Table of Contents

Hanna Instruments® Titration Systems

Titration is used in analytical chemistry to determine the amount or concentration of a substance, known as the analyte. Titration is a quantitative measurement of an analyte in solution by its complete reaction with a reagent. In a titration, one reagent (the titrant) is slowly added to a solution containing the species being measured (the analyte). As it is added, a chemical reaction occurs between the titrant and analyte. The point at which the reaction is complete and an equivalent quantity of titrant and analyte are present (a stoichiometric equivalent) is called the equivalence point. This can be determined by a chemical indicator that is also present in the solution, or by a measurable physical change in the solution, like pH, electrode potential, conductivity, or light absorption (color). In practice, an abrupt change of this physical property signals the end of titration, called the endpoint.

The purpose of titration is to determine the quantity or concentration of an analyte with a known concentration and volume of a titrant. Titrations are based on chemical reactions which must fulfill four requirements:

- The reaction between the analyte and the titrant must occur quickly, without a secondary reaction
- The reaction must go to completion
- The reaction must have well-known stoichiometry (reaction ratio)
- Must have a convenient method of endpoint detection

Titrations are highly precise and can provide many advantages over alternative methods. Titrations are quickly performed and require relatively simple apparatus and instrumentation.

Automatic Titration

Automatic titration is done with instrumentation that delivers the titrant, stops at the endpoint and calculates the concentration of the analyte automatically. Automatic titrators are best for accurate and repeatable results, as an electrochemical measurement is used to determine the endpoint as opposed to a subjective color indicator.

Analyses that can be performed by potentiometric automatic titrators include:

- Acid-base titrations
- Oxidation reduction titrations
- Complexometric titrations
- Precipitation titrations
- Non-aqueous titrations
- Argentometric titrations
- pH, ORP and Ion selective measurements

Analyses performed by bivoltammetric automatic titrators include:

- Coulometric Karl Fischer titration (trace amounts of water determination)
- Volumetric Karl Fischer titration (greater than 100 ppm water determination)

The required equipment for automatic titration include an automatic titrator equipped with a burette, a standardized titrant, a volumetric pipette (to measure the sample volume) or analytical balance (to measure or weigh a sample), a beaker, a sensor, and a stirring mechanism.

The automatic titrator must have an accurate liquid-dispensing system. In high accuracy systems, this is typically a motor-driven piston burette, a valve system to switch between titrant inlet and outlet, and a titration tip to dispense the titrant into the sample solution. These three main subsystems must be as accurate as possible, with very low gear backlash in the burette drive mechanism, low piston seal flexing, accurate burette glass cylinder diameter, low dead volume in the valve, minimal evaporation/permeation and chemically resistant tubing.

Standards and Standardization

One of the substances involved in a titration must be used as a standard for which the amount of substance present is accurately known. The standard can be present either in the form of a pure substance or as a solution. The titrant solution can be standardized in two ways; using a primary standard, or more commonly, titrating it against a previously standardized solution.

Product Spotlights

HI933

Karl Fischer Volumetric Titrator

for Moisture Determination

The HI933 is an automatic volumetric Karl Fischer titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of sample types/matrices, allowing the user to obtain both good results and high-speed analysis. The HI933 analyzes for water content ranging from 100 ppm to 100%. This powerful titrator automatically dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing.

See page 4.22

HI934

Karl Fischer Coulometric Titrator

The HI934 is an Karl Fischer coulometric titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of applications, allowing the user to obtain both good results and high-speed analysis. The HI934 analyzes for water content ranging from 1 ppm to 5%. This powerful titrator effectively monitors the KF reaction, detects the endpoint, and performs all necessary calculations and graphing.

See page 4.26

HI84530 • HI84531

Total Titratable Acidity and Titratable Alkalinity

	Low Range Acidity	High Range Acidity	Low Range Alkalinity	High Range Alkalinity	pH Range	Temperature Range (°C)	Three-point pH Calibration	Automatic Temperature Compensation	GLP Features	Backlit Display	Data Logging	PC Connectivity	Page
HI84534	•	•			•	•	•	•	•	•	•	•	4.56
HI84530	•	•			•	•	•	•	•	•	•	•	4.58
HI84531			•	•	•	•	•	•	•	•	•	•	4.60

HI84529

Dairy Products

	Low Range Acidity	High Range Acidity	pH Range	Temperature Range	Automatic Temperature Compensation	Three-point pH Calibration	GLP Features	Backlit Display	Data Logging	PC Connectivity	Page
HI84529	•	•	•	•	•	•	•	•	•	•	4.62

HI84532

Acidity in Fruit Juice

	pH Range	Temperature Range (°C)	Citric Acid Range	Malic Acid Range	Tartaric Acid Range	Three-point pH Calibration	Auto matic Temperature Compensation	GLP Features	Data Logging	Backlit Display	PC Connectivity	Page
HI84532	•	•	•	•	•	•	•	•	•	•	•	4.64

HI84500 • HI84502 • HI84533

Wine Products

	Formol Number	Tartaric Acid Range	ORP Range	Sulfur Dioxide Range	pH Range	Temperature Range	Three-point pH Calibration	Automatic Temperature Compensation	GLP Features	Data Logging	Backlit Display	PC Connectivity	Page
HI84533	•				•	•	•	•	•	•	•	•	4.66
HI84500			•	•					•	•	•	•	4.68
HI84502		•			•	•	•	•	•	•	•	•	4.70

HI932

Automatic Potentiometric Titration System (pH/mV/ISE)

The HI932 Advanced Automatic Titrator is the answer to your advanced titration needs. Fully customizable to meet your testing needs, the HI932 delivers accurate results and intuitive user experience, all in a compact package. Titrate for a variety of published methods at the push of a button, as well as perform direct measurements and back titrations for complex samples. For those that require greater automation, pair your HI932 with the HI922 Autosampler for the most accurate results with the least amount of effort.

- Small footprint so you can fully optimize your benchtop and increase productivity.
- Reduce downtime and increase efficiency when you perform multiple analyses linked in sequence.
- Works seamlessly with the HI922 Autosampler for automation of up to 18 samples.

Superior design for superior results.

The Cycoloy® body is durable, heat-resistant, and resists staining. Menu buttons are part of the display making it fully sealed and easy to clean. A high contrast LCD display makes every character on the display stand out and the wide viewing angle allows measurements to be seen from any angle. The backlight is adjustable for perfect viewing and a backlight saver option protects the display during periods of inactivity.

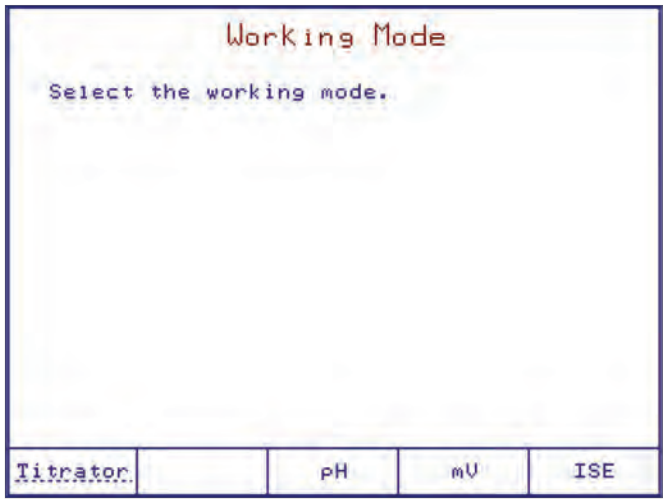
Maximize your workspace.

This new generation of titrator features a 50% smaller footprint than the HI902 Automatic Titrator for maximum use of your lab space. Use it in any sized space while providing accurate and consistent results.

Simple user experience

Virtual keys present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information. If you need additional information about a screen, simply press the dedicated button for help.

Titrator Capabilities



Multiple Titration Types

Paired with the right electrode from our sensor line, this potentiometric titrator can perform any number of standard titrations, back titrations, as well as perform direct pH, ORP, and ion selective readings.

Dynamic titrant dosing

The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Equivalence endpoint detection

Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

Multiple equivalence point detection

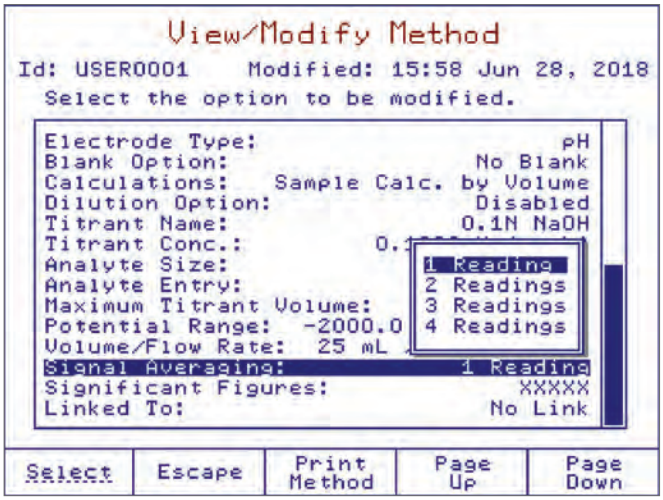
HI932 can detect multiple equivalence points during one titration as specified and required in certain standard methods and applications.

Signal stability timing

The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.

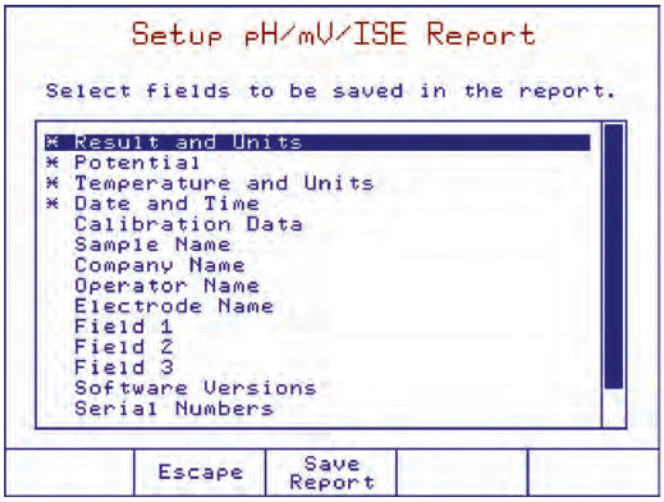
Streamline your testing with method sequencing

Reduce downtime and increase efficiency when you perform multiple analyses linked in sequence. A linked method function allows for two analyses to be run on the same sample including direct measurements, fixed endpoint titrations, multiple (up to 5) equivalence point titrations, and back titrations. Track your progress in real-time with onscreen titration curves.



Customizable methods

These titrators can store up to 100 user-defined or standard titration and direct measurement methods. Each method may be modified and optimized for performance based on application and user requirements.



Customizable Analysis Reports

Each analysis report is fully customizable to ensure the best data required for an application is stored and filed. The Multiselect feature makes batch processing simple.

Burrettes and Dosing System

Clip Lock™ exchangeable burette system

With Hanna's Clip-Lock™ burette feature, it only takes a few seconds to exchange titrants and reagents preventing cross-contamination and saving time.

Multiple burette sizes

HI932 is supplied with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette. Each burette is constructed with a ground glass syringe and chemically resistant PTFE plunger.

Automatic Reagent Addition

A peristaltic pump or a second burette may be programmed to volumetrically dispense reagent prior to titration or direct measurement or aspirate post-analysis. This helps achieve consistent and accurate results and prevents operator errors such as incorrect volumes or forgetting reagent addition.

Precision dosing pump

Our unmatched 40,000-step piston driven pump is capable of dosing extremely small and highly accurate volumes of titrant or reagent.

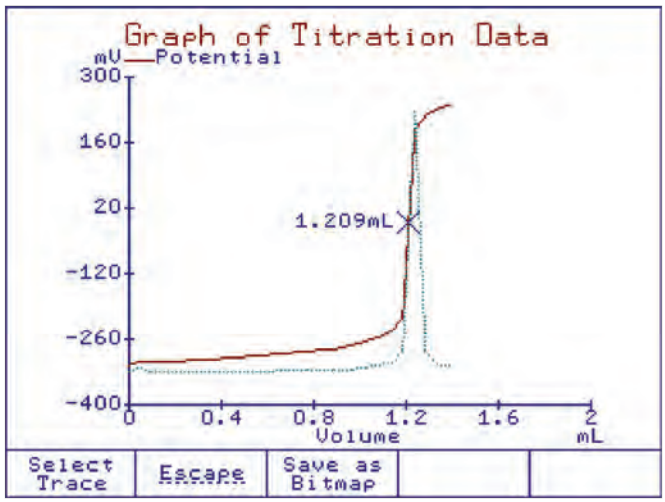
Chemically resistant tubing

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Interface and Display

Interactive color display

A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values.



Detailed titration graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Connectivity and Functionality

Stay connected.

Connect devices such as an analytical balance for automatic weight sample entry or a printer to print reports directly from the titrator.

Multifunctional

These titrators also function as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple analyses can be performed on one sample.

Rear connections

HI932 offers support for two analog boards, allowing up to two electrodes, two burettes, and two stirrers to be connected to one unit.

Data

Data storage

up to 100 titration and pH/mV/ISE reports. Transfer data via USB.

Effortless data transfer

A conveniently located USB port or direct connection to a PC allows for the transfer of titration methods, titration reports, and software upgrades. Easily convert titration methods from our software to an LIMS friendly format.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information is recorded with each sample including sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Enhanced security options

Administrative users can set a PIN code on the device protecting against unauthorized access. Titration method options and results are tamper-proof while a non-administrator operates the titrator, ensuring records remain safe, secure, and traceable.

Designed for dynamic environments.

Don't worry about small spills in the laboratory with built-in spill handling. An external gutter system protects important connections and interior trays safeguard internal electronics

Take advantage of the versatility.

HI932 functions as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple tests can be performed on one sample.

Titration solutions and reagents begin on page 4.56; See accessories on page 4.57

Electrode holder

This electrode holder can hold up to 3 electrodes, 4 tubes, and 1 temperature probe at any given time. The holder is angled and the stirrer is removable for access to smaller volume titrations without hassle.

Use electrodes with different diameters when needed by simply changing the electrode guide. No need to move electrodes around, get the best tube alignment for your titration with a rotating holder.

For a more compact design, the electrode holder is mounted directly onto the titrator body. The press-to-release button makes for simple height control. Need to save more space? Just reverse the holder to accommodate larger beakers.

The electrode holder is easy to flip to gain added height.

Smarter stirring

The removable overhead stirrer has built-in speed control for more consistent stirring.

Autosampler connectivity

The HI932 works seamlessly with our HI922 Autosampler featuring 16 or 18 sample tray options, automatic tray identification, and automatic beaker detection. Up to three peristaltic pumps for reagent addition and removal can be connected and real-time analysis and sequencing progress is visible on the HI932 display as well as indicated by the LED lights of the Autosampler.

Specifications		HI932C1 / HI932C2
Analysis Type	standard titration (standardization, fixed pH/ mV, equivalence point pH/ mV back Titration direct Reading	
End Point Mode	fixed mV fixed pH mV Equivalence Point (up to 5 points, 1st or 2nd derivate) pH Equivalence Point (up to 5 points, 1st or 2nd derivate)	
Burette	Size	5 mL / 10 mL / 25 mL / 50 mL
	Resolution	0.001 mL
	Flow Rate	0.3 mL to 2 x Burette volume per minute
	Accuracy	± 0.005 mL (5 mL Burette) ± 0.010 mL (10 mL Burette) ± 0.025 mL (25 mL Burette) ± 0.050 mL (50 mL Burette)
Stirrer	Range	200 to 2500 RPM
	Resolution	100 RPM
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
	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
	mV Calibration	single point offset
ISE	Range	$1 \cdot 10^{-6}$ to $9.999 \cdot 10^{10}$
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	± 0.001 pH
	ISE 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
Data Storage	Methods	up to 100 titration methods (standard and user) up to 30 autosampler sequences
	Reports	up to 100 titration and pH/mV/ISE reports up to 40 autosampler tray reports (e.g. 720 reports for 18 beaker tray)
Connections	Measurement (per analog board)	BNC Socket (pH, ORP, ISE half-cell and ISE combination electrodes) 4 mm Banana Socket (reference electrode) RCA Socket (temperature sensor) 6-pin Connector (stirrer)
	Peripheral	6-pin Mini DIN (external PC keyboard) DB-25 Socket (printer) USB Standard B (PC connection) DB-9 Socket (analytical balance) USB Standard A (USB flash drive)
Additional Specifications	Electrode Holder	multi-purpose slots (titrant/reagent tubes) (4) 12-mm electrode slots (3) temperature sensor slot overhead stirrer slot
	Analog Board(s) Capability	2
	Dosing Pump Capability	2
	Burette Included	1 (25 mL)
	Burette Size Capability	5, 10, 25 and 50 mL
	Burette Resolution	1/40000
	Display Resolution	0.001 mL
	Dosing Accuracy	±0.1% of full burette volume
	GLP Conformity	instrumentation data storage and printing capabilities
	Linked Methods	yes
	Back Titrations	yes
	HI922 Compatible	yes
	Display	5.7" graphical color display with backlight
	Languages	English, Portuguese, Spanish
	Power Supply	100-240 Vac, 50/60 Hz "-01" models, US plug (type A) "-02" models, European plug (type C)
	Power Draw	0.5 Amps
	Operating Environment	10 to 40 °C (50 to 104 °F); up to 95 % RH
	Storage Environment	-20 to 70 °C (-4 to 158 °F); up to 95 % RH
	Dimensions	315 x 205 x 375 mm (12.4 x 8.1 x 14.8")
	Weight	approx. 4.3 kg (9.5 lbs.) with 1 pump, stirrer and sensors
Ordering Information	**HI932C1-01** and **HI932C1-02** includes titrator with one analog board*. **HI932C2-01** and **HI932C2-02** includes titrator with two analog boards*. All models also include: overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.	
Accessories	**HI930101**	dosing pump with peristaltic pump
	HI930100	dosing pump
	HI930150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI930125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI930110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
	HI930105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)

*Each Analog Board Provides: (1) BNC (pH/mV/ISE) Input, (1) Reference Input, (1)Temperature Input, (1) Stirrer Input

Titration solutions and reagents begin on page 4.72; See accessories on page 4.73

HI922

Autosampler

control panel

Automate up to 18 samples

The HI922 Autosampler is an automated titration sample handling system designed for use with the HI932 Automatic Titration System, making multiple sample titrations quick and easy.

With the Autosampler, up to 18 samples can be run consecutively. The HI922 Autosampler interfaces directly with the HI932 to access titration methods. Once a titration method is established, the user can fully customize the automation sequence of their samples for this method. Sample names and size can be customized or auto-filled with preset values. One beaker can be designated for storage purposes before and after titration sequences; up to three beakers per tray can be designated for an electrode rinse sequence, allowing for sufficient removal of solutions that are hard to clean between each sample titration. During each sample titration, the real-time progress is shown on the HI932 display. Finished sample results and graphs can be accessed during and after the titrations have finished.

Once the Autosampler sequence is complete, two reports are available for review: a sequence report featuring 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.

16 or 18 Sample Tray

The HI922 is able to automate samples using a 16 sample tray or an 18 sample tray. The 16 sample tray holds 150 mL beakers; the 18 sample tray holds 100 mL beakers. The Autosampler trays are composed of chemically resistant materials and are removable to allow for easy handling. The dishwasher safe trays provide a quick and simple way for users to clean regularly.

Built-in Magnetic Stirrer

A magnetic stirrer comes built-in with each Autosampler tray. Users simply need to add a small magnetic stir bar to each beaker to ensure homogeneity during titrations. An optional overhead propeller stirrer can also be installed for use instead of the built-in stirrer. The HI922 allows users to easily adjust the stirring speed of both the built-in and overhead stirrers for optimal use.

Built-in RFID

The HI922 sample trays feature a built-in RFID reader that is able to communicate the tray size and serial number of each tray. Users can have multiple trays, each designated to a specific set of samples. The RFID reader can ensure that the appropriate tray is used each time.

Absolute Encoder

The Autosampler consistently tracks the tray position without the need to "home" or calibrate.

Barcode Reader

A USB-compatible barcode reader can be used to associate names with each sample for improved organization of data.

Optical IR Beaker Detection

An optical IR beam is able to detect the presence or absence of beakers within the sample tray. Users can dictate the Autosampler action if a beaker is missing from the tray during a titration sequence. If a beaker is detected as missing, the HI921 can skip over the sample or stop the titration sequence.

Versatile Electrode Holder

The durable electrode holder is able to accommodate three 12 mm electrodes, a temperature sensor, one aspiration tube, and five multipurpose tubes. The multipurpose tubes can be utilized for actions such as reagent addition or burette dosing.

Electrode Rinse Feature

Up to 3 beakers per tray can be designated for electrode dip/spray rinses.

Sample Leveling Feature

Automatic leveling for fast preparation of volumetric samples.

Waste Removal Feature

Aspirate completed samples into a waste container.

Use with the HI932 Automatic Titration System

Flexible, accurate detection of the titration endpoint with HI932 potentiometric titrator.

Real-time progress of the sequence and results shown on the HI932 titrator screen.

Control Panel

The included control panel features multiple buttons to allow for manual operation of the Autosampler tray, electrode holder, and any auxiliary pumps. A two-line backlit display on the handheld panel clearly displays status information. Manual control with the control panel is desirable for calibration, sample preparation, and method optimization.

Peristaltic and Membrane Pumps

- Up to three peristaltic pumps can be added at anytime
- User replaceable pump systems
- Peristaltic pumps
  - Uses high performance plastic that is engineered to be chemically resistant and have long service life.
  - Reagent addition, sample leveling, waste removal
  - Greater than 200 mL/min flow
- Membrane pumps
  - Simple plug connection for tubing
  - Greater than 400 mL/min flow

Users can add up to three peristaltic pumps or one membrane pump at any time with the user-replaceable pump systems on the HI922. The peristaltic pumps use high performance plastic that is engineered to be chemically resistant with a long service life. These pumps have a flow greater than 200 mL/min and can be utilized for reagent addition, sample leveling, and waste removal. The membrane pump is a simple plug connection for tubing that has a flow greater than 400 mL/min.

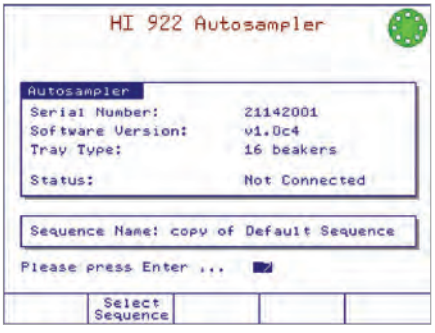
Status indicator lights

Highly visible status lights are located on both sides of the Autosampler. These lights correspond to the status indicator on the HI932 display and can easily be seen from far away. The lights double as a safety feature, as pressing them at any time will automatically stop the current titration sequence.

- Steady green
  - Idle, ready to start
- Flashing green
  - Titration sequence running

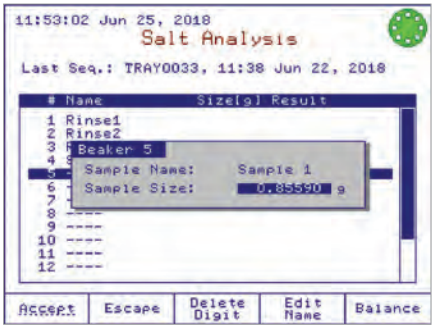
- Flashing yellow
  - Titration sequence paused

- Steady Red
  - Error or emergency stopped, or initializing during power on
- Flashing Red
  - Error during sequence running or manual operation



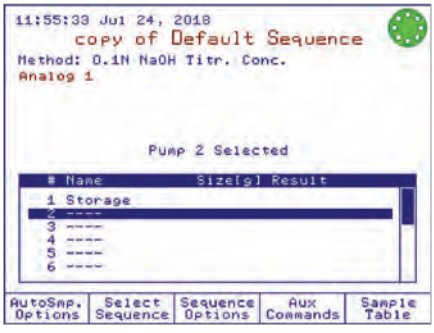
RFID recognition

Sample trays are automatically detected and identified when placed on the Autosampler.



Digital balance compatibility

Sample weights are communicated when connected to a digital balance.



Speedy sample entry

Sample names can be automatically incremented for speedy sample identification.

Specifications	HI922		
Electrode Holder Slots	3 x 12-mm electrodes	Trays	16 beakers x 150 mL (HI920-11660)
	1 temperature sensor		18 beakers x 100 mL (HI920-11853)
	1 aspiration tube		built-in RFID, transmits the tray type and serial number to Autosampler
	5 multi - purpose slots (titrant/reagent tubes)	Beakers	ASTM short-form glass beakers
	1 overhead stirrer		HI920-060 (120 mL), fits HI920-11660 tray - 20 plastic beakers
Temperature Sensor	HI7662-A (included)		HI920-053 (100 mL), fits HI920-11853 tray - 20 plastic beakers
Stirrers	built-in magnetic stirrer	Control Panel	buttons for manual operation of tray and titration head
	overhead propeller stirrer (optional)		manual operation of peristaltic or membrane pumps
Peristaltic Pumps	up to 3 can be installed		2-line backlit display with status information
	installs in slots #1, 2, 3	Barcode Reader	compatible with USB barcode readers, used to add sample names
Membrane Pump (for cleaning)	installs in slot #4	Report Storage	up to 40 trays of samples (e.g.: 720 reports for 18-beaker tray)

Ordering Information

Choose your Autosampler configuration:

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

HI922 – x y z

Titration solutions and reagents begin on page 4.72; See accessories on page 4.74

HI931

Automatic Potentiometric Titration System (pH/mV/ISE)

The HI931 Automatic Titrator is the answer to your dedicated titration needs. Fully customizable, the HI931 delivers accurate results and intuitive user experience, all in a compact package. Titrate for a variety of measurements at the push of a button including acids, bases, redox, and selective ions. With no additional programming upgrades to purchase, you can start measuring right away.

- Small footprint so you can fully optimize your benchtop and increase productivity.
- Unmatched 40,000-step dosing pump for small volumes of titrant to help you achieve a very precise endpoint for greater consistency.
- Perfect for dedicated titration needs.

Superior design for superior results.

The Cycoloy® body is durable, heat-resistant, and resists staining. Menu buttons are part of the display making it fully sealed and easy to clean. A high contrast LCD display makes every character on the display stand out and the wide viewing angle allows measurements to be seen from any angle. The backlight is adjustable for perfect viewing and a backlight saver option protects the display during periods of inactivity.

Maximize your workspace.

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Simple user experience

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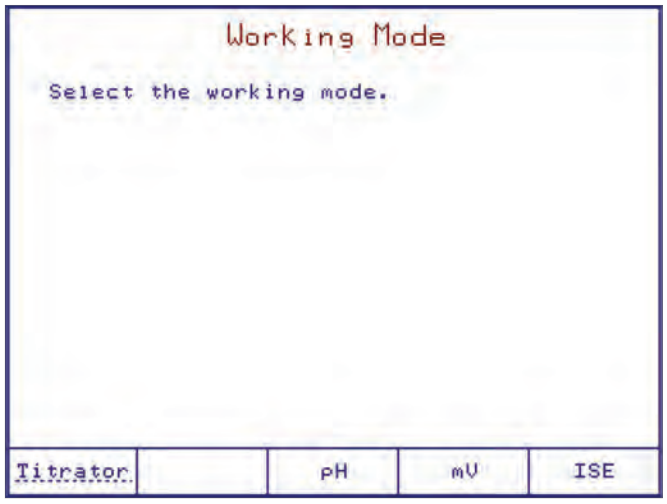
Titrator Capabilities



Multiple Titration Types

Paired with the right electrode, this potentiometric titrator can perform any number of standard titrations including pH and mV tests with fixed endpoints or single equivalence points.

Dynamic titrant dosing

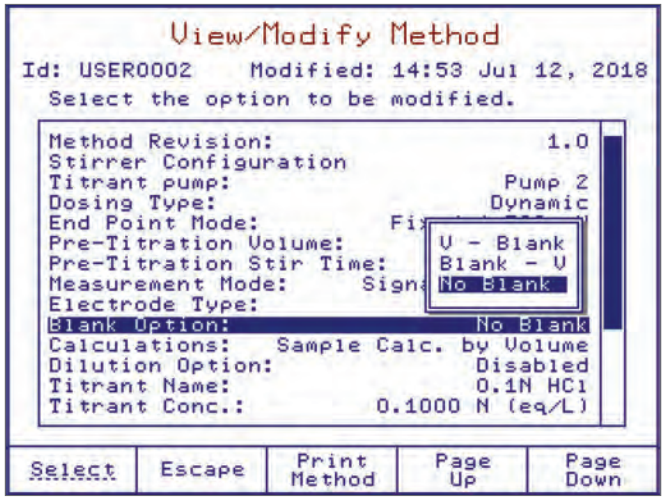
The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Equivalence endpoint detection

Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

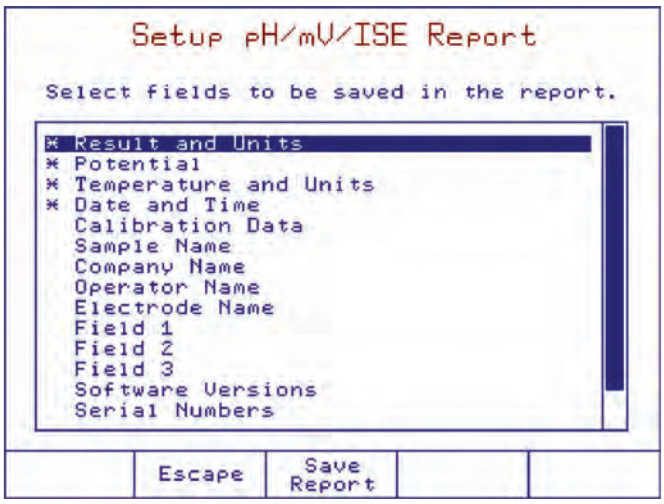
Signal stability timing

The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.



Customizable methods

These titrators can store up to 100 user-defined or standard titration and direct measurement methods. Each method may be modified and optimized for performance based on application and user requirements.



Customizable Analysis Reports

Each analysis report is fully customizable to ensure the best data required for an application is stored and filed. The Multiselect feature makes batch processing simple.

Burrettes and Dosing System

Clip Lock™ exchangeable burette system

With Hanna's Clip-Lock™ burette feature, it only takes a few seconds to exchange titrants and reagents preventing cross-contamination and saving time.

Multiple burette sizes

HI931 is supplied with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette. Each burette is constructed with a ground glass syringe and chemically resistant PTFE plunger.

Precision dosing pump

Our unmatched 40,000-step piston driven pump is capable of dosing extremely small and highly accurate volumes of titrant or reagent.

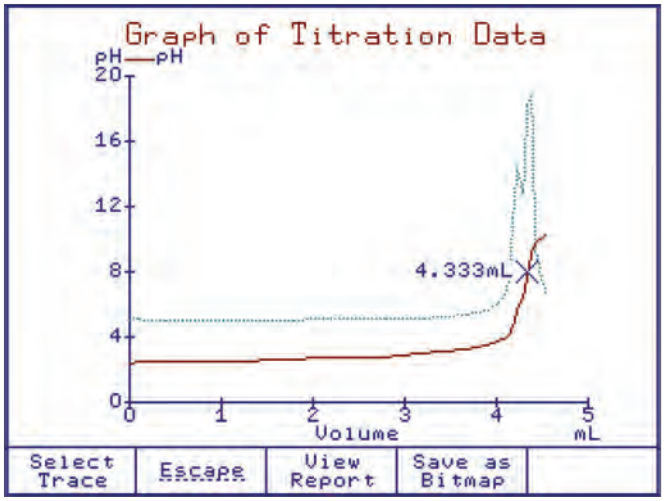
Chemically resistant tubing

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Interface and Display

Interactive color display

A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values.



Detailed titration graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Connectivity and Functionality

Stay connected.

Connect devices such as an analytical balance for automatic weight sample entry or a printer to print reports directly from the titrator.

Multifunctional

These titrators also function as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple analyses can be performed on one sample.

Rear connections

HI931 offers support for one analog board to allow an electrode, a stirrer, and up to two burettes to be connected to one unit.

Data

Data storage

up to 100 titration and pH/mV/ISE reports. Transfer data via USB.

Effortless data transfer

A conveniently located USB port or direct connection to a PC allows for the transfer of titration methods, titration reports, and software upgrades. Easily convert titration methods from our software to an LIMS friendly format.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information is recorded with each sample including sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Enhanced security options

Administrative users can set a PIN code on the device protecting against unauthorized access. Titration method options and results are tamper-proof while a non-administrator operates the titrator, ensuring records remain safe, secure, and traceable.

Designed for dynamic environments.

Don't worry about small spills in the laboratory with built-in spill handling. An external gutter system protects important connections and interior trays safeguard internal electronics

Take advantage of the versatility.

HI931 functions as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple tests can be performed on one sample.

Electrode holder

This electrode holder can hold up to 3 electrodes, 4 tubes, and 1 temperature probe at any given time. The holder is angled and the stirrer is removable for access to smaller volume titrations without hassle.

Use electrodes with different diameters when needed by simply changing the electrode guide. No need to move electrodes around, get the best tube alignment for your titration with a rotating holder.

For a more compact design, the electrode holder is mounted directly onto the titrator body. The press-to-release button makes for simple height control. Need to save more space? Just reverse the holder to accommodate larger beakers.

The electrode holder is easy to flip to gain added height.

Smarter stirring

The removable overhead stirrer has built-in speed control for more consistent stirring.

Specifications		HI931
Analysis Type		standard titration (standardization, fixed pH/ mV, equivalence point pH/ mV
End Point Mode		Fixed mV Fixed pH mV Equivalence Point (1st or 2nd derivate) pH Equivalence Point (1st or 2nd derivate)
Burette	Size	5 mL / 10 mL / 25 mL / 50 mL
	Resolution	0.001 mL
	Flow Rate	0.3 mL to 2 x Burette volume per minute
	Accuracy	± 0.005 mL (5 mL Burette) ± 0.010 mL (10 mL Burette) ± 0.025 mL (25 mL Burette) ± 0.050 mL (50 mL Burette)

Stirrer	Range	200 to 2500 RPM
	Resolution	100 RPM
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
	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
	mV Calibration	single point offset
ISE	Range	$1 \cdot 10^{-6}$ to $9.999 \cdot 10^{10}$
	Resolution	1; 0.1; 0.01
	Accuracy (@25°C/77°F)	± 0.001 pH
	ISE 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
Data Storage	Methods	up to 100 titration methods (standard and user)
	Reports	up to 100 titration and pH/mV/ISE reports
Connections	Measurement	BNC Socket (pH, ORP, ISE half-cell and ISE combination electrodes) 4 mm Banana Socket (reference electrode) RCA Socket (temperature sensor) 6-pin Connector (stirrer)
	Peripheral	6-pin Mini DIN (external PC keyboard) DB-25 Socket (printer) USB Standard B (PC connection) DB-9 Socket (analytical balance) USB Standard A (USB flash drive)
Additional Specifications	Electrode Holder	multi-purpose slots (titrant/reagent tubes) (4) 3 x 12-mm electrode slots (3) temperature sensor slot overhead stirrer slot
	Analog Board(s) Capability	1
	Dosing Pump Capability	2
	Burette Included	1 (25 mL)
	Burette Size Capability	5, 10, 25 and 50 mL
	Burette Resolution	1/40000
	Display Resolution	0.001 mL
	Dosing Accuracy	±0.1% of full burette volume
	GLP Conformity	instrumentation data storage and printing capabilities
	Display	5.7" graphical color display with backlight
	Languages	English, Portuguese, Spanish
	Power Supply	100-240 Vac, 50/60 Hz "-01" models, US plug (type A) "-02" models, European plug (type C)
	Power Draw	0.5 Amps
	Operating Environment	10 to 40 °C (50 to 104 °F); up to 95 % RH
	Storage Environment	-20 to 70 °C (-4 to 158 °F); up to 95 % RH
	Dimensions	315 x 205 x 375 mm (12.4 x 8.1 x 14.8")
	Weight	approx. 4.3 kg (9.5 lbs.) with 1 pump, stirrer and sensors

Ordering Information

HI931-01 and **HI931-02** includes titrator with one analog board*.

All models also include: overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.

Accessories

HI930100	dosing pump
HI930150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)

*Each Analog Board Provides: (1) BNC (pH/mV/ISE) Input, (1) Reference Input, (1)Temperature Input, (1) Stirrer Input

Titration solutions and reagents begin on page 4.72; See accessories on page 4.73

HI933

Karl Fischer Volumetric Titrator

for Moisture Determination

The HI933 is an automatic volumetric Karl Fischer titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of sample types/matrices, allowing the user to obtain both good results and high-speed analysis. The HI933 analyzes for water content ranging from 100 ppm to 100%. This powerful titrator automatically dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing.

- Small footprint, requires minimal bench space
- Casing made with strong, chemically resistant plastic
- Powerful built-in algorithms for termination criteria based on fixed mV endpoint or absolute/relative drift
- Titrant standardization and sample analysis averaging
- Minimized water vapor entry with the Sealed Solvent System
- Balance interface for automatic weighing
- Support for 100 titration methods
- User-customizable reports
- Clearly displayed warning and error messages

Burette and Dosing System

Precision Dosing Pump

Our unmatched 40,000 step piston driven pump is capable of delivering as little as 0.125 µL of titrant accurately and precisely.

Anti-Diffusion Dispensing Tip

A specially designed glass dispensing tip delivers titrant precisely into high turbulence mixing zones, ensuring a rapid reaction. Its angular construction helps prevent titrant from diffusing into the sample solvent.

Chemically Resistant Tubing and Syringe

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Titration and Solvent System

Efficient Sample Handling

The HI933 features a quick-remove sample port with a replaceable rubber septum allowing for fast and easy sample introduction to the titration vessel. An integrated magnetic stirrer ensures homogeneity for an accurate and speedy reaction.

Chemically Resistant Titration Vessel

The glass and PTFE titration cell and fittings are designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

The titration vessel is completely sealed to minimize exposure to ambient humidity, keep the system dry, and reduce titrant consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds without opening the titration vessel.

Visually Recognizable Desiccant

A rechargeable, color-indicating, silica gel desiccant prevents the ingress of ambient humidity into the sealed system while maintaining full titrator functionality. The desiccant color change allows a user to recognize when its adsorption capacity has depleted and is ready for replacement or recharging.

Titrator Capabilities

Dynamic Titrant Dosing

The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Drift Rate Compensation

The HI933 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Titrant Recordkeeping

The HI933's titrant database can store information for up to 20 titrants. The database may be programmed to remind a user when to standardize their titrant, reducing error in analysis.

Selectable Endpoint Criteria

The HI933 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Users may choose termination criteria based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Interface and Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, dosing size, titration volume, drift rate, and mV value.

Simple & Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Data and Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI933 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI933 Karl Fischer system.

Connectivity and Functionality

Configurable Balance Interface

Sample size may be automatically entered from any laboratory analytical balance with a RS232 serial output saving time and labor.

Multiple Peripherals

Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

Versatile Data Management

Easily incorporate into any existing GLP data management program.

- Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information
- Data can be transferred to a PC using Hanna HI900PC software
- Transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- A keyboard can be attached for added versatility

Specifications		HI933
Measurement	Range	100 ppm to 100%
	Resolution	1 ppm (0.0001%)
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg/pc, µg/pc
	Sample Type	liquid or solid
Determination	Pre-Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop or absolute drift stop
	Dosing	dynamic with optional pre-dispensing
	Result Statistic	mean, standard deviation
Titration System	Dosing Pump Resolution	1/40000 of the burette volume (0.125 µL per dose) with 5 mL burette
	Dosing Pump Accuracy	±0.1% of full burette volume
	Syringe	5 mL precision ground glass with PTFE plunger
	Valve	motor-driven 3-way, PTFE liquid contact material
	Tubing	PTFE with light block and thermal jacketing
	Dispensing Tip	glass, fixed position, anti-diffusing
	Titration Vessel	conical with operation volume between 50-150 mL
	Solvent Handling System	sealed system, integrated diaphragm air pump
Electrode	Type	HI76320 dual platinum pin, polarization electrode
	Connection	BNC
	Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
	Voltage Range	2 mV to 1000 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 %
Stirrer	Type	magnetic, optically regulated, digital stirrer
	Speed	200-2000 rpm
	Resolution	100 rpm
Storage	Methods	Up to 100 (standard and user) methods
	Reports	Up to 100 complete titration reports and drift rate reports
Additional Specifications	Display	5.7" graphical color display with backlight
	Peripheral Devices	PC (USB standard B); flash drive (USB standard A); analytical balance (DB-9 Socket); printer (DB-25 Socket); keyboard (6-pin Mini DIN)
	Languages	English, Portuguese, Spanish, and French
	Power Supply / Power Draw	100-240 Vac, 50/60 Hz / 0.5 Amps
	Enclosure Material	ABS/PC and Steel
	Keypad	polyester
	Operating Environment	10 to 40 °C (50 to 104 °F); up to 80 % RH
	Storage Environment	-20 to 70 °C (-4 to 158 °F); up to 95 % RH
	Dimensions	315 x 205 x 375 mm (12.4 x 8.1 x 14.8 ")
	Weight	approx. 4.3 kg (9.5 lbs.) with 1 pump, stirrer and sensors
Ordering Information	**HI933-01** and **HI933-02** are supplied with HI76320 dual platinum pin electrode, dosing pump, 5 mL burette assembly with tubing, air pump/stirrer assembly with tubing, beaker and bottle top assemblies and all fittings, desiccant cartridges (4) with indicating desiccant, stir bar, waste bottle, calibration key, USB cable, power cable, USB flash drive, quality certificate, ISO 8655 burette compliance report and instruction manual binder.	

