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Conductivity/TDS Meters Introduction

Definition of Conductivity

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

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

Units of Measurement

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

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

The IUPAC conversion

1000 microSiemens/cm ($\mu\text{S/cm}$) = 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.

$$\text{TDS} = \text{factor} \times \text{EC}_{25}$$

For example: 100 $\mu\text{S/cm}$ conductivity is a TDS of 50ppm when the factor is 0.5.

Conductivity/Resistivity/TDS of Commonly Measured Substances

Sample at 25°C	M Ω •cm	$\mu\text{S/cm}$	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.



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Conductivity/TDS Meters Introduction

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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.

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.

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

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

Typical Temperature Coefficients of Various Solutions

Sample	Percent / °C
Ultrapure Water	4.55
NaCl	2.12
5% NaOH	1.72
10% HCl	1.32
5% H ₂ SO ₄	0.96
98% H ₂ SO ₄	2.84

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

(USP) United States Pharmacopeia Compliant Conductivity

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

They offer programmable set points to exceed the minimum meet USP and EP requirements and prompts to guide the technician. Water that does not pass at Stage 2 must be tested for pH.

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

Conductivity Calibration

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

Types of Conductivity

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

Four electrode conductivity (four-ring conductivity) utilizes a potentiometric 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.

Conductivity / TDS

Introduction

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Product Spotlights

Conductivity / TDS

product spotlights

5.4

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edge®EC

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

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

[See page 5.6](#)



HI5321

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

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

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

[See page 5.10](#)



HI98192

Graphic Display EC/ Resistivity/TDS/NaCl Meter

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

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

[See page 5.16](#)

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®EC	•						•	•	°C/°F	1	6	•	•	•	•		•	•	•	5.6
HI5321	•				•		•	•	°C/°F K	4	†	•	•	•	•	•	•	•		5.24
HI2300	•						•		°C	1	6	•		•			•	•		5.12
HI2316	•				•							•								5.14
HI2314	•									1										5.15
HI2315	•									1		•								5.15

† auto standard recognition, custom calibration solution

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	•	•	•	•		•	•	•	•		5.16
HI98197	•		•		•	•	°C	5	7	•	•	•	•		•	•	•	•	•	5.19
HI9835	•				•	•	°C/°F	1	6	•	•		•			•	•			5.23
HI99300	•				•		°C/°F	1	1	•	•			•				•		5.24
HI99301	•				•		°C/°F	1	1	•	•			•				•		5.24
HI993310	•							1		•	•									5.25
HI9033	•							1		•	•							•		5.26
HI9034					•			1			•							•		5.26
HI8633	•							1		•								•		5.27
HI8733	•							1		•								•		5.27
HI87314	•		•					1		•										5.28
HI8734					•													•		5.29
HI8033	•				•			1												5.30

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edge® EC

Conductivity / TDS

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 $\mu\text{S}/\text{cm}$ to 500 mS/cm (absolute EC)
- Accuracy
 - $\pm 1\%$ of the reading ($\pm 0.05 \mu\text{S}/\text{cm}$ or 1 digit, whichever is greater)
- Calibration
 - Offset (0 $\mu\text{S}/\text{cm}$) 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

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edge EC technical features



- 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 charging edge EC when the cradle is not available.



- Clear, full text readout
 - edge EC 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 from the last calibration you perform is stored in the sensor including the date, time and standards. When the sensor is connected to edge EC, GLP data is automatically transferred.



- Basic mode
 - You can use edge EC in basic mode—ideal for routine measurements by displaying a simplified screen and features.

edge EC design features



- Capacitive touch keypad
 - edge EC features a capacitive touch keypad that gives a distinctive, modern look. Since the keypad is part of the screen, your buttons can never get clogged with sample residue.



- Easy to read LCD
 - edge 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 edge EC and charge its batteries.



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



- Sleek design
 - Incredibly thin and lightweight, edge EC measures just 1/2" (12.7 mm) thick and weighs just 8.8 ounces (250 g).

Accepts edge® compatible EC probes

0

footprint

0.5

inch thick
(12.7 mm)

8.8

oz. weight
(250 g)

8

hours battery
life

5.5

inch display
(14 cm)

2

USB ports

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instruments

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Conductivity / TDS

edge®EC

5

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Conductivity / TDS

edge[®]EC

A hybrid meter that can be used in portable, wall-mount and bench-top 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 be easily slipped into a backpack or messenger bag. Up to 8 hours of battery life when used as a portable device



- Wall mount cradle
- The included wall mount cradle makes it easy to conserve space on the benchtop and can charge edge EC with the AC adapter. Ideal for continuous monitoring applications



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

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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.

