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Process & Wastewater Control

HANNA instruments
CANADA

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Process pH measurement

pH measurement is a means of determining whether a substance is acidic or basic (alkaline). In process applications, pH measurement and control is essential in order to obtain repeatable results in the outcome of reactions that are pH dependent. The pH value of a solution expresses the ratio of hydrogen ion (H+) and hydroxyl ion OH- concentrations and is measured on a scale of 0 to 14.

An ion is a charged particle that comes from an atom or molecule which has either gained or lost electrons. Acids, alkalies and most salts are soluble in water and the ion containing solutions produced conduct an electric current. These solutions are described as electrolytes and the ionization in solutions is called electrolytic dissociation:

Electrolytic Dissociation Examples:

$$HCL \Leftrightarrow H^+ + Cl^-$$
$$NaOH \Leftrightarrow Na^+ + OH^-$$
$$CaCl \Leftrightarrow Ca^{2+} + 2\ Cl^-$$

In all chemical reactions the ratio of the concentration of dissociated and non-dissociated molecules is constant. This is the law of mass action. In pure water, the number of hydrogen ions and of hydroxyl ions is equal, since when a water molecule dissociates, one hydrogen ion and one hydroxyl ion are produced.

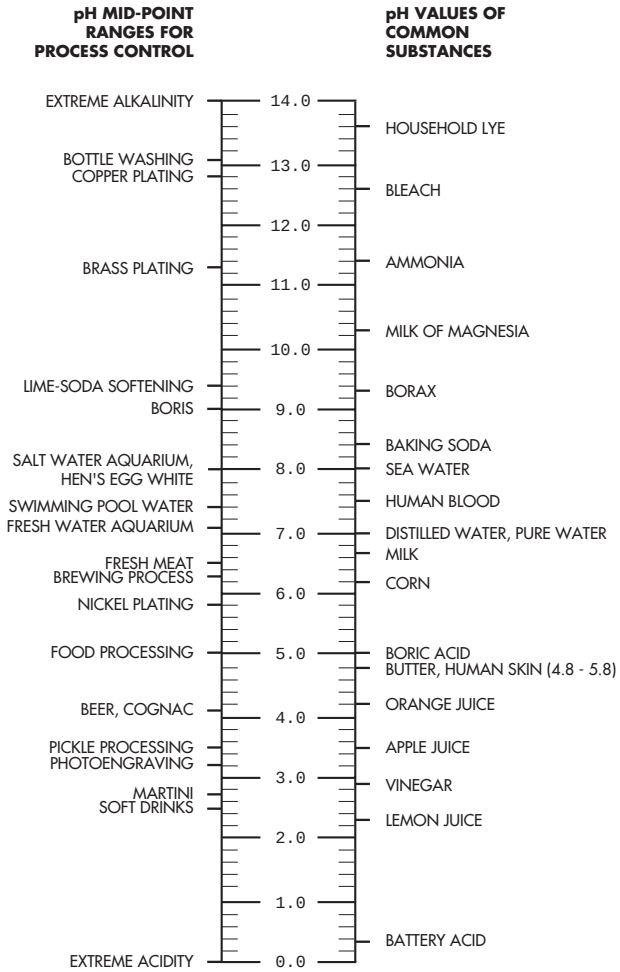
$$[H^+] = 10^{-7}\ Mol/l;\ [OH^-] = 10^{-7}\ Mol/l$$

Therefore when we know the hydrogen ion concentration, the hydroxyl ion concentration is also known. When a census of hydrogen ion activity is taken we find that it is logarithmic. In 1909 the Danish scientist S.P.L. Sorensen proposed the original definition of pH. After some practical adjustments the definition evolved into what is used today:

pH is the common logarithm of the hydrogen ion concentration, multiplied by (-1):

$$pH = -\log[H^+]$$

The diagram on the right illustrates the pH levels of some common substances and the optimum pH levels for many process applications.



Process ORP measurement

Theory and Practice
Similar to the manner in which acidic or alkaline solutions are quantified by pH measurements, solutions can also be graded as oxidizing or reducing based on measurements of ORP (sometimes called "REDOX") values.

Oxidation is a process during which a molecule or ion loses electrons. However, oxidation is always coupled together with reduction so that as one element gets oxidized, the other automatically is reduced.

The oxidation of iodide by ferric ion (Fe+++)

Redox Process : $2\ Fe^{3+} + 2I^- \rightarrow 2Fe^{2+} + I_2$
Oxidation : $2I^- \rightarrow I_2 + 2e^-$
Reduction : $2\ Fe^{3+} + 2e^- \rightarrow 2\ Fe^{2+}$

This complementary oxidation-reduction process is known as a redox reaction system and the ORP value is a measure of the electron activity as compared to the hydrogen activity in the case of pH measurements.

Redox potentials are measured by an electrode normally made of an inert metal and is capable of absorbing or releasing electrons. The common metals used are platinum or gold.

When the redox electrode is immersed in a solution containing a reversible chemical reaction system, a migration of electrons is established between the electrode and the system. This electron flow can be construed as an exchange current density and is of paramount importance for accurate, fast and reproducible redox potential measurement.

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

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

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

Process Conductivity measurement

Definition

Electric conductivity is defined as the ability of a substance to conduct an electric current and it is the reciprocal of electrical resistivity. The unit of measurement commonly used is the Siemens/cm (S/cm), in millionths (10^{-6}) of units, that is microSiemens/cm (µS/cm), or in thousandths (10^{-3}), i.e. milli-Siemens (mS/cm).

In aqueous solutions conductivity is directly proportional to the concentration of dissolved solids, therefore the higher the concentrations of solids, the greater the conductivity. The relation between conductivity and dissolved solids is expressed, depending on the application, with a good approximation, by:

1.4 µS/cm = 1 ppm or 2 µS/cm = 1 ppm (part per million of $CaCO_3$)

where 1 ppm = 1 mg/L is the measuring unit for dissolved solids.

In addition to conductivity meters, there are TDS instruments that automatically convert the conductivity value into ppm, thus providing a direct reading of the dissolved solids concentration.

The conductivity of a solution is determined by molecular motion. Temperature affects molecular motion and it is therefore important to compensate for temperature when accurate measurements are necessary. For comparative measurements, the standard temperature is normally 20°C or 25°C (68°F or 77°F). To correct for the effect of temperature, a compensation coefficient ß is used. ß is expressed in percentage per degrees Celsius or %/°C and it varies accordingly to the solution being measured. In most applications, 2% per degree Celsius is used as an approximate value for ß.

Conductivity measurements

It is possible to differentiate conductivity meters according to the measurement method they use, that is, amperometric or potentiometric. The amperometric system applies a known potential difference (V) to two electrodes and measures the current (I) that passes through them. According to Ohm's law:

$$I = \frac{V}{R}$$

where R is resistance, V is the known voltage and I is the current going from one electrode (probe) to the other.

It follows that the higher the current obtained, the greater the conductivity. The resistance however depends on the distance between the two electrodes and their surfaces, which can vary due to deposits of salts or other materials (electrolysis). For this reason amperometric system is recommended for solutions with low level of dissolved solids, i.e. up to 1 gram per liter (approx. 2000 µS/cm).

The 4-ring potentiometric method is based on the principle of induction, and eliminates common problems associated with the amperometric system such as the effects of polarization. The two outer rings apply an alternating voltage and induce a current loop in the solution. The two inner rings measure the voltage drop induced by the current loop, which is dependent on the conductivity of the solution. A PVC shield maintains the current field restrained and constant. Using the four-ring method, it is possible to measure conductivity with ranges up to 200000 µS/cm and 100 g/L.

Features

- *On/off control or control through analog output*
- *Scaleable analog output*
- *Galvanically isolated output with zoom*
- *Choose from 6 mA or VDC analog outputs*
- *0.01 pH high and low setpoint adjustment*
- *1mV high and low setpoint adjustment*
- *Alarm time delay*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *RS-485 interface*
- *Bi-directional RS-232*
- *Automatic temperature compensation*
- *2 process ID numbers*
- *Self-diagnostics and troubleshooting*

Advance microprocessor
pH-ORP-Conductivity-TDS

1- Recalls the calibration data to insure accuracy and compliance with procedures

2- Displays the various parameters and returns to normal operation mode

3- A 4-digit password protects the setup parameters to prevent tampering

4- Simple automatic calibration and temperature compensation with visual prompts

5- 17 mm high 4 1/2 digit primary display visible from a distance

6- 10 mm high 3 1/2 digits secondary display showing temperature or calibration data

7- Fixed or intermittent red, green and yellow LED's signal status from a distance

8- CFM key confirms calibration data and acts as the ENTER key

9- Hi-tech microprocessor puts a host of variables at your disposal to fine tune your process, save on chemicals and meet regulatory requirements

The Hanna line of industrial microprocessor-based controllers offer a multitude of possibilities such as single and dual setpoints, ON/OFF control, control through analog output, relay outputs, user-selectable zoom, bidirectional isolated RS 232, isolated recorder outputs in mAmps and volts, differential input, RS-485 interface and Fail Safe Features.

Simple-to-use

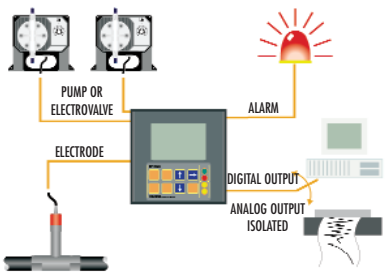
The large, dual-level LCD shows both main parameter (pH/ORP/Conductivity/TDS) and temperature, it guides operators through calibration and programming with step-by-step prompts. The choice of ON/OFF or proportional control provides extra versatility and makes it possible to pick the process controller that best fits your application. Keeping track of multiple controllers in different plants is made easy. These advanced controllers can be identified with both a factory and process ID.

Save Money with Custom Programs

The pH 500, pH 502, mV600, mV602 and HI 700 series of controllers put a host of parameters at your disposal to prevent overdosing or costly system failures. You can set your high and low setpoint hysteresis bands independently to fine tune dosing processes with the ON/OFF controllers. These advanced series of controllers also include models featuring PID (Proportional Integrative Derivative) control. The instrument can be set to P, PI and PID to suit your application. All models offer an adjustable timer from 10 minutes to 7 days as the maximum time that the relay contacts may remain closed. An important feature in case of sudden chemical depletion, truncated intake or discharge tubing and other calamities. With these silicon guardians, users can rest assured that processes are operating efficiently and safely.

Galvanically Isolated Outputs with Zoom

Some models incorporate hardware selectable isolated current or voltage output. These can drive auxiliary devices, chart recorders and provide remote monitoring. Users can also zoom on to any 2 points from the full measurement scale. These lines of industrial controllers include models that provide control through analog output. Now any compatible device such as electrovalves or pumps may be driven with these advanced controllers.



pH 500 - pH controllers

- *Single or dual setpoint*
- *Fully programmable*
- *Microprocessor memory*
- *mA & VDC recorder output or RS-232 output*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*
- *Simple wiring with removeable terminal modules*

pH 500 series of controllers offer exceptional value for your money. They are simple-to-operate, microprocessor-based process meters packed with features. For more flexibility and better resolution for chart recorders, any two points between 0 and 14 pH can be chosen to correspond to the analog output spans. Some pH 500 models are equipped with a bi-directional RS232C port. Push button password programming prevents tampering. The microprocessor memory is fully programmable and has 3 months backup power supply. The Fail Safe Alarm system protects the pH 500 against the pitfalls of process control, like power interruption or line failure. With pH 500 quick 1, 2 or 3 point calibration at pH 4.01, 7.01 and 10.01 comes standard. The temperature can be manually or automatically compensated for. Models with RS232 output allow computer compatibility, a necessity for process control instrumentation.

SPECIFICATIONS	pH 500/D	pH 500/U
RANGE	0.00 to 14.00 pH / -9.9 to 120.0°C	
RESOLUTION	0.01 pH / 0.1°C	
ACCURACY (@20°C/68°F)	±0.02 pH / ±0.5°C	
INPUT	High Impedance 10^{12} Ohm	
CALIBRATION	1, 2, or 3 points at pH 4.01, 7.01 and 10.01	
TEMPERATURE COMPENSATION	Automatic (with Pt100) or manual from -9.9 to 120°C	
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages	
OUTPUTS	Digital: RS232 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA,	
	0 to 20 mA and 4 to 20 mA (max resistive load 1KW), 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)	
SETPOINT RELAY(S)	1 or 2: SPST NO contact outputs 5A-250VAC, 5A-30VDC (resistive load)	
POWER SUPPLY	230V ±10%VAC; 50 Hz	115V ±10%VAC; 60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing	
PANEL CUTOUT	140 x 140 mm (5.5 x 5.5")	
DIMENSIONS	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
WEIGHT	1.6 Kg (3.5 lb.)	

ORDERING INFORMATION:

pH 500111	pH controller with single setpoint, ON/OFF control, analog output.
pH 500112	pH controller with single setpoint, ON/OFF control, RS232 output.
pH 500211	pH controller with dual setpoints, ON/OFF control, analog output.
pH 500212	pH controller with dual setpoints, ON/OFF control, RS232 output.

SUGGESTED ACCESSORIES:

HI 6101405	Standard glass type pH probe; built-in amplifier, PVDF body with flat tip, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 6101805	High T° glass type pH probe; built-in amplifier, PVDF body with flat tip and 1mm guard, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

pH 502 - pH controllers

The pH 502 series of controllers offer many new features to increase the level of control available in your plant. These powerful instruments can be configured to utilize P, PI or PID controlling. With this advanced feature, the pH 502 takes the place of three instruments that only allow one configuration each. The pH 502 incorporate control through analog output to drive any compatible device such as an electrovalve or pump. Each model has a differential input for a grounding bar to extend electrode life. RS-485 is standard interface. The fully programmable microprocessor memory has a 3 month backup power supply. Fail Safe Alarm system protection against power interruption or line failure. 1, 2 or 3 point automatic calibration and manual or Automatic Temperature Compensation complete the features of these state-of-the-art controllers.

- *Control through analog output (single setpoint)*
- *Fully programmable Microprocessor memory*
- *RS-485 interface*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*
- *Simple wiring with removeable terminal modules*

SPECIFICATIONS	pH 502/D	pH 502/U
RANGE	0.00 to 14.00 pH / -9.9 to 120.0°C	
RESOLUTION	0.01 pH / 0.1°C	
ACCURACY (@20°C/68°F)	±0.02 pH / ±0.5°C	
INPUT	High Impedance 10^{12} Ohm	
CALIBRATION	1, 2, or 3 points at pH 4.01, 7.01 and 10.01	
TEMPERATURE COMPENSATION	Automatic (with Pt100) or manual from -9.9 to 120°C	
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages	
OUTPUTS	Digital: RS485 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW), 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)	
SETPOINT RELAY	1 SSR, 1A, 12VDC to 230VAC ±10% (resistive and inductive load)	
POWER SUPPLY	230V ±10%VAC; 50 Hz	115V ±10%VAC; 60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing	
PANEL CUTOUT	140 x 140 mm (5.5 x 5.5")	
DIMENSIONS	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
WEIGHT	1.6 Kg (3.5 lb.)	

ORDERING INFORMATION:

pH 502523	pH controller with single setpoint, PID control, control through analog output, RS485 output.

SUGGESTED ACCESSORIES:

HI 6101405	Standard glass type pH probe; built-in amplifier, PVDF body with flat tip, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 6101805	High T° glass type pH probe; built-in amplifier, PVDF body with flat tip and 1mm guard, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

mV 600 - ORP controllers

- *Fully programmable Microprocessor memory*
- *mA & VDC recorder output or RS-232 output*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*
- *Simple wiring with removeable terminal modules*

The mV 600 series controllers with their microprocessor technology are highly sophisticated yet easy to use. A 34 level program menu offers standard features such as password protection, control relay enabling/disabling, high/low setpoint, and adjustable hysteresis for custom programming control. The 600 series controllers have a 4-20 mA output with a zoom function to allow better resolution on any two points between the 0 and 2000 mV. The fully programmable microprocessor comes complete with a 3 month back-up power supply to maintain all setpoint and parameters during power interruptions. Easy 1 or 2 point calibration at 0, 350 and 1900 mV ensures accuracy and reliability. An additional standard feature of the 600 series is a differential circuit which eliminates ground loops from the process being monitored and significantly extends the life of the electrode.

SPECIFICATIONS	mV600/D	mV600/U
RANGE	-2000 to 2000 mV	
RESOLUTION	1 mV	
ACCURACY (@20°C/68°F)	±2 mV	
INPUT	High Impedance 10^{12} Ohm	
CALIBRATION	At 0 and 350 or 1900 mV	
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages	
OUTPUTS	Digital: RS232 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW), 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)	
SETPOINT RELAY	SPST NO contact output 5A-250VAC, 5A-30VDC (resistive load)	
POWER SUPPLY	230V ±10%VAC; 50 Hz	115V ±10%VAC; 60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing	
PANEL CUTOUT	140 x 140 mm (5.5 x 5.5")	
DIMENSIONS	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
WEIGHT	1.6 Kg (3.5 lb.)	

ORDERING INFORMATION:

mV 600111	mV controller with single setpoint, ON/OFF control, analog output.
mV 600112	mV controller with single setpoint, ON/OFF control, RS232 output.

SUGGESTED ACCESSORIES:

HI 6200405	Platinum type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 6200505	Gold type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

mV 602 - ORP controllers

The mV 602 line of microprocessor controllers have been engineered to incorporate ease of use with a powerful set of features. These robust instruments can be configured to utilize P, PI or PID controlling. This means you don't need to choose from three separate instruments that only allow one configuration.

The mV 602 includes models that incorporate control through analog output to drive compatible devices such as electrovalves or pumps. Several models feature bidirectional RS485 to allow remote operation with a PC as well as analog recorder output. The fully programmable microprocessor memory has a 3 month backup power supply. The Fail Safe Alarm system protects against power interruption or line failure. Use of a Solid State Relay has been included to meet the needs of extreme industrial applications. All models now incorporate a differential input so a grounding bar may be attached, extending the life of the electrodes by eliminating ground loop current problems.