Specifications	HI76320
Sensor Type	dual platinum pin polarization electrode
Voltage Range	2 mV to 1000 mV
Voltage Resolution	0.1 mV
Accuracy (@25°C/77°F)	±0.1%
Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
Sensor Connection	BNC

*100-240 VAC
"-01" models, US plug (type A)
"-02" models, European plug (type C)

Titration solutions and reagents begin on page 4.72; See accessories on page 4.75

HI934

Karl Fischer Coulometric Titrator

The HI934 is a Karl Fischer coulometric titrator with high accuracy, great flexibility and repeatability.

The titrator is designed to perform titrations for a variety of applications, allowing the user to obtain both good results and high-speed analysis. The HI934 analyzes for water content ranging from 1 ppm to 5%. This powerful titrator effectively monitors the KF reaction, detects the endpoint, and performs all necessary calculations and graphing.

- Small footprint, requires minimal bench space
- Casing made with strong, chemically resistant plastic
- Powerful built-in algorithms for termination criteria based on fixed mV endpoint or absolute/relative drift
- Sample analysis averaging and statistical data
- Minimized water vapor entry with the sealed solvent system
- Balance interface for automatic weighing
- Support for 100 titration methods
- User-customizable reports
- Clearly displayed warning and error messages

Coulometric Reagent System

Precision Iodine Generation

Hanna's dosing algorithm allows for an extremely small amount of iodine necessary for the Karl Fischer reaction to be generated electrolytically using a pulsed current up to 400 mA delivering titrant accurately and precisely.

Titration and Solvent System

Chemically Resistant Titration Vessel and Tubing

The glass titration cell and PTFE tubing is designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

Ground glass joints completely seal the glass titration cell minimizing exposure to ambient humidity, keeping the system dry, and reducing reagent consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds with a quick fitting adjustment.

Molecular Sieve Desiccant

High efficiency molecular sieve desiccant helps maintain low and stable drift rates within the titration cell while preventing the ingress of ambient humidity into the sealed solvent system.

Digital built-in stirrer

Automatic, integrated magnetic stirrer adjustable from 200-2000 RPM with optical feedback for automatic speed control.

Titrator Capabilities

Dynamic Titrant Dosing

The titration speed feature allows for timely and accurate titration results by relating the amount of iodine generated to the mV response from the Karl Fischer reaction.

Drift Rate Compensation

The HI934 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Selectable Endpoint Criteria

The HI934 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Users may choose termination criteria based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Interface & Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, drift rate, and mV value.

Simple and Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Data & Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI934 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI934 Karl Fischer system.

Connectivity and Functionality

Configurable Balance Interface

Sample size may be automatically entered from any laboratory analytical balance with a RS232 serial output saving time and labor.

Multiple Peripherals

Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

Versatile Data Management

- Easily incorporate into any existing GLP data management program:
  - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information
- Data can be transferred to a PC using Hanna HI900PC software
- Easy transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- A keyboard can be attached for added versatility

- Fritted (Diaphragm) Generator
  - Anode/anolyte and cathode/catholyte separated by glass diaphragm
  - Prevents anode-generated iodine from being reduced to iodide at the cathode
  - Ideal for extremely low water content, high accuracy demand, nitrogenous compounds and easily reduced samples

- Fritless (No Diaphragm) Generator
  - Uses one easy-to-replace Karl Fischer reagent
  - Lower and more stable drift rates
  - Easier cleaning of generator cell

Specifications		HI934
Measurement	Range	1 ppm to 5%
	Resolution	0.1ppm
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, ppt, mgBr/100g, gBr/100g, mgBr, gBr
	Sample Type	liquid or solid (external dissolution or extraction)
Determination	Pre Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop, or absolute drift stop
	Dosing	dynamic with 3 speed settings
	Result Statistic	mean, standard deviation
Titration Vessel	Type	borosilicate glass with standard taper glass joint connections
	Operating Volume	100 to 200 mL
	Septum	silicone rubber
	Septum Cap Thread	GL-18
	Reagent Port	standard Taper 19
Detector Electrode	Type / Connection	dual platinum pin, polarization electrode / BNC connector
	Glass Connection	atandard Taper 14/20
	Polarization Current	1, 2, 5, or 10 µA
	Voltage Range	2 to 1100 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1%
Generator Electrode	Type	diaphragm or diaphragm-less
	Electrode Type Detection	automatic
	Electrical Connection	5-pin connector with detachable cable
	Glass Connection	standard Taper 29/12
	Maximum Current	400 mA
	Current Control	automatic or Fixed (400 mA)
Stirrer	Type	magnetic, electronic regulated, digital stirrer
	Speed	200 to 2000 RPM
	Resolution	100 RPM
	External Stirrer	4-pin mini DIN connection allows for the control of an external stirring apparatus
Reagent Handling System	Type	sealed system with integrated diaphragm air pump
	Desiccant Type	molecular sieves
	Bottle Thread Type	GL-45
	Glass Connection	standard taper 19 (using supplied adapter)
	Reagent/Waste Tubing	PTFE
Additional Specifications	Display	5.7" graphical color display with backlight
	Peripheral Devices	PC (USB standard B); flash drive (USB standard A); analytical balance (DB-9 Socket); printer (DB-25 Socket); keyboard (6-pin Mini DIN)
	Languages	English, Portuguese, Spanish, and French
	Power Supply / Power Draw	100-240 Vac, 50/60 Hz / 0.5 Amps
	Enclosure Material	ABS/PC and stainless Steel
	Keypad	polyester
	Operating Environment	10 to 40 °C (50 to 104 °F); up to 80 % RH
	Storage Environment	-20 to 70 °C (-4 to 158 °F); up to 95 % RH
	Dimensions	315 x 205 x 375 mm (12.4 x 8.1 x 14.8 ")
	Weight	approx. 4.3 kg (9.5 lbs.) with 1 pump, stirrer and sensors
Ordering Information	**HI934D-01** and **HI934D-02 are supplied with diaphragm,** **HI934-01** and **HI934-02** are supplied without diaphragm **All Models Include:** dual platinum pin electrode, air pump/stirrer assembly, titration vessel assembly (glass vessel, accessory port stopper, sample port cap and septum, stir bar, desiccant, desiccant cartridge, fittings), vessel support with adapter, pump locking screw with plastic head, reagent bottle assembly (bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), water bottle assembly (waste bottle, bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), calibration key, reagent exchange adapter, accessory holder assembly, joint grease, Karl Fischer generator electrode (removable generator electrode cable), USB cable, USB storage device, HI900 PC application software, power adapter, quality certificate and instruction manual binder.	

*100-240 VAC
"-01" models, US plug (type A)
"-02" models, European plug (type C)

Titration solutions and reagents begin on page 4.72; See accessories on page 4.75

HI90060X Series

Photometric Electrodes

These photometric probes are used with a potentiometric titration for equivalence end point detection of colorimetric reactions. These probes are available in 4 different wavelengths from 470 nm to 625 nm and have a universal BNC connector that is used as a potentiometric input on Hanna titrators and autosamplers.

- Reflective Measurement
  - Allows for a high color sensitivity in a compact design
- Temperature Compensation
  - Drift from variances in temperature are automatically compensated
- Glass Body
  - All of the photometric probes have a glass body that offers excellent chemical resistance. The body of the electrode is 12 mm in diameter and fits easily into sampling beakers
- LED Brightness Trimmer
  - If needed, a trimmer is provided in the head of the electrode to adjust the led output value.

pH, ORP and ISE electrodes are commonly used in potentiometric titrations. These probes produce a voltage that changes as a titrant is dosed into the sample being analyzed. The HI90060X family of photometric probes use the principle of absorbance at a specific wavelength to identify the equivalence point of a titration with the use of a color indicator. The color change of a solution causes a sharp change in the absorbance which also causes a sharp change in the mV response. It is common for a complexometric titration to end in a flat mV response. Using the Hanna potentiometric titrator it is possible to program the meter to use the first derivative as the end point. This program is ideal since when a color indicator is used the color change occurs very distinctly.

The use of a photometric probe for potentiometric titration can be used for a variety of complexometric titrations including calcium and magnesium water hardness and iron, aluminum and calcium in cement materials testing. The photometric probe is also ideal for non-aqueous titrations such as Total Acid Number (TAN) and Total Base Number (TBN) of petroleum products due to its advantages over a standard pH electrode.

With the photometric probe there is no fill solution to change in order to be compatible with a non-aqueous sample and there is no pH sensor to foul.

Each probe has an LED at a specific wavelength that shines light through the sample and reflected back by a platinum mirror sealed in glass. The reflective measurement has a fixed path length and allows for a high color sensitivity in a compact design.

All of the HI90060X have the same design but vary in the wavelength of light used for the photometric analysis.

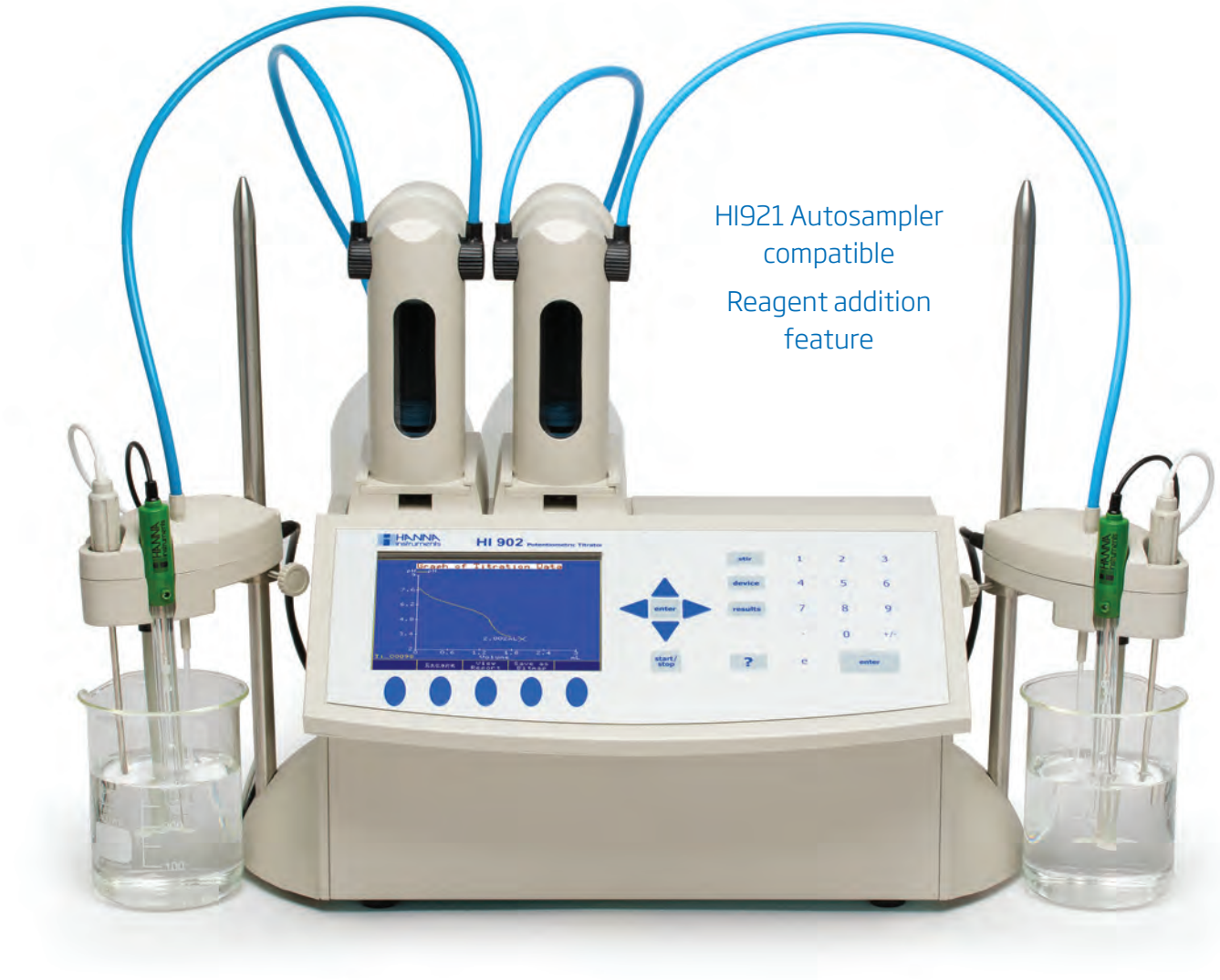
The probes' open cell design that allows for the solution to pass through with the use of a stirrer.

Specifications

mV Range	10 to 1100 mV
Wavelength / LED color	**HI900601** @ 525 nm / green LED **HI900602** @ 625 nm / red LED **HI900603** @ 590 nm / orange LED **HI900604** @ 470 nm / blue LED
Light Source	LED
Measuring Cycle	LED pulsed at 1 kHz
Light Detector	silicon photocell
Sample Temperature	0 to 75°C (32 to 167°F)
Body Material	glass
Body Length / Overall Length	120 mm / 200mm
Outer Diameter	12 mm
Connection	BNC with 1.5 meter cable for connecting to titrator or autosampler
Power supply	ps/2 connector for connecting to titration system
Environment	0 to 50°C (32 to 122°F)
Ordering Information	**HI900601** (@ 525 nm) is supplied, instruction manual, and electrode quality testing certificate. **HI900602** (@ 625 nm) is supplied, instruction manual, and electrode quality testing certificate. **HI900603** (@ 590 nm) is supplied, instruction manual, and electrode quality testing certificate. **HI900604** (@ 470 nm) is supplied, instruction manual, and electrode quality testing certificate.

HI902C

Automatic Titration System



The HI902C is an automatic titrator that complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI902C potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations, as well as back titrations and titre determinations. This powerful titrator dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing automatically. In addition to titration mode, the HI902C also operates as a fully functional pH, mV/ORP, and ion selective electrode (ISE) meter.

This titrator is supplied with a pack of standard methods or you can create your own. Methods (standard or user) can be easily transferred between titrators via USB flash drive.

Burettes and Dosing System

Exchangeable Burette System

With Hanna's Clip-Lock™ burette feature, it only takes a few seconds to exchange titrants and reagents, preventing cross-contamination and saving time.

Multiple Burette Sizes

The HI902C comes standard with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette. Each burette is constructed with a ground glass syringe and chemically resistant PTFE plunger.

Linear and Dynamic Dosing

Precision Dosing Pump

Our unmatched 40,000 step piston driven pump is capable of dosing extremely small and precise volumes of titrant or reagent.

Chemically Resistant Tubing

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Titration Capabilities

Dynamic Titrant Dosing

The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Signal Stability Timing

The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.

Equivalence Endpoint Detection

Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

Multiple Equivalence Point Detection

The HI902C can detect multiple equivalence points during one titration as specified and required in several standard methods and applications.

Method Sequencing

The HI902C offers users the option of linking two methods. This allows for two analyses to be run on the same sample or for back titrations to be performed.

Multiple Titration Types

Paired with the right electrode from our sensor line, our potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations, as well as back titrations and titre determinations.

Interface and Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values. The HI902C also offers multi-language support.

Simple and Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Data and Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI902C can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Market Specific Methods Packs

Hanna offers titration method packages for various markets including food, beverage, dairy, wine, and more. Ask our Sales Consultants about which methods in our library are available for your specific needs.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI902C system.

Connectivity and Functionality

Multifunctional with Four Working Modes

The HI902C functions as a titrator, pH meter, mV/ORP meter, and ISE meter. Valuable laboratory bench space is saved, and multiple analyses can be performed on one sample.

Multiple Connections

The titrator offers device support for two analog boards, allowing up to two electrodes, two burettes, and two stirrers to be simultaneously connected to one unit.

Autosampler Connectivity

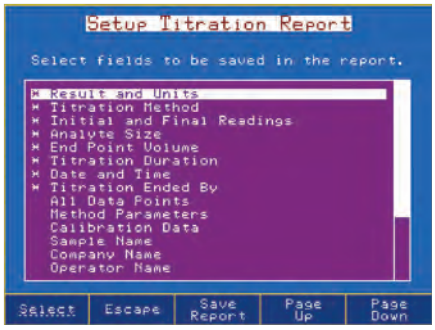
The HI902C works seamlessly with our HI921 Autosampler. The HI921 features 16 or 18 sample tray options, automatic tray identification, automatic beaker detection, up to three peristaltic pumps for reagent addition and removal, real-time titration and sequencing progress, and more.

Multiple Peripherals

Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

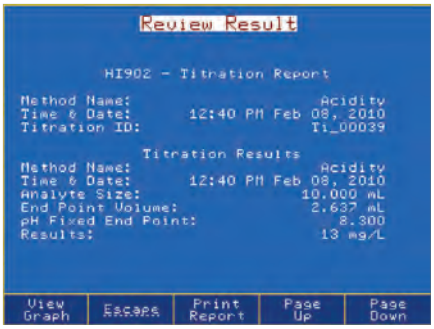
Versatile Data Management

- HI902C titration system can be easily incorporated into any existing GLP data management program:
  - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information.
- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



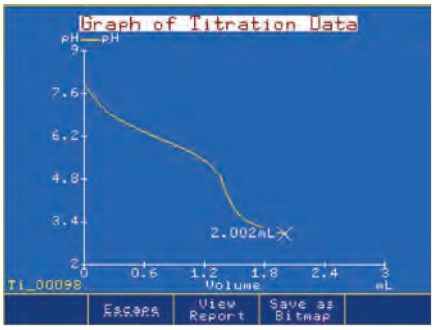
Customizable reports

Data to be stored in tiration reports is fully customizable



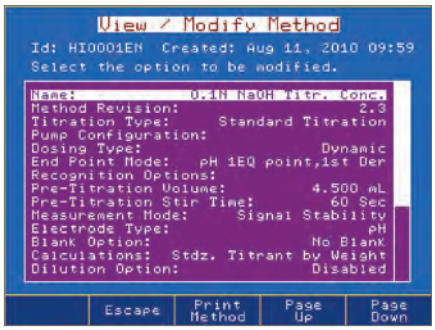
Titration reports

Titration or pH/mV/ISE results can be viewed on-screen or transferred to a USB flash drive or PC



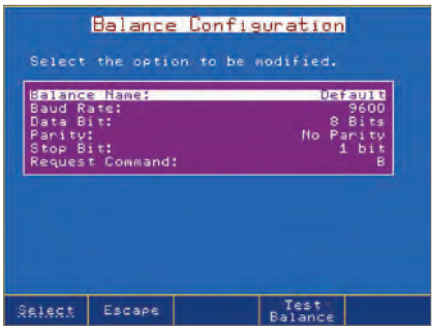
Titration graphs

Titration graphs can be viewed on-screen or saved as images and transferred along with titration report

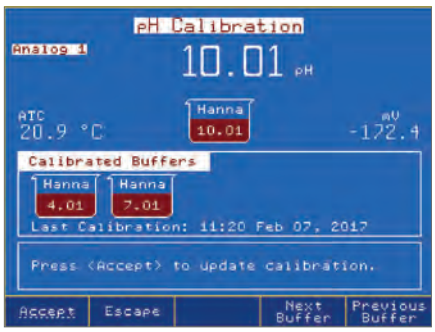


Fully customizable titration methods

Linked methods allow two methods to run in sequence



Fully configurable balance interface



Up to five-point pH calibration with automatic buffer recognition

Relative mV calibration allows for a mV offset

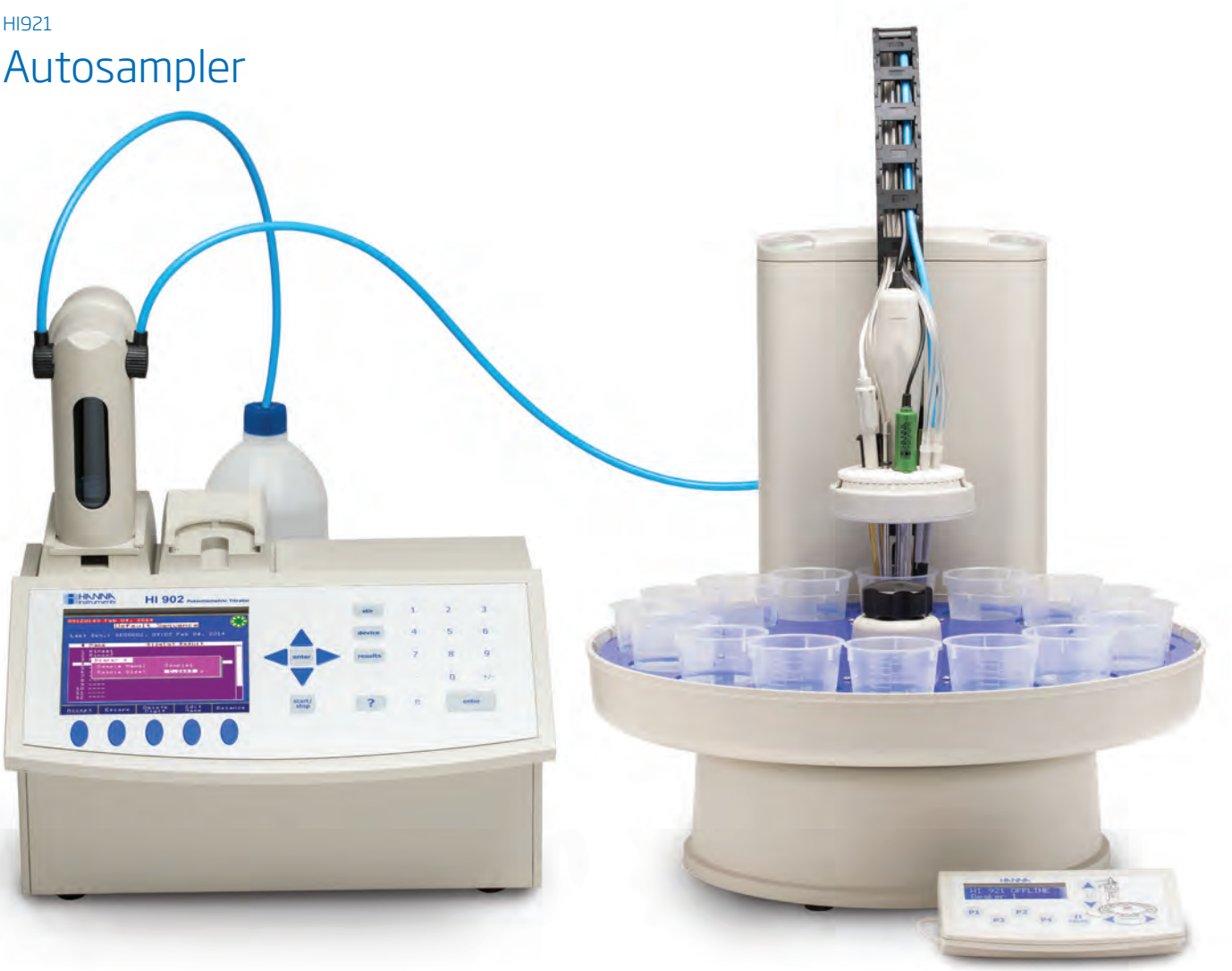
Selectable ISEs preprogrammed with molecular weight and ion charge

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
mV	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 mV
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
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
Additional 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
	pH Calibration	up to five-point calibration, eight standard buffers and five custom buffers
	mV Calibration	single point offset
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
	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
	Operating Environment	10 to 40°C (50 to 104°F), up to 95% RH
	Storage Environment	-20 to 70°C (-4 to 158°F), up to 95% RH
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9 in)
	Weight	approximately 9 kg (20 lbs.) with one pump, stirrer and sensors
Ordering Information	**HI902C1-01** and **HI902C1-02**: 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. **HI902C2-01** and **HI902C2-02**: 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.	

Titration solutions and reagents begin on page 4.72; See accessories on page 4.76

HI921

Autosampler



control panel

Automate up to 18 samples

The HI921 Autosampler is an automated titration sample handling system designed for use with the HI902C Automatic Titration System, making multiple sample titrations quick and easy.

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 titration method is established, the user can fully customize the automation sequence of their samples for this method. Sample names and size can be customized or auto-filled with preset values. One beaker can be designated for storage purposes before and after titration sequences; up to three beakers per tray can be designated for an electrode rinse sequence, allowing for sufficient removal of solutions that are hard to clean between each sample titration. During each sample titration, the real-time progress is shown on the HI902C display. Finished sample results and graphs can be accessed during and after the titrations have finished.

Once the Autosampler sequence is complete, two reports are available for review: a sequence report featuring 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.

16 or 18 Sample Tray

The HI921 is able to automate samples using a 16 sample tray or an 18 sample tray. The 16 sample tray holds 150 mL beakers; the 18 sample tray holds 100 mL beakers. The Autosampler trays are composed of chemically resistant materials and are removable to allow for easy handling. The dishwasher safe trays provide a quick and simple way for users to clean regularly.

Built-in Magnetic Stirrer

A magnetic stirrer comes built-in with each Autosampler tray. Users simply need to add a small magnetic stir bar to each beaker to ensure homogeneity during titrations. An optional overhead propeller stirrer can also be installed for use instead of the built-in stirrer. The HI921 allows users to easily adjust the stirring speed of both the built-in and overhead stirrers for optimal use.

Built-in RFID

The HI921 sample trays feature a built-in RFID reader that is able to communicate the tray size and serial number of each tray. Users can have multiple trays, each designated to a specific set of samples. The RFID reader can ensure that the appropriate tray is used each time.

Absolute Encoder

The Autosampler consistently tracks the tray position without the need to "home" or calibrate.

Barcode Reader

A USB-compatible barcode reader can be used to associate names with each sample for improved organization of data.

Optical IR Beaker Detection

An optical IR beam is able to detect the presence or absence of beakers within the sample tray. Users can dictate the Autosampler action if a beaker is missing from the tray during a titration sequence. If a beaker is detected as missing, the HI921 can skip over the sample or stop the titration sequence.

Versatile Electrode Holder

The durable electrode holder is able to accommodate three 12 mm electrodes, a temperature sensor, one aspiration tube, and five multipurpose tubes. The multipurpose tubes can be utilized for actions such as reagent addition or burette dosing.

Electrode Rinse Feature

Up to 3 beakers per tray can be designated for electrode dip/spray rinses.

Sample Leveling Feature

Automatic leveling for fast preparation of volumetric samples.

Waste Removal Feature

Aspirate completed samples into a waste container.

Use with the HI902 Automatic Titration System

Flexible, accurate detection of the titration endpoint with HI902C potentiometric titrator.

Real-time progress of the sequence and results shown on the HI902 titrator screen.

Control Panel

The included control panel features multiple buttons to allow for manual operation of the Autosampler tray, electrode holder, and any auxiliary pumps. A two-line backlit display on the handheld panel clearly displays status information. Manual control with the control panel is desirable for calibration, sample preparation, and method optimization.

Peristaltic and Membrane Pumps

- Up to three peristaltic pumps can be added at anytime
- User replaceable pump systems
- Peristaltic pumps
  - Uses high performance plastic that is engineered to be chemically resistant and have long service life.
  - Reagent addition, sample leveling, waste removal
  - Greater than 200 mL/min flow
- Membrane pumps
  - Simple plug connection for tubing
  - Greater than 400 mL/min flow

Users can add up to three peristaltic pumps or one membrane pump at any time with the user-replaceable pump systems on the HI921. The peristaltic pumps use high performance plastic that is engineered to be chemically resistant with a long service life. These pumps have a flow greater than 200 mL/min and can be utilized for reagent addition, sample leveling, and waste removal. The membrane pump is a simple plug connection for tubing that has a flow greater than 400 mL/min.

Status indicator lights

Highly visible status lights are located on both sides of the Autosampler. These lights correspond to the status indicator on the HI902C display and can easily be seen from far away. The lights double as a safety feature, as pressing them at any time will automatically stop the current titration sequence.

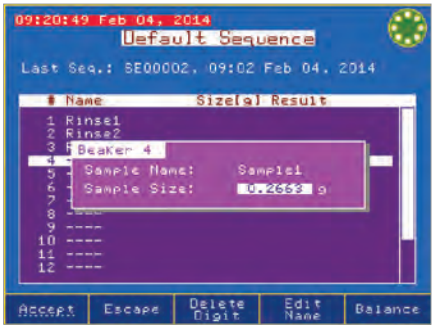
- Steady green
  - Idle, ready to start
- Flashing green
  - Titration sequence running

- Flashing yellow
  - Titration sequence paused

- Steady Red
  - Error or emergency stopped, or initializing during power on
- Flashing Red
  - Error during sequence running or manual operation

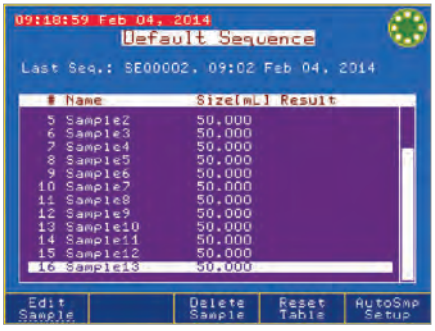
RFID recognition

Sample trays are automatically detected and identified when placed on the Autosampler.



Digital balance compatibility

Sample weights are communicated when connected to a digital balance.



Speedy sample entry

Sample names can be automatically incremented for speedy sample identification.

Specifications	HI921		
Electrode Holder Slots	3 x 12-mm electrodes	Trays	16 beakers x 150 mL (HI920-11660)
	1 temperature sensor		18 beakers x 100 mL (HI920-11853)
	1 aspiration tube		built-in RFID, transmits the tray type and serial number to Autosampler
	5 multi - purpose slots (titrant/reagent tubes)	Beakers	ASTM short-form glass beakers
	1 overhead stirrer		HI920-060 (120 mL), fits HI920-11660 tray - 20 plastic beakers
Temperature Sensor	HI7662-A (included)		HI920-053 (100 mL), fits HI920-11853 tray - 20 plastic beakers
Stirrers	built-in magnetic stirrer	Control Panel	buttons for manual operation of tray and titration head
	overhead propeller stirrer (optional)		manual operation of peristaltic or membrane pumps
Peristaltic Pumps	up to 3 can be installed		2-line backlit display with status information
	installs in slots #1, 2, 3	Barcode Reader	compatible with USB barcode readers, used to add sample names
Membrane Pump (for cleaning)	installs in slot #4	Report Storage	up to 40 trays of samples (e.g.: 720 reports for 18-beaker tray)

Ordering Information

Choose your Autosampler configuration:

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

HI921 – x y z

Titration solutions and reagents begin on page 4.72; See accessories on page 4.76

HI901C

Automatic Titration System

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Equivalence Endpoint Detection

Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.

Multiple Titration Types

Paired with the right electrode from our sensor line, our potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and titrations with an ion selective electrode.

Interface and Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, titration volume, temperature, and mV or pH values. The HI901C also offers multi-language support.

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Market Specific Methods Packs

Hanna offers titration method packages for various markets including food, beverage, dairy, wine, and more. Ask our Sales Consultants about which methods in our library are available for your specific needs.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI901C system.

Connectivity and Functionality

Multifunctional with Four Working Modes

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Multiple Connections

The titrator offers device support for two burrettes and two analog boards, which allows two electrodes and two stirrers to be simultaneously connected to one unit (HI901C2-01 and HI901C2-02 only).

Multiple Peripherals

Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

Versatile Data Management

- HI901C titration system can be easily incorporated into any existing GLP data management program:
  - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information.
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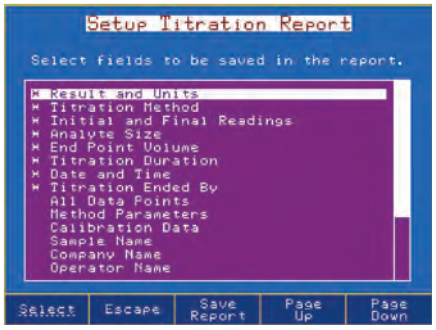

Customizable reports

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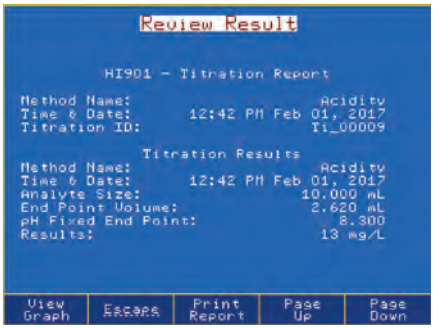
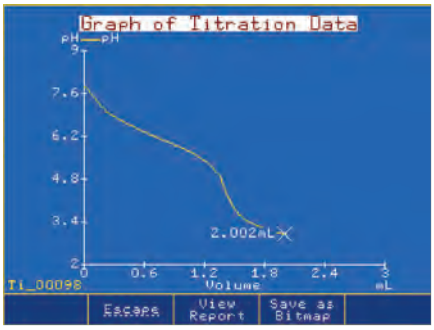


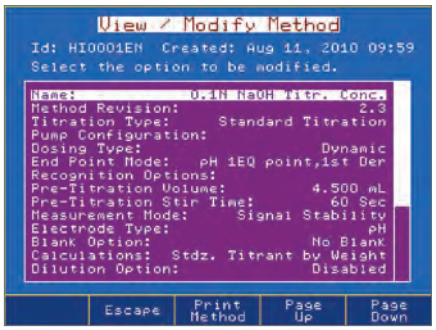
Titration reports

Titration or pH/mV/ISE results can be viewed on-screen or transferred to a USB flash drive or PC

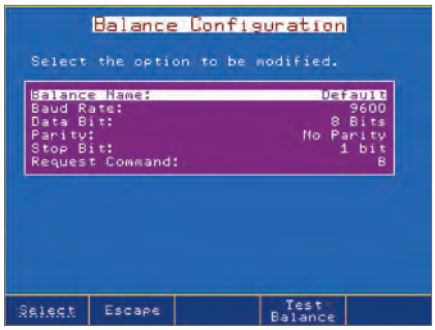


Titration graphs

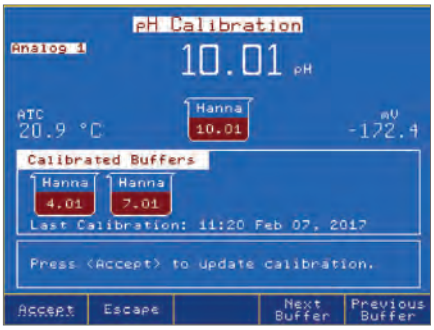
Titration graphs can be viewed on-screen or saved as images and transferred along with titration report



Fully customizable titration methods

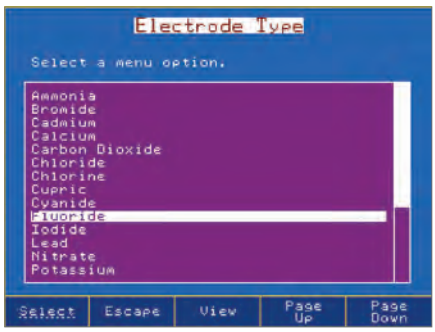


Fully configurable balance interface



Up to five-point pH calibration with automatic buffer recognition

Relative mV calibration allows for a mV offset



Selectable ISEs preprogrammed with molecular weight and ion charge

Specifications		HI901C
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
	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
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
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; 0.1K
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error
Additional Specifications	Analog Board(s)	Each Analog Board Provides: BNC (pH/mV/ISE) Input (1), Reference Input (1), Temperature Input (1), Stirrer Input (1)
	Analog Board(s) Capability	1
	Dosing Pump Capability	2
	Burette Included	1 (25 mL)
	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 pump unit
	Programmable Stirrer	overhead propeller type, 200-2500 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
	GLP Conformity	instrumentation data storage and printing capabilities
	Operating Environment	10 to 40°C (50 to 104°F), up to 95% RH
	Storage Environment	-20 to 70°C (-4 to 158°F), up to 95% RH
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9 in)
	Weight	approximately 9 kg (20 lbs.) with one pump, stirrer and sensors
Ordering Information	**HI901C1-01** and **HI901C1-02**: 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. **HI901C2-01** and **HI901C2-02**: 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.	

Titration solutions and reagents begin on page 4.72; See accessories on page 4.76

HI901W

Automatic Titration System for Wine

All-in-one titration solution made for wine.

The HI901W Wine Titrator is perfect for winemakers who need accurate results, ease-of-use, and the ability to expand the system as their analytical needs grow. It comes preloaded with methods for wine analysis, and with Hanna, you get the support you need to run them perfectly in your lab.

The Wine Titrator complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI901W potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and ion selective titrations. This powerful titrator dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphs automatically. In addition to titration mode, the HI901W also operates as a fully functional pH, mV/ORP, and ion selective electrode (ISE) meter.

This titrator is supplied with standard wine methods or you can create your own. Methods (standard or user) can be easily transferred between titrators via USB flash drive or PC application.

Optimized for Wine

Supplied with a full suite of standard wine methods, the Wine Titrator is optimized for winemakers. Packages are designed so that you'll have everything you need to produce quality wine. Our preloaded packages include the following methods:

Titratable Acidity	Acid/Base Titration (pH)
Free SO_2 (Ripper)	Redox Titration (ORP)
Total SO_2 (Ripper)	Redox Titration (ORP)
Free SO_2 (AO)	Acid/Base Titration (pH)

Total SO_2 (AO)	Acid/Base Titration (pH)
Volatile Acid	Acid/Base Titration (pH)
YAN (Formal Number)	Acid/Base Titration (pH)
Reducing Sugar	Redox Titration (ORP)

Features

Burettes and dosing system

- Exchangeable burette system
  - With Hanna's Clip-Lock burette, it only takes a few seconds to exchange titrants and reagents, preventing cross-contamination and saving time.
- Multiple burette sizes
  - The HI901W comes standard with a 25 mL burette but may be equipped with a 5 mL, 10 mL, or 50 mL burette.
- Precision dosing pump
  - Our unmatched 40,000 step piston driven pump is capable of dosing extremely small and precise volumes of titrant or reagent.

Methods of analysis

- Customizable methods
  - The HI901W can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.
- Titration method support
  - Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Titrator capabilities

- Dynamic titrant Dosing
  - Dynamic dosing allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.
- Equivalence endpoint detection
  - Equivalence endpoint detection is critical in applications where fixed endpoints are not specified in standard methods. This endpoint indicates where the mV response from the titration is greatest with respect to the volume of titrant dosed.
- Multiple titration types
  - Paired with the right electrode from our sensor line, our potentiometric titrator can perform acid/base, redox (ORP), complexometric, precipitation, non-aqueous, argentometric, and titrations with an ion selective electrode.
- Signal stability timing
  - The signal stability feature monitors when the mV response of the titration reaction stabilizes before providing the next titrant dose. This ensures reliable measurement values throughout the length of a titration.

Data and storage

- Customizable titration reports
  - Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.
- Effortless data transfer
  - Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software.

Connectivity and functionality

- Multifunctional with four working modes
  - The HI901W functions as a titrator, pH meter, mV/ORP meter, and ISE meter.
- Multiple peripherals
  - Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

Specifications		HI901W Wine Titrator
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
	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
	ISE Calibration	up to five-point calibration, seven standard solutions and five user-defined standards
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; 0.1K
	Accuracy (@25°C/77°F)	±0.1°C; ±0.2°F; ±0.1K, excluding probe error
Other Specifications	Analog Board	Analog Board Provides: BNC (pH/mV/ISE) Input (1), Reference Input (1), Temperature Input (1), Stirrer Input (1)
	Analog Board(s) Capability	1
	Dosing Pump Capability	2
	Burette Included	1 (25 mL)
	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 pump unit
	Programmable Stirrer	overhead propeller type, 200-2500 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
	GLP Conformity	instrumentation data storage and printing capabilities
	Operating Environment	10 to 40°C (50 to 104°F), up to 95% RH
	Storage Environment	-20 to 70°C (-4 to 158°F), up to 95% RH
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9 in)
	Weight	approximately 9 kg (20 lbs.) with one pump, stirrer and sensors
Ordering Information	**HI901W-01** (115V) and **HI901W-02** (230V) includes titrator with one analog board, overhead propeller stirrer with stand, 25 mL glass burette, dosing pump, temperature sensor, USB cable, USB flash drive and PC software.	

