such as salt is dissolved in a liquid to form electrical components having opposite charges. The sodium chloride separates to form Na^+ and Cl^- ions. All ions present in the solution contribute to the current flowing through the sensor and therefore, contribute to the conductivity measurement. Conductivity can be used as a measure of the concentration of ions present in the sample.

TDS

Total dissolved solids (TDS) is a gravimetric measurement, but because the solids in a solution are predominately present in ionic form, they can be approximated with conductivity. The TDS scale uses 2 µS/cm = 1 ppm (part per million as $CaCO_3$), expressed as 1 mg/L TDS. The method of measurement is the same; the conductivity meters make the conversion and express the results of a measurement in TDS units.

Resistivity

For solutions with low ionic concentration, the measured conductivity becomes difficult and inaccurate. Therefore, the resistivity scale is used to express the results as opposed to fractions. The numbers are exactly the inverse of each other. The reciprocal of 0.10 µS/cm or $1/(0.10 \times 10^{-6}$ S/cm)] is then 10×10^6 ohms x cm (10 MΩ x cm). This is also commonly referred to as "mega-ohms." Either unit of measurement can be used to state exactly the same value.

HI5321

Research Grade Conductivity/TDS Meter

EC/TDS/Resistivity/Salinity and Temperature

- Measures from ultrapure water to brine
- Four-point calibration
- Three selectable logging modes (Auto, Manual and AutoHold)
- Up to 100 logging lots (10,000 records/lot)
- GLP features
- Connectivity via USB
- Real-time graphic displays
- Four-ring potentiometric probe
- Capacitive touch keypad

The HI5321 is a research grade EC/TDS/resistivity/salinity benchtop meter with a large, colored graphic LCD screen with backlight and capacitive touch keypad. It measures conductivity with an extended range from 0.001 µS/cm to 1 S/cm.

Conductivity parameters are fully configurable and include: temperature compensation coefficient, temperature reference, selectable compensation method (linear, natural water and no compensation), adjustable cell constant and TDS factor.

All ranges of conductivity, resistivity and TDS are autoranging or can be manually selected.

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)
	Calibration	automatic standard recognition, user standard single point / multi-point calibration
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)
Ordering Info		**HI5321** is supplied with HI76312 conductivity probe, HI76404W electrode holder, 1413 µS/cm conductivity standard sachets (2), 12880 µS/cm conductivity standard sachets (2), 5000 µS/cm conductivity standard sachets (2), electrode rinse solution sachets (2), 12 VDC adapter, quality certificates, quick start guide and instruction manual.

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

HI98192

Professional Waterproof Meter

EC/TDS/Resistivity/Salinity Meter

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Calibration
  - Perform up to a five point calibration
- 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)
- Log-on-demand
  - Store measurement data at the press of a button
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- AutoHold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Help menu
  - On-screen context specific help is readily available at the press of a button
- Backlit LCD
- Clear display
  - Dot matrix display with multifunction virtual keys
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software

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 automatically recognizes the probe type (two or four-ring) and allows the user to adjust the nominal cell constant. HI98192 is also ready to perform accurate EC measurement from groundwater to ultrapure water.

Quick connect probe

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

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
Ordering Info		**HI98192** is supplied with HI763133 conductivity 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), instruction manual, quick start guide, quality certificate and 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 supplied 4m cable probe
** Uncompensated temperature reading

(†) Reduced to actual sensor limits

HI98311 • HI98312

EC/TDS/Temperature Testers

- Waterproof and designed to float
- Automatic Temperature Compensation
- HOLD button to freeze readings on the display
- BEPS (Battery Error Prevention System)
- Exposed temperature sensor for fast response

These testers include features such as: a replaceable graphite electrode, adjustable TDS ratio, °C or °F measurement, Automatic Temperature Compensation with adjustable β, battery level indicator, stability indicator, automatic shut-off and automatic calibration.

The replaceable graphite conductivity electrode offers greater accuracy by resisting contamination by salt deposits in the sample.

Specifications		HI98311 (DiST®5)	HI98312 (DiST®6)
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.
	Calibration	automatic, one point at 1413 µS/cm	automatic, one point at 12.88 mS/cm
TDS	Range	0 to 2000 mg/L (ppm)	0.00 to 10.00 g/L (ppt)
	Resolution	1 mg/L (ppm)	0.01 g/L (ppt)
	Accuracy	±2% F.S.	±2% F.S.
	Calibration	automatic, one point at 1382 mg/L (ppm)	automatic, one point at 6.44 g/L (ppt)
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
Ordering Info		**HI98311** (DiST®5) and **HI98312** (DiST®6) are supplied with HI73311 EC/TDS probe, HI73128 probe removal tool, batteries and instructions.	

HI98308 (PWT)

Water Purity Tester

Pure Water Test (PWT) enables users to check the purity of your distilled or demineralized water in laboratory or harsh industrial environments. PWT is suited for fields where distilled, demineralized or pure water is used.

Specifications	HI98308 (PWT)
Range	0.0 to 99.9 µS/cm
Resolution	0.1 µS/cm
Accuracy	±2% F.S.
Calibration	manual, one point
Ordering Info	**HI98308** (PWT) is supplied with protective cap, calibration screwdriver, batteries and instructions.

HI96702C

Copper, High Range Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96702C measures the copper content in water and wastewater.

Specifications	HI96702C Copper HR	
Range	0.00 to 5.00 mg/L (ppm)	
Resolution	0.01 mg/L (ppm)	
Accuracy @ 25°C (77°F)	±0.02 mg/L ±4% of reading @ 25°C	
Ordering Info	**HI96702C** is supplied with 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	**HI96702-11**	CAL Check™ Standard Cuvettes
	HI93702-01	Reagents for 100 tests
	HI93702-03	Reagents for 300 tests

Copper

Copper is an essential trace element in the human diet (the daily requirement is around 2.0 mg) and a factor in plant metabolism. On the other hand, corrosion of copper alloys in pipe fittings may introduce considerable quantities of copper into water supplies.

HI3847

Copper Test Kit

Specifications	
Method	colorimetric
Range	0.0-2.5 mg/L (ppm)
Smallest Increment	0.5 mg/L (ppm)
Chemical Method	bicinchoninic acid
# Tests	100
Ordering Info	**HI3847** test kit comes with HI3847-0 reagent (100 packets) and color comparison cube.

HI96729C

Fluoride Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96729C meter measures the fluoride (F^-) content in drinking, surface and wastewaters. The amount of reagent is precisely dosed by use of the supplied automatic pipette for maximum repeatability.

Specifications	HI96729C Fluoride LR	
Range	0.00 to 2.00 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	
Ordering Info	**HI96729C** is supplied with 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	**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

HI96735C

Hardness, EPA Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI93735C measures the total hardness in drinking, surface and wastewater.

Specifications	HI96735C 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 250 mg/L	1 mg/L from 0 to 100 mg/L 5 mg/L, from 100 to 750 mg/L	5 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
Ordering Info	**HI96735C** 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	**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)	

HI4109

Cyanide Ion Selective Electrode

ISE

For use with compatible ISE meters

Specifications	
Measurement Range	10^{-2}M to $1 \cdot 10^{-6}$M 260 to 0.02 mg/L (ppm)
Optimum pH Range	>11
Temperature Range	0 to 80°C
Approximate Slope	-57
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI
Ordering Info	**HI4109** solid-state; combination ISE with 1m coaxial cable and BNC connection

HI4110

Fluoride Ion Selective Electrode

ISE

For use with compatible ISE meters

Specifications	
Measurement Range	1M to $1 \cdot 10^{-6}$M Sat. to 0.02 mg/L (ppm)
Optimum pH Range	5 to 8
Temperature Range	0 to 80°C
Approximate Slope	-56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI/epoxy
Ordering Info	**HI4110** solid-state; combination ISE with 1m coaxial cable and BNC connection

HI38033

Hardness, Total (as $CaCO_3$) Test Kit

0-30 gpg range

Specifications	
Method	titration
Range	0-30 gpg
Smallest Increment	1 gpg
Chemical Method	EDTA
# Tests	100
Ordering Info	**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.

HI3841

Hardness, Total (as $CaCO_3$) Test Kit

Medium range

Specifications	
Method	titration
Range	40-500 mg/L (ppm)
Smallest Increment	20 mg/L (ppm)
Chemical Method	EDTA
# Tests	50 avg.
Ordering Info	**HI3841** test kit comes with 30 mL hardness MR reagent and 50 mL calibrated vessel.

* 1 gpg = 17 ppm $CaCO_3$

Fluoride

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 the proximity of sea water. While fluoride does help prevent tooth decay, too little can be ineffective and too much can cause staining.

Hardness

Total hardness, that is the presence of magnesium and calcium, is due mainly to the runoff water dissolving these salts as it flows or filters through different strata. Hardness can cause scaling of pipes in cooling and heating systems.

Iron

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 cause an unpleasant 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.

Manganese

Manganese is one of the most common metals present in nature and is used in many industrial applications, such as 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

HI96746C • HI96721C

Iron Portable Photometers

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI 96746C meter measures the iron content in water, wastewater and seawater. The HI 96721 meter measures total iron (Fe) content in water samples.

Specifications	HI96746C Iron LR	HI96721C 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
Ordering Info	**HI96746C** and **HI96721C** is supplied with 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	liquid reagents for 50 tests
		HI93746-03	liquid 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

HI96748C • HI96709C

Manganese Portable Photometers

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96748C measures the low range manganese content in water and wastewater. The HI96709C measures the high range manganese content in water and wastewater.

Specifications	HI96748C Manganese, LR	HI96709C 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
Ordering Info	**HI96748C** and **HI96709C** is supplied with 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	liquid reagents for 50 tests
		HI93748-03	liquid reagents for 150 tests
	HI96709	**HI96709-11**	CAL Check™ standard cuvettes
		HI93709-01	liquid reagents for 100 tests
		HI93709-03	liquid reagents for 300 tests

HI38040

Iron (Fe^{2+} & Fe^{3+}) Test Kit

Medium Range with Checker® Disc

Specifications	
Method	checker disc
Range	0.0-5.0 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Chemical Method	phenanthroline
# Tests	100
Ordering Info	**HI38040** test kit comes with 100 packets iron reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI38041

Iron (Fe^{2+} & Fe^{3+}) Test Kit

High Range with Checker® Disc

Specifications	
Method	checker disc
Range	0.0-10.0 mg/L (ppm)
Smallest Increment	0.2 mg/L (ppm)
Chemical Method	phenanthroline
# Tests	100
Ordering Info	**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.

HI96728C

Nitrate (as NO_3^-–N) Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96728C measures the nitrate content in water and wastewater.

Specifications	HI96728C Nitrate	
Range	0.0 to 30.0 mg/L (ppm)	
Resolution	0.1 mg/L	
Accuracy @ 25°C (77°F)	±0.5 mg/L ±10% of reading	
Ordering Info	**HI96728C** is supplied with 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	**HI96728-11**	CAL Check™ standard cuvettes
	HI93728-01	reagents for 100 tests
	HI93728-03	reagents for 300 tests

HI3874

Nitrate Test Kit

Specifications	
Method	colorimetric
Range	0-50 mg/L (ppm)
Smallest Increment	10 mg/L (ppm)
Chemical Method	cadmium reduction
# Tests	100
Ordering Info	**HI3874** test kit comes with 100 packets nitrate reagent, glass cuvette and color comparison cube.

HI4113

Nitrate Ion Selective Electrode

ISE

For use with compatible ISE meters

Specifications	
Measurement Range	1.0M to $1 \cdot 10^{-5}$M 6200 to 0.62 mg/L (ppm) 1400 to 0.4 mg/L (ppm) as N
Optimum pH Range	3.0 to 8
Temperature Range	0 to 40°C
Approximate Slope	-56
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI/PVC
Ordering Info	**HI4113** combination ISE with polymer membrane, 1m coaxial cable and BNC connection

HI96732

Dissolved Oxygen Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

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	
Ordering Info	**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

HI3810

Dissolved Oxygen Test Kit

The Hanna dissolved oxygen portable test kit can determine the oxygen concentration in water quickly and easily.

Specifications	
Method	titration
Range	0.0 to 10.0 mg/L (ppm)
Smallest Increment	0.1 mg/L (ppm)
Chemical Method	modified Winkler
# Tests	110 avg.
Ordering Info	**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.

Nitrate

Nitrate ions are present in trace amounts in surface water and in higher levels in some groundwater. Nitrate is found only in small quantities in domestic wastewater, but can reach higher concentration (up to 30 mg/L as nitrogen) in the outflow of nitrifying biological treatment plants. Excessive amounts can contribute to methemoglobinemia: infant death and adult illness. In order to prevent this, a 10 mg/L limit (as nitrogen) has been imposed on drinking water.

Dissolved Oxygen

The concentration of dissolved oxygen in water is extremely important in nature as well in man's environment. In the oceans, lakes, rivers, and other surface water bodies, dissolved oxygen is essential to the growth and development of aquatic life.

HI5421

Research Grade Bench Meter

Dissolved Oxygen and BOD

- Measures DO, atmospheric pressure and temperature
- Logging
  - Large log memory with different logging methods
  - Up to 100 log lots with 50,000 records/lots
- Automatic barometric pressure compensation
- BOD, OUR and SOUR inside and outside limits alarm
- GLP features
- Real-time graphic displays
- Capacitive touch keypad
- Up to 10 user profiles
- PC compatible via USB

The HI5421 is a research grade dissolved oxygen benchtop meter with extensive capabilities in measuring DO as well as BOD (Biological Oxygen Demand), OUR (Oxygen Uptake Rate), SOUR (Specific Oxygen Uptake Rate) and temperature.

DO measurements can be performed with ppm, mg/L or % air saturation units of measurement. DO measurements feature automatic or manual temperature and atmospheric pressure compensation, as well as manual salinity compensation.

The DO probe uses the polarographic principal of measurement and has a built-in temperature sensor.

Specifications		HI5421
DO	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 digit
	Calibration	automatic using one 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 16.40 psi; .592 to 1.118 atm
	Resolution	1 mm Hg
	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)
Ordering Info		**HI5421** is supplied with HI764083 DO probe, HI76404W electrode holder, HI7041S electrolyte solution (30 mL), membrane caps (2), o-rings (2), 12 VDC adapter, quality certificates, quick start guide and instruction manual.

HI98193

Professional Waterproof Meters

Dissolved Oxygen and BOD

- Choice of units
  - Display units in % saturation or mg/L (ppm)
- Salinity compensation
  - Users can set the salinity value
- Automatic pressure compensation
  - Built-in barometer with 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 PTFE preformed membrane caps
- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Log-on-demand
  - Store measurement data at the press of a button
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- AutoHold
  - Automatically holds the first stable reading on the display
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- Help menu
  - On-screen context specific help is readily available at the press of a button
- Backlit LCD
- Clear display
  - Dot matrix display with multifunction virtual keys
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- 200 hour battery life
  - Approximately 200 hours of continuous use

Quick connect probe

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

For Universal Applications

The HI98193 portable dissolved oxygen meter 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.

Salinity compensation allows for direct determination of dissolved oxygen in saline waters. Temperature compensation is automatic with the probes built-in sensor, which features a one or two-point calibration. 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). 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.

Other features include measurement, methods and calculations for BOD, OUR and SOUR.

		HI98193
DO	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
Ordering Info		**HI98193** is supplied with HI764073 DO probe, HI7040 bi-component zero oxygen solution (260 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), instruction manual, quick start guide, quality certificate and rugged carrying case with custom insert.

Wastewater needs to be monitored closely to prevent environmental pollution and human illness

Chemical Oxygen Demand

Chemical Oxygen Demand (COD) is a measure of the biologically available and inert organic matter that is susceptible to oxidation by a strong oxidizing agent.

The Hanna COD method is based on the well established closed dichromate-reflux colorimetric method. The colorimetric measurement of COD is faster and easier to perform than the titrimetric analysis; additional reagents are not required. The sample is added to the reagent vial and digested under closed reflux conditions and allowed to cool before measurement is taken. Reference standards can be made using potassium hydrogen phthalate (KHP), 1 mg of KHP is equal to 1.175 mg COD.

The US Environmental Protection Agency (EPA) specifies that the dichromate reflux method is the only method acceptable for reporting purposes. The advantage in using this method includes certifiable results as well as high accuracy.