- Simply connect each probe via the 3.5 mm jack; digital Smart electrodes are automatically recognized

Conductivity probe



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

Specifications	edge EC
EC	Range0.00 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**
	Resolution0.01 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)
	Calibrationsingle cell factor calibration; six standards available: 84 µS/cm, 1413 µS/cm, 5.00 mS/cm, 12.88 mS/cm, 80.0 mS/cm, 118.8 mS/cm, one point offset: 0.00 µS/cm
	Temperature Coefficient0.00 to 6.00%/°C (for EC and TDS only), default value is 1.90%/°C
TDS	Range0.00 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**
	Resolution0.01 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)
	Calibrationthrough EC calibration
	TDS Factor0.40 to 0.80 (default value is 0.50)
Salinity†	Range0.0 to 400.0 ‰ NaCl; 2.00 to 42.00 PSU; 0.0 to 80.0 g/L
	Resolution0.1 ‰ NaCl; 0.01 PSU; 0.01 g/L
	Accuracy (@25°C/77°F)±1% of reading
	CalibrationPSU 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
	Resolution0.1°C; 0.1°F
	Accuracy±0.5°C; ±0.9°F
Additional Specifications	ProbeHI763100 digital four-ring conductivity probe with 3.5 mm (1/8") connector and 1 m (3.3') cable
	Loggingup to 1000 ¹ (400 for basic mode) records organized in: manual log-on-demand (max. 200 logs), manual log-on-stability (max. 200 logs), interval logging ¹ (max. 600 samples; 100 lots)
	Connectivity1 USB port for storage; 1 micro USB port for charging and PC connectivity
	Environment0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Power Supply5 VDC adapter (included)
	Dimensions202 x 140 x 12 mm (7.9" x 5.5" x 0.5")
	Weight250 g (8.82 oz.)
Ordering Information	HI2003-01 (115V) and HI2003-02 (230V) edge®EC includes: HI763100 Conductivity probe, 1413 µS/cm conductivity standard sachets (4), 12880 µS/cm conductivity standard sachets (2), 5000 µS/cm conductivity standard sachets (2), electrode rinse solution sachets (2), benchtop docking station with electrode holder, wall-mount cradle, USB cable, 5 VDC power adapter, quality certificates and instruction manual.

* temperature limits will be reduced to actual probe limits
** with temperature compensation function disabled
¹ standard mode only
EC, TDS and Salinity solutions begin on page 5.31

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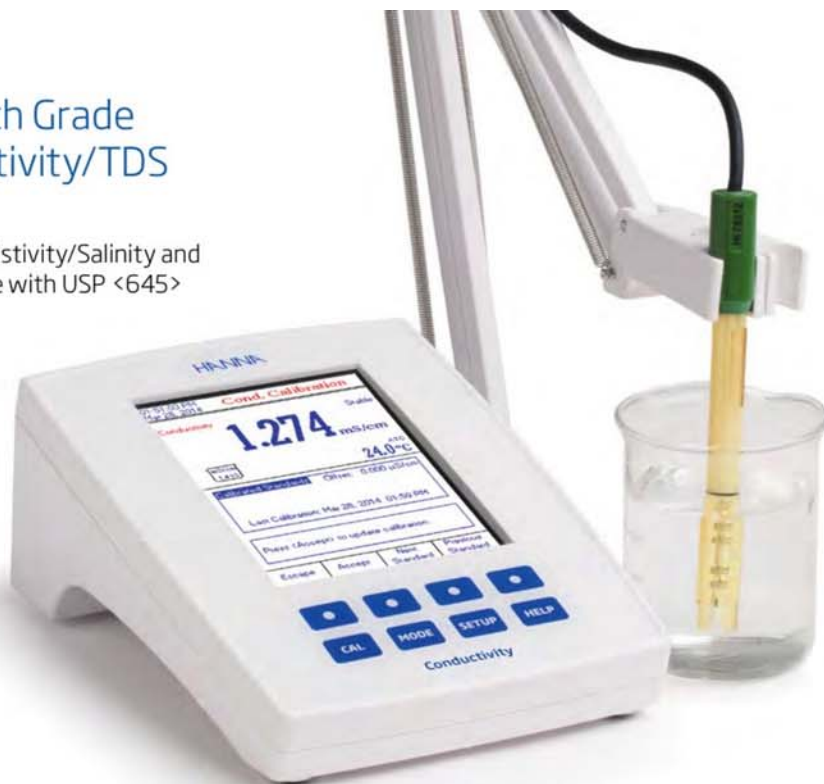
HI5321

Research Grade Conductivity/TDS Meter

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

Conductivity / TDS

benchtop



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 $\mu\text{S}/\text{cm}$ 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.

