CONTENTS

Conductivity/TDS Meters Introduction

Definition of Conductivity

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

Conductivity Units

Electrical conductivity is the reciprocal of electrical resistivity. Electrical resistivity uses the unit of ohm meter or Ω x m. Rather than use the units Ω−1 x m−1, in 1971 the unit "siemens" (symbolized by the capital letter S) was adopted by the General Conference on Weights and Measures as an SI derived unit.

The unit for electrical conductivity becomes siemens per meter. The siemens unit is named after Werner von Siemens, the 19th century German inventor and entrepreneur in the area of electrical engineering. Previously to the siemens per meter unit, mho/cm was used to measure conductivity, where the unit "mho" is a reciprocal ohm. The "mho" is the "ohm" spelled backwards. Because of the history of conductivity, micromho/cm and millimho/cm is commonly translated to microsiemens/cm and millisiemens/cm because they correspond one-to-one.

The unit of measurement commonly used is one millionth of a Siemens per centimeter (micro-Siemens per centimeter or µS/cm). When measuring more concentrated solutions, the units are expressed as milli-Siemens/cm (mS/cm). For ease of expression, 1000 µS/cm are equal to 1 mS/cm. Often times conductivity is expressed simply as either micro or milli Siemens.

Table of Aqueous Conductivity/TDS/Resistivity

Solution	µS/cm	mS/cm	ppm	MΩ x cm
Pure water	0.055			18.18
Typical DI water	0.1			10
Distilled water	0.5			2
Rain water	50-100		25-50	0.02 - 0.01
Drinking water	500-800	0.5-0.8	250-400	2.0-1.25 [KΩ x cm]
Potable water (max)	1 055	1.055	528	0.95 [KΩ x cm]
Sea water	56 000	56	28 000	
1 mol/L NaCl	85 000	85	42.5 [ppt]	
1 mol/L HCl	332 000	332	166 [ppt]	

TDS

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

Resistivity

For low and very low ionic concentration, the measured conductivity becomes difficult and not accurate. Therefore, the resistivity scale is used to express the results as opposed to fractions. The numbers are exactly the inverse of each other. The reciprocal of 0.10 µS/cm or 1/(0.10 x 10^{-6} S/cm)] is then 10 x 10^6 ohms x cm (10 MΩ x cm). This is also commonly referred to as "mega-ohms". Either unit of measurement can be used to state exactly the same value.

Salinity

Salinity is a measurement without the unit corresponding to the weight of dissolved salts in seawater. The salinity is calculated from an empirical relationship between the conductivity and the salinity of a seawater sample. Oceanographic Tables and Standards endorsed by UNESCO/SCOR/ICES/IAPSO are used for the calculation.

Salinity measurements are performed with no direct temperature correction. The salinity range is calibrated using a standard sea water solution.

Temperature effect

Conductivity is temperature sensitive as ionic activity increases with increasing temperature. Commonly, conductivity is referred to 25°C such as in the reference temperature of some standards. The coefficient used to correct for changes in temperature, β is expressed as a percentage of reading per degree Celsius. In order to establish the true value of beta, the solution is measured at high temperature (without temperature compensation = actual conductivity), then the solution is cooled and re-measured. β can then be calculated for that solution. HANNA conductivity meters allow for custom reference temperatures and adjustable β temperature correction factor. The β temperature correction factor can be in the following ranges according with the solution class: Acids: (1.0 ÷ 1.6%)/°C; Bases: (1.8 ÷ 2.2%)/°C; Salts: (2.2 ÷ 3.0%)/ °C; Drinking water: 2.0%/°C; Ultrapure water: 5.2%/°C.

In the case of natural water, the temperature correction is no longer linear, in this case, a non linear characteristic has to be used. Many HANNA meters offer the ability to apply this temperature correction curve.

Amperometric

The first solution to measure conductivity was originally an amperometric probe based on two electrodes at a distance of 1 cm. The amperometric method applies a known potential (voltage, V) to

the pair of electrodes and measures the current (I) that is established in the solution. Current is proportional with the conductivity. Construction for these types of probes can use either graphite or stainless steel pin electrodes. HANNA offers probes and instruments using either constructed solutions. The resistance can be precisely calculated but is not constant, the major perturbation is generated by the deposits and polarization effect that appear on the electrodes based on the electrolysis effect which appears in the solution during the measurements. For low to medium levels of conductivity (< 2 mS/cm) the effect is not significant and this may be acceptable if the voltage that is applied is alternated. For higher values the accuracy of reading will be affected, and in this case, the potentiometric method is recommended.

Potentiometric

The potentiometric method employs four rings: two outer rings apply an alternating voltage and induce a current loop in the solution, while the remaining inner rings measure the voltage drop induced by the current loop. The voltage drop measured is directly dependent to solution conductivity. All of the probes utilize a sleeve during the measurement to control the influence of the external elements over the inducted field. The range in which these kinds of probes can be used is higher than the limits imposed to the amperometric methods by the electrolysis effect. Stainless steel or platinum rings can be used in the construction of this type of probe. HANNA offers both solutions for these types of probes. The selection has to be chosen based on criteria in which the resistance to corrosion and cleaning are important factors.

Inductive or Toroidal

For industrial process control systems, another method of conductivity measurement is available using an inductive or toroidal sensor. The advantage of this technology is measurement without any electrical contact between the electrode and the process fluid. The probe uses two toroidal transformers which are inductively coupled side by side and encased in a plastic sheath.

The controller supplies a high frequency reference voltage to the first toroid or drive coil which generates a strong magnetic field. The liquid containing conductive ions close the magnetic field that induces in the second toroidal current. A clear relation between the measured current and the conductivity of solution in which the probe is immersed can be established. The magnetic field is not disturbed if a minimum distance from the wall or pipe is respected.

Calibration

The calibration of conductivity meters is performed using a conductivity standard, by example 1413 µS/cm. The scope of the calibration is to determine the precise value of cell constant of the probe. The meters allow the user to select from a range of pre-selected standard values according with the range where solution will be measured and expected to be. Many HANNA meters allow up to five point calibration for improved accuracy over a wider range of measured values. It is recommended to calibrate the probes a minimum of one time per week.

US Pharmacopoeia

USP <645> with Stage 1, 2 and 3 compliance is required for purified water and WFI (water for injection). HANNA offers instruments that are able to perform all three stages required by this standard. Some of these requirements are: Resolution of 0.1µS/cm or better, accuracy at 1.3µS/cm of 0.1µS/cm, to be able to read with or without automatic temperature compensation, the cell constant be known with an uncertainty better than ±2%.

Conductivity partly depends on other factors such as the pH, the temperature, and the amount of atmospheric carbon dioxide which has been dissolved in the water to form ions (intrinsic conductivity). Conductivity also depends on the chloride, sodium and ammonium ions considered as water impurities (extraneous conductivity). The conductivity (intrinsic and extraneous) of the water is measured and compared to values listed in a table to evaluate if the studied water is suitable or not for use in pharmaceutical applications. If the sample fails Stage 1, additional tests have to be performed (Stages 2 and 3) in order to determine if the excessive conductivity value is due to intrinsic factors or extraneous ions.

6.8

HI 4321

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

HI 4321 is a research-grade EC/Resistivity/TDS/Salinity benchtop meter with a large, color, graphic LCD with backlight capable of millesimal measuring resolution of conductivity with an extended range from 0.001 µS/cm to 1 S/cm.

HI 4321 can be used to perform all 3 stages of USP <645> method required for conductivity measurement of pure and ultra pure water. The instrument provides clear directions on how to perform each testing stage and automatically monitors the temperature, conductivity and stability during testing and determines whether a sample is within USP limits.

Product Spotlights

HI 2300

Autoranging EC/TDS/ NaCl/Temperature Meter

6.14

HI 2300 measures EC, TDS, NaCl and temperature. In extended conductivity and TDS ranges (up to 500 mS/cm and 400 g/L respectively) the instrument automatically chooses the best scale to maintain the highest accuracy.

This instrument utilizes a four ring potentiometric probe with platinum sensors that offers greater versatility over typical amperometric designs. By utilizing the four ring method, it is possible to measure very low or high conductivity levels without changing probes.

Calibration is automatic at one point with six memorized buffers. The meter has three options for temperature compensation: ATC between 0 to 60.0°C , MTC and NoTC. Other features include a read lock function, stability indicator, GLP and PC compatibility via optional HI 92000 software.

HI 98188

Graphic Display EC/Resistivity/ TDS/NaCl Meter

6.18

HI 98188 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.001 µS/cm to 400 mS/cm, as well as 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.

Choose from seven memorized standards and obtain up to a five point calibration. For salinity (% range), HI 7037 standard allows you to make a one point calibration. Both linear and natural water temperature compensation are available and the reference temperature is user adjustable. Ten sets of measurement parameters (such as reference temperature, temperature compensation mode, TDS factor, calibration etc.) can be stored as a customized user profile and recalled for later use. HI 98188 is also USP <645> compliant with stages 1, 2 and 3.

HI 99300 • HI 99301

EC/TDS/Temperature Meters

6.22

H 99300 and HI 99301 are portable, microprocessor-based EC/TDS and temperature meters. HI 99300N measures conductivity in µS/cm and TDS in ppm while the HI 99301N measures conductivity in mS/cm and TDS in ppt.

These instruments are ideal in applications such as water conditioning, fish farming, agriculture and water treatment. They 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.

HANNA instruments

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Benchtop Meters

GUIDE	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	Waterproof	Page
HI 4522	•	•	•	•	•	•	°C/°F K	4	*	•		•	•	•	•	•		6.6
HI 4521	•	•	•	•	•	•	°C/°F K	4	*	•		•	•	•	•	•		6.6
HI 4321	•		•		•	•	°C/°F K	4	*	•		•	•	•	•	•		6.8
HI 3512	•	•	•	•	•		°C/°F	2	*	•		•	•	•	•	•		6.10
HI 2550	•	•		•	•	•	°C	1	6	•		•	•	•	•	•		6.12
HI 2300	•				•		°C	1	6	•			•		•	•		6.14
HI 216	•		•					1		•								6.16
EC 214	•							1										6.17
EC 215	•							1		•								6.17
EC 215R	•							1		•								6.17

Portable Meters

GUIDE	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	Waterproof	Page
HI 98188	•		•		•	•	°C	5	7			•	•		•	•	•	6.18
HI 9835	•				•	•	°C	1	6	•	•		•			•	•	6.20
HI 98360	•				•	•	°C	1	6	•	•	•	•		•	•	•	6.20
HI 99300	•				•		°C/°F	1		•	•			•			•	6.22
HI 99301	•				•		°C/°F	1		•	•			•			•	6.22
HI 993310	•							1		•	•							6.24
HI 9033	•				•			1		•	•						•	6.25
HI 9034	•				•			1		•	•						•	6.25
HI 8633	•							1		•							•	6.26
HI 8733	•							1		•							•	6.26
HI 87314	•		•					1		•								6.27
HI 8730	•				•		°C	1		•								6.28
HI 8731	•				•		°C	1		•								6.28
HI 8732	•				•		°C	1		•								6.28
HI 86301	•				•			1		•								6.29
HI 86302	•				•			1		•								6.29
HI 86303	•				•			1		•								6.29
HI 86304	•				•			1		•								6.29
HI 8734					•												•	6.30
HI 8033	•				•			1										6.31

* auto standard recognition, custom calibration solution

HI 4521 • HI 4522

Research Grade Meter with Calibration Check™ and USP <645>

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

- Up to eight measurement parameters, two input channels
- Extended range from 0.001 µS/cm to 1000 mS/cm
- Performs all three stages of USP <645> method required for conductivity measurement of pure and ultra pure water
- Practical salinity, natural sea water, and percent scales
- Linear and natural water temperature compensation, no compensation for actual conductivity
- Five point pH and ISE calibration with standard and custom buffers
- Large log memory with different logging methods
- pH Calibration Check™
- Fully customizable

HI 4521 and HI 4522 are research grade, benchtop instruments that feature 8 measurement ranges: pH, ORP (Oxidation Reduction Potential), ISE (HI 4522 only), conductivity, resistivity, TDS, salinity and temperature. These instruments incorporate dual channels with a separate temperature input and support the external reference electrodes required by some pH and ISE sensors.