Solutions

Yeast Available Nitrogen (YAN) titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L
HI70457	sodium hydroxide solution (1 N), 1 L

Titratable acidity titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L

Volatile acidity (VA)

Acetic acid is commonly formed during yeast growth in the early stages of fermentation. The rate and amount of acetic acid formed is partially dependent on the pH, sugar levels, available nitrogen, and temperature of the system. Typical VA levels post-fermentation range from 0.2–0.4 g/L. Any level higher could indicate microbial involvement and potential spoilage.

Volatile acidity titration solution

Reagent Code	Description
HI70456	sodium hydroxide solution (0.1 N), 1 L
HI70432	hydrogen peroxide solution (3%), 25 mL

Titration solutions and reagents begin on page 4.72; See accessories on page 4.76

HI903

Karl Fischer Volumetric Titrator

for Moisture Determination

The HI903 Karl Fischer Volumetric Titrator is an automatic titrator that complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI903 analyzes for water content ranging from 100 ppm to 100%. This powerful titrator automatically dispenses the titrant, detects the endpoint, and performs all necessary calculations and graphing.

Measures 100 ppm to 100% water content

Burette and Dosing System

Precision Dosing Pump

Our unmatched 40,000 step piston driven pump is capable of delivering as little as 0.125 µL of titrant accurately and precisely.

Anti-Diffusion Dispensing Tip

A specially designed glass dispensing tip delivers titrant precisely into high turbulence mixing zones, ensuring a rapid reaction. Its angular construction helps prevent titrant from diffusing into the sample solvent.

Chemically Resistant Tubing and Syringe

Aspiration and dispensing tubes are constructed of durable, chemically resistant PTFE and feature a light-blocking polyurethane outer sleeve to protect light sensitive reagents.

Titration and Solvent System

Efficient Sample Handling

The HI903 features a quick-remove sample port with a replaceable rubber septum allowing for fast and easy sample introduction to the titration vessel. An integrated magnetic stirrer ensures homogeneity for an accurate and speedy reaction.

Chemically Resistant Titration Vessel

The glass and PTFE titration cell and fittings are designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

The titration vessel is completely sealed to minimize exposure to ambient humidity, keep the system dry, and reduce titrant consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds without opening the titration vessel.

Visually Recognizable Desiccant

A rechargeable, color-indicating, silica gel desiccant prevents the ingress of ambient humidity into the sealed system while maintaining full titrator functionality. The desiccant color change allows a user to recognize when it's adsorption capacity has depleted and is ready for replacement or recharging.

Titrator Capabilities

Dynamic Titrant Dosing

The dynamic dosing feature allows for timely and accurate titration results by relating the titrant volume dosed to the mV response from the titration reaction. This provides for larger doses near the beginning of a titration and smaller, more precise doses near the titration endpoint.

Drift Rate Compensation

The HI903 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Titrant Recordkeeping

The HI903's titrant database can store information for up to 20 titrants. The database may be programmed to remind a user when to standardize their titrant, reducing error in analysis.

Selectable Endpoint Criteria

The HI903 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Users may choose termination criteria based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Interface and Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, dosing size, titration volume, drift rate, and mV value.

Simple & Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Data and Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI903 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI903 Karl Fischer system.

Connectivity and Functionality

Configurable Balance Interface

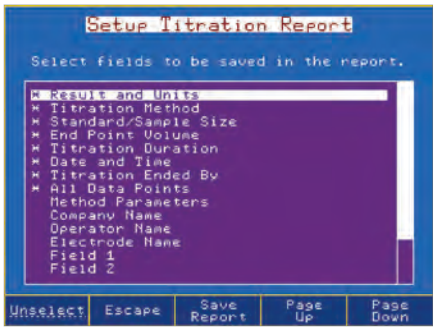
Sample size may be automatically entered from any laboratory analytical balance with a RS232 serial output saving time and labor.

Multiple Peripherals

Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

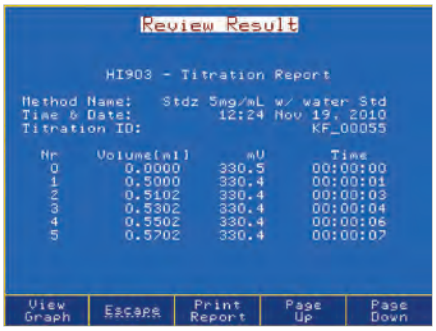
Versatile Data Management

- HI900 Series titration systems can be easily incorporated into any existing GLP data management program.
  - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information
- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



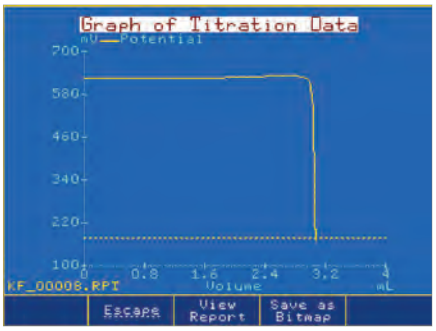
Customizable reports

Titration reports are fully customizable



Titration reports

Titration results can be viewed on-screen or transferred to a USB storage device

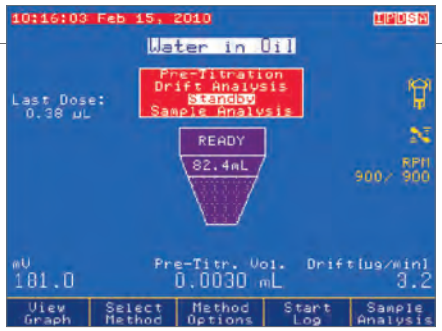


Titration graphs

Titration graphs can be viewed on-screen or saved as images and transferred along with titration report

Methods

The HI903 comes with a standard method pack



Standby

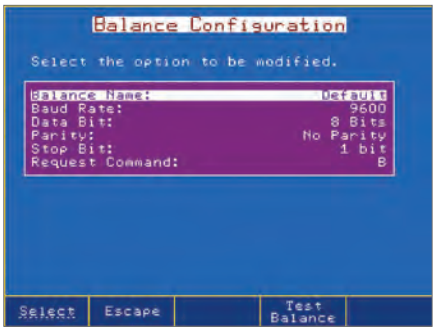
The HI903 keeps the solvent dry between samples and corrects for water entering the cell (drift rate)

Results

Titration results are displayed with links to average results or a user-customized report

Titrant database

The HI903 stores standardization information for up to 20 titrants and displays a reminder when standardization is due



Fully configurable balance interface

Enter sample size automatically from any laboratory analytical balance with RS232 serial output

Fully customizable titration methods

Customize methods for any application

Specifications		HI903
Titration	Range	100 ppm to 100%
	Resolution	1 ppm to 0.0001%
	Result Units	%, ppm, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg/pc, µg/pc
	Sample Type	liquid or solid
Determination	Pre-Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop or absolute drift stop
	Dosing	dynamic with optional pre-dispensing rate
	Result Statistic	mean, standard deviation
Clip Lock™ Exchangeable Burette System	Dosing Pump Resolution	1/40000 of the burette volume (0.125 µL per dose) with 5 mL burette
	Dosing Pump Accuracy	±0.1% of full burette volume
	Syringe	5 mL precision ground glass with PTFE plunger
	Valve	motor-driven 3-way, PTFE liquid contact material
	Tubing	PTFE with light block and thermal jacketing
	Dispensing Tip	glass, fixed position, anti-diffusing
	Titration Vessel	conical with operation volume between 50-150 mL
	Solvent Handling System	sealed system, integrated diaphragm air pump
Electrode	Type	HI76320 dual platinum pin, polarization electrode
	Connection	BNC
	Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
	Voltage Range	2 mV to 1000 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1 %
Stirrer	Type	magnetic, optically regulated, digital stirrer
	Speed	200-2000 rpm
	Resolution	100 rpm
Peripheral Devices	PC	easily view, transfer, print or delete methods and reports via HI900PC application
	USB Flash Drive	easily upgrade software or transfer methods and reports between devices using a USB drive
	Laboratory Analytical Balance	RS232 to connect any laboratory balance
	Printer	print directly from the HI903 to a printer via parallel port
	Monitor	instrument status and titrations can be viewed on a larger screen using any VGA-compatible external monitor
	Keyboard	alphanumeric text can be entered using an optional PS/2 keyboard
Additional Specifications	Graphic Display	5.7" (320 x 240 pixel) color LCD
	Titration Methods	up to 100 (standard and user) methods
	Data Storage	up to 100 complete titration reports and drift rate reports can be stored
	GLP Conformity	Good Laboratory Practice and instrument data storage and printing
	Languages	English, Portuguese, Spanish, and French
	Enclosure Material	ABS plastic and steel
	Keypad	polycarbonate
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Operating Environment	10 to 40°C, up to 95% RH
	Storage Environment	-20 to 70°C, up to 95% RH
	Dimensions	390 x 350 x 380 mm (15.3 x 13.8 x 14.9")
	Weight	approximately 10 kg (22 lbs.)
Ordering Information	**HI903-01** and **HI903-02** are supplied with HI76320 dual platinum pin electrode, dosing pump, 5 mL burette assembly with tubing, air pump assembly with tubing, beaker and bottle top assemblies and all fittings, desiccant cartridges (4) with indicating desiccant, stir bar, waste bottle, calibration key, USB cable, power cable, HI900PC application, USB flash drive, quality certificate, ISO 8655 burette compliance report and instruction manual binder.	

Specifications	HI76320
Sensor Type	dual platinum pin polarization electrode
Voltage Range	2 mV to 1000 mV
Voltage Resolution	0.1 mV
Accuracy (@25°C/77°F)	±0.1%
Polarization Current	1, 2, 5, 10, 15, 20, 30 or 40 µA
Sensor Connection	BNC

Titration solutions and reagents begin on page 4.72; See accessories on page 4.77

HI904

Karl Fischer Coulometric Titrator

The HI904 Karl Fischer (KF) Coulometric Titrator is an automatic titrator that complements our wide range of products dedicated to efficient and accurate laboratory analysis. The HI904 analyzes for water content ranging from 1 ppm to 5%. This powerful titrator effectively monitors the KF reaction, detects the endpoint, and performs all necessary calculations and graphing.

Measures 1 ppm to 5% water content

Coulometric Reagent System

Precision Iodine Generation

Hanna's dosing algorithm allows for an extremely small amount of iodine necessary for the Karl Fischer reaction to be generated electrolytically using a pulsed current up to 400 mA delivering titrant accurately and precisely.

Titration and Solvent System

Chemically Resistant Titration Vessel and Tubing

The glass titration cell and PTFE tubing is designed to withstand the harsh solvents and reagents involved in Karl Fischer reactions.

Sealed Solvent System

Ground glass joints completely seal the glass titration cell minimizing exposure to ambient humidity, keeping the system dry, and reducing reagent consumption while saving time between titrations. Solvent may be exchanged in a matter of seconds with a quick fitting adjustment.

Molecular Sieve Desiccant

High efficiency molecular sieve desiccant helps maintain low and stable drift rates within the titration cell while preventing the ingress of ambient humidity into the sealed solvent system.

Built-in stirrer

Automatic, integrated magnetic stirrer adjustable from 200-2000 RPM with optical feedback for automatic speed control.

Titrator Capabilities

Dynamic Titrant Dosing

The titration speed feature allows for timely and accurate titration results by relating the amount of iodine generated to the mV response from the Karl Fischer reaction.

Drift Rate Compensation

The HI904 automatically adjusts the titration calculation to account for the effects of any ambient humidity entering the titration cell. This provides a more accurate result by correcting for water not present in the actual sample.

Titration Results Averaging

Successive results from a titration method may be averaged with recording of the standard deviation.

Selectable Endpoint Criteria

The HI904 employs a dual platinum pin electrode for bivoltammetric endpoint determination. Users may choose termination criteria based on mV stability times or drift rates.

Multistage Cell Preparation

A pre-titration stage eliminates residual water present in the solvent and the cell, providing a reliable baseline start to analysis. Standby mode then keeps the solvent dry between titrations and when the titrator is not in use.

Interface & Display

Detailed Titration Graphs

A real-time titration curve can be displayed during each titration; this feature is useful when new methods are tested or when a procedure requires optimization.

Interactive Color Display

A large, color LCD screen clearly shows the chosen titration method along with results, units, drift rate, and mV value.

Simple and Quick Navigation

Virtual key selections present on the display allow for simple and quick navigation between screens and menus without getting lost in a nest of information.

Data & Storage

Customizable Titration Reports

Each titration report is fully customizable so users can ensure they are storing and filing the appropriate data required for their application and procedures.

Flexible GLP Management

All necessary GLP (Good Laboratory Practice) information can be recorded with each sample including: sample identification, company and operator name, date, time, electrode ID codes, and calibration information.

Effortless Data Transfer

Data can easily be transferred to a USB flash drive or PC with the Hanna HI900PC application software. The USB port allows for the transfer of titration methods, titration reports, and software upgrades via USB flash drive.

Methods of Analysis

Customizable Methods

The HI904 can store up to 100 user-defined or standard titration methods. Each method may be customized and optimized for performance based on application and user requirements.

Titration Method Support

Onsite installation, training, and customization is available from one of our Applications or Service experts. Hanna offers continued support via phone or webinar for any questions you might have along the way.

Adaptable Standard Methods

Our technical experts can program and customize standard methods developed by such affiliations as ISO, ASTM, AOAC, AOCS, EPA, and more directly onto your titrator. Ask our Sales Consultants which standard methods are possible with our HI904 Karl Fischer system.

Connectivity and Functionality

Configurable Balance Interface

Sample size may be automatically entered from any laboratory analytical balance with a RS232 serial output saving time and labor.

Multiple Peripherals

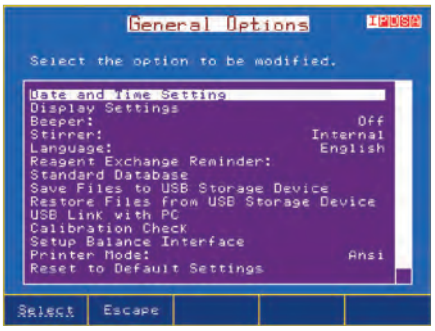
Users can print reports directly from the titrator using a standard parallel printer. An external monitor and keyboard may be attached for added versatility, as well as an analytical balance for automatic sample mass entry for titrations.

- Fritted (Diaphragm) Generator
  - Anode/anolyte and cathode/catholyte separated by glass diaphragm
  - Prevents anode-generated iodine from being reduced to iodide at the cathode
  - Ideal for extremely low water content, high accuracy demand, nitrogenous compounds and easily reduced samples

- Fritless (No Diaphragm) Generator
  - Uses one easy-to-replace Karl Fischer reagent
  - Lower and more stable drift rates
  - Easier cleaning of generator cell

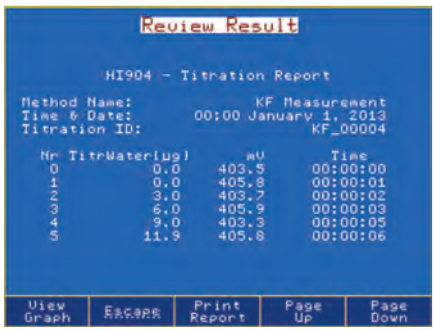
Versatile Data Management

- HI900 Series titration systems can be easily incorporated into any existing GLP data management program:
  - Easily record all necessary GLP information with every sample, such as sample identification, company and operator name, date, time, electrode ID codes and calibration information
- Data can be transferred to a PC using Hanna HI900PC software
- The USB port allows for the easy transfer of methods, reports and software upgrades via a USB flash drive
- Users can print reports of analyses directly from the titrator using a standard parallel printer
- An external monitor and keyboard can be attached for added versatility



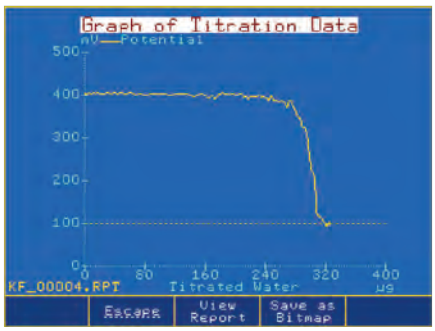
Customizable general options

Titration general options can be configured to user requirements



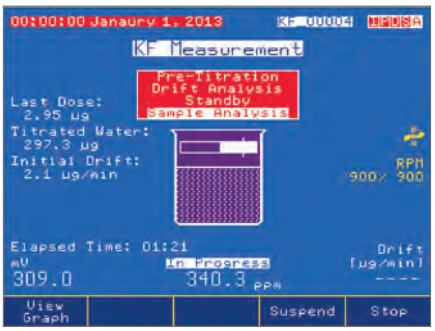
Titration reports

Titration results can be viewed on-screen or transferred to a USB storage device



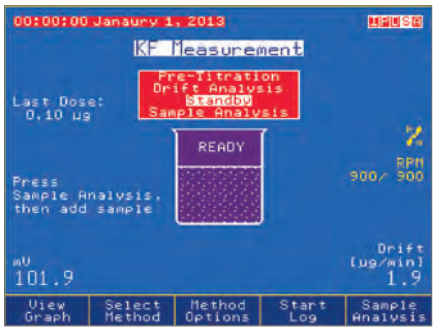
Titration graphs

Titration graphs can be viewed on-screen or saved as images and transferred along with titration report



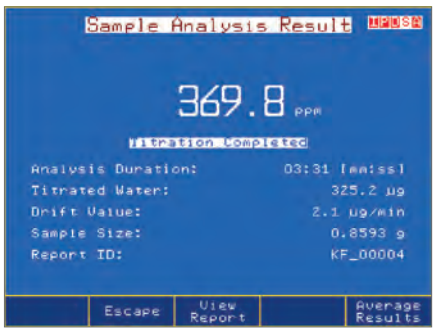
Sample analysis

Interface displays real-time monitoring of water content and results



Standby

The HI904 keeps the solvent dry between samples and monitors the drift rate

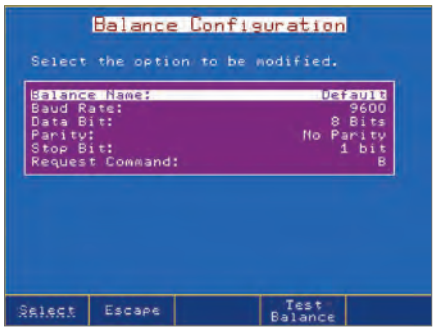


Results

Titration results are displayed with options to average results or a user-customized report

Sample addition

The HI904 recommends a sample size based on expected results



Fully configurable balance interface

Enter sample weight automatically from any laboratory analytical balance with RS232 serial output

Fully customizable titration methods

Customize methods for any application

Specifications		HI904
Titration	Range	1 ppm to 5%
	Resolution	0.1ppm to 0.0001%
	Result Units	%, ppm, ppt, mg/g, µg/g, mg, µg, mg/mL, µg/mL, mg Br/100g, g Br/100g, mg Br, g Br
	Sample Type	liquid or solid (external dissolution / extraction)
	Titration Vessel	operating volume between 100 - 200 mL
	Reagent Handling System	sealed system with integrated diaphragm air pump and beaker adapter
Generator Electrode	Configuration	diaphragm or diaphragm-less
	Current Control	automatic or fixed (400 mA)
	Electrode Type Detection	automatic
Determination	Pre Titration Conditioning	automatic
	Background Drift Correction	automatic or user-selectable value
	Endpoint Criteria	fixed mV persistence, relative drift stop, or absolute drift stop
	Dosing	dynamic
	Result Statistic	mean, standard deviation
Detector Electrode	Type / Connection	dual platinum pin, polarization electrode / BNC connector
	Polarization Current	1, 2, 5, or 10 µA
	Voltage Range	2 mV to 1100 mV
	Voltage Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±0.1%
Peripheral Devices	PC	easily view, transfer, print or delete methods and reports via HI900 PC application
	USB Flash Drive	easily upgrade software or transfer methods and reports between devices using a USB drive
	Laboratory Analytical Balance	RS232 to connect a laboratory analytical balance
	Printer	print directly from the HI904 to a parallel port printer
	Monitor	instrument status and titrations can be viewed on a larger screen using any VGA compatible external monitor
	Keyboard	alphanumeric text can be entered using an optional PS/2 keyboard
Additional Specifications	Graphic Display	5.7" (320 x 240 pixel) color LCD
	Titration Methods	up to 100 (standard and user methods)
	Data Storage	up to 100 (titration and drift rate reports)
	GLP Conformity	Good Laboratory Practice and instrument data storage and printing
	Languages	English, Portuguese, Spanish, and French
	Enclosure Material	ABS plastic and steel
	Keypad	polycarbonate
	Power	100-240 VAC "-01" models, US plug (type A) "-02" models, European plug (type C)
	Operating Environment	10 - 40°C, up to 95% RH
	Storage Environment	-20 to 70°C, up to 95% RH
	Dimensions / Weight	390 x 350 x 380 mm (15.3 x 13.8 x 14.9"); approximately 10 kg (22 lbs.)
Ordering Information	**HI904D-01** and **HI904D-02** are supplied with diaphragm**, HI904-01** and **HI904-02** are supplied without diaphragm **All Models Include:** dual platinum pin electrode, air pump assembly, titration vessel assembly (glass vessel, accessory port stopper, sample port cap and septum, stir bar, desiccant, desiccant cartridge, fittings), vessel support with adapter, pump locking screw with plastic head, reagent bottle assembly (bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), water bottle assembly (waste bottle, bottle cap, desiccant, desiccant cartridge, fittings, tubing (silicone and PTFE)), calibration key, reagent exchange adapter, accessory holder assembly, joint grease, Karl Fischer generator electrode (removable generator electrode cable), USB cable, USB storage device, HI900 PC application software, power adapter, quality certificate and instruction manual binder.	

Titration solutions and reagents begin on page 4.72; See accessories on page 4.77

HI84534

Titratable Acidity Titrator and pH Meter

for Vinegar

- Piston driven pump with dynamic dosing
  - For highly accurate, repeatable results
- Two endpoints and two ranges
- CAL Check™
  - Alerts users to potential problems during calibration such as contaminated buffers or a dirty/broken pH electrode
- 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
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - User intuitive design with large keys and easy to navigate screens
- HELP features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84534 is a low-cost, easy to use automatic minititrator and pH meter designed for the rapid and accurate analysis of Total Titratable Acidity in Vinegar. The HI84534 minititrator is a valuable tool because of its ability to eliminate subjective factors including color indicators, errors in mathematical calculations or erratic titrant additions, it will quickly become a valuable acidity analysis tool of vinegar.

The HI84534 incorporates a precise piston dosing system, which allows for a highly accurate determination of the amount of titrant used. It is also capable of dynamic dosing, making testing both faster and more accurate. Pump calibrations are performed with the provided Hanna standard and help assure the accuracy of the measurement.

An intuitive interface makes the instrument simple to use and the dedicated HELP key guides the user through set-up, calibration status, and troubleshooting.

This mini titrator includes a pre-programmed analysis method based on the Standard Methods of Water and Wastewater Determination. It uses a powerful algorithm which analyzes the shape of the electrode response in order to determine when the titration reaction has reached completion.

This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check function not only ensures an accurate pH reading when the HI84534 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

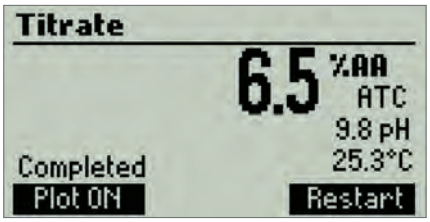
Vinegar

Vinegar is made when acetic acid bacteria is added to an alcohol beverage such as wine. The bacteria will eat the ethanol and produce a tart, pungent liquid know as acetic acid. The acetic acid concentration in vinegar typically ranges from 4 to 9 % (w/v). The pH of vinegar is typically between 2.5 to 3.0, depending on the acetic acid concentration.

Vinegar can be made out of anything that has alcohol (ethanol) in it, including wine, beer, and hard cider. The type of vinegar depends on what liquid the ethanol has been fermented in. White vinegar is made a vodka type liquor made from grain, while apple cider vinegar is made from apples and balsamic vinegar is made from grape must. Outside of the United States popular vinegars include rice, coconut and cane. Vinegars are commonly used in food preparation, medicine, agriculture and in cleaning solutions.

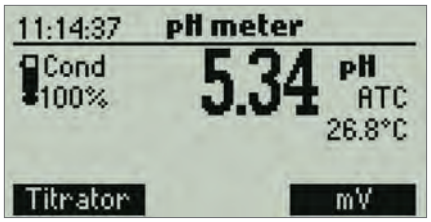
The titratable acidity of vinegar is determined by titrating the sample with a strong base to a fixed pH. The end point is determined by the potentiometric input and the results are typically expressed as % (g/100mL) or g/L acetic acid. The HI84534 minititrator method is based on the Official Methods of Analysis of AOAC International.

On-screen Features



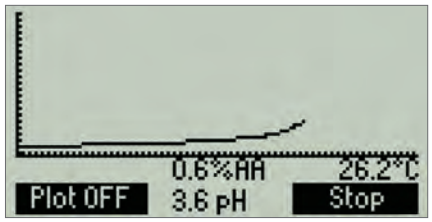
Easy and clear measurement

The HI84534 is a single parameter titrator designed to measure acidity in a few easy steps. The HI84534 displays the results directly on the screen in user-selectable units.



pH meter with electrode condition on display

The HI84534 also functions as a pH meter. The HI84534 also displays the electrode condition on the LCD using Hanna's exclusive electrode diagnostics.



Titration curve displayed on screen

The HI84534 offers real time graphing of the titration curve on the LCD.

Specifications		HI84534
Titrator	Range	0.3 to 10.0 % w/v (g/100mL) as acetic acid 3 to 100 g/L as acetic acid
	Resolution	0.1%, 1g/L
	Accuracy (@25°C/77°F)	3% of reading or ± 0.1 % , whichever is greater 3% of reading or ± 1 g/L, whichever is greater
	Sample Volume	1 mL
	Titration Method	Acid-base titration
	Principle	Fixed end point titration to pH 8.2
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
	Data storage	up to 200 titrations
pH/mV Meter	pH Range	-2.0 to 16.0 pH / -2.00 to 16.00 pH
	pH Resolution	0.1 pH / 0.01 pH
	pH Accuracy (@25°C/77°F)	± 0.01 pH
	pH Calibration	one, two or three-point calibration; four available buffers (pH 4.01, 7.01, 8.20, 10.01)
	mV Range	-2000.0 to 2000.0 mV
	mV Resolution	0.1 mV
	mV Accuracy (@25°C/77°F)	± 1.0 mV
	Data storage	up to 200 data points (pH or mV)
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)	±0.4°C; ±0.8°F without probe error
	Compensation	manual or automatic
Additional Specifications	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122 °F); max 95% RH non-condensing
	Power Supply	12 VDC power adapter
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	**HI84534-01** (115V) and **HI84534-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution, HI84534-70 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.	

See reagents and accessories on page 4.78

HI84530

Total Titratable Acidity Titrator and pH Meter

for Water Analysis

- Piston driven pump with dynamic dosing
  - For highly accurate, repeatable results
- Two endpoints and two ranges
- CAL Check™
  - Alerts users to potential problems during calibration such as contaminated buffers or a dirty/broken pH electrode
- 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
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - User intuitive design with large keys and easy to navigate screens
- HELP features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84530 is an easy to use, fast and affordable mini automatic titrator with a pH meter designed for the rapid and accurate analysis of Total Titratable and Strong Acidity in water. This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.

The HI84530 incorporates a precise piston dosing system, which allows for a highly accurate determination of the amount of titrant used. It is also capable of dynamic dosing, making testing both faster and more accurate. Pump calibrations are performed with the provided Hanna standard and help assure the accuracy of the measurement.

An intuitive interface makes the instrument simple to use and the dedicated HELP key guides the user through set-up, calibration status, and troubleshooting.

This mini titrator includes a pre-programmed analysis method based on the Standard Methods of Water and Wastewater Determination. It uses a powerful algorithm which analyzes the shape of the electrode response in order to determine when the titration reaction has reached completion.

This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check function not only ensures an accurate pH reading when the HI84530 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

Total Titratable Acidity

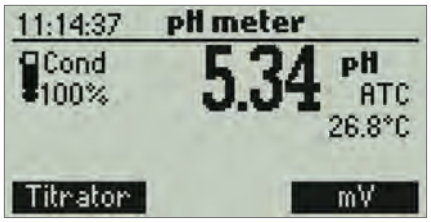
Water acidity is an important parameter to monitor as it can affect the corrosive capacity of a water, chemical reaction rates and biological processes. Acidity can also be used to monitor pollution in wastewater and drinking water.

Total titratable acidity is a measure of all of the acid compounds present in a sample. Many factors can contribute to the acidity of water in a sample, including strong acids (hydrochloric, sulfuric, nitric, etc.), weak acids (organic acids) and other acidic components (aluminum, iron, etc.).

On-screen Features

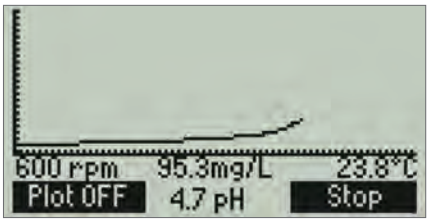
Easy and clear measurement

The HI84530 is a single parameter titrator designed to measure total acidity in a few easy steps. The HI84530 displays the results directly on the screen in user-selectable units.



pH meter with electrode condition on display

The HI84530 also functions as a pH meter. The HI84530 also displays the electrode condition on the LCD using Hanna's exclusive electrode diagnostics.



Titration curve displayed on screen

The HI84530 offers real time graphing of the titration curve on the LCD.

Specifications		HI84530
Titrator	Range (as $CaCO_3$)	Low Range: 15.0 to 400.0 mg/L; 0.3 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 / 0.1 meq/L High Range: 1 mg/L / 0.1 meq/L
	Accuracy (@25°C/77°F)	Low Range: ±0.5 mg/L or 3% of reading, whichever is greater High Range: ±15 mg/L or 3% of reading, whichever is greater
	Titration Method	acid-base titration, total acidity / strong acidity
	Titration Principle	fixed endpoint titration : 8.30 pH (phenolphthalein) or 3.7 pH (Methyl Orange)
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
pH Meter	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 (pH 4.01, 7.01, 8.30, 10.01)
	Temperature Compensation	manual or automatic from -20 to 120 °C (-4 to 248 °F)
mV Meter	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 (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Additional Specifications	Logging	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
	Power Supply	12 VDC power adapter
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	**HI84530-01** (115V) and **HI84530-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution, HI84530-70 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.	

See reagents and accessories on page 4.78

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
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - User intuitive design with large keys and easy to navigate screens
- HELP features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84531 is a dedicated mini titrator and pH meter 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. A titrant is slowly added to the sample while the pH and temperature are carefully monitored. The software analyzes the resulting titration curve and calculates the volume of titrant required to reach the endpoint. The user can choose either to measure strong alkalinity with a 8.30 pH endpoint (known as phenolphthalein alkalinity) or total alkalinity with a 4.50 pH endpoint (known as bromcresol green-methyl red alkalinity).

The dispensed titrant volume is used to automatically calculate the alkalinity, which can be displayed in mg/L or meq/L as $CaCO_3$.

This mini titrator is also designed to be used as a benchtop pH/mV meter. 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.

Total Alkalinity

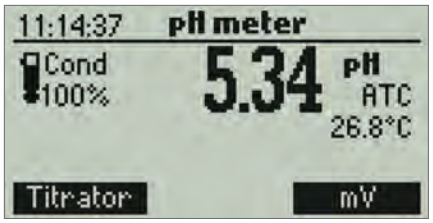
Total titratable alkalinity is a measure of primarily three types of alkalinities present in a water sample: hydroxide, carbonate and bicarbonate. Alkalinity in water can be the result of contributions from common chemicals, including carbonate, bicarbonate, hydroxide, phosphates, borate and organic acid salts.

The alkalinity of a water sample indicates its ability to resist pH change. The amount of alkalinity in water is mostly due to the bicarbonate/carbonate present. A low alkalinity level indicates that the water is susceptible to pH changes, while a high alkalinity level indicates that the water will be able to resist pH changes. Alkalinity can also be used to determine the corrosive capacity of water and can provide an estimation of water hardness.

On-screen Features

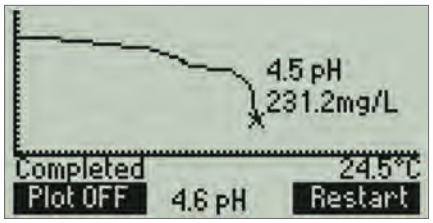
Easy and clear measurement

These titrators are designed to measure in a few easy steps. The results are displayed directly on the screen.



Electrode condition on display

These titrators feature a pH meter which also displays the electrode condition on the LCD.



Titration Curve Displayed On Screen

The HI84531 offers real time graphing of the titration curve on the LCD.

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
	Titration Method	acid-base titration (strong alkalinity /total alkalinity)
	Titration Principle	endpoint titration : 8.30 pH (phenolphthalein) / 4.50 pH (bromcresol green-methyl red)
	Pump Volume	10 mL/min
	Stirring Speed	600 rpm
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)
	Temperature Compensation	manual or automatic
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
Additional Specifications	Logging	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50 °C (32 to 122 °F); max 95% RH non-condensing
	Power Supply	12 VDC adapter
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	**HI84531-01** (115V) and **HI84531-02** (230V) are supplied with HI1131B pH electrode, HI7662-T temperature probe,HI7082 electrode fill solution, HI84531-70 reagent kit for water analysis, 100 mL beakers (2), dosing pump valve, 5 mL syringe, 2000 µL automatic pipette (1) with plastic tips (2), 20 mL beakers (2), tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, power adapter, instruction manual and quality certificate.	

See reagents and accessories on page 4.79

HI84529

Titratable Acidity Mini Titrator and pH Meter

for the Dairy Industry

- 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 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 regardless of viscosity of solution
- GLP features
  - Date, time, offset, slope and buffers used
- Application-specific FC260B half-cell pH electrode
  - This electrode is designed to measure all types of dairy related products
- HI5315 double junction half-cell reference electrode
  - Features a plunger design to clear any clogging of the outer junction
- Help features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84529 is an easy-to-use, fast and affordable mini automatic titrator and pH meter designed for testing acidity levels in dairy products. This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.

This mini titrator includes a pre-programmed analysis method designed for acidity measurements for dairy analysis. It uses a powerful algorithm which analyzes the electrode response in order to determine when the titration reaction has reached completion. By simply pressing the START key, the HI84529 automatically performs a pH endpoint titration and displays results immediately in a choice of units.

Acidity Measurement and its Significance in the Dairy Industry

There are two fundamentally different measurements of dairy products: titratable acidity and pH. pH is a measurement of hydrogen ion concentration while titratable acidity is the neutralizing capacity of a dairy product with NaOH.

An increase in acidity can be caused by bacteria formation. Monitoring acidity is a way of determining the quality and freshness of dairy products. Acidity is determined by a pH endpoint titration using sodium hydroxide (NaOH), and is defined as the consumption necessary to shift the pH value from 6.6 (corresponding to fresh milk) to a pre-determined pH value. While pH 7.0 is the actual point of neutralization, phenolphthalein is commonly employed as a color indicator to determine the endpoint of reaction; with phenolphthalein, a color change occurs at pH 8.3. Titratable acidity

is expressed in a variety of units based on the one which reflects the titration method and strength of NaOH used during titration.

Titratable acidity can be expressed in several units. Each of these units corresponds to a specific procedure used to titrate dairy products.

% Lactic Acid (% l.a.): is determined by titrating a 20 mL or 20 g sample diluted with twice its volume of deionized or distilled water with 0.1 M sodium hydroxide to a phenolphthalein endpoint.

Degree Soxhlet Henkel (°SH): is determined by titrating a 50 mL sample with 0.1 M sodium hydroxide to a phenolphthalein endpoint.

Degree Dornic (°D): is determined by titrating a 100 mL sample with N/9 sodium hydroxide to a phenolphthalein endpoint.

Degree Thörner: is determined by titrating a 10 mL sample diluted with twice its volume of deionized or distilled water with 0.1 M sodium hydroxide to a phenolphthalein endpoint.

From:	To:	Divide By:
%l.a.	°SH	0.0225
%l.a.	°D	0.0100
%l.a.	°Th	0.0090

Eliminate Subjectivity and Increase Efficiency

The HI84529 Mini Titrator eliminates the subjective endpoint color change detection determined by the human eye, and instead employs the sensitivity and accuracy of a pH sensor. The titration method is a potentiometric endpoint determination using a pre-determined pH value.

The titratable acidity values will vary depending on the method used. Select Low 50 to titrate a non diluted sample, or select low 20/High 20 to titrate 20 mL or 20 g samples that are diluted with twice its volume or deionized or distilled water. The HI84529 uses methods based on AOAC International and Standard Methods for the Examination of Dairy Products. Both of these methods report titratable acidity as % lactic acid, a rough conversion factor can be used to convert the results to the other available units.

The HI84529 can be customized to meet the needs of any dairy analysis lab. Samples can be titrated by weight or volume, diluted or non-diluted (low range only) and titrated to a fixed pH endpoint that can be adjusted by the user.

Specifications		HI84529
Titrator	Range	Low Range: %l.a.: 0.01 to 0.20; °SH: 0.4 to 8.9; °D: 1.0 to 20.0; °Th: 1.1 to 22.2 High Range: %l.a.: 0.1 to 2.0; °SH: 4.4 to 88.9; °D: 10 to 200; °Th: 11.1 to 222.2
	Resolution	Low Range: %l.a.: 0.01 ; °SH: 0.1; °D: 0.1; °Th: 0.1 High Range: %l.a.: 0.1; °SH: 0.1; °D: 1; °Th: 0.1
	Accuracy (@25°C/77°F)	Low Range: ± 0.01 %l.a. High Range: ± 0.1 %l.a.
	Method	acid-base titration
	Sample Size (LR 20)	20 mL or 20 g
	Sample Size (LR 50)	50 mL or 50 g
	Sample Size (HR 20)	20 mL or 20 g
	Principle	endpoint titration, adjustable (pH 8.0 - 8.7 in 0.1 increments)
	Pump Speed	10 mL/min
	Stirring Speed	800 (Low Range) / 1000 (High Range)
pH Meter	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 (pH 4.01, 6.00, 8.30, 10.01)
	Temperature Compensation	manual or automatic
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	± 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
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	Electrodes	FC260B pH electrode with 1 m (3.3') cable (included), HI5315 reference probe with 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC power adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information		**HI84529-01** (115V) and **HI84529-02** (230V) are supplied with HI84529-70 Reagent Kit for titratable acidity in dairy products, FC260B pH electrode, HI5315 reference electrode, HI7662-M temperature probe, HI7072 fill solution (30 mL), HI700640 cleaning solution for milk deposits (2 x 20 mL), capillary dropper pipette, 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.

See reagents and accessories on page 4.79

HI84532

Titratable Acidity Mini Titrator and pH Meter

for Fruit Juice

- 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 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 600 RPM regardless of viscosity of solution
- GLP features
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - Intuitive design with large keys and easy to navigate screens
- Help features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84532 digital automatic mini titrator and pH meter is designed for measuring the concentration of titratable hydrogen ions contained in fruit juice samples by neutralization with a strong base solution to a fixed pH endpoint as according to the Official Methods of Analysis of AOAC International. This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.

A clear and intuitive user interface allows users to easily navigate the HI84532's menus and functions. The HELP key located on the keypad aids in on-screen set-up, status and troubleshooting.

The HI84532 incorporates a precise piston dosing system, which allows for a highly accurate determination of the amount of titrant used. It is capable of dynamic dosing, making testing both faster and more accurate. Pump calibrations, performed with the provided Hanna standards, help assure the measurement accuracy.