5.10



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USP <645>

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



Specifications	HI5321
EC	Range
	0.000 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 1000.0 mS/cm actual EC*
	Resolution
	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy
	±1% of reading (±0.01 µS/cm)
	Cell Constant
	0.0500 to 200.00/cm
	Cell Type
	4-pole cell
TDS	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
Resistivity	Profiles
	up to 10
	USP Compliant
	yes
	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)
Salinity	Range
	1.0 to 99.9 g/cm; 100 to 999 g/cm; 1.00 to 9.99 kQ/cm; 10.0 to 99.9 kQ/cm; 100 to 999 kQ/cm; 1.00 to 9.99 MQ/cm; 10.0 to 100.0 MQ/cm
	Resolution
	0.1 g/cm; 1 g/cm; 0.01 kQ/cm; 0.1 kQ/cm; 1 kQ/cm; 0.01 MQ/cm; 0.1 MQ/cm
	Accuracy
	±2% of reading (±1 g/cm)
	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
Temperature**	Accuracy
	±1% of reading
	Calibration
	percent scale—one-point (with HI7037 standard); all others through EC
	Range
	-20.0 to 120°C; -4.0 to 248.0°F; 253.15 to 393.15K
	Resolution
	0.1°C; 0.1°F; 0.1K
	Accuracy
	±0.2°C; ±0.4°F; ±0.2K (without probe)
Additional Specifications	EC Probe
	HI76312 platinum, four-ring EC/TDS probe with and 1 m (3.3') cable (included)
	GLP
	cell constant, reference temperature/coefficient, calibration points, cal time stamp, probe offset for conductivity
	Logging
	record : 100,000 data point storage/channel, up to 100 lots with max. 50,000 records/lot; interval : fourteen presets selectable between 1 second and max log time of 180 minutes; type : automatic, manual, AutoHOLD; additional : 200 records USP
	PC Connection
	USB
	Power Supply
	12 VDC adapter (included)
Ordering Information	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.)
	HI5321-01 (115V) and HI5321-02 (230V) are supplied with HI76312 EC/TDS probe, 1413 µS/cm conductivity standard sachet (4), 12880 µS/cm conductivity standard sachet (2), 5000 µS/cm conductivity standard sachet (2), electrode rinse solution sachet (2), HI76404W electrode holder, 12 VDC adapter, capillary dropper pipette, quality certificate, quick start guide and instruction manual.

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

EC, TDS and Salinity solutions begin on page 5.31

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5.11

Conductivity / TDS

benchmark

5

5

HI2300

Autoranging Bench Meter

EC, TDS, Salinity and Temperature

Conductivity / TDS

benchtop



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 $\mu\text{S}/\text{cm}$ 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.

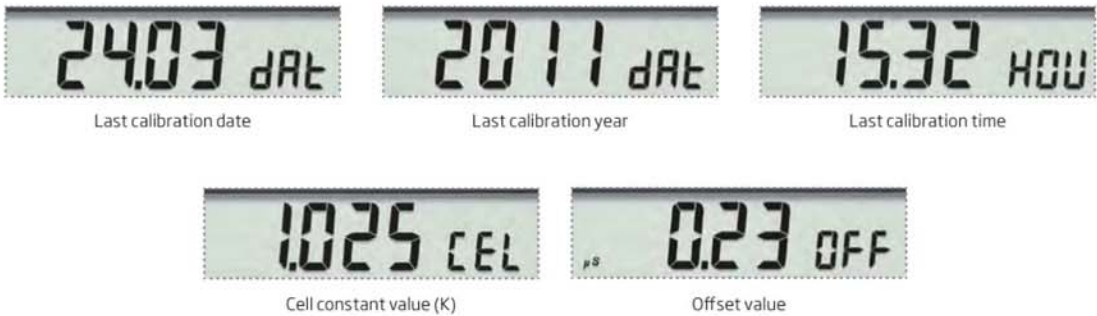
Data Transfer

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

5.12


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On-screen Features



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 5.31

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5.13

HI2316
EC and Resistivity
Meter

The HI2316 is a durable benchtop EC and resistivity meter that comes with a four-ring potentiometric EC probe and a resistivity probe. Both EC and resistivity can be manually calibrated at one point, and a knob on the front panel allows users to adjust the temperature coefficient.

Four-ring EC Probe

The HI2316 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 $\mu\text{S}/\text{cm}$ to 199.9 mS/cm .

Resistivity Probe

The HI3316D probe is specially designed to measure resistivity. The probe features a built-in temperature sensor and is easy to maintain.

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 $\%/^{\circ}\text{C}$ for EC measurements and from 2 to 7 $\%/^{\circ}\text{C}$ for resistivity measurements.

Calibration

One-point calibration for both EC and resistivity is able to be performed manually.

Large LCD

The large LCD display is bright and easy to read.