The user interface is customizable and capable of displaying two channels at the same time, showing the measurements in various modes: basic measurement with or without GLP information, graph or log history.

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

All ranges of conductivity, resistivity and TDS feature autorange or users can select the unit of measure manually. Three salinity scales are available: natural sea water, practical salinity and %.

These instruments can be used to perform all 3 stages of USP <645> method required for conductivity measurement of pure and ultra pure water. The instrument provides clear directions on how to perform each testing stage and automatically monitors the temperature, conductivity and stability during testing and determines whether a sample is within USP limits.

These instruments are equipped with auto standard recognition and can support custom calibration solutions. Up to a four point calibration can be obtained for enhanced accuracy over an extended measuring range.

The enhanced warning system is in place to alert users when measuring outside the calibration range. This system will also remind the user when a new calibration is due.

HANNA's pH Calibration Check™ diagnostics system ensures accurate readings every time by alerting users of potential problems during the calibration process.

Automatic, semiautomatic and manual pH calibration is available in up to five points, with 8 standard (1.68, 3.00, 4.01, 6.86, 7.01, 9.18, 10.01 and 12.45) and up to 5 custom buffers. These instruments also feature up to five point Manual Selection and Custom Standard ISE calibration with up to five standard solutions and up to 5 custom solutions with or without temperature compensation (HI 4522 only).

Up to 10 profiles can be saved and recalled eliminating the need to reconfigure each time when a different electrode is used.

Three selectable logging modes are available: Automatic, Manual and AutoHold. Up to 100 logging lots with 10,000 records per lot can be stored for automatic or manual modes along with up to 200 USP reports, and up to 100 ISE method reports. Automatic logging features a selectable area and sampling period while GLP information includes complete data about user calibration of each parameter and identification information for the instrument, user, and company. Data can be transferred to a PC via the opto-isolated PC interface via the RS232 or USB ports and HI 92000 software (optional).

These instruments offer multi-language support and contextual help is available through a dedicated Help key. Clear tutorial messages and directions are available on-screen to quickly and easily guide users through all measurement and calibration procedures to ensure measurements and procedures are performed properly.

HANNA instruments

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SPECIFICATIONS		HI 4521	HI 4522
pH	Range	-2.000 to 20.000 pH	
	Resolution	0.1 pH; 0.01 pH; 0.001 pH	
	Accuracy	±0.1 pH; ±0.01 pH; ±0.002 pH ±1 LSD	
mV	Range	±2000 mV	
	Resolution	0.1 mV	
	Accuracy	±0.2 mV ±1 LSD	
ISE	Range	–	1 x 10^{-6} to 9.99 x 10^{10} concentration
	Resolution	–	1; 0.1; 0.01; 0.001 concentration
	Accuracy	–	±0.5% (monovalent ions); ±1% (divalent ions)
Conductivity	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 999.9 mS/cm; 1000 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; 1 mS/cm	
	Accuracy	±1% of reading (±0.01 µS/cm)	
	Cell Constant	0.0500 to 200.00	
	Cell Type	2, 4 rings	
	Calibration Type	auto standard recognition, user standard single point / multi point calibration	
	Calibration Reminder	yes	
	Temperature Coefficient	0.00 to 10.00 %/°C	
	Reference Temperature	15.0 °C to 30.0°C	
	Profiles	up to 10	
	USP Compliant	yes	
Resistivity	Range	1.0 to 99.9 Ohms x cm; 100 to 999 Ohms x cm; 1.00 to 9.99 kOhms x cm; 10.0 to 99.9 kOhms x cm; 100 to 999 kOhms x cm; 1.00 to 9.99 MOhms x cm; 10.0 to 100.0 MOhms x cm	
	Resolution	0.1 Ohms x cm; 1 Ohms x cm; 0.01 kOhms x cm; 0.1 kOhms x cm; 1 kOhms x cm; 0.01 MOhms x cm; 0.1 MOhms x cm	
	Accuracy	±2% of reading (±1 Ohm x cm)	
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 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	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	
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 (excluding probe error)	
Calibration	pH	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	
	ISE	–	automatic, up to five point calibration, 5 fixed standard solutions available for each measurement unit, and 5 user defined standards
	Conductivity	auto standard recognition, user standard single point/multi-point	
	Salinity	percent scale–1 point (with HI 7037 standard)	
pH Calibration Check™		yes	
Relative mV Offset Range		±2000 mV	
Input Channel(s)		1 pH/ORP + 1 EC	1 pH/ORP/ISE + 1 EC
GLP		cell constant, reference temperature/coefficient, calibration points, cal time stamp	
Temperature Compensation	pH	automatic or manual from -20.0 to 120.0°C/-4.0 to 248.0°/253 to 393K	
	EC	disabled, linear and non-linear (natural water)	
pH Electrode		HI 1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)	
EC Probe		HI 76312 platinum, 4-ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable (included)	
Temperature Probe		HI 7662-T stainless steel temperature probe with 1 m (3.3') cable (included)	
Logging	Record	100 lots with 10,000 record/lot	
	Interval	settable between 1 and max log time	
	Type	automatic, log on demand, AutoHold	
Replatinization		yes	
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration	
PC Connection		USB and RS232	
Power Supply		12 VDC adapter (included)	
Environment		0-50°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 (2.6 lbs.)	

ORDERING INFORMATION

HI 4521-01 (115V), **HI 4521-02** (230V), **HI 4522-01** (115V) and **HI 4522-02** (230V) are supplied with HI 76312 conductivity/TDS probe, HI 1131B pH electrode, HI 7662-T temperature probe, HI 70004 pH 4.01 buffer solution sachet, HI 70007 pH 7.01 buffer solution sachet, HI 700661 electrode cleaning solution sachet (2), HI 7071S electrolyte solution (30 mL), HI 76404N electrode holder, 12 VDC adapter and instructions.

SOLUTIONS

HI 6004	pH 4.010 buffer solution, 500 mL
HI 6007	pH 7.010 buffer solution, 500 mL
HI 6010	pH 10.010 buffer solution, 500 mL
HI 7030L	12880 µS/cm cal. solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm cal. solution, 500 mL
HI 7035L	111800 µS/cm cal. solution, 500 mL
HI 7039L	5000 µS/cm cal. solution, 500 mL
HI 7037L	Salinity standard solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection
HI 76404N	Electrode holder

For a complete list of Solutions and Electrodes, see the end of pH *Section 3*, ISE *Section 4* and Conductivity *Section 6*.

HI 4321

Research Grade Conductivity/ TDS Meter with USP <645>

EC/TDS/Resistivity/Salinity and Temperature

- EC, resistivity, TDS and salinity ranges
- Extended range from 0.001 µS/cm to 1000 mS/cm
- Ready to perform all three stages of USP <645> method required for conductivity measurement of pure and ultra pure water
- Three salinity scales: practical salinity, natural sea water, percent
- Linear and natural water temperature compensation, no compensation for actual conductivity
- Fully customizable
- Large log memory with different logging methods

HI 4321 is a research-grade EC/Resistivity/TDS/Salinity benchtop meter with a large, color, graphic LCD with backlight, capable of millesimal measuring resolution of conductivity with an extended range from 0.001 µS/cm to 1 S/cm.

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

All ranges of conductivity, resistivity and TDS feature autorange or users can select the unit to measure manually. Three salinity scales are available: natural sea water, practical salinity and %.

HI 4321 can be used to perform all 3 stages of USP <645> method required for conductivity measurement of pure and ultra pure water. The instrument provides clear directions on how to perform each testing stage and automatically monitors the temperature, conductivity and stability during testing and determines whether a sample is within USP limits.

This instrument is equipped with auto standard recognition and can support custom calibration solutions. Up to a four point calibration can be obtained for enhanced accuracy over an extended measuring range.

The enhanced warning system is in place to alert users when measuring outside the calibration range. This system will also remind the user when a new calibration is due.

Features also include real-time graphic displays and on-screen GLP data. Fully customizable instrument and parameters via setup screens. On-board contextual help can be accessed from any mode simply by pressing the HELP button.

Up to 10 profiles can be saved and recalled eliminating the need to reconfigure each time when a different electrode is used.

Three selectable logging modes are available: Automatic, Manual and AutoHold. Up to 100 logging lots with 10,000 records per lot can be stored for automatic or manual modes along with up to 200 USP reports.

All features are available in English, Italian, Portuguese and Spanish. Connect to a PC via the USB or RS232 ports, with the use of HI 92000 Windows® compatible software.

EC USP Mode

HI 4321 is capable of performing all 3 stages of United States Pharmacopeia testing requirements for water quality (USP <645>).

This instrument provides clear instructions on performing each stage and automatically checks the respects of USP limits.

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

SPECIFICATIONS		HI 4321
Conductivity	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 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)
Resistivity	Range	1.0 to 99.9 Ohms x cm; 100 to 999 Ohms x cm; 1.00 to 9.99 kOhms x cm; 10.0 to 99.9 kOhms x cm; 100 to 999 kOhms x cm; 1.00 to 9.99 MOhms x cm; 10.0 to 100.0 MOhms x cm
	Resolution	0.1 Ohms x cm; 1 Ohms x cm; 0.01 kOhms x cm; 0.1 kOhms x cm; 1 kOhms x cm; 0.01 MOhms x cm; 0.1 MOhms x cm
	Accuracy	±2% of reading (±1 Ohm x cm)
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 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)
	Factor	0.40 to 1.00
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
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 (excluding probe error)
Calibration	Conductivity	auto standard recognition, custom calibration solution/four point calibration
	Salinity	percent scale–one point (with HI 7037 standard)
	Temperature	three points
Temperature Compensation		linear and non-linear (natural water)
EC Probe		HI 76312 platinum, four ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable (included)
Temperature Probe		HI 7662-T stainless steel temperature probe with 1 m (3.3') cable (included)
Logging	Record	100 lots with 10,000 record/lot
	Interval	settable between one and max log time
	Type	automatic, log on demand, AutoHold
Replatinization		yes
Display		240 x 320 dot-matrix color LCD with on-screen help, graphing, language selection and custom configuration
PC Connection		RS232, USB
Power Supply		12 VDC adapter (included)
Environment		0-50°C (32 to 122°F) (273 to 323K) RH max 95% non-condensing
Dimensions		160 x 231 x 94 mm (6.3 x 9.1 x 3.7")
Weight		1.2 Kg (2.6 lbs.)