- *Control through analog output (single setpoint)*
- *Fully programmable Microprocessor memory*
- *RS-485 interface*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*
- *Simple wiring with removeable terminal modules*

SPECIFICATIONS	mV602/D	mV602/U
RANGE	-2000 to 2000 mV	
RESOLUTION	1 mV	
ACCURACY (@20°C/68°F)	±2 mV	
INPUT	High Impedance 10^{12} Ohm	
CALIBRATION	At 0 and 350 or 1900 mV	
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages	
OUTPUTS	Digital: R5485 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW), 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)	
SETPOINT RELAY	SPST NO contact output 5A-250VAC, 5A-30VDC (resistive load) or SSR, 1A, 12VDC to 230VAC ±10% (resistive and inductive load)	
POWER SUPPLY	230V ±10%VAC; 50 Hz	115V ±10%VAC; 60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing	
PANEL CUTOUT	140 x 140 mm (5.5 x 5.5")	
DIMENSIONS	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
WEIGHT	1.6 Kg (3.5 lb.)	

ORDERING INFORMATION:

mV 602523	mV controller with single setpoint, PID control, control through analog output, RS485 output.

SUGGESTED ACCESSORIES:

HI 6200405	Platinum type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 6200505	Gold type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

HI 700 - Conductivity/TDS controllers

- *Fully programmable Microprocessor memory*
- *Dual setpoints*
- *mA & VDC recorder output*
- *Differential input for ground loop protection*
- *Automatic 1 or 2 points calibration*
- *Last calibration data*
- *Manual or automatic temperature compensation*
- *Extensive range for both conductivity & TDS*

The HI 700 series of regulators offer state-of-the-art specifications for your process control. They can be configured for ON/OFF, Proportional, PI or PID control. Thanks to Hanna exclusive technology, they can be customized to best fit your application. A menu driven display aids the user throughout the operations with running messages and clear prompts. All relevant parameters can be simply adjusted and will remain memorized until overwritten. Bright LED lights show the current status even from a distance. With self-diagnostic features and extractable terminals, installation and maintenance are rapid and simple. A password protection guarantees that the calibration and predetermined parameters cannot be altered unnecessarily. The controllers can operate with 4-ring probe or 4-20 mA signal. They accept probes with or without a built-in Pt 100 temperature sensor. HI 710 monitors and controls both conductivity and TDS. If you only need conductivity or TDS, then order HI 700 or HI 705, respectively.

SPECIFICATIONS		HI 700	HI 705	HI 710
RANGE	µS	0.0 to 199.9/0 to 1999	-	0.0 to 199.9/0 to 1999
	mS	0.00 to 19.99/0.0 to 199.9	-	0.00 to 19.99/0.0 to 199.9
	ppm	-	0.0 to 100.0/0 to 1000	0.0 to 100.0/0 to 1000
	ppt	-	0.00 to 10.00/0.0 to 100.0	0.00 to 10.00/0.0 to 100.0
	°C	-10.0 to 100.0	-10.0 to 100.0	-10.0 to 100.0
RESOLUTION	µS	0.1/1	-	0.1/1
	mS	0.01/0.1	-	0.01/0.1
	ppm	-	0.1/1	0.1/1
	ppt	-	0.01/0.1	0.01/0.1
	°C	0.1	0.1	0.1
ACCURACY (@20°C/68°F)		±0.5% F.S. (EC & TDS); ±0.5°C (0 to 70°C); ±1°C (outside)		
CALIBRATION		Automatic or manual single point		
TEMPERATURE COMPENSATION		Automatic (with Pt100) or manual from -10 to 100°C with coeff. from 0.00 to 10.00%/°C		
TDS RATIO		-	0.5	Adjustable from 0.00 to 1.00
READOUT		Dual level LCD with graphic symbols and messages		
OUTPUT		Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW), 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)		
ANALOG INPUT		4 to 20 mA		
SETPOINT RELAY		2 SPDT 5A-250VAC contact outputs , 5A-30VDC (resistive load)		
ALARM RELAY		SPDT 5A-250VAC contact outputs , 5A-30VDC (resistive load)		
POWER SUPPLY		115V ±10% or 230V ±10%VAC; 50/60 Hz		
ENVIRONMENT		0 to 50°C (32 to 122°F); max. 85% RH non-condensing		
PANEL CUTOUT		140 x 140 mm (5.5 x 5.5")		
DIMENSIONS		1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")		
WEIGHT		1.6 Kg (3.5 lb.)		

ORDERING INFORMATION:

HI 700	EC controller, double setpoint, ON/OFF and PID control, analog output
HI 705	TDS controller, double setpoint, ON/OFF and PID control, analog output
HI 710	EC and TDS controller, double setpoint, ON/OFF and PID control, analog output

SUGGESTED ACCESSORIES:

HI 7639	EC/TDS Pt 100 probe and 3 m (9.9') cable
HI 7640	EC/TDS probe for tank applications and 3 m (9.9') cable
HI 3011	EC/TDS in-line probe and 3 m (9.9') cable
HI 3012	EC/TDS probe for tank applications and 3 m (9.9') cable
HI 70030P	12880 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70039P	5000 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70033P	84 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70038P	6.44 ppt (g/l) single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70032P	1382 ppm single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70080P	800 ppm single use calibration sachets, 25 x 20 ml (25 calibrations)

Features

- *Easy and fast wall mount installation*
- *On/off control or control through analog output*
- *Scaleable analog output*
- *Galvanically isolated output with zoom*
- *Choose from 6 mA or VDC analog outputs*
- *0.01 pH high and low setpoint adjustment*
- *1mV high and low setpoint adjustment*
- *Alarm time delay*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *RS-485 interface*
- *Automatic temperature compensation*
- *2 process ID numbers*
- *Self-diagnostics and troubleshooting*

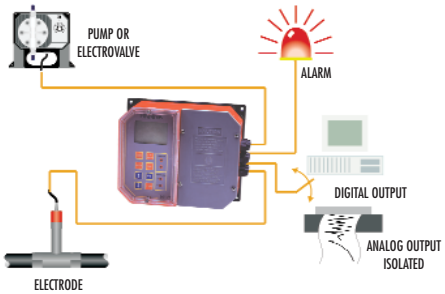
Advance Microprocessor
Wall mount pH & ORP controllers

The Hanna line of industrial microprocessor-based wall mount controllers offer a multitude of possibilities such as single and dual setpoints, ON/OFF control, control through analog output, relay outputs, user-selectable zoom, isolated recorder outputs in mAmps and volts, differential input, RS-485 interface and Fail Safe Features.

Simple-to-use
The large, dual-level LCD shows both main parameter (pH/ORP) and temperature, it guides operators through calibration and programming with step-by-step prompts. The choice of ON/OFF or proportional control provides extra versatility and makes it possible to pick the process controller that best fits your application. Keeping track of multiple controllers in different plants is made easy. These advanced controllers can be identified with both a factory and process ID.

Save Money with Custom Programs
The HI 21 and HI 22 series of controllers put a host of parameters at your disposal to prevent overdosing or costly system failures. You can set your high and low setpoint hysteresis bands independently to fine tune dosing processes with the ON/OFF controllers. These advanced series of controllers also include models featuring PID (Proportional Integrative Derivative) control. The instrument can be set to P, PI and PID to suit your application. All models offer an adjustable timer from 10 minutes to 7 days as the maximum time that the relay contacts may remain closed. An important feature in case of sudden chemical depletion, truncated intake or discharge tubing and other calamities. With these silicon guardians, users can rest assured that processes are operating efficiently and safely.

Galvanically Isolated Outputs with Zoom
Some models incorporate hardware selectable isolated current or voltage output. These can drive auxiliary devices, chart recorders and provide remote monitoring. Users can also zoom on to any 2 points from the full measurement scale. These lines of industrial controllers include models that provide control through analog output. Now any compatible device such as electrovalves or pumps may be driven with these advanced controllers.



HI 21 - wall mount pH controllers

- *Control through analog output (single setpoint)*
- *Fully programmable Microprocessor memory*
- *RS-485 interface*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*

The HI 21 controllers are simple-to-operate, microprocessor-based process meters packed with features. For more flexibility and better resolution for chart recorders, any two points between 0 and 14 pH can be chosen to correspond to the analog output spans. Some HI 21 models are equipped with a bi-directional RS485 port. Push button password programming prevents tampering. The microprocessor memory is fully programmable and has 3 months backup power supply. The Fail Safe Alarm system protects the HI 21 against the pitfalls of process control, like power interruption or line failure. With HI 21 quick 1, 2 or 3 point calibration at pH 4.01, 7.01 and 10.01 comes standard. The temperature can be manually or automatically compensated for. Models with RS485 output allow computer compatibility, a necessity for process control instrumentation. You can also choose from ON/OFF, Proportional and PID control to save on chemicals.

SPECIFICATIONS	HI 21
RANGE	0.00 to 14.00 pH / -9.9 to 120.0°C
RESOLUTION	0.01 pH / 0.1°C
ACCURACY (@20°C/68°F)	±0.02 pH / ±0.5°C
CALIBRATION	1, 2, or 3 points at pH 4.01, 7.01 and 10.01
TEMPERATURE COMPENSATION	Automatic (with Pt100) or manual from -9.9 to 120°C
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages
OUTPUTS	Digital: RS485 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW) 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)
SETPOINT RELAY(S)	1 or 2: SPST contact outputs, 5A-250VAC, 5A-30VDC (resistive load) Fuse protected: 5A, 250V fast fuse
ALARM RELAY	Electromechanical relay SPDT contact output, 5A - 250 VAC, 5A - 30 VDC (resistive load) Fuse protected: 5A, 250V fast fuse
POWER SUPPLY	230V ±10%VAC; 50 Hz or 115V ±10%VAC; 60 Hz
POWER CONSUMPTION	15 VA
MAX. OSCILLATION FREQUENCY	4 MHz
OVER CURRENT PROTECTION	200 mA, 250 V, fast fuse
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing
PROTECTION	IP 54
DIMENSIONS	221 x 181 x 86 mm (8.7 x 7.1 x 3.4")
WEIGHT	1.4 Kg (3.1 lb.)

ORDERING INFORMATION:

HI 21111	pH Controller with single setpoint, ON/OFF control and analog output.
HI 21211	pH Controller with dual setpoint, ON/OFF control and analog output.
HI 21221	pH Controller with dual setpoint, ON/OFF control and proportional ON/OFF control with analog output.
HI 21222	pH Controller with dual setpoint, proportional ON/OFF control with RS485 output.
HI 21223	pH Controller with single setpoint, control through analog output, PID and ON/OFF control with analog and RS485 output.

SUGGESTED ACCESSORIES:

HI 6101405	Standard glass type pH probe; built-in amplifier, PVDF body with flat tip, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 6101805	High T° glass type pH probe; built-in amplifier, PVDF body with flat tip and 1mm guard, matching pin, pt100 T°sensor, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

HI 22 - wall mount ORP controllers

The HI 22 controllers have been engineered with the same outstanding features as the HI 21 meters. The microprocessor memory is fully programmable and has a 3-month backup power supply. The Fail Safe Alarm system protects these meters against the pitfalls of process control. User-selectable timing capability safeguards against overdosing and saves money while protecting the environment. These instruments have a differential input, extending electrode life by eliminating ground loop current through the reference. Users can choose between ON/OFF and Proportional control as well as selectable current and voltage outputs. For more flexibility and better resolution for chart recorders, choose any two points between 0 and 2000 mV to correspond to the analog output spans. RS485 capability makes one model PC compatible. Wiring the controllers is simple with extractable terminal modules. A host of self-testing features and user-friendly functions make HI 22 a great value.

- *Fully programmable Microprocessor memory*
- *RS-485 interface*
- *Differential input for ground loop protection*
- *Automatic 3 points calibration*
- *Last calibration data*
- *Automatic temperature compensation*

SPECIFICATIONS	HI 22
RANGE	±2000 mV / -9.9 to 120.0°C
RESOLUTION	1 mV / 0.1°C
ACCURACY (@20°C/68°F)	±2 mV / ±0.5°C
CALIBRATION	At 0 and 350 or 1900 mV
TEMPERATURE COMPENSATION	Automatic (with Pt100) or manual from -9.9 to 120°C
READOUT	4 1/2-digit dual level LCD with graphic symbols and messages
OUTPUTS	Digital: RS485 bi-directional opto-isolated; or Analog: galvanically isolated 0 to 1 mA, 0 to 20 mA and 4 to 20 mA (max resistive load 1KW) 0 to 5VDC, 1 to 5VDC and 0 to 10VDC (min. resistive load 1KW)
SETPOINT RELAYS(S)	1 or 2: SPST contact outputs, 5A-250VAC, 5A-30VDC (resistive load) Fuse protected: 5A, 250V fast fuse
ALARM RELAY	Electromechanical relay SPDT contact output, 5A - 250 VAC, 5A - 30 VDC (resistive load) Fuse protected: 5A, 250V fast fuse
POWER SUPPLY	230V ±10%VAC; 50 Hz or 115V ±10%VAC; 60 Hz
POWER CONSUMPTION	15 VA
MAX. OSCILLATION FREQUENCY	4 MHz
OVER CURRENT PROTECTION	200 mA, 250 V, fast fuse
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 85% RH non-condensing
PROTECTION	IP 54
DIMENSIONS	221 x 181 x 86 mm (8.7 x 7.1 x 3.4")
WEIGHT	1.4 Kg (3.1 lb.)

ORDERING INFORMATION:

HI 22111	ORP Controller with single setpoint, ON/OFF control and analog output.
HI 22122	ORP Controller with single setpoint, proportional ON/OFF control and RS485 output.

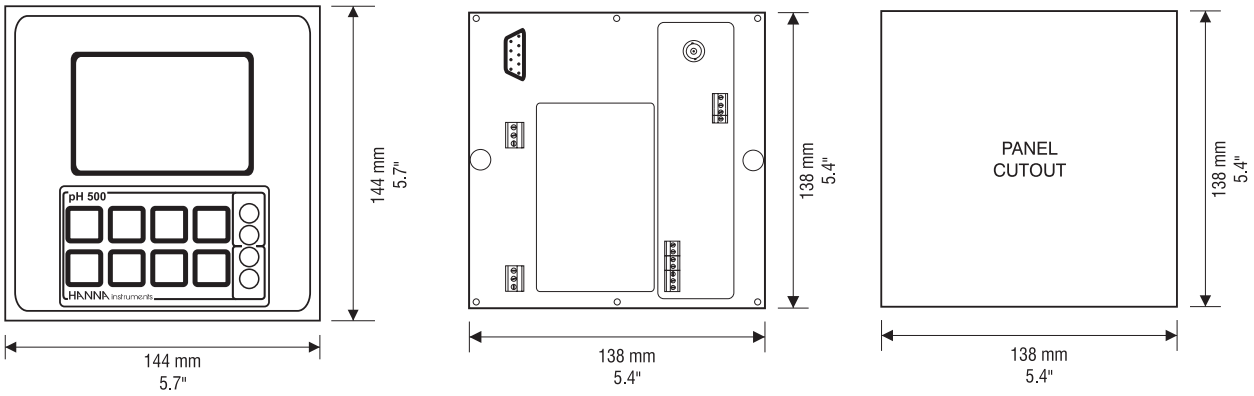
SUGGESTED ACCESSORIES:

HI 6200405	Platinum type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 6200505	Gold type ORP probe; built-in amplifier, PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

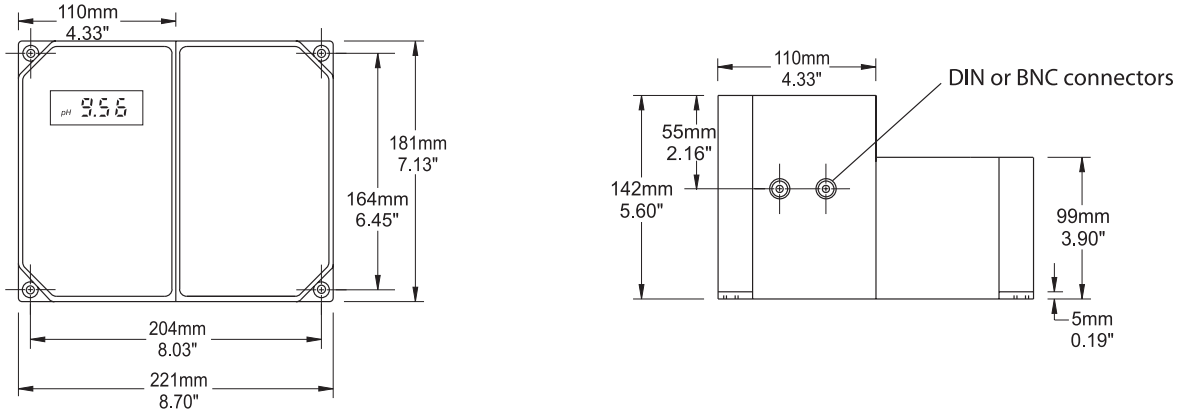
** See Industrial probes section on page 55 for a complete line of ORP probes.*

Mechanical dimensions

pH 500, pH 502
mV600, mV602
HI 700, HI 705, HI 710



HI 21, HI 22



Features

- *Single or dual setpoint*
- *Isolated recorder output*
- *Auto-diagnostic test to check both instrument and probe status*
- *Consent contact*
- *0.02 pH accuracy*
- *5 mV ORP accuracy*
- *2% conductivity accuracy*
- *Direct probe or 4-20 mA input*
- *Automatic temperature compensation*
- *Easy 1 or 2 points calibration through trimmers*
- *Unbeatable price !*

Economical Series

pH, ORP & Conductivity controllers & indicators

1- Dual setpoint control

2- Sensor status test button

3- Meter calibration satus test button

4- High and low alarm

5- Splash proof IP42 transparent protective cover

6- Accurate measurements with 0.01pH & 1 mV resolution

Technical superiority

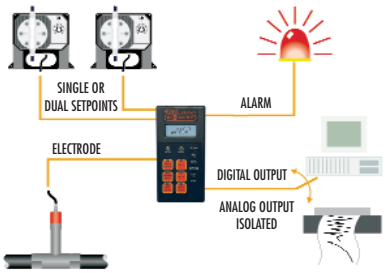
Hanna's panel mounted pH, ORP, and conductivity controllers are designed to meet your most demanding process control requirements. Where a direct electrode input is not suitable, the controller is available with a 4-20 mA input from the amplifier. This feature greatly improves the safety of your instrumentation and plant. Accurate measurements are displayed on a large LCD, enabling the operator to check the controller readings easily. These units have sophisticated, built-in self-diagnostic functions that allow the operator to check whether a malfunction has originated in the instrument itself, or in the outside connection. This saves valuable time and money, particularly in the monitoring of important processes. In the event of a malfunction, the operator can determine the origin and rectify the situation before any costly errors occur. The unique Self-Diagnostic Error Prevention System makes the Hanna process meters superior to conventional controllers.