Built-in Solution Holders

The HI2316 features four built-in solution holders for users to conveniently store their calibration standards when not in use.



Specifications		HI2316
EC	Range	0.0 to 199.9 $\mu\text{S}/\text{cm}$; 0 to 1999 $\mu\text{S}/\text{cm}$; 0.00 to 19.99 mS/cm ; 0.0 to 199.9 mS/cm
	Resolution	0.1 $\mu\text{S}/\text{cm}$; 1 $\mu\text{S}/\text{cm}$; 0.01 mS/cm ; 0.1 mS/cm
	Accuracy	$\pm 1\%$ FS
Resistivity	Range	0 to 19.90 $\text{M}\Omega\cdot\text{cm}$
	Resolution	0.10 $\text{M}\Omega\cdot\text{cm}$
	Accuracy	$\pm 2\%$ FS
Additional Specifications	Calibration	manual, one point, for both EC and resistivity
	Temperature Compensation	Automatic, 0 to 50°C (32 to 122°F) with β user selectable coefficients between 0 to 2.5 $\%/^{\circ}\text{C}$ for EC and from 2 to 7 $\%/^{\circ}\text{C}$ for resistivity
	Probes	HI76303 platinum four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included); HI3316D resistivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)
	Power Supply	12 VDC (power adapter included)
	Environment	0 to 50°C (32 to 122°F); RH max 95%
Ordering Information	Dimensions / Weight	235 x 222 x 109 mm (9.2 x 8.7 x 4.3") 1.3 kg (2.9 lbs)
		HI2316-01 (115V) and HI2316-02 (230V) are supplied with HI76303 conductivity probe, HI3316D resistivity probe, 12 VDC adapter and instruction manual.



HI2314 · HI2315

Conductivity Meter

5

Conductivity / TDS

benchtop

The HI2314 and HI2315 are durable benchtop meters that measure conductivity in four different ranges. These meters utilize a four-ring potentiometric conductivity probe with platinum sensors to offer versatility over typical amperometric designs. By utilizing the four-ring probe, it is possible to measure very low or very high conductivity levels without having to change probes. EC can be manually calibrated at one point, and a knob on the front panel allows users to adjust the temperature coefficient.

The HI2315 also offers automatic temperature compensation and an adjustable temperature coefficient (β).

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 $\mu\text{S}/\text{cm}$ to 199.9 mS/cm.

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.

Calibration

Users can easily perform a manual, one-point calibration to ensure accurate measurements.

Large LCD

The large LCD display is bright and easy to read.

Built-in Solution Holders

The HI2315 features four built-in solution holders for users to conveniently store their calibration standards when not in use.

Specifications	HI2314	HI2315
EC	Range	0.0 to 199.9 $\mu\text{S}/\text{cm}$; 0 to 1999 $\mu\text{S}/\text{cm}$; 0.00 to 19.99 mS/cm; 0.0 to 199.9 mS/cm
	Resolution	0.1 $\mu\text{S}/\text{cm}$; 1 $\mu\text{S}/\text{cm}$; 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	manual, 0 to 50°C (32 to 122°F) with $\beta = 2\%/^{\circ}\text{C}$ automatic, 0 to 50°C (32 to 122°F) with β adjustable coefficient from 0 to 2.5%/°C
	Probe	HI76300, platinum four ring conductivity probe with DIN connector and 1 m (3.3') cable (included) 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	HI2314-01 (115V) and HI2314-02 (230V) are supplied with HI76300 conductivity probe, 12 VDC adapter and instruction manual. HI2315-01 (115V) and HI2315-02 (230V) are supplied with HI76303 conductivity probe, 12 VDC adapter and instruction manual.	

EC solutions begin on page 5.31

5

Conductivity / TDS

portable

HI98192

Professional
Waterproof MetersEC/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 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**
 - Dot matrix display with multifunction virtual keys
- **AutoHold**
 - Automatically holds the first stable reading on the display
- **Calibration timeout**
 - Alerts when calibration is due at a specified interval
- **Connectivity**
 - PC connectivity via opto-isolated micro-USB with HI92000 software
- **GLP**
 - GLP data provides data from previous calibration to ensure Good Laboratory Practices are met
- **Intuitive keypad**
 - Most of the available options such as GLP information, help, range, calibration and backlight have a dedicated button
- **Supplied complete**
 - Each meter is supplied complete with sensor, calibration solution, beakers, PC software and connection cable, instruction manual, quick start guide and batteries in a rugged, custom carrying case.



For Universal Applications

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



Backlit Graphic LCD Display

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

Waterproof Protection

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



Quick connect probe

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

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.