ORDERING INFORMATION

HI 4321-01 (115V) and **HI 4321-02** (230V) are supplied with HI 76312 conductivity probe, HI 76404N electrode holder, 12 VDC power adapter and instructions.

PROBES

HI 76312	Platinum, four ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable
HI 7662-T	Stainless steel temperature probe with 1 m (3.3') cable

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7037L	Salinity solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

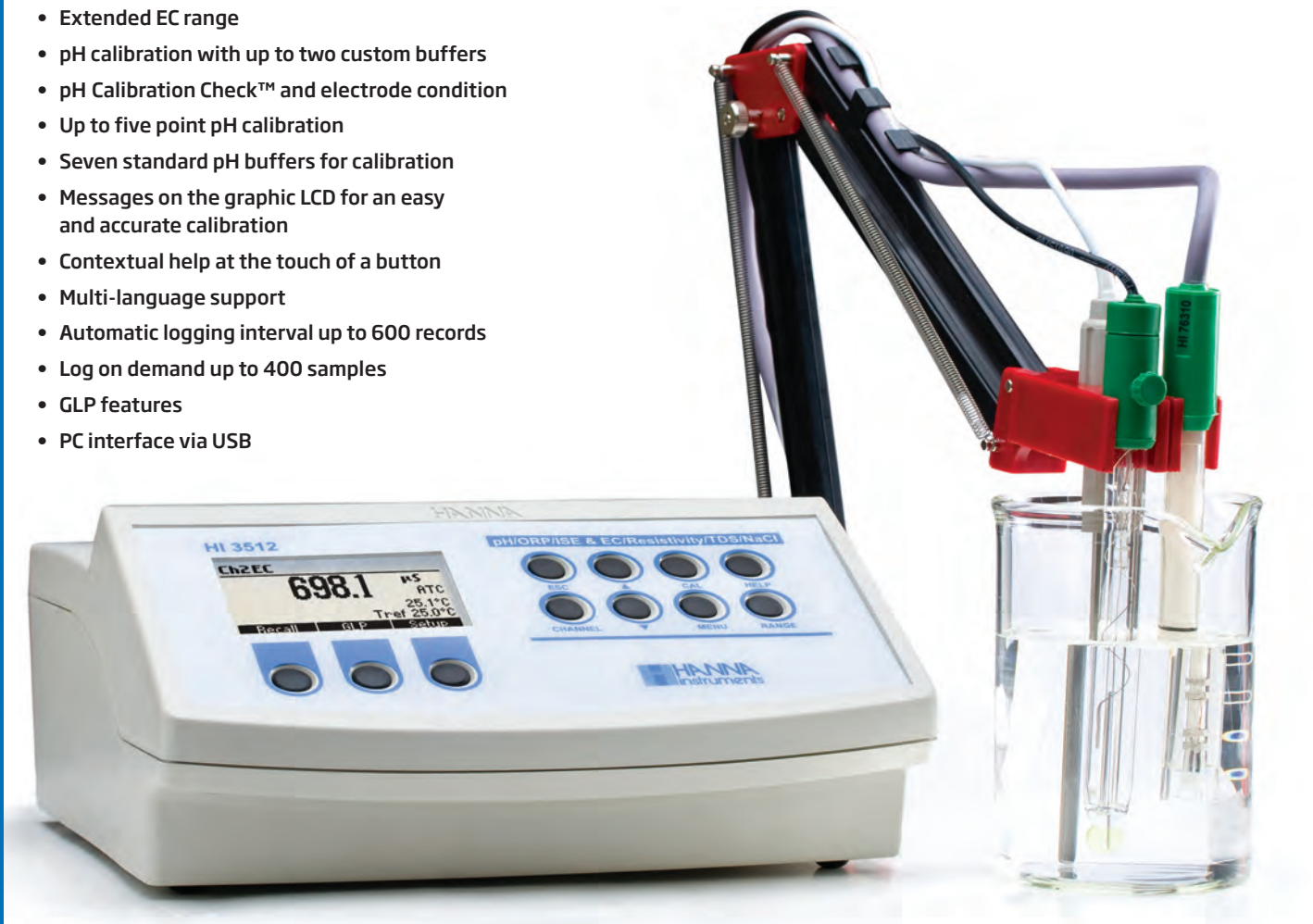
HI 76404N	Electrode holder
HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection
HI 920010	RS232 cable for PC connection

For a complete list of Solutions and Electrodes, see the end of this section.

HI 3512

Two Channel, pH/ORP/ISE, EC/TDS/NaCl/Resistivity Benchtop Meter

- EC calibration for up to two calibration points
- Seven memorized EC standards for calibration
- Extended EC range
- pH calibration with up to two custom buffers
- pH Calibration Check™ and electrode condition
- Up to five point pH calibration
- Seven standard pH buffers for calibration
- Messages on the graphic LCD for an easy and accurate calibration
- Contextual help at the touch of a button
- Multi-language support
- Automatic logging interval up to 600 records
- Log on demand up to 400 samples
- GLP features
- PC interface via USB



The HI 3512 is a multiparameter, 2 channel professional benchtop meter with a graphic LCD, designed to provide accurate laboratory results. Channel 1 features pH/ORP/ISE and temperature measurement capability while channel 2 measures EC/TDS/NaCl/Resistivity and temperature.

The EC channel measures an extended range from 0.001 µS to 1000 mS (actual EC) and offers up to two calibration points with 7 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 and 111.8 mS/cm). The EC channel supports autoranging, manual ranging and lock of the user selected range, temperature compensation selection, temperature reference selection (15 °C, 20 °C or 25 °C) and temperature coefficient set. Cell constant can be set from 0.010 to 10.000 and TDS factor from 0.40 to 1.00.

The pH channel offers up to five point pH calibration with seven standard buffers (pH 1.68, 4.01, 6.86, 7.01, 9.18, 10.01 and 12.45) and up to two custom buffers.

HANNA's exclusive Calibration Check™ diagnostics system ensures accurate pH readings every time by alerting users of potential problems during the calibration process. The Calibration Check™ system eliminates erroneous readings due to dirty or faulty pH electrodes or contaminated pH buffer solutions. After the guided calibration process, a probe condition indicator is displayed on the LCD informing the user of the overall pH electrode status.

This instrument can measure using ORP electrodes (pH channel input), thanks to their capability to measure mV with a resolution up to 0.1 mV and ISE electrodes on ppm scale (pH channel input). The electrode type and unit selection capability and the ISE calibration in up to five calibration standard solutions make this instrument very useful for a large range of concentration solution measurements.

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

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

Other features of the HI 3512 include log-on-demand of up to 400 samples, automatic logging interval with log on stability feature of up to 600 records, auto HOLD that freezes the first stable reading on the LCD display, GLP to view the last calibration data for pH, rel mV, ISE, EC or NaCl and PC interface via USB.

SPECIFICATIONS		HI 3512
pH	Range	-2.0 to 20.0; -2.00 to 20.00; -2.000 to 20.000 pH
	Resolution	0.1 pH; 0.01 pH; 0.001 pH
	Accuracy	±0.01 pH; ±0.002 pH
mV	Range	±2000.0 mV
	Resolution	0.1 mV
	Accuracy	±0.2 mV
ISE	Range	1.00 E-7 to 9.99 E10 conc.
	Resolution	3 digits 0.01, 0.1, 1, 10 conc.
	Accuracy	±0.5% of reading (monovalent ions); ±1% of reading (divalent ions)
Temperature Channel 1	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)
Relative mV Offset Range		±2000 mV
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
pH Calibration Check™		yes
Slope Calibration		from 80 to 110%
pH Temperature Compensation		manual or automatic from -20.0 to 120.0 °C (-4.0 to 248.0 °F)
pH Electrode		HI 1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
Temperature probe		HI 7662-T temperature probe with 1 m (3.3') cable (included)
ISE Calibration		up to five-point calibration points 6 standard solutions available (0.1, 1, 10, 100, 1000, 10000 ppm)
EC	Range	0.001 µS/cm to 400 mS/cm (shows values up to 1000 mS/cm) actual conductivity 1000 mS/cm; 0.001 to 9.999 µS/cm; 10.00 to 99.99 µS/cm; 100.0 to 999.9 µS/cm; 1.000 to 9.999 mS/cm; 10.00 to 99.99 mS/cm; 100.0 to 999.9 mS/cm; 1000 mS/cm (autoranging)
	Resolution	0.001 µS/cm; 0.01 µS/cm; 0.1 µS/cm; 0.001 mS/cm; 0.01 mS/cm; 0.1 mS/cm; 1 mS/cm
	Accuracy	±1% of reading (±0.01 µS/cm or 1 digit whichever is greater) excluding probe error
Resistivity	Range	1.0 to 99.9 ohms; 100 to 999 ohms; 1.00 to 19.99 Kohms; 10.0 to 99.9 Kohms; 100 to 999 Kohms; 1.00 to 9.99 Mohms; 10.0 to 100.0 Mohms (autoranging)
	Resolution	0.1 ohm; 1 ohm; 0.01 Kohms; 0.1 Kohms; 1 Kohms; 0.01 Mohms; 0.1 Mohms
	Accuracy	±1% of reading (±10 ohms or 1 digit whichever greater) excluding probe error
TDS	Range	0.000 to 9.999 ppm; 10.00 to 99.99 ppm; 100.0 to 999.9 ppm; 1.000 to 9.999 g/L; 10.00 to 99.99 g/L; 100.0 to 400.0 g/L (autoranging)
	Resolution	0.001 ppm; 0.01 ppm; 0.1 ppm; 0.001 g/L; 0.01 g/L; 0.1 g/L
	Accuracy	±1% of reading (±0.05 ppm or 1 digit whichever greater) excluding probe error
	Factor	0.40 to 1.00
Salinity	Range	% NaCl: 0.0 to 400.0 %
	Resolution	0.1 %
	Accuracy	±1% of reading excluding probe error
Temperature Channel 2	Range	-20.0 to 120°C
	Resolution	0.1°C
	Accuracy	±0.2 °C (excluding probe error)
EC Calibration		automatic up to two 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)
Constant Cell Setup		0.010 to 10.000
NaCl Calibration		max. one point only (with HI 7037 standard)
EC Probe		HI 76310 platinum four ring conductivity/TDS probe with 1 m (3.3') cable (included)
Temperature Source		automatic from sensor inside the probe; manual entry
EC Temperature Compensation		NoTC, MTC, ATC
Reference Temperature		15, 20, 25 °C
Temperature Coeficient		0.00 to 10.00 %/°C
Log On Demand		400 samples
Lot Logging		600 samples
PC interface		opto-isolated USB
Input Impedance		10^{12} ohms
Power Supply		12 VDC adapter (included)
Environment		0 to 50 °C (32 - 122 °F) RH max 55% non-condensing
Dimensions / Weight		235 x 207 x 110 mm (9.2 x 8.14 x 4.33") / 1.8 Kg (4.1 lbs.)