Low or high impedance input

Hanna pH and ORP controllers come in two different models to meet all requirements. The E model, has a high impedance 10^{12} Ohm direct input from an electrode, ideal for connections with a distance of up to 10 meters (33 feet). The T model, however, is recommended for distances greater than 10 meters (33 feet) and should be used with a 4 to 20 mA transmitter. The greater the distance between the controller and the sample, the greater the chance you have of line noise causing erroneous readings. Using a transmitter (see page 46) greatly enhances the input signal, thus allowing high accuracy at distances of up to 300 meters (1000 feet).

Consent feature

The consent contact allows you to be sure that the ORP dosing occurs only when the pH value is correct. This assures that the pH is within a specified range before any dosing of oxidizing or reducing agents occurs. This will prevent any overdosing of chemicals, a very important cost-effective feature in many applications.



Let us make your life easier...

...with custom built control panels. (Nema 4X)
See page 69 !

HI 8510 - pH indicators

- *Ideal for constant monitoring of pH in industrial process control.*
- *Accurate measurements from 0.00 to 14.00 pH with a 0.01 resolution displayed on a large, easy to read LCD.*
- *Designed with DIN standard panel-mount for easy installation (mounting brackets are also included).*
- *A unique auto-diagnostic test can be performed to check the pH electrode and instrument status.*
- *Two different models to accept either a direct input from a pH electrode (10^{12} Ohm), or input from a pH transmitter (4 to 20 mA) (see page 46).*
- *Isolated recorder output in either 0 to 20 mA configuration or 4 to 20 mA.*
- *LED indicators positively identify operational mode.*
- *Protected behind a removable splash-proof transparent cover.*

SPECIFICATIONS	HI 8510E	HI 8510T
RANGE	0.00 to 14.00 pH	
RESOLUTION	0.01 pH	
ACCURACY (@20°C/68°F)	±0.02 pH	±0.5%
INPUT	High Impedance 10^{12} Ohm	4 to 20 mA
CALIBRATION	Offset: ±2 pH by Δ 0 trimmer / Slope: 80 to 100% by slope trimmer	
TEMPERATURE COMPENSATION	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
READOUT	4 digit LCD with graphic symbols	
RECORDER OUTPUT	0 to 20 mA or 4 to 20 mA (isolated)	
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz	
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum. Front and back with shockproof ABS plastic and transparent cover	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

INPUT FROM ELECTRODE

HI 8510E020 with 0 to 20 mA recorder output
HI 8510E420 with 4 to 20 mA recorder output

INPUT FROM TRANSMITTER

HI 8510T020 with 0 to 20 mA recorder output
HI 8510T420 with 4 to 20 mA recorder output

SUGGESTED ACCESSORIES:

HI 1006-2005 Standard glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 1006-3007 High T° glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L Cleaning solution for pH probe , 460 ml
HI 70300L Storage solution for pH probe, 460 ml

For HI 8510T only
HI 8614 **pH Transmitter**
HI 8614L **pH transmitter with LCD**

** See Industrial probes section on page 55 for a complete line of pH probes.*

HI 8512 - ORP indicator

- *Provides constant monitoring of ORP in process control.*
- *Easy to install DIN standard panel-mount with mounting brackets included.*
- *LED indicators display operational mode.*
- *Measures ORP from -1000 to +1000mV.*
- *Built-in auto-diagnostic tests check the indicator's status with LED indicators.*
- *The 'E' model accepts direct input from the ORP electrode while the 'T' model accepts a 2-wire current loop from an ORP transmitter.*
- *Isolated recorder output in either 0 to 20 mA configuration or 4 to 20 mA.*
- *Splash-proof transparent cover protects the keyboard from liquids.*
- *The body is constructed of Aluminum and the front is made of rugged ABS for maximum strength.*

SPECIFICATIONS	HI 8512E	HI 8512T
RANGE	-1000 to 1000 mV	
RESOLUTION	1 mV	
ACCURACY (@20°C/68°F)	±5 mV	±0.5%
INPUT	High Impedance 10^{12} Ohm	4 to 20 mA
CALIBRATION	Slope: 90 to 110% by slope trimmer	
READOUT	4 digit LCD with graphic symbols	
RECORDER OUTPUT	0 to 20 mA or 4 to 20 mA (isolated)	
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz	
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum Front and back with shockproof ABS plastic and transparent cover	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

INPUT FROM ELECTRODE

HI 8512E020 with 0 to 20 mA recorder output
HI 8512E420 with 4 to 20 mA recorder output

INPUT FROM TRANSMITTER

HI8512T020 with 0 to 20 mA recorder output
HI 8512T420 with 4 to 20 mA recorder output

SUGGESTED ACCESSORIES:

HI 2004-1007 Platinum type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 2004-2007 Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L Pretreatment reducing solution, 460 ml
HI 7092L Pretreatment oxydizing solution, 460 ml
HI 7021L Test solution @ 240 mV, 460 ml
HI 7022L Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

For HI 8512T only
HI 8615 **pH Transmitter**
HI 8615L **pH transmitter with LCD**

HI 8710 - pH controllers

- *Single set point version with selection of acid or alkaline dosage.*
- *The alarm band is user-selectable from 0.1 to 3 pH and will be activated when the pH level deviates from the set point by more than the selected alarm value.*
- *When used in conjunction with the HI 8720 ORP controller, ODCD* ensures that ORP dosage will only start when the pH is at the correct level.*
- *Two models are available, one for direct input from the pH electrode, and another for 4 to 20 mA input from a pH transmitter (see page 46).*
- *Isolated recorder output in either 0 to 20 mA configuration or 4 to 20 mA.*
- *Sophisticated auto-diagnostic functions make it easy to check and troubleshoot malfunctions from the front panel.*

** ORP Dosing Consent Device.*

SPECIFICATIONS	HI 8710E	HI 8710T
RANGE	0.00 to 14.00 pH	
RESOLUTION	0.01 pH	
ACCURACY (@20°C/68°F)	±0.02 pH	±0.5%
INPUT	High Impedance 10^{12} Ohm	4 to 20 mA
CALIBRATION	Offset: ±2 pH by Δ 0 trimmer / Slope: 80 to 110% by slope trimmer	
TEMPERATURE COMPENSATION	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
READOUT	4 digit LCD with graphic symbols	
RECORDER OUTPUT	0 to 20 mA or 4 to 20 mA (isolated)	
SET POINT RELAY	One, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
ALARM RELAY	One, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz	
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum. Front and back with shockproof ABS plastic and transparent cover	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

INPUT FROM ELECTRODE

HI 8710E020	with 0 to 20 mA recorder output
HI 8710E420	with 4 to 20 mA recorder output

INPUT FROM TRANSMITTER

HI 8710T020	with 0 to 20 mA recorder output
HI 8710T420	with 4 to 20 mA recorder output

SUGGESTED ACCESSORIES:

HI 1006-2005	Standard glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 1006-3007	High T° glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

For HI 8710T only

HI 8614	**pH Transmitter**
HI 8614L	**pH transmitter with LCD**

** See Industrial probes section on page 55 for a complete line of pH probes.*

HI 8711 - pH controllers

- *Dual set point with 2 independent dosing outputs, one for acid and another for alkaline dosage.*
- *Auto-diagnostic feature is incorporated to verify offset and slope calibration as well as electrode contamination/deterioration.*
- *The alarm band is user selectable from 0.1 to 3 pH and will be activated when the pH level deviates from the set point by more than the selected alarm value.*
- *Two models are available. The HI 8711E accepts direct input from the pH electrode, and the HI 8711T accepts a 4 to 20 mA input from a pH transmitter (see page 46).*
- *Isolated recorder output in either 0 to 20 mA configuration or 4-20 mA.*
- *Splash proof transparent cover protects the controls of the instrument from liquids.*

SPECIFICATIONS	HI 8711E	HI 8711T
RANGE	0.00 to 14.00 pH	
RESOLUTION	0.01 pH	
ACCURACY (@20°C/68°F)	±0.02 pH	±0.5%
INPUT	High Impedance 10^{12} Ohm	4 to 20 mA
CALIBRATION	Offset: ±2 pH by Δ 0 trimmer / Slope: 80 to 110% by slope trimmer	
TEMPERATURE COMPENSATION	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
READOUT	4 digit LCD with graphic symbols	
RECORDER OUTPUT	0 to 20 mA or 4 to 20 mA (isolated)	
SET POINT RELAY	Two, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
ALARM RELAY	One, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz	
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum Front and back with shockproof ABS plastic and transparent cover	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

INPUT FROM ELECTRODE

HI 8711E020 with 0 to 20 mA recorder output
HI 8711E420 with 4 to 20 mA recorder output

INPUT FROM TRANSMITTER

HI 8711T020 with 0 to 20 mA recorder output
HI 8711T420 with 4 to 20 mA recorder output

SUGGESTED ACCESSORIES:

HI 1006-2005 Standard glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 1006-3007 High T° glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L Cleaning solution for pH probe , 460 ml
HI 70300L Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

For HI 8711T only
HI 8614 **pH Transmitter**
HI 8614L **pH transmitter with LCD**

HI 932500 - ORP controller

- *HI 932500 is an ORP controller designed for precise regulation of oxidants or reductants.*
- *It is available in single set point version with the selection of reducing or oxidizing dosage. When hooked up to the consent contacts of HI 8710, a ODCD* ensures that any ORP dosing starts only after the pH level is corrected. This avoids overdosage of oxidants or reductants.*
- *Any ORP electrode can be directly connected to the BNC connector.*
- *Recorder output is 4 to 20 mA.*
- *Splash-proof, transparent cover, protects the controls of the instrument from water splashes.*
- *With its plug-in convenience, the unit can be quickly removed for service with minimal downtime.*

** ORP Dosing Consent Device.*

SPECIFICATIONS	HI 932500
RANGE	-1000 to 1000 mV
RESOLUTION	1 mV
ACCURACY (@20°C/68°F)	±5 mV
INPUT	High Impedance 10^{12} Ohm
CALIBRATION	Slope: 90 to 110% by slope trimmer
READOUT	4 digit LCD with graphic symbols
RECORDER OUTPUT	4 to 20 mA (isolated)
SET POINT RELAY	One, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum. Front and back with shockproof ABS plastic and transparent cover
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")
WEIGHT	1 Kg (2.2 lb.)

ORDERING INFORMATION:

HI 932500	ORP Controller with single setpoint

SUGGESTED ACCESSORIES:

HI 2004-1007	Platinum type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 2004-2007	Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

HI 8720 - ORP controllers

- *Single set point version with selection of reducing or oxidizing dosage.*
- *Automatic diagnostic controls can be user activated to check 0 mV and offset status.*
- *The alarm band is user-selectable from 10 to 200 mV and will be activated when the mV level deviates from the set point by more than the selected alarm value.*
- *When linked to the consent contacts of the HI 8710 pH controller, ODCD* ensures that ORP dosing will start only when the pH level is corrected.*
- *Two models are available, one with direct input from an ORP electrode ('E' type), and another for a 2-wire current loop of 4 to 20 mA from an ORP transmitter ('T' type).*
- *Isolated recorder output in either 0 to 20 mA configuration or 4 to 20 mA.*

** ORP Dosing Consent Device.*

SPECIFICATIONS	HI 8720E	HI 8720T
RANGE	-1000 to 1000 mV	
RESOLUTION	1 mV	
ACCURACY (@20°C/68°F)	±5 mV	±0.5%
INPUT	High Impedance 10^{12} Ohm	4 to 20 mA
CALIBRATION	Slope: 90 to 110% by slope trimmer	
READOUT	4 digit LCD with graphic symbols	
RECORDER OUTPUT	0 to 20 mA or 4 to 20 mA (isolated)	
SET POINT RELAY	Two, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
ALARM RELAY	One, isolated, 2 A, max. 240V resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz	
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum. Front and back with shockproof ABS plastic and transparent cover	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

INPUT FROM ELECTRODE

HI 8720E020	with 0 to 20 mA recorder output
HI 8720E420	with 4 to 20 mA recorder output

INPUT FROM TRANSMITTER

HI 8720T020	with 0 to 20 mA recorder output
HI 8720T420	with 4 to 20 mA recorder output

SUGGESTED ACCESSORIES:

HI 2004-1007	Platinum type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 2004-2007	Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

For HI 8720T only

HI 8615	**pH Transmitter**
HI 8615L	**pH transmitter with LCD**

HI 8931 - conductivity controllers

- *Built-in auto-diagnostic function for offset and slope to determine whether a malfunction originates in the instrument or in the probe.*
- *Using HI 8931 in conjunction with a transmitter (HI 8936) will assure you of a strong, interference-free signal at distances of up to 300 meters (1000').*
- *Available in four models with different measurement ranges to suit your individual application from deionized water to brine.*
- *Recorder output is 4 to 20 mA.*
- *4 to 20 mA input from the conductivity transmitter.*
- *LED indicators will positively identify whether the controller is in operational mode or in selection mode.*

SPECIFICATIONS	HI 8931A	HI 8931B	HI 8931C	HI 8931D
RANGE	0.0 to 199.9 mS/cm	0.0 to 19.99 mS/cm	0 to 1999 µS/cm	0.0 to 199.9 µS/cm
RESOLUTION	0.1 mS/cm	0.01 mS/cm	1 µS/cm	0.1 µS/cm
ACCURACY (@20°C/68°F)	±2% of full scale			
4-20 mA INPUT FROM TRANSMITTER	HI 8936A	HI 8936B	HI 8936C	HI 8936D
TEMPERATURE COMPENSATION	See HI 8936 transmitter			
READOUT	4-digit LCD plus graphic symbols			
RECORDER OUTPUT	4 to 20 mA (isolated)			
SETPOINT RELAY	One, isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes			
ALARM RELAY	One, isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes			
POWER SUPPLY	110/115V ±10% or 220/240V ±10%VAC; 50/60 Hz			
ENVIRONMENT	-10 to 50°C (14 to 122°F); max. 95% RH non-condensing			
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")			
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum Front and back with shockproof ABS plastic and transparent cover.			
WEIGHT	1 Kg (2.2 lb.)			

ORDERING INFORMATION:

HI 8931A	0.0 to 199.9 mS/cm controller
HI 8931B	0.00 to 19.99 mS/cm controller
HI 8931C	0 to 1999 µS/cm controller
HI 8931D	0.0 to 199.9 µS/cm controller

SUGGESTED ACCESSORIES:

HI 8936A	Conductivity transmitter for HI 8931A
HI 8936AL	Transmitter with LCD for HI 8931A
HI 8936B	Conductivity transmitter for HI 8931B
HI 8936BL	Transmitter with LCD for HI 8931B
HI 8936C	Conductivity transmitter for HI 8931C
HI 8936CL	Transmitter with LCD for HI 8931C
HI 8936D	Conductivity transmitter for HI 8931D
HI 8936DL	Transmitter with LCD for HI 8931D
HI 7638	Conductivity probe (for use with HI 8936)
HI 779/10	6 wire cable (10 m/33')
HI 70030P	12880 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70033P	84 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7034L	80000 µS/cm calibration solution (460 mL)

HI 943500 - conductivity controllers

- *Direct connection of up to 20 m (66'), without the need of intermediate amplifiers to the HI 7638 conductivity probe.*
- *An auto-diagnostic test of the offset and slope determines the status of the instrument.*
- *Available in four models with different ranges to cover conductivity measurement from deionized water to brine.*
- *Recorder output in 4 to 20 mA configuration.*
- *LED indicators identify whether the controller is in operational mode or selection mode.*
- *The HI 7638 potentiometric conductivity probe provides automatic temperature compensated measurements.*

SPECIFICATIONS	HI 943500A	HI 943500B	HI 943500C	HI 943500D
RANGE	0.0 to 199.9 mS/cm	0.0 to 19.99 mS/cm	0 to 1999 µS/cm	0.0 to 199.9 µS/cm
RESOLUTION	0.1 mS/cm	0.01 mS/cm	1 µS/cm	0.1 µS/cm
ACCURACY (@20°C/68°F)	±2% of full scale			
TEMPERATURE COMPENSATION	Automatic from 0 to 60°C (32 to 140°F) with 2% temperature coefficient			
READOUT	4-digit LCD plus graphic symbols			
RECORDER OUTPUT	4 to 20 mA (isolated)			
SETPOINT RELAY	One, isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes			
ALARM RELAY	One, isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes			
POWER SUPPLY	110/115V or 220/240V; 50/60 Hz			
ENVIRONMENT	-10 to 50°C (14 to 122°F); max. 95% RH non-condensing			
PANEL CUTOUT	141 x 69 mm (5.55 x 2.71")			
ENCLOSURE	DIN 43 700 144 x 72 mm (5.67 x 2.83") in black anodized aluminum. Front and back with shockproof ABS plastic and transparent cover.			
WEIGHT	1 Kg (2.2 lb.)			