COD Testing Applications

COD is used as a measurement of pollutants. It is normally measured in both municipal and industrial wastewater treatment plants and gives an indication of the efficiency of the treatment process. COD is measured on both influent and effluent water. The efficiency of the treatment process is normally expressed as COD removal, measured as a percentage of the organic matter purified during the cycle. COD has further applications in power plant operations, chemical manufacturing, commercial laundries, pulp and paper mills, agriculture and animal waste runoff, environmental studies and general education. Hanna's COD meter can be used in the laboratory or for on-site testing. The measurement procedure has been designed for ease of use by personnel at any skill level.

Wastewater monitoring examples:

COD Influent	COD Effluent	COD Removal
1214	451	62%
948	328	63%
1341	307	77%

Beyond COD: Nitrogen and Phosphorus

The goal in wastewater treatment is not only COD reduction, but also to control nitrogen and phosphorus, which are responsible for eutrophication phenomena in natural environments. COD, nitrogen, and phosphorus control are performed not only to obey environmental protection laws, but also to optimize plant costs.

Effective monitoring and control of parameters such as ammonia, nitrate, total nitrogen and total reactive phosphorus allow plant managers to profile and improve the health of aquatic ecosystems. By accurately monitoring levels of each specific pollutant, operational parameters can be adjusted to maintain high efficiency of biodegradation treatments while also minimizing costs.

Nitrogen

When a treatment plant uses processes like nitrification and denitrification, it is important to monitor and maintain the equilibrium between ammonia-nitrogen, nitrate and total nitrogen during the bio-treatment. The nitrogen level is important because it relates to the quantity of oxygen provided in the nitrification area. Ammonia is also controlled because it can become very toxic for the bacteria responsible for denitrification.

Nitrification

$$NH_3 + O_2 \xrightarrow[\text{bacteria}]{\text{nitrosomonas}} NO_2^- + 3H^+ + 2e^-$$

$$NO_2^- + H_2O \xrightarrow[\text{bacteria}]{\text{nitrobacter}} NO_3^- + 2H^+ + 2e^-$$

Denitrification

$$3NO_3^- + 10e^- + 12H^+ \longrightarrow N_2 + 6H_2O$$

Phosphorus

Phosphorus is measured during both biological and chemical dephosphorization. An excessive amount of phosphate discharged in superficial waters or in bio-treatment tanks causes an increase of algae and system eutrophication.

HI83214

COD Meter and Multiparameter Photometer

for Wastewater Analysis

- Easy COD measurement
  - The HI83214 multiparameter photometer has preprogrammed curves to measure COD levels at three ranges at the touch of a button
- Outstanding measurement quality
  - An advanced optical system assures high accuracy measurements throughout the entire range
- Save space in your laboratory
  - The compact size of the HI83214 allows users to eliminate the clutter of bulky and costly spectrophotometers
- Log up to 200 samples

The HI83214 is designed and built to perform COD analysis in accordance with EPA 410.4 and ISO 15705:2002 standards. Ensuring accurate and repeatable results, it is the ideal tool for documenting waste treatment processes.

Besides the fundamental parameter of COD, HI83214 also measures total ammonia, free and total chlorine, nitrate, nitrogen, and various forms of phosphorus.

The HI83214 allows for a complete wastewater analysis in a single, powerful instrument.

Specifications	HI83214
Light Source	tungsten lamps with narrow-band interference filters
Light Detector	silicon photocell
Ordering Info	**HI83214** is supplied with glass cuvettes (5), 9V batteries (2), 12 VDC adapter and instructions

COD Test	Range	Method	Reagent Code
COD LR	0 to 150 mg/L	dichromate EPA‡ dichromate mercury-free◇◇ dichromate ISO◇	**HI93754A-25** **HI93754D-25** **HI93754F-25**
COD MR	0 to 1500 mg/L	dichromate EPA‡ dichromate mercury-free◇◇ dichromate ISO◇	**HI93754B-25** **HI93754E-25** **HI93754G-25**
COD HR	0 to 15000 mg/L	dichromate	**HI93754C-25**

Parameter	Range	Method	Reagent Code
Ammonia, LR	0.00 to 3.00 mg/L	Nessler	**HI93764A-25**
Ammonia, HR	0 to 100 mg/L	Nessler	**HI93764B-25**
Chlorine, Free	0.00 to 5.00 mg/L	DPD	**HI93701-01**
Chlorine, Total	0.00 to 5.00 mg/L	DPD	**HI93711-01**
Nitrate	0.0 to 30.0 mg/L	chromotropic acid	**HI93766-50**
Nitrogen, Total	0.0 to 25.0 mg/L	chromotropic acid	**HI93767A-50**
Nitrogen, Total HR	10 to 150 mg/L	chromotropic acid	**HI93767B-50**
Phosphorus, Reactive	0.00 to 5.00 mg/L	ascorbic acid	**HI93758A-50**
Phosphorus, Acid Hydrolyzable	0.00 to 5.00 mg/L	ascorbic acid	**HI93758B-50**
Phosphorus, Total	0.00 to 3.50 mg/L	ascorbic acid	**HI93758C-50**
Phosphorus, Reactive HR	0.0 to 100.0 mg/L	vanadomolybdophosphoric acid	**HI93763A-50**
Phosphorus, Total HR	0.0 to 100.0 mg/L	vanadomolybdophosphoric acid	**HI93763B-50**

Accessories

HI839800
COD test Tube Heater

The HI839800 COD reactor is constructed of durable materials. The aluminum block incorporates a 25-vial capacity and a well for a reference temperature probe.

HI740217
Lab Safety Shield

For safety, the optional HI740217 safety shield and HI740216 test tube cooling rack for the HI839800 are strongly recommended.

HI740216
Test Tube Cooling Rack

Some analytical methods require digestion of the sample. For digestion of the vials, use the Hanna HI839800 reactor only.

Notes:
‡ Method with chromium-sulfuric acid is officially recognized by EPA for wastewater analysis.
◇ The HI93754F-25 and HI93754G-25 method follows the official method ISO 15705.
◇◇ This method is recommended for general purpose analysis with no chloride interference.

HI83099

COD Meter and Multiparameter Photometer

- Easy COD measurement
- Outstanding measurement quality
- Compact, multiparameter meter
- PC compatible
- 47 methods

The HI83099 is one of the most versatile photometers on the market. In addition to COD, this meter measures 44 of the most important water quality parameters using liquid or powder reagents. The amount of reagent is precisely dosed to ensure maximum reproducibility.

The HI83099 bench photometer can be connected to a PC via a USB cable. The optional HI92000 Windows® Compatible Software helps users manage their data.

The HI83099 features a powerful interactive user support to assist during each step of the analysis process. A tutorial mode is also available in the setup menu.

Specifications	HI83099
Light Source	tungsten lamps with narrow band interference filters
Light Detector	silicon photocell
Ordering Info	**HI83099** is supplied with glass cuvettes with caps (4), cell protective cap, batteries, 12 VDC adapter, sample preparation kit (for turbidity or concentrated samples), cloth for wiping cuvettes, 60mL glass bottle for DO analysis, scissors, and instructions.

COD Test	Range	Method	Reagent Code
COD LR	0 to 150 mg/L	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI93754A-25** **HI93754D-25** **HI93754F-25**
COD MR	0 to 1500 mg/L	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI93754B-25** **HI93754E-25** **HI93754G-25**
COD HR	0 to 15000 mg/L	dichromate	**HI93754C-25**

Water Quality Test	Range	Method	Reagent Code†
Alkalinity	0 to 500 mg/L (ppm) as $CaCO_3$	bromocresol green	**HI93755-01**
Aluminum	0.00 to 1.00 mg/L	aluminon	**HI93712-01**
Ammonia MR	0.00 to 10.00 mg/L	Nessler	**HI93715-01**
Ammonia LR	0.00 to 3.00 mg/L	Nessler	**HI93700-01**
Bromine	0.00 to 8.00 mg/L	DPD	**HI93716-01**
Calcium	0 to 400 mg/L	oxalate	**HI937521-01**
Chlorine Dioxide	0.00 to 2.00 mg/L	chlorophenol red	**HI93738-01**
Chlorine, Free	0.00 to 2.50 mg/L	DPD	**HI93701-01**
Chlorine, Total	0.00 to 3.50 mg/L	DPD	**HI93711-01**
Chromium VI HR	0 to 1000 µg/L	diphenylcarbohydrazide	**HI93723-01**
Chromium VI LR	0 to 300 µg/L	diphenylcarbohydrazide	**HI93749-01**
Color of Water	0 to 500 PCU	colorimetric platinum cobalt	–
Copper HR	0.00 to 5.00 mg/L	bicinchoninate	**HI93702-01**
Copper LR	0 to 1000 µg/L	bicinchoninate	**HI95747-01**
Cyanuric Acid	0 to 80 mg/L	turbidimetric	**HI93722-01**
Fluoride	0.00 to 2.00 mg/L	SPADNS	**HI93729-01**
Hardness, Calcium	0.00 to 2.70 mg/L	calmagite	**HI93720-01**
Hardness, Magnesium	0.00 to 2.00 mg/L	EDTA	**HI93719-01**
Hydrazine	0 to 400 µg/L	p-dimethylaminobenzaldehyde	**HI93704-01**
Iodine	0.0 to 12.5 mg/L	DPD	**HI93718-01**
Iron HR	0.00 to 5.00 mg/L	phenantroline	**HI93721-01**
Iron LR	0 to 400 µg/L	TPTZ	**HI93746-01**
Magnesium	0 to 150 mg/L	calmagite	**HI937520-01**
Manganese HR	0.0 to 20.0 mg/L	periodate	**HI93709-01**
Manganese LR	0 to 300 µg/L	PAN	**HI93748-01**
Molybdenum	0.0 to 40.0 mg/L	mercaptoacetic acid	**HI93730-01**
Nickel HR	0.00 to 7.00 g/L	photometric	**HI93726-01**
Nickel LR	0.000 mg/L to 1.000 mg/L	PAN	**HI93740-01**
Nitrate	0.0 to 30.0 mg/L	cadmium reduction	**HI93728-01**
Nitrite HR	0 to 150 mg/L	ferrous sulfate	**HI93708-01**
Nitrite LR	0.00 to 1.15 mg/L	diazotization	**HI93707-01**
Oxygen, Dissolved (DO)	0.0 to 10.0 mg/L	Winkler	**HI93732-01**
Ozone	0.00 to 2.00 mg/L	DPD	**HI93757-01**
pH	6.5 to 8.5 pH	phenol red	**HI93710-01**
Phosphate HR	0.0 to 30.0 mg/L	amino acid	**HI93717-01**
Phosphate LR	0.00 to 2.50 mg/L	ascorbic acid	**HI93713-01**
Phosphorus	0.0 to 15.0 mg/L	amino acid	**HI93706-01**
Potassium HR	20 to 200 mg/L	turbidimetric tetraphenylborate	**HI93750-01**
Potassium MR	10 to 100 mg/L	turbidimetric tetraphenylborate	**HI93750-01**
Potassium LR	0.0 to 20.0 mg/L	turbidimetric tetraphenylborate	**HI93750-01**
Silica	0.00 to 2.00 mg/L	heteropoly blue	**HI93705-01**
Silver	0.000 to 1.000 mg/L	PAN	**HI93737-01**
Sulfate	0 to 150 mg/L	turbidimetric	**HI93751-01**
Zinc	0.00 to 3.00 mg/L	zincon	**HI93731-01**

Notes:
‡ Method with chromium-sulfuric acid is officially recognized by EPA for wastewater analysis.
◊ The HI93754F-25 and HI93754G-25 method follows the official method ISO 15705.
◊◊ This method is recommended for general purpose analysis with no chloride interference.

HI83224

COD Meter and Multiparameter Photometer

with Bar Code Recognition of Sample Vials

- Measures ammonia, chlorine, COD, nitrate, nitrogen and phosphorus
- Three operation modes: automatic, semi-automatic and manual
- Bar coded pre-dosed reagent vials
- On screen step-by-step tutorial
- Log up to 200 samples
- Context sensitive help screen at the touch of a button
- USB connection

Application Designed Photometers

The HI83224 is a multiparameter benchtop photometer that features 15 methods for measurement of ammonia, COD, chlorine, nitrate, nitrogen and phosphorus.

This meter features automatic recognition of bar coded samples. The HI83224 scans each vial inserted into the vial holder and automatically identifies the sample method and range. This feature eliminates errors and simplifies the testing process.

The HI83224 also features a powerful interactive user support system that assists users before, during and after analysis. On-screen tutorials guide users through set-up, calibration and measurement procedures while context sensitive help screens are available at a push of a button.

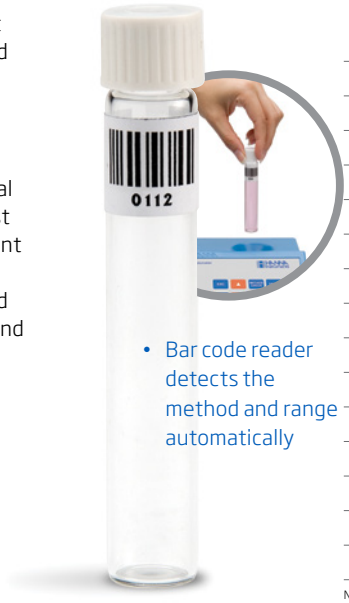
HI83224 uses a new series of pre-dosed reagent vials for 13 of the 15 methods, each bar coded with specific reagent information at our factory. The chlorine method uses supplied vials and powder packets. This information is automatically scanned by the HI83224 to assure that the vial and method are the same.

HI83224 can log and recall up to 200 individual readings. Stored data includes parameter, test results, sample number, lot number, instrument id, date and time. For data management, the HI83224 bench photometer can be connected to a PC via the optional HI920013 USB cable and HI 92000 Windows® compatible software.

Bar code identification avoids vial confusion and wrong samples

Sample vials inserted into the HI83224 are identified using bar codes. The bar codes for different methods are shown in the table below. For parameters that don't use a bar coded reagents, the vials supplied with the instrument should be used. The bar code has 4 digits. The first 2 digits are for parameter identification and the second 2 digits are for reagent lot ID.

HI83224 has a powerful interactive help system that assists the user during the analysis process. At a touch of a button, users can get detailed help tailored to the current information on the LCD. A tutorial mode is also available and can be accessed via the setup menu.



- Bar code reader detects the method and range automatically

Part Code	Test	Vial Bar Code
HI94764A-25	Ammonia LR	01xx
HI94764B-25	Ammonia HR	02xx
HI93701-01	Chlorine, Free	–
HI93711-01	Chlorine, Total	–
HI94766-50	Nitrate	05xx
HI94767A-50	Nitrogen, Total LR	16xx; 06xx
HI94767B-50	Nitrogen, Total HR	17xx; 07xx
HI94754A-25	Oxygen Demand, Chemical (COD) LR	12xx
HI94754B-25	Oxygen Demand, Chemical (COD) MR	13xx
HI94754C-25	Oxygen Demand, Chemical (COD) HR	24xx
HI94758A-50	Phosphorus, Reactive	30xx
HI94758B-50	Phosphorus, Acid Hydrolyzable	31xx
HI94758C-50	Phosphorus, Total	32xx
HI94763A-50	Phosphorus, Reactive HR	33xx
HI94763B-50	Phosphorus, Total HR	34xx

Note: xx represents the reagent lot code.

Specifications	HI83224
Light Source	tungsten lamps with narrow band interference filters
Light Detector	silicon photocell
Ordering Info	**HI83224** is supplied with sample vials (10), vial cleaning cloths (4), scissors and instruction manual.