ORDERING INFORMATION

HI 3512-01 (115V) and **HI 3512-02** (230V) is supplied with HI 76310 conductivity/TDS probe, HI 1131B pH electrode, HI 7662-T temperature probe, HI 70004 pH 4.01 buffer solution sachet, HI 70007 pH 7.01 buffer solution sachet, HI 700661 electrode cleaning solution sachet (2), HI 7071S electrolyte solution (30 mL), HI 76404N electrode holder, 12 VDC adapter and instructions.

SOLUTIONS

HI 6016	pH 1.679 buffer solution, 500 mL
HI 6004	pH 4.010 buffer solution, 500 mL
HI 6007	pH 7.010 buffer solution, 500 mL
HI 6010	pH 10.010 buffer solution, 500 mL
HI 6124	pH 12.450 buffer solution, 500 mL
HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7037L	Salinity standard solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

HI 76404N	Electrode holder
HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection

For a complete list of Solutions and Electrodes, see the end of pH *Section 3*, ISE *Section 4* and Conductivity *Section 6*.

HI 2550

pH/ORP/ISE, EC/TDS/NaCl Benchtop Meter

- Up to seven measurement parameters
- Two input channels: pH/ORP/ISE and EC/TDS/Resistivity/NaCl
- Up to five point pH calibration with seven standard and two custom buffers
- EC/TDS autoranging, manual ranging and range lock
- Automatic Temperature Compensation (pH & EC)
- PC interface via USB
- GLP features

HI 2550 is a multiparameter 2 channel instrument that measures up to 7 parameters. With this single laboratory bench meter you can measure pH, ORP, ISE, conductivity (EC), TDS, NaCl percentage and temperature.

EC measurements can be compensated relative to a selected reference temperature of 20°C or 25°C and the temperature coefficient can be set between 0.0 and 6.0%/°C. Also selectable is the cell constant between 0.500 and 1.700 and TDS factor from 0.40 to 0.80. 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 HI 2550 also includes the ability to set and lock the range manually.

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

This instrument can measure using ORP electrodes (pH channel input), due to it's capability to measure mV with a resolution up to 0.1 mV and also use ISE electrodes on the mV scale (pH channel input).

This instrument provides GLP capabilities that allows the storage and retrieval of all data regarding pH, rel mV, EC and NaCl calibration and sample measurement as well as data regarding the maintenance and status of the electrode.

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		HI 2550
Range	pH	-2.0 to 16.0 pH; -2.00 to 16.00 pH; -2.000 to 16.000 pH
	ISE & ORP	±999.9 mV (ISE & ORP); ±2000 mV (ISE & ORP)
	EC	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
	TDS	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)
	NaCl	0.0 to 400.0% NaCl
	Temperature	-20.0 to 120.0 °C (pH, EC range)
Resolution	pH	0.1 pH; 0.01 pH; 0.001 pH
	ISE & ORP	0.1 mV (±999.9 mV); 1 mV (± 2000 mV)
	EC	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	TDS	0.01 ppm; 0.1 ppm; 1 ppm; 0.01 g/l; 0.1 g/L
	NaCl	0.1% NaCl
	Temperature	0.1 °C
Accuracy @ 20°C/68°F	pH	± 0.01 pH; ± 0.002 pH
	ISE & ORP	± 0.2 mV (±999.9 mV); ± 1 mV (±2000 mV)
	EC	± 1 % reading (±0.05 µS/cm or 1 digit, whichever greater)
	TDS	±1% of reading (±0.03 ppm or 1 digit, whichever greater)
	NaCl	±1% of reading
	Temperature	± 0.4 °C (excluding probe error)
Relative mV Offset		±2000 mV
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
EC 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
NaCl Calibration		one point with HI 7037L standard (optional)
Temperature Compensation		manual or automatic from: -20.0 to 120.0 °C (pH range) -20.0 to 120.0 °C (EC range) (can be disabled on conductivity or TDS range to measure actual conductivity) or actual TDS
Cond. Temp. Coefficient		0.00 to 6.00 %/°C (for EC and TDS only) default value is 1.90 %/°C
TDS Factor		0.40 to 0.80 (default value is 0.50)
pH Probe		HI 1131B glass body pH electrode with BNC connector and 1 m (3.3') cable (included)
Conductivity Probe		HI 76310 platinum four ring conductivity/TDS probe with built-in temperature sensor and 1 m (3.3') cable (included)
Temperature Probe		HI 7662 temperature probe with 1 m (3.3') cable (included)
Input Impedance		10^{12} ohms
PC Connectivity		opto-isolated USB
Log On Demand		200 records
Log Interval Feature		500 records; stability logging ("StAb") , 5, 10, 30 sec and 1, 2, 5, 10, 15, 30, 60, 120, 180 min
Power Supply		12 VDC
Environment		0 to 50°C (32 to 122°F); RH max 95% non-condensing
Dimensions		235 x 218 x 108 mm (9.2 x 8.5 x 4.2")
Weight		1.3 Kg (2.9 lb); kit with holder 2.1 Kg (4.6 lb.)

*with temperature compensation disabled

ORDERING INFORMATION

HI 2550-01 (115V) and **HI 2550-02** (230V) are supplied with HI 1131B pH electrode, HI 76310 conductivity/TDS probe, HI 7662 temperature probe, HI 76404N electrode holder, HI 70004 pH 4.01 buffer solution sachet, HI 70007 pH 7.01 buffer solution sachet, HI 7071S electrolyte solution (30 mL), 12 VDC adapter and instruction manual.

PROBES

HI 1131B	Glass body pH electrode with BNC connector and 1 m (3.3') cable
HI 76310	Platinum, 4-ring conductivity/TDS probe with built-in temperature sensor and 1 m (3.3') cable
HI 7662	Stainless steel temperature probe with 1 m (3.3') cable

SOLUTIONS

HI 5004L	pH 4.01 buffer solution, 500 mL
HI 5007L	pH 7.01 buffer solution, 500 mL
HI 5010L	pH 10.01 buffer solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL
HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7037L	Salinity standard solution, 500 mL

ACCESSORIES

HI 76404N	Electrode holder
HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection

For a complete list of Solutions and Electrodes, see the end of pH *Section 3*, ISE *Section 4* and Conductivity *Section 6*.

HI 2300

Autoranging EC, TDS, NaCl, Temperature Meter

- **Autoranging**
  The EC and TDS scales are autoranging. The meter automatically sets the scale with the highest possible resolution.
- **Manual range selection and range lock**
- **Four ring potentiometric conductivity probe with internal temperature sensor**
- **Automatic (ATC), manual (MTC) or no temperature compensation (NoTC)**
- **GLP features**
- **Log-on-demand up to 500 records**
- **PC compatible via USB**

HI 2300 measures EC, TDS, NaCl and temperature. In conductivity and TDS ranges (up to 500 mS/cm and 400 g/L respectively) the instrument automatically chooses the best scale to maintain the highest accuracy.

EC calibration is a one-point procedure. Selectable calibration points are 0.00 µS, 84.0 µS, 1413 µS, 5.00 mS, 12.88 mS, 80.0 mS, and 111.8 mS selected according with the expected measurement range. NaCl calibration is a one-point procedure at 100.0% NaCl. Use HI 7037L calibration solution as a 100% NaCl standard solution.

This instrument utilizes a four ring potentiometric probe with platinum sensors to offer versatility over typical amperometric designs. By utilizing the four ring method, it is possible to measure very low or high conductivity levels without changing probes.

Three options of compensating for temperature are available for this instrument:

Automatic (ATC): The EC probe has a built-in temperature sensor which is used to automatically compensate the EC/TDS reading (from -9.9°C to 120.0°C), using the selected reference temperature (20 or 25°C) and temperature compensation coefficient from (0.0 to 6.0%)/°C

Manual (MTC): The temperature value, shown on the secondary LCD, can be manually set with the ARROW keys. The compensation is referenced at the selected temperature. All the other parameters of temperature compensation are settable similar to ATC.

No Compensation (NoTC): For actual conductivity or TDS measurement, the temperature value shown on the secondary LCD is not taken into account.

Cell constant is selectable between 0.5 and 1.700. TDS factor is selectable between 0.40 and 0.80.

The HI 2300 also provides users with GLP capabilities. Good Laboratory Practice (GLP) is a set of functions that allows storage and retrieval of data regarding the status of the system. After a successful calibration, the meter automatically stores the date and time of calibration, the calibration solution used and the resulting cell constant value. All this information can be later recalled by the user. Other features include a lock range function and stability indicator.

For PC communication, use the optional HI 92000 software and HI 920013 USB cable. The software is provided with an exclusive online guide of all the commands available and allows data printing, plotting and exporting.

Last calibration date

Last calibration year

Last calibration time

Cell constant value (K)

Offset value

SPECIFICATIONS		HI 2300
Range	EC	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)*
	TDS	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
	NaCl	0.0 to 400.0%
	Temperature	-20.0 to 120.0°C
Resolution	EC	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	TDS	0.01 mg/L; 0.1 mg/L; 1 mg/L; 0.01 g/L; 0.1 g/L
	NaCl	0.1%
	Temperature	0.1°C
Accuracy	EC	±1% of reading ± (0.05 µS/cm or 1 digit)
	TDS	±1% of reading ± (0.03 mg/L or 1 digit)
	NaCl	±1% of reading
	Temperature	±0.4°C
Calibration	EC	automatic, one point with six memorized values (84, 1413, 5000, 12880, 80000, 111800 µS/cm)
	NaCl	one point, with HI 7037 calibration solution
	Temperature	two point, at 0 and 50°C
Temperature Compensation		automatic or manual from -20.0 to 120.0°C
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		HI 76310 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 218 x 108 mm (9.2 x 8.5 x 4.2")
Weight		1.3 kg (2.9 lbs.)

* with temperature compensation function disabled

ORDERING INFORMATION

HI 2300-01 (115V) and **HI 2300-02** (230V) is supplied with HI 76310 conductivity probe, 12 VDC adapter and instructions.

PROBES

HI 76310	Platinum, four ring conductivity/TDS probe with internal temperature sensor and 1 m (3.3') cable

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7037L	Salinity solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection
HI 76404N	Electrode holder

For a complete list of Solutions, see the end of this section.

HI 216

EC and Resistivity Meter

- **Four user selectable conductivity measurement ranges**
- **Automatic probe recognition**
- **EC and resistivity temperature compensation**
- **Four platinum ring EC probe and resistivity probe included**

HI 216 is a combination bench meter that can read conductivity in four different ranges and resistivity.