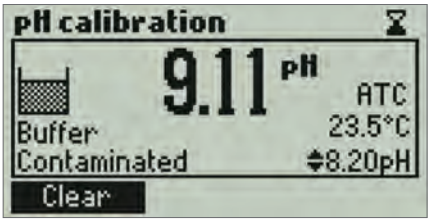
This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check function not only ensures an accurate pH reading when the HI84532 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

The Importance of Titratable Acidity

Titratable acidity is an important parameter in determining fruit maturity and sour taste in citrus fruits. The maturity of fruit is one of the most important factors to determine how well fruit will store and how it will taste. For some fruits, governmental quality standards (based on titratable acidity or the ratio of total soluble solids (°Brix) to titratable acidity) are in place to protect consumers. Immature fruit will normally have a low sugar to acid ratio as compared to mature fruit that will have a high sugar to acid ratio.

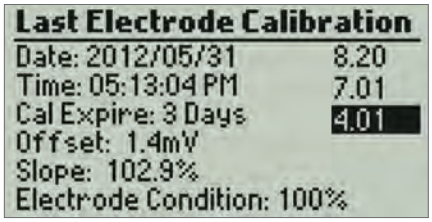
The HI84532 measures the concentration of titratable acids contained in fruit juice samples by neutralization with a strong base solution to a fixed pH. This value includes all the substances of an acidic nature in the fruit juice including: free hydrogen ions, organic acids and acid salts. Titratable acidity is expressed as g/100 mL of the predominant acid. The predominant acids in fruit depend on the type of fruit being tested and include citric acid, tartaric acid, and malic acid.

On-screen Features



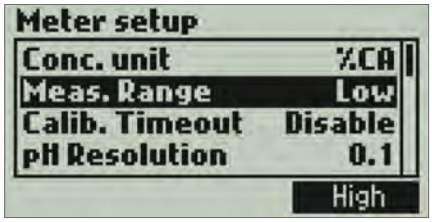
CAL Check™

CAL Check is a Hanna exclusive process for checking the condition of pH electrodes for accurate measurements



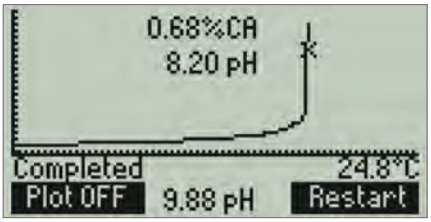
GLP

The GLP feature records electrode and pump calibration data to help keep measurements accurate and reliable.



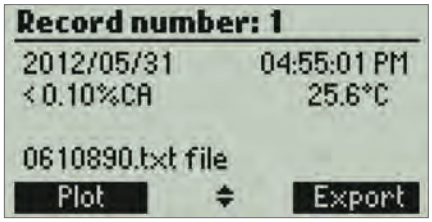
Setup screens

The LCD features an easy to use setup screen.



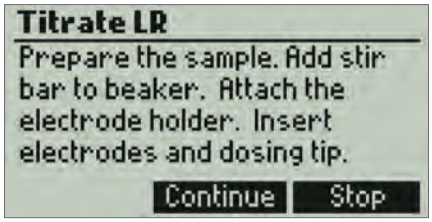
Titration curve displayed on screen

The HI84532 offers real time graphing of the titration curve on the LCD.



Log and recall data

The HI84532 can log up to 400 samples (200 for titration; 200 for pH/mV) and recall or export data to a USB drive or PC.



Tutorial and help screens

Accessing the tutorial menu provides helpful information during calibration and titration.

Specifications

HI84532

Titrator	Titratable Acidity Range	Low Range (5 mL sample): g/100 mL as citric acid: 0.10 to 2.00% CA; g/100 mL as tartaric acid: 0.11 to 2.35% TA; g/100 mL as malic acid: 0.10 to 2.09% MA High Range (5 mL sample): g/100 mL as citric acid: 1.00 to 10.00% CA; g/100 mL as tartaric acid: 1.17 to 11.72% TA; g/100 mL as malic acid: 1.05 to 10.47% MA
	Titratable Acidity Resolution	0.01%
	Accuracy (@25°C/77°F)	± 0.02% CA or 3% of reading whichever is greater
	Titration Method	acid-base titration
	Principle	endpoint titration: 8.1 pH
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
pH Meter	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, 8.20, 10.01)
	Temperature Compensation	manual or automatic
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	± 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 (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	Electrode	HI1131B glass body pH electrode with BNC connector and 1 m (3.3') cable
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable(included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC power adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	**HI84532-01** (115V) and **HI84532-02** (230V) are supplied with HI84532-70 reagent Kit for titratable acidity in fruit juice, HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution (30 mL), 100 mL beakers (2), 20 mL beaker, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), dosing pump valve, 5 mL syringe, 1 mL plastic pipette, stir bar, power adapter, instruction manual and quality certificate.	

See reagents and accessories on page 4.79

HI84533

Formol Number Mini Titrator and pH Meter

for Wines and Fruit Juices

- 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 electrode
- 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 600 RPM regardless of viscosity of solution
- GLP features
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - Intuitive design with large keys and easy to navigate screens
- Help features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84533 is an easy to use, fast and affordable mini automatic titrator designed for the rapid and accurate determination of formol number in wines or fruit juices. This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.

The HI84533 incorporates a precise piston dosing system which allows for a highly accurate determination of the amount of titrant used. It is also capable of dynamic dosing, making testing both faster and more accurate. A pump calibration performed with the supplied Hanna standard help assure the accuracy of the measurement.

This mini titrator includes a user adjustable programmed analysis method designed for formol number analysis. It employs a powerful and effective algorithm to analyze the pH response to determine the exact pH endpoint, then uses this algorithm to perform the necessary calculations.

This mini titrator is also designed to be used as a benchtop pH/mV meter. The CAL Check function not only ensures an accurate pH reading when the HI84533 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

Why Formol Number is an Important Determination

The content of amino-acids and other nitrogen compounds in fruit juices and wines is expressed as total assimilable nitrogen and is determined by the formol method using an acid-base titration. The formol number (also known as formol index) is a parameter used for evaluation of the quality of fruit juices and wines.

In wines, the concentration of alpha amino acid in grapes change as a function of maturity and crop load (yield to vine size ratio). The concentration increases with fruit

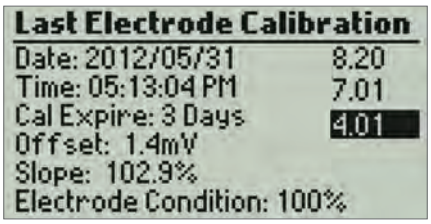
The HI84533 has two operating options:

1. pH measurement using the meter in pH mode
2. Formol number determination by titration of wines and fruit juice samples with sodium hydroxide solution to an 8.2 pH endpoint

maturation and decreases with crop load. In the fermentation of wine, there is a minimum amount of amino acid and other nitrogen compounds (eg: 150-200 mg/L of yeast assimilable nitrogen) that has to be present in the must/juice. Too low of an amount will result in a stuck fermentation in which there is not enough nitrogen for the yeast to thrive. Because of the importance of nitrogen in fermentation, it is desirable to determine the nitrogen concentration before fermentation.

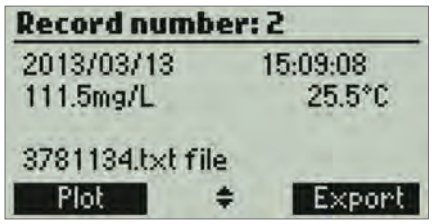
In fruit juices, the formol nitrogen number is one of the basic parameters measured to determine quality. Depending on the type of fruit, the number can increase or decrease with maturity. In orange and grapefruit juice, lower values are observed when the fruit is not suitably mature or there has been frost damage. In pineapple juice, a low number could be indicative of over-dilution with water or a disproportionate amount of the core was used. To determine the adulteration of fruit juices, the formol number, along with the chromatography characterization of amino acids, can be used.

On-screen Features



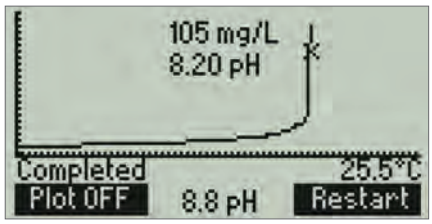
GLP

The GLP feature records electrode and pump calibration data to help keep measurements accurate and reliable.



Log and recall data

The HI84533 can log up to 400 samples (200 for titration results; 200 for mV/pH) and recall or export data to a USB drive or PC.



Titration curve displayed on screen

The HI84533 offers real time graphing of the titration curve on the LCD.

Specifications		HI84533
Titrator	Range (as N)	Low Range: 2.14 to 28.57 meq/L; 0.21 to 2.85 meq%; 30.0 to 400.0 mg/L High Range: 21.7 to 71.4meq/L; 2.14 to 7.14 meq%; 300 to 1000 mg/L
	Resolution	Low Range: 0.01 meq/L; 0.01 meq%; 0.1 mg/L High Range: 0.1 meq/L; 0.01 meq%; 1 mg/L
	Accuracy (@25°C/77°F)	±0.1 mg/L or 3 % of reading, whichever is greater
	Sample Volume	Low Range: 10 mL High Range: 5 mL
	Method	acid-base titration
	Principle	endpoint titration, adjustable (pH 8.0 - 8.5 in 0.1 increments)
	Pump Speed	10 mL/min
	Stirring Speed	600 rpm
pH Meter	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; 4 available buffers (4.01; 7.01; 8.20; 10.01)
	Temperature Compensation	manual or automatic
mV Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy	±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
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1131B glass body, refillable, with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information		**HI84533-01** (115V) and **HI84533-02** (230V) are supplied with HI84533-70 reagent kit for formol number in wine and fruit juices, HI1131B pH electrode, HI7662-T temperature probe, HI7082 electrode fill solution (30 mL), 100 mL beakers (2), tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), dosing pump valve, 5 mL syringe (2), 2000 µL automatic pipette (1) with plastic tips (2), plastic pipette (1 mL), HI731319 stir bar, electrode cleaning solution sachets for wine deposits (2), electrode cleaning solution sachets for wine stains (2), power adapter, instruction manual and quality certificate.

See reagents and accessories on page 4.80

HI84500

Sulfur Dioxide Mini Titrator

for Wine Analysis

- Piston driven pump with dynamic dosing
  - For highly accurate, repeatable results
- Log-on-demand
  - Log data up to 400 samples (200 for titration; 200 for ORP/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 700 RPM regardless of viscosity of solution
- GLP features
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - User intuitive design with large keys and easy to navigate screens
- HELP features
  - Dedicated HELP key for content sensitive help
- mV meter

An Easy-to-Use, Fast and Affordable All-in-one Solution

The HI84500 is an easy to use, fast and affordable automatic mini titrator designed for testing free or total sulfur dioxide (SO_2) levels in wine. It includes a pre-programmed analysis method and uses a powerful algorithm in order to determine when the titration reaction has reached completion. The HI84500 incorporates a precision dosing pump which allows for a highly accurate determination of the amount of titrant used. Pump calibrations, performed with the provided Hanna standards, help assure the measurement accuracy. The HI84500 also features a new low range measurement and can also be used as a mV meter for direct ORP measurements.

This new generation of mini automatic titrator improves upon the titrant delivery system and measuring ranges for increased accuracy compared to previous models. This meter reflects Hanna's years of experience as a manufacturer of analytical instruments.

Why Free & Total Sulfur Dioxide is Important

Winemakers add sulfur dioxide to wine in order to inhibit bacteria and wild yeast growth and to serve as an antioxidant to prevent browning. When SO_2 is added to wine, a portion of it becomes immediately bound while a remaining portion is unbound SO_2. The portion that is unbound is also called free SO_2; it is responsible for protecting the wine.

The bound and free SO_2 together are referred to as total SO_2. The relationship between the amount of SO_2 added and the amount of free SO_2 is complex. This relationship is governed by the total amount of SO_2 in the wine and the ability of compounds (e.g. sugars, aldehydes, ketonic acid, quinones, anthocyanin) in the wine to bind SO_2.

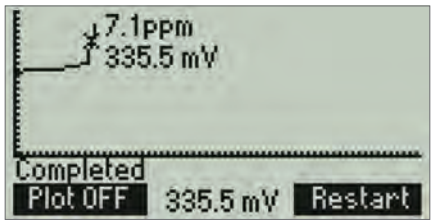
The exact relationship between free and bound SO_2 will vary from wine to wine. The amount of free SO_2 depends on how much is added, how much was present before the addition, and how much was immediately bound. Free SO_2 exists in two forms: bisulfite (HSO_3^-) is the predominant form but is relatively ineffective and molecular SO_2 is the minor form and is responsible for protecting the wine. The amount of molecular SO_2 available in wine is depended on the amount of free SO_2 present and the pH. Typically 0.8 ppm of molecular SO_2 provides adequate protection against bacteria growth and oxidation. In order to obtain this value for a wine sample that has a pH of 3.2 you would need 22 ppm of free SO_2; if the pH was at 3.5 you would need double the amount, 44 ppm of free SO_2.

Molecular SO_2 can be detected by human senses at about 2.0 ppm. This level is needed for maximum protection of wine. Higher levels are needed for sweet and most notable, botrytised wine. The HI84500 can be used to test for free and total SO_2 in all wines, including red, which are difficult to test using traditional methods associated with a distinctive color change to determine the endpoint.

Application-specific ORP Electrode

The HI84500 is supplied with the HI3148B ORP electrode featuring CPS™ technology to prevent the clogging of the reference junction. Conventional electrodes may clog quickly in biological samples such as wine. By design, the HI3148B ORP electrode utilizes a ground glass/PTFE sleeve junction which controls a steady, predictable flow of electrolyte solution, keeping the junction open. The hydrophobic properties of PTFE repels wetness and coatings.

On-screen Features

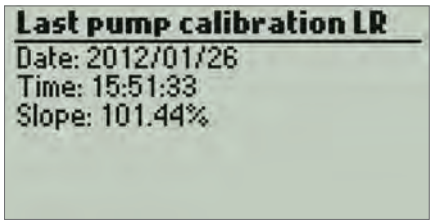


Titration curve displayed on screen

The HI84500 offers real time graphing of the titration curve on the LCD.

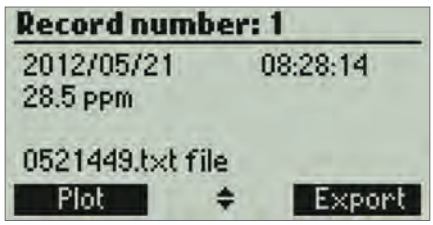
ORP

During ORP measurements, the stirrer icon will be displayed when the stirrer is on



GLP

Records pump calibration data to ensure measurements are accurate and reliable.

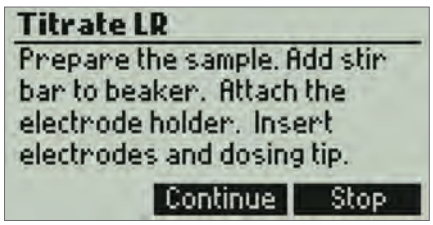


Log and recall data

Log up to 400 samples (200 for titration results; 200 for ORP/mV) and recall or export data to a USB stick or PC.

Procedure warnings

Users are warned if there is an error in procedures such as the titration exceeded the maximum volume of titrant.



Tutorial and help screens

Accessing the tutorial menu provides helpful information during calibration and titration.

Specifications		HI84500
Titrator	Range	Low Range: 1.0 to 40.0 ppm of SO_2 High Range: 30 to 400 ppm of SO_2
	Resolution	Low Range: 0.1 ppm High Range: 1 ppm
	Accuracy (@25°C/77°F)	Low Range: ±0.5 ppm or 3% of reading, whichever is greater High Range: ±1 ppm or 3% of reading, whichever is greater
	Sample Volume	50 mL
	Method	Ripper method
	Principle	equivalence point redox titration
	Pump speed	10 mL/min
	Stirring Speed	700 rpm
ORP Meter	Range	-2000.0 to 2000.0 mV
	Resolution	0.1 mV
	Accuracy (@25°C/77°F)	±1 mV
Additional Specifications	Logging Data	up to 400 samples (200 ORP/mV, 200 titration)
	Electrode	HI3148B glass body ORP electrode with BNC connector and 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information		**HI84500-01** (115V) and **HI84500-02** (230V) are supplied with HI3148B ORP electrode, HI7082 electrode fill solution (30 mL), HI84500-70 reagent kit for SO_2 determination (consisting of: 1 bottle HI84500-50 (230 mL) low range titrant, 1 bottle HI84500-51 high range titrant (230mL), 1 bottle HI84500-55 pump calibration standard (120 mL), 1 bottle HI84500-60 acid reagent (230 mL), 1 bottle HI84500-61 alkaline reagent (120 mL) and HI84500-62 stabilizer packets (100 packets)), 100 mL beakers (2), 20 mL beakers (2), scissors, 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, electrode cleaning solution sachets for wine deposits (2), electrode cleaning solution sachets for wine stains (2), power adapter, instruction manual and quality certificate.

See reagents and accessories on page 4.80

HI84502

Total Acidity Mini Titrator and pH Meter

for Wine 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 electrode
- 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 600 RPM regardless of viscosity of solution
- GLP features
  - Date, time, offset, slope and buffers used
- Easy-to-use interface
  - User intuitive design with large keys and easy to navigate screens
- Help features
  - Dedicated HELP key for content sensitive help
- pH/mV meter
  - Doubles as a benchtop pH meter

An Easy-to-Use, All-in-one Solution

The HI84502 is an easy to use, fast and affordable automatic mini titrator designed for testing total acidity levels in wine. It includes a pre-programmed analysis method and uses a powerful algorithm in order to determine when the titration reaction has reached completion. The results are displayed in g/L as tartaric acid. The HI84502 incorporates a precision piston driven dosing pump which allows for a highly accurate determination of the amount of titrant used. Pump calibrations performed with the provided Hanna standards assure the accuracy of measurements.

This mini titrator is also designed to be used as a benchtop pH/mV meter. As a pH meter, it has many features of a professional grade benchtop including automatic calibration up to three points with four available buffers, a 0.01 pH resolution, accuracy of ±0.01 pH, automatic temperature compensation and comprehensive GLP data.

The GLP data includes date, time, offset, slope, and buffers used for calibration. Accuracy is always ensured with Hanna's unique CAL Check feature, which analyzes the response of the electrode during the calibration process. Based on electrode response in the buffer, indicators are displayed on screen to alert the user of potential problems during calibration. These indicators include Buffer Contaminated, Electrode Dirty/Broken, and overall probe condition.The CAL Check function not only ensures an accurate pH reading when the HI84502 is used as a pH meter but also an accurate titration since the endpoint is determined by a set pH value.

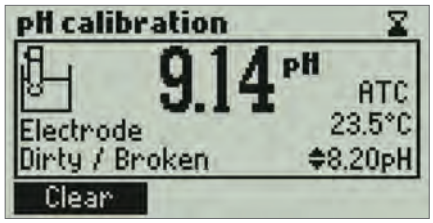
The Significance of Titratable Total Acidity

Acids occur naturally during the growing of grapes and as part of the fermentation process. Wines show lower levels of acid when there is a hot growing season or when the grapes come from warmer regions. In the proper proportion, acids are a desirable trait and give the wine character. The three predominant acids in wine are tartaric, malic and citric. Tartaric acid is the principal acid in grapes and is a component that promotes a crisp flavor and graceful aging in wine. A moderate amount of a wine's acid comes from malic acid, which contributes to fruitiness. A small amount of titratable acidity comes from citric acid. Wine also contains trace amounts of other acids; the least desirable acid in wine is acetic acid, which, when present in more than a nominal amount, gives wine a sour or vinegary aspect.

Total acidity, also called titratable acidity, is the sum of the fixed and volatile acids. In the United States the total acidity is usually expressed in terms of tartaric acid, even though the other acids are measured.

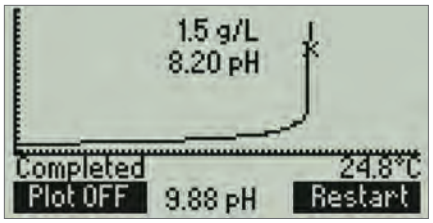
Total acidity directly affects the color and flavor of wine and, depending on the style of the wine, is sought in a perfect balance with the sweet and bitter sensations of other components. Too much acidity makes wine tart and sharp; too little makes wines flat, flabby and uninteresting. Proper acidity in wine is what makes it refreshing and an ideal accompaniment to food. The proper acid level of a wine varies, with sweeter wines generally requiring somewhat higher levels to retain the proper balance.

On-screen Features



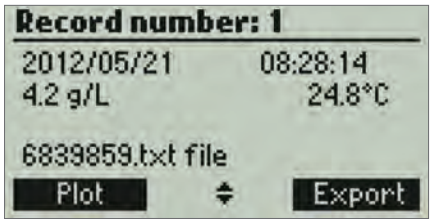
CAL Check™

A Hanna exclusive process for checking the condition of electrodes which helps keep measurements accurate.



Titration Curve Displayed On Screen

The HI84502 offers real time graphing of the titration curve on the LCD.



Log and Recall Data

Log up to 400 samples (200 for titration results; 200 for mV/pH) and recall or export data to a USB stick or PC.

Specifications		HI84502
Titrator	Range	Low Range: 0.1 to 5.0 g/L (ppt) of tartaric acid High Range: 4.0 to 25.0 g/L (ppt) of tartaric acid
	Resolution	0.1 g/L (ppt)
	Accuracy (@25°C/77°F)	±0.1 g/L or 3 % of reading, whichever is greater
	Method	acid-base titration
	Sample Volume	Low Range: 10 mL High Range: 2 mL
	Principle	endpoint titration: 7.00 pH or 8.20 pH
	Pump speed	10 mL/min
	Stirring Speed	600 rpm
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, 8.20, 10.01)
	Temperature Compensation	manual or automatic
mV Meter	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 (@25°C/77°F)	±0.4°C; ±0.8°F; ±0.4 K
Additional Specifications	Logging Data	up to 400 samples (200 pH/mV, 200 titration)
	pH Electrode	HI1048B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
	Temperature Probe	HI7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
	Connectivity	(1) Type-B USB for PC interface, (1) Type-A USB for storage
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	12 VDC adapter (included)
	Dimensions	235 x 200 x 150 mm (9.2 x 7.9 x 5.9")
	Weight	1.9 kg (67.0 oz.)
Ordering Information	**HI84502-01** (115V) and **HI84502-02** (230V) are supplied with HI1048B pH electrode, HI7662-T temperature probe, HI7082 electrode fill Solution (30 mL), HI84502-70 reagent kit (consisting of: 1 bottle HI84502-50 (230 mL) titration solution and HI84502-55 (120 mL) pump calibration standard (1 bottle)), (2) 100 mL beakers, dosing pump valve, 2000 µL automatic pipette (1) with plastic tips (2), 5 mL syringe, 1 mL plastic pipette, tube set (aspiration tube with titrant bottle cap and dispensing tube with tip), stir bar, electrode cleaning solution sachets for wine deposits (2), electrode cleaning solution sachets for wine stains (2), power adapter, instruction manual and quality certificate.	

See reagents and accessories on page 4.80

Titration Solutions and Reagents

HI70401	potassium hydrogen phthalate, 20 g
HI70402	tartaric acid, 20 g
HI70403	sodium thiosulfate pentahydrate, 20 g
HI70404	potassium iodide powder packets, 100 packets
HI70405	glucose/fructose, 20 g
HI70406	sodium chloride, 20 g
HI70407	potassium iodate, 20 g
HI70408	oxalic acid, 20 g
HI70409	potassium permanganate, 20 g
HI70422	silver nitrate (0.1 M), 1L
HI70423	sodium hydroxide solution (0.11 N), 1 L
HI70424	amino-propanol buffer, 25 mL
HI70425	sulfuric acid solution (16%), 500 mL
HI70426	glyoxal solution (40%), 100 mL
HI70427	nitric acid solution (1.5 M), 500 mL
HI70428	sodium hydroxide solution (0.25N), 1 L
HI70429	silver nitrate solution (0.05 M), 1L
HI70432	hydrogen peroxide solution (3%), 25 mL
HI70433	stabilized iodine solution (0.01 N), 1L
HI70434	phosphoric acid (85%), 500 mL
HI70435	sodium hydroxide solution (5 M), 500 mL
HI70436	deionized water, 1 G
HI70437	potassium Iodide concentrated (30%) solution, 500 mL
HI70438	tris buffer set, 1 L
HI70439	sodium thiosulfate solution (0.1 M), 1 L
HI70440	iodine stabilized solution (0.02 N), 1 L

HI70441	iodine stabilized solution (0.04 N), 1 L
HI70443	sulfuric acid solution (10%), 500 mL
HI70444	sulfuric acid solution (25%), 500 mL
HI70445	nitric acid solution (1 M), 500 mL
HI70446	Fehling solution A, 500 mL
HI70447	Fehling solution B, 500 mL
HI70448	silver nitrate solution (0.02 M), 1 L
HI70449	EDTA solution (0.02 M), 1 L
HI70453	hydrochloric acid solution (0.02 N), 1 L
HI70454	sodium hydroxide solution (0.02 N), 1 L
HI70455	sodium hydroxide solution (0.01 N), 1 L
HI70456	sodium hydroxide solution (0.1 N), 1 L
HI70457	sodium hydroxide solution (1 N), 1 L
HI70458	sulfuric acid solution (0.01 M), 1 L
HI70459	sulfuric acid solution (0.05 M), 1 L
HI70462	hydrochloric acid solution (0.01 N), 1 L
HI70463	hydrochloric acid solution (0.1 N), 1 L
HI70464	hydrochloric acid solution (1 N), 1 L
HI70465	hydrogen peroxide solution (30%), 25 mL
HI70466	phenylarsine oxide (PAO) solution (0.00564N), 500 mL
HI70467	pH 4.18 acetate buffer, 230 mL
HI70468	potassium iodide, 35g
HI70469	iodine solution (0.00188N), 230 mL (4)
HI70471	phenylarsine oxide (PAO) solution (0.000564N), 500 mL
HI70472	pH 7.15 phosphate buffer solution, 230 mL
HI70436M	distilled water, 230 ml

Meter Accessories and Reagents

HI930100

HI930101
(HI932 only)

burette

HI930301

HI930320

HI930310

HI932 and HI931 Automatic Titration System Accessories

Code	Description
HI930100	dosing pump
HI930101	dosing pump with peristaltic pump (HI932 only)
HI930150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI930105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI900250	50 mL burette syringe
HI900225	25 mL burette syringe
HI900210	10 mL burette syringe
HI900205	5 mL burette syringe
HI900260	3-way valve (includes 3 gaskets and 2 screws)
HI900942	tool for burette cap removal
HI900270S	aspiration tube set with 316 stainless steel fitting (includes blue protection tube, gasket, and tube lock)
HI930280	dispensing tube set with 316 stainless steel fitting (includes standard dispensing tip, blue protection tube, gasket, and tube lock)
HI930190	blank burette holder
HI930191	blank cover
HI930201	Replacement cap and rotor for peristaltic pump
HI930202	tubing set with plastic dispensing tube for peristaltic pump
HI930204	roller tube for peristaltic pump (3)
HI930301	overhead stirrer (includes overhead stirrer and 3 propellers)
HI930302	replacement propellers (3)
HI930303	PVDF replacement propellers (3) for organic solvents
HI930310	overhead electrode holder (includes overhead holder without electronics or propeller)
HI930320	stirrer support (metal rod only)
HI7662-TW	temperature probe
HI920013	USB cable (1.8 m)
HI930900U	USB stoage device with HI900 PC software
HI930401	potentiometric analog board for HI932
HI900945	shorting cap
HI900946	power adapter 110VAC to 24VDC
HI900947	power adapter 220VAC to 24VDC

See HI932 on page 4.6; See HI931 on page 4.16

Meter Accessories and Reagents

HI922 Autosampler Accessories

Code	Description
HI920-922	control panel for HI922
HI7662-AW	autosampler temperature sensor w/1.5m cable
HI920-933	titrator/autosampler communication cable
HI920-960	tray locking screw
HI920-931	BNC extension cable (1m)
HI920-932	reference extension cable (1m)
HI920-310	electrode holder
HI920-901	USB storage device
HI920-281	titrant dispensing tube (1.5 m)
HI920-103	peristaltic pump with dispensing tubing
HI920-104	peristaltic pump with aspiration tubing
HI920-113	membrane pump with tubing
HI920-11660W	16 Beaker Tray, 60 mm diameter, Single Row with RFID
HI920-11853W	18 Beaker Tray, 53 mm diameter, Single Row with RFID
HI920-060	120 mL plastic beakers that fit HI920-11660W (20)
HI920-053	100 mL plastic beakers that fit HI920-11853W (20)
HI920-212	membrane pump complete tubing set
HI920-290	Tygon tube (5 m)
HI930-301	overhead stirrer
HI920-201	replacement Cap and Rotor for peristaltic pump
HI920-208	dispensing set with plastic dispensing tube for peristaltic pump
HI920-203	dispensing set with stainless steel aspiration tube for peristaltic pump
HI920-204	roller tube for peristaltic pump (3)
HI920-205	roller tube for peristaltic pump - high chemical compatibility (3)
HI930-302	replacement propellers (3)
HI930-303	replacement propellers - high chemical resistance (3)
HI930-320	cable chain
HI920-191	pump covers
HI731319	25 mm x 7 mm stir bars (10)

HI920-922

See HI922 on page 4.12

Meter Accessories and Reagents

HI933 KF Volumetric Titrator Accessories

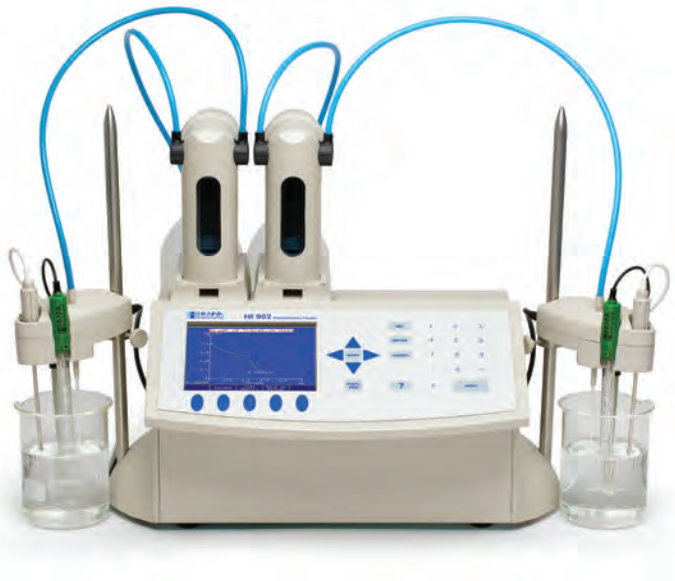
Code	Description
HI76320	dual platinum pin KF electrode with BNC connector
HI900205	5 mL syringe
HI900522	beaker for HI903/HI933
HI900523	dispensing tip (2)
HI900527	septum (5)
HI900528	solvent port plugs (2)
HI900530	titrant bottle top assembly
HI900531	solvent/waste bottle top assembly
HI900532	desiccant cartridge for titration beaker or titrant bottle
HI900533	desiccant cartridge for solvent or waste bottle
HI900534	waste bottle
HI900535	tubing for solvent/waste handling (2)
HI900536	tubing for air pump (2)
HI900540	O-ring set
HI900550	desiccant, 250 g
HI900570S	aspiration tubing
HI900580S	dispensing tubing and fitting
HI900941	calibration key
HI900942	tool for burette cap removal
HI920013	USB cable
HI930100	pump assembly
HI930180	air pump and magnetic stirrer for HI933/HI934
HI930505	5 mL burette assembly
HI930520	beaker assembly
HI930900U	USB flash drive

HI934 KF Coulometric Titrator Accessories

Code	Description
HI76330	detector electrode
HI900511	generator electrode with diaphragm
HI900512	generator electrode without diaphragm
HI900534	waste bottle
HI900535	tubing for solvent/waste handling (2)
HI900536	tubing for air pump (2)
HI900537	bottle top assembly (with molecular sieves)
HI900538	desiccant cartridge for reagent/waste bottles
HI900542	o-ring set
HI900543	glass joint grease
HI900551	molecular sieves, 150 g
HI900561	titration vessel (glass only)
HI900563	glass stopper, standard taper 19
HI900564	desiccant cartridge for generator electrodes
HI900566	open-top GL18 cap
HI900567	septum (5)
HI900568	reagent exchange adapter
HI900931	generator cable
HI900940	calibration key
HI920013	USB cable
HI930180	air pump and magnetic stirrer for HI933/HI934
HI930182	reagent adapter holder
HI930560	titrator vessel assembly
HI930900U	USB flash drive

See HI933 on page 4.22; See HI934 on page 4.26

Meter Accessories and Reagents



HI902C, HI901, and HI901W Automatic Titration System Accessories

Code	Description
HI900100	dosing pump
HI900150	50 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI900125	25 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI900110	10 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI900105	5 mL burette assembly (includes syringe, aspiration, and dispensing tubes)
HI900250	50 mL burette syringe
HI900225	25 mL burette syringe
HI900210	10 mL burette syringe
HI900205	5 mL burette syringe
HI900260	3-way valve (includes 3 gaskets and 2 screws)
HI900270S	aspiration tube set with 316 stainless steel fitting (includes blue protection tube, gasket, and tube lock)
HI900280S	dispensing tube set with 316 stainless steel fitting (includes standard dispensing tip, blue protection tube, gasket, and tube lock)
HI900301	overhead stirrer assembly (includes overhead stirrer and 3 propellers)
HI900302	replacement propellers (3)
HI900303	PVDF replacement propellers (3) for organic solvents
HI900304	Replacement shearing type polycarbonate propeller (1) for HI901 and HI902 overhead stirrer
HI900310	overhead electrode holder (includes overhead stirrer without electronics or propeller)
HI900320	stirrer stand
HI7662-T	temperature probe
HI900942	tool for burette cap removal
HI900946	power adapter 120VAC to 24VDC
HI900947	power adapter 220VAC to 24VDC
HI920013	USB cable (HI902C only)
HI900805	HI902C1/HI902C2 Design, Installation, Operation, and Performance Qualification (DQ/IQ/OQ/PQ) Documentation

HI921 Autosampler Accessories

Code	Description
HI920-11660	single row with RFID, 16 beaker position, 60mm dia.
HI920-060	120 mL plastic beakers that fit HI920-11660 (20)
HI920-11853	single row with RFID, 18 beaker position, 53mm dia.
HI920-053	100 mL plastic beakers that fit HI920-11853 (20)
HI920-301	overhead stirrer
HI920-101	peristaltic pump with dispensing tubing
HI920-102	peristaltic pump with aspiration tubing
HI920-111	membrane pump for rinsing probes
HI920-112	electrode holder accessory for HI920-111 membrane pump
HI920-201	peristaltic pump replacement cap and rotor
HI920-202	peristaltic pump complete tubing set with plastic dispensing tube
HI920-203	peristaltic pump complete tubing set with stainless-steel aspiration tube
HI920-205	peristaltic pump roller tube (3) with fittings and grease - general purpose
HI920-204	peristaltic pump roller tube (3) with fittings and grease - increased chemical resistance
HI920-206	Tygon E-LFL tubing set for peristaltic pump, inlet and outlet with increased chemical resistance
HI920-207	Tygon E-LFL tubing set with SS aspiration tube for peristaltic pump, inlet and outlet with increased chemical resistance
HI920-290	5m Tygon tube
HI920-280S	1.5m dispensing tube set with 316 stainless steel fitting for burette to autosampler
HI920-304	Replacement shearing type polycarbonate propeller (1) for HI921 overhead stirrer
HI920-302	replacement propellers (3)
HI920-303	high chemical resistance replacement propellers (3)
HI920-310	three electrode holder
HI920-900	USB memory stick
HI920-921	control panel for HI921
HI920-930	titrator/autosampler communication cable
HI920-931	BNC extension cable (1m)
HI920-932	reference extension cable (1m)
HI920-960	tray locking screw
HI7662-A	autosampler temperature sensor w/1.5m cable
HI731319	25 mm x 7 mm stir bars (10)

See HI902C on page 4.32 ; See HI921 on page 4.36; See HI901C on page 4.40; See HI901W on page 4.44

Meter Accessories and Reagents

HI903 KF Volumetric Titrator Accessories

Code	Description
HI76320	dual platinum pin KF electrode with BNC connector
HI900100	titrant dosing pump
HI900520	beaker assembly (beaker, dispensing tip, fittings, o-rings, top, holder,stirrer, solvent port plug)
HI900505	5 mL burette assembly (syringe, aspiration, and dispensing tubes)
HI900205	5 mL burette syringe
HI900260	3-way valve (3 gaskets and 3 screws)
HI900522	KF beaker (glass only)
HI900523	dispensing tip (2)
HI900527	septum (5)
HI900528	solvent port plugs (2)
HI900530	titrant bottle top assembly
HI900531	solvent/waste bottle top assembly
HI900532	desiccant cartridge for KF beaker or titrant bottle top
HI900533	desiccant cartridge for solvent or waste bottle top
HI900534	waste bottle
HI900180	solvent-handling pump
HI900535	tubing for solvent/waste handling
HI900536	tubing for solvent-handling pump
HI900540	O-ring set
HI900550	color-indicating, silica gel desiccant, 250 g
HI900570S	aspiration tube set with 316 stainless steel fitting (PTFE titrant tubing, blue protection and tube lock)
HI900580S	dispensing tube set with 316 stainless steel fitting (PTFE titrant tubing)
HI900942	tool for burette cap removal
HI900950	chemical spoon for measuring and introducing sample
HI920013	USB cable for PC connection
HI900806	HI903 Design, Installation, Operation, and Performance Qualification (DQ/IQ/OQ/PQ) Documentation

HI904 KF Coulometric Titrator Accessories

Code	Description
HI900561	titration vessel (glass only)
HI76330	detector electrode
HI900511	generator electrode with diaphragm
HI900512	generator electrode without diaphragm
HI900180	solvent handling pump
HI900181	reagent adapter holder assembly
HI900182	reagent adapter holder (glass only)
HI900560	titration vessel assembly
HI900568	reagent exchange adapter
HI900537	bottle top assembly (with molecular sieves)
HI900538	desiccant cartridge for reagent/waste bottles (with molecular sieve)
HI900535	tubing set for reagent/waste handling (2)
HI900536	tubing for solvent handling pump (2)
HI900566	open-top GL18 cap
HI900563	glass stopper, standard taper 19
HI900564	desiccant cartridge for generator electrode
HI900542	O-ring set
HI900534	waste bottle
HI900551	molecular sieves, 150 g
HI900940	calibration key
HI900946	power adapter 120VAC to 24VDC
HI900567	septum kit (5)
HI900543	glass joint grease
HI900950	chemical spoon for measuring and introducing sample
HI900931	generator cable
HI920013	USB Cable for PC Connection
HI900807	HI904/HI904D Design, Installation, Operation, and Performance Qualification (DQ/IQ/OQ/PQ) Documentation

See HI903 on page 4.48 ; See HI904 on page 4.52

Meter Accessories and Reagents

HI84534 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84534-50	Titratable acidity titrant, 120 mL
HI84534-55	Titratable acidity calibration standard, 120 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7061M	general purpose electrode cleaning solution, 230 mL

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

HI84530 Total Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84530-50	titrant solution for low range, 120 mL
HI84530-51	titrant solution for high range, 120 mL
HI84530-55	pump calibration standard, 230 mL
HI84530-60	hydrogen peroxide, 30 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7061M	general purpose electrode cleaning solution, 230 mL

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

See HI84534 on page 4.56; See HI84530 on page 4.58

HI84531 Titratable Alkalinity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84531-50	titrant solution for low range, 120 mL
HI84531-51	titrant solution for high range, 120 mL
HI84531-55	pump calibration standard, 230 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7061M	general purpose electrode cleaning solution, 230 mL
Accessory Code	**Description**
HI740236	5 mL syringe for mini titrator
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

HI84529 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84529-50	titrant solution for low range 20, 120 mL
HI84529-51	titrant solution for high range 20, 120 mL
HI84529-52	titrant solution for low range 50, 120 mL
HI84529-55	pump calibration standard, 230 mL
HI7004M	pH 4.01 buffer, 230 mL
HI70060M	pH 6.00 buffer, 230 mL
HI70083M	pH 8.30 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70640M	cleaning solution for milk deposits, 230 mL
HI70641M	cleaning and disinfection solution for dairy products, 230 mL
HI7072	reference half-cell filling solution, 1M KNO_3, 30 mL (4)
Accessory Code	**Description**
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
FC260B	replacement pH half-cell electrode for dairy
HI5315	replacement reference half-cell electrode
HI7662-T	replacement temperature probe