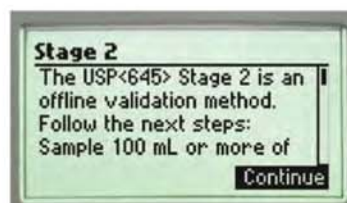
Ten sets of customized measurement parameters can be stored as a user profile and later recalled.

USP <645>

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

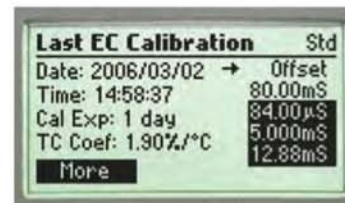


- Progress bar
- Displays reading stability progress towards meeting stage 2 requirements



Data Logging

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



GLP

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

Intuitive Keypad

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

AutoHold

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

Dedicated Help Key

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

Setup screen

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

PC Connectivity

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

Long Battery Life

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

Rugged custom carrying case

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



Specifications		HI98192
EC	Range	0 to 400 mS/cm (shows values up to 1000 mS/cm actual conductivity)** 0.001 to 9.999 μ S/cm*; 10.00 to 99.99 μ S/cm; 100.0 to 999.9 μ S/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 μ S/cm*; 0.01 μ S/cm; 0.1 μ S/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm
	Accuracy	$\pm 1\%$ of reading ($\pm 0.01 \mu$ S/cm or 1 digit, whichever is greater)
	Calibration	automatic up to five points with seven memorized standards (0.00 μ S/cm, 84.0 μ S/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	$\pm 1\%$ of reading (± 0.05 ppm or 1 digit, whichever is greater)
Resistivity	Range	1.0 to 99.9 $\Omega \cdot \text{cm}$; 100 to 999 $\Omega \cdot \text{cm}$; 1.00 to 9.99 $\text{K}\Omega \cdot \text{cm}$; 10.0 to 99.9 $\text{K}\Omega \cdot \text{cm}$; 100 to 999 $\text{K}\Omega \cdot \text{cm}$; 1.00 to 9.99 $\text{M}\Omega \cdot \text{cm}$; 10.0 to 100.0 $\text{M}\Omega \cdot \text{cm}$ * (autoranging)
	Resolution	0.1 $\Omega \cdot \text{cm}$; 1 $\Omega \cdot \text{cm}$; 0.01 $\text{K}\Omega \cdot \text{cm}$; 0.1 $\text{K}\Omega \cdot \text{cm}$; 1 $\text{K}\Omega \cdot \text{cm}$; 0.01 $\text{M}\Omega \cdot \text{cm}$; 0.1 $\text{M}\Omega \cdot \text{cm}$ *
	Accuracy	$\pm 1\%$ of reading ($\pm 10 \Omega$ 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	$\pm 1\%$ 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	$\pm 0.2^\circ\text{C}$; $\pm 0.4^\circ\text{F}$ (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 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	HI98192 is supplied with HI763133 platinum, four-ring conductivity/TDS probe, HI7031M 1413 μ S/cm calibration solution (230 mL), HI7035 111.8 mS/cm calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V AA batteries (4), quick start guide, quality certificate and instruction manual in an HI720192 rugged carrying case with custom insert.	

* The 0.000 μ S/cm EC range and 0.1 $\text{M}\Omega \cdot \text{cm}$ resistivity range are not available with the optional 4m cable probe

**Uncompensated temperature reading

(†) Reduced to actual sensor limits



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EC, TDS and Salinity solutions begin on page 5.31



For Ultrapure Water Applications

HI98197 is a waterproof, portable EC (conductivity) meter that has an expanded conductivity range from 0.000 $\mu\text{S}/\text{cm}$ to 400 mS/cm , as well as TDS (total dissolved solids), resistivity, and three salinity scales. This meter offers a quick connect four-ring 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.

HI98197

Professional Waterproof Meter for Ultrapure Water

- Conductivity and resistivity
 - High resolution of 0.001 $\mu\text{S}/\text{cm}$ for conductivity and 0.1 $\text{M}\Omega\cdot\text{cm}$ 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
- Approximately 100 hour battery life
 - Powered by (4) 1.5V AA batteries
- Four-ring platinum probe
 - This probe can cover low EC samples to 1000 mS/cm (actual EC)
- Waterproof
 - IP67 rated waterproof, rugged enclosure
- 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

5

Conductivity / TDS

portable

5

Conductivity / TDS

portable

5.20


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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 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 $18.2 \text{ M}\Omega \cdot \text{cm}$ at 25°C .



HI605453 flow cell
for ultrapure water





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. The probe features an IP68 rating for continuous immersion in water.



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.

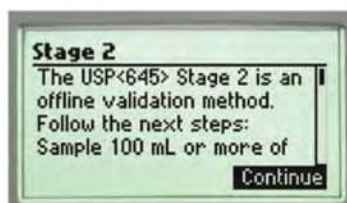
* The 0.000 µS/cm EC range and 0.1 MΩ·cm resistivity range are not available with the optional 4m cable probe
**Uncompensated temperature reading

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 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.