For conductivity measurements, the calibration is a simple one point procedure using the easy to operate front panel knob and the supplied EC probe does not require recalibration when switching from one range to another. The four platinum ring probe has a built-in temperature sensor that automatically compensates for temperature. The temperature coefficient can be adjusted from 0 to 2.5% by also using a knob on the front panel.

For resistivity measurements, the meter is factory calibrated and if necessary, calibration can be adjusted. The HI 3316D resistivity probe is easy to clean and requires little maintenance. It also features a built-in temperature sensor for automatic temperature compensation and the temperature coefficient is user selectable from 2 to 7%.

Both the EC and resistivity probes use the same DIN connector on the rear panel and the meter automatically recognizes which probe is connected.

ORDERING INFORMATION

HI 216-01 (115V) and **HI 216-02** (230V) are supplied with HI 76303 conductivity probe, HI 3316D resistivity probe, 12 VDC adapter and instruction manual.

PROBES

HI 76303 Platinum four ring conductivity probe with interal temperature sensor, DIN connector and 1 m (3.3') cable.

HI 3316D Resistivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable.

SOLUTIONS

HI 7030L 12880 µS/cm calibration solution, 500 mL
HI 7031L 1413 µS/cm calibration solution, 500 mL
HI 7033L 84 µS/cm calibration solution, 500 mL
HI 7034L 80000 µS/cm calibration solution, 500 mL
HI 7035L 111800 µS/cm calibration solution, 500 mL
HI 7039L 5000 µS/cm calibration solution, 500 mL
HI 7061L Electrode cleaning solution, 500 mL

ACCESSORIES

HI 76405 Probe holder

SPECIFICATIONS		HI 216
Range	EC	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
	Resistivity	0 to 19.90 MΩ•cm
Resolution	EC	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Resistivity	0.10 MΩ•cm
Accuracy (@20°C)	EC	±1% FS
	Resistivity	±2% FS
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		HI 76303 platinum four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included); HI 3316D 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%
Dimensions / Weight		240 x 182 x 74 mm (9.4 x 7.1 x 2.9") / 1.0 kg (2.3 lbs.)

For a complete list of Solutions, see the end of this section.

EC 214 • EC 215 • EC 215R

Conductivity Meters

- **Four measurement ranges**
- **Manual calibration**
- **Automatic Temperature Compensation**
- **Analog output (EC 215R)**

These instruments utilize a four ring potentiometric probe with platinum sensor that offers greater versatility over typical amperometric designs. A potentiometric probe works on the principal of induction which eliminates the effects of polarization (a common problem of amperometric systems). Two outer rings apply an alternating voltage and induce a current loop in the solution while two inner rings measure the voltage drop induced by the current loop (which is dependent on the conductivity of the solution). By utilizing the 4-ring method, it is possible to measure very low or high conductivity levels (up to 200 mS/cm) without changing probes.

The temperature coefficient correction is settable between 0 and 2.5%/°C for EC 215.

In addition, the EC 215R model offers analog output of 0 to 5V that represents the full conductivity scale across all four ranges.

SPECIFICATIONS	EC 214	EC 215	EC 215R
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 (@20°C/68°F)	±1% F.S. (excluding probe error)		
Calibration	manual, one point		
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	HI 76300, platinum four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)	HI 76303, platinum four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)	
Analog Output	–	–	0 to 5 Vcc non isolated output; accuracy ±0.1% of reading; resolution ±2.5 mV
Power Supply	12 VDC adapter (included)		
Environment	0 to 50°C (32 to 122°F); RH max 95% non-condensing		
Dimensions	240 x 182 x 74 mm (9.4 x 7.2 x 2.9")		
Weight	1.0 kg (2.2 lbs.)		

ORDERING INFORMATION

EC 214-01 (115V) and **EC 214-02** (230V) are supplied with HI 76300 conductivity probe, 12 VDC adapter and instruction manual.
EC 215-01 (115V), **EC 215-02** (230V), **EC 215-03** (AUS plug), **EC 215R-01** (115V) and **EC 215R-02** (230V) are supplied with HI 76303 conductivity probe, 12 VDC adapter and instruction manual.

ELECTRODES

HI 76300 Platinum four ring conductivity probe with DIN connector and 1 m (3.3') cable for EC 214
HI 76303 Platinum four ring conductivity probe with interal temperature sensor, DIN connector and 1 m (3.3') cable for EC 215 and EC 215R

SOLUTIONS

HI 7030L 12880 µS/cm calibration solution, 500 mL
HI 7031L 1413 µS/cm calibration solution, 500 mL
HI 7033L 84 µS/cm calibration solution, 500 mL
HI 7034L 80000 µS/cm calibration solution, 500 mL
HI 7035L 111800 µS/cm calibration solution, 500 mL
HI 70300L Electrode storage solution, 500 mL
HI 7061L Electrode cleaning solution, 500 mL

ACCESSORIES

HI 76404 Probe holder

For a complete list of Solutions, see the end of this section.

HI 98188

Graphic Display EC/Resistivity/TDS/NaCl Meter with USP <645>

- **Autorange from 0.001 µS/cm to 1,000 mS/cm (actual EC)**
- **Ready to perform all three stages of USP <645>method required for EC measurement of pure and ultra pure water**
- **Linear, natural water, or no temperature compensation**
- **Memorize up to ten user profiles**
- **Log on demand and autolog**
  All logged data can be transferred to PC through USB port.
- **GLP features**
- **Backlit, graphic display**

Rechargeable batteries

These models have up to 100 hours of extended battery life to guarantee long operation in the field. When the batteries are low, you don't have to worry about carrying a spare set with you–the batteries can be recharged with HANNA's inductive recharger. Simply leave the meter on the recharger for a few hours and you're ready to go. The recharger can be plugged into a standard 115V or 230V socket using the appropriate HANNA adapter.

HI 98188 is a waterproof, portable conductivity meter that has an expanded conductivity range from 0.001 µS/cm to 400 mS/cm, as well as TDS, resistivity and three salinity scales. This meter automatically recognizes the probe type (two or four ring) and allows the user to adjust the nominal cell constant. HI 98188 is also ready to perform all three stages of USP <645> method required for EC measurement of pure and ultrapure water.

Choose from seven memorized standards and obtain up to a five point conductivity calibration. For salinity (% range), HI 7037 standard allows users to make a one point calibration.

EC and TDS measurements are fully customizable and include: cell contant selection between 0.0 and 10.000, selection of linear or natural water (non-linear) or no (for actual conductivity reading) temperature compensation, configurable temperature compensation coefficient range from 0.00 to 10.00%/°C, choice of reference temperatures of 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 recalled for later use.

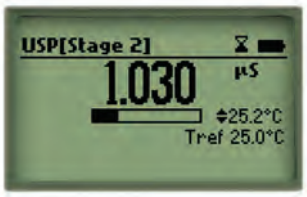
Data may be captured by either the log on demand option (400 samples) or by interval logging (from 5 sec to 1 minute). Data can be transferred to a PC using HI 92000 software and HI 920013 USB cable.

A combination of dedicated and soft keys allows quick, intuitive operation in a choice of languages. Comprehensive GLP data is directly accessible by pressing the GLP key. At the touch of a button users can access the contextual help menu to obtain on-screen information and assistance about each feature.

Designed for field use, this instrument can be easily operated with one hand and includes a rugged carrying case. With an extended battery life of up to 100 hours, users are assured long operation. The inductive charger can either be plugged into a standard 115V socket with the adapter included or a 12 Vdc source, such as a car's 12 volt accessory outlet.

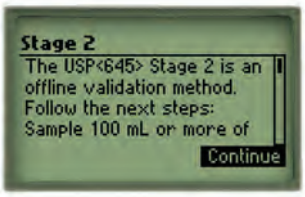
3 Stage conformity

This meter can perform all 3 stages of USP <645> water quality testing requirements.



Progress bar

Meter displays progress towards meeting stage 2 stability requirements.



On-screen guide

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

User profiles

10 sets of measurement parameters can be stored in user profiles for later retrieval.

Measurement

Large backlit graphic display shows multiple messages along with the current measurement readings.

Help

Users can consult the on-screen help from any mode by pressing the HELP key. The instrument will then explain the function and options currently available.

SPECIFICATIONS		HI 98188
EC	Range	0.001 µS/cm to 400 mS/cm (actual conductivity 1000 mS/cm) 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 (actual EC) (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)
Resistivity	Range	1.0 to 99.9 Ohms; 100 to 999 Ohms; 1.00 to 9.99 KOhms; 10.0 to 99.9 KOhms; 100 to 999 KOhms; 1.00 to 9.99 MOhms; 10.0 to 100.0 MOhms (autoranging)
	Resolution	0.1 Ohm; 1 Ohm; 0.01 KOhms; 0.1 KOhms; 1 KOhms; 0.01 MOhms; 0.1 MOhms
	Accuracy	±1% of reading (±10 Ohms or 1 digit, whichever is greater)
TDS	Range	0.00 to 99.99 mg/L (ppm); 100.0 to 999.9 mg/L (ppm); 1.000 to 9.999 g/L (ppt); 10.00 to 99.99 g/L (ppt); 100.0 to 400.0 g/L (ppt) (autoranging)
	Resolution	0.01 mg/L (ppm); 0.1 mg/L (ppm); 0.001 g/L (ppt); 0.01 g/L (ppt); 0.1 g/L (ppt)
	Accuracy	±1% of reading (±0.05 mg/L (ppm) or 1 digit, whichever is greater)
NaCl	Range	%: 0.0 to 400.0%; **seawater scale:** 0.00 to 80.00 (ppt); **practical salinity:** 0.01 to 42.00 (PSU)
	Resolution	0.1%; 0.01
	Accuracy	±1% of reading
Temperature	Range	-20.0 to 120.0°C
	Resolution	0.1°C
	Accuracy	±0.2°C (excluding probe error)
Calibration	EC	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)
	NaCl	one point only in % range (with HI 7037 standard); use conductivity calibration for all other ranges
	Temperature	one or two points
Temperature Compensation		-20.0 to 120.0°C
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		HI 76313 platinum, four ring conductivity/TDS probe with internal temperature sensor, DIN connector and 4 m (13.1') 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 USB (with HI 92000 software)
Battery Type / Life		1.2V AA rechargeable batteries (4) / approximately 100 hours of continuous use (without backlight); user selectable auto-off: 5, 10, 30, 60 minutes or disabled
Environment		IP67
Dimensions		226.5 x 95 x 52 mm (8.9 x 3.75 x 2")
Weight		525 g

* The 0.001 µS/cm EC range and 0.1 MOhms Resistivity range are not available with the 4m cable probe.

ORDERING INFORMATION

HI 98188-01 (115V) and **HI 98188-02** (230V) are supplied with HI 76313 conductivity probe, 100 mL plastic beaker, HI 7031M 1413 mS/cm calibration solution (230 mL), HI 7035 111.8 mS/cm calibration solution, rechargeable batteries, 12 VDC adapter/charger, instructions and rugged carrying case.
HI 98188/10M (230V) is supplied with everything above but includes a HI 76313 probe with 10 m (32.8') cable in place of the standard cable length.