COD Test	Range	Resolution	Accuracy	Method	Reagent Code
COD LR	0 to 150 mg/L (as O_2) 0 to 150 mg/L 0 to 150 mg/L	1 mg/L 1 mg/L 1 mg/L	±5 mg/L or ±5 % of reading** ±5 mg/L or ±5% of reading** ±5 mg/L or ±5% of reading**	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI94754A-25** (25 tests) **HI94754D-25** (25 tests) **HI94754F-25** (25 tests)
COD MR	0 to 1500 mg/L (as O_2) 0 to 1500 mg/L 0 to 1500 mg/L	1 mg/L 1 mg/L 1 mg/L	±15 mg/L or ±4 % of reading** ±15 mg/L or ±4% of reading** ±15 mg/L or ±4% of reading**	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI94754B-25** (25 tests) **HI94754E-25** (25 tests) **HI94754G-25** (25 tests)
COD HR	0 to 15000 mg/L (as O_2)	10 mg/L	±150 mg/L or ±3 % of reading**	dichromate	**HI94754C-25** (25 tests)

Test	Range	Resolution	Accuracy*	Method	Reagent Code
Ammonia LR	0.00 to 3.00 mg/L (as NH_3–N)	0.01 mg/L	±0.10 mg/L or ±5 % of reading**	Nessler	**HI94764A-25** (25 tests)
Ammonia HR	0 to 100 mg/L (as NH_3–N)	1 mg/L	±1 mg/L or ±5 % of reading**	Nessler	**HI94764B-25** (25 tests)
Chlorine, Free	0.00 to 5.00 mg/L	0.01 mg/L below 0.99 mg/L; 0.1 mg/L above 0.99 mg/L	±0.03 mg/L or ±4 % of reading**	DPD	**HI93701-01** (100 tests) **HI93701-03** (300 tests)
Chlorine, Total	0.00 to 5.00 mg/L	0.01 mg/L below 0.99 mg/L; 0.1 mg/L above 0.99 mg/L	±0.03 mg/L or ±4 % of reading**	DPD	**HI93711-01** (100 tests) **HI93711-03** (300 tests)
Nitrate	0.0 to 30.0 mg/L (as NO_3–N)	0.1 mg/L	±1.0 mg/L or ±5 % of reading @20°C	chromotropic acid	**HI94766-50** (50 tests)
Nitrogen, Total LR	0.0 to 25.0 mg/L (as N)	0.1 mg/L	±1.0 mg/L or ±5 % of reading @20°C	chromotropic acid	**HI94767A-50** (50 tests)
Nitrogen, Total HR	10 to 150 mg/L (as N)	1 mg/L	±3 mg/L or ±4 % of reading**	chromotropic acid	**HI94767B-50** (50 tests)
Phosphorus, Acid Hydrolyzable	0.00 to 1.60 mg/L (as P)	0.01 mg/L	±0.05 mg/L or ±5 % of reading**	ascorbic acid	**HI94758B-50** (50 tests)
Phosphorus, Reactive	0.00 to 1.60 mg/L (as P)	0.01 mg/L	±0.05 mg/L or ±5 % of reading**	ascorbic acid	**HI94758A-50** (50 tests)
Phosphorus, Reactive HR	0.0 to 32.6 mg/L (as P)	0.1 mg/L	±0.5 mg/L or ±5 % of reading**	vanadomolybdophosphoric acid	**HI94763A-50** (50 tests)
Phosphorus, Total	0.00 to 1.15 mg/L (as P)	0.01 mg/L	±0.05 mg/L or ±6 % of reading**	ascorbic acid	**HI94758C-50** (50 tests)
Phosphorus, Total HR	0.0 to 32.6 mg/L (as P)	0.1 mg/L	±0.5 mg/L or ±5 % of reading**	vanadomolybdophosphoric acid	**HI94763B-50** (50 tests)

Accessories

HI839800
COD test Tube Heater

The HI839800 COD reactor is constructed of durable materials. The aluminum block incorporates a 25-vial capacity and a well for a reference temperature probe.

HI740217
Lab Safety Shield

For safety, the optional HI740217 safety shield and HI740216 test tube cooling rack for the HI839800 are strongly recommended.

HI740216
Test Tube Cooling Rack

Some analytical methods require digestion of the sample. For digestion of the vials, use the Hanna HI839800 reactor only.

Notes:
‡ Method with chromium-sulfuric acid is officially recognized by EPA for wastewater analysis.
◊ The HI94754F-25 and HI94754G-25 method follows the official method ISO 15705.
◊◊ This method is recommended for general purpose analysis with no chloride interference.
* @ 25°C (77°F) unless otherwise stated
** Whichever is greater

HI839800

COD Test Tube Heater

with 25 Vial Capacity

- Low temperature alert
  - Alerts the user that the temperature is below the set value
- High temperature alert
  - Alerts the user that the temperature is above the set value
- Countdown timer
  - Shows time remaining until the heating element shuts off

This COD reactor is an easy to use test tube heater. Its well-marked user interface provides intuitive operation. The reactor is equipped with two predefined temperature settings: 105°C and 150°C. COD and total phosphorus digestions are conducted at 150°C, and total nitrogen digestions are at the 105°C.

The HI839800 COD reactor is constructed of durable materials. The aluminum block incorporates a 25 vial capacity and a well for a reference temperature probe.

In addition, the HI839800 has 3 LEDs for visual indication. A green LED indicates power, a blinking red LED warns the user of a hot heater block (above 50°C), and a yellow LED indicates heating.

A three hour countdown timer is also incorporated to control timed digestions. When the countdown timer expires, a beep will sound and the heating element will turn off. The reactor contains a thermal fuse that prevents overheating by turning off the heating element.

Block temperature is continuously displayed on the LCD even when there is no active temperature program running.

Outer casing stays cool to the touch!

Specifications	HI839800
Temperature of Reaction	105°C or 150°C (221°F or 302°F)
Temperature Stability	±0.5°C (±0.9°F)
Temperature Range	-10°C to 160°C (14°F to 320°F)
Accuracy	±2°C (±3.6°F)
Capacity	25 vials (dia 16 x 100 mm), one receptacle for a stainless steel reference thermometer
Warm-up Time	10-15 minutes, depending on selected temperature
Operating Mode	timed (0 to 180 minutes) or infinity mode
Block	aluminum
Ordering Info	**HI839800** is supplied with power cable and instructions.

Certified COD Reagents

Hanna COD reagents are available in the following formats:

COD Test	Range	Method	Reagent Code
COD LR	0 to 150 mg/L	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI93754A-25** **HI93754D-25** **HI93754F-25**
COD MR	0 to 1500 mg/L	dichromate EPA‡ dichromate mercury-free◊◊ dichromate ISO◊	**HI93754B-25** **HI93754E-25** **HI93754G-25**
COD HR	0 to 15000 mg/L	dichromate	**HI93754C-25**

Each box of 25 vials is supplied with a Hanna certificate of quality. The reagents are traceable to NIST SRM® 930.

- Three measurement ranges to satisfy every need
  - As COD levels vary depending on the application and process measuring points, Hanna offers reagents to cover three separate ranges. Simply choose the best range for the application:
    Low range: 0 to 150 mg/L O_2
    Medium range: 0 to 1500 mg/L O_2
    High range: 0 to 15000 mg/L O_2
- Accurate and repeatable measurements
  - Hanna COD reagents have been developed in accordance with Standard Methods 5220D, USEPA 410.4 and ISO 15705:2002 methods.
- Pre-dosed vials
  - Hanna vials contain approximately 3 mL of pre-dosed reagent. The operator just needs to add a small quantity of the sample.

  Quick and accurate measurements
  - With pre-dosed vials, test preparation time is dramatically reduced. There is no time-consuming reagent preparation procedure or glassware cleaning.
- Safe reagents
  - Hanna COD reagents are safe for operators and the environment. Vials and caps have been designed to avoid accidental reagent spills. Due to the pre-dosed reagents, the amount of chemicals and handling time is minimized.

Notes:
‡ Method with chromium-sulfuric acid is officially recognized by EPA for wastewater analysis.
◊ The HI94754F-25 and HI94754G-25 method follows the official method ISO 15705.
◊◊ This method is recommended for general purpose analysis with no chloride interference.

HI5221 • HI5222

Research Grade Meters

pH/ORP/ISE and Temperature

- CAL Check™
- Five-point calibration
  - Five-point pH with preprogrammed and custom buffers
  - Five-point ISE with preprogrammed and custom standards (HI5222 only)
- Large log memory (100,000 records) with selectable logging modes
- ISE incremental methods provided (HI5222)
- Multiple input channels (HI5222)
  - 2 channels for pH/ORP/ISE
- PC compatible via USB
- Capacitance touch keypad

Two Galvanically Isolated pH/ORP/ISE Channels

HI5221 and HI5222 are research grade pH, mV and temperature benchtop meters. HI5222 is a dual channel meter with two independent inputs for pH, ORP and ISE probes. Each channel has it's own temperature input and supports half-cells with a separate reference electrode input.

CAL Check™

Hanna's exclusive CAL Check™ diagnostics system ensures accurate pH readings every time by alerting users to potential problems during the calibration process. The CAL Check™ system eliminates erroneous readings due to dirty or faulty pH electrodes or contaminated pH buffer solutions during calibration.

Data Logging

Three selectable logging modes are available: automatic, manual and AutoHold logging. Automatic and manual logs up to 100 lots, 50,000 records max/lot; 100,000 data points per channel, and up to 100 ISE methods reports (HI5222 only). GLP information is stored with each lot recorded. Data can be transferred to a PC via USB and HI92000 software (optional).

Specifications		HI5221	HI5222
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°/253.15 to 393.15K	
mV	Range	±2000 mV	
	Resolution	0.1 mV	
	Accuracy	±0.2 mV ±1 LSD	
	Relative mV Offset Range	±2000 mV	
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	
ISE	Range	–	$5 \cdot 10^{-7}$ to $5 \cdot 10^{7}$ 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
Additional Specifications	Input Channel(s)	1 pH/ORP	2 pH/ORP/ISE
Ordering Info	**HI5221** and **HI5222** are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI76404W electrode holder, HI70004 pH 4.01 buffer solution sachet (2), HI70007 pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), capillary dropper pipette, 12 VDC adapter, quality certificates, quick start guide and instruction manual.		

ISE

HI5222 is compatible with ion selective electrodes

Code	Parameter	Page
HI4101	Ammonia	4
HI4107	Chloride	4
HI4109	Cyanide	10
HI4110	Fluoride	10
HI4113	Nitrate	12
HI4115	Silver/Sulfide	25

(*) Reduced to actual probe limits

HI3220 • HI3222

pH Benchtop Meters

pH/mV/ISE and Temperature

- CAL Check™
  - Alerts users of calibration status
- GLP features
- Logging
  - Stability, interval and log-on-demand
- PC connectivity via opto-isolatedUSB
- One (HI3220) or two (HI3222) input channels

ISE

HI3222 is compatible with ion selective electrodes

Code	Parameter	Page
HI4101	Ammonia	4
HI4107	Chloride	4
HI4109	Cyanide	10
HI4110	Fluoride	10
HI4113	Nitrate	12
HI4115	Silver/Sulfide	25

Specifications		HI3220	HI3222
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 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 five custom buffers	
	Temperature Compensation	manual or automatic from -20.0 to 120.0°C (-4.0 to 248.0°F)	
mV	Range	±2000 mV	
	Resolution	0.1 mV	
	Accuracy	±0.2 mV	
	Rel mV Offset Range	±2000 mV	
Temperature*	Range	-20.0 to 120.0°C (-4.0 to 248.0°F)	
	Resolution	0.1°C (0.1°F)	
	Accuracy	±0.2°C (±0.4°F) (excluding probe error)	
ISE	Range	–	$1 \cdot 10^{-7}$ to $9.99 \cdot 10^{10}$ concentration (choice of units)
	Resolution	–	3 digits
	Accuracy	–	±0.5% of reading (monovalent ions), ±1% of reading (divalent ions)
	Calibration	–	up to five-point calibration, six standard solutions (in units selected)
Ordering Info	**HI3220** and **HI3222** are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI76404N electrode holder, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), 12 VDC adapterand instructions.		

pH

The secondary standard guidelines for water systems set by the EPA states pH should be maintained between 6.5 and 8.5 to control corrosion and avoid aesthetic or cosmetic concerns. pH is considered a critical variable for determining treatment options in public water systems operation. Many factors affect pH measurements. Temperature measurement and correction and the number of calibrated pH standards will improve the quality of the pH measurement. The pH probe together with instrumentation should be calibrated at multiple calibration points in standardized buffer solution prior to analysis.

ORP

ORP measurements are based on the potential difference measured between the platinum or gold electrode and a reference electrode. The identical reference system utilized for the pH electrode (Ag/AgCl) is also used for redox measurements.

Redox electrodes are used to monitor many chemical processes particularly those involving reversible reactions.

Industrial Wastewater Treatment

The redox systems used in water treatment are the reduction of chromates and oxidation of cyanides. Waste hexavalent chromium is reduced to trivalent chromium by the addition of sodium bisulfite or sulfur dioxide. In the case of cyanide, chlorine or sodium hypochlorite is used to oxidize the cyanide, followed by the hydrolysis of cyanogen chloride to form cyanate.

(*) Reduced to actual sensor limits

Quick connect probe for HI98190

The HI98190 features probes with a quick connect DIN connector to make attaching and removing the probe simple and easy.

See p.49 for all HI98190 compatible probes

Specifications		HI98190	HI98191
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -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	
	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 five custom buffers	
	Temperature Compensation	automatic or manual from -20.0 to 120.0°C (-4.0 to 248.0°F)	
mV	Range	±2000 mV	
	Resolution	0.1 mV	
	Accuracy	±0.2 mV	
	Relative mV Offset Range	±2000 mV	
ISE (HI98191 only)	Range	–	from $1 \cdot 10^{-7}$ to $9.99 \cdot 10^{10}$ concentration
	Resolution	–	3 digits 0.01; 0.1; 1; 10 concentration
	Accuracy	–	±0.5% of reading (monovalent ions), ±1% of reading (divalent ions)
	Calibration	–	up to five-point calibration, seven standard solutions available
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 (±0.8°F) (excluding probe error)	
Additional Specifications	pH Probe	HI12963 titanium body, pH electrode with internal temperature sensor, quick DIN connector and 1 m (3.3' cable)	HI72911B titanium body, pH electrode with internal temperature sensor, BNC connector and 1 m (3.3' cable)
	Log-on-demand	200 samples (100 each pH/mV range)	300 samples (100 each pH/mV/ISE range)
Ordering Info	**HI98190** and **HI98191** are supplied with HI12963 pH electrode (HI98190), HI72911B pH electrode (HI98191), HI7662 temperature probe for use with ISEs (HI98191), HI7004M pH 4.01 buffer solution (230 mL), HI7007M pH 7.01 buffer solution (230 mL), electrode general cleaning solution sachet (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), instruction manual, quick start guide, quality certificate, and rugged carrying case with custom insert.		

HI98190 • HI98191

Professional Waterproof Meters

pH/ORP and pH/ORP/ISE

- Waterproof
  - IP67 rated waterproof, rugged enclosure
- ISE measurement units (HI98191 only)
  - Extensive choice of units to display readings (ppm, ppt, g/L, µg/L, mg/L, M, mol/L, mmol/L, %, w/v, user)
- CAL Check™
  - Alerts users to problems during calibration including dirty/broken electrode, contaminated buffer and overall probe condition
- Automatic or manual temperature compensation
- Calibration
  - Up to a five-point calibration with seven standard buffers and five custom buffers available
- AutoHold
  - Automatically holds the first stable reading on the display
- Log-on-demand
  - Store measurement data at the press of a button
- Calibration timeout
  - Alerts when calibration is due at a specified interval
- GLP
  - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- Connectivity
  - PC connectivity via opto-isolated micro-USB with HI92000 software
- Approximately 200 hour battery life
- Powered by (4) 1.5V AA batteries

For Universal Applications

HI98190 and HI98191 are IP67 rated waterproof meters designed for universal applications. HI98190 measures pH/ORP and temperature while HI98191 also includes ISE measurements.

Exchange out the pH probe for an ORP probe to obtain mV readings in the ±2000 mV range. HI98191 adds direct ion concentration readings for ISEs with a choice of units for calibration and display.

HI98127 (pHep®4)
HI98128 (pHep®5)

pH and Temperature Testers

- Waterproof and designed to float
- Replaceable pH electrode cartridge
- Automatic calibration
- Automatic Temperature Compensation
- HOLD button to freeze readings on the display
- Stability indicator
- BEPS (Battery Error Prevention System)

The pHep®4 and pHep®5 testers are for users that require the greatest accuracy while staying economical. The pHep®4 has a 0.1 pH resolution and pHep®5 reads up to 0.01 pH.

Specifications		HI98127 (pHep®4)	HI98128 (pHep®5)
pH	Range	-2.0 to 16.0 pH	-2.00 to 16.00 pH
	Resolution	0.1 pH	0.01 pH
	Accuracy	±0.1 pH	±0.05 pH
	pH Calibration	automatic, one or two-point with two sets of standard buffers (pH 4.01 / 7.01 / 10.01 or pH 4.01 / 6.86 / 9.18)	
Temperature	Range	-5.0 to 60.0°C / 23.0 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
Ordering Info		**HI98127** (pHep®4) and **HI98128** (pHep®5) are supplied with HI73127 pH electrode, HI73128 electrode removal tool, batteries and instructions.	