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 $\mu\text{S}/\text{cm}$; 10.00 to 99.99 $\mu\text{S}/\text{cm}$; 100.0 to 999.9 $\mu\text{S}/\text{cm}$; 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 $\mu\text{S}/\text{cm}$; 0.01 $\mu\text{S}/\text{cm}$; 0.1 $\mu\text{S}/\text{cm}$; 0.001 mS/cm ; 0.01 mS/cm ; 0.1 mS/cm
TDS	Accuracy
	$\pm 1\%$ of reading ($\pm 0.01 \mu\text{S}/\text{cm}$ or 1 digit, whichever is greater)
	Calibration
	automatic up to five points with seven memorized standards (0.00 $\mu\text{S}/\text{cm}$, 84.0 $\mu\text{S}/\text{cm}$, 1.413 mS/cm , 5.00 mS/cm , 12.88 mS/cm , 80.0 mS/cm , 111.8 mS/cm)
Resistivity	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
Salinity	Accuracy
	$\pm 1\%$ of reading ($\pm 0.05 \text{ ppm}$ or 1 digit, whichever is greater)
	Range
	1.0 to 99.9 $\Omega \cdot \text{cm}$; 100 to 999 $\Omega \cdot \text{cm}$; 1.00 to 9.99 $\text{K}\Omega \cdot \text{cm}$; 10.0 to 99.9 $\text{K}\Omega \cdot \text{cm}$; 100 to 999 $\text{K}\Omega \cdot \text{cm}$; 1.00 to 9.99 $\text{M}\Omega \cdot \text{cm}$; 10.0 to 100.0 $\text{M}\Omega \cdot \text{cm}$ (autoranging)
Temperature [†]	Resolution
	0.1 $\Omega \cdot \text{cm}$; 1 $\Omega \cdot \text{cm}$; 0.01 $\text{K}\Omega \cdot \text{cm}$; 0.1 $\text{K}\Omega \cdot \text{cm}$; 1 $\text{K}\Omega \cdot \text{cm}$; 0.01 $\text{M}\Omega \cdot \text{cm}$; 0.1 $\text{M}\Omega \cdot \text{cm}$
	Accuracy
	$\pm 1\%$ of reading ($\pm 10 \Omega$ or 1 digit, whichever is greater)
Additional Specifications	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
Ordering Information	Accuracy
	$\pm 1\%$ of reading
	Calibration
	max. one point only in % NaCl range with HI7037 standard; use conductivity calibration for all other ranges
Additional Specifications	Range
	-20.0 to 120.0°C; -4.0 to 248.0°F
	Resolution
	0.1°C; 0.1°F
Additional Specifications	Accuracy
	$\pm 0.2^\circ\text{C}$; $\pm 0.4^\circ\text{F}$ (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
Additional Specifications	Reference Temperature
	15°C, 20°C, and 25°C
	Temperature Coefficient
	0.00 to 10.00 %/°C
Additional Specifications	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)
Additional Specifications	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
Additional Specifications	Measurement Modes
	autorange, autoend, lock, and fixed range
	PC Connectivity
	opto-isolated sealed USB (with HI92000 software and micro USB cable)
Additional Specifications	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
Additional Specifications	Environment
	0 to 50°C (32 to 122°F); RH100% 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 $\mu\text{S}/\text{cm}$ calibration solution (230 mL), HI7033M 84 $\mu\text{S}/\text{cm}$ calibration solution (230 mL), 100 mL plastic beaker (2), HI92000 PC software, HI920015 micro USB cable, 1.5V batteries (4), quality certificate, instruction manual and quick start guide in an HI720197 rugged carrying case with custom insert.

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



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EC, TDS and Salinity solutions begin on page 5.31



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, 1413, 5000, 12880, 80000, 111800 µS/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 and TDS solutions begin on page 5.31

HI99300 · HI99301

Portable EC Meters
EC/TDS and Temperature

- **ATC**
 - Automatic temperature compensation
- **Methods**
 - Measures EC/TDS and Temperature
- **BEPS**
 - Alerts the user when the battery is low
- **Battery indicator**
 - Battery life indicator at startup
- **One-point calibration**
 - One-point EC/TDS calibration
- **Waterproof**