ORDERING INFORMATION:

HI 943500A	0.0 to 199.9 mS/cm controller	**HI 943500C**	0 to 1999 µS/cm controller
HI 943500B	0.00 to 19.99 mS/cm controller	**HI 943500D**	0.0 to 199.9 µS/cm controller

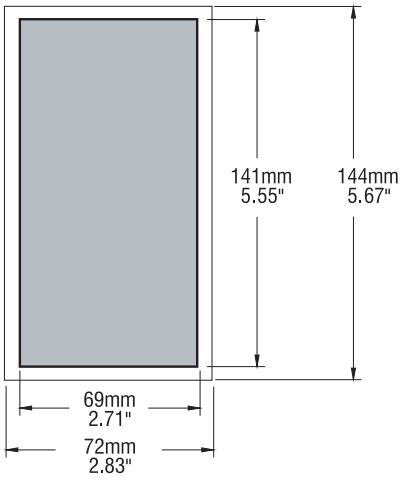
SUGGESTED ACCESSORIES:

HI 7638	Platinum conductivity probe
HI 779/10	6 wire cable (10 m/33')
HI 70030P	12880 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70033P	84 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70034L	80000 µS/cm calibration solution (460 mL)

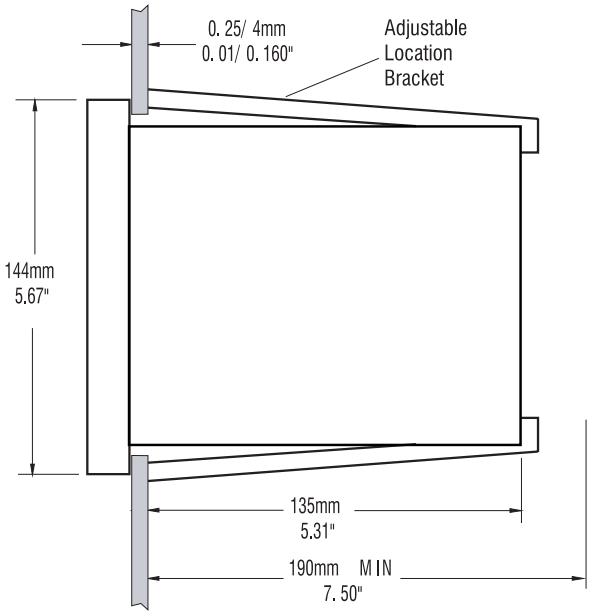
Mechanical dimensions

HI 8510, HI 8512
HI 8710, HI 8711
HI 932500, HI 8720
HI 8931, HI 943500

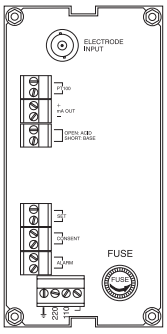
FRONT VIEW



SIDE VIEW



REAR VIEW



Features

- *Accurate*
- *Compact*
- *Simple to use*
- *Simple to install*
- *Supplied with probe*
- *Very low cost !*

Compact Series

pH, ORP, Conductivity, Resistivity, TDS & Level

Reverse Osmosis, Water Conditioning, Car Wash, Printing, Desalination, Ultrapure Water, Water Purification

Traditionally, process monitoring has required considerable investment in system design, equipment, maintenance and training. With the introduction of our mini controllers, we are able to offer a solution for industries that have to monitor a process economically. Hanna's mini controllers are easy to use and allow accurate continuous monitoring and control of pH, ORP, TDS, EC, Resistivity and Level. These compact in-line instruments are designed to consistently perform in most environments and conditions.

Our line of simple-to-operate controllers have been specially designed for hydroponics, swimming pools or applications where space or cost are a major concern. Thanks to their compact size of only 8 by 5 cm (3 x 2"), They can be mounted in confined spaces and right next to tanks or vats. The low cost of the meter will also make it possible for processes that up to now were manually maintained to be controlled automatically, saving considerable time and money. Measurements are displayed in large digits on the LCD and LED lights indicate status even from a distance.

Simplicity of Installation
Concise wiring schematics are printed directly on the controller to make the installation procedure unmistakable and clear.

Extractable Terminal Modules
Wiring these controllers is quick and easy with extractable terminal modules. Simply pull out the appropriate module, wire it and then plug it right back in.

Compact and Versatile
The compact size of these instruments makes them extremely versatile by saving valuable panel space, even allowing operators to mount them right next to the monitored system.

HI 931700 - pH controllers

- *HI 931700 is the smallest panel mounted pH controller around.*
- *Its small size allows installation close to the monitored equipment, thus adding to its versatility in industry.*
- *Possible applications are almost infinite; from textile (particularly in he monitoring of pH in the wool processing), paper, photographic, plating and aquariums to the process industry. Also small swimming pools and water purification plants can be controlled with HI 931700.*
- *With an affordable cost, HI 931700 can help you monitor your installations that up to now have been controlled with difficulty.*
- *HI 931700 is equipped with single set point with selection of acid or alkaline dosage. It accepts direct input from any combination pH electrode ending in a BNC connector and provides measurements from 0 to 14 pH with a resolution of 0.01 pH.*
- *The mini pH controller range has now been enhanced with a UL/CSA approved model. HI 931700V is powered by 12VDC and supplied complete with a transformer.*

SPECIFICATIONS	HI 931700U	HI 931700D	HI 931700V
RANGE		0.00 to 14.00 pH	
RESOLUTION		0.01 pH	
ACCURACY (@20°C/68°F)		±0.02 pH	
INPUT		High impedance 10^{12} Ohm	
CALIBRATION		Offset: ±2 pH by trimmer / Slope: 80 to 110% by slope trimmer	
READOUT		4-digit LCD plus graphic symbols	
RECORDER OUTPUT		4 to 20 mA (upon request also 0 to 20 mA)	
1 SET POINT RELAY		2 A, Max. 240 V, resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V; 50/60 Hz	220/240V; 50/60 Hz	12VDC adapter
ENVIRONMENT		-10 to 50°C (14 to 122°F), RH 95% non-condensing	
PANEL CUTOUT		73 x 42 mm (2.87 x 1.65")	
DIMENSIONS		79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT		130 g (4.58 oz.)	

ORDERING INFORMATION:

HI 931700U	110/115V controller is supplied with mounting brackets and instruction manual.
HI 931700D	220/240V controller is supplied with mounting brackets and instruction manual.
HI 931700V	Controller is supplied with mounting brackets, 12VDC adapter and instruction manual.

SUGGESTED ACCESSORIES:

HI 1001	Plastic in-line pH electrode
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

Let us make your life easier...

...with custom built control panels. (Nema 4X)
See page 69 !

HI 981411 - pH controllers

HI 981411 is a simple-to-operate pH controller specially designed for hydroponics, swimming pools or applications where space or cost are a major concern. Thanks to its compact size of only 8 by 5 cm (3 x 2"), HI 981411 can be mounted in confined spaces and right next to tanks or vats. The low cost of the meter will also make it possible for processes that up to now were manually maintained to be controlled automatically, saving considerable time and money.

Measurements are displayed in large digits on the LCD and LED lights indicate the exact status of the controller, even from a distance. HI 981411 also incorporates a bi-directional relay. Through a simple jumper on the rear of the meter, the operator can select acid dosage, which means the relay is activated with measurements above the setpoint, or alkaline with relay closed when measuring below the setpoint. In order to adjust the setpoint from 0 to 14 pH or to calibrate meter at any point on the scale, simply turn the relevant trimmer right on the front panel.

SPECIFICATIONS	HI 981411-0	HI 981411-1	HI 981411-2
RANGE		0.0 to 14.0 pH	
RESOLUTION		0.1 pH	
ACCURACY (@20°C/68°F)		±0.2 pH	
INPUT		High impedance 10^{12} Ohm	
CALIBRATION		1 point adjustable with trimmer	
READOUT		4-digit LCD plus graphic symbols	
1 SET POINT RELAY		Adjustable from 0.0 to 14.0 pH with trimmer 2 A, Max. 240 V, resistive load, 1,000,000 strokes	
POWER SUPPLY	12 VDC adapter (included)	110/115V; 50-60 Hz	220/240V; 50/60 Hz
ENVIRONMENT		0 to 50°C (32 to 122°F), RH 95%	
PANEL CUTOUT		73 x 42 mm (2.87 x 1.65")	
DIMENSIONS		79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT		130 g (4.58 oz.)	

ORDERING INFORMATION:

HI 981411-0	12VDC controller is supplied with mounting brackets and instruction manual.
HI 981411-1	110/115V controller is supplied with mounting brackets and instruction manual.
HI 981411-2	220/240V controller is supplied with mounting brackets and instruction manual.

SUGGESTED ACCESSORIES:

HI 1001	Plastic in-line pH electrode
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

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See page 69 !

HI 932700 - ORP controllers

- *HI 932700 is the smallest panel mounted ORP controller around.*
- *Its small size allows installation close to the monitored equipment, thus increasing its application in the industry.*
- *Possible applications are almost infinite; from textile (particularly in the monitoring of ORP in the bleaching processes) to waste water treatment and swimming pool industry.*
- *With an affordable cost, HI 932700 can help you monitor your installations that up to now have been seldom controlled.*
- *HI 932700 is equipped with single set point with selection of reducing or oxidizing dosage. It provides ORP measurements from -1000 to 1000 mV, with a resolution of 1 mV.*
- *The mini ORP controller range has now been enhanced with a UL/CSA approved model. HI 932700V is powered by 12VDC and supplied complete with a transformer with a UL/CSA approved model.*

SPECIFICATIONS	HI 932700U	HI 932700D	HI 932700V
RANGE		-1000 to 1000 mV	
RESOLUTION		1 mV	
ACCURACY (@20°C/68°F)		±5 mV	
INPUT		High impedance 10^{12} Ohm	
CALIBRATION		Slope: 90 to 110% by slope trimmer	
READOUT		4-digit LCD plus graphic symbols	
RECORDER OUTPUT		4 to 20 mA (upon request also 0 to 20 mA)	
1 SET POINT RELAY		2 A, Max. 240 V, resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V; 50/60 Hz	220/240V; 50/60 Hz	12VDC adapter
ENVIRONMENT		-10 to 50°C (14 to 122°F), RH 95% non-condensing	
PANEL CUTOUT		73 x 42 mm (2.87 x 1.65")	
DIMENSIONS		79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT		130 g (4.58 oz.)	

ORDERING INFORMATION:

HI 932700U	110/115V controller is supplied with mounting brackets and instruction manual.
HI 932700D	220/240V controller is supplied with mounting brackets and instruction manual.
HI 932700V	12VDC controller is supplied with mounting brackets and instruction manual.

SUGGESTED ACCESSORIES:

HI 2001	Plastic in-line ORP electrode
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

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See page 69 !

HI 982411 - ORP controllers

HI 982411 is a simple-to-operate ORP controller specially designed for swimming pools, spas, start-up research or applications where space or costs are a major concern. Thanks to its compact size of 8 by 5 cm (3 x 2"), HI 982411 can be mounted in confined spaces or even right next to the vat or barrel containing the chemicals. Due to its low price tag, HI 982411 can check all of those processes that the prohibitive costs associated with automatic monitoring up to now left without proper control. This will translate itself into a substantial saving in money over time.

The measurements from 0 to 1000 mV are displayed in large digits on the LCD. In addition, LED lights indicate the exact status of the controller. Both the measurements and the LED's can be seen even from a distance. HI 982411 also incorporates a relay which can be set at any value over the entire range. The relay is activated, whenever the measurement is below the setpoint.

SPECIFICATIONS	HI 982411-0	HI 982411-1	HI 982411-2
RANGE		0 to 1000 mV	
RESOLUTION		1 mV	
ACCURACY (@20°C/68°F)		±5 mV	
INPUT		High impedance 10^{12} Ohm	
CALIBRATION		Adjustable from 0 to 1000 mV with trimmer	
READOUT		4-digit LCD plus graphic symbols	
1 SET POINT RELAY		Oxidizing dosage: activated when the measured value is lower than the setpoint	
POWER SUPPLY	12 VDC adapter (included)	110/115V; 50-60 Hz	220/240V; 50/60 Hz
ENVIRONMENT		0 to 50°C (32 to 122°F), RH 95%	
PANEL CUTOUT		73 x 42 mm (2.87 x 1.65")	
DIMENSIONS		79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT		130 g (4.58 oz.)	

ORDERING INFORMATION:

HI 982411-0	12VDC controller is supplied with mounting brackets and instruction manual.
HI 982411-1	110/115V controller is supplied with mounting brackets and instruction manual.
HI 982411-2	220/240V controller is supplied with mounting brackets and instruction manual.

SUGGESTED ACCESSORIES:

HI 2001	Plastic in-line ORP electrode
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

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HI 983313-17-27 - conductivity controllers

These Hanna mini controllers have been specially designed for the water conditioning and growing applications. They are miniaturized to an 8 by 5 cm (3 x 2") dimension so that they can be mounted right on the water softening or fertilizing equipment. Due to their equally compact prices, these meters are ideal for softeners that do not incorporate a controller and leave the controlling to manual checks. The conductivity values are displayed in large digits on the LCD. There are even LED's to indicate whether the relay is active or not.

HI 983313 and HI 983327 measure conductivity from 0 to 1999 mS/cm and 0.00 to 10.00 mS/cm, respectively. HI 983317 also measures conductivity from 0.00 to 10.00 mS/cm. Each meter is available in three models to best suit your application. You can choose from the 110-115V or the 220-240V model. For those who prefer to operate at low voltage, there is also the 12VDC version with the transformer included in the low cost of the meter.

SPECIFICATIONS	HI 983313-0 HI 983313-1 HI 983313-2	HI 983317-0 HI 983317-1 HI 983317-2	HI 983327-0 HI 983327-1 HI 983327-2
RANGE	0 to 1999 µS/cm	0.00 to 10.00 mS/cm	0.00 to 10.00 mS/cm
RESOLUTION	1 µS/cm	0.01 mS/cm	0.01 mS/cm
ACCURACY (@20°C/68°F)	±2% F.S.	±2% F.S.	±2% F.S.
CALIBRATION	1 point adjustable with trimmer		
TEMPERATURE COMPENSATION	Automatic from 5 to 50°C		
SETPOINT	Adjustable with trimmer throughout the range		
RELAY CONTROL	Activated when the reading is higher than the setpoint	Activated when the reading is lower than the setpoint	Activated when the reading is higher than the setpoint
PROBE (included)	HI 7634-00	HI 7632-00	HI 7632-00
POWER SUPPLY	HI 983313-0, HI 983317-0, HI 983327-0: 12 VDC adapter (included)		
	HI 983313-1, HI 983317-1, HI 983327-1: 110/115V; 50-60 Hz		
	HI 983313-2, HI 983317-2, HI 983327-2: 220/240V; 50-60 Hz		
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%		
DIMENSIONS	79 x 49 x 95 mm (3.1 x 1.9 x 3.8")		
WEIGHT	150 g (5.3 oz.)		

ORDERING INFORMATION:

HI 983313-0	12VDC controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983313-1	110/115V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983313-2	220/240V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983317-0	12VDC controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983317-1	110/115V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983317-2	220/240V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983327-0	12VDC controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983327-1	110/115V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983327-2	220/240V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.

SUGGESTED ACCESSORIES:

HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70039P	5000 µS single use calibration sachets, 25 x 20 ml (25 calibrations)

HI 983318-19-29 - TDS controllers

HI 983318, HI 983319 and HI 983329 are simple-to-use TDS controllers, specially designed for the hydroponics, horticultural and water conditioning applications. Thanks to their compact size of only 8 by 5 cm (3 x 2"), they can be mounted in confined spaces and right next to the fertilizer mixing vats or softening equipment. Due to their incredibly low cost, these meters are ideal for all those start-up operations that up to now were manually maintained with substantial savings in time and considerable improvement of the yield.

The measurements are displayed in large digits on the LCD with the LED light indicating the exact status of the controllers from a distance. HI 983318 and HI 983329 check and control TDS from 0.00 to 10.00 ppt and 0 to 999 ppm respectively, where HI 983319 checks and controls TDS from 0 to 1999 ppm. HI 983319 operates with a conversion rate of 0.65 between TDS and conductivity which best fits the hydroponics andgreenhouse applications. The meters come with a built-in relay terminal that is activated when the measurements are below the setpoint (HI 983319) or above the setpoint (HI 983318 and HI 983329).

In order to adjust the setpoint or calibrate the controllers at any point over the full range, simply turn the relevant trimmer positioned on the front panel.

SPECIFICATIONS	HI 983318-0 HI 983318-1 HI 983318-2	HI 983319-0 HI 983319-1 HI 983319-2	HI 983329-0 HI 983329-1 HI 983329-2
RANGE	0.00 to 10.00 ppt	0 to 1999 mg/l (ppm)	0 to 999 ppm
RESOLUTION	0.01 ppt	1 mg/l (ppm)	1 ppm
ACCURACY (@20°C/68°F)	±2% F.S.	±2% F.S.	±2% F.S.
CALIBRATION	1 point adjustable with trimmer		
TEMPERATURE COMPENSATION	Automatic from 5 to 50°C		
SETPOINT	Adjustable with trimmer throughout the range		
RELAY CONTROL	Activated when the reading is higher than the setpoint	Activated when the reading is lower than the setpoint	Activated when the reading is higher than the setpoint
PROBE (included)	HI 7632-00	HI 7634-00	HI 7634-00
POWER SUPPLY	HI 983318-0, HI 983319-0, HI 983329-0: 12 VDC adapter (included) HI 983318-1, HI 983319-1, HI 983329-1: 110/115V; 50-60 Hz HI 983318-2, HI 983319-2, HI 983329-2: 220/240V; 50-60 Hz		
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%		
DIMENSIONS	79 x 49 x 95 mm (3.1 x 1.9 x 3.8")		
WEIGHT	150 g (5.3 oz.)		

ORDERING INFORMATION:

HI 983318-0	12VDC controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983318-1	110/115V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983318-2	220/240V controller is supplied complete with HI 7632-00 probe, mounting brackets and instructions.
HI 983319-0	12VDC controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983319-1	110/115V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983319-2	220/240V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983329-0	12VDC controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983329-1	110/115V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.
HI 983329-2	220/240V controller is supplied complete with HI 7634-00 probe, mounting brackets and instructions.

SUGGESTED ACCESSORIES:

HI 70038P	6.44 ppt single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70032P	1382 ppm single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70080P	800 ppm single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70033P	84 µS, (42 ppm) single use calibration sachets, 25 x 20 ml (25 calibrations)

HI 983324 - TDS controllers

The HI 983324-0 and HI 983324-1 are TDS indicators and controllers with a relay output designed for simplicity of use in a wide range of industrial applications.

The models are panel mounted with membrane keypads on the front panel and an easy-to-read LCD display. LED indicators on the front panel identify whether the controller is in set or reading mode and if the alarm is active. The meters compensate for temperature variations automatically and the probe is easy to clean and requires little maintenance.

Measurements are highly accurate and the meters can be calibrated at one point. Power supply, wiring and selection are made via plug-in terminal blocks on the rear panel.

SPECIFICATIONS	HI 983324-0	HI 983324-1
RANGE	0.0 to 49.9 ppm	
RESOLUTION	0.1 ppm	
ACCURACY (@20°C/68°F)	±2% F.S.	
SETPOINT	Adjustable with trimmer throughout the range	
PROBES (included)	HI 7634-00	
TEMPERATURE COMPENSATION	Automatic from 0 to 50°C	
CALIBRATION	1 point adjustable with trimmer @ 84 µS/cm (42 ppm)	
POWER SUPPLY	12VDC adapter	110/115V; 50-60 Hz
ENVIRONMENT	-10 to 50°C (14 to 122°F), RH 95% non-condensing	
PANEL CUTOUT	73 x 42 mm (2.87 x 1.65")	
DIMENSIONS	79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT	130 g (4.58 oz.)	