HI96713C

Phosphate Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

Specifications	HI96713C Phosphate LR	
Range	0.00 to 2.50 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.04 mg/L ±4% of reading	
Ordering Info	**HI96713C** is supplied with 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	**HI96713-11**	CAL Check™ standard cuvettes
	HI93713-01	reagents for 100 tests
	HI93713-03	reagents for 300 tests

HI38058

pH Test Kit

Specifications	
Method	Checker Disc
Range	4.0-10.0 pH
Smallest Increment	0.5 pH
Chemical Method	modified Winkler
# Tests	100
Ordering Info	**HI38058** test kit comes with 30 mL pH 4.0-10.0 reagent, checker disc, glass vials with caps (2) and 3 mL plastic pipette.

HI 3864

Phenols Test Kit

Specifications	
Method	Checker Disc
Range	0.00-1.00 mg/L (ppm) 0.5-5.0 mg/L (ppm)
Smallest Increment	0.02 mg/L 0.1 mg/L
Chemical Method	aminoantipyrine
# Tests	100
Ordering Info	**HI3864** test kit comes with 100 packets reagent A, 100 packets reagent B, checker discs (2), glass vials with caps (2) and mirror.

Phenols

Phenols are widely used in pharmaceuticals, dyes and indicators, and as general disinfectants. They may occur in household and industrial wastewaters and in natural waters; they can also enter potable water supplies and chlorination of such waters results in malodorous chlorophenol products that are detectable from 0.001 mg/L (1 ppb).

Phosphate

Phosphates are present in a number of products that are used 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.

The largest use of phosphates is in the conversion of the mineral apatite, which is a mixture of calcium phosphate and other calcium compounds that are used in fertilizers.

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.

Phosphates are also utilized in detergents and are needed, in small quantities, for heating systems.

For these reasons, it is necessary to closely monitor the phosphate levels present in both municipal and industrial wastewater.

Sulfate

Sulfate is widely present within natural waters in different concentrations. Sulfates are to be kept within a strict range for drinking water, especially since this value can be high near mine drainage points.

Zinc

Zinc is widely used in alloys (brass, bronze, and dye-casting alloys), in galvanizing iron and other metals, and also as a fungicide. It is also an essential growth element in human diet. But with concentrations higher than 5 mg/L, it gives a bitter taste to water and opalescence to alkaline water.

Zinc can enter the domestic water supply from the deterioration of galvanized iron and dezincification of brass.

HI96751C

Sulfate Portable Photometer

- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96751 measures the sulfate content in water samples in the 0 to 150 mg/L (ppm) range.

Specifications	HI96751C Sulfate	
Range	0 to 150 mg/L (ppm)	
Resolution	1 mg/L	
Accuracy @ 25°C (77°F)	±1 mg/L ±5% of reading	
Ordering Info	**HI96751C** is supplied with 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

HI4115

Silver/Sulfide Ion Selective Electrode

ISE

For use with compatible ISE meters

Specifications	
Measurement Range	Ag^+ 1.0M to $1•10^{-6}$M 107900 to 0.11ppm S^{2-} 1.0M to $1•10^{-7}$M 32100 to 0.003 ppm
Optimum pH Range	Ag^+ 2 to 8 S^{2-} 12 to 14
Temperature Range	0 to 80°C
Approximate Slope	+56 Ag^+ / -28 S^{2-}
Body O.D.	12 mm
Insertion Length	120 mm
Body Material	PEI
Ordering Info	**HI4115** solid-state; combination ISE with 1m coaxial cable and BNC connection

HI96731C

Zinc Portable Photometer

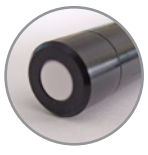
- CAL Check™
- BEPS (Battery Error Prevention System)
- GLP Features

The HI96731 measures the zinc content in water and wastewater in the 0.00 to 3.00 mg/L (ppm) range.

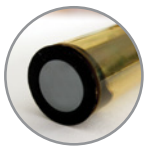
Specifications	HI96731C Zinc	
Range	0.00 to 3.00 mg/L (ppm)	
Resolution	0.01 mg/L	
Accuracy @ 25°C (77°F)	±0.03 mg/L ±3% of reading	
Ordering Info	**HI96731C** is supplied with CAL Check™ standards, sample cuvettes (2) with caps, 9V battery, scissors, cuvette wiping cloth, instrument quality certificate, 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

About Our Combination Ion Specific Electrodes

Combination electrodes include a sensor and reference electrode in a single electrode body. Our combination ion selective electrodes provide the same selectivity and response as our ISE half cells, but include our superior double junction reference into the same electrode body. Combination solid state electrodes have a built-in solid state sensor and quick refillable reference electrode.



Gas sensing combination tip



Solid-state combination tip

HI93510N

Thermistor Thermometers

- HOLD Key to freeze readings on display
- BEPS (Battery Error Prevention System)
- Battery level indicator at startup
- Backlit display
- Waterproof
- User calibration

The HI93510N is a waterproof thermometer tailored for the lab and field. The LCD displays the highest and lowest readings in the cycle along with the current temperature.

The HI93510N offers a CAL button to allow the operator to calibrate the meter and probe in an ice bath at 0°C.

Specifications	HI93510N	
Range	-50.0 to 150.0°C; -58.0 to 302.0°F	
Resolution	0.1°C; 0.1°F (-58.0 to 230.0°F) and 0.2°F (outside)	
Accuracy	±0.4°C; ±0.8°F (for 1 year, excluding probe error)	
Ordering Info	**HI93510** and **HI93510N** are supplied with HI762BL temperature probe, batteries and instructions.	
Probes	**HI762L**	air/liquid, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable
	HI762A	air/gas, stainless steel thermistor temperature probe with white handle and 1 m (3.3') cable

HI98501 Checktemp®

Digital Thermometer

with Stainless Steel Penetration Probe

- Large display
  - The large display features a wide temperature range and optimal viewing angle
- CAL Check™
  - Automatically verifies calibration at startup and alerts the user of the calibration status
- IP65 water resistant protection
- AISI 316 stainless steel penetration probe
- C and °F measurement

The Checktemp® delivers high accuracy temperature measurements over a wide range without concern for breakage or condensation.

Specifications	°C	°F
Range	-50.0 to 150.0°C	-58.0 to 302°F
Resolution	0.1°C (-50.0 to 150.0°C)	0.1°F (-58.0 to 199.9°F); 1°F (above 200°F)
Accuracy	±0.2°C (-30 to 120°C) ±0.3°C (outside: -50.0 to -30.0°C and 120.0 to 150.0°C)	±0.5°F (-22 to 199.9°F) ±1°F (outside: -58.0 to -22.0°F and 200 to 302°F)
Ordering Info	**HI98501** (Checktemp®) is supplied with penetration probe, protective cap, battery and instructions.	

HI147

Checkfridge™ Remote Sensor Thermometer

- CAL Check™ verification at 0°C
- BEPS (Battery Error Prevention System)
- Magnetic backing
- Stainless steel thermistor probe on 1m (3.3') cable

Few manufacturers have given any thought to providing the user a convenient means to monitor internal temperature conditions of a refrigerator, freezer or incubator from the outside.

Water testing laboratories require constant monitoring of refrigerators and incubators for compliance to standard operations. The Hanna HI147 Checkfridge™ is the ideal thermometer for accurate, reliable internal temperature readings.

How do you know when the reading on the thermometer is correct? An ice point or slurry could be made. Even then there could be several degrees difference between the real and theoretical temperatures. With the HI147, there is no need to waste time preparing and ice bath for making these tests; its unique CAL Check™ feature can simulate it. Conveniently located on the face of the thermometer is a TEST switch. Engage the switch and the HI147 performs an internal CAL Check™. In only a few seconds, you see the results on the large LCD. Return the switch to the READ position and the HI147 returns to its normal measuring status.

Specifications	HI147-00 Checkfridge™ C
Range	-50.0 to 150.0°C
Resolution	0.1°C
Accuracy	±0.3°C (-20 to 90°C); ±0.5°C (outside)
Ordering Info	**HI147-00** (Checkfridge™ C) is supplied with battery and instructions.

HI921

Autosampler

Automate up to 18 samples

The HI921 Autosampler is an automated titration sample handling system designed for use with the HI902C Potentiometric Titration System. This high quality system makes the titration of multiple samples quick and easy.

The HI921 can utilize up to three peristaltic pumps for automatic reagent addition, sample leveling and waste aspiration and one membrane pump for spray rinsing. An included control panel allows for manual operation of the motors and pumps. The HI921 also features a built-in magnetic stirrer, electrode rinse feature, USB interface with compatible barcode reader and built-in RFID for each tray.

With the Autosampler, up to 18 samples can be run consecutively. The HI921 Autosampler interfaces directly with the HI902C to access titration methods. Once a method is established, the user can then customize the automation sequence for their samples. Sample names and size can be customized or auto-filled with preset values. Once the Autosampler sequence is complete, two reports are available for review: a sequence report with a table outlining each sample name, beaker position, sample size and result for the tray, and a detailed titration report for each individual sample, including the graph of the titration data.

- Flexible, accurate detection of the titration endpoint with HI902C potentiometric titrator
- Automation of up to 18 samples per tray
  - 16 sample tray holds 150 mL beakers
  - 18 sample tray holds 100 mL beakers
- Absolute encoder in sample tray
  - The Autosampler always knows the tray position without the need to "home" or calibrate
- Electrode rinse feature
  - Up to 3 beakers per tray can be designated for electrode dip/spray rinses
- Automatic addition of reagents or deionized water to the sample beaker by peristaltic pump
- Included control panel for manual operation of motors and pumps
- Built-in magnetic stirrer or optional overhead propeller stirrer
- Barcode reader interface for easy sample tracking
- Built-in RFID in each tray, communicating tray serial number and type
- Optical IR beam detects presence or absence of beakers in the tray
  - Ensures the Autosampler does not proceed with titration if a beaker is missing
- Field upgradable software
- Sample trays made of chemically-resistant materials are removable, easy to clean and dishwasher safe
- Electrode holder can accommodate 3 x 12 mm electrodes, temperature sensor, 1 aspiration tube and 5 multipurpose tubes (reagent addition, burette dosing)
- Real-time progress of the sequence and results shown on the HI902 titrator screen
- Optional integrated peristaltic (up to 3) or membrane pumps
- Sample leveling feature
  - Automatic leveling for fast preparation of volumetric samples
- Waste removal feature
  - Aspirate completed samples into a waste container

Specifications	HI921
Electrode Holder Slots	3 x 12-mm electrodes
	1 temperature sensor
	1 aspiration tube
	5 multi - purpose slots (titrant/reagent tubes)
	1 overhead stirrer
Temperature Sensor	HI7662-A (included)
Stirrers	built-in magnetic stirrer
	overhead propeller stirrer (optional)
Peristaltic Pumps	up to 3 can be installed
	installs in slots #1, 2, 3
Membrane Pump (for cleaning)	installs in slot #4
Trays	16 beakers x 150 mL (HI920-11660)
	18 beakers x 100 mL (HI920-11853)
	built-in RFID, transmits the tray type and serial number to Autosampler
Beakers	ASTM short-form glass beakers
	HI920-060 (150 mL), fits HI920-11660 tray - 16 plastic beakers
	HI920-053 (100 mL), fits HI920-11853 tray - 18 plastic beakers
Control Panel	buttons for manual operation of tray and titration head
	manual operation of peristaltic or membrane pumps
	2-line backlit display with status information
Barcode Reader	compatible with USB barcode readers, used to add sample names
Report Storage	up to 40 trays of samples (e.g.: 720 reports for 18-beaker tray)

Ordering Info

Choose your Autosampler configuration:

HI921 – x y z

x=	1	16 sample tray
	2	18 sample tray
y=	0	no peristaltic pump
	1	one peristaltic pump
	2	two peristaltic pumps
	3	three peristaltic pumps
z=	0	no membrane pump
	1	one membrane pump

HI902C

Automatic Titration System

- Linear and dynamic dosing
- USB port allows for the transfer of methods and reports to a PC or another titrator via USB flash drive
- One or two sensor input models
- RS232 port for connection to an analytical laboratory balance
- VGA port for external monitor
- Multi-language support

Four working modes:

- Potentiometric titrator
  - Choice of endpoint detection: equivalence point (1st or 2nd derivative) or fixed pH/mV value
  - Clip-Lock™ exchangeable burette system enables users to exchange burettes in a matter of seconds
  - Acid-base, non-aqueous, redox, complexometric, precipitation, non-aqueous and argentometric titrations can be performed
  - Supports up to 100 titration methods (standard and user-defined)
  - Supplied with a standard methods pack or customizable user methods
  - Titration graph can be displayed on-screen and saved as a bitmap
  - Reminders for titrant age and standardization expiration
  - Multiple equivalence endpoint titrations with multiple molecular weights and reaction ratios
  - Supports two burette dosing pumps with the ability to perform back titrations
  - 5, 10, or 25 mL precision ground glass syringe with PTFE plunger
  - 40,000 step screw drive, piston dosing pump
  - 3-way motor driven valve
  - PTFE burette tubing with polyurethane tube jacketing
- Full featured research grade pH meter
  - Automatic Temperature Compensation (ATC)
  - Up to five calibration points with automatic recognition of standard buffers and up to five custom buffers
- mV (ORP) meter
  - Relative mV calibration
- ISE meter
  - Numerous concentration units including: mol/L, mmol/L, mg/L, mg/mL, µg/L, %, ppt, ppm, g/L and user-defined
  - Up to five calibration points with five custom standards

The HI902C can measure these crucial wastewater parameters:

- Alkalinity
- Volatile acidity
- Hardness
  - Calcium
  - Magnesium
  - Total
- Chloride
- TKN (Total Kjehldahl Nitrogen)

Powerful Customization, Accurate Analysis

The HI902C is an automatic titrator that complements our wide range of products dedicated to quick and accurate laboratory analysis. HI902C can perform acid-base, redox, complexometric, precipitation, non-aqueous and argentometric titrations.

The HI902C dispenses the titrant, detects the endpoint and performs all necessary calculations automatically.

This versatile titrator supports up to 100 standard or user-defined methods. When powered on, the instrument initiates an internal diagnostics check and then readies itself for the first titration of the day. A large color LCD screen clearly shows the chosen method and related information. A real-time titration curve can be shown on the display; this feature is useful when new methods are tested or when a procedure needs to be optimized. At the end of the titration, the data is automatically stored and can be transferred to a flash drive or PC by USB connection.

This titrator is supplied with a pack of standard methods or you can create your own. Methods (standard or user) can be transferred between titratorsusing a USB flash drive. Software updates can also be performed using a USB flash drive as well.

Users can connect pH, ORP or ISE electrodes to the HI902C, as well as create a complete workstation with a PC, monitor, keyboard and printer.

The HI902C complies with GLP requirements. All GLP information from each sample can be stored, including ID number, date and time of analysis, electrode ID code, and last calibration date.

Specifications		HI902C
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 pH
	Resolution	0.1; 0.01; 0.001 pH
	Accuracy (@25°C/77°F)	±0.001 pH
	Calibration	up to five-point calibration, eight standard buffers and five custom buffers
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 mV
	Calibration	single point offset
ISE	Range	$1 \cdot 10^{-6}$ to $9.99 \cdot 10^{10}$
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	±0.5% monovalent; ±1% divalent
	Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
Temperature	Range	-5.0 to 105.0°C; 23.0 to 221.0°F; 268.2 to 378.2 K
	Resolution	0.1°C; 0.1°F; 0.1K
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error
Other Specifications	Burette Sizes	5, 10, 25 and 50 mL
	Burette Resolution	1/40000
	Display Resolution	0.001 mL
	Dosing Accuracy	±0.1% of full burette volume
	Display	5.7" (320 x 240 pixel) backlit color LCD
	Languages	English, Portuguese, Spanish
	Methods	load up to 100 methods (standard and user-defined)
	Burette Auto-Detection	burette size is automatically recognized when inserted into the unit
	Programmable Stirrer	overhead propeller type, 100-2500 RPM, resolution 100 rpm
	Flow Rate	user-selectable from 0.1 mL/min to 2 x burette volume/min
	Temperature Compensation	manual (MTC) or automatic (ATC)
	Endpoint Determination	equivalence point (1st or 2nd derivative) or fixed pH/mV value
	Potentiometric Titrations	acid-base, redox, precipitation, complexometric, non-aqueous, argentometric
	Measurement Units	user-specified expression of concentration units to suit specific calculation requirements
	Real Time & Stored Graphs	mV-volume or pH-volume titration curve, 1st derivative curve or 2nd derivative curve pH mode, mV mode or ISE mode: pH/mV/concentration versus time
	Data Storage	up to 100 titration and pH/mV/ISE reports
	USB Host (Side)	flash drive compatibility for transfers of methods and reports
	Peripherals (Rear)	connections for VGA display, PC-keyboard, parallel printer, USB device input, RS232, interface for autosampler
	GLP Conformity	instrumentation data storage and printing capabilities
Ordering Info		**HI902C1**: titrator with one analog board, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump drive, temperature sensor, USB cable, 256 Mb USB flash drive and PC software. **HI902C2**: titrator with two analog boards, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, 256 Mb USB flash drive and PC software.