HI84532 Titratable Acidity Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84532-50	titrant solution for low range, 120 mL
HI84532-51	titrant solution for high range, 120 mL
HI84532-55	pump calibration standard, 230 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI7061M	general purpose cleaning solution, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
Accessory Code	**Description**
HI731342	automatic pipette (2000 µL)
HI731352	tips for 2000 µL automatic pipette (4)
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

See HI84531 on page 4.60; See HI84529 on page 4.62; See HI84532 on page 4.64

Meter Accessories and Reagents

HI84533 Formol Number Mini Titrator and pH Meter Reagents and Accessories

Reagent Code	Description
HI84533-50	titrant solution, 230 mL
HI84533-55	pump calibration standard, 120 mL
HI84533-60	hydrogen peroxide reagent, 30 mL
HI84533-61	formol base reagent, 230 mL
HI84533-62	pH adjustment reagent, 30 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1131B	replacement pH electrode
HI7662-T	replacement temperature probe

HI84500 Sulfur Dioxide Mini Titrator for Wine Analysis Reagents and Accessories

Reagent Code	Description
HI84500-50	titrant solution for low range, 230 mL
HI84500-51	titrant solution for high range, 230 mL
HI84500-55	pump calibration standard, 120 mL
HI84500-60	acid reagent, 230 mL
HI84500-61	alkaline reagent (Total SO_2), 120 mL
HI84500-62	stabilizer powder packets (100)
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)
HI7021M	ORP test solution @ 240 mV (@25°C), 230 mL
HI7092M	oxidizing pretreatment solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI70300M	storage solution, 230 mL

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, dosing tip and valve
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740037P	20 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI3148B	ORP electrode for wine

HI84502 Total Acidity Mini Titrator and pH Meter for Wine Analysis Reagents and Accessories

Reagent Code	Description
HI84502-50	titrant solution, 230 mL
HI84502-55	pump calibration standard, 120 mL
HI7004M	pH 4.01 buffer, 230 mL
HI7007M	pH 7.01 buffer, 230 mL
HI70082M	pH 8.20 buffer, 230 mL
HI7010M	pH 10.01 buffer, 230 mL
HI70300M	storage solution, 230 mL
HI70635M	cleaning solution for wine deposits, 230 mL
HI70636M	cleaning solution for wine stains, 230 mL
HI7082	pH electrode filling solution, 3.5M KCl, 30 mL (4)

Accessory Code	Description
HI70500	tube set with cap for titrant bottle, tip and valve
HI731352	tips for 2000 µL automatic pipette (4)
HI731342	automatic pipette 2000 µL
HI731319	stir bar, 25 x 7 mm (10)
HI740036P	100 mL beaker (10)
HI740236	5 mL syringe for mini titrator
HI920013	PC connection cable
HI1048B	replacement pH electrode for wine
HI7662-T	replacement temperature probe

See HI84533 on page 4.66; See HI84500 on page 4.68; See HI84502 on page 4.70

Table of Contents

Conductivity/TDS Meters Introduction

Definition of Conductivity

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

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

Units of Measurement

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

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

The IUPAC convension

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

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

Conductivity versus Resistivity

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

TDS

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

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

TDS = factor x EC_{25}

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

Conductivity/Resistivity/TDS of Commonly Measured Substances

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

Salinity

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

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

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

Conductivity and Temperature

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

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

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

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

Typical Temperature Coefficients of Various Solutions

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

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

(USP) United States Pharmacopeia Compliant Conductivity

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

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

Conductivity Calibration

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

Types of Conductivity

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

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

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

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

Product Spotlights

HI99300 · HI99301

Portable EC Meters

EC/TDS and Temperature

See page 5.27

edge®EC

Innovation in a single parameter

See page 5.10

HI5321

Research Grade Conductivity/ TDS Meter

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

See page 5.14

HI98192

Professional Waterproof Meters

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

See page 5.19

Benchtop Meters

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

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

Portable Meters

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

edge®

pH • EC • DO

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

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

edge® technical features

Rechargeable Battery

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

Two USB ports

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

Clear, full text readout

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

Data logging

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

GLP

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

Two Operating Modes

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

edge pH Features*

CAL Check™ (pH only)

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

Sensor Check™ (pH only)

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

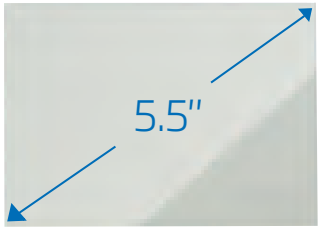
ORP Measurement

edge measures ORP with edge compatible ORP probes.

edge design features

Capacitive touch keypad

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



Easy to read LCD

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

Zero footprint

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

* Using edge compatible pH electrodes

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

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

Portable field unit

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

Wall-mount cradle

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

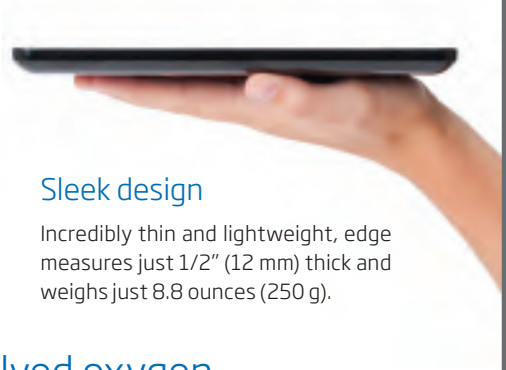
Electrode holder with built-in cradle

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

Digital electrodes

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

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



Sleek design

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

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

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

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

EC, TDS and Salinity solutions begin on page 5.34

edge® EC

edge®EC–Innovation in a Single Parameter

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

Additional feature information

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

edge®EC technical features

Rechargeable Battery

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

Two USB ports

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

Clear, full text readout

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

Data logging

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

GLP

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

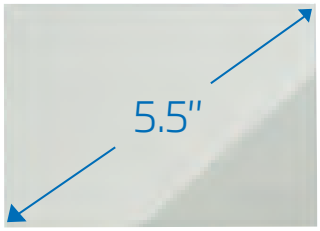
Two Operating Modes

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

edge EC design features

Capacitive touch keypad

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



Easy to read LCD

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

Zero footprint

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

3.5 mm probe input

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

Sleek design

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

Accepts edge EC compatible conductivity probe

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

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

Portable field unit

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

Wall-mount cradle

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

Electrode holder with built-in cradle

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

Digital electrodes

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

Conductivity probe

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

Specifications		HI2003 edge EC
EC	Range	0.00 to 29.99 µS/cm; 30.0 to 299.9 µS/cm; 300 to 2999 µS/cm; 3.00 to 29.99 mS/cm; 30.0 to 200.0 mS/cm; up to 500.0 mS/cm absolute EC**
	Resolution	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% of reading (±0.05 µS/cm or 1 digit, whichever is greater)
	Calibration	single cell factor calibration; six standards available: 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm, one point offset: 0.00 µS/cm
	Temperature Coefficient	0.00 to 6.00%/°C (for EC and TDS only), default value is 1.90%/°C
TDS	Range	0.00 to 14.99 mg/L (ppm); 15.0 to 149.9 mg/L (ppm); 150 to 1499 mg/L (ppm); 1.50 to 14.99 g/L; 15.0 to 100.0 g/L; up to 400.0 g/L absolute TDS using 0.80 conversion factor**
	Resolution	0.01 mg/L (ppm); 0.1 mg/L (ppm); 1 (ppm); 0.01 g/L; 0.1 g/L
	Accuracy (@25°C/77°F)	±1% of reading (±0.03 ppm or 1 digit, whichever is greater)
	Calibration	through EC calibration
	TDS Factor	0.40 to 0.80 (default value is 0.50)
Salinity†	Range	0.0 to 400.0 % NaCl; 2.00 to 42.00 PSU; 0.0 to 80.0 g/L
	Resolution	0.1 % NaCl; 0.01 PSU; 0.01 g/L
	Accuracy (@25°C/77°F)	±1% of reading
	Calibration	PSU and g/L through EC calibration; % NaCl – one-point with HI7037 sea water standard
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe	HI763100 digital four-ring conductivity probe with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Logging	up to 1000† (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging† (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information		**HI2003-01** (115V) and **HI2003-02** (230V) edge EC includes: HI763100 Conductivity probe, 1413 µS/cm conductivity standard sachets (4), 12880 µS/cm conductivity standard sachets (2), 5000 µS/cm conductivity standard sachets (2), electrode rinse solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual. **HI2003-03** includes the above without probe.

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

EC, TDS and Salinity solutions begin on page 5.34

HI5321

Research Grade Conductivity/TDS Meter

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

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

Customizable User Interface

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

Color Graphic LCD

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

Capacitive Touch

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

Auto-ranging

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

Automatic Temperature Compensation

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

Calibration

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

GLP Data

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

Data Logging

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

Data Transfer

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

Contextual Help

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

Four-ring Conductivity Probe

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

USP <645>

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

Specifications		HI5321
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm)
	Cell Constant	0.0500 to 200.00/cm
	Cell Type	4 cells
	Calibration	automatic standard recognition, user standard, single point / multi-point calibration
	EC Calibration Solution	84.00 µS/cm, 1.413 mS/cm, 5.000 mS/cm, 12.88 mS/cm, 80.00 mS/cm, 111.8 mS/cm
	Calibration Reminder	yes
	Temperature Compensation	disabled, linear and non-linear (natural water)
	Temperature Coefficient	0.00 to 10.00 %/°C
	Reference Temperature	5.0 to 30.0°C
	Profiles	up to 10
	USP <645> Application	yes
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 ppt; 10.00 to 99.99 ppt; 100.0 to 400.0 ppt actual TDS (with 1.00 factor)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 ppt; 0.01 ppt; 0.1 ppt
	Accuracy	±1% of reading (±0.01 ppm)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 kΩ•cm; 10.0 to 99.9 kΩ•cm; 100 to 999 kΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 kΩ•cm; 0.1 kΩ•cm; 1 kΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±1% of reading (±1 Ω•cm)
	Calibration	Uses Conductivity
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)
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)
	Calibration	User calibration in 3 points (0, 50, 100 °C)
Additional Specifications	EC Probe	HI76312 platinum, four-ring EC/TDS probe with and 1 m (3.3') cable (included)
	GLP	Probe cell constant / offset, reference teperature, compensation coefficient, calibration points, calibration time stamp
	Logging	**record :** Up to 100 lots, 50,000 records max/lot / maximum 100,000 data points; **interval:** 14 selectable between 1 second and 180 minutes; **type:** Automatic, Log on demand, AutoHold; **additional:** 200 records USP
	PC Connection	Opto-isolated USB
	Power Supply	12 VDC adapter (included)
	Environment	0 to 50°C (32 to 122°F; 273 to 323K) RH max 95% non-condensing
	Dimensions / Weight	160 x 231 x 94 mm (6.3 x 9.1 x 3.7") / 1.2 kg (2.64 lbs.)
Ordering Information		**HI5321-01** (115V) and **HI5321-02** (230V) are supplied with HI76312 EC/TDS probe, 1413 µS/cm conductivity standard sachet (4), 12880 µS/cm conductivity standard sachet (2), 5000 µS/cm conductivity standard sachet (2), electrode rinse solution sachet (2), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

(*) Reduced to actual probe limits

EC, TDS and Salinity solutions begin on page 5.34

HI2300

Autoranging Bench Meter

EC, TDS, Salinity and Temperature

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

Four-ring EC Probe

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

Calibration

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

Temperature Compensation

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

Adjustable TDS Factor

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

GLP Data

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

Data Logging

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

Data Transfer

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

On-screen Features

Last calibration date

Last calibration year

Last calibration time

Cell constant value (K)

Offset value

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

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

EC, TDS and Salinity solutions begin on page 5.34

HI2315

Conductivity Meter

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

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

Simple User Interface

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

Calibration

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

Four-ring EC Probe

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

Temperature Compensation

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

Built-in Solution Holders

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

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

EC solutions begin on page 5.34

HI98192

Professional Waterproof Meters

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

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

For Universal Applications

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange

Backlit Graphic LCD Display

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

Waterproof Protection

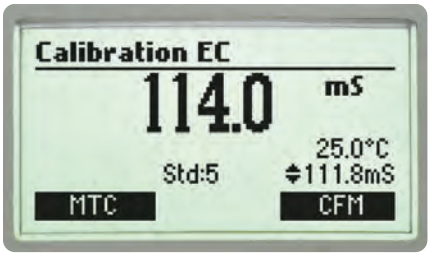
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes.

Quick connect probe

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

PC Connectivity

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

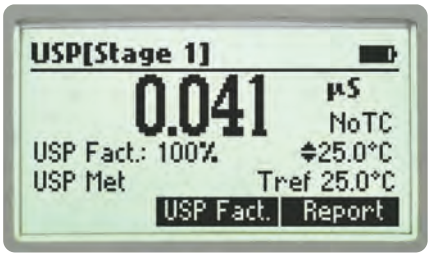


Calibration

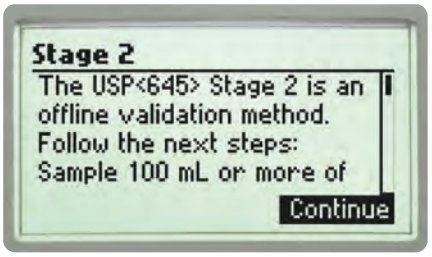
Choose from seven memorized standards and obtain up to a five point conductivity calibration. For salinity (% range), HI7037 standard allows users to perform a one point calibration.

USP <645>

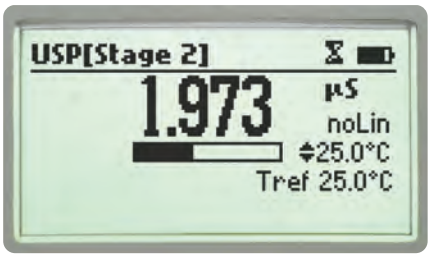
HI98192 can be used to perform all three stages of USP method required for EC measurement of ultrapure water and generates a report when the any of the three stages are met.



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



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



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

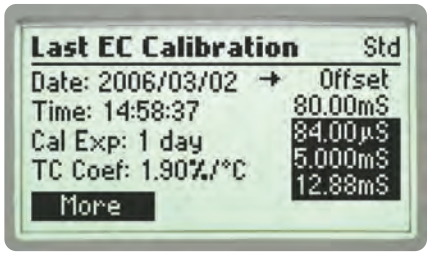
Measurement

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

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

Data Logging

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



GLP

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

AutoHold

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

Dedicated Help Key

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

Rugged custom carrying case

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

Specifications		HI98192
EC	Range	0 to 400 mS/cm (shows values up to 1000 mS/cm actual conductivity)** 0.001 to 9.999 µS/cm*; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (autoranging)
	Resolution	0.001 µS/cm*; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 µS/cm, 84.0 µS/cm, 1.413 mS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
TDS	Range	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm* (autoranging)
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 KΩ•cm; 0.1 KΩ•cm; 1 KΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm*
	Accuracy	±1% of reading (±10 Ω or 1 digit, whichever is greater)
Salinity	Range	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
	Calibration	max. one point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Temperature †	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two points
Additional Specifications	Cell Constant Setup	0.010 to 10.000
	Temperature Compensation	NoTC, linear (-20.0 to 120.0°C (-4.0 to 248.0°F)), non linear (0 to 36°C (32 to 98.6°F)) ISO/DIS 7888 std
	Reference Temperature	15°C, 20°C and 25°C
	Temperature Coefficient	0.00 to 10.00 %/°C
	TDS Factor	0.40 to 1.00
	Probe	HI763133 stainless steel, four-ring conductivity/TDS probe with internal temperature sensor and 1.5 m (4.9') cable (included)
	Logging	log-on-demand: 400 samples; lot logging: 5, 10, 30 sec, 1, 2, 5, 10, 15, 30, 60, 120, 180 min (max 1000 samples)
	Memorized Profiles	up to 10
	Measurement Modes	autorange, autoend, lock and fixed range
	PC Connectivity	opto-isolated sealed USB (with HI92000 software and micro USB cable)
	Battery Type / Life	1.5V AA batteries (4) / approximately 100 hours of continuous use (without backlight), 25 hours with backlight;
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions/Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	**HI98192** is supplied with HI763133 stainless steel, four-ring conductivity/TDS probe, HI7031M 1413 µS/cm calibration solution (230 mL), HI7035M 111.8 mS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720192 rugged carrying case with custom insert.	
Accessories	**HI710034** orange protective rubber boot	

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

EC, TDS and Salinity solutions begin on page 5.34

HI98197

Professional Waterproof Meter

for Ultrapure Water

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

For Ultrapure Water Applications

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange

Backlit Graphic LCD Display

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

Waterproof Protection

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

Quick connect probe

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

Calibration

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

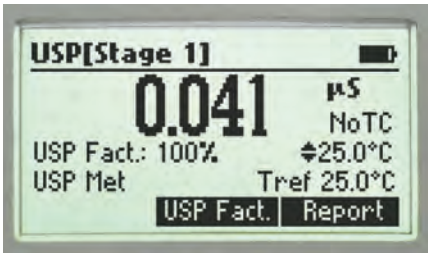
Measurement

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

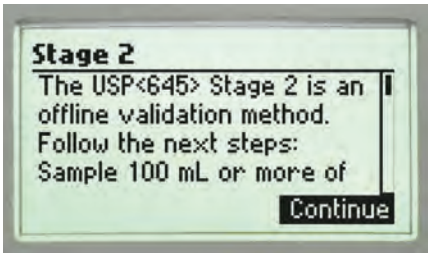
Ten sets of customized measurement parameters can be stored as a user profile and later recalled.

USP <645>

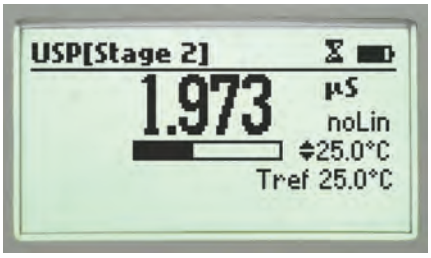
HI98197 can be used to perform all three stages of USP <645> method required for EC measurement of water for injection and generates a report when the any of the three stages are met.



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



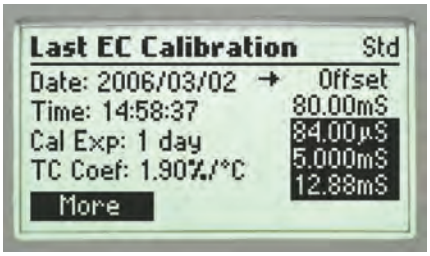
- On-screen guide
  - Users are provided with on-screen instructions for each USP stage



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

Data Logging

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



GLP

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

Intuitive Keypad

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

AutoHold

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

Dedicated Help Key

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

Setup screen

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

PC Connectivity

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

Long Battery Life

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

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

Designed for Water Professionals

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

HI605453 flow cell
for ultrapure water

Supplied complete

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

Specifications		HI98197
EC	Range	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm (actual conductivity*; temperature compensated to 400 mS/cm)
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 µS/cm, 84.0 µS/cm, 1.413 mS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm)
TDS	Range	0.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 Ω•cm; 100 to 999 Ω•cm; 1.00 to 9.99 KΩ•cm; 10.0 to 99.9 KΩ•cm; 100 to 999 KΩ•cm; 1.00 to 9.99 MΩ•cm; 10.0 to 100.0 MΩ•cm (autoranging)
	Resolution	0.1 Ω•cm; 1 Ω•cm; 0.01 KΩ•cm; 0.1 KΩ•cm; 1 KΩ•cm; 0.01 MΩ•cm; 0.1 MΩ•cm
	Accuracy	±1% of reading (±10 Ω or 1 digit, whichever is greater)
Salinity	Range	% NaCl : 0.0 to 400.0%; practical salinity: 0.00 to 42.00 (PSU); seawater scale: 0.00 to 80.00 (ppt)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
	Calibration	max. one point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Temperature †	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two points
Additional Specifications	Cell Constant Setup	0.010 to 10.000
	Temperature Compensation	NoTC, linear (-20.0 to 120.0°C; -4.0 to 248.0°F), non linear (0 to 36°C; 32 to 98.6°F) ISO/DIS 7888 std
	Reference Temperature	15°C, 20°C, and 25°C
	Temperature Coefficient	0.00 to 10.00 %/°C
	TDS Factor	0.40 to 1.00
	Probe	HI763123 platinum, four-ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable (included)
	Logging	log-on-demand: 400 samples; lot logging: 5, 10, 30 sec, 1, 2, 5, 10, 15, 30, 60, 120, 180 min (max 1000 samples)
	Memorized Profiles	up to 10
	Measurement Modes	autorange, autoend, lock, and fixed range
	PC Connectivity	opto-isolated sealed USB (with HI92000 software and micro USB cable)
	Battery Type / Life	1.5V AA batteries (4) / approximately 100 hours of continuous use (without backlight), 25 hours with backlight
	Auto-off	user selectable: 5, 10, 30, 60 min, disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions/Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	**HI98197** is supplied with HI763123 platinum, four-ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable, HI605453 stainless steel flow cell for ultrapure water, tubing, HI7031M 1413 µS/cm calibration solution (230 mL), HI7033M 84 µS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V batteries (4), quality certificate, instruction manual and quick start guide in an HI720197 rugged carrying case with custom insert.	
Accessories	**HI710034** orange protective rubber boot	

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

EC, TDS and Salinity solutions begin on page 5.34

HI9835

EC/TDS/Salinity/°C Meters

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

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

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

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

HI76309 conductivity probe

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

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

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

**Uncompensated temperature reading

EC, TDS and Salinity solutions begin on page 5.34

HI99300 · HI99301

Portable EC Meters

EC/TDS and Temperature

- Simultaneous EC/TDS and temperature measurements on a large dual-line LCD display
- User-friendly Design
  - With only two buttons, meter operation could not be simpler. Two buttons allow you to quickly adjust settings, select the measurement range, and choose calibration buffer sets.
- Durable IP67 waterproof casing
  - Designed to withstand the knocks, drops, and spills of real life, the new IP67 body ensures top performance in any environment. These meters are totally protected against dust and water intrusion from any direction.
- Watertight Connection
  - A Quick Connect DIN connector makes attaching and removing the probe simple and easy. The rubber coating protects the cable and creates a sealed connection for added reliability.
- HOLD button
  - Freezes the reading on the display
- Selectable temperature unit (°C or °F)
- Battery life indication and low battery detection

HI99300 and HI99301 are conductivity, total dissolved solids and temperature meters designed to meet the requirements encountered in manufacturing and environmental testing protocols.

To increase precision, these models feature a different conductivity range, to cover applications from purified to brackish waters.

The supplied multi-parameter probe includes EC/TDS and temperature in one convenient, rugged probe.

Other user selectable features include different TDS factors from 0.45 to 1.00, and a range of temperature coefficients (β) from 0.0 to 2.4% for better solution temperature compensation.

Specifications		HI99300	HI99301
EC	Range	0 to 3999 µS/cm*	0.00 to 20.00 mS/cm*
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy (@25°C/77°F)	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy (@25°C/77°F)	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C/32.0 to 140.0°F	0.0 to 60.0°C/32.0 to 140.0°F
	Resolution	0.1°C/0.1°F	0.1°C/0.1°F
	Accuracy (@25°C/77°F)	±0.5°C/±1.0°F	±0.5°C/±1.0°F
Additional Specifications	Calibration	automatic, one point at 1413 µS/cm or 1382 ppm (CONV 0.5) or 1500 ppm (CONV 0.7)	automatic, one point at 12.88 mS/cm or 6.44 ppt (CONV 0.5) or 9.02 ppt (CONV 0.7)
	EC/TDS Temperature Compensation	automatic, with β selectable from 0.0 to 2.4 %/ °C with 0.1 increments	
	TDS conversion factor	Selectable from 0.45 to 1.00 with 0.01 increments	
	Probe (included)	HI763063 EC/TDS/temperature sensor, DIN connector and 1 m (3.3') cable	
	Battery Type / Life	1.5V AAA (3) / approx. 500 hours of continuous use	
	Auto-Off	user selectable: after 8 min, 60 min or disabled	
	Environment	0 to 50°C (32 to 122°F); RH max. 100%	
	Meter Dimensions	154 x 63 x 30 mm (6.1 x 2.5 x 1.2")	
	Meter Mass (with batteries)	196 g (6.91 oz.)	
	Case Ingress Protection Rating	IP67	
Ordering Information	**HI99300** is supplied with HI763063 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1m (3.3') cable, HI70031 1413 µS/cm and HI70032 1382 ppm calibration solution sachets, 100 mL beaker, 1.5V AAA batteries (3), calibration certificate of meter, calibration certificate of probe, instruction manual and HI710142 rugged carrying case. **HI99301** is supplied with HI763063 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1m (3.3') cable, HI70030 12880 µS/cm and HI70038 6.44 ppt calibration solution sachets, 100 mL beaker, 1.5V AAA batteries (3), calibration certificate of meter, calibration certificate of probe, instruction manual and HI710142 rugged carrying case.		

* displays µS for µS/cm.
* displays mS for mS/cm.

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710028 Orange
HI710029 Blue
HI710030 Green

EC and TDS solutions begin on page 5.34

HI993310

Direct Soil Activity and Solution Conductivity Measurement Kit

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

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

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

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

Why this meter is so important...

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

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

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

EC solutions begin on page 5.34

HI9033

Multi-range EC Meter

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

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

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

EC solutions begin on page 5.34

HI8633 · HI8733

Multi-range EC Meters

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

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

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

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

Temperature compensation for HI8633 is performed by manual adjustment.

Specifications	HI8633	HI8733
Range	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm
Resolution	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm	0.1 µS/cm; 1 µS/cm 0.01 mS/cm; 0.1 mS/cm
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)	±1% F.S. (excluding probe error)
Calibration	manual, one-point through EC knob	manual, one-point through EC knob
Temperature Compensation	manual, 0 to 50°C (32 to 122°F) with β = 2%/°C	automatic, 0 to 50°C (32 to 122°F) with β adjustable from 0 to 2.5%/°C
Probe	HI76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)	HI76302W four-ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 100 hours of continuous use	9V / approximately 100 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
Weight	230 g (8.1 oz.)	230 g (8.1 oz.)
Ordering Information	**HI8633** is supplied with HI76301D conductivity probe, 12880 µS/cm HI70030 calibration solution sachet, battery, instructions and rugged carrying case. **HI8733** is supplied with HI76302W conductivity probe, 12880 µS/cm HI70030 calibration solution sachet, battery, instructions and rugged carrying case.	
Accessories	**HI710007** blue shockproof rubber boot	
	HI710008 orange shockproof rubber boot	

EC solutions begin on page 5.34

HI87314

EC and Resistivity Meter

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

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

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

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

Specifications		HI87314
EC	Range	199.9 µS/cm; 1999 µS/cm; 19.99 mS/cm; 199.9 mS/cm
	Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy (@25°C/77°F)	±1% F.S.
Resistivity	Range	0 to 19.90 MΩ•cm
	Resolution	0.10 MΩ•cm
	Accuracy (@25°C/77°F)	±2% F.S.
Additional Specifications	Calibration	manual, one point, for both EC and resistivity
	Temperature Compensation	automatic from 0 to 50°C with β selectable from 0 to 2.5%/°C for EC and from 2 to 7%/°C for resistivity
	Probes	HI76302W conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable; HI3316D resistivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable
	Battery Type / Life	9V / approximately 100 hours of use
	Environment	0 to 50°C (32 to 122°F); RH max 100%
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
	Weight	230 g (8.1 oz.)
Ordering Information	**HI87314** is supplied with HI76302W conductivity probe, HI3316D resistivity probe, HI70030 calibration solution sachet, calibration screwdriver, battery, instructions and hard carrying case.	
Accessories	**HI710007** blue shockproof rubber boot	
	HI710008 orange shockproof rubber boot	

EC solutions begin on page 5.34

HI8734

TDS Meter

- One-point calibration
- Waterproof

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

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

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

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

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

Specifications	HI8734
Range	0.0 to 199.9 mg/L (ppm); 0 to 1999 mg/L (ppm); 0.00 to 19.99 g/L (ppt)
Resolution	0.1 mg/L (ppm); 1 mg/L (ppm); 0.01 g/L (ppt)
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Calibration	manual, one-point through TDS knob
Temperature Compensation	manual from 0 to 50°C (32 to 122°F) with β = 2%/°C
TDS Factor	0.5
Probe	HI76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 100 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
Weight	230 g (8.1 oz.)
Ordering Information	**HI8734** is supplied with HI76301D conductivity probe, HI70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.
Accessories	**HI710007** blue shockproof rubber boot
	HI710008 orange shockproof rubber boot

TDS solutions begin on page 5.39

HI8033

EC/TDS Meter

- One-point calibration
- Manual temperature compensation

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

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

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

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

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

Specifications		HI8033
EC	Ranges	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm; 0.00 to 19.99 mS/cm
	Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm
TDS	Range	0 to 19990 mg/L (ppm)
	Resolution	10 mg/L (ppm)
	Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)
Additional Specifications	Calibration	manual, one-point
	Temperature Compensation	manual from 0 to 50°C (32 to 122°F) with β=2%/°C
	Probe	HI76301W conductivity probe with 1 m (3.3') cable (included)
	Battery Type / Life	9V / approximately 100 hours of continuous use
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	185 x 82 x 47 mm (7.3 x 3.2 x 1.9")
	Weight	270 g (9.5 oz.)
Ordering Information	**HI8033** is supplied with HI76301W conductivity probe, battery and instructions.	
Accessories	**HI710009** Blue shockproof rubber boot	

EC and TDS solutions begin on page 5.34

EC Calibration Solutions

Quality Solutions for Laboratory Applications

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

84 µS/cm Calibration Solution

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

84 µS/cm Bottles

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

EC Calibration Solutions

Quality Solutions for Laboratory Applications

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

1413 µS/cm Bottles

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

1413 µS/cm Sachets

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

1413 µS/cm Calibration Solution

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

EC Calibration Solutions

Quality Solutions for Laboratory Applications

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

5000 µS/cm Calibration Solution

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

5000 µS/cm Bottles

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

5000 µS/cm Sachets

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

EC Calibration Solutions

Quality Solutions for Laboratory Applications

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

12880 µS/cm Bottles

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

12880 µS/cm Sachets

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

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.

EC Calibration Solutions

Quality Solutions for Laboratory Applications

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

80000 µS/cm Calibration Solution

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

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

111800 µS/cm Calibration Solution

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

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

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

80000 µS/cm Bottles

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

111800 µS/cm Bottles

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

TDS Calibration Solutions

Quality Solutions for Laboratory Applications

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

TDS Bottles

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

TDS Solutions

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

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

TDS Sachets

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

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

Quick Cal

pH/EC Quick Cal Calibration Solution

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

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

GroLine

Quick Cal pH/EC Bottles

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

Quick Cal pH/EC Sachets

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

Seawater Salinity Calibration Solutions

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

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

Salinity Bottles

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

Salinity Sachets

Code	Description	Size	Package
HI70024P	35.00 ppt	20 mL	25 pcs

Table of Contents

Dissolved Oxygen Meters

Professional Instruments for a Variety of Applications

Dissolved Oxygen Theory and Measurement

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

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

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

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

Effects of Temperature and Pressure

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

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

Applications

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

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

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

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

Laboratory Monitoring of BOD, OUR and SOUR

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

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

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

Types of Dissolved Oxygen Probes

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

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

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

opdo™

HI98198

Optical Dissolved Oxygen Meter

Professional dissolved oxygen measurement with digital optical probe

The HI98198 opdo™ meter is a rugged, portable dedicated dissolved oxygen (DO) meter designed for fresh and saltwater measurements of dissolved oxygen. This professional, waterproof meter complies with IP67 standards and measures DO, barometric pressure, and temperature. The HI98198 is supplied with a HI764113 digital optical dissolved oxygen probe in a custom thermoformed durable carrying case with accessories. It is compact and ergonomically designed to provide ready access to the materials required for routine sampling.

See page 6.16

Comparison Guide

Bench Meters

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

Portable Meters

	Dissolved Oxygen Range	Optical DO Meter	Barometric Pressure	% Saturation O_2	Salinity Compensation	Altitude Compensation	Temperature Range(s)	DO Calibration Points	Barometric Pressure Calibration Points	ATC	Hold Feature	BEPS	PC Connectivity	Logging	Alarm	GLP	Capacitive Touch Buttons	Benchtop, Portable & Wall-Mount	Page
HI98198	•	•	•	•	•		°C/°F	2	1	•	•	•	•	•		•			6.16
HI98193	•		•	•	•		°C/°F	2	1	•	•	•	•	•		•			6.20
HI9147	•			•	•	•	°C/°F	1		•		•							6.23
HI9146	•			•	•	•	°C	2		•		•				•			6.24
HI9142	•						°C/°F	2		•		•							6.26
HI8043	•						°C/°F	2		•		•							6.27

edge®

pH • EC • DO

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

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

edge® technical features

Rechargeable Battery

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

Two USB ports

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

Clear, full text readout

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

Data logging

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

GLP

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

Two Operating Modes

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

edge pH Features*

CAL Check™ (pH only)

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

Sensor Check™ (pH only)

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

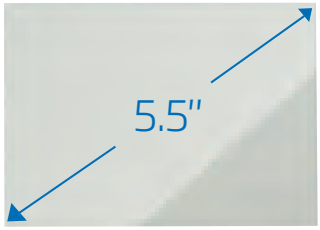
ORP Measurement

edge measures ORP with edge compatible ORP probes.

edge design features

Capacitive touch keypad

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



Easy to read LCD

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

Zero footprint

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

* Using edge compatible pH electrodes

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

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

Portable field unit

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

Wall-mount cradle

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

Electrode holder with built-in cradle

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

Digital electrodes

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

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

Sleek design

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

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

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

* temperature limits will be reduced to actual probe limits

See page 6.30 for DO solutions and accessories

edge® DO

edge DO–Innovation in a Single Parameter

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

Additional feature information

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

edge®DO technical features

Rechargeable Battery

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

Two USB ports

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

Clear, full text readout

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

Data logging

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

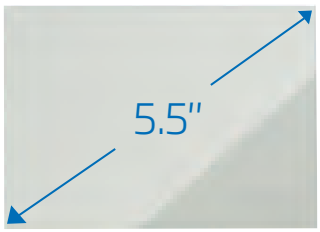
GLP

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

edge DO design features

Capacitive touch keypad

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



Easy to read LCD

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

Zero footprint

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

3.5 mm probe input

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

Sleek design

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

Accepts edge DO compatible dissolved oxygen probe

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

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

Portable field unit

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

Wall-mount cradle

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

Electrode holder with built-in cradle

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

Digital electrodes

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

Dissolved oxygen electrode

HI764080 (included)

Dissolved oxygen electrode with temperature sensor

Recommended for general purpose

Specifications		HI2004 edge DO
Dissolved Oxygen	Range	0.00 to 45.00 ppm (mg/L); 0.0 to 300.0 % saturation
	Resolution	0.01 ppm (mg/L); 0.1 % saturation
	Accuracy	± 1.5% of reading ±1 digit
	Calibration	one or two-point at 0% (HI7040 solution) and 100% (in air)
	Temperature Compensation	ATC (0 to 50°C; 32.0 to 122.0°F)*
	Salinity Compensation	0 to 40 g/L (with 1 g/L resolution)
	Altitude Compensation	-500 to 4000 m (-1640 to 13120') (with 100 m (328') resolution)
Temperature	Range*	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy	±0.5°C; ±0.9°F
Additional Specifications	Probe	HI764080 digital dissolved oxygen electrode with 3.5 mm (1/8") connector and 1 m (3.3') cable (included)
	Logging	up to 1000 records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging (max. 600 samples; 100 lots)
	Connectivity	1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply	5 VDC adapter (included)
	Dimensions	202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight	250 g (8.82 oz.)
Ordering Information	**HI2004-01** (115V) and **HI2004-02** (230V) edge DO includes: HI764080 dissolved oxygen electrode, HI7041S refill electrolyte solution, DO membrane caps (2), o-rings (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual. **HI2004-03** includes the above without electrode.	

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

See page 6.30 for DO solutions and accessories

HI5421

Research Grade Bench Meter

Dissolved Oxygen and BOD

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

Customizable User Interface

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

Color Graphic LCD

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

Capacitive Touch

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

Built in Barometer

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

Choice of Calibration

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

BOD, OUR and Sour Measurement Modes

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

Automatic Salinity Compensation

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

GLP Data

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

Data Transfer

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

Data Logging

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

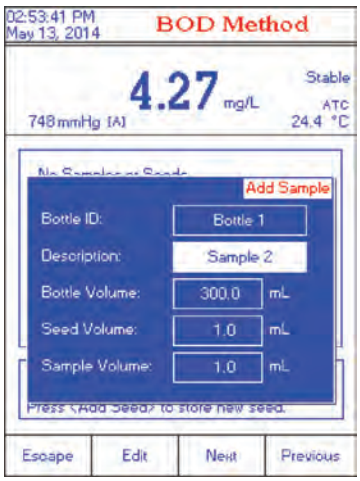
Contextual Help

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

DO probe included

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

On-screen Features



BOD (Biological Oxygen Demand)

OUR (Oxygen Uptake Rate)

SOUR (Specific Oxygen Uptake Rate)

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

See page 6.31 for DO solutions and accessories

HI2400

Dissolved Oxygen Meter

Dissolved Oxygen and Temperature

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

Accurate, Repeatable Measurements

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

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

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

Data Logging

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

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

GLP Capabilities

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

HI76407

Standard DO Probe

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

Several cable lengths are available.

HI76408

Thinner DO Probe for Laboratories

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

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

HI76407A/P

Easy, Screw Cap DO Membranes

Carry Extras for Assurance

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

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

See page 6.34 and 6.35 for DO solutions and accessories

HI98198

Optical Dissolved Oxygen Meter

Professional dissolved oxygen measurement with digital optical probe

Design Features

- Digital optical probe with Quick Connect
- IP67 rated waterproof, rugged enclosure
- Clear, dot matrix, back-lit display with multifunction virtual keys
- A dedicated HELP key for assistance anytime.

Technical Features

- Percent saturation or concentration measurements (mg/L)
- One or two-point calibration at 0 or/and 100% saturation (with auto recognition).
- Automatic temperature compensation with one-point temperature calibration
- Salinity compensation
  - Salinity compensation allows for direct determination of dissolved oxygen in saline waters.
  - Users can set the salinity value
- A user selectable "Calibration due" warning.
- Built-in calculations
  - Biochemical Oxygen Demand (BOD), Oxygen Uptake Rate (OUR) and Specific Oxygen Uptake Rate (SOUR) modes
- Built-in barometer
  - Automatic barometric pressure compensation with 1 point calibration
  - Displays pressure in user-selectable units (mmHg, inHg, atm, psi, kPa, mbar)
- Log on demand with 4000 records capability.
- AutoEnd freezes the next stable measurement value on the display.
- GLP
  - A dedicated GLP key that includes at last 5 calibrations with time, date, calibration points as well as barometric pressure, temperature and salinity setting.
- USB-C port for easy data transfer to memory stick, PC or other compatible device
- Displays temperature in °C or °F
- Approximately 200 hours of continuous use using 4 AA batteries

The HI98198 opdo™ meter is a rugged, portable dedicated dissolved oxygen (DO) meter designed for fresh and saltwater measurements of dissolved oxygen. This professional, waterproof meter complies with IP67 standards and measures DO, barometric pressure, and temperature. The HI98198 is supplied with a HI764113 digital optical dissolved oxygen probe in a custom thermoformed durable carrying case with accessories. It is compact and ergonomically designed to provide ready access to the materials required for routine sampling.

The HI98198 opdo meter is only compatible with the Hanna HI764113 digital dissolved oxygen probe.

Concentration measurements are automatically compensated for barometric pressure, temperature and salinity. Barometric pressure and temperature are automatically measured and compensated. Salinity is automatically compensated by setting manually the salinity concentration of the water being measured. The meter also has a built in application to measure and calculate BOD (Biological Oxygen Demand), OUR (Oxygen uptake rate), and SOUR (Specific Oxygen Update Rate).

Features in Detail

Backlit graphic LCD display

The HI98198 features a backlit graphic LCD with on-screen help and battery life indicator. Dissolved oxygen, barometric pressure, and temperature readings can be displayed in user preferred units. The graphic display allows the use of virtual keys to enhance the intuitive user interface. The meter also displays a text reminder when a scheduled calibration is due.