ORDERING INFORMATION:

HI 983324-0 12VDC controller is supplied complete with HI 7634-00 probe, mounting brackets and instruction manual.
HI 983324-1 110/115V controller is supplied complete with HI 7634-00 probe, mounting brackets and instruction manual.

SUGGESTED ACCESSORIES:

HI 70033P 84 µS, (42 ppm) single use calibration sachets, 25 x 20 ml (25 calibrations)

HI 983314 - resistivity controllers

HI 983314 is a simple-to-operate resistivity controller designed for ultrapure water, R.O, and water conditioning applications. The HI 983314 resistivity controller is also ideal for continuous monitoring of process solutions. Calibration and setpoint value is established with a trimmer and the alarm relay allows for control. Readings are automatically temperature compensated, with three different coefficients (b=2.4, 3.5 or 4.5 %/°C). The controller is panel-mounted with membrane keypad and LED indicators on the front panel that identify SET and MEASurement mode, and if alarm contact is active.

The alarm contact can be used for connection to an alarm, pump, solenoid or dosing system. When readings are higher than the setpoint (+Hysteresis), the relay contact is opened and the "ABOVE" LED lights up. If measurements are lower than setpoint (-Hysteresis), the relay contact is closed and the "BELOW" LED lights up. The Hysteresis is typically 0.20 MOhm/cm around the setpoint. The measurements from 0.00 to 19.90 MOhm/cm are displayed in large digits on the LCD. Two models are available: HI 983314-0 runs with 12 VDC, while HI 983314-1 runs with 115/230 VAC.

SPECIFICATIONS	HI 983314-0	HI 983314-1
RANGE	0.00 to 19.99 MW/cm	
RESOLUTION	0.10 MOhm/cm	
ACCURACY (@20°C/68°F)	±2% F.S.	
TEMPERATURE COMPENSATION	Automatic and linear from 5 to 50°C b=2.4, 3.5 and 4.5%/°C User selectable through jumper on rear panel	
TEMPERATURE COEFFICIENT	Manual, through trimmer	
CALIBRATION	Adjustable from 0.00 to 19.90 MW/cm through trimmer	
SETPOINT	Contact Open and ABOVE LED ON for measurements higher than setpoint value+hysteresis	
ALARM CONDITION	Contact Closed and BELOW LED ON for measurements lower than setpoint value - hysteresis	
ALARM OUTPUT	2-contact relay, not fuse protected. 5A, 240 VAC, 30 VDC	
TYPICAL HYSTERESIS	0.20 MOhm/cm	
PROBE	HI 3314 2-electrode resistivity probe with 2 m (6.6') cable (included)	
POWER SUPPLY	External 12 VDC	External 115/230 VAC; 50/60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95% non condensing	
DIMENSIONS	79 x 49 x 95 mm (3.1 x 1.9 x 3.8")	
WEIGHT	140 g (4.96 oz.)	250 g (8.85 oz)

ORDERING INFORMATION:

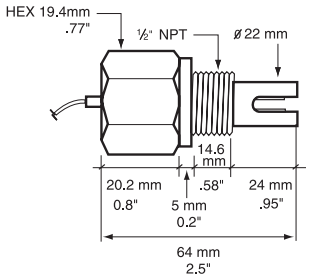
HI 983314-0	12VDC controller is supplied with HI 3314 2-electrode resistivity probe, mounting brackets and instruction manual.
HI 983314-1	115/230VAC controller is supplied with HI 3314 2-electrode resistivity probe, mounting brackets and instruction manual.

SUGGESTED ACCESSORIES:

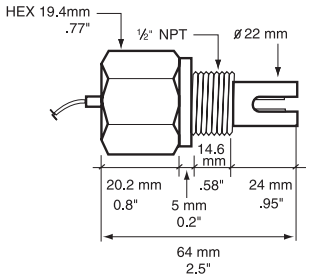
HI 3314	Resitivity probe
HI 710005	12VDC power adapter

Probe mechanical dimensions

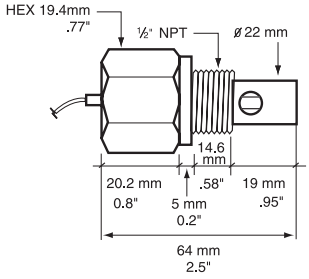
Mechanical dimensions - HI 7632



Mechanical dimensions - HI 7634



Mechanical dimensions - HI 3314



HI 7871 & HI 7873 - level controllers

HI 7871 and HI 7873 mini-level controllers are ideal for liquid level control over distances of up to 1000 feet (300 meters). They are highly compact and will fit into tight spaces. These easy to use controllers are ideal for nearly any liquid level application such as industrial and municipal water treatment, nutrient tank control in farming, hydroponics, aquacultural applications and plating rinse baths, oil and grease traps and many more.

HI 7871 features high and low level control, while HI 7873 includes an overflow alarm. Both instruments work with a 2 wire transmitter which is ideal for level monitoring in remote applications.

The durable ABS HI 7874 houses the electrode bars as well as the amplifier circuit and the 2-wire terminal board. It comes with a sturdy mounting bracket for rapid installation. The HI 731324 pack of measuring bars are made of stainless steel. Each bar is 1.5 feet (50 cm) long and comes with a male and female thread at either end allowing for long measuring bars assembly in deep tanks. A conductivity of only 10 µS/cm is sufficient to activate the system. HI 7871 requires 3 bars, one each for low and high levels and the third as a consent sensor. HI 7873 requires four bars with the additional bar used for overflow measurement.

SPECIFICATIONS	HI 7871/115	HI 7871/220	HI 7873/115	HI 7873/220
TRANSMISSION	300 meters (990' feet) max.			
CONNECTION	HI 7164 (11-pin connector)			
LEVEL ADJUSTMENT	High and low		High, low and overflow	
LEVEL INDICATION	High and low		High, low, overflow	
SENSOR BARS	3 pcs (min.)		4 pcs (min.)	
	HI 731324 pack of 5 pcs (not included)			
TRANSMITTER	HI 7874 (not included)			
OUTPUT CONTACT	1 relay of 2A/max. 240V resistive load 1,000,000 strokes		1 relay of 2A/max. 240V resistive load 1,000,000 strokes	
POWER SUPPLY	110/115V 50/60 Hz	220/240V 50/60 Hz	110/115V 50/60 Hz	220/240V 50/60 Hz
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%			
DIMENSIONS	79 x 49 x 95 mm (3.1 x 1.9 x 3.8")			
WEIGHT	150 g (5.3 oz.)			

ORDERING INFORMATION:

HI 7871/115	110/115V controller is supplied with mounting brackets and instruction manual.
HI 7871/220	220/240V controller is supplied with mounting brackets and instruction manual.
HI 7873/115	110/115V controller is supplied with mounting brackets and instruction manual.
HI 7873/220	220/240V controller is supplied with mounting brackets and instruction manual.

A complete liquid level measuring system requires:
1) A controller (HI 7871 or HI 7873)
2) A bar holder transmitter with amplifier circuitry (HI 7874)
3) A package of measuring bars (HI 731324)
4) An undecal connector (HI 7164)

SUGGESTED ACCESSORIES:

HI 7874	Bar holder amplifier with amplifier circuitry
HI 7164	Undecal connector
HI 731324	Threaded measuring bars (5 pcs)

Let us make your life easier...

...with custom built control panels.
See page 69 !

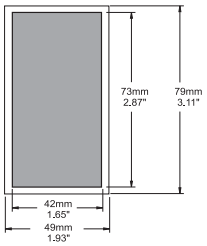
Quick reference table

Measurement	RANGE	MODEL	RESOLUTION	ACCURACY	ACTIVATED	ELECTRODE
Conductivity	0.00 to 19.99 µS/cm	HI 983322	0.01 µS/cm	±0.4 µS/cm	Above set point	HI 7634-00
	0.0 to 199.9 µS/cm	HI 983320	0.1 µS/cm	±4 µS/cm	Above set point	HI 7634-00
	0 to 1999 µS/cm	HI 983313	1 µS/cm	±20 µS/cm	Above set point	HI 7631-00
	0.00 to 10.00 mS/cm	HI 983317	0.01 mS/cm	±2% F.S.	Below set point	HI 7632-00
	0.00 to 10.00 mS/cm	HI 983327	0.01 mS/cm	±0.2 mS/cm	Above set point	HI 7630-00
	0 to 2,000 µS/cm	HI 933700/1	N/A	±40 µS/cm	Above set point	HI 7682
	0 to 2,000 µS/cm	HI 933700/2	N/A	±40 µS/cm	Below set point	HI 7682
	0 to 4,000 µS/cm	HI 933700/3	N/A	±80 µS/cm	Above set point	HI 7682
	0 to 4,000 µS/cm	HI 933700/4	N/A	±40 µS/cm	Below set point	HI 7682
ORP	0 to 1,000 mV	HI 982411	1 mV	±5 mV	Oxidizing	HI 2001
	-1,000 to 1,000 mV	HI 932700	1 mV	±5 mV	Oxidizing or Reducing	HI 2001
pH	0.0 to 14.0 pH	HI 981411	0.1 pH	±0.2 pH	Acid or Base	HI 1001
	0.00 to 14.00 pH	HI 931700	0.01 pH	±0.02 pH	Acid or Base	HI 1001
Resistivity	0.00 to 19.90 MΩ/cm	HI 983314	0.10 MΩ/cm	±0.4 MΩ/cm	Above/below set point	HI 3314
TDS	0.0 to 19.9 ppm	HI 983321	0.1 ppm	±0.4 ppm	Above set point	HI 7634-00
	0.0 to 49.9 ppm	HI 983324	0.1 ppm	±1 ppm	Above Set Point	HI 7634-00
	0.0 to 199.9 ppm	HI 983315	0.1 ppm	±4 ppm	Above set point	HI 7634-00
	0 to 999 ppm	HI 983329	1 ppm	±10 ppm	Above set point	HI 7631-00
	0.00 to 10.00 ppt	HI 983318	0.01 ppt	±0.2 ppt	Above set point	HI 7630-00
	0 to 1999 mg/l (ppm)	HI 983319	1 mg/l (ppm)	±2% F.S.	Below set point	HI 7634-00

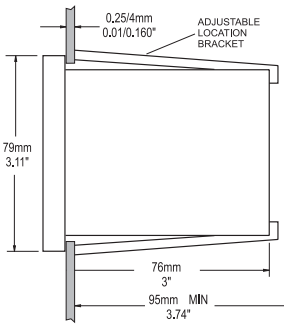
Measurement	Model	Level Adjustment	Level Indication	Transmission	Sensing Bars	Transmitter
Level	HI 7871	High, low	High, low	300 m (900') max	3	HI 7874
	HI 7873	High, low, Over	High, low, Over	300 m (900') max	4	HI 7874

Mechanical dimensions for all mini-controllers

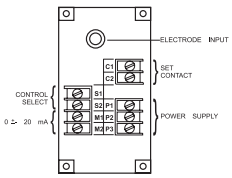
FRONT VIEW



SIDE VIEW



REAR VIEW



MEAsuring & DOSing Controllers

Features

- *2 advanced instruments in 1*
- *Easy installation*
- *Rugged construction*
- *Superior materials*
- *Proportional dosing*
- *Isolated recorder output*
- *Alarm output*
- *Auxiliary dosing contacts*

This series of instruments will mount easily in your plant using a minimum of wall space. The controls and pumphead are located in the front to allow easy access. They offer accurate measurements with unbeatable performance in one compact, affordable unit.

2 ADVANCED INSTRUMENTS IN 1

MEADOS pumps combine the powerful BlackStone dosing pumps with the state-of-the-art controllers that Hanna is famous for. These unique products were developed by BlackStone for measuring and controlling pH or ORP and regulated dosing of various chemicals. This latest innovation eliminates the need for multiple instruments by combining two instruments into one. No more complicated installations, wiring, or compatibility problems. This compact unit features accurate regulation, proportional dosing, alarm and recorder signals and much more all in one meter.

EASY INSTALLATION

Designed with mounting holes in the rugged base, BlackStone pump/controllers are simple to install. There is no need for any additional hardware. All of the controls and pump assemblies are conveniently located on the front of the unit. If the operator must access the pump head or control panel for any reason, there is no need to uninstall the unit.

RUGGED CONSTRUCTION

BlackStone pump/controllers are housed in rugged, fiber-reinforced polypropylene casings. They are IP55 rated, preventing the intrusion of liquids. The material used for the housing resists corrosion caused by most chemicals, protecting the unit from hazardous spills and splashes.

SUPERIOR MATERIALS

BlackStone pumps use Kynar®, Viton® and Teflon® materials for all components in contact with the chemicals being dosed. These materials have properties which enable them to resist even the most corrosive chemicals in the industry. BlackStone's choice of material makes the pump more versatile, allowing it to handle a wider variety of chemicals.

PROPORTIONAL DOSING

The BlackStone controller/pump strokes at full capacity when the measured value deviates by more than 1.5 pH or 150 mV from the set value. A proportional control slows down the stroke rate as the measured value approaches the user-selectable value, avoiding overdosage of chemicals. This feature makes the pump's dosing more accurate, saves chemicals and eliminates unnecessary and costly corrections of your processes, especially with slow reacting chemicals.

ISOLATED RECORDER OUTPUT

To enhance troubleshooting and provide the user with the ability to record data while monitoring, BlackStone's controller/pumps provide a recorder output. By simply attaching a recorder to the instrument's 4 to 20 mA output contacts, conveniently located on the front panel, you can obtain a hard copy of the results on demand.

ALARM OUTPUT

When monitoring and controlling pH and ORP levels in a process, it is very important that any potential problem does not go unattended. The Hanna MEADOS units incorporate an alarm system that will alert the user if the reaction is not within certain guidelines. The alarm of the BL 7916 will be activated if the measured pH value is 2 pH units lower than the set point. If dosing acid, this indicates overdosage, a common symptom of siphoning. The alarm will also activate if the value is 2 pH higher than the set point. If dosing acid, this is an indication of insufficient dosage, a common symptom of the lack of chemicals. The BL 7917's alarm will activate if the mV value is 200 mV lower than the set point (if dosing reducing chemicals, this indicates overdosage). The alarm will also activate if the value is 200 mV higher than the set point (if dosing reducing chemicals, this is an indication of lack of chemicals).

AUXILIARY DOSING CONTACTS

The auxiliary dosing contacts of the MEADOS units are closed whenever the pump is dosing. This solution offers considerable advantages, especially for small plants where these pumps need to be the only equipment left running. This will spare other equipment such as mixers, priming pumps etc. With this feature activated, a mixer can be automatically started when the pump is dosing.

BL 7916 - Combined pH controllers & pumps

- *pH controller and dosing pump in one compact unit.*
- *±0.01 pH accuracy with unbeatable performance.*
- *Isolated 4 to 20 mA recorder output.*
- *Proportional dosing slows the pump down when the measured pH level approaches the setpoint which ensures precise dosage and avoids costly waste of chemicals due to overdosage.*
- *Alarm contact is activated whenever the pH value varies by more than 2 pH units from the set point.*
- *Auxiliary contacts allow the user to attach a mixer or priming pump that is activated only when the pump is dosing.*
- *Kynar®, Viton® and Teflon® materials are used for all parts that come into contact with liquid.*

SPECIFICATIONS	BL 7916U	BL 7916D
RANGE	0.00 to 14.00 pH	
RESOLUTION	0.01 pH	
ACCURACY (@20°C/68°F)	±0.01 pH	
FLOW RATE	See table on page 42	
INPUT	High impedance 10^{12} Ohm	
CALIBRATION	Offset: ±2 pH by offset trimmer; Slope: 85 to 115% by slope trimmer	
DOSAGE	Proportional: acid or base. User selectable	
RECORDER OUTPUT	4 to 20 mA, isolated	
DOSING CONTACT	Isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes	
ALARM RELAY	Isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes	
POWER SUPPLY	110/115V 50/60 Hz ±15% (40W)	220/240V 50/60 Hz ±15% (40W)
ENVIRONMENT	32 to 122°F (0 to 50°C); RH 95% non-condensing	
DIMENSIONS	7.1L x 8.7W x 5.6H" (181L x 221W x 142D mm)	
WEIGHT	Approx. 11 lb. (5 Kg)	

ORDERING INFORMATION:

BL 7916U	110/115V is supplied with tubing, injection valve, foot valve, ceramic weight, power cable and instructions.
BL 7916D	220/240V is supplied with tubing, injection valve, foot valve, ceramic weight, power cable and instructions.

SUGGESTED ACCESSORIES:

HI 1006-2005	Standard glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 1006-3007	High T° glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

** See Industrial probes section on page 55 for a complete line of pH probes.*

BL 7917 - Combined ORP controllers & pumps

- *ORP controller and dosing pump in one compact unit.*
- *±5 mV accuracy with unbeatable performance.*
- *Isolated 4 to 20 mA recorder output.*
- *Proportional dosing slows the pump down when the measured ORP level approaches the set value which avoids over dosage of oxidizing or reducing agents.*
- *Alarm contact is activated whenever the ORP value varies by more than 200 mV from the set point.*
- *Auxiliary contacts allow the user to attach a mixer or priming pump that is activated only when the pump is dosing.*
- *Kynar®, Viton® & Teflon® materials are used for all parts that come in contact with the liquids being pumped.*

SPECIFICATIONS	BL 7917D	BL 7917U
RANGE	0 to ±999 mV	
RESOLUTION	1 mV	
ACCURACY (@20°C/68°F)	±5 mV	
FLOW RATE	See table on page 42	
INPUT	High Impedance 10^{12} Ohm	
DOSAGE	Proportional: oxidizing or reducing. User selectable	
RECORDER OUTPUT	4 to 20 mA, isolated	
DOSING CONTACT	Isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes	
ALARM CONTACT	Isolated, 2 A, Max. 240V, resistive load, 1,000,000 strokes	
POWER SUPPLY	220/240V 50/60 Hz ±15% (40W)	110/115V 50/60 Hz ±15% (40W)
ENVIRONMENT	-10 to 50°C (14 to 122°F), RH 95% non-condensing	
DIMENSIONS	181H x 221W x 142D mm (7.1L x 8.7W x 5.6H")	
WEIGHT	5 Kg (11 lb.)	