Accessories

Code	Description	Code	Description
HI900100	dosing pump	**HI900260**	3-way valve (includes 3 gaskets and 2 screws)
HI900150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	**HI900270**	aspiration tube with fitting (includes blue protection tube, gasket, and tube lock)
HI900125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	**HI900280**	dispensing tube with fitting (includes standard dispensing tip, blue protection tube, gasket, and tube lock)
HI900110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	**HI900301**	overhead stirrer assembly (includes overhead stirrer and 3 propellers)
HI900105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)	**HI900302**	replacement propellers (3)
HI900250	50 mL burette syringe	**HI900303**	PVDF replacement propellers (3) for organic solvents
HI900225	25 mL burette syringe	**HI900310**	overhead electrode holder (includes overhead stirrer without electronics or propeller)
HI900210	10 mL burette syringe	**HI900320**	stirrer stand
HI900205	5 mL burette syringe		

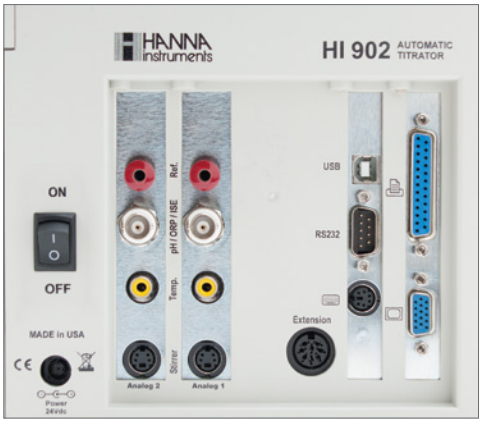
Clip-Lock™ Exchangeable Burette System

With Clip-Lock™, it only takes a few seconds to exchange the reagent burettes to perform a different titration.

The Clip-Lock™ exchangeable burette system prevents cross contamination while reducing loss of time and reagents. Simply slide out the burettes and detach the dispensing tubes from the overhead assembly for quick exchange.

Having several prepared burettes on hand will make the Hanna HI902C one of the fastest and most versatile titration systems on the market.

- Fully customizable titration methods



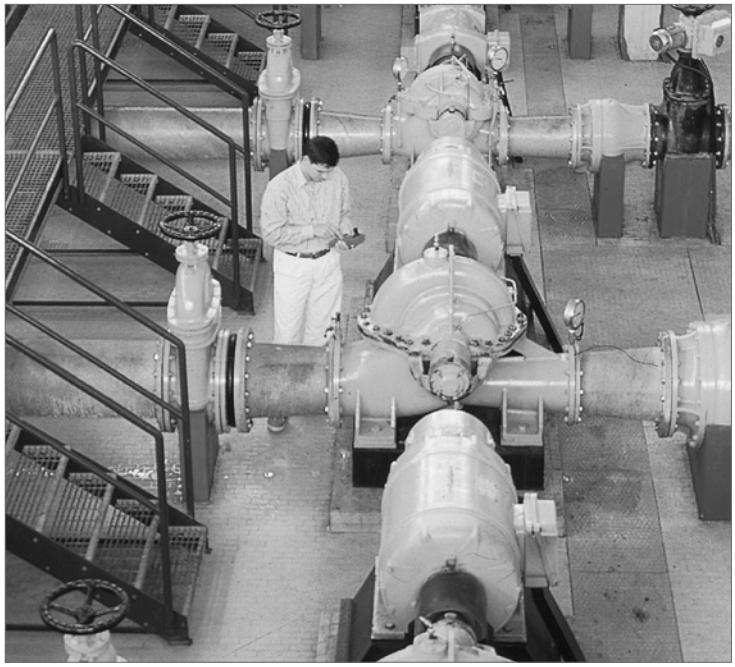
- Support for 2 electrodes, 2 burette dosing pumps and 2 stirrers

Turbidity

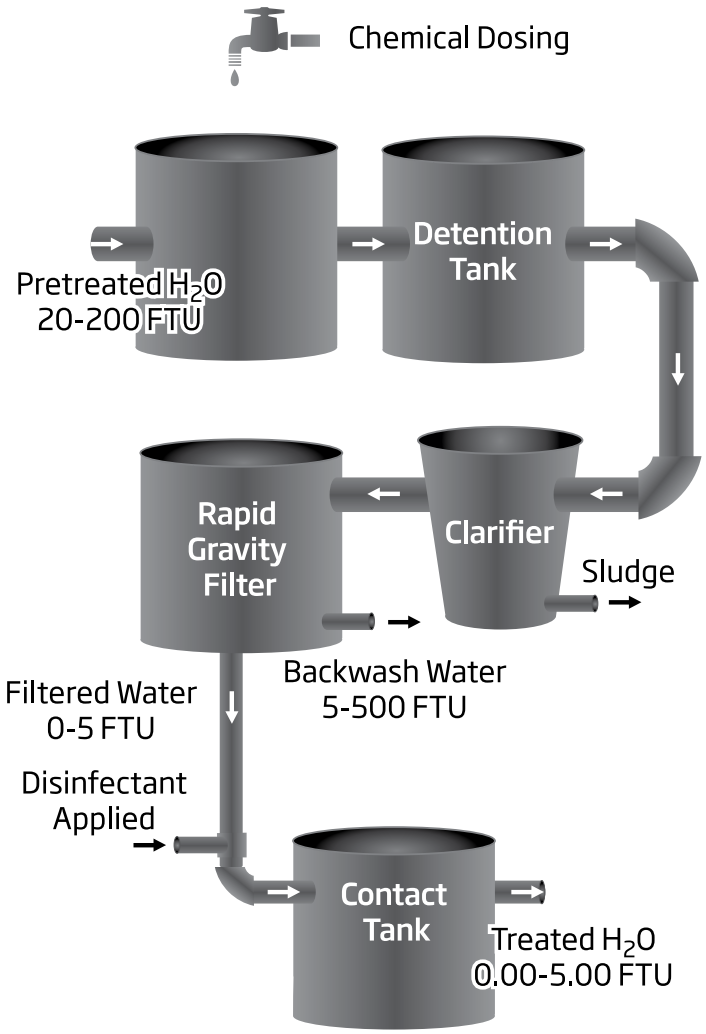
Turbidity of water is an optical property that causes light to be scattered and absorbed, rather than transmitted. The scattering of the light that passes through a liquid is primarily caused by the suspended solids. The higher the turbidity, the greater the amount of scattered light. Even a very pure fluid will scatter light to a certain degree, no solution will have zero turbidity.

There are different measurement standards used based on applications, and with these standards are applied units. The ISO standard adopted the FNU (Formazin Nephelometric Unit) while the EPA uses the NTU (Nephelometric Turbidity Unit). Other units include the JTU (Jackson Turbidity Unit), FTU (Formazin Turbidity Unit), EBC (European Brewery Convention Turbidity Unit) and diatomaceous earth (mg/L SiO_2).

	JTU	FTU (NTU/FNU)	SiO_2 (mg/L)
JTU	1	19	2.5
FTU (NTU/FNU)	0.053	1	0.13
SiO_2 (mg/L)	0.4	7.5	1



Treatment Process of Drinking Water



Purification of Drinking Water

Turbidity is one of the most important parameters used to determine the quality of drinking water. Public water suppliers are required to treat their water to remove turbidity. In the United States, for systems that use conventional or direct filtration methods, turbidity cannot be higher than 1.0 nephelometric turbidity units (NTU) at the plant outlet, and all samples for turbidity must be less than or equal to 0.3 NTU for at least 95 percent of the samples in any month. Adequately treated surface water does not usually present a turbidity problem. The World Health Organization indicates 5 NTU as the reference turbidity value of water for trade. This value has been established based on the aesthetic characteristics of water. From a hygienic point of view, 1 NTU is the recommended value. Many drinking water utilities strive to achieve levels as low as 0.1 NTU.

Turbidity is an indicator and will not give results for a specific pollutant. It will, however, provide information on the degree of overall contamination. The flow chart for the water treatment process of drinking water shows the turbidity reference values for each phase.

Monitoring for Natural Water Supplies

In natural water, turbidity measurements are taken to gauge general water quality and its compatibility in applications where there are aquatic organisms. It has been found that there is a strong correlation between the turbidity level and the BOD value. Moreover, by definition, turbidity obstructs light, thus reducing the growth of marine plants, eggs and larvae, which are usually found in the lower levels of an aquatic ecosystem.

Wastewater Treatment and Turbidity

Historically, turbidity is one of the main parameters monitored in wastewater. In fact, the monitoring and treatment process was once solely based on the control of turbidity. Currently, the measurement of turbidity at the end of the wastewater treatment process is necessary to verify that the values are within regulatory standards. Generally speaking, the turbidity value has to be between 0 and 50 FTU, with an accuracy of ±3 FTU, depending on the phase of the wastewater treatment process. By monitoring the turbidity level, it can be determined if the different stages of the process, particularly in the filtration and purification stages, have been completed correctly.

HI83414

Turbidity and Free/ Total Chlorine Meter

EPA Compliant

- Meets USEPA requirements
- CAL Check™
- Alerts users of calibration status
- Up to five-point turbidity calibration
- PC interface via USB
- Log and recall up to 200 measurements
- Meets Good Laboratory Practices
- Contextual help and tutorial mode

The HI83414 successfully combines turbidity and colorimetric measurements to test the most important parameters of drinking water: turbidity and free/total chlorine. This meter is specially designed for water quality measurements, providing reliable and accurate readings on low turbidity and chlorine values. The HI83414 meets and exceeds the requirements of USEPA and Standard Methods for turbidity and colorimetric measurements.

Specifications

HI83414 Turbidity Specifications

Non-Ratio Mode	Range	0.00 to 9.99; 10.0 to 40.0 NTU; 0.0 to 99.9; 100 to 268 Nephelos; 0.00 to 9.80 EBC
	Resolution	0.01; 0.1 NTU; 0.1; 1 Nephelos; 0.01 EBC
Ratio Mode	Range	0.00 to 9.99; 10.0 to 99.9; 100 to 4000 NTU; 0.0 to 99.9; 100 to 26800 Nephelos; 0.00 to 9.99; 10.0 to 99.9; 100 to 980 EBC
	Resolution	0.01; 0.1; 1 NTU; 0.1; 1 Nephelos; 0.01; 0.1, 1 EBC
Accuracy		±2% of reading plus 0.02 NTU (0.15 Nephelos; 0.01 EBC); ±5% of reading above 1000 NTU (6700 Nephelos; 245 EBC)
Method		nephelometric method (90°) or ratio nephelometric method (90° & 180°), adaptation of the USEPA method 180.1 and standard method 2130 B
Measuring Mode		normal, average, continuous
Turbidity Standards		<0.1, 15, 100, 750 and 2000 NTU
Calibration		two, three, four or five-point calibration

HI83414 Free and Total Chlorine Specifications

Range	0.00 to 5.00 mg/L (ppm)
Resolution	0.01 mg/L (ppm) from 0.00 to 3.50 mg/L (ppm); 0.10 above 3.50 mg/L (ppm)
Accuracy @25°C/77°F	±0.02 mg/L @ 1.00 mg/L
Method	adaptation of the USEPA Method 330.5 and Standard Method 4500-Cl G.
Standards	1.00 mg/L (ppm) free chlorine; 1.00 mg/L)(ppm) total chlorine
Calibration	one-point calibration

Ordering Info	**HI83414** is supplied with sample cuvettes and caps (5), calibration cuvettes for turbidity (HI88703-11) and colorimeter (HI93414-11), silicone oil (HI98703-58), cuvette wiping cloth, scissors, power cord and instruction manual.	
Reagents and Standards	**HI93414-11**	CAL Check™ calibration standards for free and total chlorine
	HI93701-01	free chlorine (Cl_2) reagent kit, 100 tests
	HI93701-03	free chlorine (Cl_2) reagent kit, 300 tests
	HI93711-01	total chlorine (Cl_2) reagent kit, 100 tests
	HI93711-03	total chlorine (Cl_2) reagent kit, 300 tests
	HI88703-11	turbidity calibration standards (<0.1, 15, 100, 750 and 2000 NTU)

Turbidity Testing

Water clarity is paramount when producing water for human consumption.

Turbidity, an optical property, is a measure of the cloudiness of water. Turbidity causes light to be scattered and absorbed rather than transmitted.

The measurement of turbidity is used to indicate water quality and filtration effectiveness. Increases in suspended and colloidal matter increase turbidity. These levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Although microbiological testing is also done, turbidity measurements are used with regularity to detect changes immediately. EPA regulations require filter effluent values of 0.3 NTU (Nephelometric Turbidity Units) in at least 95 percent of measurements taken each month with a maximum level of 1 NTU.

HI93414

Turbidity and Free/ Total Chlorine Portable Meter

EPA Compliant

- Meets USEPA requirements
- CAL Check™
- Up to four-point turbidity calibration
- USB and RS232 PC connectivity
- Meets Good Laboratory Practices
- Log up to 200 readings
- Automatic turbidity range selection
- iButton® Tag Identification System
- User-friendly, backlit display
- Battery indicator on startup

The HI93414 measures the most important parameters of drinking water: turbidity and free/total chlorine. Designed for water quality measurements, HI93414 provides reliable and accurate readings on low turbidity and chlorine values. The HI93414 meets and exceeds the requirements of USEPA and Standard Methods both for turbidity and colorimetric measurements.

For advanced field applications, the HI93414 is equipped with Fast Tracker™–Tag Identification System (T.I.S.) that makes data collecting and management simpler than ever. Fast Tracker™ allows users to record the time and location of a specific measurement or series of measurements.

CAL Check™ Calibration Validation

With Hanna's exclusive CAL Check™ validation function, users are able to verify the performance of the instrument at any time. Using Hanna's exclusive ready-made, NIST traceable standards, validation is user friendly and ensures proper calibration.

iButton® Tags are Easy to Install

Install 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.