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

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

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

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

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



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



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	Range0.00 to 19.99 mS/cm
	Resolution0.01 mS/cm
	Accuracy (@25°C/77°F)±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Soil Activity	Range0.00 to 1.00 g/L
	Resolution0.01 g/L
	Accuracy (@25°C/77°F)±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Additional Specifications	Calibrationmanual, one point
	Temperature Compensationautomatic from 0 to 50°C (32 to 122°F), β=2%/°C
	ProbesHI76305 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 / Life9V / approximately 100 hours of continuous use
	Environment0 to 50°C (32 to 122°F); RH max 95% non-condensing
	Dimensions185 x 82 x 52 mm (7.3 x 3.2 x 2.0")
	Weight275 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 5.31

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HI9033 - HI9034

Multi-range EC and TDS Meters

- Automatic temperature compensation (ATC)
- Battery Error Prevention System (BEPS)
 - Alerts the user of low battery power that could adversely affect readings
- One-point calibration
- Waterproof

The HI9033 is a rugged conductivity meter designed to hold up under extended use in wet, humid, dusty and muddy conditions. This meter has the advantage of measuring samples from deionized water to brine without having to switch or recalibrate the probe.

The HI9034 measures total dissolved solids (TDS) in three ranges and offers the highest accuracy when performing measurements in applications as diverse as HVAC, wastewater treatment and reverse osmosis. All three ranges can be activated at the touch of a button without having to change the conductivity probe.

Both instruments perform measurements with Automatic Temperature Compensation which adjusts for the effects of temperature on the probe. These instruments also feature Hanna's BEPS (Battery Error Prevention System) technology that alerts the user when low batteries could affect the readings.



Specifications	HI9033 (EC)	HI9034 (TDS)
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 mg/L; 0 to 1999 mg/L; 0.00 to 19.99 g/L
Resolution	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm	0.1 mg/L; 1 mg/L; 0.01 g/L
Accuracy (@25°C/77°F)	±1% F.S. (excluding probe error)	±1% F.S. (excluding probe error)
Calibration	manual, one point	manual, one point
TDS Factor	–	0.5
Temperature Compensation	automatic, 10 to 50°C (50 to 122°F) with β = 2%/°C	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)	HI76302W 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	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")	185 x 72 x 36 mm (7.3 x 2.8 x 1.4")
Weight	425 g (0.9 lbs.)	425 g (0.9 lbs.)
Ordering Information	HI9033 and HI9034 are supplied with HI76302W conductivity probe, battery, instructions and rugged carrying case.	



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 $\mu\text{S}/\text{cm}$; 0 to 1999 $\mu\text{S}/\text{cm}$ 0.00 to 19.99 mS/cm ; 0.0 to 199.9 mS/cm	0.0 to 199.9 $\mu\text{S}/\text{cm}$; 0 to 1999 $\mu\text{S}/\text{cm}$ 0.00 to 19.99 mS/cm ; 0.0 to 199.9 mS/cm
Resolution	0.1 $\mu\text{S}/\text{cm}$; 1 $\mu\text{S}/\text{cm}$ 0.01 mS/cm ; 0.1 mS/cm	0.1 $\mu\text{S}/\text{cm}$; 1 $\mu\text{S}/\text{cm}$ 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 $\beta = 2\%/^{\circ}\text{C}$	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 $\mu\text{S}/\text{cm}$ HI70030 calibration solution sachets (5), battery, instructions and rugged carrying case. HI8733 is supplied with HI76302W conductivity probe, 12880 $\mu\text{S}/\text{cm}$ HI70030 calibration solution sachets (5), battery, instructions and rugged carrying case.	

EC solutions begin on page 5.31

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.



Conductivity / TDS

portable

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.



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 $\beta = 2\%/^{\circ}\text{C}$
TDS Factor	0.5
Probe	HI76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)
Battery Type / Life	9V / approximately 100 hours of continuous use
Environment	0 to 50°C (32 to 122°F); RH max 100%
Dimensions	145 x 80 x 36 mm (5.7 x 3.1 x 1.4")
Weight	230 g (8.1 oz.)
Ordering Information	HI8734 is supplied with HI76301D conductivity probe, HI70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.

TDS solutions begin on page 5.31

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.	



84 µS/cm Bottles

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

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		
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		
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	•
HI70031P	1413 µS/cm	20 mL	25 sachets	
HI77100C	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	•
HI77100P	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- **Guaranteed quality**
 - Each label shows the production batch number, expiration date and conductivity/temperature correlation table.
- **Certified solutions available**
- **FDA compliant bottles**
 - Opaque, light-tight bottles that meet FDA standards (HI80XX)

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.

Using our single-dose 20 mL solution sachets guarantees freshness for every calibration.

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.

This solution is also available in different sized bottles and in single dose, ready to use sachets.

The HI8031L solution is provided in an opaque bottle according to FDA (Food & Drug Administration) regulations, which prevents the reagent from damage due to extended exposure to light.

Our wide range of calibration solutions also includes solutions provided with a certificate of analysis to satisfy the requirements of any application from the farm to the factory.