Waterproof protection

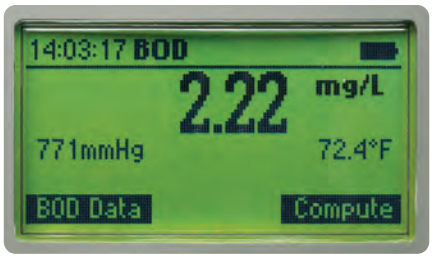
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1m for up to 30 minutes.

Quick connections to probes

The HI98198 meter is compatible with the HI764113 Optical dissolved oxygen probe. Connections are facilitated by the Quick Connect 7-pin DIN connector which makes attaching and removing the probe quick and easy. The meter automatically detects the connected probe.

Measurement

The HI98198 automatically compensates dissolved oxygen concentrations. Temperature and atmospheric pressure compensations are automatically made. Salinity compensation can be manually entered.



BOD, OUR and SOUR

Dedicated measurement programs are available by using the Mode selection key.

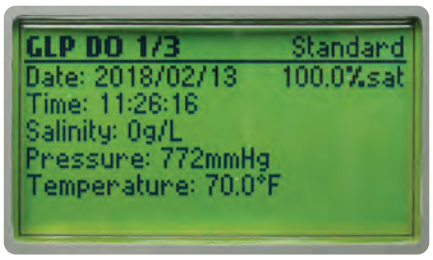
Built-in barometer

With the internal barometer, the HI98198 is able to compensate for changes in barometric pressure so there is no need for charts, altitude information or external barometric pressure information.

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

Data logging

Log on demand or stability (400 samples); interval logging (selectable 1s to 1 hour) with storage of up to 10,000 records in up to 100 files with 1,000 data points each.



GLP

The last five sets of Calibration data are available by pressing the dedicated GLP key. Calibration values with time and date stamp are captured as well as pressure, salinity and temperature values at the time of calibration. GLP data is available on logged data.

Data transfer

USB Type-C port for easy data transfer to memory stick, PC, or other compatible devices.

Intuitive keypad

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

Dedicated help key

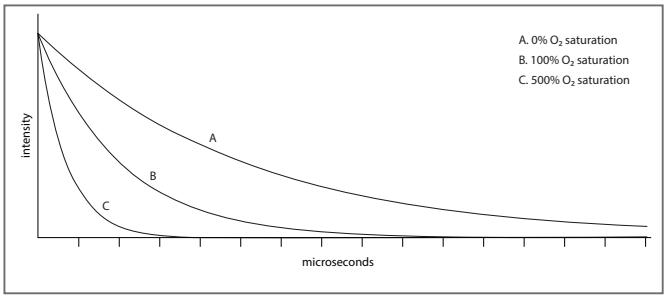
Access help at any time via the Help button and view content specific information based on the screen that is currently being viewed.

AutoEnd

Press AutoEnd during measurement to hold the first stable reading on the display automatically.

Theory

The Hanna HI764113 optical DO sensing probe is based on the principle of fluorescence quenching. The sensing method features an immobilized Pt based luminophore that is excited by the light of a blue LED and emits a red light. Dissolved oxygen quenches this excitation. When there is no oxygen present, the lifetime of the signal is the greatest; as oxygen hits the sensing surface, the lifetime becomes shorter. The intensity and lifetime are inversely proportional to the amount of oxygen present; as oxygen interacts with the luminophore it reduces the intensity and lifetime of the luminescence. The lifetime of the luminescence is measured by a photodetector, and is used to calculate the dissolved oxygen concentration. This is in turn reported by the meter as a % saturation or mg/L reading of Dissolved Oxygen.



Luminophore emissions of three oxygen measurements after pulsed blue light excitation.

The major components of the probe include a blue LED for excitation, a red LED that is used as a reference light, and a photodetector. The Smart Cap™ is locked in place on the optical probe and includes the immobilized O_2 sensitive luminophore with rugged insoluble black oxygen permeable protective layer.

Over time, the sensor's optical components can age but are compensated for by using the reference signal to compensate the measuring path. As a result, the sensor provides accurate DO measurements over long periods of time without the need for frequent calibration.

Specifications		HI98198
Dissolved Oxygen	Range	0.00 to 50 mg/L (ppm); 0.0 to 500.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@25°C/77°F)	1.5% of reading ± 0.01mg/L for 0.00-20.00mg/L; 5% of reading for 20.00-50.00mg/L; 1.5% of reading ±0.1% for 00-200.0%; 5% of reading for 200.0-500.0%
	Calibration	one or two points automatic calibration at 100% (8.26 mg/L) and 0% (0 mg/L); Single point manual using a value entered by the user in % saturation or mg/L
Barometric Pressure	Range	420 to 850 mmHg
	Resolution	1 mmHg
	Accuracy (@25°C/77°F)	±3 mmHg within ±15% from the calibration point
	Calibration	single point anywhere within pressure range
Temperature	Range	-5.0 to 50.0°C (23 to 122°F)
	Resolution	0.1°C (0.1°F)
	Accuracy (@25°C/77°F)	±0.3°C (±0.4°F)
	Calibration	single point anywhere within temperature range
Additional Specifications	Temperature Compensation	automatic from -5.0 to 50.0°C (23.0 to 122.0°F)
	Pressure Compensation	automatic from 420 to 850 mmHg
	Salinity Compensation	automatic from 0 to 70 PSU (manually set)
	Probe	HI764113 optical DO probe with stainless steel, weighted protective sleeve, internal temperature sensor, 7-pin DIN connector and 4m (13') cable (included)
	Logging	On demand with 4000 records capability
	Battery Type / Life	1.5V (4) AA batteries / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user-selectable: 5, 10, 30, 60 min or disabled
	PC Connectivity	USB Type-C
	Dimensions	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4")
	Weight (with batteries)	450 g (15.9 oz.)
	Case Ingress Protection Rating	IP67
	Environment	0 to 50 °C (32 to 122 °F) max. RH 100%
Ordering Information	**HI98198** is supplied with HI764113 Optical DO probe with built-in temperature sensor, protective shield and 4 m (13'4) cable, HI764113-1 Smart Cap™ with o-ring, HI7040 Bicomponent Zero Oxygen Solution, Calibration/storage vessel, 100 mL plastic beaker (2), 1 syringe with silicon grease, 1 lens wipe, 1.5V AA batteries (4), Instruction manual, meter quality certificate, probe quality certificate, cap quality certificate, HI920016 USB Type A to C cable in a rugged carrying case.	
Accessories	**HI710034** orange protective rubber boot	

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

  HI710034 Orange

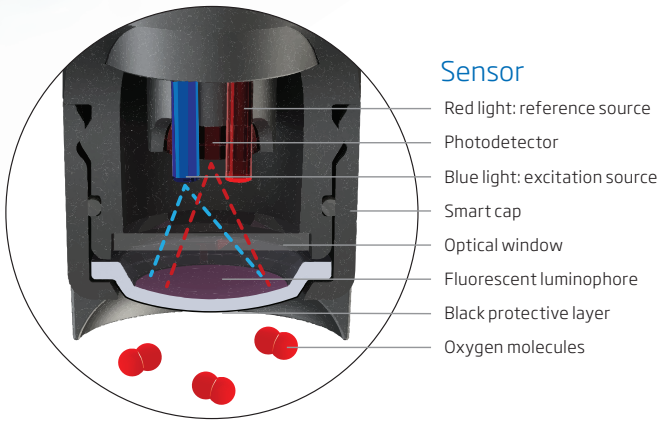
Rugged custom carrying case

The HI98198 meter, probe, and all accessories are supplied in a rugged carrying case designed to provide years of use. The inside compartment of the carrying case is thermoformed to securely hold and protect all of the components.

HI764113

Rugged Optical Dissolved Oxygen Probe for Fresh and Saltwater Applications

- Digital, weighted probe
- No membranes
- No electrolytes
- No oxygen consumption
- No flow dependence or minimum flow rate
- Fast and stable readings
- Not affected by sunlight
- Factory calibrated "Smart Cap"
- Smart Caps last one year
- Minimal maintenance



Specifications	HI764113
Probe body material	ABS
Smart Cap™ material	Polypropylene
Cable jacket material	PVC
Cable length	4 m (13.1 ft.), 10 m (32.8 ft.), and 20 m (65.6 ft.) options
Probe guard	316 Stainless Steel
Temperature Measurement	Thermistor
Pressure	20 m (29 PSI)
Probe Dimensions (with Guard)	174 X 25 mm (6.8 X 1")
Response Time (t95)	45 seconds
Probe Weight (with Guard)	400 g (14.2 oz); 4 m (13.1 ft.) cable length
Probe Ingress Protection Rating	IP68
Sensor type	Optical; Luminescence Quenching

Smart Cap

RFID tag

Smart Cap with RFID communication stores factory calibration coefficients.

The domed surface helps repel surface bubbles and provides increased luminophore surface area for better measurement sensitivity.

See page 6.28 for additional probe information

HI98193

Professional Waterproof Meters

Dissolved Oxygen and BOD

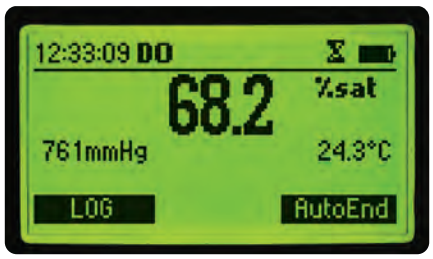
- Waterproof
  - IP67 rated waterproof, rugged enclosure
- Choice of units
  - Display units in % saturation or mg/L (ppm)
- Salinity compensation
  - Salinity compensation allows for direct determination of dissolved oxygen in saline waters.
  - Users can set the salinity value
- Built-in temperature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

For Universal Applications

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange



Backlit Graphic LCD Display

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

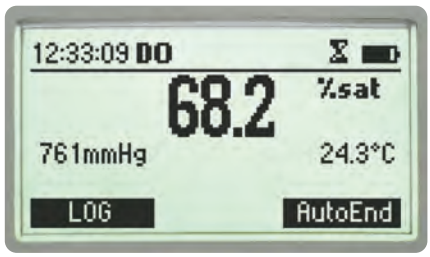
Waterproof Protection

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

Quick connect probe

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

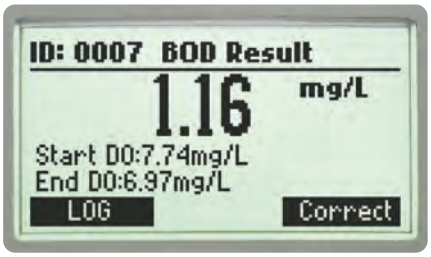
The HI764073's built-in temperature sensor allows for automatic temperature compensation. The temperature sensor can be calibrated to one or two points. Manual entry of salinity values allows for the salinity compensation of dissolved oxygen readings in saline waters.



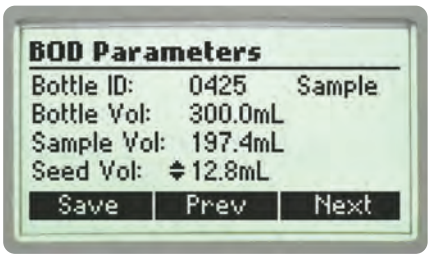
Measurement

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

BOD, OUR and SOUR

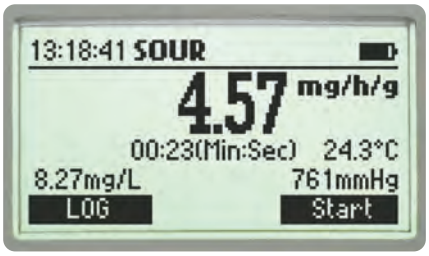


- BOD results
  - BOD is calculated in mg per liter from the difference between the initial and final dissolved oxygen



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

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



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

AutoHold

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

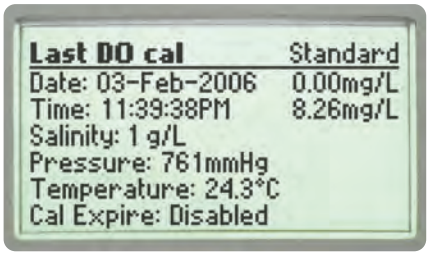
Built-in Barometer

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

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

Data Logging

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



GLP

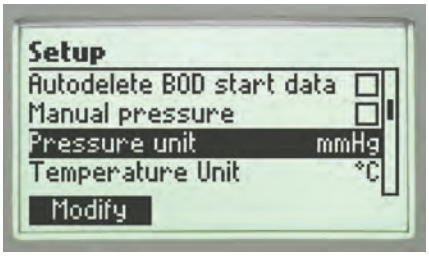
Comprehensive GLP functions are directly accessible by pressing the GLP key. This data includes date, time, pressure, calibrated value, temperature and salinity value of the last calibration.

Intuitive Keypad

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

Dedicated Help Key

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



Setup screen

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

PC Connectivity

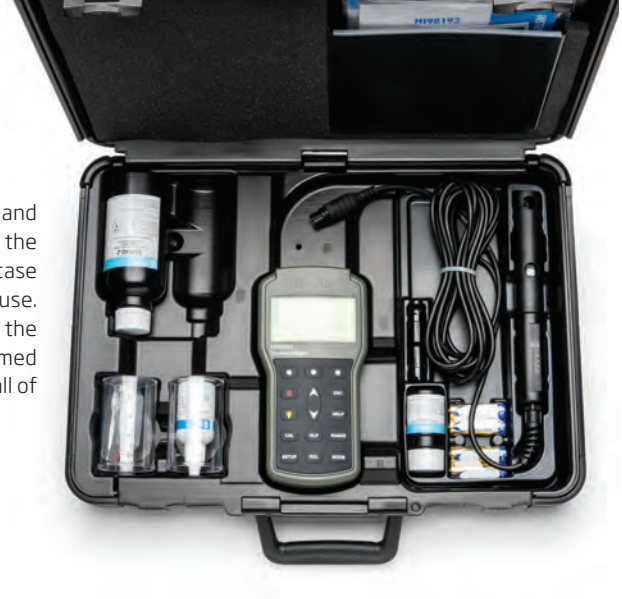
Logged data can be transferred to a Windows compatible PC with the included HI920015 micro USB cable and HI92000 software.

Long Battery Life

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

Rugged custom carrying case

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



Specifications		HI98193
Dissolved Oxygen	Range	0.00 to 50.00 mg/L (ppm); 0.0 to 600.0% saturation
	Resolution	0.01 mg/L (ppm); 0.1% saturation
	Accuracy (@25°C/77°F)	±1.5% of reading ±1 digit
	Calibration	automatic one or two point at 100 % (8.26 mg/L) and 0 % (0 mg/L).; manual one point using a value entered by the user in % saturation or mg/L
Atmospheric Pressure	Range	450 to 850 mmHg
	Resolution	1 mmHg
	Accuracy (@25°C/77°F)	± 3 mmHg within ±15% from the calibration point
	Calibration	one point at any in range pressure value
Temperature	Range	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution	0.1°C; 0.1°F
	Accuracy (@25°C/77°F)	±0.2°C; ±0.4°F (excluding probe error)
	Calibration	one or two point at any in range temperature value
Additional Specifications	Measurement Modes	direct DO; BOD (biochemical oxygen demand); OUR (oxygen uptake rate); SOUR (specific oxygen uptake rate)
	Barometric Compensation	automatic from 450 to 850 mmHg
	Salinity Compensation	automatic from 0 to 70 g/L
	Temperature Compensation	automatic from 0.0 to 50.0 °C (32.0 to 122.0 °F)
	Probe	HI764073 polarographic DO probe with protective sleeve, internal temperature sensor, DIN connector and 4m (13') cable (included)
	Logging	log-on-demand up to 400 samples
	PC Connectivity	opto-isolated USB (with HI92000 software)
	Battery Type / Life	1.5V (4) AA batteries / approximately 200 hours of continuous use without backlight (50 hours with backlight)
	Auto-off	user-selectable: 5, 10, 30, 60 min or can be disabled
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Dimensions	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4")
	Weight	400 g (14.2 oz.)
Ordering Information	All meters are supplied with: HI7040 bi-component zero oxygen solution (230 mL + 30 mL), HI7041S electrolyte solution (30 mL), preformed PTFE membrane caps (2), DO protective cap, O-rings (2), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720193 rugged carrying case with custom insert. **HI98193** is supplied with HI764073 polarographic DO probe with protective sleeve and 4m (13') cable. **HI98193/10** is supplied with HI764073/10 polarographic DO probe with protective sleeve and 10m (33') cable.	
Accessories	**HI710034** orange protective rubber boot	

See page 6.32 for DO solutions and accessories

HI9147

Dissolved Oxygen Meter for Aquaculture

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

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

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

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

DO Levels at 100% Saturation

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

Specifications		HI9147
Dissolved Oxygen	Range	0.0 to 50.0 mg/L (ppm); 0 to 600% saturation
	Resolution	0.1 mg/L (ppm); 1% saturation
	Accuracy (@25°C/77°F)	±1% of reading
Temperature	Range	-5.0 to 50.0°C; 23.0 to 122.0°F
	Resolution	0.1°C; 1°F
	Accuracy (@25°C/77°F)	±0.2°C; ±1°F (excluding probe error)
Additional Specifications	Calibration	manual, in saturated air
	Temperature Compensation	automatic, 0° to 50°C (32°F to 122°F)
	Altitude Compensation	0 to 4000 m (resolution 100 m)
	Salinity Compensation	0 to 51 g/L (ppt) (1 g/L resolution)
	Probe	HI76409/4 galvanic DO probe (fixed) with internal temperature sensor, DIN connector and 4 m (13') cable (HI9147-04), 10 m (33') cable (HI9147-10), or 15 m (49') cable (HI9147-15)
	Battery Type / Life	1.5V AAA (3) / approx. 1000 hours of continuous use without backlight
	Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions / Weight	185 x 72 x 36 mm (7.3 x 2.8 x 1.4") / 450 g (15.9 oz.)
Ordering Information	**HI9147-04** is supplied with HI76409/4 probe with 4 m (13') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	
	HI9147-10 is supplied with HI76409/10 probe with 10 m (32.8') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	
	HI9147-15 is supplied with HI76409/15 probe with 15 m (49.2') cable, spare membranes (5), electrolyte solution (30 mL), batteries, screwdriver and instructions.	

See page 6.33 for DO solutions and accessories

HI9146

Dissolved Oxygen Meter

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

Polarographic Measuring System

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

Replaceable Membrane Caps

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

Automatic Calibration

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

Good Laboratory Practice (GLP)

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

Automatic Temperature Compensation

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

Altitude Compensation

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

Salinity Compensation

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

Auto End Point

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

Backlit LCD

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

Battery Error Prevention System (BEPS)

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

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

See page 6.32 for DO solutions and accessories

HI9142

Manual Calibration Dissolved Oxygen Meter

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

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

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

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

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

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

See page 6.34 for DO solutions and accessories

HI8043

Classic Manual Calibration Dissolved Oxygen Meter

- Automatic Temperature Compensation (ATC)
- manual, two-point calibration
- Easy dial to switch between parameters
- Low battery warning
- Standby mode (std) keeps the polarographic probe ready for use

The HI8043 is a versatile dissolved oxygen meter ideal for use in school laboratories, wastewater treatment, fish-farming and water analysis.

This meter can operate continuously for approximately 100 hours on one 9V battery. The HI8043's low battery warning helps reduce the possiblity of taking an erroneous reading due to low power.

The easy dial on this meter is it's greatest asset. Select the O_2 mode and the polarographic probe will supply you with accurate dissolved oxygen measurements in mg/L. Switch the dial to °C to display the temperature readings.

The standby mode (stb) is particularly useful to keep the current flowing through the probe which is continuously polarized and ready for use.

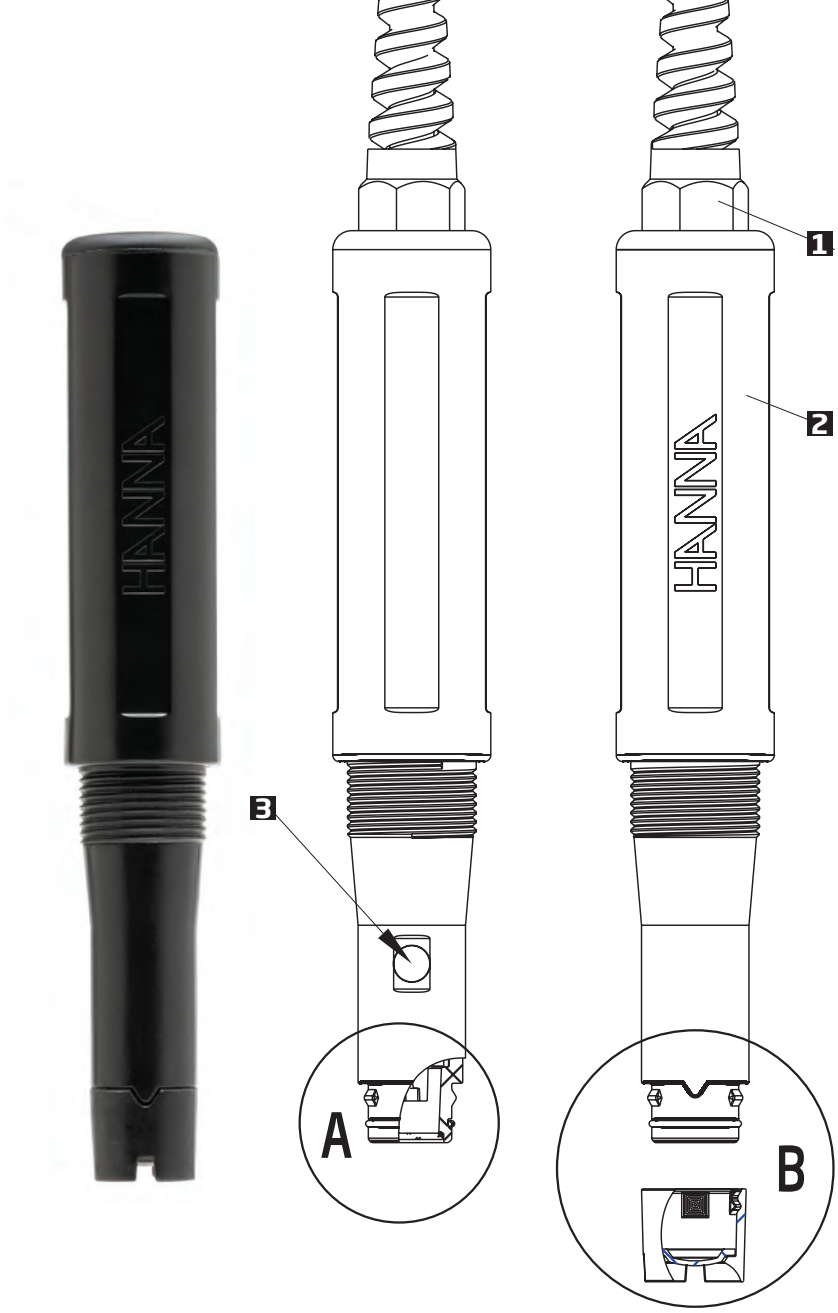
Specifications		HI8043
Dissolved Oxygen	Range	0.00 to 19.90 mg/L (ppm)
	Resolution	0.01 mg/L (ppm)
	Accuracy (@ 25°C/77°F)	±1.5% F.S.
Temperature	Range	0.0 to 50.0°C
	Resolution	0.1°C
	Accuracy (@ 25°C/77°F)	±0.5°C
Additional Specifications	Calibration	manual, two points (zero and slope)
	Temperature Compensation	automatic, 0 to 30°C
	Probe	HI76401 polarographic DO probe with internal temperature sensor, DIN connector and 3 m (10') cable
	Battery Type / Life	9V / approximately 100 hours of continuous use
	Environment	0 to 50°C (32 to 122°F); RH max 95%
	Dimensions	180 x 83 x 40 mm (7.1 x 3.3 x 1.6")
	Weight	240 g (8.4 oz.)
Ordering Information	**HI8043** is supplied with HI76401 DO probe, membrane caps (2), O-rings (2), protective cap, electrolyte solution (30 mL), screwdriver for calibration, battery and instruction manual.	
Accessories	**HI710009** Blue shockproof rubber boot	

See page 6.36 for DO solutions and accessories

HI764113

Optical DO Probe

- Digital, weighted probe
- No membranes
- No electrolytes
- No oxygen consumption
- No flow dependence or minimum flow rate
- Fast and stable readings
- Not affected by sunlight
- Factory calibrated "Smart Cap"
- Smart Caps last one year
- Minimal maintenance



1 Strain relief

2 ABS Probe body

3 Temperature Sensor

4 O-Ring Seal

5 Optical window

6 Alignment key

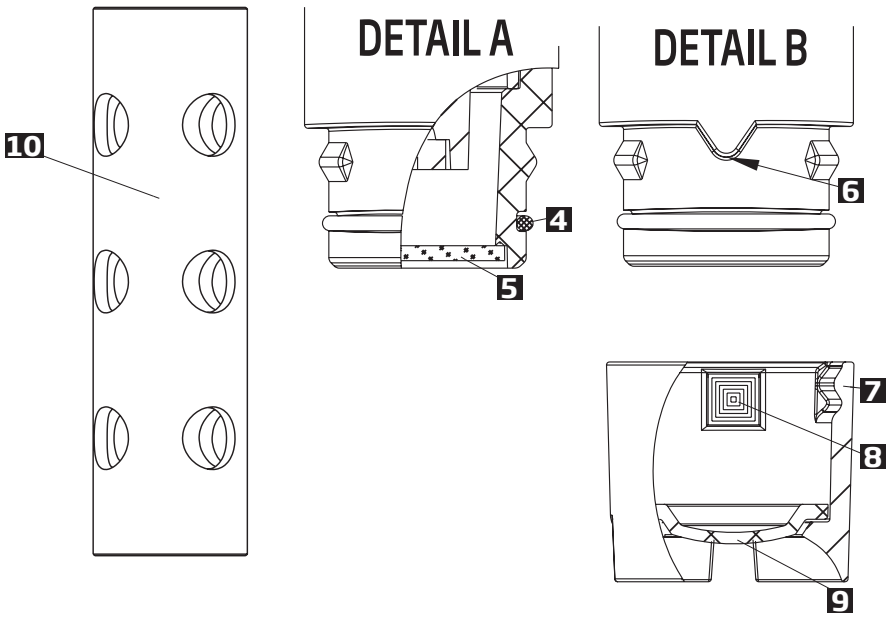
7 Smart Cap™

8 RFID Tag

9 Embedded O_2 sensitive luminophore with black protective layer

10 Protective shield

Probe	Cable Length	Required Meter
HI764113	2 m (6.6')	HI98198
HI764113/10	10 m (33')	
HI764113/20	20 m (33')	



Accessories

HI764113-1	Smart Cap with O-ring
HI764113-2	Calibration/Storage vessel
HI764113-3	Stainless Steel Protective Shield

HI764113 with HI764113-3 stainless steel protective shield attached

HI764113 with HI764113-2 calibration/ storage vessel attached

Smart Cap

Smart Cap with RFID communication stores factory calibration coefficients.

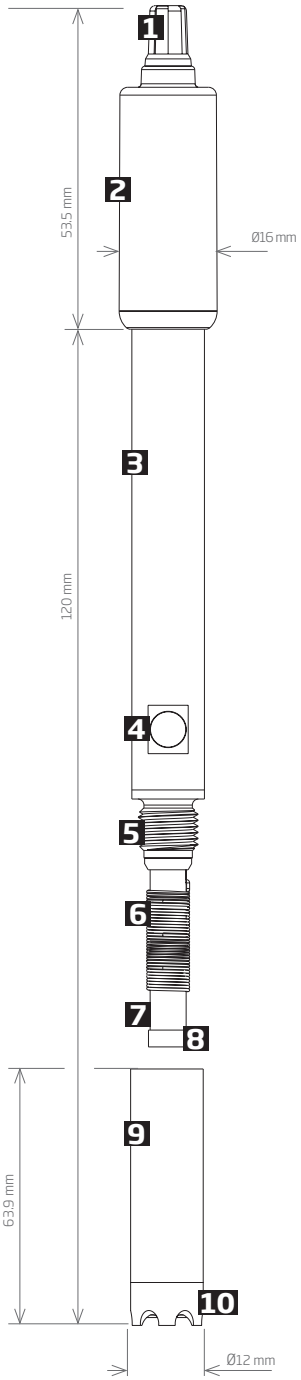
The domed surface helps repel surface bubbles and provides increased luminophore surface area for better measurement sensitivity.

HI764080

edge® Compatible Digital DO Probe

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

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



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

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

HI764080A/P

Easy, Screw Cap DO Membranes

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

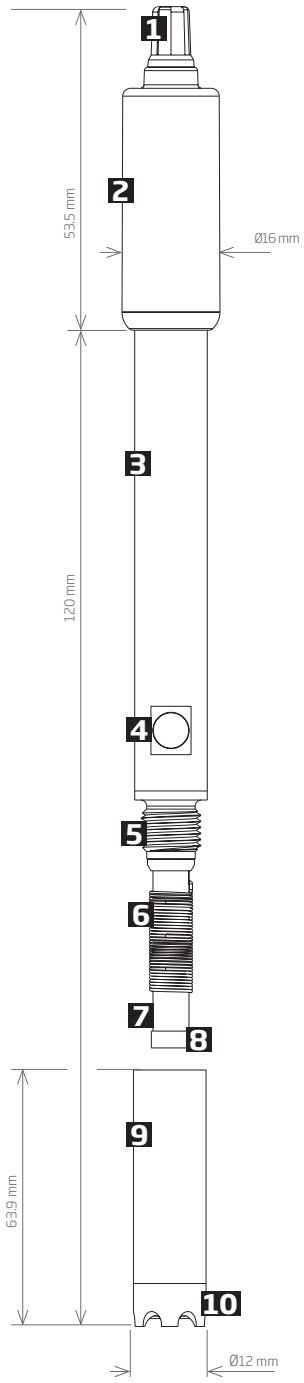
HI764080A/P	Contains 5 ready-to-use, replacement membranes

HI7041

Electrolyte Solution

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

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



HI76483

Polarographic DO Probe

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

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

1 Strain relief

2 Probe cap

3 PEI probe body

4 Temperature sensor

5 Threads for membrane cap

6 Ag/AgCl anode and reference

7 Glass insulator

8 Platinum cathode

9 Disposable membrane cap

10 Oxygen permeable PTFE membrane

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

HI76483A/P

Easy, Screw Cap DO Membranes

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

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

HI7041

Electrolyte Solution

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

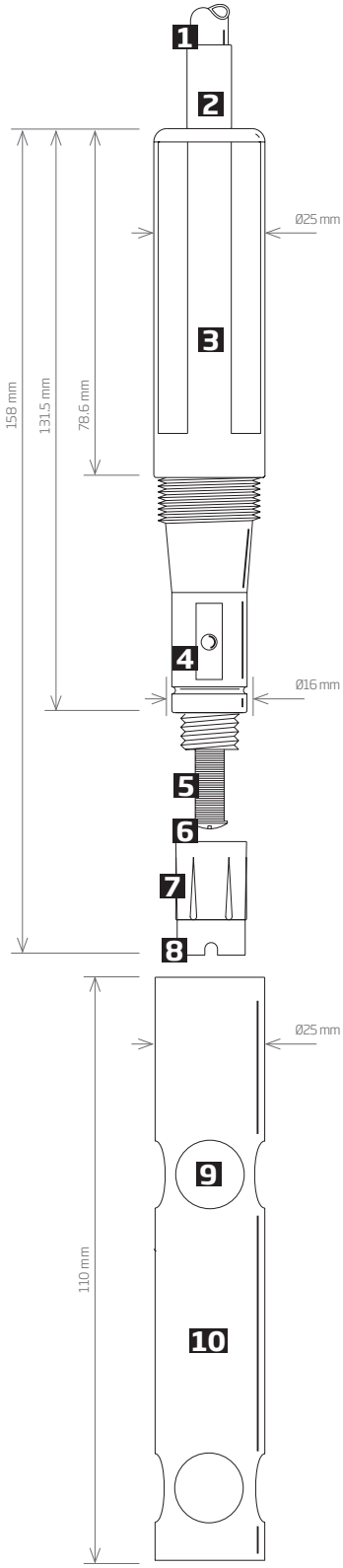
HI7041S	refilling electrolyte solution (30 mL)
HI7041M	refilling electrolyte solution (230 mL)
HI7041L	refilling electrolyte solution (500 mL)

HI76407 · HI764073 Protected Sleeve Series

DO Probe

with Protective Sleeve

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



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

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

HI76407A/P

Easy, Screw Cap DO Membranes

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

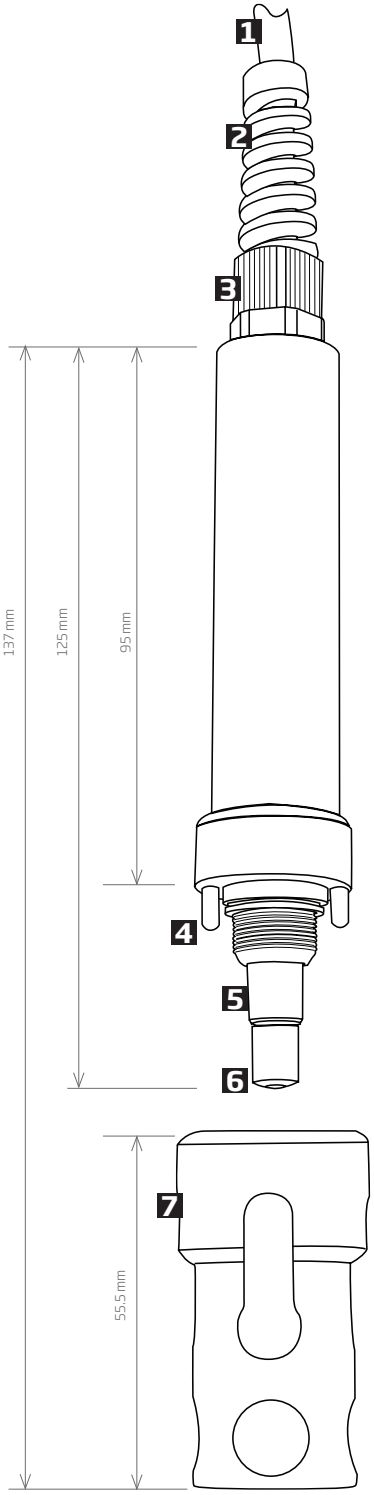
HI76407A/P	contains 5 ready-to-use, replacement membranes.

HI7040 • HI7041

DO Solutions

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

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



HI76409

Galvanic DO Probe

with Protective Cap

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

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

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

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

HI76409A/P

Easy, Screw Cap DO Membranes

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

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

HI7040 • HI7042

DO Solutions

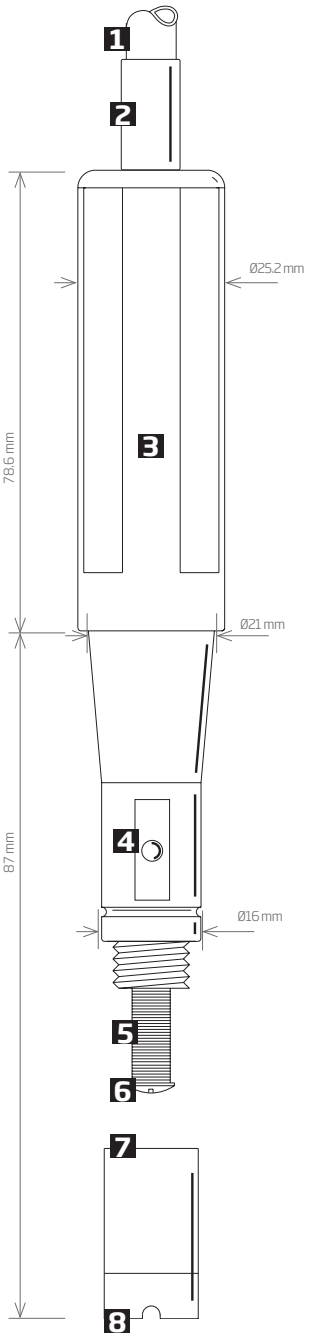
It is crucial to the performance of your DO probe to keep the sensor active with regular maintenance.

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

HI76407

Standard DO Probe

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



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

Probe	Cable Length	Recommended Meter
HI76407/2	2 m (6.6')	HI2400 HI9142
HI76407/4	4 m (13')	
HI76407/10	10 m (33')	
HI76407/20	20 m (66')	

HI76407A/P

Easy, Screw Cap DO Membranes

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

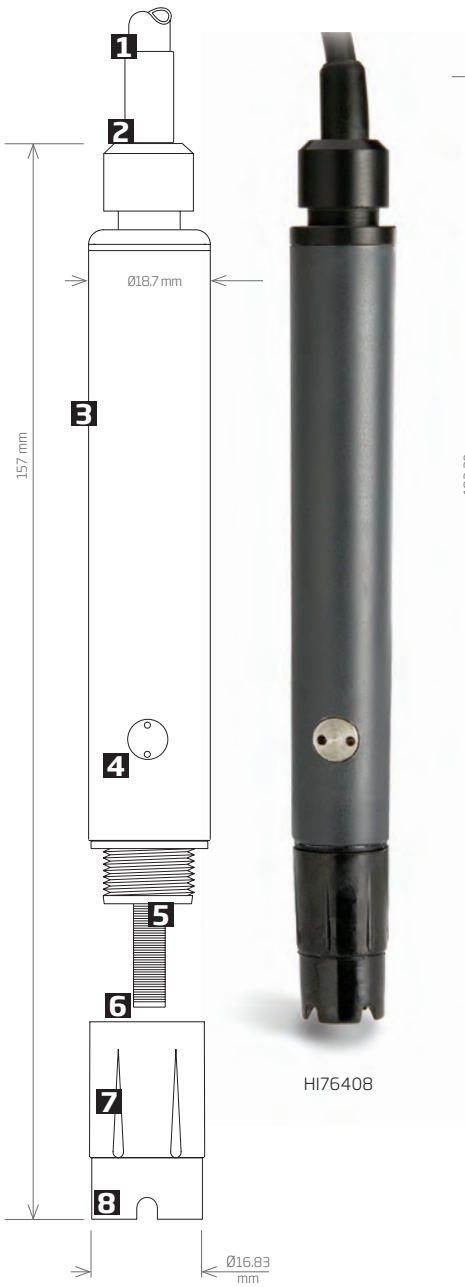
HI76407A/P	contains 5 ready-to-use, replacement membranes.

HI7041

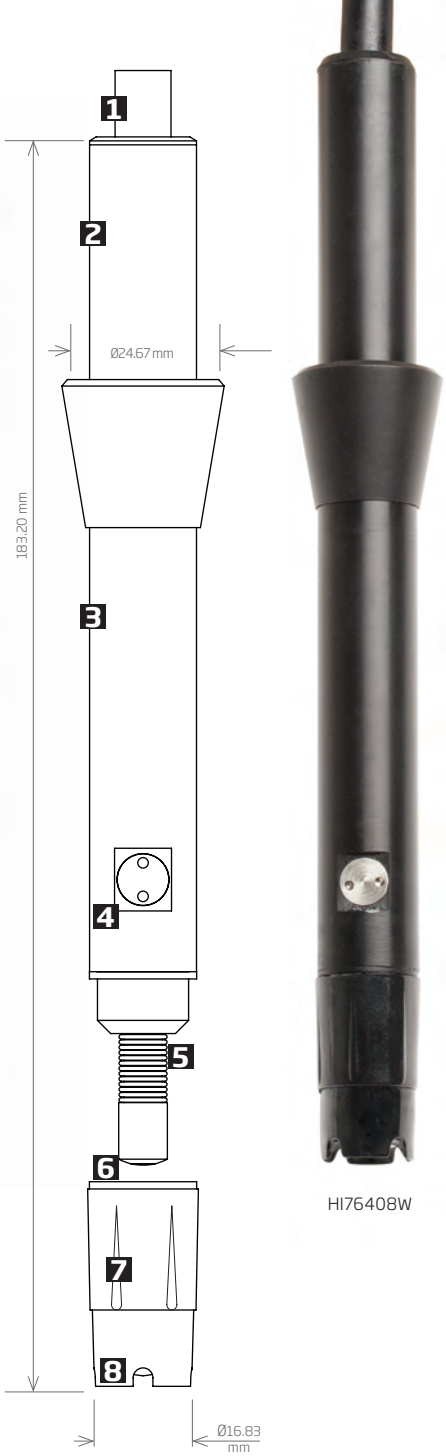
Electrolyte Solution

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

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



HI76408



HI76408W

HI76408 · HI76408W

Thinner, Lighter Probe

for Laboratories

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

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

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

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

HI76407A/P

Easy, Screw Cap DO Membranes

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

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

HI7040 • HI7041

DO Solutions

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

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

HI76401

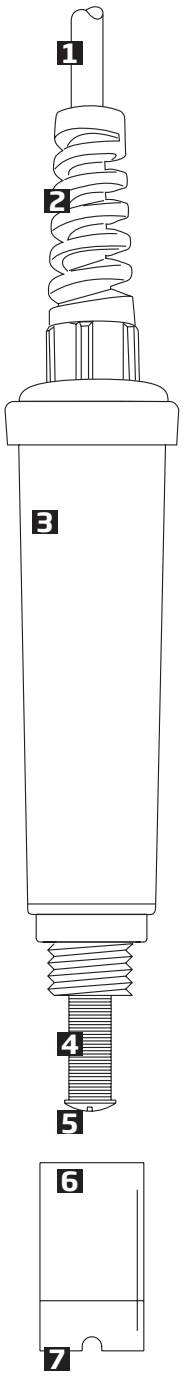
Classic DO Probe

The HI76401 dissolved oxygen probe is extremely rugged, making it perfect for both laboratory and field applications. Calibration is fast, simple and all DO readings are temperature compensated.