HI920005
Tag holders with tags (5)

Specifications	HI93414 Turbidity
Range	0.00 to 1000 NTU
Range Selection	automatic
Resolution	0.01 (0.00 to 9.99 NTU); 0.1 (10.0 to 99.9 NTU); 1 (100 to 1000 NTU)
Accuracy	±2% of reading plus 0.02 NTU
Method	ratio nephelometric method (90° and 180°), ratio of scattered and transmitted light; adaptation of the USEPA method 180.1 and standard method 2130 B
Measuring Mode	normal, average, continuous
Turbidity Standards	<0.1, 15, 100 and 750 NTU
Calibration	two, three or four-point calibration

	HI93414 Free and Total Chlorine
Range	0.00 to 5.00 mg/L
Resolution	0.01 mg/L (0.00 to 3.50 mg/L); 0.10 mg/L (above 3.50 mg/L)
Accuracy @25°C /77°F	±0.02 mg/L @ 1.00 mg/L
Detector	silicon photocell with 525 nm narrow band interference filter
Ordering Info	**HI93414-01** is supplied with sample cuvettes and caps (5), calibration cuvettes for turbidity (HI98703-11), calibration cuvettes for colorimeter (HI93414-11), silicone oil (HI98703-58), cuvette wiping cloth, scissors, batteries, AC adapter, instruction manual and rugged carrying case.
Reagents and Standards	**HI93414-11** CAL Check™ calibration standards for free and total chlorine
	HI93701-01 free Chlorine (Cl_2) reagent kit, 100 tests
	HI93701-03 free Chlorine (Cl_2) reagent kit, 300 tests
	HI93711-01 total Chlorine (Cl_2) reagent kit, 100 tests
	HI93711-03 total Chlorine (Cl_2) reagent kit, 300 tests
	HI98703-11 turbidity calibration standards (<0.1, 15 100 and 750 NTU)

Specifications		HI88703
Non-ratio Mode	Range	0.00 to 9.99; 10.0 to 40.0 NTU; 0.0 to 99.9; 100 to 268 Nephelos; 0.00 to 9.80 EBC
	Resolution	0.01; 0.1 NTU; 0.1; 1 Nephelos; 0.01 EBC
Ratio Mode	Range	0.00 to 9.99; 10.0 to 99.9; 100 to 4000 NTU 0.0 to 99.9; 100 to 26800 Nephelos 0.00 to 9.99; 10.0 to 99.9; 100 to 980 EBC
	Resolution	0.01; 0.1; 1 NTU; 0.1; 1 Nephelos; 0.01; 0.1, 1 EBC
Accuracy		±2% of reading plus 0.02 NTU (0.15 Nephelos; 0.01 EBC); ±5% of reading above 1000 NTU (6700 Nephelos; 245 EBC)
Method		nephelometric method (90°) or ratio nephelometric method (90° & 180°), adaptation of the USEPA method 180.1 and standard method 2130 B
Measuring Mode		normal, average, continuous
Turbidity Standards		<0.1, 15, 100, 750 and 2000 NTU
Calibration		two, three, four or five-point calibration
Ordering Info		**HI88703** is supplied with sample cuvettes and caps (5), calibration cuvettes (HI88703-11), silicone oil (HI98703-58), cuvette wiping cloth, power cord and instruction manual.
Standards	**HI88703-11**	turbidity calibration standards (<0.1, 15, 100, 750 and 2000 NTU)

HI88703

Precision Turbidity Benchtop Meter

EPA Compliant

- Meets USEPA requirements
- Up to five-point turbidity calibration
- USB PC connectivity
- Log and recall up to 200 measurements
- Contextual help and tutorial mode
- Meets Good Laboratory Practices

iButton® Tags are Easy to Install

Install 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.

Specifications	HI98703
Range	0.00 to 1000 NTU
Range Selection	automatic
Resolution	0.01 (0.00 to 9.99 NTU); 0.1 (10.0 to 99.9 NTU); 1 (100 to 1000 NTU)
Accuracy	±2% of reading plus 0.02 NTU
Method	ratio nephelometric method (90° and 180°), ratio of scattered and transmitted light; adaptation of the USEPA method 180.1 and standard method 2130 B
Measuring Mode	normal, average, continuous
Turbidity Standards	<0.1, 15, 100 and 750 NTU
Calibration	two, three or four-point calibration
Ordering Info	**HI98703** is supplied with sample cuvettes and caps (5), calibration cuvettes, silicone oil (HI98703-58), cuvette wiping cloth, batteries, AC adapter, instruction manual and rugged carrying case.
Standards	**HI98703-11** turbidity calibration standards (<0.1, 15 100 and 750 NTU)

HI98703

Turbidity Meter

EPA Compliant

- Up to four-point turbidity calibration
- USB and RS232 PC connectivity
- Log for up to 200 readings
- Meets Good Laboratory Practices
- User-friendly, backlit display
- Battery indicator on startup

The HI98703 meets and exceeds the requirements of the USEPA Method 180.1 for wastewater and Standard Method 2130 B for drinking water. The instrument has an EPA compliance reading mode which rounds readings to meet EPA reporting requirements. Users will appreciate the accuracy and sensitivity of this instrument, particularly at very low turbidity levels.

HI5522

Research Grade Meter

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

- CAL Check™
- Five-point pH and ISE calibration
- Large log memory (100,000 records)
- Auto, log-on-demand and AutoHold Logging
- ISE incremental methods provided
- USP compliant
- Multiple input channels
- PC compatible via USB
- Capacitive touch keypad

HI5522 is a research grade benchtop meter that features up to eight measurement parameters: pH, mV (for Oxidation Reduction Potential), ISE, conductivity, resistivity,TDS, salinity and temperature.

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. The difference in mV determines the concentration. Historically the user would use mathematical equations to determine the ion concentration of the sample; with 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 re-entering 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.

Available Methods:

- Known Addition
- Known Subtraction
- Analyte Addition
- Analyte Subtraction

ISE

HI5522 is compatible with ion selective electrodes

Code	Parameter	Page
HI4101	Ammonia	4
HI4107	Chloride	4
HI4109	Cyanide	10
HI4110	Fluoride	10
HI4113	Nitrate	12
HI4115	Silver/Sulfide	25

Specifications		HI5522
pH	Range	-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, and five custom buffers
mV	Range	±2000 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV ±1 LSD
ISE	Range	$5•10^{-7}$ to $5•10^{7}$ 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)
	Calibration	automatic standard recognition, user standard single point / multi-point calibration
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
Ordering Info		**HI5522** is supplied with HI1131B pH electrode, HI76312 conductivity probe, HI7662-T temperature probe, HI76404W electrode holder, HI70004 pH 4.01 buffer solution sachet (2), HI70007 pH 7.01 buffer solution sachet (2), HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), capillary dropper pipette, 12 VDC adapter, quality certificates, quick start guide and instruction manual.

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

HI3512

Multiparameter Meter

Dual-channel pH/ORP/ISE and EC/TDS/ Resistivity/Salinity and Temperature

- CAL Check™ for pH
  - Alerts users of calibration status
- Calibration points
  - Up to five-point pH calibration and up to two-point EC calibration
- Logging
  - Automatic logging up to 600 records and log on demand up to 400 samples
- PC connectivity via opto-isolated USB
- Meets Good Laboratory Practices

The HI3512 is a dual-channel benchtop meter with a graphic LCD designed to provide accurate laboratory results. Channel 1 features pH/ORP/ISE and temperature measurement capability while channel 2 features conductivity, TDS, salinity, or resistivity measurements and temperature capability.

Calibration

The pH channel offers up to five-point pH calibration with seven standard buffers and up to two custom buffers.

A five-point ISE calibration selected from up to six calibration standards makes this instrument very useful for a large range of ion concentrations.

The EC channel permits a two-point calibration selected from seven Hanna standards. The EC channel supports auto-ranging, manual ranging and lock of the user selected range as well as temperature compensation selection, temperature reference selection and temperature coefficient selection.

Total Dissolved Solids (TDS) factor is user-adjustable and can be set between 0.40 and 1.00.

pH and EC channels also provide "out of calibration range" warnings and a "calibration timeout" message to remind the user when a new calibration is necessary.

Messages on the graphic LCD offer directions for easy and accurate calibration for both channels, as well as diagnostics to alert the user when calibration or measurement issues are detected.

Specifications		HI3512
pH	Range	-2.0 to 20.0 pH; -2.00 to 20.00 pH; -2.000 to 20.000 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
mV	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
ISE	Range	$1 \cdot 10^{-7}$ to $9.99 \cdot 10^{10}$ concentration (choice of units)
	Resolution	3 digits
	Accuracy	±0.5% of reading (monovalent ions); ±1% of reading (divalent ions)
	Calibration	up to five-point calibration points six standard solutions available (0.1, 1, 10, 100, 1000, 10000 ppm)
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)
EC	Range	0 µS/cm to 400 mS/cm (shows values up to 1000 mS/cm absolute 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 999.9 mS/cm; 1000 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; 1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit whichever is greater) excluding probe error
	Calibration	automatic up to two points with seven Hanna 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	0.000 to 9.999 ppm; 10.00 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	0.001 ppm; 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 greater) excluding probe error
	Factor	0.40 to 1.00
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 KΩ•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 Ω•cm; 1 Ω•cm; 0.01 MΩ•cm; 0.1 Ω•cm
	Accuracy	±1% of reading (±10 Ω•cm or 1 digit whichever greater) excluding probe error
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)
Ordering Info	**HI3512** is supplied with HI76310 EC/TDS probe, HI1131B pH electrode, HI7662-T temperature probe, HI70004 pH 4.01 buffer solution sachet, HI70007 pH 7.01 buffer solution sachet, HI700601 electrode cleaning solution sachet (2), HI7082 3.5M KCl electrolyte solution (30 mL), HI76404N electrode holder, 12 VDC adapter and instructions.	

(*) Reduced to actual sensor limits

ISE

HI3512 is compatible with ion selective electrodes

Code	Parameter	Page
HI4101	Ammonia	4
HI4107	Chloride	4
HI4109	Cyanide	10
HI4110	Fluoride	10
HI4113	Nitrate	12
HI4115	Silver/Sulfide	25

See p.36 for all edge® compatible probes

edge®
pH • EC • DO

A hybrid meter that can be used as a portable, wall-mount or benchtop

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 be easily slipped into a backpack or messenger bag. Up to 8 hours of battery life when used as a portable device.
- Wall mount cradle
  - The included wall mount cradle makes it easy to conserve space on the benchtop and can charge edge® with the AC adapter. Ideal for continuous monitoring applications.
- Electrode holder with built-in cradle
  - The included electrode holder features a swivel,adjustable arm with a built-in cradle to hold edge® securely in place at the optimum viewing angle.

edge® technical features

- 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 charging edge® 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. Logging data sets include readings, GLP data, date and time.
- GLP
  Data from the last calibration you perform is stored in the sensor including the date, time and standards. When any sensor (pH, EC, or DO) is connected to edge®, GLP data is automatically transferred.
- Basic mode
  You can use edge® in basic mode–ideal for routine measurements by displaying a simplified screen and features.
- CAL Check™ (edge® pH measurement only)
  edge® features Hanna's exclusive CAL Check™ technology to warn you if the electrode bulb is not clean or if the buffers are contaminated during calibration.

edge® design features

- Capacitive touch keypad
  edge® features a capacitive touch keypad that gives a distinctive, modern look. Since the keypad is part of the screen, your 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 edge® and charge its 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).

3	0	0.5	8.8	8	5.5	2
parameters pH, EC, DO	footprint	inch thick (12.7 mm)	oz. weight (250 g)	hours battery life	inch display (14 cm)	USB ports

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.

edge® features Hanna's exclusive pH CAL Check™ to warn you if the electrode in use is not clean or if your buffers are contaminated during calibration. We have added Sensor Check™ for pH sensors with a matching pin. Our Sensor Check™ feature warns you if the pH bulb is cracked and/or the junction of the electrode is compromised.

Specifications		edge®
pH	Range*	-2.00 to 16.00 pH; -2.000 to 16.000 pH†
	Resolution	0.01 pH; 0.001 pH†
	Accuracy (@25°C/77°F)	±0.01 pH; ±0.002 pH†
	Calibration	automatic, up to three points (five points†) calibration, 5 standard (7 standard†) buffers available (1.68†, 4.01 or 3.00, 6.86, 7.01, 9.18, 10.01, 12.45†) and two custom buffers†
mV pH	Range	±1000 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.2 mV
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 (±0.5 µS 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, 118.8 mS/cm, one point offset: 0.00 µS/cm
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
DO	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	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
Ordering Info	**edge® is available in 3 kit configurations: pH, EC and DO** All kits Include: edge®, benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificate and instruction manual. **HI2020** pH kit includes: *HI11310 glass body, refillable pH electrode with temperature sensor*, pH 4 buffer solution sachets (2), pH 7 buffer solution sachets (2), pH 10 buffer solution sachets (2) and electrode cleaning solution sachets (2). **HI2030** EC kit includes: *HI763100 EC probe*, 1413 µS/cm conductivity standard sachets (3) and 12880 µS/cm conductivity standard sachets (3). **HI2040** DO kit includes: *HI764080 dissolved oxygen electrode*, HI7041S refill electrolyte solution, DO membrane caps (2) and o-rings (2).	

HI991300

pH/EC/TDS/ Temperature Meter

- Automatic Temperature Compensation
- IP67 waterproof protection
- One to two-point calibration
- BEPS (Battery Error Prevention System)
- Sensor Check™
- Auto-recognition of all sensors
- Battery indicator
- Help feature
- Hold feature
  - Freezes readings on the display
- Backlit, graphic LCD display

HI991300 has been designed to offer pH, conductivity, total dissolved solids and temperature measurements in a slim, lightweight, portable unit.

Specifications		HI991300
pH	Range	0 to 14.00 pH
	Resolution	0.01 pH
	Accuracy	±0.01 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	Range	0 to 3999 µS/cm
	Resolution	1 µS/cm
	Accuracy	±2% F.S.
	Calibration	automatic one point at: 1382 ppm (CONV=0.5) or 1500 ppm(CONV=0.7) or 1413 µS/cm
TDS	Range	0 to 2000 ppm (mg/L)
	Resolution	1 ppm (mg/L)
	Accuracy	±2% F.S.
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
Ordering Info	**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.	

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

HI9829

GPS Multiparameter Meters

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

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

Rugged, waterproof and ideal for field measurements

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, ammonium (NH_4^+–N), nitrate (NO_3^-–N), chloride (Cl^-), dissolved oxygen (as % saturation or concentration), resistivity, TDS, salinity, and seawater σ. Atmospheric pressure is measured for DO concentration compensation.

Autonomously Logging Probes

After starting a log, logging probes can autonomously log parameters without further connection to the HI9829. To retrieve the logged measurements, connect the probe to the HI9829 or a PC.

User-friendly Features

The HI9829 features a graphic, backlit LCD that scales digits to fit up to 12 parameters and allows full configuration of each parameter measured along with an on-screen graphing capability.

GPS Capabilities

The HI9829 with the GPS option incorporates a built-in GPS receiver and antenna that guarantees position accuracy. Measurements from specific locations are tracked with detailed coordinate information that can be viewed immediately on the display.

- Basic GPS Features
  - Coordinates shown on the LCD with up to 10 measurement parameters
  - Signal strength on LCD display
  - Logged data is embedded with GPS coordinates
  - Status screen
- Advanced GPS Features
  - Coordinates can be associated with alphanumeric locations
  - Distances between current location and predefined locations are displayed arranged by distance
  - Memorizes last location and time should signal be lost

Probes and Sensors

Hanna offers a selection of 8 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.

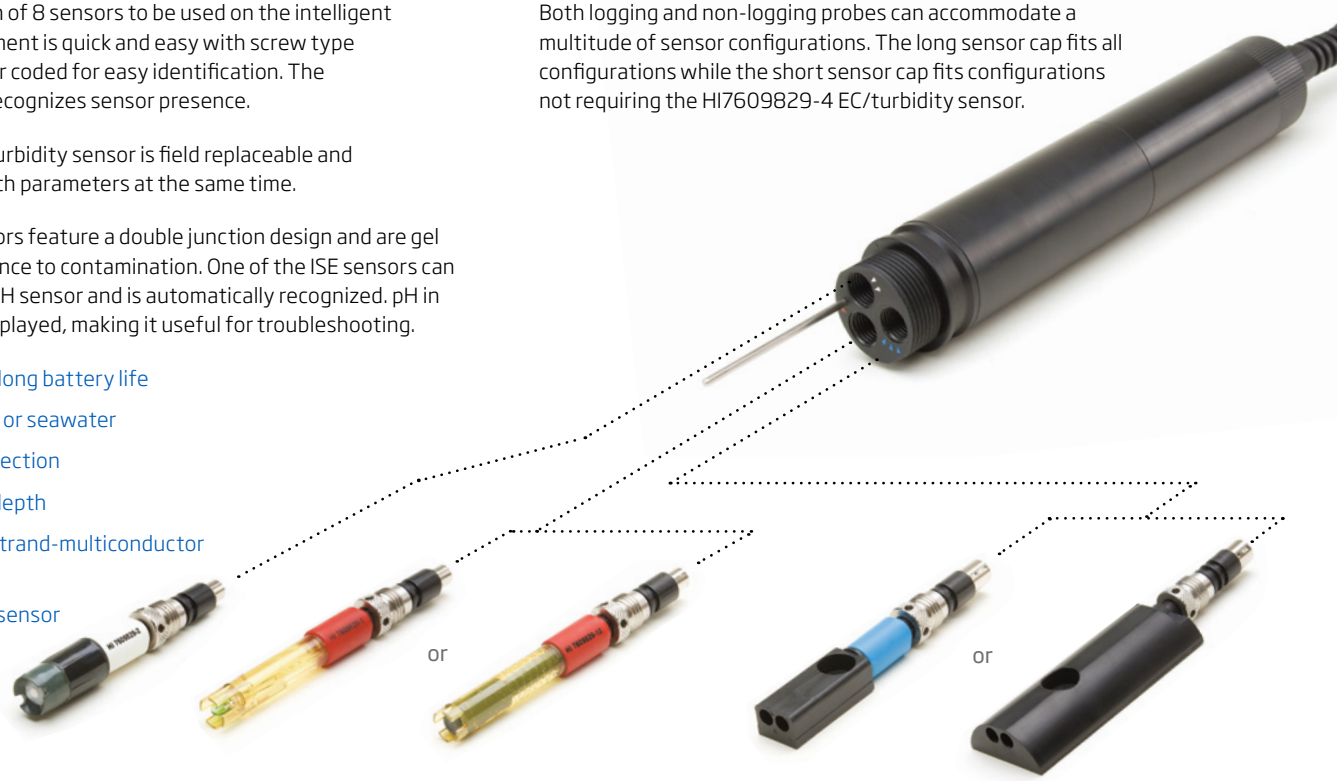
The HI7609829-4 EC/turbidity sensor is field replaceable and offers readings from both parameters at the same time.