PROBES

HI 76313	Platinum, four ring conductivity/TDS probe with internal temperature sensor, DIN connector and 4 m (13.1') cable

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 70442L	1500 mg/L (ppm) calibration solution, 500 mL
HI 7036L	12.41 g/L (ppt) calibration solution, 500 mL
HI 7037L	Salinity solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

HI 92000	Windows® compatible software
HI 920013	USB cable for PC connection

For a complete list of Solutions, see the end of this section.

HI 9835 • HI 98360

EC/TDS/NaCl/°C Meters

- **Autoranging, manual ranging and range lock**
- **Four ring probe design**
- **Automatic, manual and no Temperature Compensation**
- **Auto endpoint**

  Automatically freezes stable readings on the LCD display
- **GLP features**
- **BEPS**

  (Battery Error Prevention System) alerts the user in the event that low battery power could adversely affect readings
- **On-screen user guides**
- **Backlit display**
- **Logging of up to 500 records** (HI 98360)
- **% Battery displayed on startup**
- **USB port for PC compatibility** (HI 98360)

HI 9835 and HI 98360 are handheld conductivity/TDS/salinity/temperature meters. Users are provided with a series of diagnostic features and messages on the LCD which guide the user 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.

Both instruments utilize the four ring HI 76309/1.5 conductivity probe with internal temperature sensor. The four ring design offers accurate readings over all the conductivity range with immunity to polarization and falling that occurs on long term use of amperometric probes.

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.

The HI 98360 includes all of the features of the HI 9835 while adding data logging (up to 500 records) and a USB port for data transfer to a computer.

HI 76309/1.5 Conductivity Probe

The HI 76309/1.5 conductivity and temperature probe features a PVC body with a stainless steel four ring design. This design offers accurate readings over all the conductivity range.

- **Four ring design**
  Immune to polarization and fouling for longer periods of time
- **Extended cable**
  This probe features a 1.5 m (4.9') cable

SPECIFICATIONS		HI 9835	HI 98360
Range	EC	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)*	
	TDS	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	
	NaCl	0.0 to 400.0%	
	Temperature	-20.0 to 120.0 °C (-4.0 to 248.0°F)**	
Resolution	EC	0.01 µS/cm; 0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm	
	TDS	0.01 mg/L (ppm); 0.1 mg/L (ppm); 1 mg/L (ppm); 0.01 g/L (ppt); 0.1 g/L (ppt)	
	NaCl	0.1%	
	Temperature	0.1°C	
Accuracy	EC	±1 % of reading (±0.05 µS/cm or 1 digit)	±0.5% of reading
	TDS	±1 % of reading (±0.03 mg/L (ppm) or 1 digit, whichever greater)	±0.5% of reading
	NaCl	±1% of reading	±0.5% of reading
	Temperature	±0.2°C (excluding probe error)	
Calibration	EC	automatic, one point with six memorized values (84, 1413, 5000, 12880, 80000, 111800 µS/cm)	
	NaCl	one point with HI 7037 calibration solution	
	Temperature	two point, at 0 and 50°C (32 and 122°F)	
Temperature Compensation		automatic or manual from -20.0 to 120.0 °C (-4.0 to 248.0°F) (can be disabled for measuring conductivity)	
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)	
Data Logging		–	log on demand, up to 500 samples
PC Interface		–	opto-isolated USB
Probe (included)		HI 76309 four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable	HI 76309/1.5 four ring conductivity probe with internal temperature sensor, DIN connector and 1.5 m (4.9') 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)	

* with temperature compensation function disabled ** using the proper probe

ORDERING INFORMATION

HI 9835 is supplied with HI 76309 conductivity probe, batteries, instructions and rugged carrying case.
HI 98360 is supplied with HI 76309/1.5 conductivity probe, batteries, instructions and rugged carrying case.

PROBES

HI 76309	Four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable
HI 76309/1.5	Four ring conductivity probe with internal temperature sensor, DIN connector and 1.5 m (4.9') cable
HI 76309/10	Four ring conductivity probe with internal temperature sensor, DIN connector and 10 m (32.8') cable
HI 76309/20	Four ring conductivity probe with internal temperature sensor, DIN connector and 20 m (65.6') cable
HI 76309/50	Four ring conductivity probe with internal temperature sensor, DIN connector and 50 m (164') cable.

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7037L	100% NaCl seawater standard solution, 500 mL
HI 7061L	Electrode cleaning solution, 500 mL

ACCESSORIES

HI 92000	Windows® compatible software
HI 920014	Mini USB connection cable

For a complete list of Solutions, see the end of this section.

HI 99300 • HI 99301

EC/TDS/Temperature Meters

- **Amperometric probe technology**
- **Automatic Temperature Compensation**
- **Automatic single calibration with calibration indicator**
- **On-screen tutorial messages for calibration and set-up**
- **HOLD**
- **BEPS**
  (Battery Error Prevention System) alerts the user in the event that low battery power could adversely affect readings
- **Battery % displayed on startup**.
- **Compact, heavy-duty and waterproof**

HI 99300 and HI 99301 are portable, EC/TDS/temperature meters. HI 99300 measures low range conductivity in µS/cm and TDS in ppm while the HI 99301 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 automatically 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 and 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 HI 76306 EC/TDS/temperature probe resists clogging and is easy to clean.

HANNA instruments

With Great Products, Come Great Results™

Shown with HI 710023 protective boot (optional)

- **Protective rubber boot**
  The optional rubber boot helps protect your meter

SPECIFICATIONS		HI 99300	HI 99301
Range	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 ppm (mg/L)	0.00 to 10.00 ppt (g/L)
	Temperature	0.0 to 60.0°C/32.0 to 140.0°F	
Resolution	EC	1 µS/cm	0.01 mS/cm
	TDS	1 ppm (mg/L)	0.01 ppt (g/L)
	Temperature	0.1°C/0.1°F	
Accuracy (@20°C)	EC/TDS	±2% F.S.	
	Temperature	±0.5°C/±1°F	
Calibration		automatic, one point at 1413 µS/cm, 1382 ppm (CONV 0.5) or 1500 ppm (CONV 0.7)	automatic, one point at 12.88 mS/cm, 6.44 ppt (CONV 0.5) or 9.02 ppt (CONV 0.7)
Temperature Compensation	EC/TDS	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		HI 76306 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. auto-off after eight minutes of non-use	
Environment		0 to 50°C (32 to 122°F); RH max. 100%	
Dimensions		152 x 58 x 30 mm (6.0 x 2.3 x 1.2")	
Weight		205g (7.2 oz.)	

HI 76306 EC/TDS Probe

The slim yet rugged EC/TDS probe features a built-in temperature sensor for simultaneous EC and temperature readings. The multi-level LCD of the HI 99300 and HI 99301 displays both of these readings at the same time.

ORDERING INFORMATION

HI 99300 and **HI 99301** are supplied with HI 76306 EC/TDS probe, batteries, instructions and rugged carrying case.

PROBES

HI 76306	EC/TDS probe with internal temperature sensor, DIN connector and 1 m (3.3') cable

SOLUTIONS

HI 7030M	12.88 mS/cm solution, 230 mL
HI 7031M	1413 µS/cm solution, 230 mL
HI 7032M	1382 ppm solution, 230 mL
HI 70442M	1500 ppm solution, 230 mL
HI 70038P	6.44 ppt solution, 20 mL (25)

ACCESSORIES

HI 710023	Orange protective rubber boot
HI 710024	Blue protective rubber boot

For a complete list of Solutions, see the end of this section.

HI 993310

Direct Soil Activity and Solution Conductivity Measurement Kit

- **Supplied with two probes**
- **Automatic Temperature Compensation**
- **BEPS**

  (Battery Error Prevention System) alerts the user in the event that low battery power could adversely affect readings

HI 993310 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: HI 76305 with stainless steel, conical tip for direct soil measurement and HI 76304 for fertilizer enriched solutions.

HI 993310 measures the soil conductivity in EC (mS/cm) as well as salt 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, HI 993310 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 HI 76305 probe. Once inserted into the ground, the user simply waits until the meter displays the value read by the auger-like probe.

ORDERING INFORMATION

HI 993310 is supplied with HI 76304 conductivity probe, HI 76305 direct soil conductivity probe, battery, instructions and rugged carrying case.

PROBES

HI 76305	Stainless steel conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for direct soil measurement
HI 76304	Conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for measurement in soil slurry sample

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7051M	Soil preparation solution, 230 mL

ACCESSORIES

HI 721319	Ground auger
HI 710009	Shockproof rubber boot, blue
HI 710010	Shockproof rubber boot, orange
HI 721313	Rugged carrying case

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 for 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		HI 993310
Range	**EC**	0.00 to 19.99 mS/cm
	Salt Activity	0.00 to 1.00 g/L
Resolution	**EC**	0.01 mS/cm
	Salt Activity	0.01 g/L
Accuracy (@20°C/68°F)		±2% F.S. (0 to 15.00 mS/cm; excluding probe error)
Calibration		manual, one point
Temperature Compensation		automatic, 0 to 50°C (32 to 122°F), β=2%/°C
Probes		HI 76305 stainless steel conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for direct soil measurement (included); HI 76304 conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for measurement in soil slurry 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.)

For a complete list of Solutions, see the end of this section.

Multi-range EC and TDS Meters

- **Multiple conductivity ranges**
- **Automatic Temperature Compensation**
- **BEPS** (Battery Error Prevention System)

The HI 9033 is a rugged 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.

HI 9034 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	HI 9033	HI 9034
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 (@20°C/68°F)	±1% F.S. (excluding probe error)	
Calibration	manual, one point	
TDS Factor	–	0.5
Temperature Compensation	automatic, 10 to 50°C (50 to 122°F) with β = 2%/°C	
Probe	HI 76302W 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	
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	425 g (0.9 lbs.)	

ORDERING INFORMATION

HI 9033 and **HI 9034** are supplied with HI 76302W conductivity probe, battery, instructions and rugged carrying case.

PROBES

HI 76302W Four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable

HI 76302W/5 Four ring conductivity probe with internal temperature sensor, DIN connector and 5 m (16.4') cable

SOLUTIONS

HI 7030L 12880 µS/cm calibration solution, 500 mL
HI 7031L 1413 µS/cm calibration solution, 500 mL
HI 7033L 84 µS/cm calibration solution, 500 mL
HI 7034L 80000 µS/cm calibration solution, 500 mL
HI 7035L 111800 µS/cm calibration solution, 500 mL
HI 7032L 1382 mg/L (ppm) calibration solution, 500 mL
HI 7036L 12.41 g/L (ppt) calibration solution, 500 mL
HI 7061L Electrode cleaning solution, 500 mL

ACCESSORIES

HI 721317 Rugged carrying case

For a complete list of Solutions, see the end of this section.