The pre-tensioned, ready-made PTFE membrane can be changed in a few seconds without the need to stretch and cut replacements.

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

Probe	Cable Length	Recommended Meter
HI76401	3 m (10')	HI8043



HI76407A/P

Easy, Screw Cap DO Membranes

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

HI7040 • HI7041

DO Solutions

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

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

Table of Contents

Product Spotlights

HI98194 • HI98195 • HI 98196

Multiparameter Meters

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

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

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

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

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

See pages 7.30, 7.34, and 7.38

Multiparameter Guide

	(B) Benchtop, (P) Portable	pH	ORP	ISE	EC	TDS	Resistivity	Salinity	Temperature	Ammonium	Chloride	Nitrate	Seawater σ	Turbidity	Dissolved Oxygen	Atmospheric Pressure	GPS	Fast Tracker™	Logging	Page
HI5522	B	•	•	•	•	•	•	•	•										•	7.4
HI5521	B	•	•		•	•	•	•	•										•	7.10
HI2550	B	•	•	•	•	•		•	•										•	7.14
HI9829	P	•	•		•	•	•	•	•	•	•	•	•	•	•	•	•[1]	•	•	7.16
HI98194	P	•	•		•	•	•	•	•				•		•	•			•	7.30
HI98195	P	•	•		•	•	•	•	•				•						•	7.34
HI98196	P	•	•						•						•	•			•	7.38
HI991300	P	•			•	•			•											7.42
HI991301	P	•			•	•			•											7.42
HI9814	P	•			•	•			•											7.44
HI9813-5	P	•			•	•			•											7.46
HI9813-6	P	•			•	•			•											7.46
HI9810-5	P	•			•	•			•											7.48
HI9811-5	P	•			•	•			•											7.48
HI9812-5	P	•			•	•			•											7.48

[1] Select Models

HI9829

GPS Multiparameter Meters

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

The HI9829 is a waterproof portable logging multiparameter meter that monitors up to 14 different water quality parameters.

The microprocessor based multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, dissolved oxygen, turbidity, ammonium, chloride, nitrate, and temperature. The probe transmits readings digitally with options to log data while disconnected from the meter. An optional GPS provides location tracking of measurements. The complete system is simple to setup and easy to use. The HI9829 is highly customizable and supplied with all necessary accessories, packaged in a durable carrying case.

See page 7.16

GroCine

HI9814

pH / EC / TDS / Temperature Meter

with Multiparameter Probe

HI9814 is a durable, portable pH, conductivity, total dissolved solids and temperature meter for most measurements encountered in hydroponics, aquaponics or general agriculture applications. All operations and settings, are made through only two buttons. The housing is waterproof and rated for IP67 conditions.

The supplied HI1285-7 multiparameter probe measures pH, EC/TDS, and temperature in one convenient, rugged probe.

See page 7.44

HI991300 · HI991301

pH/EC/TDS/ Temperature Meters

The HI991300 and HI991301 are light weight, portable pH, conductivity (or total dissolved solids) and temperature meters for portable applications requiring both a pH and conductivity (or TDS) measurement. Applications include measurements for greenhouses irrigation, hydroponics and groundwater monitoring from agriculture nutrient pollution.

See page 7.42

HI5522

Research Grade Meter

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

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

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

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

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

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

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

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

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

Customizable User Interface

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

Color Graphic LCD

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

Capacitive Touch

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

Four Ring Conductivity Probe

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

Choice of Calibration

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

CAL Check™

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

GLP Data

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

ISE Measurement with Choice of Concentration Units

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

ISE Measurement with Incremental Methods

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

Data Logging

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

Data Transfer

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

Contextual Help

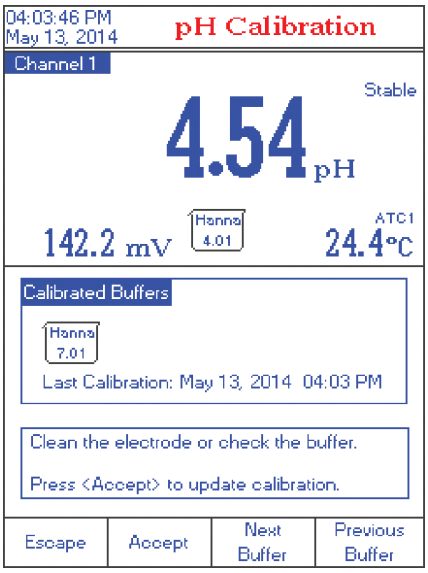
Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

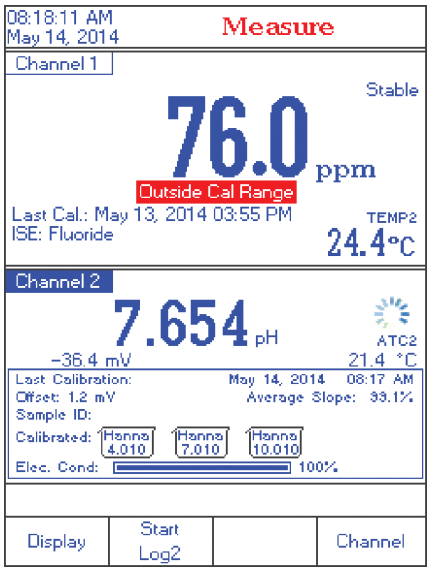
pH and EC Features

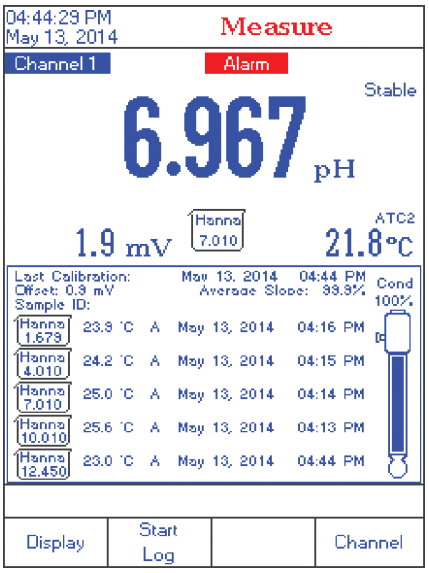
pH CAL Check™

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

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







EC USP Mode

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

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

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

ISE Features

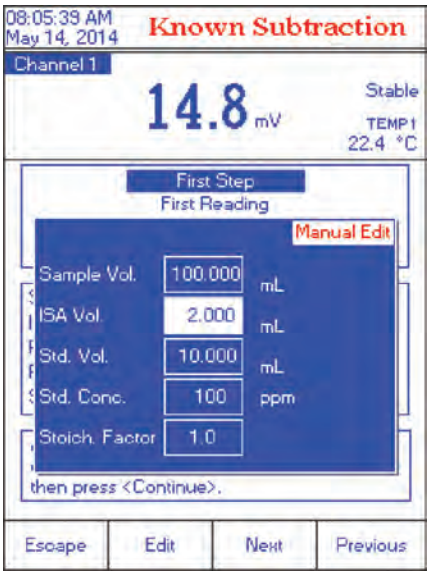
ISE Incremental Methods

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

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

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

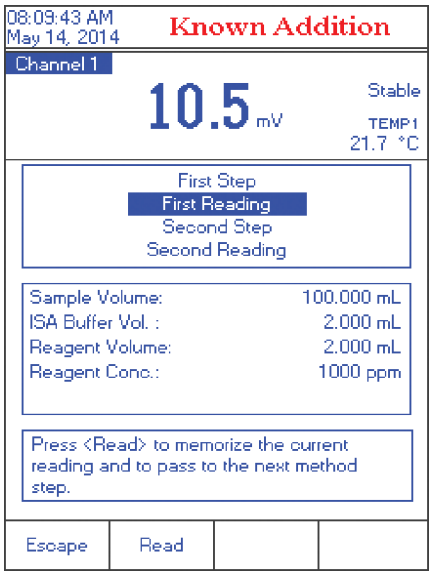
Known Addition, Known Subtraction, Analyte Addition, and Analyte Subtraction methods are standard method choices provided by the HI5522.



First Step

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

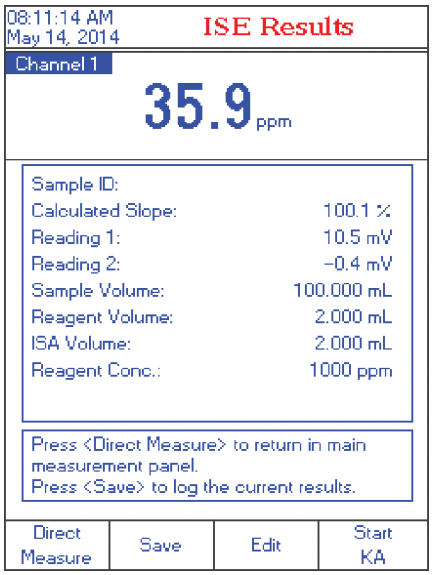
When repeating the analysis on another sample, the parameters do not need to be reentered.



Sequence of Readings

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

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



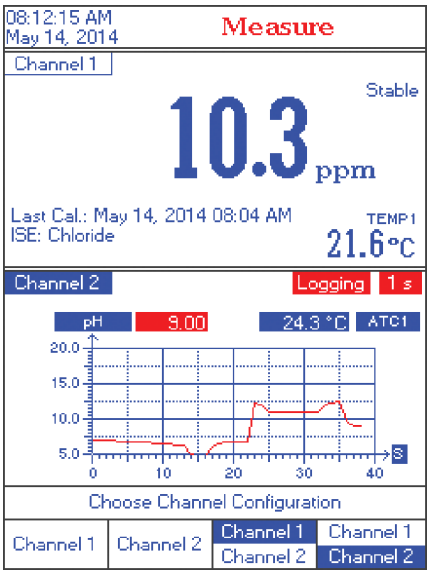
Results

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

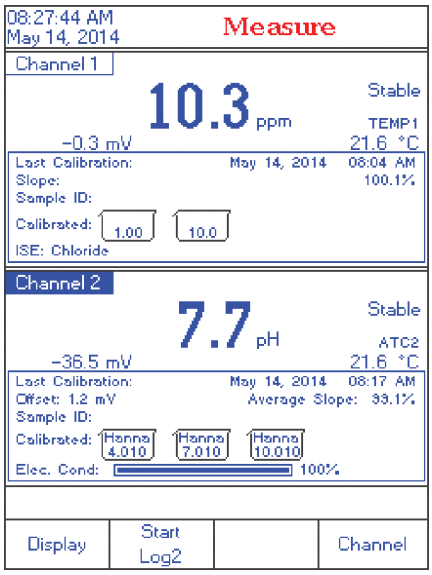
At this time, results can be saved into an ISE Methods Report and printed using the HI92000 PC software.

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

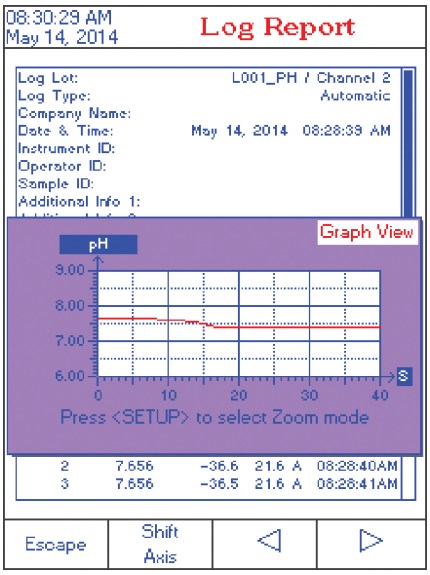
Additional Features by Screen



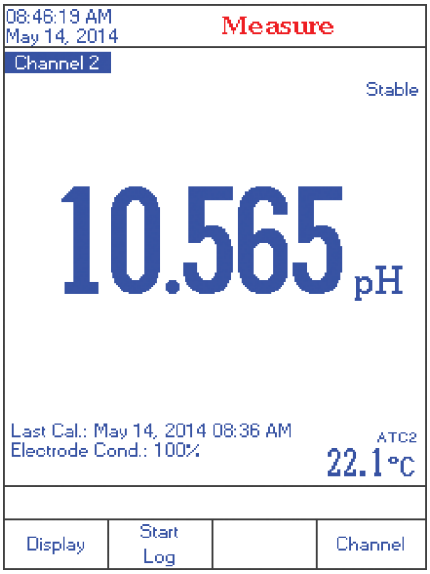
Channel Configuration



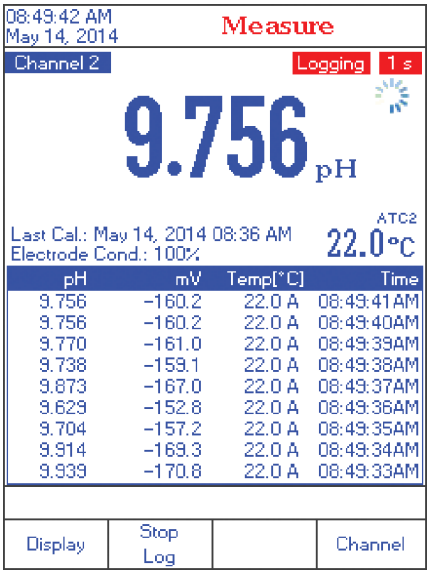
Good Laboratory Practices



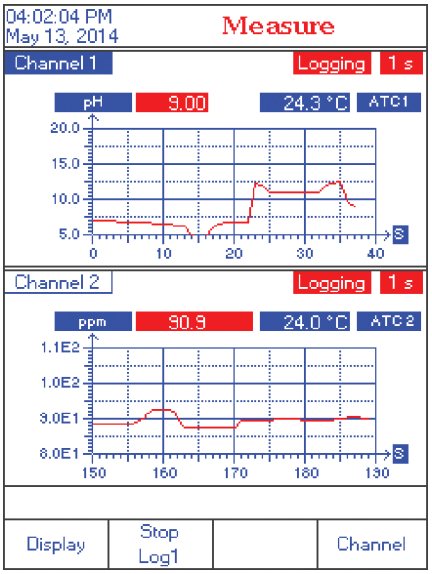
Log Recall



Basic Display



Real-Time Logging



Simultaneous Dual-Channel Graphing

Dual Channels

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

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

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

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

pH and ORP electrodes begin on page 2.134; pH and ORP solutions begin on page 2.154;
ISE electrodes and solutions begin on page 3.22; EC, TDS and salinity solutions begin on page 5.34

HI5521

Research Grade Meter

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

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

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

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

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

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

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

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

Customizable User Interface

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

Color Graphic LCD

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

Capacitive Touch

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

Four Ring Conductivity Probe

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

Choice of Calibration

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

CAL Check™

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

GLP Data

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

Data Logging

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

Data Transfer

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

Contextual Help

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

Dual Channels

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

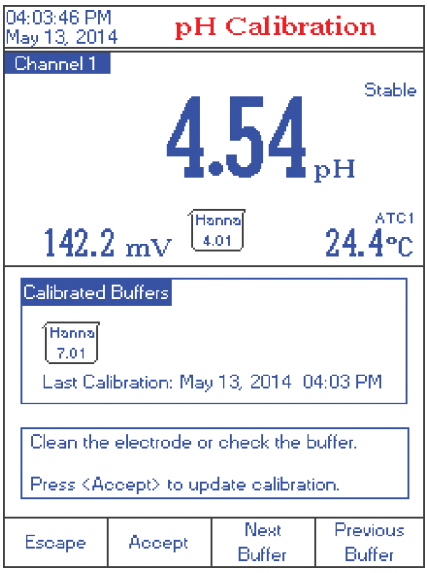
Communication is via opto-isolated USB.

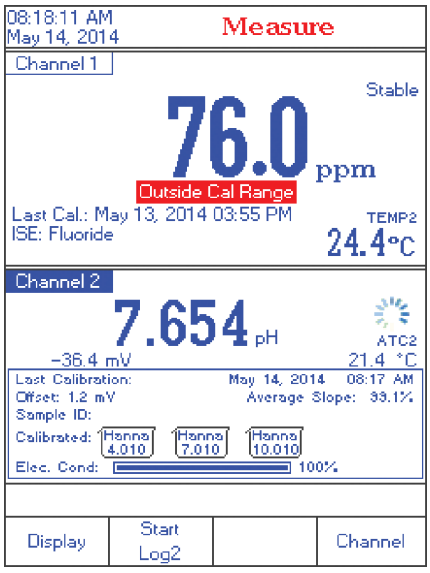
pH and EC Features

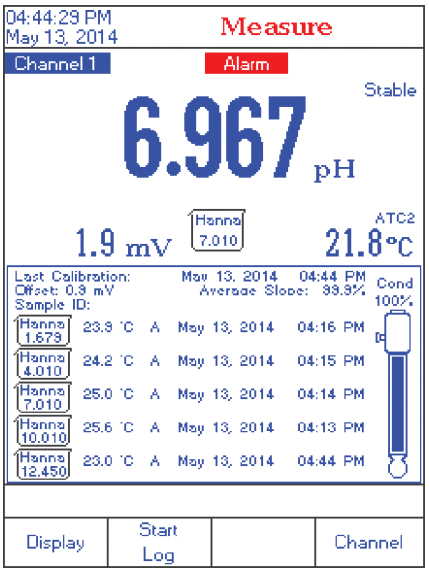
pH CAL Check™

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

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







EC USP Mode

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

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

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

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

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

pH and ORP electrodes begin on page 2.134; pH and ORP solutions begin on page 2.154;
EC, TDS and salinity solutions begin on page 5.34

HI2550

Multiparameter Meter

pH/ORP/ISE and EC/TDS/Salinity

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

Dual-Channel, with Up to Seven Parameters

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

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

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

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

Good Laboratory Practice

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

Data Logging

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

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

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

pH and ORP electrodes begin on page 2.134; pH and ORP solutions begin on page 2.154;
ISE electrodes and solutions begin on page 3.22; EC, TDS and salinity solutions begin on page 5.34

HI9829

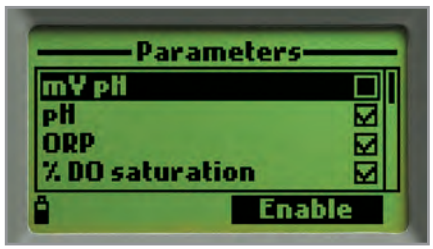
GPS Multiparameter Meters

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

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

Waterproof Protection

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



Backlit Dot Matrix LCD Display

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

Intuitive Keypad

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

Auto-sensor Recognition

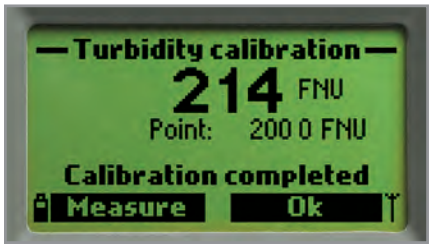
The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

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

Automatic Barometric Pressure Compensation

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



Quick Calibration

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

Dedicated Help Key

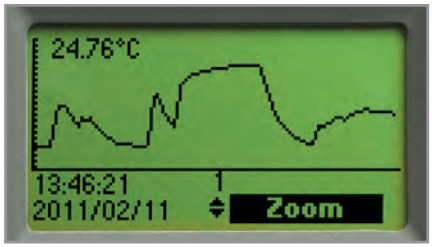
Contextual help is always available through a dedicated "HELP" key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through setup and calibration. The help information displayed is relative to the setting/option being viewed.

GLP Data

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

Data Logging

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



Graphing Capability

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

PC Connectivity

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

Long Battery Life

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

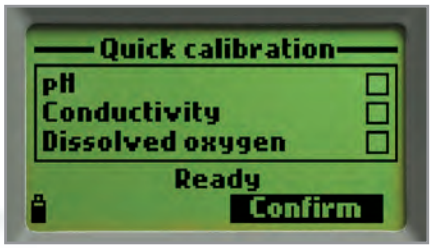
* Without GPS or turbidity measurements

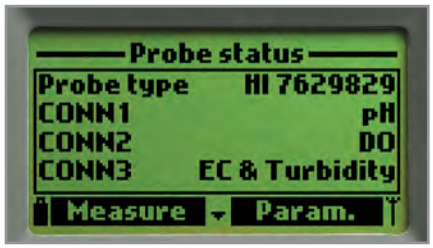
Rugged Custom Carrying Case

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

HI7698297 Quick Release Flow Cell (optional)

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





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

Probes

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

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

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

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

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

Sensors

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

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

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

HI7609829
for pH/ORP, Dissolved Oxygen, EC

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

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

Specifications		HI7609829	HI7629829	
Supported Configuration	Connector 1	pH, pH/ORP, ammonium ISE, chloride ISE, nitrate ISE	pH, pH/ORP, ammonium ISE, chloride ISE, nitrate ISE	
	Connector 2	dissolved oxygen	dissolved oxygen	
	Connector 3	EC	EC	
Temperature sensor		built-in	built-in	
Autonomous Logging		–	yes	
Logging Interval		–	1 second to 3 hours	
Computer Interface		–	USB (HI76982910)	
Memory		–	140,000 measurements (single parameter logged); 35,000 measurements (all parameters logged)	
Operating Temperature		-5 to 55°C*	-5 to 55°C*	
Maximum Depth		20 m (66')*	20 m (66')*	
Cable Specification		multistrand-multiconductor shielded cable with internal strength member rated for 68 kg (150 lb.) intermittent use		
Wetted Materials		body: ABS; threads: nylon; shield: ABS/316 SS; temperature probe: 316 SS; O-rings: EPDM		
Logging Probe Internal Battery Type		–	1.5V (4) AA alkaline	
Logging Probe Battery Life Note: Log space must be available for continuous logging		–	Interval	all channels logging (no averaging)
			1-5 seconds	72 hours
			1 minute	22 days
			10 minutes	70 days
Sample Environment		fresh, brackish, seawater	fresh, brackish, seawater	
Waterproof Protection		IP68	IP68	
Dimensions (without cable)		342 mm (13.5"), dia=46 mm (1.8")	442 mm (17.4"), dia 46 mm (1.8")	
Weight (with batteries and sensors)		570 g (20.1 oz.)	775 g (27.3 oz.)	

* Reduced for ISE sensors

Sensor Configurations

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

Dissolved Oxygen

HI7609829-2 DO

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

pH

HI7609829-0 pH
HI7609829-1 pH/ORP

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

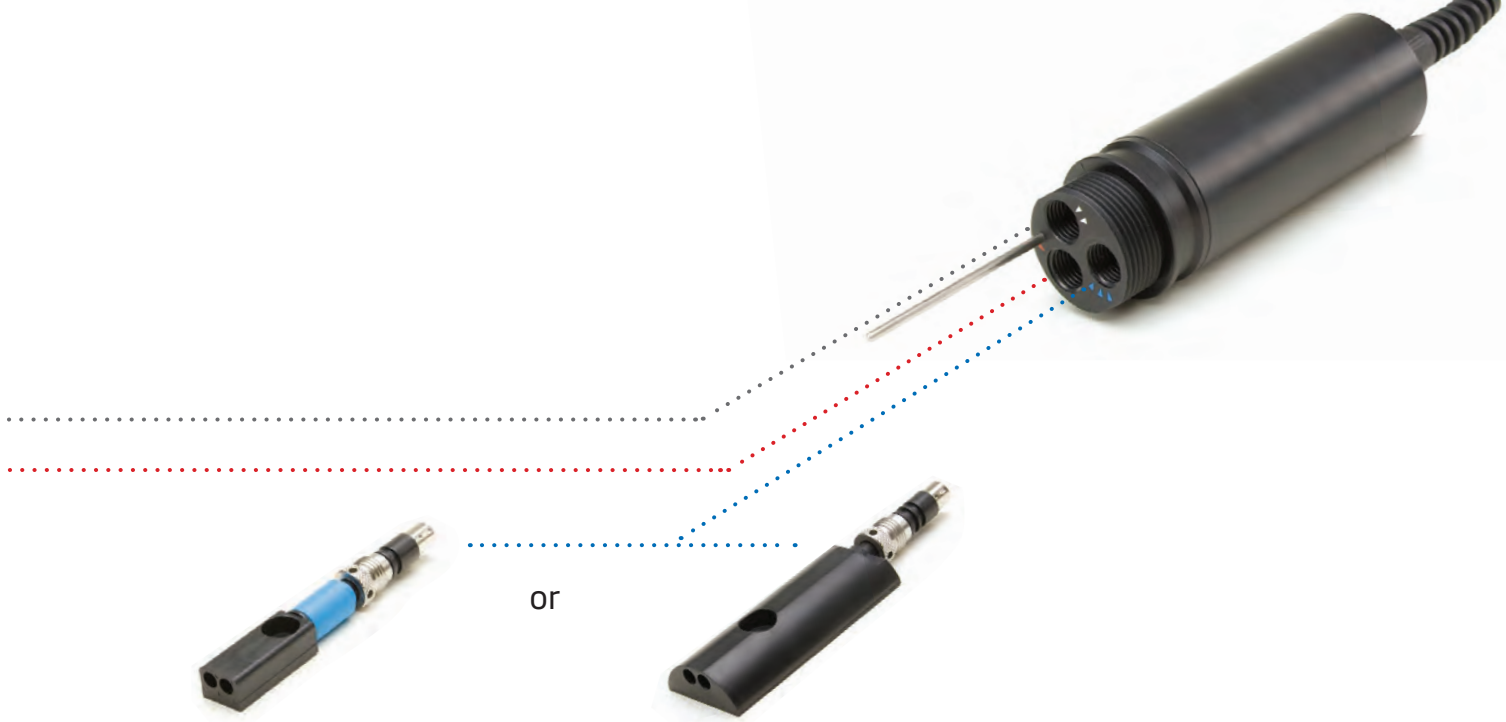
ISE

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

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

HI7698295

Short cap for probes without EC/turbidity sensor



or

Conductivity

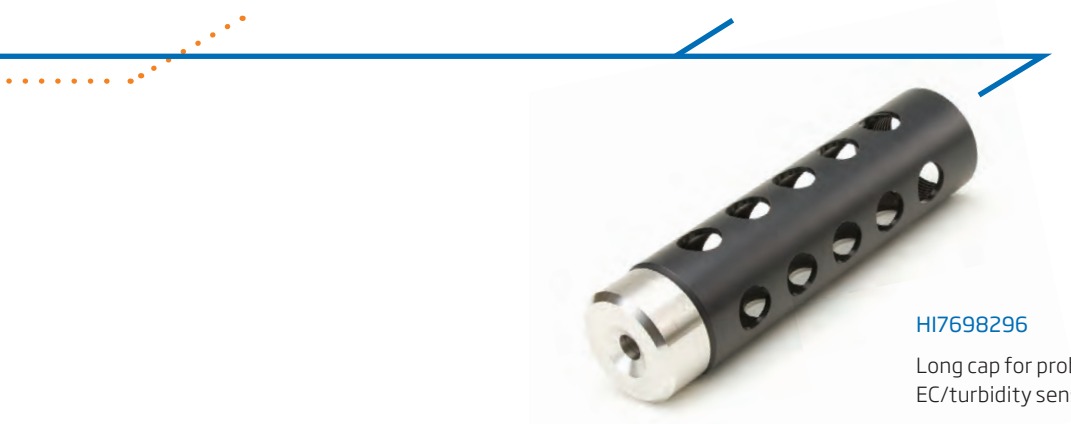
HI7609829-3 EC

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

Conductivity and Turbidity

HI7609829-4 EC/Turbidity

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



HI7698296

Long cap for probes with EC/turbidity sensor

FastTracker™
location traceability

Fast Tracker™–Tag Identification System

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

iButton® Tags are Easy to Install

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

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

Monitoring and Tracking

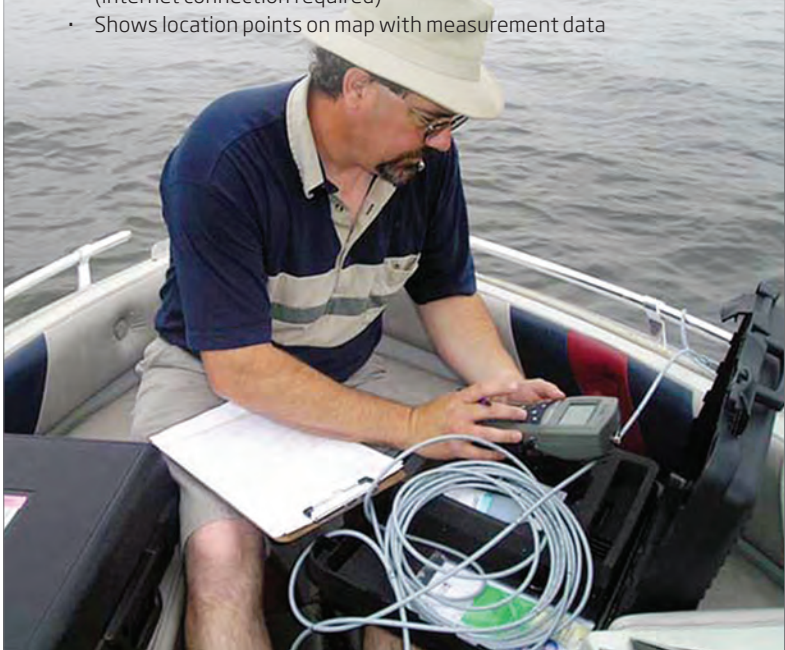
The HI9829 with GPS module can track measurement locations with detailed coordinate information. All models of the HI9829 are equipped with the Fast Tracker™ TAG ID system which is an invaluable tool for associating measurements with their locations. The HI9829 also incorporates a real-time clock which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

GPS (Global Positioning System)

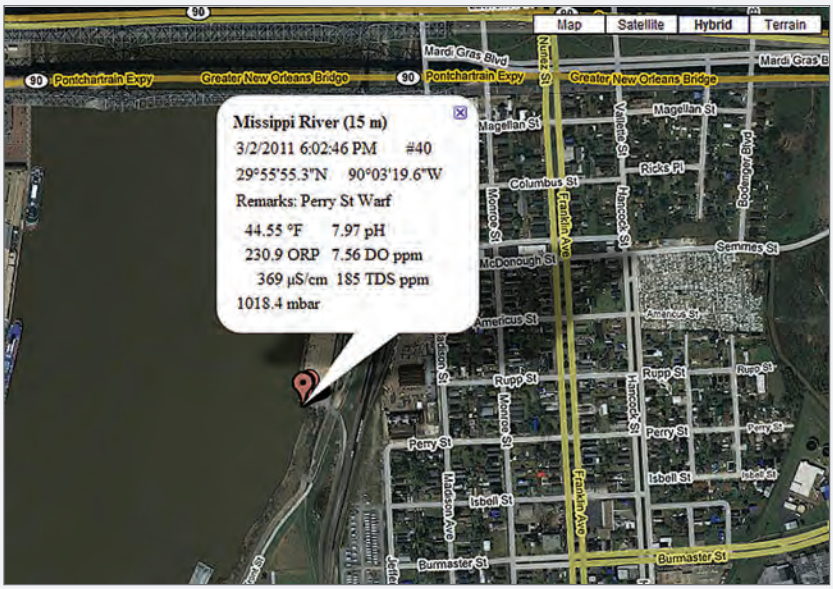
The HI9829 with GPS features an internal 12 channel GPS receiver and antenna that calculates its position to track locations along with measurement data. The GPS tracks your location using satellites to within 30 ft (10 m) so you can be sure that you return to the same location for repeated measurements.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

Features

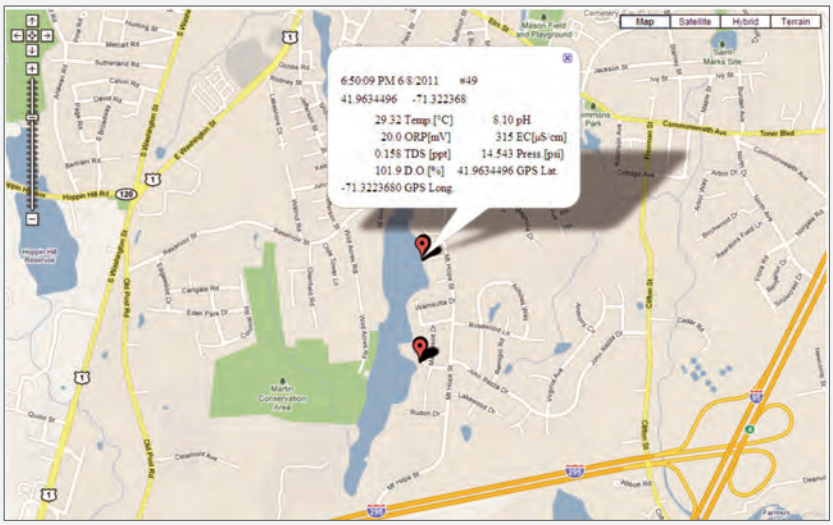
- Basic GPS Features
  - GPS coordinates shown on the LCD with up to 10 measurement parameters
  - GPS signal strength shown on LCD
  - Logged data is embedded with GPS coordinates
  - GPS status screen
- Advanced GPS Features
  - Users can associate GPS coordinates with alphanumeric locations
  - Distances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



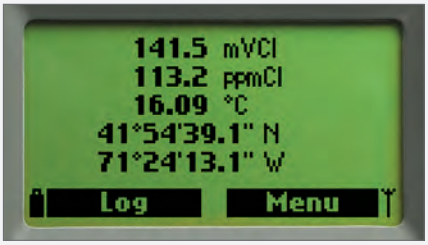
GPS Screen Features



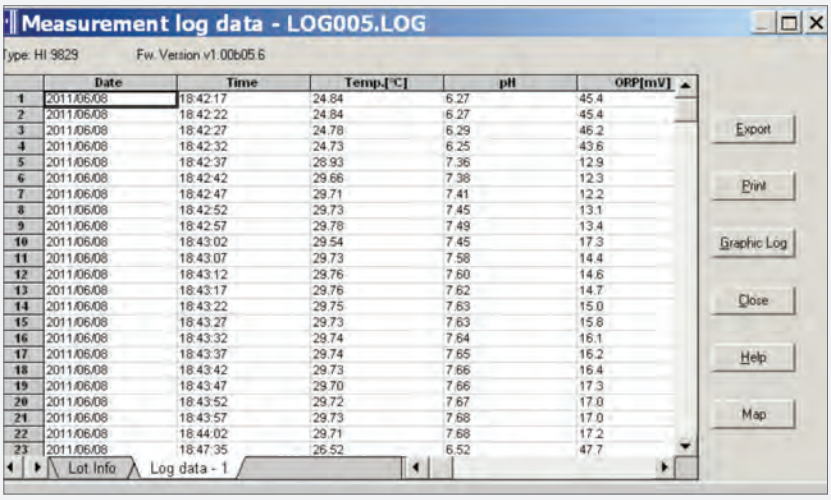
- GPS data can be customized to meet specific requirement

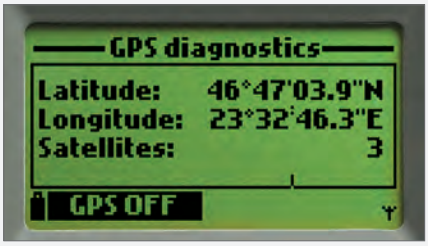


- Displays distances between current and predefined locations



- Display current readings along with GPS coordinates





- Shows current position and number of satellites

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

HI9829 Parameter Specifications

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

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

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

solutions and accessories begin on page 7.28

Ordering Information

Meter and Probe with Rugged Carrying Case

HI9829 – w x y z

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

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

All HI9829 Kits Include:

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

Optional Kit Components:

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

Spare Solution

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

Kit Specific Components:

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

solutions and accessories begin on page 7.28

Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Probe with Rugged Carrying Case

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

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

solutions and accessories begin on page 7.28

Meter with Probe Ordering Information

Choose Your Configuration Below

Meter and Logging Probe with Rugged Carrying Case

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

Meter Only

Basic	**HI9829-01** (115V) **HI9829-02** (230V)	HI9829 meter only
GPS	**HI98290-01** (115V) **HI98290-02** (230V)	HI9829 meter with GPS only

solutions and accessories begin on page 7.28

Solutions & Accessories Ordering Information

HI9828-27
Quick calibration solution, 1 gallon

Probe Only, No Sensors

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

Sensors with O-Ring

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

Quick Calibration Solutions

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

pH Calibration Solutions

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

ORP Calibration Solutions

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

EC Calibration Solutions

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

Dissolved Oxygen Solutions

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

Solutions & Accessories Ordering Information

Turbidity Calibration Solutions

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

ISE Standards

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

Probe Maintenance Kit

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

pH/ORP Cleaning and Storage Solutions

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

Accessories

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

HI76982910
USB cable, PC to probe

HI710046
Car accessory port cable

HI7698292
Probe maintenance kit

HI7698297
Long, quick release flow cell

HI98194

Multiparameter Waterproof Meter

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

pH Features

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

Dissolved Oxygen Features

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

EC/TDS/Resistivity Features

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

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

Backlit Graphic LCD Display

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

Waterproof Protection

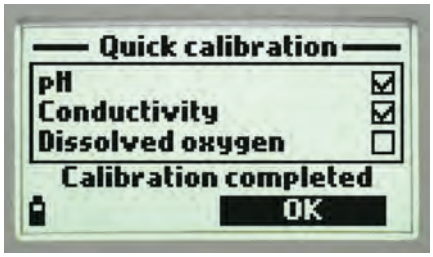
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Digital Probe

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

Color Coded, Field Replaceable Sensors

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



Standard or Quick Calibration

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

Auto-sensor Recognition

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

Automatic Temperature Compensation

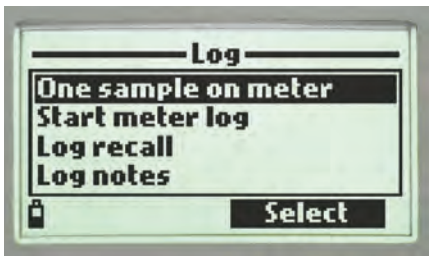
Integrated temperature sensor allows for automatic temperature compensation of pH, conductivity, and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

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

GLP Data

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

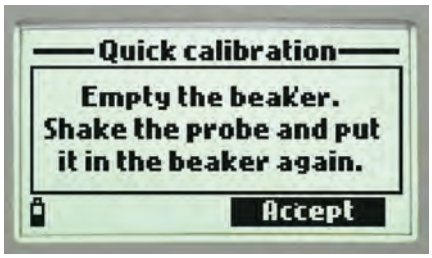


Data Logging

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

Intuitive Keypad

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



Dedicated Help Key

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

PC Connectivity

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

Long Battery Life

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

Rugged Custom Carrying Case

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

Probe and Sensors

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

Probe Specifications	HI7698194	
Sensor Inputs	three (pH or pH/ORP, DO, EC)	
Sample Environment	fresh, brackish, seawater	
Waterproof Protection	IP68	
Operating Temperature	-5 to 55°C	
Storage Temperature	-20 to 70°C	
Maximum Depth	20 m (66')	
Dimensions (without cable)	342 mm (13.5"); 46 mm (1.8") dia	
Weight (without sensors)	570 g (20.1 oz.)	
Cable Specification	multistrand-multiconductor shielded cable with internal strength member rated for 68 kg (150 lb.) intermittent use	
Wetted Materials	Body	ABS
	Threads	Nylon
	Shield	ABS / 316 SS
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange

HI9828-25
Quick Calibration solution

or

		HI7698194-0	HI7698194-1	HI7698194-3	HI7698194-2
Description		pH sensor	pH/ORP sensor	EC sensor	DO sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	EC	DO (% saturation and concentration)
Measurement Range		0.00 to 13.00 pH ; ±600.0 mV	0.00 to 13.00 pH; ±600.0 mV; ±2000.0 mV	0.0 to 200.0 mS/cm; 0.0 to 400 mS/cm (absolute)	0.0 to 500.0 %; 0.00 to 50.00 mg/L
Temperature Range		-5 to 55°C	-5 to 55°C	-5 to 55°C	-5 to 55°C
Color Code		red	red	blue	white
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	stainless steel electrodes AISI 316	cat/an: Ag/Zn
	Glass Type	LT (low temperature)	LT (low temperature)	–	–
	Junction	ceramic	ceramic	–	membrane: HDPE
	Body	PEI	PEI	ABS/epoxy	white top ABS
	Electrolyte	gel	gel	–	–
	Reference	double	double	–	–
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	none	HI7042S (DO electrolyte)
Dimensions		118 x 15 mm	118 x 15 mm	111 x 17 mm	99 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')	20 m (65')

Specifications		HI98194
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic one, two, or three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
EC	Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
	Resolution	**manual:** 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; **automatic:** 1 µS/cm from 0 to 9999 µS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm; **automatic mS/cm:** 0.001 mS/cm from 0.000 to 9.999 mS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm
	Accuracy	±1% of reading or ±1 µS/cm whichever is greater
	Calibration	automatic single point, with six standard solutions (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point
TDS	Range	0.0 to 400.0 ppt (g/L) (the maximum value depends on the TDS factor)
	Resolution	**manual:** 1 ppm (mg/L); 0.001 ppt (g/L); 0.01 ppt (g/L); 0.1 ppt (g/L); 1 ppt (g/L); **automatic:** 1 ppm (mg/L) from 0 to 9999 ppm (mg/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L); **automatic ppt (g/L):** 0.001 ppt (g/L) from 0.000 to 9.999 ppt (g/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L)
	Accuracy	±1% of reading or ±1 ppm (mg/L) whichever is greater
	Calibration	based on conductivity calibration
Resistivity	Range	0 to 999999 Ω•cm; 0 to 1000.0 kΩ•cm; 0 to 1.0000 MΩ•cm
	Resolution	dependent on resistivity reading
	Calibration	based on conductivity calibration
Salinity	Range	0.00 to 70.00 PSU
	Resolution	0.01 PSU
	Accuracy	±2% of reading or ±0.01 PSU whichever is greater
	Calibration	based on conductivity calibration
Seawater σ	Range	0.0 to 50.0 σ_t, σ_0, σ_{15}
	Resolution	0.1 σ_t, σ_0, σ_{15}
	Accuracy	±1 σ_t, σ_0, σ_{15}
	Calibration	based on conductivity calibration
Dissolved Oxygen	Range	0.0 to 500.0%; 0.00 to 50.00 ppm (mg/L)
	Resolution	0.1%; 0.01 ppm (mg/L)
	Accuracy	0.0 to 300.0%: ±1.5% of reading or ±1.0% whichever is greater; 300.0 to 500.0%: ±3% of reading; 0.00 to 30.00 ppm (mg/L): ±1.5% of reading or ±0.10 ppm (mg/L), whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): ±3% of reading
	Calibration	automatic one or two points at 0, 100% or one custom point
Atmospheric Pressure	Range	450 to 850 mm Hg; 17.72 to 33.46 in Hg; 600.0 to 1133.2 mbar; 8.702 to 16.436 psi; 0.5921 to 1.1184 atm; 60.00 to 113.32 kPa
	Resolution	0.1 mm Hg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa
	Accuracy	±3 mm Hg within ±15°C from the temperature during calibration
	Calibration	automatic at one custom point
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional Specifications	Temperature Compensation	automatic from -5 to 55°C (23 to 131°F)
	Logging Memory	45,000 records (continuous logging or log-on-demand of all parameters)
	Logging Interval	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 360 hours of continuous use without backlight (50 hours with backlight)
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	All models are supplied with: HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor, HI7698295 short protective probe shield, HI7698194-2 DO sensor, HI9828-20 quick calibration solution, HI76981942 probe maintenance kit, HI7698290 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert. **HI98194** is supplied with HI7698194/4 multiparameter probe with 4m (13') cable **HI98194/10** is supplied with HI7698194/10 multiparameter probe with 10m (33') cable **HI98194/20** is supplied with HI7698194/20 multiparameter probe with 20m (66') cable **HI98194/40** is supplied with HI7698194/40 multiparameter probe with 40m (131') cable	
Accessories	**HI710034** orange protective rubber boot	

pH and ORP solutions begin on page 2.154; EC, TDS and salinity solutions begin on page 5.34;
for DO accessories see HI7042S, HI7040L and HI76409A/P page 6.33

HI98195

Multiparameter Waterproof Meter

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

pH Features

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

EC/TDS/Resistivity Features

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

The HI98195 is a waterproof portable logging multiparameter meter that monitors up to 9 different water quality parameters. It's multi-sensor probe allows for the measurement of key parameters including pH, ORP, conductivity, and temperature. The probe transmits readings digitally to the meter, where data points can be displayed and logged. The complete system is simple to setup and easy to use.