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, making it useful for troubleshooting.

- Interval logging with long battery life
- Use in fresh, brackish or seawater
- IP68 waterproof protection
- 20m (66') maximum depth
- ABS body with multistrand-multiconductor shielded cable
- Built-in temperature sensor

Sensor Configurations

Both logging and non-logging 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 HI7609829-4 EC/turbidity sensor.



Dissolved Oxygen

HI7609829-2 DO

pH

HI7609829-0 pH
HI7609829-1 pH/ORP

ISE

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

Conductivity

HI7609829-3 EC

Conductivity and Turbidity

HI7609829-4 EC/Turbidity

HI7698295

Short cap for probes without EC/turbidity sensor

HI7698296

Long cap for probes with EC/turbidity sensor

The Perfect Monitoring Tool

Water scientists and managers alike utilize data-collection programs as part of environmental monitoring. These programs are designed to reveal changes in water and the environment around it over time. Reliable, dependable measurements are required to monitor these changes and understand the contributions from seasonal fluctuations, weathering, as well as man made pollution.

Specifications	HI9829	HI9829 with GPS
Temperature Compensation	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	
Logging Interval	1 second to 3 hours	
Computer Interface	USB (with HI 929829 software)	
FastTracker™ TAG ID	yes	
Waterproof Protection	IP67	
Environment	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	
Dimensions	221 x 115 x 55 mm (8.7 x 4.5 x 2.2")	
Weight	750g (26.5 oz.)	

- Field Ready
  - For field calibration, our quick calibration solution allows users to standardize pH and conductivity with one calibration solution.

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

Ordering Info

Choose your configuration below.

HI9829 – w x y z

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

All HI9829 Kits Include:

HI9829 or HI98290 (GPS Model) Meter
HI710140 Hard carrying case
Mulitiparameter Probe (based on configuration)
HI7609829-1 pH/ORP sensor
HI7609829-2 Galvanic DO Sensor
HI9828-25 Calibration solution
HI7692892 Probe Maintenance Kit
HI929829 Application Software
HI7698291 USB cable (PC to meter)
HI710046 12V accessory port cable
HI920005 iButton® with holder (5 pcs)
HI710005/8 (115V/12 VDC adapter))
HI710045 Power supply cable (115V)
Instruction Manual

Optional Kit Components:

HI7609829-12 Nitrate sensor
HI7619829-11 Chloride ISE sensor
HI7609829-10 Ammonium ISE sensor
HI7698297 Long quick release flow cell

Spare Solutions

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

Accessories

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.

Quick Calibration Solutions

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

HI920005

HI7698294

Accessories (included)

HI929829	PC application software
HI7698291	USB cable, PC to meter
HI710046	Car accessory port cable
HI7698290	Short calibration beaker (dependent on model chosen)
HI7698293	Long calibration beaker (dependent on model chosen)
HI7698295	Short protective shield (dependent on model chosen)
HI7698296	Long protective shield (dependent on model chosen)
HI920005	iButton® with holder (5 pcs)
HI710140	Hard carrying case
HI710045	Power supply cable

Accessories (optional)

HI7698294	Short flow cell
HI7698297	Long, quick release flow cell
HI76982910	USB cable, PC to probe

HI98194 • HI98195 • HI98196

Multiparameter Waterproof Meters

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

- Waterproof
  - IP67 rated waterproof, rugged enclosure for meter, IP68 for probe
- Digital probe
  - Digital probe with integral temperature sensor and up to three ports for pH/ORP, EC and DO sensors
- Color coded, field replaceable sensors
- Auto-sensor recognition
- Quick calibration feature
  - Standardize pH and conductivity with one calibration solution
- Automatic barometric pressure compensation (HI98194, HI98196)
- Automatic temperature compensation
- Automatic logging
  - Store up to 45,000 samples
- Log-on-demand
  - Store measurement data at the press of a button
- GLP
  - GLP data provides data from previous five calibrations to ensure Good Laboratory Practices are met
- Dedicated help key
  - On-screen context specific help is available at the press of a button
- Backlit LCD display with multifunction virtual keys
- Dedicated and virtual soft keys
- Quick Connect Probes
  - Fast, secure and waterproof connection
- PC connectivity via opto-isolated micro-USB with Hanna software
- Up to 360 hours of battery life powered by 1.5V AA batteries

For Universal Applications

These waterproof meters provide multiparameter measurement in compact and rugged, IP67 waterproof enclosures. Ideal for demanding applications, these meters feature our rugged, quick connect digital probes with field replaceable sensors.

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.

Data Logging

These multiparameter meters allow storage of up to 45,000 continuous or log-on-demand samples with logging intervals from one second to three hours. Logged data can be later transferred to a PC with the HI920015 micro USB cable and Hanna HI9298194 software.

Dedicated HELP Button

The contextual HELP menu can be accessed to obtain on-screen information and assistance about each feature at the touch of a button.

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.

HI98194 probe shown for example

pH

HI7698194-0 pH
HI7698194-1 pH/ORP

Conductivity

HI7698194-3 EC

Dissolved Oxygen

HI7698194-4 DO

Specifications		HI98194 (pH/ORP/EC/DO)	HI98195 (pH/ORP/EC)	HI98196 (pH/ORP/DO)
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)	–	0.0 to 500.0%; 0.00 to 50.00 ppm (mg/L)
	Resolution	0.1%; 0.01 ppm (mg/L)	–	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	–	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	–	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	–	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	–	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	–	±3 mm Hg within ±15°C from the temperature during calibration
	Calibration	automatic at one custom point	–	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		

Ordering Info

HI98194 is supplied with HI7698194/4 probe, HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor and HI7698194-2 DO sensor and HI76981942 probe maintenance kit.

HI98195 is supplied with HI7698195/4 probe, HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor, HI76981952 probe maintenance kit and HI76981943 calibration beaker.

HI98196 is supplied with HI7698196/4 probe, HI7698194-1 pH/ORP sensor, HI7698194-2 DO sensor and HI76981942 probe maintenance kit.

All models include HI76981943 calibration beaker, HI9828-25 quick calibration solution, Hanna PC software, HI920015 micro USB cable, 1.5V AA batteries (4), instruction manual, quick start guide, quality certificate and rugged carrying case with custom insert.

General Cleaning and Storage Solutions

General Use Electrode Cleaning Solutions

Clean the sensing portion of your electrodes weekly to prevent fouling and to maintain accuracy. Immerse the electrode in the proper cleaning solution for at least 15 to 20 minutes.

Electrode Storage Solutions

To minimize junction clogging and ensure fast response time, always keep the glass bulb and the junction of your pH electrode moist. Store the electrode with a few drops of HI70300 storage solution in the protective cap.

Code	Application	Package
HI7061L	general purpose cleaning solution	500 mL bottle
HI70300L	electrode storage solution	500 mL bottle

Electrode Fill Solutions

Electrode Fill Solutions

The electrolyte level in refillable electrodes should be checked before performing any measurement. If the level is low, refill with the proper electrolyte solution to ensure the correct electrode performance. This simple maintenance helps guarantee adequate head pressure to keep the liquid junction flowing.

Code	Description	Package
HI7071	electrolyte solution, 3.5M KCl + AgCl	30 mL bottle (4)
HI7071M	electrolyte solution, 3.5M KCl + AgCl	230 mL bottle
HI7082	electrolyte solution, 3.5M KCl	30 mL bottle (4)
HI7082M	electrolyte solution, 3.5M KCl	230 mL bottle
HI7082L	electrolyte solution, 3.5M KCl	460 mL bottle

ORP Test Solutions

ORP standard solutions allows users to test the precision of ORP electrodes.

Code	Description	Package
HI7021L	ORP test solution @240 mV (@25°C)	500 mL bottle
HI7022L	ORP test solution @470 mV (@25°C)	500 mL bottle

pH Technical Calibration Solutions

Technical Solutions (±0.01 pH) for Each Point of the pH Scale

To obtain precise and valid pH measurements, the pH meter and electrode must be calibrated at a minimum of two different points, close to the value of the sample to be tested.

These solutions are dedicated to applications that require extremely accurate pH monitoring, and come with a **certificate of analysis** prepared by comparison against NIST standards.

Also available are solution bottles that are colored according to a given standard calibration value: HI5004-R (Red), HI5007-G (Green) and HI5010-V (Violet).

Easy to Use Single Dose Sachets

For the highest level of reliability of field instrumentation, technical solutions are also provided in convenient single dose sachets.

pH Value @25°C	Code	Package
4.01	**HI5004**	500 mL bottle
4.01	**HI5004-01**	1 L bottle
4.01	**HI5004-R**	500 mL bottle (red colored solution)
4.01	**HI50004-02**	20 mL (25) sachets
7.01	**HI5007**	500 mL bottle
7.01	**HI5007-01**	1 L bottle
7.01	**HI5007-G**	500 mL bottle (green colored solution)
7.01	**HI50007-02**	20 mL (25) sachets
10.01	**HI5010**	500 mL bottle
10.01	**HI5010-01**	1 L bottle
10.01	**HI5010-V**	500 mL bottle (violet colored solution)
10.01	**HI50010-02**	20 mL (25) sachets

pH Standard Calibration Solutions

with ±0.01 pH accuracy @25°C

4.01 pH Buffer Solution

Hanna buffer solutions are prepared according to precise formulas and are standardized with a pH electrode and meter calibrated with NIST standards. This buffer value is widely used in water purification plants, in the food industry and wherever the pH is expected to be slightly acidic.

7.01 pH Buffer Solution

pH 7.01 is the most widely used among all buffer solutions. For this reason we have prepared it in a wider variety of sizes to meet application demand.

8.30 pH Buffer Solution

To increase accuracy of your alkalinity titration, Hanna offers the 8.30 pH buffer solution.

10.01 pH Buffer Solution

pH 10.01 solution is commonly used to calibrate equipment used for analyzing basic samples.

pH Value @25°C	Code	Package
4.01	**HI7004L**	500 mL bottle
4.01	**HI7004/1L**	1 L bottle
4.01	**HI70004P**	20 mL (25) sachets
7.01	**HI7007L**	500 mL bottle
7.01	**HI7007/1L**	1 L bottle
7.01	**HI70007P**	20 mL (25) sachets
8.30	**HI70083M**	500 mL bottle
10.01	**HI7010L**	500 mL bottle
10.01	**HI7010/1L**	1 L bottle
10.01	**HI70010P**	20 mL (25) sachets

Dissolved Oxygen Solutions

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

Code	Application	Package
HI7040M	zero oxygen solution	230 mL bottle
HI7040L	zero oxygen solution	500 mL bottle

EC Calibration Solutions

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.

1413 µS/cm Calibration Solution

The 1413 µS/cm calibration solution is best suited for general use.

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.

Code	EC Value @25°C	Package
HI7030L	12880 µS/cm	500 mL bottle
HI7031L	1413 µS/cm	500 mL bottle
HI7033L	84 µS/cm	500 mL bottle

Titration Solutions

Code	Description
HI70424	amino-propanol buffer, 25 mL bottle
HI70427	HNO_3 solution (1.5 M), 500 mL bottle
HI70428	NaOH solution (0.25 N), 1 L bottle
HI70448	$AgNO_3$ solution (0.02 M), 1 L bottle
HI70449	EDTA solution (0.02 M), 1 L bottle
HI70456	NaOH solution (0.1 N), 1 L bottle
HI70458	H_2SO_4 solution (0.01 M), 1 L bottle
HI70463	HCl solution (0.1 N), 1 L bottle
HI84531-50	titrant solution for low range, 120 mL bottle
HI84531-51	titrant solution for high range, 120 mL bottle
HI84531-55	pump calibration standard, 230 mL bottle

ISE Solutions, ISA (Ionic Strength Adjusters) and Accessories

Ammonia ISE

Code	Description	Package
HI4001-00	alkaline ISA for ammonia and cyanide ISEs	500 mL bottle
HI4001-01	0.1 M ammonia standard	500 mL bottle
HI4001-02	100 mg/L (ppm) ammonia standard (as N)	500 mL bottle
HI4001-03	1000 mg/L (ppm) ammonia standard (as N)	500 mL bottle
HI4001-40	ammonia filling solution	30 mL bottles (4)
HI4001-45	conditioning and storage solution for HI4101 ammonia ISE	500 mL bottle
HI4000-47	pH 4 and pH 7 buffers with chloride ions background, used to check internal glass electrode of gas sensors	10 packages ea. and 2 beakers
HI4000-52	gas sensor membrane cap for ammonia	
HI4001-51	ammonia membrane kit (20)	
HI4000-51	gas sensor replacement pH for ammonia sensor	

Calcium ISE

Code	Description	Package
HI4004-00	ISA for calcium ISEs	500 mL bottle
HI4004-01	0.1 M calcium standard	500 mL bottle
HI7082	3.5M KCL electrolyte solution for double junction electrodes	30 mL bottle (4)
HI4004-45	conditioning and storage solution for calcium ISEs	500 mL bottle
HI4004-51	calcium module for half-cell	
HI4104-51	calcium module for combination	

Chloride ISE

Code	Description	Package
HI4000-00	ISA for halide ISEs	500 mL bottle
HI4007-01	0.1 M chloride standard	500 mL bottle
HI4007-02	100 mg/L (ppm) chloride standard	500 mL bottle
HI4007-03	1000 mg/L (ppm) chloride standard	500 mL bottle
HI7072	electrolyte solution, 1 M KNO_3	30 mL bottles (4)
HI4000-70	halide polishing strip	

Cyanide ISE

Code	Description	Package
HI4001-00	alkaline ISA for ammonia and cyanide ISEs	500 mL bottle
HI7072	electrolyte solution, 1 M KNO_3	30 mL bottles (4)
HI4000-70	halide polishing strip	

Fluoride ISE

Code	Description	Package
HI4010-00	TISAB II for fluoride ISEs	500 mL bottle
HI4010-05	TISAB II for fluoride ISEs	1 gallon
HI4010-06	TISAB III concentrate for fluoride ISEs	500 mL bottle
HI4010-01	0.1 M fluoride standard	500 mL bottle
HI4010-02	100 mg/L (ppm) fluoride standard	500 mL bottle
HI4010-03	1000 mg/L (ppm) fluoride standard	500 mL bottle
HI7075	electrolyte solution, 1.7M KNO_3 and 0.7M KCl	30 mL bottles (4)
HI4010-10	10 mg/L (ppm) fluoride standard premixed with TISAB II	500 mL bottle
HI4010-11	1 mg/L (ppm) fluoride standard premixed with TISAB II	500 mL bottle
HI4010-12	2 mg/L (ppm) fluoride standard premixed with TISAB II	500 mL bottle
HI4010-30	kit containing 4 bottles each of : HI 4010-10, HI 4010-11 and HI 4010-00	500 mL ea. bottle
HI4110-51	fluoride module for combination electrode	

Nitrate ISE

Code	Description	Size
HI4013-00	ISA for nitrate ISEs	500 mL bottle
HI4013-01	0.1 M nitrate standard	500 mL bottle
HI4013-02	100 mg/L (ppm) nitrate standard (as N)	500 mL bottle
HI4013-03	1000 mg/L (ppm) nitrate standard (as N)	500 mL bottle
HI7078	electrolyte solution, 0.5M $(NH_4)_2 SO_4$	30 mL bottles (4)
HI4013-06	nitrate interferent suppressant ISA	500 mL bottle
HI4013-53	Nitrate module 3 pack for half-cell	
HI4113-53	Nitrate module 3 pack for combination	