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- Guaranteed quality
 - Each label shows the production batch number, expiration date and conductivity/temperature correlation table.
- Certified solutions available
- FDA compliant bottles
 - Opaque, light-tight bottles that meet FDA standards (HI80XX)

5000 $\mu\text{S}/\text{cm}$ Calibration Solution

This calibration solution is ideal for applications that need to achieve higher reading accuracies in a conductivity scale between 2,000 $\mu\text{S}/\text{cm}$ and 10,000 $\mu\text{S}/\text{cm}$. This solution is widely used in agriculture for monitoring and preparing nutrient solutions for proper crop production.

Hanna has produced a 5000 $\mu\text{S}/\text{cm}$ calibration solution that is available in a wide range of sizes and packages to suit every application.

12880 $\mu\text{S}/\text{cm}$ Calibration Solution

The 12880 $\mu\text{S}/\text{cm}$ (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.

This solution is used mainly for industrial applications and is available in various sizes to better meet user requirements.



5000 $\mu\text{S}/\text{cm}$ Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7039L	5000 $\mu\text{S}/\text{cm}$	500 mL	1 bottle		
HI7039M	5000 $\mu\text{S}/\text{cm}$	230 mL	1 bottle		
HI8039L	5000 $\mu\text{S}/\text{cm}$	500 mL	1 bottle	•	•

5000 $\mu\text{S}/\text{cm}$ Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70039C	5000 $\mu\text{S}/\text{cm}$	20 mL	25 sachets	•
HI70039P	5000 $\mu\text{S}/\text{cm}$	20 mL	25 sachets	

12880 $\mu\text{S}/\text{cm}$ Bottles

Code	EC Value @25°C	Size	Package	FDA Bottle	Certificate of Analysis
HI7030/1G	12880 $\mu\text{S}/\text{cm}$	1 G (3.78 L)	1 bottle		
HI7030L	12880 $\mu\text{S}/\text{cm}$	500 mL	1 bottle		
HI7030M	12880 $\mu\text{S}/\text{cm}$	230 mL	1 bottle		
HI8030L	12880 $\mu\text{S}/\text{cm}$	500 mL	1 bottle	•	•

12880 $\mu\text{S}/\text{cm}$ Sachets

Code	EC Value @25°C	Size	Package	Certificate of Analysis
HI70030C	12880 $\mu\text{S}/\text{cm}$	20 mL	25 sachets	•
HI70030P	12880 $\mu\text{S}/\text{cm}$	20 mL	25 sachets	

EC Calibration Solutions

Quality Solutions for Laboratory Applications

- **Guaranteed quality**
 - Each label shows the production batch number, expiration date and conductivity/temperature correlation table.
- **Certified solutions available**
- **FDA compliant bottles**
 - Opaque, light-tight bottles that meet FDA standards (HI80XX)

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.

It is available in two different sizes and also in an FDA approved light shielded bottle.

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
HI7034L	80000 µS/cm	500 mL	1 bottle		
HI7034M	80000 µS/cm	230 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
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

TDS Solutions

Hanna is one of the few producers to offer calibration solutions in packages from 20 to 500 mg/L for lab and field applications. Our packaging has been designed to keep air and light from damaging the solution.

Safety Data Sheets

The safety data sheets for all Hanna solutions in this catalog are available at www.hannainst.com or upon request.

Expiration Date

The production batch number and the expiration date are reported on all Hanna calibration solutions.

NIST Traceability

TDS solutions are produced with high-quality potassium chloride in various concentrations. They are standardized using a conductivity meter calibrated with NIST potassium chloride.



TDS Bottles

Code	TDS Value @25°C	Size	Package	Certificate of Analysis
HI6032	1382 mg/L (ppm)	500 mL	1 bottle	•
HI7032L	1382 mg/L (ppm)	500 mL	1 bottle	
HI7032M	1382 mg/L (ppm)	230 mL	1 bottle	
HI7036L	12.41 g/L (ppt)	500 mL	1 bottle	
HI7036M	12.41 g/L (ppt)	230 mL	1 bottle	
HI70442L*	1500 mg/L (ppm)	500 mL	1 bottle	
HI70442M*	1500 mg/L (ppm)	230 mL	1 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	
HI70442C*	1500 mg/L (ppm)	20 mL	25 sachets	•
HI70442P*	1500 mg/L (ppm)	20 mL	25 sachets	
HI77200C	1500 mg/L (ppm) & pH 7.01	20 mL	20 sachets (10 ea)	•
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).

Salinity Calibration Solutions

Salinity Bottles

Code	Description	Size	Package
HI7037L	Salinity solution	500 mL	1 bottle
HI7037M	Salinity solution	230 mL	1 bottle



www.hannainst.com