HI 8633 • HI 8733

Multi-range EC Meters

- **Four ring potentiometric probe**
- **On-screen operation guide**
- **Multiple scales cover a wide range**
- **Automatic Temperature Compensation** (HI 8733)

HI 8633 and HI 8733 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–ideal for indoor, as well as outdoor measurements.

HI 8733's conductivity measurements can be automatically temperature compensated by using the HI 76302W probe with built-in temperature sensor.

Temperature compensation for HI 8633 is performed by manual adjustment.

ORDERING INFORMATION

HI 8633 is supplied with HI 76301D conductivity probe, 12880 µS/cm HI 70030 calibration solution sachets (5), calibration screwdriver, battery, instructions and rugged carrying case.
HI 8733 is supplied with HI 76302W conductivity probe, 12880 µS/cm HI 70030 calibration solution sachets (5), battery, instructions and rugged carrying case.

PROBES

HI 76301D	Four ring conductivity probe with DIN connector and 1 m (3.3') cable for HI 8633
HI 76302W	Four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable for HI 8733
HI 76302W/5	Four ring conductivity probe with internal temperature sensor, DIN connector and 5 m (16.4') cable for HI 8733

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 721313	Rugged carrying case

SPECIFICATIONS	HI 8633	HI 8733
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 (@20°C/68°F)	±1% f.s. (excluding probe error)	
Calibration	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	HI 76301D four ring conductivity probe with DIN connector and 1 m (3.3') cable (included)	HI 76302W 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	
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.)	

For a complete list of Solutions, see the end of this section.

HI 87314

EC and Resistivity Meter

- **Supplied with two probes**
- **Automatic probe recognition**
- **On-screen operation guide**
- **Automatic Temperature Compensation**

HI 87314 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% using a knob on the front panel.

For resistivity measurements, the meter is factory calibrated and, if necessary, calibration can be adjusted. The HI 3316D 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%.

SPECIFICATIONS		HI 87314
Range	EC	199.9 µS/cm; 1999 µS/cm; 19.99 mS/cm; 199.9 mS/cm
	Resistivity	0 to 19.90 MΩ•cm
Resolution	EC	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm; 0.1 mS/cm
	Resistivity	0.10 MΩ•cm
Accuracy (@20°C)	EC	±1% FS
	Resistivity	±2% FS
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		HI 76302W conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable; HI 3316D 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

HI 87314 is supplied with HI 76302W conductivity probe, HI 3316D resistivity probe, HI 70030 calibration solution sachet, calibration screwdriver, battery, instructions and hard carrying case.

PROBES

HI 76302W	Four ring conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable
HI 76302W/5	Four ring conductivity probe with internal temperature sensor, DIN connector and 5 m (16.4') cable
HI 3316D	Resistivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7034L	80000 µS/cm calibration solution, 500 mL
HI 7035L	111800 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL
HI 7061L	Cleaning solution, 500 mL

ACCESSORIES

HI 76405	Electrode holder

For a complete list of Solutions, see the end of this section.

HI 8730 • HI 8731 • HI 8732

EC, TDS and Temperature Meters

- **Watertight**
- **On-screen operation guide**
- **Automatic Temperature Compensation**

These EC/TDS meters are lightweight, water-tight and easy to maintain. Each desired measurement mode features its own key for quick selection.

HI 8730 measures EC in the 0 to 1990 µS/cm range and TDS from 0 to 1990 ppm.

HI 8731 measures EC and TDS with extended ranges (from 0 to 6000 µS/cm and from 0 to 3000 ppm, respectively).

HI 8732 measures EC in the 0 to 4 mS/cm range, TDS from 0 to 1999 ppm with adjustable TDS factor

The HI 761285 probe features a built-in temperature sensor and has been designed to require little maintenance.

ORDERING INFORMATION

HI 8730 is supplied with HI 761285 conductivity probe, HI 70031 1413 µS/cm calibration solution sachet, HI 70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.
HI 8731 is supplied with HI 761285 conductivity probe, HI 70032 1382 mg/L (ppm) calibration solution sachet, HI 70039 5000 µS/cm calibration solution sachet, battery, instructions and rugged carrying case.
HI 8732 is supplied with HI 761285 conductivity probe, HI 70031 1413 µS/cm calibration solution sachet, HI 70442 1500 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.

PROBES

HI 761285 Conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable

SOLUTIONS

HI 70031P 1413 µS/cm calibration solution, 20 mL sachet (25)
HI 7031M 1413 µS/cm cal. solution, 230 mL
HI 7031L 1413 µS/cm cal. solution, 500 mL
HI 70032P 1382 mg/L (ppm) calibration solution, 20 mL sachet (25)
HI 7032M 1382 mg/L (ppm) cal. solution, 230 mL
HI 7032L 1382 mg/L (ppm) cal. solution, 500 mL
HI 70039P 5000 µS/cm calibration solution, 20 mL sachet (25)
HI 7039M 5000 µS/cm cal. solution, 230 mL
HI 7039L 5000 µS/cm cal. solution, 500 mL
HI 70442P 1500 mg/L (ppm) calibration solution, 20 mL sachet (25)
HI 70442M 1500 mg/L (ppm) cal. solution, 230 mL
HI 70442L 1500 mg/L (ppm) solution, 500 mL

SPECIFICATIONS		HI 8730	HI 8731	HI 8732
Range	EC	0 to 1990 µS/cm	0 to 6000 µS/cm	0.00 to 4.00 mS/cm
	TDS	0 to 1990 mg/L (ppm)	0 to 3000 mg/L (ppm)	0 to 1999 mg/L (ppm)
	Temperature	0 to 70°C	0.0 to 70.0°C	
Resolution	EC	10 µS/cm		0.01 mS/cm
	TDS	10 mg/L (ppm)		1 mg/L (ppm)
	Temperature	1°C	0.1°C	
Accuracy (@20°C)	EC/TDS	±2% F.S.		
	Temperature	±1 °C	±0.5 °C	
Calibration		EC/TDS: manual one point through knob; temperature: factory calibrated		
TDS Factor		0.5		variable, 0.56 to 0.72 (according to TDS 442 curve)
Probe		HI 761285 conductivity probe with internal temperature sensor, DIN connector and 1 m (3.3') cable (included)		
Temperature Compensation		automatic, 0 to 50°C (32 to 122 °F) with β=2%/°C		
Environment		0 to 50°C (32 to 122°F); RH max 100%		
Battery Type / Life		1.9V / approximately 200 hours of continuous use		
Dimensions		145 x 80 x 36 mm (5.7 x 3.1 x 1.4")		
Weight		230 g (8.1 oz.)		

For a complete list of Solutions, see the end of this section.

HI 86301 • HI 86302 • HI 86303 • HI 86304

TDS and EC Meters

- **On-screen tutorial messages for EC/TDS calibration**
- **Automatic Temperature Compensation**
- **BEPS**
  Battery Error Prevention System turns the meter off in the event that low battery power could adversely affect readings

These meters have been designed for simplicity of use while still retaining measurement accuracy. Readings are automatically compensated for temperature variations and calibration is manually performed at one point through a knob.

The housings of these instruments have been completely sealed against humidity for use in harsh environments. The probe is easy to clean and requires little maintenance.

SPECIFICATIONS	HI 86301	HI 86302	HI 86303	HI 86304
Range	0 to 1999 mg/L (ppm)	0.00 to 10.00 g/L (ppt)	0 to 1999 µS/cm	0.00 to 19.99 mS/cm
Resolution	1 mg/L (ppm)	0.01 g/L (ppt)	1 µS/cm	0.01 mS/cm
Accuracy (@20°C/68°F)	±2% f. s.			±2% f. s. (up to 15.00 mS/cm calibrated in 12.88 mS solution), ±6% f. s. over
Calibration	manual, one point, through knob			
Calibration Solution	HI 70032	HI 70032	HI 70031	HI 70039
Temperature Compensation	automatic, 5 to 50°C (41 to 122°F) with β=2%/°C			
Probe	HI 7634D/1	HI 7632D/1	HI 7634D/1	HI 7632D/1
Battery Type / Life	9V alkaline / approx. 200 hours	9V alkaline / approx. 150 hours	9V alkaline / approx. 200 hours	9V alkaline / approx. 150 hours
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

HI 86301 is supplied with HI 7634D/1 conductivity probe, HI 70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.
HI 86302 is supplied with HI 7632D/1 conductivity probe, HI 70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.
HI 86303 is supplied with HI 7634D/1 conductivity probe, HI 70031 1413 µS/cm calibration solution sachet, battery, instructions and hard carrying case.
HI 86304 is supplied with HI 7632D/1 conductivity probe, HI 70039 5000 µS/cm calibration solution sachet, battery, instructions and rugged carrying case.

PROBES

HI 7632D/1	Conductivity probe, HR, with internal temperature sensor, DIN connector and 1 m (3.3') cable
HI 7634D/1	Conductivity probe, LR, with internal temperature sensor, DIN connector and 1 m (3.3') cable

SOLUTIONS

HI 70031P	1413 µS/cm calibration solution, 20 mL sachet (25)
HI 7031M	1413 µS/cm calibration solution, 230 mL
HI 70032P	1382 mg/L (ppm) calibration solution, 20 mL sachet (25)
HI 7032M	1382 mg/L (ppm) calibration solution, 230 mL
HI 7032L	1382 mg/L (ppm) calibration solution, 500 mL
HI 70039P	5000 µS/cm calibration solution, 20 mL sachet (25)
HI 7039M	5000 µS/cm calibration solution, 230 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL

For a complete list of Solutions, see the end of this section.

HI 8734

TDS Meter

- **Three measurement ranges**
- **Rugged probe for field use**
- **Waterproof**

HI 8734 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.

ORDERING INFORMATION

HI 8734 is supplied with HI 76301D conductivity probe, HI 70032 1382 mg/L (ppm) calibration solution sachet, battery, instructions and rugged carrying case.

PROBES

HI 76301D	Four ring conductivity probe with DIN connector and 1 m (3.3') cable

SOLUTIONS

HI 7032L	1382 mg/L (ppm) calibration solution, 500 mL
HI 7036L	12.41 g/L (ppt) calibration solution, 500 mL

ACCESSORIES

HI 710007	Shockproof rubber boot, blue
HI 710008	Shockproof rubber boot, orange
HI 710022	Spare protective case

SPECIFICATIONS	HI 8734
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 (@20°C/68°F)	±1% F.S. (excluding probe error)
Calibration	manual, one point through TDS knob
Temperature Compensation	manual, 0 to 50°C (32 to 122°F) with β = 2%/°C
TDS Factor	0.5
Probe	HI 76301D 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.)

For a complete list of Solutions, see the end of this section.

µS/mS/TDS Meter

- **Potentiometric technology**
- **Three conductivity ranges and one TDS**
- **Accurate and reliable**
- **Easy to clean probe**

HI 8033 is a handheld conductivity meter with the ability to take measurements in three different ranges.

The included HI 76301W 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 HI 8033 easily indicates which range you are working in.