Silver/Sulfide ISE

Code	Description	Package
HI4000-00	ISA for halide ISEs	500 mL bottle
HI4015-00	SAOB (sulfide antioxidant buffer)	500 mL bottle + 18 g (2 components)
HI4015-01	0.1 M silver standard	500 mL bottle
HI7072	electrolyte solution, 1 M KNO_3	30 mL bottles (4)
HI4000-70	halide polishing strip	

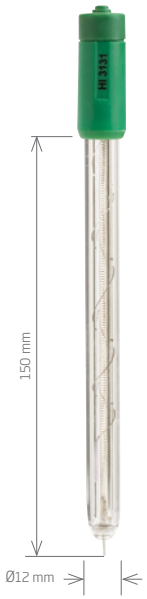
pH and ORP Electrodes

HI1230B
Combination pH Electrode

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	gel
Max Pressure	2 bar
Range	pH: 0 to 13
Recommended Operating Temp.	0 to 70°C (32 to 158°F) – GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	no
Amplifier	no
Body Material	PEI
Ordering Info	**HI1230B** combination pH electrode with 1 m (3.3') cable and BNC connection

HI1131B
Refillable Combination pH Electrode

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temp.	0 to 100°C (32 to 212°F) – HT
Tip /Shape	spheric (dia: 9.5 mm)
Temperature Sensor	no
Amplifier	no
Body Material	glass
Ordering Info	**HI1131B** refillable, combination pH electrode with 1 m (3.3') cable and BNC connection



HI3131B
Refillable Combination ORP Electrode

Reference	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M + AgCl
Max Pressure	0.1 bar
Range	ORP: ±2000 mV
Recommended Operating Temp.	-5 to 70°C (23 to 158°F)
Tip /Shape	platinum pin
Temperature Sensor	no
Amplifier	no
Body Material	glass
Ordering Info	**HI3131B** refillable, combination ORP electrode with 1 m (3.3') cable and BNC connection

HI1053B
Refillable, Combination pH Electrode

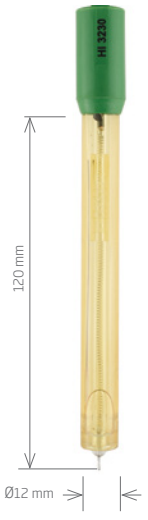
with Low Temperature (LT) Glass and Conical Tip

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, triple / 40-50 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temp.	-5 to 100°C (23 to 212°F) - LT
Tip /Shape	conic (12 x 12 mm)
Temperature Sensor	no
Amplifier	no
Body Material	glass – LT
Ordering Info	**HI1053B** refillable, combination pH electrode w/ conical tip, 1 m (3.3') cable and BNC connection

HI1048B
pH Electrode with CPS™

(Clogging Prevention System)

Reference	double, Ag/AgCl
Junction / Flow Rate	open, CPS™
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temp.	0 to 80°C (32 to 176°F) - GP
Tip /Shape	dome (dia: 8 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	glass
Ordering Info	**HI1048B** pH electrode with CPS™ (Clogging Prevention System) with 1 m (3.3') cable and BNC connection



HI3230B
ORP Electrode

Ideal for Municipal Water and QC

Reference	single, Ag/AgCl
Junction / Flow Rate	ceramic, single
Electrolyte	gel
Max Pressure	2 bar
Range	ORP: ±2000 mV
Recommended Operating Temp.	-5 to 70°C (23 to 158°F)
Tip /Shape	platinum pin
Temperature Sensor	no
Amplifier	no
Body Material	PEI
Ordering Info	**HI3230B** gel-filled, combination ORP electrode w/ platinum contact, 1 m (3.3') cable and BNC connection

edge® (p.36)

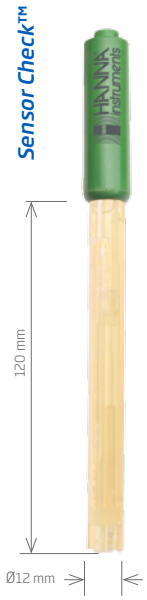
Compatible Digital Electrodes

These digital electrodes are auto-recognized, providing sensor type, calibration data and a serial number when connected to edge®.

edge® features Hanna's exclusive pH CAL Check™ to warn you if the electrode in use is not clean or if your buffers are contaminated during calibration. We have added Sensor Check™ for pH sensors with a matching pin. Our Sensor Check™ feature warns you if the pH bulb is cracked and/or the junction of the electrode is compromised.

- GLP
  Data from the last calibration you perform is stored in the sensor including the date, time and standards. When any sensor (pH, EC, or DO) is connected to edge®, GLP data is automatically transferred.

- 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.

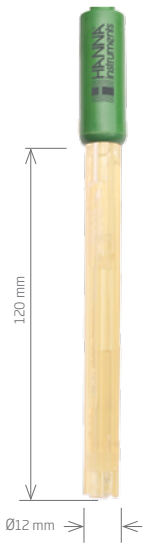


HI12301

Combination, Digital Smart pH Electrode

with Matching Pin for Sensor Check™

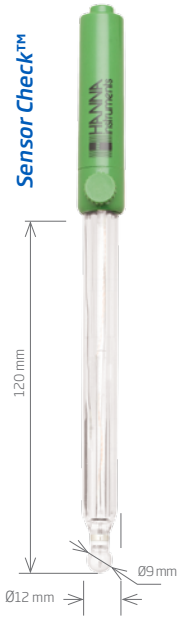
Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	gel
Max Pressure	2 bar
Range	pH: 0 to 13
Recommended Operating Temp.	-5 to 70°C (23 to 158°F) - GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	yes
Matching Pin	yes
Amplifier	yes
Body Material	PEI
Ordering Info	**HI 12301** combination, digital smart pH electrode with 1m (3.3') coaxial cable and 3.5mm jack connection.



HI12300

Combination, Digital Smart pH Electrode

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	gel
Max Pressure	2 bar
Range	pH: 0 to 13
Recommended Operating Temp.	-5 to 70°C (23 to 158°F) - GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	yes
Matching Pin	no
Amplifier	yes
Body Material	PEI
Ordering Info	**HI 12300** combination, digital pH electrode with 1m (3.3') coaxial cable and 3.5mm jack connection.



HI11311

Refillable, Combination, Digital Smart pH Electrode

with Matching Pin for Sensor Check™

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temp.	-5 to 100°C (23 to 212°F) - HT
Tip /Shape	spheric (dia: 9.5 mm)
Temperature Sensor	yes
Matching Pin	yes
Amplifier	yes
Body Material	glass
Ordering Info	**HI 11311** refillable, combination, digital smart pH electrode with 1m (3.3') coaxial cable and 3.5mm jack connection

HI10530

Refillable, Combination, Digital Smart pH Electrode

with Conical Tip

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, triple / 40-50 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temp.	-5 to 100°C (23 to 212°F) - LT
Tip /Shape	conic (12 x 12 mm)
Temperature Sensor	yes
Matching Pin	no
Amplifier	yes
Body Material	glass
Ordering Info	**HI 10530** refillable, combination, digital pH electrode with conical tip, 1m (3.3') coaxial cable and 3.5mm jack connection.

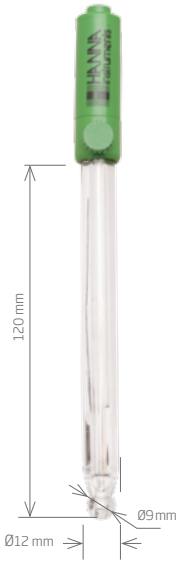
HI98190 (p. 25) pH and ORP Compatible Electrodes

HI12963
pH Electrode
with Titanium Casing and Quick Connection

Reference	single, Ag/AgCl
Junction / Flow Rate	cloth
Electrolyte	gel
Max Pressure	3 bar
Range	pH: 0 to 13
Recommended Operating Temp.	0 to 80°C (32 to 176°F) - GP
Tip /Shape	spheric (dia: 5 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	Titanium
Ordering Info	**HI12963** pH electrode with titanium casing and 1 m (3.3') cable and quick connection

HI12303
Combination pH Electrode
with Quick Connection

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	gel
Max Pressure	2 bar
Range	pH: 0 to 13
Recommended Operating Temp.	0 to 70°C (32 to 158°F) – GP
Tip /Shape	spheric (dia: 7.5 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	PEI
Ordering Info	**HI12303** combination pH electrode with 1 m (3.3') cable and quick connection



HI11313
Refillable, Combination pH Electrode
with Quick Connection

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 13
Recommended Operating Temp.	0 to 100°C (32 to 212°F) – HT
Tip /Shape	spheric (dia: 9.5 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	glass
Ordering Info	**HI11313** refillable, combination pH electrode with 1 m (3.3') cable and quick connection

HI10533
Refillable, Combination pH Electrode
with Conical Tip and Quick Connection

Reference	double, Ag/AgCl
Junction / Flow Rate	ceramic, triple / 40-50 µL/h
Electrolyte	KCl 3.5M
Max Pressure	0.1 bar
Range	pH: 0 to 12
Recommended Operating Temp.	-5 to 100°C (23 to 212°F) - LT
Tip /Shape	conic (12 x 12 mm)
Temperature Sensor	yes
Amplifier	yes
Body Material	glass – LT
Ordering Info	**HI10533** refillable, combination pH electrode w/ conical tip, 1 m (3.3') cable and quick connection

HI36183
Refillable, Combination ORP Electrode
with Quick Connection

Reference	single, Ag/AgCl
Junction / Flow Rate	ceramic, single / 15-20 µL/h
Electrolyte	KCl 3.5M + AgCl
Max Pressure	0.1 bar
Range	ORP: ±2000 mV
Recommended Operating Temp.	-5 to 70°C (23 to 158°F)
Tip /Shape	platinum pin
Temperature Sensor	yes
Amplifier	yes
Body Material	glass
Ordering Info	**HI36183** combination ORP electrode with 1 m (3.3') cable and quick connection

HI36203
Combination ORP Electrode
with Quick Connection

Reference	single, Ag/AgCl
Junction / Flow Rate	ceramic, single
Electrolyte	gel
Max Pressure	2 bar
Range	ORP: ±2000 mV
Recommended Operating Temp.	-5 to 70°C (23 to 158°F)
Tip /Shape	platinum pin
Temperature Sensor	yes
Amplifier	yes
Body Material	PEI
Ordering Info	**HI36203** combination ORP electrode with and 1 m (3.3') cable and quick connection

HI190M

Our Most Popular Magnetic Mini-Stirrer

- Compact size
  - The compact size of this stirrer allows 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 resists most harmful chemicals in the lab

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

This stirrer incorporates 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 HI190M, as the Speedsafe™ mechanism ensures that the maximum speed is never exceeded.

HI190M is supplied with an ABS cover that will resist the harmful effects of chemicals that are accidentally spilled.

Speedsafe™

Specifications	HI190M
Maximum Stirring Capacity	1 liter (0.26 gallons)
Min. Speed Range	100 rpm
Max. Speed Range	1000 rpm
Cover Material	ABS plastic
Ordering Info	**HI190M** mini-stirrer is supplied with micro stir bar and instructions.
Accessories	**HI731319** magnetic micro stir bar (10)

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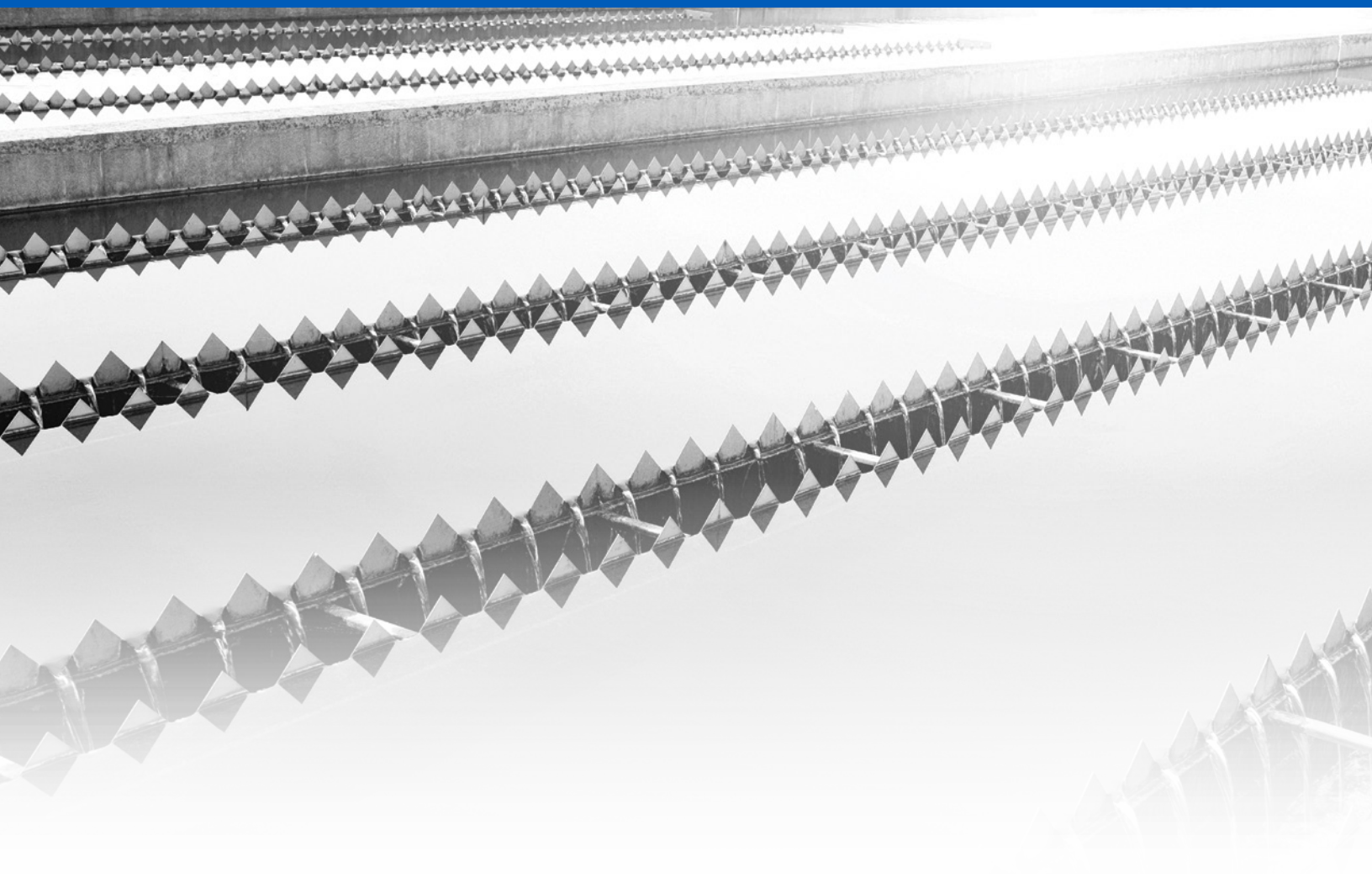
Limited Warranty

Hanna products are manufactured in our ISO 9001:2008 facilities, meeting the highest quality standards in the industry. Hanna's high standards also apply should a product be returned due to defects in material or workmanship. Our extensive warranty extends up to five years on some products.

- Limitations: Warranted products may be returned for repair or replacement only at the discretion of Hanna. In some circumstances, remedy may constitute refund for the price paid for the product.

The warranty period commences from the original date of sale to the user or a maximum of 18 months from factory ship date. Warranty is valid only when the product is used under normal conditions and in accordance with operating limitations and prescribed maintenance procedures. The express warranty stated previously is the only express warranty given by Hanna to the end-user buyer. Hanna expressly disclaims any warranties implied by law, including but not limited to warranty of merchantability of fitness for a particular purpose. Hanna shall not be liable for any individual or consequential damages of any kind for breach of any warranty, negligence, on the basis of strict liability or otherwise. Hanna's warranty periods differ across our range of instrumentation, please visit us on the web at: www.hannainst.com or contact your local Hanna representative for specific warranty information.

Hanna Instruments® reserves the right to change or modify the design of its products at any time without advance notice.



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When you buy a Hanna product, you're not only buying the best value for your money, but you're also receiving the benefit of Hanna's unsurpassed customer service and post-sale technical support.

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Offering research grade quality at competitive prices, every Hanna office strives to work with each customer to develop a solution tailored to their needs, and within their budget.

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