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange

Backlit Graphic LCD Display

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

Waterproof Protection

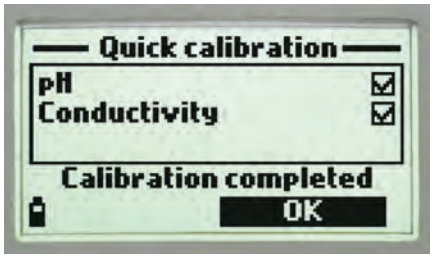
The meter is enclosed in an IP67 rated waterproof casing and can withstand immersion in water at a depth of 1 m for up to 30 minutes. The probe features an IP68 rating for continuous immersion in water.

Quick Connect Digital Probe

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

Color Coded, Field Replaceable Sensors

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



Standard or Quick Calibration

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

Auto-sensor Recognition

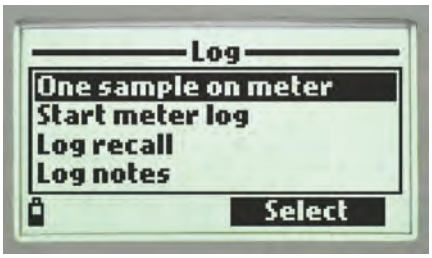
The probe and meter automatically recognize the sensors that are connected. Any ports not used on the probe will not have the parameter displayed or be configurable.

Automatic Temperature Compensation

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

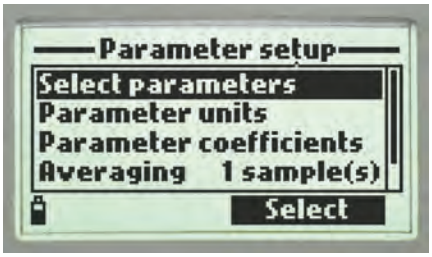
GLP Data

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



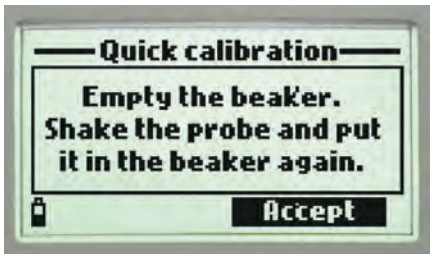
Data Logging

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



Intuitive Keypad

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



Dedicated Help Key

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

PC Connectivity

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

Long Battery Life

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

Rugged Custom Carrying Case

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

Probe and Sensors

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

Specifications	HI7698195	
Sensor Inputs	two (pH or pH/ORP, EC)	
Sample Environment	fresh, brackish, seawater	
Waterproof Protection	IP68	
Operating Temperature	-5 to 55°C	
Storage Temperature	-20 to 70°C	
Maximum Depth	20 m (66')	
Dimensions (without cable)	342 mm (13.5"); 46 mm (1.8") dia	
Weight (without sensors)	570 g (20.1 oz.)	
Cable Specification	multistrand-multiconductor shielded cable with internal strength member rated for 68 kg (150 lb.) intermittent use	
Wetted Materials	Body	ABS
	Threads	Nylon
	Shield	ABS / 316 SS
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

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

HI9828-25
Quick Calibration solution

or

Sensor Specifications		HI7698194-0	HI7698194-1	HI7698194-3
Description		pH sensor	pH/ORP sensor	EC sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	EC
Measurement Range		0.00 to 13.00 pH ; ±600.0 mV	0.00 to 13.00 pH; ±600.0 mV; ±2000.0 mV	0.0 to 200.0 mS/cm; 0.0 to 400 mS/cm (absolute)
Temperature Range		-5 to 55°C	-5 to 55°C	-5 to 55°C
Color Code		red	red	blue
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	stainless steel electrodes AISI 316
	Glass Type	LT (low temperature)	LT (low temperature)	–
	Junction	ceramic	ceramic	–
	Body	PEI	PEI	ABS/epoxy
	Electrolyte	gel	gel	–
	Reference	double	double	–
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	none
Dimensions		118 x 15 mm	118 x 15 mm	111 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')

Specifications		HI98195
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic one, two, or three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
EC	Range	0 to 200 mS/cm (absolute EC up to 400 mS/cm)
	Resolution	**manual:** 1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm; **automatic:** 1 µS/cm from 0 to 9999 µS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm; **automatic mS/cm:** 0.001 mS/cm from 0.000 to 9.999 mS/cm; 0.01 mS/cm from 10.00 to 99.99 mS/cm; 0.1 mS/cm from 100.0 to 400.0 mS/cm
	Accuracy	±1% of reading or ±1 µS/cm whichever is greater
	Calibration	automatic single point, with six standard solutions (84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 111.8 mS/cm) or custom point
TDS	Range	0.0 to 400.0 ppt (g/L) (the maximum value depends on the TDS factor)
	Resolution	**manual:** 1 ppm (mg/L); 0.001 ppt (g/L); 0.01 ppt (g/L); 0.1 ppt (g/L); 1 ppt (g/L); **automatic:** 1 ppm (mg/L) from 0 to 9999 ppm (mg/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L); **automatic ppt (g/L):** 0.001 ppt (g/L) from 0.000 to 9.999 ppt (g/L); 0.01 ppt (g/L) from 10.00 to 99.99 ppt (g/L); 0.1 ppt (g/L) from 100.0 to 400.0 ppt (g/L)
	Accuracy	±1% of reading or ±1 ppm (mg/L) whichever is greater
	Calibration	based on conductivity or salinity calibration
Resistivity	Range	0 to 999999 Ω•cm; 0 to 1000.0 kΩ•cm; 0 to 1.0000 MΩ•cm
	Resolution	dependent on resistivity reading
	Calibration	based on conductivity or salinity calibration
Salinity	Range	0.00 to 70.00 PSU
	Resolution	0.01 PSU
	Accuracy	±2% of reading or ±0.01 PSU whichever is greater
	Calibration	based on conductivity calibration
Seawater σ	Range	0.0 to 50.0 σ_t, σ_0, σ_{15}
	Resolution	0.1 σ_t, σ_0, σ_{15}
	Accuracy	±1 σ_t, σ_0, σ_{15}
	Calibration	based on conductivity or salinity calibration
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional Specifications	Temperature Compensation	automatic from -5 to 55°C (23 to 131°F)
	Logging Memory	45,000 records (continuous logging or log-on-demand of all parameters)
	Logging Interval	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 360 hours of continuous use without backlight (50 hours with backlight)
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	All models are supplied with: HI7698194-1 pH/ORP sensor, HI7698194-3 EC sensor, HI7698295 short protective probe shield, HI9828-20 quick calibration solution, HI76981952 probe maintenance kit, HI7698290 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert. **HI98195** is supplied with HI7698195/4 multiparameter probe with 4m (13') cable **HI98195/10** is supplied with HI7698195/10 multiparameter probe with 10m (33') cable **HI98195/20** is supplied with HI7698195/20 multiparameter probe with 20m (66') cable **HI98195/40** is supplied with HI7698195/40 multiparameter probe with 40m (131') cable	
Accessories	**HI710034** orange protective rubber boot	

pH and ORP solutions begin on page 2.154; EC, TDS and salinity solutions begin on page 5.34;

HI98196

Multiparameter Waterproof Meter

pH, ORP, Dissolved Oxygen, Atmospheric Pressure and Temperature

pH Features

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

Dissolved Oxygen Features

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

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710034 Orange

Backlit Graphic LCD Display

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

Waterproof Protection

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

Quick Connect Digital Probe

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

Color Coded, Field Replaceable Sensors

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

Standard Calibration

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

Auto-sensor Recognition

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

Automatic Temperature Compensation

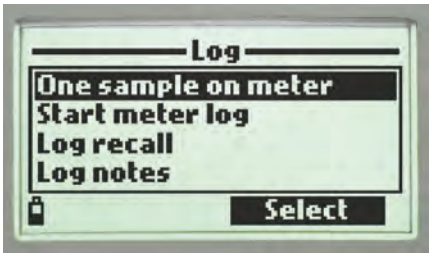
Integrated temperature sensor allows for automatic temperature compensation of pH and dissolved oxygen measurements.

Automatic Barometric Pressure Compensation

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

GLP Data

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

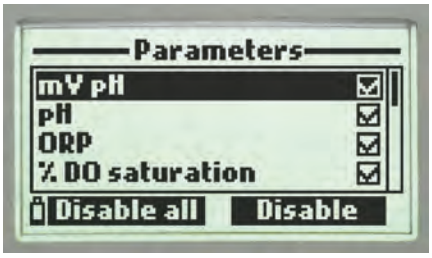


Data Logging

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

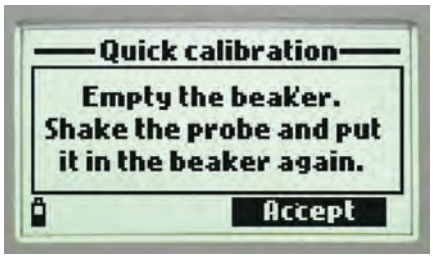
Intuitive Keypad

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



Setup

Extensive setup screen features



Dedicated Help Key

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

PC Connectivity

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

Long Battery Life

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

Rugged custom carrying case

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

Probe and Sensors

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

Specifications	HI7698196	
Sensor Inputs	two (pH or pH/ORP, DO)	
Sample Environment	fresh, brackish, seawater	
Waterproof Protection	IP68	
Operating Temperature	-5 to 55°C	
Storage Temperature	-20 to 70°C	
Maximum Depth	20 m (66')	
Dimensions (without cable)	342 mm (13.5"); 46 mm (1.8") dia	
Weight (without sensors)	570 g (20.1 oz.)	
Cable Specification	multistrand-multiconductor shielded cable with internal strength member rated for 68 kg (150 lb.) intermittent use	
Wetted Materials	Body	ABS
	Threads	Nylon
	Shield	ABS / 316 SS
	Temperature Probe	316 SS
	O-rings	EPDM

Multi-function Sensor

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

Sensor Specifications		HI7698194-0	HI7698194-1	HI7698194-2
Description		pH sensor	pH/ORP sensor	DO sensor
Measurement Type		pH, mV (pH)	pH, mV (pH), ORP	DO (% saturation and concentration)
Measurement Range		0.00 to 13.00 pH ; ±600.0 mV	0.00 to 13.00 pH; ±600.0 mV; ±2000.0 mV	0.0 to 500.0 %; 0.00 to 50.00 mg/L
Temperature Range		-5 to 55°C	-5 to 55°C	-5 to 55°C
Color Code		red	red	white
Materials	Tip	glass (pH)	glass (pH); Pt (ORP)	cat/an: Ag/Zn
	Glass Type	LT (low temperature)	LT (low temperature)	–
	Junction	ceramic	ceramic	membrane: HDPE
	Body	PEI	PEI	white top ABS
	Electrolyte	gel	gel	–
	Reference	double	double	–
Maintenance Solution		HI70300 (storage solution)	HI70300 (storage solution)	HI7042S (DO electrolyte)
Dimensions		118 x 15 mm	118 x 15 mm	99 x 17 mm
Depth		20 m (65')	20 m (65')	20 m (65')

Specifications		HI98196
pH / mV	Range	0.00 to 14.00 pH / ±600.0 mV
	Resolution	0.01 pH / 0.1 mV
	Accuracy	±0.02 pH / ±0.5 mV
	Calibration	automatic up to three points with automatic recognition of five standard buffers (pH 4.01, 6.86, 7.01, 9.18, 10.01) or one custom buffer
ORP	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±1.0 mV
	Calibration	automatic at one custom point (relative mV)
Dissolved Oxygen	Range	0.0 to 500.0%; 0.00 to 50.00 ppm (mg/L)
	Resolution	0.1%; 0.01 ppm (mg/L)
	Accuracy	0.0 to 300.0%: ±1.5% of reading or ±1.0% whichever is greater; 300.0 to 500.0%: ±3% of reading; 0.00 to 30.00 ppm (mg/L): ±1.5% of reading or ±0.10 ppm (mg/L), whichever is greater; 30.00 ppm (mg/L) to 50.00 ppm (mg/L): ±3% of reading
	Calibration	automatic one or two points at 0, 100% or one custom point
Atmospheric Pressure	Range	450 to 850 mm Hg; 17.72 to 33.46 in Hg; 600.0 to 1133.2 mbar; 8.702 to 16.436 psi; 0.5921 to 1.1184 atm; 60.00 to 113.32 kPa
	Resolution	0.1 mm Hg; 0.01 in Hg; 0.1 mbar; 0.001 psi; 0.0001 atm; 0.01 kPa
	Accuracy	±3 mm Hg within ±15°C from the temperature during calibration
	Calibration	automatic at one custom point
Temperature	Range	-5.00 to 55.00°C; 23.00 to 131.00°F; 268.15 to 328.15K
	Resolution	0.01°C; 0.01°F; 0.01K
	Accuracy	±0.15°C; ±0.27°F; ±0.15K
	Calibration	automatic at one custom point
Additional Specifications	Temperature Compensation	automatic from -5 to 55°C (23 to 131°F)
	Logging Memory	45,000 records (continuous logging or log-on-demand of all parameters)
	Logging Interval	one second to three hours
	PC Connectivity	via USB (with Hanna PC software)
	Environment	0 to 50°C (32 to 122°F); RH 100% IP67
	Battery Type / Life	1.5V AA batteries (4) / approximately 360 hours of continuous use without backlight (50 hours with backlight)
	Dimensions / Weight	185 x 93 x 35.2 mm (7.3 x 3.6 x 1.4") / 400 g (14.2 oz.)
Ordering Information	All models are supplied with: HI7698194-1 pH/ORP sensor, HI7698194-2 DO sensor, HI7698295 short protective probe shield, HI9828-20 quick calibration solution, HI76981942 probe maintenance kit, HI7698290 calibration beaker, HI9298194 PC software, HI920015 micro USB cable, batteries (4), quality certificate, and instruction manual in a rugged carrying case with custom insert. **HI98196** is supplied with HI7698196/4 multiparameter probe with 4m (13') cable **HI98196/10** is supplied with HI7698196/10 multiparameter probe with 10m (33') cable **HI98196/20** is supplied with HI7698196/20 multiparameter probe with 20m (66') cable **HI98196/40** is supplied with HI7698196/40 multiparameter probe with 40m (131') cable	
Accessories	**HI710034** orange protective rubber boot	

pH and ORP solutions begin on page 2.154;
for DO accessories see HI7042S, HI7040L and HI76409A/P page 6.33

HI991300 · HI991301

pH/EC/TDS/ Temperature Meters

- Simultaneous, pH, EC/TDS and temperature measurements on a large three-line LCD display;
- User-friendly Design
  - With only two buttons, meter operation could not be simpler. Two buttons allow you to quickly adjust settings, select the measurement range, and choose calibration buffer sets.

- Watertight Connection
  - A Quick Connect DIN connector makes attaching and removing the probe simple and easy. The rubber coating protects the cable and creates a sealed connection for added reliability.
- Probe Condition
  - An on-screen indicator provides visual confirmation that your probe is working at its best.
- Large LCD
  - A multilevel display provides at-a-glance readings of your most important numbers from any angle.
- Durable IP67 waterproofcCasing
  - Designed to withstand the knocks, drops, and spills of real life, the new IP67 body ensures top performance in any environment. These meters are totally protected against dust and water intrusion from any direction.
- On-screen calibration tags
- mV of pH measurement for electrode check
- Selectable temperature unit (°C or °F)
- Battery life indication and low battery detection

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710028 Orange
HI710029 Blue

The HI991300 and HI991301 are light weight, portable pH, conductivity (or total dissolved solids) and temperature meters for portable applications requiring both a pH and conductivity (or TDS) measurement. Applications include measurements for greenhouses irrigation, hydroponics and groundwater monitoring from agriculture nutrient pollution.

The HI991300 and HI991301 meters feature 2 button operation and are simple to use. All operations and settings, including calibration buffers and temperature scale selections, are made through these 2 buttons. They have a waterproof and compact casing rated for IP67 conditions and a large Tri-line display. The meters have automatic pH calibration at one or two points and a single conductivity calibration. Other user selectable features include different TDS factors from 0.45 to 1.00, and a range of temperature coefficients (β) from 0.0 to 2.4% for better conductivity or TDS solution temperature compensation. These meters are supplied with a multi-parameter probe specifically designed for these meters. To increase conductivity accuracy, two meter models are available, with different conductivity ranges, for applications from purified to brackish waters.

The HI12883 multi-parameter probe, incorporates a domed shaped pH bulb rated from 0-13 pH, a single junction Ag/AgCl reference electrode with gelled electrolyte and a retractable cloth wick junction, a graphite EC/TDS cell, and a temperature sensor in one convenient, rugged polypropylene body. In addition, to ensure against interference from transient electrical noise to pH, a solidstate preamplifier is integrated into the probe. The probe is rated from 0 to 50°C.

HI1288 amplified pH electrode

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

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

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

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

Specifications		HI991300	HI991301
pH	Range*	-2.00 to 16.00 pH / -2.0 to 16.0 pH	-2.00 to 16.00 pH / -2.0 to 16.0 pH
	Resolution	0.01 pH / 0.1 pH	0.01 pH / 0.1 pH
	Accuracy (@25°C/77°F)	±0.02 pH / ±0.1 pH	±0.02 pH / ±0.1 pH
	Calibration	automatic, 1 or 2 points choose between 2 sets of buffers (standard: 4.01; 7.01; 10.01 or NIST: 4.01; 6.86; 9.18)	automatic, 1 or 2 points choose between 2 sets of buffers (standard: 4.01; 7.01; 10.01 or NIST: 4.01; 6.86; 9.18)
pH-mV	Range	±825 mV	±825 mV
	Resolution	1 mV	1 mV
	Accuracy (@25°C/77°F)	±1 mV	±1 mV
EC	Range	0 to 3999 µS/cm**	0.00 to 20.00 mS/cm**
	Resolution	1 µS/cm	0.01 mS/cm
	Accuracy (@25°C/77°F)	±2% F.S.	±2% F.S.
TDS	Range	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Resolution	1 ppm (mg/L)	0.01 ppt (g/L)
	Accuracy (@25°C/77°F)	±2% F.S.	±2% F.S.
Temperature	Range*	-5.0 to 105.0°C / 23.0 to 221.0°F	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F	0.1°C/0.1°F
	Accuracy (@25°C/77°F)	±0.5°C / ±1.0°F	±0.5°C / ±1.0°F
	EC/TDS Calibration	automatic, one point at: 1413 µS/cm or 1382 ppm (CONV=0.5) or 1500 ppm(CONV=0.7)	automatic, one point at: 12880 µS/cm or 6.44 ppt (CONV=0.5) or 9.02 ppt (CONV=0.7)
	pH Temp. Compensaiton	automatic	automatic
	EC/TDS Temperature Compenation	automatic with β selectable from 0.0-2.4%/°C with 0.1 increments	
	TDS Conversion Factor	selectable from 0.45 to 1.00 with 0.01 increments	
	Probe (included)	HI12883 pH/EC/TDS/temperature sensor, DIN connector and 1 m (3.3') cable	
	Battery Type/Life	1.5V AAA (3) /approx. 600 hours of continuous use	
	Auto-off	user selectable: after 8 min, 60 min or disabled	
	Environment	0 to 50°C (32 to 122°F); RH max. 100%	
	Meter Dimensions	154 x 63 x 30 mm (6.1 x 2.5 x 1.2")	
	Meter Mass (with batteries)	196 g (6.91 oz.)	
	Casing Ingress Protection Rating	IP67	
Ordering Information		**HI991300** is supplied with HI12883 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1m (3.3') cable, pH 4.01 and 7.01 buffer sachets, HI70031 1413 µS/cm and HI70032 1382 ppm calibration solution sachets, HI700601 Electrode cleaning solution sachets (2), 100 mL beaker, 1.5V AAA batteries (3), calibration certificate of meter, calibration certificate of probe, instruction manual and HI710142 rugged carrying case. **HI991301** is supplied with HI12883 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1m (3.3') cable, pH 4.01 and 7.01 buffer sachets, HI70030 12880 µS/cm and HI70038 6.44 ppt calibration solution sachets, HI700601 electrode cleaning solution sachets (2), 100 mL beaker, 1.5V AAA batteries (3), calibration certificate of meter, calibration certificate of probe, instruction manual and HI710142 rugged carrying case.	

* the pH range is limited from 0 to 13 pH and the temperature range from 0 to 50°C (32 to 122°F) using HI12883 probe
** displays µS for µS/cm
** displays mS for mS/cm

pH solutions begin on page 2.154; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

Gro Line

HI9814

pH / EC / TDS / Temperature Meter

with Multiparameter Probe

- Simultaneous, pH, EC/TDS and temperature measurements on a large three-line LCD display;
- User-friendly Design
  - With only two buttons, meter operation could not be simpler. Two buttons allow you to quickly adjust settings, select the measurement range, and choose calibration buffer sets.

- Watertight Connection
  - A Quick Connect DIN connector makes attaching and removing the probe simple and easy. The rubber coating protects the cable and creates a sealed connection for added reliability.
- Probe Condition
  - An on-screen indicator provides visual confirmation that your probe is working at its best.
- Large LCD
  - A multilevel display provides at-a-glance readings of your most important numbers from any angle.
- Durable IP67 waterproof Casing
  - Designed to withstand the knocks, drops, and spills of real life, the new IP67 body ensures top performance in any environment. These meters are totally protected against dust and water intrusion from any direction.
- On-screen calibration tags
- mV of pH measurement for electrode check
- Selectable temperature unit (°C or °F)
- Battery life indication and low battery detection

HI9814 is a durable, portable pH, conductivity, total dissolved solids and temperature meter for most measurements encountered in hydroponics, aquaponics or general agriculture applications. All operations and settings, are made through only two buttons and the housing is waterproof and rated for IP67 conditions. User-selectable features include selectable TDS factors of 0.5 and 0.7 as well as auto-off after 8 minutes or 60 minutes to prolong battery life.

The supplied HI1285-7 multiparameter probe measures pH, EC/TDS, and temperature in one convenient, rugged probe.

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

- Optional shockproof silicon rubber boot
  - Specially designed to protect your instrument from damage or impact

HI710030 Green

HI1285-7 Multiparameter Probe

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

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

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

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

Specifications		HI9814
pH	Range*	-2.00 to 16.00 pH
	Resolution	0.01 pH
	Accuracy	±0.02 pH
	Calibration	automatic, one or two-point calibration (using pH 4.01, 7.01, 10.01 buffers); one-point calibration using quick calibration solution
	Temperature Compensation	automatic
pH-mV	Range	±825 mV
	Resolution	1 mV
	Accuracy	±1 mV
EC	Range	0.00 to 6.00 mS/cm**
	Resolution	0.01 mS/cm
	Accuracy	±2% F.S.
	Calibration	automatic, one-point at 1.41 mS/cm or 5.00 mS/cm; one-point calibration using quick calibration solution
	Temperature Compensation	automatic, with β = 1.9%/°C
TDS	Range	0 to 3000 ppm (500 CF); 0 to 3999 ppm (700 CF)
	Resolution	10 ppm (mg/L)
	Accuracy	±2% F.S.
	Conversion Factor (CF)***	0.5 (500 ppm) or 0.7 (700 ppm)
Temperature	Range*	-5.0 to 105.0°C / 23.0 to 221.0°F
	Resolution	0.1°C/0.1°F
	Accuracy	±0.5°C /±1.0°F
Additional Specifications	Probe (included)	HI1285-7 pH/EC/TDS/temperature sensor, DIN connector and 1 m (3.3') cable
	Battery Type/Life	1.5V AAA (3) /approx. 500 hours of continuous use
	Auto-off	user selectable: after 8 min, 60 min or disabled
	Environment	0 to 50°C (32 to 122°F); RH max. 100%
	Meter Dimensions	154 x 63 x 30 mm (6.1 x 2.5 x 1.2")
	Meter Mass (with batteries)	196 g (6.91 oz.)
	Casing Ingress Protection Rating	IP67
Ordering Information	**HI9814** is supplied with HI1285-7 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1m (3.3') cable, HI50036 Quick calibration solution sachets (3), HI700661 electrode cleaning solution sachets for agriculture (3), 100 mL beaker, 1.5V AAA batteries (3), calibration certificate of meter, calibration certificate of probe, instruction manual and rugged carrying case.	

* the pH range is limited from 0 to 13 pH and the temperature range from 0 to 50 °C (32 to 122 °F) using HI1285-7 probe.
** mS/cm is displayed as mS on the display.
*** TDS Conversion Factor: 1000 µS/cm = 500 ppm with 0.5 CF.

pH and Quick Cal solutions begin on page 2.154; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

HI12943 pH Electrode

HI9814 is also compatible with the HI12943 pH electrode.

See page 2.139 for more information

HI9813-5 · HI9813-6

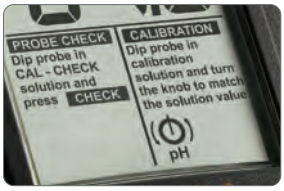
pH/EC/TDS/ Temperature Portable Meter

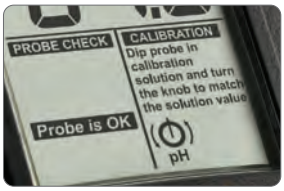
- Waterproof
- CAL Check™ (HI9813-6)
  - Allows the user to easily check the probe calibration status at any time.
- Variable EC to TDS conversion factor
  - Factor automatically adjusts from 0.56 to 0.78 based on actual EC readings
  - Factor based on 442 curve for natural water
- Automatic Temperature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

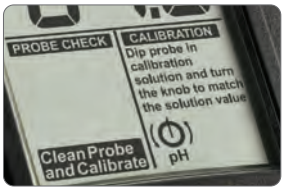
The HI9813-6 and HI9813-5 portable meters feature a large LCD which displays either pH, EC, TDS or temperature readings along with tutorial instructions. The pH readings are displayed with a 0.1 resolution and an accuracy of ±0.1 pH while the EC and TDS readings are displayed with a 0.01 mS/cm and 1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

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

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







HI9813-6 CAL Check™ Feature

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

HI1285 series probes

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

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

Specifications		HI9813-5	HI9813-6 (with CAL Check)
pH	Range	0.0 to 14.0 pH	0.0 to 14.0 pH
	Resolution	0.1 pH	0.1 pH
	Accuracy	±0.1 pH	±0.1 pH
EC	Range	0.00 to 4.00 mS/cm	0.00 to 4.00 mS/cm
	Resolution	0.01 mS/cm	0.01 mS/cm
	Accuracy	±2% F.S.	±2% F.S.
TDS	Range	0 to 1999 ppm (mg/L)	0 to 1999 ppm (mg/L)
	Resolution	1 ppm (mg/L)	1 ppm (mg/L)
	Accuracy	±2% F.S.	±2% F.S.
Temperature	Range	0.0 to 60.0°C	0.0 to 60.0°C
	Resolution	0.1°C	0.1°C
	Accuracy	±0.5°C	±0.5°C
Additional Specifications	TDS Conversion Factor	0.56 to 0.78 ppm = 1 µS/cm (according to TDS 442 curve)	0.56 to 0.78 ppm = 1 µS/cm (according to TDS 442 curve)
	pH & EC/TDS Calibration	manual, one point (all parameters except temperature)	manual, one point (all parameters except temperature)
	Temp. Compensation	automatic 0 to 70°C (32 to 158°F) with β=2%/°C (EC/TDS only)	automatic 0 to 70°C (32 to 158°F) with β=2%/°C (EC/TDS only)
	Probe	HI1285-5 polypropylene body, pre-amplified multiparameter probe with internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable (included)	HI1285-6 polypropylene body, pre-amplified multiparameter probe with CAL Check compatibilty, internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable (included)
	Battery Type / Life	9V / approximately 450 hours of continuous use	
	Environment	0 to 50°C (32 to 122°F); RH max 100%	
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")	
	Weight	230 g (8.1 oz.)	
Ordering Information		**HI9813-5** is supplied with HI1285-5 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70442 1500 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI700661 electrode cleaning solution sachets (2), battery and instructions. **HI9813-6** is supplied with HI1285-6 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70442 1500 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI50021 calibration check solution sachets (2), HI700661 electrode cleaning solution sachets (2), 9v battery (1), instructions and rugged carrying case.	
Accessories		**HI50021P** CAL Check solution sachets for HI9813-6, 20mL (25)	
		HI710007 blue shockproof rubber boot	
		HI710008 orange shockproof rubber boot	

pH solutions begin on page 2.154; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

HI9810-6 · HI9811-5 · HI9812-5

pH/EC/TDS/ Temperature Portable Meters

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

HI9810-6 is a pH/EC/TDS meter designed to measure pH, µS/cm, mg/L and temperature in hydroponics, greenhouse, farming and ground water applications. HI9810-6 features Cal Check™, which allows the user to easily check the probe calibration status at any time.

The HI9812-5 and HI9811-5 are pH/EC/TDS meters for agriculture, greenhouse and hydroponics applications.

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

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

The supplied probe on all models feature a polypropylene body, amplified pH electrode with a built-in EC/TDS and temperature sensors. The amplifier for the pH electrode prevents interference from humidity and electrical noise from common sources including from motors, ballasts or pumps.

HI1285-5 and HI1285-6 probes

HI9811-5 and HI9812-5 are supplied with the HI1285-5 pH/EC/TDS/temperature probe. The HI9810-6 is supplied with the HI1285-6 pH/EC/TDS/temperature probe with CAL Check. The pH, EC, TDS, and temperature sensor are housed in a single body that connects to the meter with a DIN connector.

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

Specifications		HI9810-6	HI9811-5	HI9812-5
pH	Range	0.0 to 14.0 pH	0.0 to 14.0 pH	0.0 to 14.0 pH
	Resolution	0.1 pH	0.1 pH	0.1 pH
	Accuracy	±0.1 pH	±0.1 pH	±0.1 pH
EC	Range	0 to 6000 µS/cm	0 to 6000 µS/cm	0 to 1990 µS/cm
	Resolution	10 µS/cm	10 µS/cm	10 µS/cm
	Accuracy	±2% F.S.	±2% F.S.	±2% F.S.
TDS	Range	0 to 3000 ppm (mg/L)	0 to 3000 ppm (mg/L)	0 to 1990 ppm (mg/L)
	Resolution	10 ppm (mg/L)	10 ppm (mg/L)	10 ppm (mg/L)
	Accuracy	±2% F.S.	±2% F.S.	±2% F.S.
Temperature	Range	0 to 70°C	0 to 70°C	0 to 60°C
	Resolution	0.1°C	0.1°C	10°C
	Accuracy	±0.5°C	±0.5°C	±1°C
Additional Specifications	TDS Conversion Factor	0.5 ppm (mg/L) = 1 µS/cm	0.5 ppm (mg/L) = 1 µS/cm	
	pH Calibration	manual, 1-point through offset trimmer		
	EC/TDS Calibration	manual, 1-point through slope trimmer		
	EC/TDS Temperature Compensation	automatic from 0 to 70°C (32 to 158°F) with β = 2% /°C		
	Probe (included)	HI1285-6 polypropylene body, pre-amplified multiparameter probe with CAL Check, internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable	HI1285-5 polypropylene body, pre-amplified multiparameter probe with internal temperature sensor, 8-pin DIN connector and 1 m (3.3') cable	
	Battery Type / Life	9V / approximately 450 hours of continuous use		
	Environment	0 to 50°C (32 to 122°F); RH max 100%		
	Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")		
	Weight	230 g (8.1 oz.)		
Ordering Information		**HI9810-6** is supplied with HI1285-6 multiparameter probe with CAL Check, HI70007 pH 7.01 calibration solution sachet, HI70032 1382 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI700661 electrode cleaning solution sachets (2), 9v battery (1), instructions and rugged carrying case. **HI9811-5** and **HI9812-5** are supplied with HI1285-5 multiparameter probe, HI70007 pH 7.01 calibration solution sachet, HI70032 1382 ppm (mg/L) calibration solution sachet, HI70031 1413 µS/cm calibration solution sachet, HI700661 electrode cleaning solution sachets (2), 9v battery (1), instructions and rugged carrying case.		
Accessories		**HI710007** blue shockproof rubber boot		
		HI710008 orange shockproof rubber boot		

pH solutions begin on page 2.154; EC and TDS solutions begin on page 5.34;
See page 7.50 for probe specifications

Replacement Probes

Code	HI1285-7	HI1285-6	HI1285-5	HI12883
Description	pre-amplified pH and EC probe	pre-amplified pH and EC probe	pre-amplified pH and EC probe	pre-amplified pH and EC probe
Reference	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl	single, Ag/AgCl
Junction / Flow Rate	cloth	cloth	cloth	cloth
Electrolyte	gel	gel	gel	gel
Max Pressure	0.1 bar	0.1 bar	0.1 bar	1 bar
Range	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT	pH: 0 to 13 / EC T: 0 to 50°C (32 to 122°F) - LT
Tip /Shape	spheric (dia: 8.0 mm)	spheric (dia: 8.0 mm)	spheric (dia: 8.0 mm)	spheric (dia: 8.5 mm)
Glass Type	LT (low temperature)	LT (low temperature)	LT (low temperature)	LT (low temperature)
Temperature Sensor	yes	yes	yes	yes
Amplifier	yes	yes	yes	yes
Body Material	polypropylene	polypropylene	polypropylene	polypropylene
Cable	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')	7-pole; 1 m (3.3')
Recommended Use	greenhouses, hydroponics	greenhouses, hydroponics, environmental monitoring, water treatment, boilers, cooling towers	greenhouses, hydroponics, environmental monitoring, water treatment, boilers, cooling towers	general purpose, water treatment, agriculture, boilers, cooling towers
Plug	Quick Connect DIN To be used with HI9814	DIN with CAL Check™ To be used with HI9813-6 and HI9810-6	DIN To be used with HI9811, HI9812 and HI9813 series	Quick Connect DIN To be used with HI991300 and HI991301

Table of Contents

Magnetic Stirrers

Speedsafe™ from Hanna

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

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

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

Sophisticated Engineering

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

- ABS plastic cover
- Stainless steel cover

Speedsafe™

HI190M • HI190M-0 • HI200M

Our Most Popular Magnetic Mini-Stirrers

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

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

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

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

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

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

HI300N • HI310N

Heavy-duty Magnetic Stirrers

- Stainless steel cover

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

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

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

HI302N

Auto-reverse Magnetic Stirrers

- Stainless steel cover

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

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

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

HI304N

Auto-reverse Magnetic Stirrers

with Tachometer

- Stainless steel cover

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

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

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

HI324N

Timer Controlled Magnetic Stirrers

- Stainless steel cover

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

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

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

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

HI181

Compact Magnetic Mini-Stirrers

with Electrode Holder

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

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

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

Speedsafe™

11 colors to choose from


HI181 - Black


HI181W - Arctic White


HI181F - Blue


HI181K - Orange


HI181J - Charcoal


HI181I - Ivory


HI181C - Glacier Blue


HI181A - Yellow


HI181M - Moss Green


HI181E - Green


HI181L - Lavender

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

Ordering Information

All models include electrode holder, micro stir bar and instructions

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

Speedsafe™

11 colors to choose from


HI180 - Black


HI180W - Arctic White


HI180F - Blue


HI180K - Orange


HI180J - Charcoal


HI180I - Ivory


HI180C - Glacier Blue


HI180A - Yellow


HI180M - Moss Green


HI180E - Green


HI180L - Lavender

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

HI180

Compact Magnetic Mini-Stirrers

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

Hanna HI180 series is compact, lightweight and inexpensive.

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

Ordering Information

All models are supplied with micro stir bar and instructions

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