ORDERING INFORMATION:

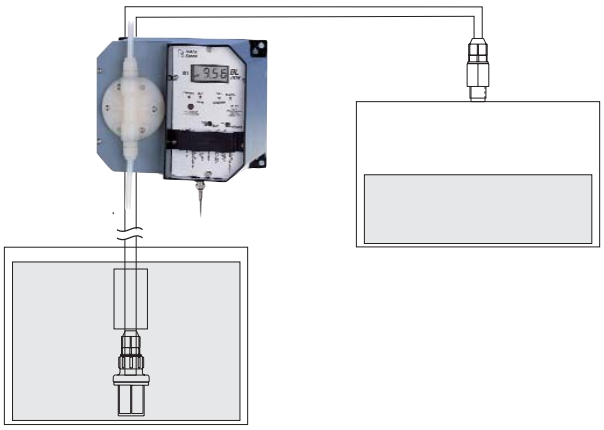
BL 7917D	220/240V is supplied with discharge and suction valves and instructions.
BL 7917U	110/115V is supplied with discharge and suction valves and instructions.

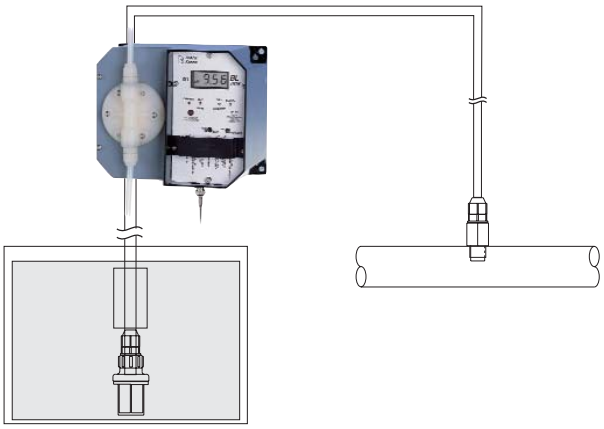
SUGGESTED ACCESSORIES:

HI 2004-1007	Platinum type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 2004-2007	Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

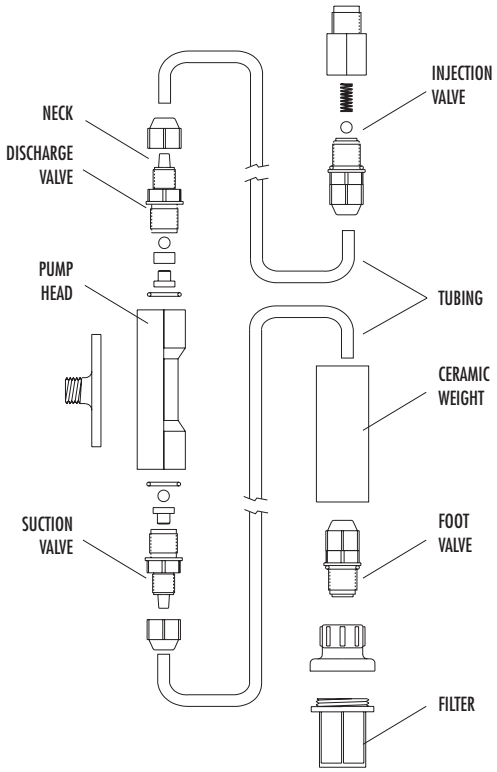
** See Industrial probes section on page 55 for a complete line of ORP probes.*

Typical installations





Valve/Hose Assembly Diagram



BL 7916 / BL 7917

FLOW/PRESSURE

BAR (PSI)	LPH (GPH)
0.5 (7.3)	13.3 (3.5)
1.0 (14.5)	11.7 (3.1)
2.0 (29.0)	10.1 (2.7)
3.0 (43.5)	9.0 (2.4)
4.0 (58.0)	7.8 (2.1)

Pump replacement parts

HI 721101
This kit contains the Kynar® pumphead, Teflon® coated O-ring, 6 screws and washers

HI 721102
This kit contains all the necessary replacement parts for your discharge valve assembly. Complete with a Viton® O-ring, glass valve ball, valve spacer and seat, head nipple and tube nut to secure the assembled parts.

HI 721103
HI 721103 is the suction valve assembly. Complete with a Viton® O-ring, glass valve ball, the valve spacer and seat, head nipple and the tube nut to secure the assembled parts.

HI 721004
The HI 721004 comes complete with an injection nipple, Teflon® coated spring, glass valve ball and a valve assembly.

HI 721005
This kit contains a filter with a filter holder and a valve assembly.

HI 721003
This kit contains 10 glass balls and 10 valve O-rings.

HI 721006
This kit contains 4 Kynar® springs.

HI 720029
LDPE hose, 10' (3 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

HI 720030
LDPE hose, 33' (10 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

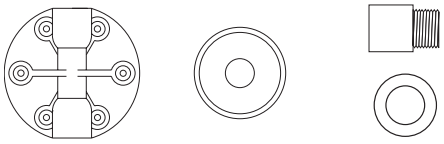
HI 720031
LDPE hose, 165' (50 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

HI 720032
LDPE hose, 333' (100 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

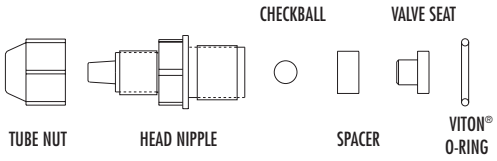
HI 721008
This kit contains 4 ceramic weights.

HI 740156
This kit contains 3 valve seats.

HI 721101



HI 721102



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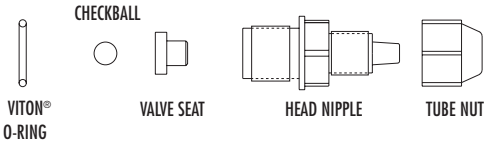

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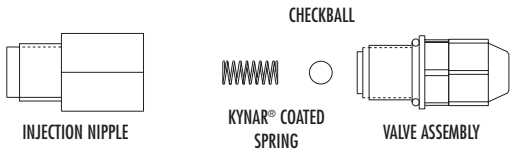

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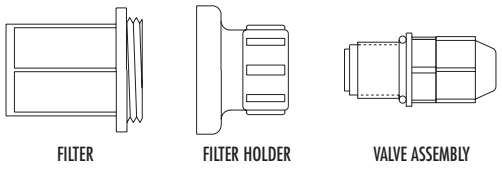
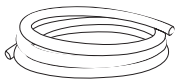


HI 721003

HI 721006

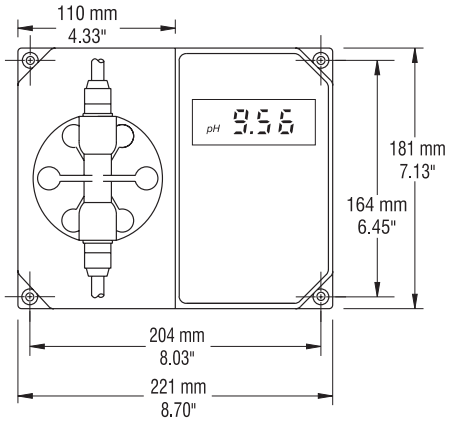
HI 720032



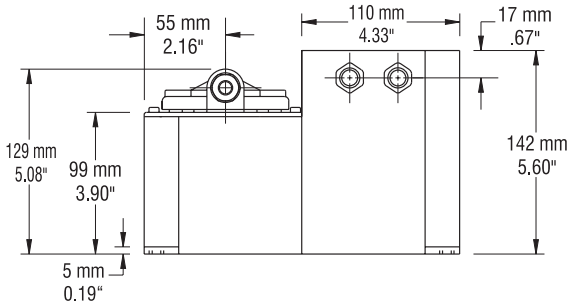
HI 721008

Mechanical dimensions

FRONT VIEW



BOTTOM VIEW



Wallmount
pH, ORP & conductivity transmitters

Features

- *4-20 mA isolated output*
- *Easy maintenance and calibration*
- *LCD built right on the casing: from 0 to 14 pH (HI 8614L) and -1000 to +1000 mV (HI 8615L)*
- *IP 65 protection against dust, splashes & humidity*
- *Direct hook up of electrodes with BNC connector*
- *Electronics sealed against humidity & condensation*

TWO-WIRE pH & ORP TRANSMITTERS

Two-wire transmitters are widely used for process control in industry today. These instruments are particularly useful in industrial conditions where electrical interference is an important factor. By galvanically isolating the signals, any interference created is prevented from reaching the transmitter. One usually associates industrial environments with corrosive conditions, therefore any instrumentation used must be resistant to liquids and corrosion. Hanna transmitters meet all of these criteria and they only use two wires which reduces costs and eliminates the need for expensive coaxial cable. Two-wire transmitters are ideal when used in remote applications that do not have AC power available.

As technology advances it is becoming more important to monitor certain processes closely, particularly from remote locations. Computers are commonly used to receive signals from transducers that have travelled a great distance (up to 300 meters, [1000']). When transmitting signals over such a distance, it is likely that a substantial portion of the signal will be absorbed by the resistance of the lines. Considerable differences in ground potentials and between the signal source and load, are inherent to long lines.
Powering the system with an AC supply is beneficial in eliminating this problem. One of the two wires is power ground return, while the other is the power supply. The power supply line acts in a dual manner, as a power supply, and as a signal carrier. This allows the transmitter to operate with 2 wires.

The signal current from the process controller is normally 4 to 20 mA. When the load is connected with the power supply return line, the signal current will be proportional in the range of 4 to 20 mA.

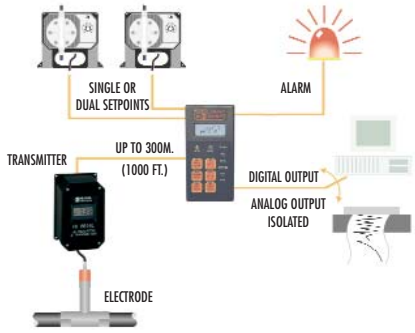
The ability to use a thinner gauge of wire greatly reduces the costs associated with the wiring of remote transmitters. Typically, a heavy gauge of shielded cable is required in order to minimize the ambient electrical noise from AC power sources, interference from electrical equipment or various other sources of noise.
Thin wire will also provide better operation when the transmitter current output is a 4 to 20 mA signal. All of these features and many more, give Hanna Instruments transmitters the versatility to be used over long distances in almost any process control application.

CONDUCTIVITY, 4-RING TECHNOLOGY

Hanna Instruments conductivity transmitters use top of-the-line, 4-ring Potentiometric probes. As opposed to the more widely used 2-electrode Amperometric method, the 4-ring potentiometric method provides the highest accuracy and repeatability attainable. When measuring liquids that have a high conductivity, the 2-electrode system is susceptible to polarization. This condition makes it exceptionally difficult to obtain measurements with any accuracy. The polarization is directly related to the electrode's current load, and will cause a considerable, nonlinear drop in the voltage. As a result, the solution around the

electrode simulates a low conductivity condition.
4-ring electrodes eliminate the polarization effect by splitting the four rings into 2 current electrodes and 2 voltage electrodes. When placed in a conductive liquid, the 2 current electrodes take the alternating voltage and create a current. This alternating current produces a Buffer Field from which polarization is absent. The voltage is then measured in this field assuring no altered readings.

Voltage electrodes carry very little current. This allows the electrodes to be arranged in a manner where the current electrodes, which are the most susceptible to polarization, are placed where they cannot effect the voltage electrodes. Consequently, the Buffer Field is large enough for the voltage electrodes to take accurate readings without being effected by polarization.



HI 8614 - HI 8614L - pH transmitters

- *The HI 8614 is a water-resistant pH transmitter designed with a high impedance input to accept signals directly from a pH electrode. The signal is then processed by a special high-impedance amplifier which transmits an output current directly proportional to the input signal but independent of changes in load or cable capacitance. Calibration is performed by adjustment of two independent trimmers for slope and offset.*
- *Temperature compensation is performed by the transmitter's ATC circuitry when measurements are taken with a temperature probe attached, it is also possible to substitute a fixed resistor (supplied) for the temperature probe, if ATC is not required.*
- *The transmitter can be connected to Hanna controllers HI 8510, HI 8710 or HI 8711, recorders, computers or any data monitoring device that accepts 4 to 20 mA input.*
- *Two versions are available, the standard model HI 8614, and HI 8614L with an LCD. HI 8614L allows easy verification and monitoring of measured values, and is easier to calibrate and maintain.*

SPECIFICATIONS	HI 8614 & HI 8614L	HI 8614L only
RANGE	4 to 20 mA	0.00 to 14.00 pH
RESOLUTION	0.01 mA	0.01 pH
ACCURACY (@20°C/68°F)	±0.02 mA	±0.02 pH
CALIBRATION	Offset: ±2.2 mA/Slope: ±0.5 mA	Offset: ±2 pH/Slope: 86 to 116%
TEMPERATURE COMPENSATION	Fixed or automatic from 0 to 100°C (32 to 212°F) with HI 76608	
INPUT IMPEDANCE	10^{12} Ohm	
OUTPUT	4 to 20 mA isolated	
pH ELECTRODE (OPTIONAL)	See accessories	
TEMPERATURE PROBE (OPTIONAL)	HI 76608 / 2K Ohm	
PROTECTION	IP 65	
POWER SUPPLY	Without LCD: 15 to 30 VDC / with LCD 20 to 36 VDC	
LOAD	Max. 500 Ohm	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95% non-condensing	
DIMENSIONS	165L x 110W x 90H mm (6.5 x 4.3 x 3.5")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

HI 8614	is supplied with instruction manual
HI 8614L	with LCD is supplied with instruction manual

SUGGESTED ACCESSORIES:

HI 1006-2005	Standard glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-13 pH, -5 to 80°C (23 to 176°F)
HI 1006-3005	High T° glass type pH probe; PVDF body with flat tip and 1mm guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 5m cable. Range 0-14 pH, 0 to 100°C (32 to 212°F)
HI 76608	Temperature probe (2K Ohm)
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

* *See Industrial probes section on page 55 for a complete line of pH probes.*

HI 8615 - HI 8615L - ORP transmitters

- *Designed for transmitting ORP measurements from remote locations in industrial environments.*
- *Two controls to compensate for electronic drift and ambient temperature. One for 4 mA and one for 20 mA.*
- *The transmitter uses a universal BNC socket for quick and secure connection of any ORP electrode with a BNC connector.*
- *Two versions are available, the standard model HI 8615, and the HI 8615L with an LCD. HI 8615L allows easy verification and monitoring of measured values, and is easier to calibrate and maintain.IP65 rating, and a rugged polypropylene casing, provide optimum protection even in harsh environments.*
- *Ideal for chromium hexavalent reductions, cyanide oxidation reactions and water sanitation.*
- *The transmitter can be connected to Hanna meters HI 8512, HI 8720 or any recorders, computers or data monitor that accepts 4 to 20 mA input.*

SPECIFICATIONS	HI 8615 & HI 8615L	HI 8615L only
RANGE	4 to 20 mA	-1000 to 1000 mV
RESOLUTION	0.01 mA	1 mV
ACCURACY (@20°C/68°F)	±0.02 mA	±5 mV
CALIBRATION	Offset: ±0.8 mA Slope: ±0.8 mA	Offset: ±100 mV Slope: 90-110%
INPUT IMPEDANCE	10^{12} Ohm	
OUTPUT	4 to 20 mA isolated	
ORP ELECTRODE (OPTIONAL)	See accessories	
PROTECTION	IP 65	
POWER SUPPLY	Without LCD: 15 to 30 VDC / with LCD 20 to 36 VDC	
LOAD	Max. 500 Ohm	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95% non-condensing	
DIMENSIONS	165L x 110W x 90H mm (6.5 x 4.3 x 3.5")	
WEIGHT	1 Kg (2.2 lb.)	

ORDERING INFORMATION:

HI 8615	is supplied with instruction manual
HI 8615L	with LCD is supplied with instruction manual

SUGGESTED ACCESSORIES:

HI 2004-1007	Platinum type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 2004-2007	Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7m cable. Range ±2000mV, -5 to 100°C (23 to 212°F)
HI 7091L	Pretreatment reducing solution, 460 ml
HI 7092L	Pretreatment oxydizing solution, 460 ml
HI 7021L	Test solution @ 240 mV, 460 ml
HI 7022L	Test solution @ 470 mV, 460 ml

** See Industrial probes section on page 55 for a complete line of ORP probes.*

HI 8936 - conductivity transmitters

- *Hanna's 4-ring potentiometric conductivity probe is virtually immune to contamination by unclean solutions. This allows the transmitter to operate at peak performance at all times.*
- *Temperature effects are compensated for by the built-in temperature sensor on the probe and the transmitter's ATC circuitry with a ß of 2%.*
- *Direct connection of the probe to the transmitter assures a positive electrical connection with no signal loss over long distances.*
- *Two versions are available, HI 8936 without an LCD, and the LCD version, HI 8936L. HI 8936L allows easy verification and monitoring of measured values, and is easier to calibrate and maintain.*
- *The HI 8936 series should be used in conjunction with the HI 7638 platinum probe.*

SPECIFICATIONS	HI 8936A HI 8936AL	HI 8936B HI 8936BL	HI 8936C HI 8936CL	HI 8936D HI 8936DL
RANGE	0.0-199.9 mS/cm	0.00-19.99 mS/cm	0-1999 µS/cm	0.0-199.9 µS/cm
RESOLUTION (L models only)	0.1 mS/cm	0.01 mS/cm	1 µS/cm	0.1 µS/cm
ACCURACY (@20°C/68°F)	±2% of full scale, excluding probe error			
CALIBRATION	4 mA (zero) ±0.8 mA Slope: ±1.6 mA (90-110%)			
TEMPERATURE COMPENSATION	Automatic from 0 to 50°C (32 to 122°F) with to ß of 2%			
OUTPUT	4 to 20 mA not-isolated Max. 500 Ohm			
PROBE (OPTIONAL)	HI 7638			
PROTECTION	IP 65			
POWER SUPPLY	without LCD: 15 to 30 VDC / with LCD 20 to 36 VDC			
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95% non-condensing			
DIMENSIONS	165L x 110W x 90H mm (6.5 x 4.3 x 3.5")			
WEIGHT	1 Kg (2.2 lb.)			