HI 710010
Shockproof Boot

HI 710001 Soft Carrying Case

SPECIFICATIONS		HI 8033
Range	EC	0.0 to 199.9 µS/cm; 0 to 1999 µS/cm; 0.00 to 19.99 mS/cm
	TDS	0 to 19990 mg/L (ppm)
Resolution	EC	0.1 µS/cm; 1 µS/cm; 0.01 mS/cm
	TDS	10 mg/L (ppm)
Accuracy (@20°C/68°F)		±1% F.S. (excluding probe error)
Calibration		manual, one point
Temperature Compensation		manual, 0 to 50°C (32 to 122°F) with β=2%/°C
Probe		HI 76301W 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

HI 8033 is supplied with HI 76301W conductivity probe, calibration screwdriver, battery and instructions.

PROBES

HI 76301W	Four ring conductivity probe with 1 m (3.3') cable

SOLUTIONS

HI 7030L	12880 µS/cm calibration solution, 500 mL
HI 7031L	1413 µS/cm calibration solution, 500 mL
HI 7032L	1382 mg/L (ppm) calibration solution, 500 mL
HI 7033L	84 µS/cm calibration solution, 500 mL
HI 7039L	5000 µS/cm calibration solution, 500 mL

ACCESSORIES

HI 710009	Shockproof rubber boot
HI 710010	Shockproof rubber boot
HI 710001	Soft carrying case
HI 721313	Rugged carrying case

For a complete list of Solutions, see the end of this section.

Quality Solutions for Laboratory Applications

Conductivity Calibration Solutions

BOTTLES					
CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 6031	1413 µS/cm	500 mL	1 bottle		•
HI 6033	84 µS/cm	500 mL	1 bottle		•
HI 7030L	12880 µS/cm	500 mL	1 bottle		on request
HI 7030M	12880 µS/cm	230 mL	1 bottle		on request
HI 7030/1G	12880 µS/cm	1 gallon (3.78 L)	1 bottle		on request
HI 7031L	1413 µS/cm	500 mL	1 bottle		on request
HI 7031L/C	1413 µS/cm	500 mL	1 bottle		•
HI 7031M	1413 µS/cm	230 mL	1 bottle		on request
HI 7031/1G	1413 µS/cm	1 gallon (3.78 L)	1 bottle		on request
HI 7033L	84 µS/cm	500 mL	1 bottle		on request
HI 7033M	84 µS/cm	230 mL	1 bottle		on request
HI 7034L	80000 µS/cm	500 mL	1 bottle		on request
HI 7034M	80000 µS/cm	230 mL	1 bottle		on request
HI 7035L	111800 µS/cm	500 mL	1 bottle		on request
HI 7035M	111800 µS/cm	230 mL	1 bottle		on request
HI 7039L	5000 µS/cm	500 mL	1 bottle		on request
HI 7039M	5000 µS/cm	230 mL	1 bottle		on request
HI 8030L	12880 µS/cm	500 mL	1 bottle	•	•
HI 8031L	1413 µS/cm	500 mL	1 bottle	•	•
HI 8033L	84 µS/cm	500 mL	1 bottle	•	•
HI 8034L	80000 µS/cm	500 mL	1 bottle	•	•
HI 8035L	111800 µS/cm	500 mL	1 bottle	•	•
HI 8039L	5000 µS/cm	500 mL	1 bottle	•	•

SACHETS				
CODE	EC VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70030C	12880 µS/cm	20 mL	25 sachets	•
HI 70030P	12880 µS/cm	20 mL	25 sachets	
HI 70031C	1413 µS/cm	20 mL	25 sachets	•
HI 70031P	1413 µS/cm	20 mL	25 sachets	
HI 70031P/5	1413 µS/cm	20 mL	500 sachets	
HI 70033C	84 µS/cm	20 mL	25 sachets	•
HI 70033P	84 µS/cm	20 mL	25 sachets	
HI 70039C	5000 µS/cm	20 mL	25 sachets	•
HI 70039P	5000 µS/cm	20 mL	25 sachets	
HI 77100C	1413 µS/cm and pH 7.01	20 mL	20 sachets (10 ea)	•
HI 77100P	1413 µS/cm and pH 7.01	20 mL	20 sachets (10 ea)	

Solutions for All Your Needs

Proper calibration of the instrument/ sensor measuring system will ensure your results are accurate and repeatable.

The use of standard calibration solutions is fundamental for correctly calibrating the measuring system.

The HANNA range of conductivity calibration solutions has been produced to ensure the maximum accuracy for conductivity meters and probes.

Guaranteed Quality

HANNA conductivity meters can be calibrated in a few minutes right in the laboratory or field.

HANNA offers a range of six conductivity solutions in different forms and values.

Each label shows the production batch number, expiration date and conductivity /temperature correlation table.

Certified Solutions

For those users that require documented accuracy, conductivity (EC) solutions are available in bottles or sachets with certificates of analysis.

FDA Compliant Bottles

HANNA solutions are offered in opaque, light-tight bottles that meet FDA requirements.

High Accuracy Solutions

HI 60xx 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, for example, in the measurement of pure or distilled water.

By using our single-dose 20 mL sachets, solution freshness is guaranteed for every calibration.

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 6033	84 µS/cm	500 mL	1 bottle		•
HI 7033L	84 µS/cm	500 mL	1 bottle		on request
HI 7033M	84 µS/cm	230 mL	1 bottle		on request
HI 8033L	84 µS/cm	500 mL	1 bottle	•	•

SACHETS

CODE	EC VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70033C	84 µS/cm	20 mL	25 sachets	•
HI 70033P	84 µS/cm	20 mL	25 sachets	

1413 µS/cm Calibration Solution

The 1413 µS/cm calibration solution is best suited for general use. This solution is also available in combined 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 HI 8031L 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.

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 6031	1413 µS/cm	500 mL	1 bottle		•
HI 7031/1G	1413 µS/cm	1 gallon (3.78 L)	1 bottle		on request
HI 7031L	1413 µS/cm	500 mL	1 bottle		on request
HI 7031L/C	1413 µS/cm	500 mL	1 bottle		•
HI 7031M	1413 µS/cm	250 mL	1 bottle		on request
HI 8031L	1413 µS/cm	500 mL	1 bottle	•	•

SACHETS

CODE	EC VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70031C	1413 µS/cm	20 mL	25 sachets	•
HI 70031P	1413 µS/cm	20 mL	25 sachets	
HI 77100C	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	•
HI 77100P	1413 µS/cm & pH 7.01	20 mL	20 sachets (10 ea)	

Quality Solutions for Laboratory Applications

Conductivity Calibration Solutions

5000 µS/cm Calibration Solution

This calibration solution is ideal for those applications that need to achieve higher reading accuracies in a conductivity scale between 2000 µS/cm and 10000 µS/cm.

HANNA has produced a 5000 µS/cm calibration solution that is available in a wide range of sizes and packages to suit every application.

This solution is widely used in agriculture for monitoring and preparing nutrient solutions for proper crop production.

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 7039L	5000 µS/cm	500 mL	1 bottle		on request
HI 7039M	5000 µS/cm	230 mL	1 bottle		on request
HI 8039L	5000 µS/cm	500 mL	1 bottle	•	•

SACHETS

CODE	EC VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70039C	5000 µS/cm	20 mL	25 sachets	•
HI 70039P	5000 µS/cm	20 mL	25 sachets	

12880 µS/cm Calibration Solution

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.

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

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 7030/1G	12880 µS/cm	1 gallon (3.78 L)	1 bottle		on request
HI 7030L	12880 µS/cm	500 mL	1 bottle		on request
HI 7030M	12880 µS/cm	230 mL	1 bottle		on request
HI 8030L	12880 µS/cm	500 mL	1 bottle	•	•

SACHETS

CODE	EC VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70030C	12880 µS/cm	20 mL	25 sachets	•
HI 70030P	12880 µS/cm	20 mL	25 sachets	

80000 µS/cm Calibration Solution

HANNA 8000 µS/cm calibration solution is needed for the proper calibration of instrumentation used to measure high conductivity samples, such as very dirty wastewater, solutions with suspended materials and plating baths.

It is available in 2 different sizes and also in an FDA approved light shielded bottle.

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

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 7034L	80000 µS/cm (µmho/cm)	500 mL	1 bottle		on request
HI 7034M	80000 µS/cm (µmho/cm)	230 mL	1 bottle		on request
HI 8034L	80000 µS/cm (µmho/cm)	500 mL	1 bottle	•	•

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.

BOTTLES

CODE	EC VALUE @25°C	SIZE	PACKAGE	FDA BOTTLE	CERTIFICATE OF ANALYSIS
HI 7035L	111800 µS/cm (µmho/cm)	500 mL	1 bottle		on request
HI 7035M	111800 µS/cm (µmho/cm)	230 mL	1 bottle		on request
HI 8035L	111800 µS/cm (µmho/cm)	500 mL	1 bottle	•	•

Quality Solutions for Laboratory Applications

TDS Calibration Solutions

TDS Solutions

HANNA is one of the few producers to offer calibration solutions in packages from 20 to 500 mL 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 of 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.

BOTTLES

CODE	TDS VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 6032	1382 mg/L (ppm)	500 mL	1 bottle	•
HI 7032L	1382 mg/L (ppm)	500 mL	1 bottle	on request
HI 7032M	1382 mg/L (ppm)	230 mL	1 bottle	on request
HI 7036L	12.41 g/L (ppt)	500 mL	1 bottle	on request
HI 7036M	12.41 g/L (ppt)	230 mL	1 bottle	on request
HI 70442L*	1500 mg/L (ppm)	500 mL	1 bottle	on request
HI 70442M*	1500 mg/L (ppm)	230 mL	1 bottle	on request

SACHETS

CODE	TDS VALUE @25°C	SIZE	PACKAGE	CERTIFICATE OF ANALYSIS
HI 70032C	1382 mg/L (ppm)	20 mL	25 sachets	•
HI 70032P	1382 mg/L (ppm)	20 mL	25 sachets	
HI 70032P/5	1382 mg/L (ppm)	20 mL	500 sachets	
HI 70038C	6.44 g/L (ppt)	20 mL	25 sachets	•
HI 70038P	6.44 g/L (ppt)	20 mL	25 sachets	
HI 70080C	800 mg/L (ppm)	20 mL	25 sachets	•
HI 70080P	800 mg/L (ppm)	20 mL	25 sachets	
HI 70442C*	1500 mg/L (ppm)	20 mL	25 sachets	•
HI 70442P*	1500 mg/L (ppm)	20 mL	25 sachets	
HI 77200C*	1500 mg/L (ppm) & pH 7.01	20 mL	20 sachets (10 ea)	•
HI 77200P*	1500 mg/L (ppm) & pH 7.01	20 mL	20 sachets (10 ea)	
HI 77300C	1382 mg/L (ppm) & pH 7.01	20 mL	20 sachets (10 ea)	•
HI 77300P	1382 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).

HI 6032 Standard Solution

- **High precision standard solution at 1382 ppm**
- **Certificate of analysis**

HANNA instruments

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