ORDERING INFORMATION:

HI 8936A	0.0-199.9 mS/cm transmitter	**HI 8936C**	0-1999 µS/cm transmitter
HI 8936AL	0.0-199.9 mS/cm transmitter with LCD	**HI 8936CL**	0-1999 µS/cm transmitter with LCD
HI 8936B	0.00-19.99 mS/cm transmitter	**HI 8936D**	0.0-199.9 µS/cm transmitter
HI 8936BL	0.00-19.99 mS/cm transmitter with LCD	**HI 8936DL**	0.0-199.9 µS/cm transmitter with LCD

SUGGESTED ACCESSORIES:

HI 7638	Conductivity probe (for use with HI 8936)
HI 779/10	6 wire cable (10 m/33')
HI 70030P	12880 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70033P	84 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7034L	80000 µS/cm calibration solution (460 mL)

HI 98143 - pH & conductivity transmitter

- *HI 98143 is a pH and conductivity transmitter designed to accept signals directly from a pH electrode and a conductivity probe at the same time.*
- *Direct connection of the probes to the transmitter assures a positive electrical connection with no signal loss. This transmitter is most useful in remote process control applications. There are 3 models, transmitting a 0-1 V, 0-4 V or 4-20 mA signal. The output signals are proportional to the input signals but independent of changes in load or cable capacitance.*
- *Temperature compensation for conductivity measurements is performed by the transmitter's ATC circuitry.*
- *The transmitter can be connected to any pH and conductivity controller, recorder, computer or any data monitoring device that accepts 0 to 1 V, 0 to 4 V or 4 to 20 mA input.*
- *HI 98143 is an ideal tool for applications such as hydroponics and greenhouses that require the monitoring of both pH and conductivity at the same time.*

SPECIFICATIONS	HI 98143-01	HI 98143-04	HI 98143-20
RANGE	0 to 14 pH; 0 to 10 mS/cm (mmho/cm)		
ACCURACY (@20°C/68°F)	pH: ±0.5% F.S.; EC: ±2% F.S.		
CALIBRATION	Manual through offset and slope trimmers for both pH and conductivity at 4/10 and 7 pH or 0 and 5 mS/cm		
TEMPERATURE COMPENSATION	EC only: automatic from 0 to 60°C (41 to 132°F) with to ß of 2%		
OUTPUT (isolated)	0-1 V	0-4 V	4-20 mA
PROBES (OPTIONAL)	See accessories		
PROTECTION	IP 54		
POWER SUPPLY	12 to 24 VDC		
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95% non-condensing		
DIMENSIONS/WEIGHT	160L x 105W x 31H mm (6.3 x 4.1 x 1.2")/280 g (9.9 oz.)/1 Kg (2.2 lb.)		

ORDERING INFORMATION:

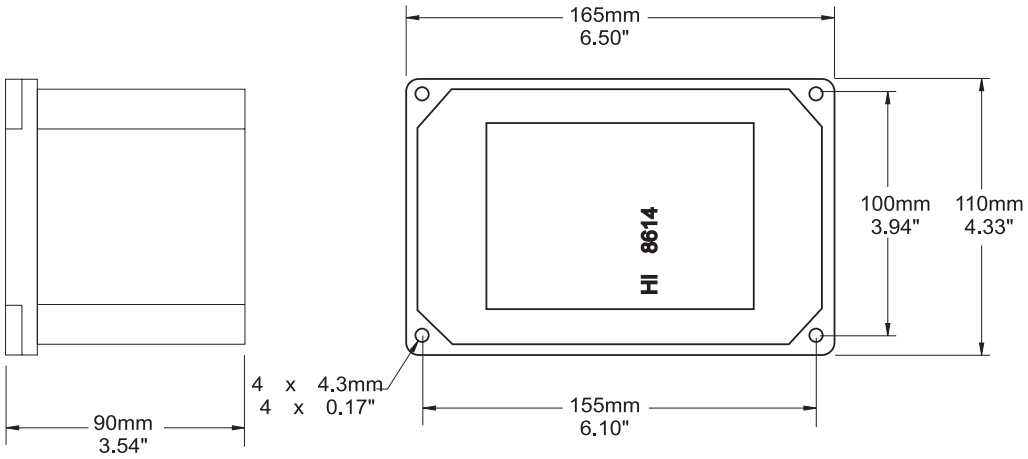
HI 98143-01	pH and EC transmitter, isolated output 0-1 V
HI 98143-04	pH and EC transmitter, isolated output 0-4 V
HI 98143-20	pH and EC transmitter, isolated output 4-20 mA

SUGGESTED ACCESSORIES:

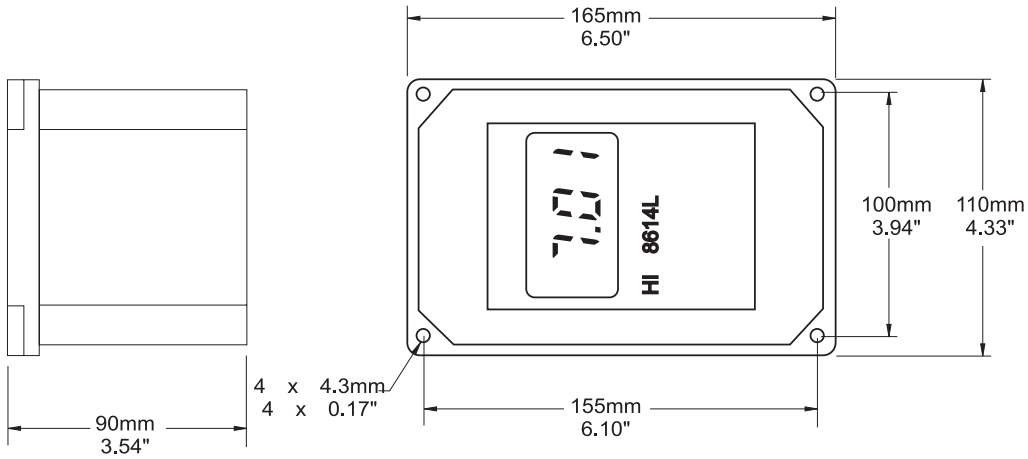
HI 1001	Plastic in-line pH electrode
HI 3001	4-ring conductivity probe
HI 7638	Platinum conductivity probe
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70039P	5000 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution for pH probe, 460 ml

Mechanical dimensions

HI 8614, HI 8615, HI 8936A, HI 8936B, HI 8936C, HI 8936D



HI 8614L, HI 8615L, HI 8936AL, HI 8936BL, HI 8936CL, HI 8936DL



High quality *BL series*

Features

- *Simple operation*
- *Flow rate control*
- *High quality materials*
- *Rugged design*
- *Supplied complete*

Black Stone

The most important question one must ask when choosing a dosing system is: can it handle all the chemicals that we plan to use? Not all dosing pumps are manufactured the same way and you need to be sure that the pump you choose is engineered to handle all the chemicals at different concentrations for your requirements. Most pumps are offered with materials such as polypropylene that are adequate only in a very narrow spectrum of applications. This means that the user often needs to change a whole set of pumpheads, valves and membranes when choosing different chemicals. This is not only time consuming but also necessitates keeping a stock full of different spare parts. Any advantages that might have been accrued by using cheap material goes out by the wayside when considering time, confusion, stock and heightened possibility of errors. We are certain that our solution, due to economy of scale, costs no more than ordinary pumps on the market.

High Quality Materials
Blackstone pumps are supplied with the highest quality material as standard equipment, not optional. The diaphragm utilizes one-piece construction in Teflon®, which unlike conventional laminated diaphragms stands up to the test of time and wear. Ball valves are constructed in glass. The Pumphead and O-rings are all made of Teflon® or Kynar® which offer unsurpassed resistance. The chemical resistance chart, on next page, shows how well Kynar® and Teflon® stand up to the most aggressive chemicals.

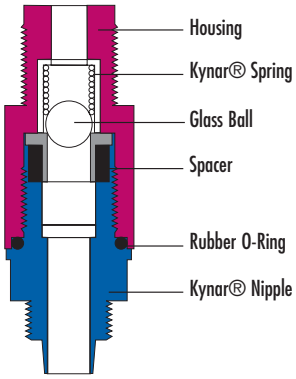
Simple Operation
Blackstone pumps are equipped with a single control for pump output. The external Flow Rate Control (potentiometer) on the face of the pump allows you to adjust the flow percentage up to 100% of the rated capacity. This feature eliminates the need to worry about stroke lengths and power settings.

Versatility of Design
BlackStone pumps have been designed to meet the ever changing needs of industry. To accommodate diverse applications, the pumps can be easily mounted anywhere in your plant with a broad, flat horizontal base and holes for tank, shelf or floor mounting. The rear of the pump housing also provides holes to facilitate vertical, wall, tank or machine mounting. With pump valve assembly and unit controls both located on the front of the pump, there is never a problem with installation or flow adjustments.

Rugged Design
BlackStone pumps are completely sealed during assembly and offer IP65 resistance against splashes and spills providing excellent protection even in hostile environments. The fiber-reinforced polypropylene housing stands up to aggressive chemicals while offering superior strength under tough industrial conditions.

Reliability Through Simplicity
BlackStone's positive displacement solenoid driven pumps use a minimum number of moving parts, therefore reducing the chance of mechanical failure. BlackStone pumps are more accurate than standard pumps with the positive displacement design ensuring each stroke is identical to the strokes before and after it, thus keeping the flow rate constant.

BlackStone Prevails
BlackStone pumps offer features not usually found in other pumps. Together with the superior customer service and expert technical support, BlackStone is placed in a league of its own. When comparing material, construction, performance and price, you will agree that BlackStone is simply the best.



BL series

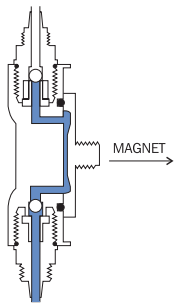
Chemical resistance guide

	PVC	Polypro	Hypalon	Viton	Kynar	Teflon
Acetic Acid, 80%	D	B	A	E	A	A
Bleach	A	B	A	A	A	B
Citric Acid	A	A	A	A	A	A
Copper Cyanide	A	A	X	B	A	A
Copper Sulfate	A	A	B	B	A	A
Ferric Chloride	A	A	B	B	A	A
Ferric Sulfate	A	A	B	B	A	A
Hydrazine	**X**	**X**	**B**	**B**	**A**	**A**
Hydrochloric Acid, (Concentrated)	**A**	**A**	**B**	**B**	**A**	**A**
Hydrochloric Acid, (Diluted)	**A**	**A**	**B**	**B**	**A**	**A**
Hydrofluoric Acid, (Diluted)	D	B	D	A	A	A
Hydrogen Sulfide AQ. SOL.	C	A	B	B	A	A
Magnesium Nitrate	A	A	A	A	A	A
Magnesium Sulfate	A	A	A	A	A	A
Nitric Acid, 50%	A	C	E	A	A	A
Phosphoric Acid	B	B	A	B	A	A
Plating Solutions	A	A	C	A	A	A
Potassium Cyanide	A	A	B	B	A	A
Potassium Nitrate	A	A	B	B	A	A
Propyl Alcohol	C	X	B	B	A	A
Soaps	A	A	B	B	A	A
Sodium Bicarbonate	A	A	A	A	A	A
Sodium Bisulfite	**A**	**A**	**A**	**A**	**A**	**A**
Sodium Hydroxide, 50%	**A**	**A**	**B**	**E**	**A**	**A**
Sodium Hypochlorite, 18%	**A**	**A**	**A**	**D**	**A**	**A**
Sulfuric Acid, (Concentrated)	**A**	**A**	**B**	**A**	**A**	**A**
Tanning Reagents	A	A	A	X	A	A
Trichlorethane	E	C	E	A	A	A

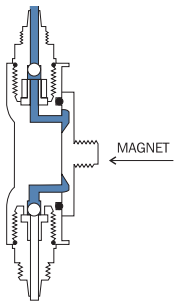
SYMBOL KEY

A - Excellent
B - Good
C - Fair
D - Acceptable (limited use)
E - Not recommended
X - Unknown

Positive Displacement Magnetic Pump



During intake or suction stroke, the magnet draws the diaphragm back, opening the suction valve (lower glass ball) and filling the pumphead with the material.



The discharge stroke closes the suction valve and forces all the pumphead out through the discharge valve (upper glass ball) and into the delivery system.

Check Ball Valves

The valve assemblies of BlackStone pumps have glass check balls. This is a proven system requiring minimum maintenance and providing maximum control of the liquid flow. Glass is used for its ability to resist corrosion when exposed to a wide variety of aggressive chemicals. The spring in the injection valve assembly (optional) is made entirely in Kynar® in order to protect it from aggressive chemicals. O-Rings forming a seal between components are also encapsulated in Teflon® to prevent damage and prolong their lives, without compromising flexibility.

BlackStone Pumps

A wide range of BlackStone pumps with different dosing capacities are available for your specific needs. Each pump is supplied with an injection and foot valve assembly plus 23' (7 m) of polyethylene tubing. Replacement parts and maintenance kits are available through your authorized Hanna distributor.

SPECIFICATIONS	**BL 1.5**	**BL 3**	**BL 5**	**BL 7**	**BL 10**	**BL 15**	**BL 20**
OUTPUT in GPH/LPH	0.4/1.5	0.8/2.9	1.3/5.0	2.0/7.6	2.9/10.8	4.0/15.2	4.8/18.3
PRESSURE in PSI/BAR	188.5/13	116/8	101.5/7	43.5/3	43.5/3	14.5/1	7.3/0.5
PUMP CASING	Fiber-reinforced polypropylene						
PUMPHEAD	Pumphead in Kynar®, diaphragm and valve seats in Teflon® , glass ball valves and O-rings in Viton®						
FITTINGS	Polyethylene, 3/8" injection fitting						
SELF-PRIMING	Max. self priming height 5 feet (1.5 m)						
POWER SUPPLY	*110/115V, 50/60Hz						
MAX. ABSORBED POWER	Approximately 200 W						
PROTECTION	IP65						
ENVIRONMENT	0 to 50°C (32 to 122°F); max. 95% RH non-condensing						
DIMENSIONS	165H x 194W x 121D mm (6.5 x 7.6 x 4.8")						
WEIGHT	Approximately 3 Kg (6.6 lb.)						

**220/240V 50/60 Hz model available*

HI 721101
This kit contains the Kynar® pumphead, Teflon® coated O-ring, 6 screws and washers

HI 721102
This kit contains all the necessary replacement parts for your discharge valve assembly. Complete with a Viton® O-ring, glass valve ball, valve spacer and seat, head nipple and tube nut to secure the assembled parts.

HI 721103
HI 721103 is the suction valve assembly. Complete with a Viton® O-ring, glass valve ball, the valve spacer and seat, head nipple and the tube nut to secure the assembled parts.

HI 721004
The HI 721004 comes complete with an injection nipple, Teflon® coated spring, glass valve ball and a valve assembly.

HI 721005
This kit contains a filter with a filter holder and a valve assembly.

HI 721003
This kit contains 10 glass balls and 10 valve O-rings.

HI 721006
This kit contains 4 Kynar® springs.

HI 720029
LDPE hose, 10' (3 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

HI 720030
LDPE hose, 33' (10 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

HI 720031
LDPE hose, 165' (50 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

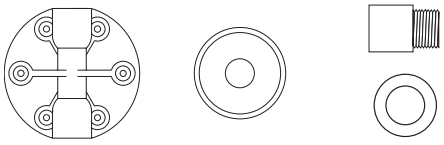
HI 720032
LDPE hose, 333' (100 m)
Inside diameter, 1/4" (4.71 mm)
Outside diameter, 3/8" in (7.87 mm)

HI 721008
This kit contains 4 ceramic weights.

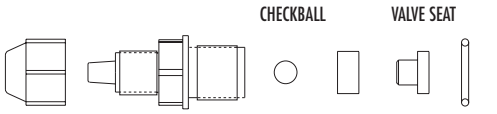
HI 740156
This kit contains 3 valve seats.

Pump replacement parts

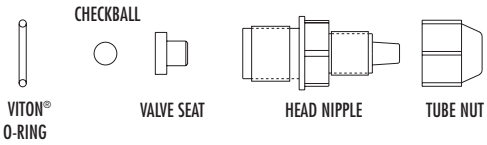
HI 721101



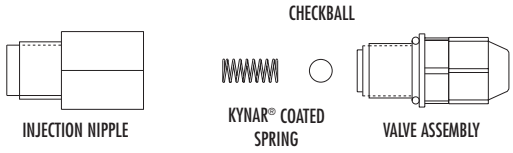
HI 721102



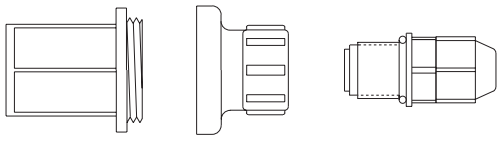
HI 721103



HI 721004



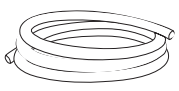
HI 721005



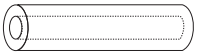
HI 721003

HI 721006

HI 720032

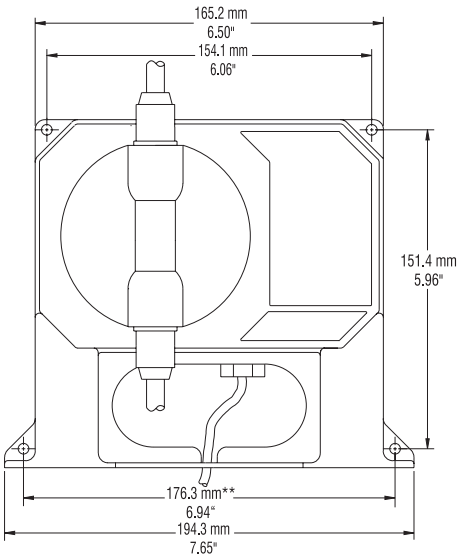


HI 721008

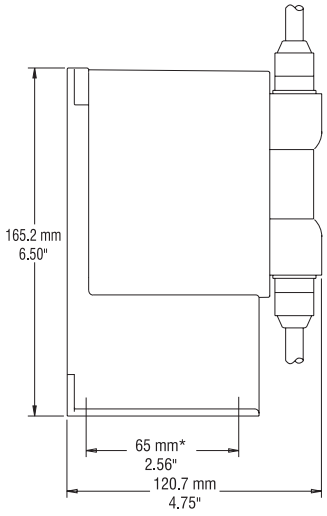


Mechanical dimensions

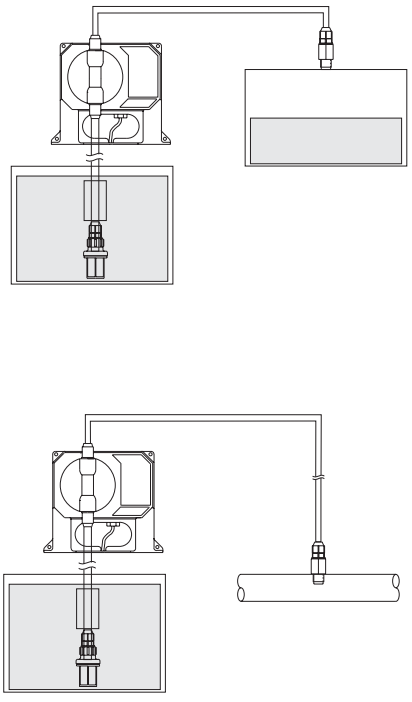
FRONT VIEW



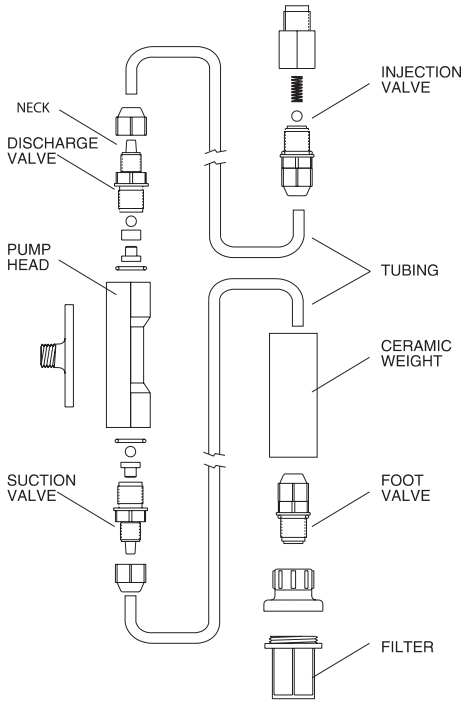
BOTTOM VIEW



TYPICAL INSTALLATION



VALVE/HOSE ASSEMBLY DIAGRAM

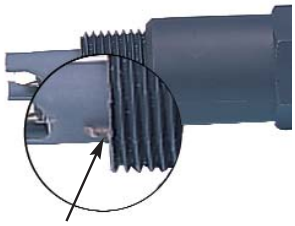


Features

- *Self clean sensors*
- *Built-in amplifier and replaceable battery*
- *Ground loop matching pin*
- *PVDF body material*
- *Incorporated 3 wires PT 100 sensors*
- *Four different glass type pH sensors*
  - *standard*
  - *low T°*
  - *high T°*
  - *HF resistant*
- *Two different metal type ORP sensors*
  - *platinum*
  - *gold*

pH & ORP probes

Built-in amplifier and replaceable battery
The Hanna AmpHel system is a breakthrough in pH/ORP electrode technology. Hanna`s new wastewater line of electrodes feature a replaceable battery on electrode cable to ensure longer battery life in high temperature applications where regular head built-in battery may fail rapidely.



Ground loop matching pin

Ground loop matching pin
Fluctuation of readings and short electrode life can be related to a ground loop current problem. The solution to this problem is Hanna's electrode with ground loop matching pin. Hanna's PH 500, PH 502, MV 600, MV 602, HI 21 & HI 22 controllers now come with a differential input to prevent such problems. With this new feature, the life of the electrodes will be greatly extended and expensive labor and time will be eliminated.

PVDF body material
Agressive chemicals and high temperature are common agressors of pH and ORP probes. For those applications, Hanna has developed a complete line of sensors with PVDF body.

Industrial challenges and Hanna solutions

Industrial challenges
Process applications present some major challenges to the pH measurement system. The most common of these are long distances between the sample and the meter, high and low temperature extremes, electrical interferences, high pressure, poisoning or fouling of the junction/reference electrode and chemical/physical breakage. For each of these common problems, Hanna has developed specific electrodes and electrode features for excellent performance in all types of process applications.

pH measurement over long distances
Due to the high resistance of the glass membrane of a pH electrode, conventional pH measuring systems utilize high impedance signal transmission. Poor insulation of the electrode connectors and cables results in high susceptibility to leakage, stray noise and humidity which tends to give erroneous pH readings. As a result, particular care has to be taken in connecting the electrode to the metering system. For this conventional system, the cable length is restricted to typically less than 10 meters. For measurements to be accurate the use of a high impedance meter is required and it is necessary to provide for high insulation at all connections.

With Hanna's AmpHeltm electrodes there is an amplifier built into the electrode, problems associated with high impedance are now isolated to one location. The high impedance circuitry is located at the top of the electrode which is completely encapsulated. As a result you now have low output impedance signals from the electrode to the metering system. This means you can use ordinary connections with long unshielded cables (up to 50 meters) and an ordinary meter. For greater distances up to 300 meters it is recommended that you use a Hanna 2-wire transmitter.

High and low temperature extremes
As we have discussed the pH glass membrane is sensitive to the temperature of the solution. Prolonged use and/or exposure to temperatures above 35 °C will accelerate the aging and increase chemical attack to the glass membrane which will shorten the overall service life of an ordinary sensor. With advanced sensor glass formulation and construction, Hanna has developed electrodes that will perform consistently in higher and lower temperature extremes. These new sensors will deliver a useful life comparable to a standard electrode under optimum conditions.

Industrial applications up to 87 psi (6 BAR)
Standard electrodes are not suitable to perform measurements in pressurized systems over 44 psi (3 BAR). An electrode not engineered for high pressure applications could cause a major leak in the process and even be dangerously projected from the system. Hanna's high pressure electrodes have been constructed to operate reliably in pressurized systems up to 87 psi (6 BAR).

Reference poisoning and junction fouling
One of the most common causes of electrode failure is fouling of the junction. The junction simply becomes physically clogged due to either solids in the sample solution or by precipitation (of AgCl for instance). To help overcome this problem Hanna has increased the physical size of the junction with the result of increasing the life of the electrode when introduced into applications that would normally quickly clog the junction. Hanna's glass sensors are thicker and the composition has been formulated to offer greater chemical resistance and an increased impedance range. Reference fouling was a common problem before the introduction of double junction technology. Poisoning ions will actually plate onto the sensor of the reference compartment when the positive flow of electrolyte is reversed in a single junction system. In a double junction system the reference electrode is not in direct contact with the sample and the problem of reference poisoning is nearly eliminated.

Physical breakage
Normal maintenance is usually the main cause of electrode breakage. The delicate sensor must be treated with extreme care. A bulbous electrode in a process stream will also become dirty with deposits such as silicate or phosphate. These deposits may not be visible but the electrode will become sluggish or exhibit a dramatic change in the slope value. Hanna's flat tip process electrodes have shown significantly less breakage than bulbous electrodes. Flat electrodes also experience less abrasion in a flow application and nearly eliminate deposits.

Process pH and ORP electrodes
Hanna's latest additions to the range of industrial combination pH and ORP electrodes incorporate over 20 years of electrode manufacturing experience. These advanced electrodes feature proven flat tip technology for superior in line performance. The flat tip virtually eliminates deposits that can foul the electrode significantly reducing necessary maintenance.

Each electrode has a built-in potential matching pin. With this feature, electrode fouling due to ground loop current through the reference of the sensor is a thing of the past. These electrodes have been engineered with a replaceable battery to power the amplifier. This feature adds life to the electrode and aids in troubleshooting. Some electrode models are available with a built-in 3-wire Pt 100 sensor allowing the user to do away with any additional probe or thermometer for temperature compensation. For those applications that have proven particularly hostile to glass sensors, Hanna Instruments has developed four types of specialized glass. First is an extremely durable sensor glass for general purpose industrial use. This glass can withstand sudden impacts and extreme mechanical stress. The remaining types of electrode glass allow continuous monitoring in highly acidic solutions containing fluoride ions, as well as high or low temperature process streams significantly increasing the useful life of the electrode.

Improved performance through innovation

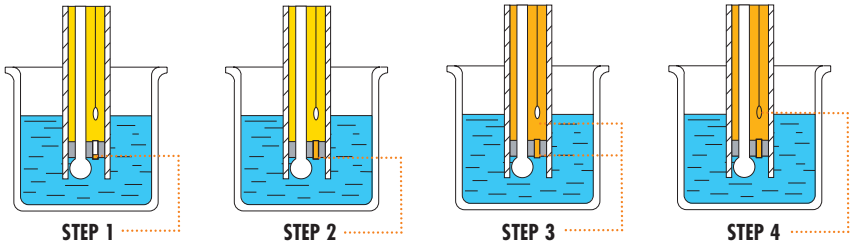
Hanna has been at the forefront of sensor research and development in the 80s and 90s. The increasing demand for reliable, rugged and high quality electrodes for the laboratory, water treatment and process industries has motivated us to increase our commitment to innovative developments. The most common sensing problems related to pH electrodes are the contamination and clogging of the reference junction, resulting in slow, drifty and noisy measurements. Hanna's vast experience in the manufacturing of electrodes has enabled us to introduce innovative ideas, developing dedicated answers to specific problems in the measurement of pH.

Advantages of double junction electrodes

Minimizing Contamination
Reduction in Clogging of Junctions

Minimizing Contamination

Conventional electrodes are normally single junction. As depicted by the figures below, these electrodes have only a single junction which serves to put the reference electrode system in contact with the sample. Under adverse conditions e.g. high pressure, high temperature, highly acidic or alkaline solutions etc., the positive flow of the electrolyte through the junction is often reversed resulting in the ingress of sample solution into the reference compartment. If this is left unchecked, the reference electrode ultimately is contaminated, leading to complete electrode failure.



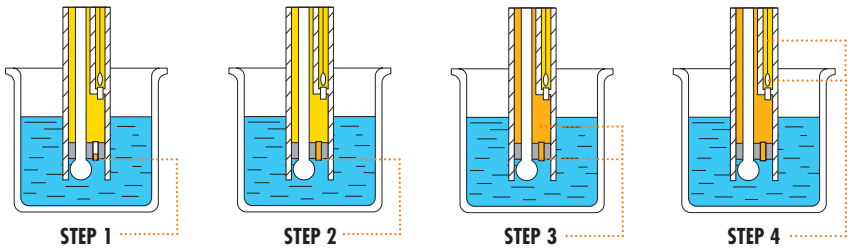
STEP 1 Junction contamination begins

STEP 2 Junction contaminated

STEP 3 Junction contaminated + reference chamber contaminated

STEP 4 Contamination of AgCl reference wire leads to electrode failure

Hanna's double junction system, as the name implies, has two junctions, only one of which is in contact with the sample. As illustrated in the figures below, under adverse conditions, the same tendency of sample ingress is evident. However, as the reference electrode system is separated physically from the intermediate electrolyte area, the contamination of the electrode is minimized. This leads to long electrode life. The chances of recovery are also higher if pro-per maintenance procedures are taken.



STEP 1 First junction contamination begins

STEP 2 First junction contaminated

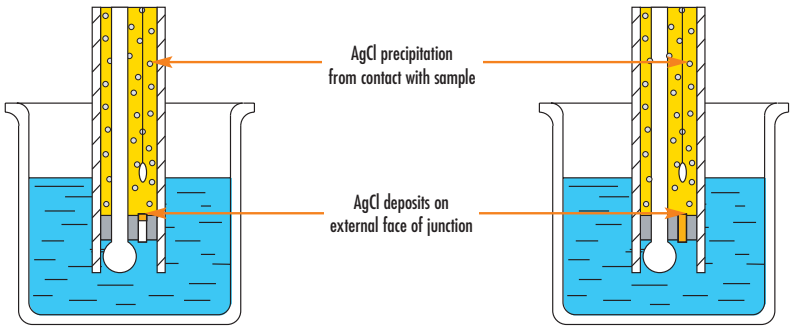
STEP 3 First junction contaminated + first reference chamber contaminated

STEP 4 Second junction + second reference system is untouched, electrode still working

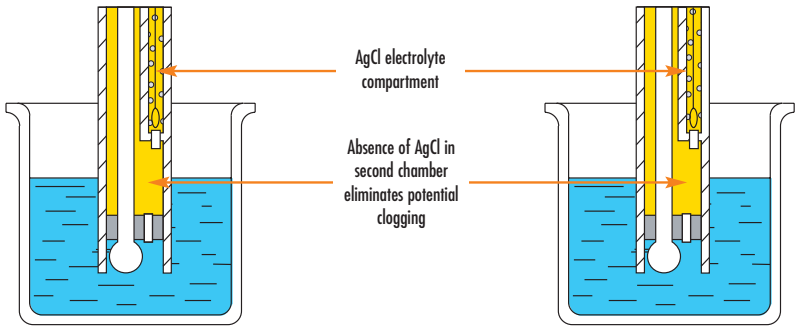
Improved performance through innovation

Reduction in Clogging of Junctions

A common cause of clogged junctions in conventional electrodes is due to the common ion effect. AgCl is less soluble in the sample than the reference electrolyte solution. Therefore, when the electrolyte solution makes contact with the sample, some AgCl will precipitate on the external face of the junction. Even though regular maintenance procedures and backflushing eliminates clogging, often the severity of this problem is not comprehended. The result is drifty readings obtained from the sensor.



In Hanna's double junction electrodes, the secondary compartment electrolyte which contacts the sample through the junction does not contain any Silver Chloride ions. As such, this problem is non existent. Though the primary compartment contains heavy ions, the contact across the primary junction is purely by ionic diffusion and as such in contrast to the high flow junctions in contact with the sample, the clogging effect is negligible.

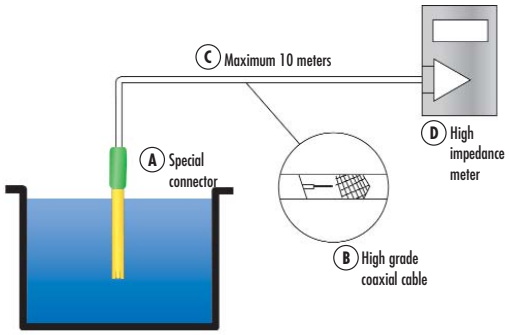


Amplified pH & ORP probes

***AmpHel : Amp**lified **pH El**ectrode*

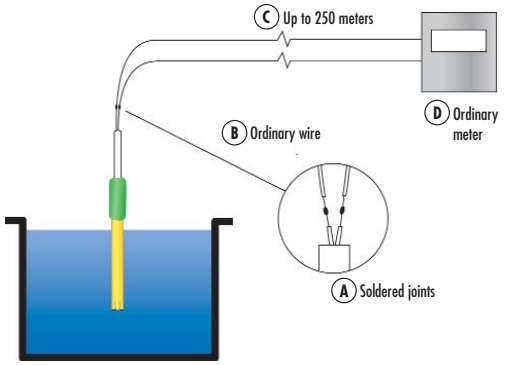
Conventional pH Technology

Due to the high resistance of the glass membrane of a pH electrode, conventional pH measuring systems utilize high impedance signal transmission. Bad insulation of the electrode connectors (A) and cables (B) results in high susceptibility to leakage, stray noise and humidity which tends to give erroneous pH readings. As a result, particular care has to be taken in connecting the electrode to the metering system. For this conventional system, the cable length (C) is restricted to typically less than 10 meters because of the low signal transmission. For measurements to be accurate the use of a high impedance meter (D) is required and it is necessary to provide for high insulation in the meter connections. For these reasons the conventional pH measuring system is delicate.



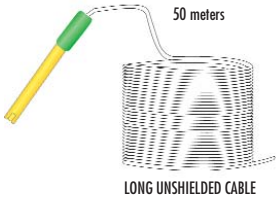
Breakthrough by HANNA

With an amplifier built into the electrode, the problems associated with high impedance is now isolated to one location (see Figure on the right). The high impedance circuitry is now located at the top of the electrode which is completely encapsulated. As a result, you now have low output impedance signals from the electrode to the metering system. This means you can use ordinary connectors (A) with long unshielded cables (B, C) and an ordinary meter (D). This breakthrough in pH technology provides you with a rugged system for all industrial pH measurements and monitoring.

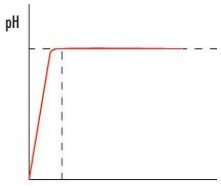


Characteristics and Advantages

- *Combination Ag/AgCl sensor & reference system.*
- *Rugged design with epoxy body housing and sensor protection.*
- *Battery life of 2 years.*
- *Very low output impedance (typically 10K Ohms) for:*
  - *instantaneous response*
  - *unsurpassed stability*
  - *connections with long unshielded cables (up to 50 meters)*
  - *high mechanical and electrical noise immunity*
  - *compatibility with existing pH meters in the market*
  - *on-line process control applications*
- *Double junction reference system for minimization of contamination due to clogged pores or ingress of sample.*
- *Refillable external reference system for versatility and durability.*
- *High flow rate fiber junction for optimum ionic conduction.*
- *Complete pH range from 0 to 14 & temperature range from 0 to 80°C.*

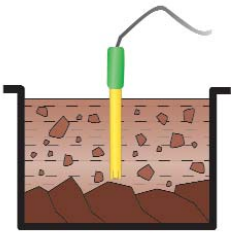


LONG UNSHIELDED CABLE



FAST AND STABLE RESPONSE

SIMPLE CONNECTION, IMMUNE TO HUMIDITY AND NOISE



MINIMAL CONTAMINATION

Heavy duty pH probes

Standard glass type pH sensors

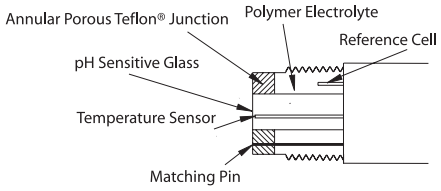
		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6100405	0-13	Double	Teflon®	Polymer	Yes	-	Yes	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 6101405	0-13	Double	Teflon®	Polymer	Yes	Pt100	Yes	-5 to 80°C	6 bars (87 PSI)	BNC+ Lead	5 m	PVDF
HI 1006-2005	0-13	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PVDF

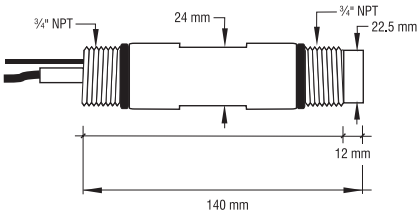
Low T° glass type pH sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6100605	0-12	Double	Teflon®	Polymer	Yes	-	Yes	-10 to 80°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 6101605	0-12	Double	Teflon®	Polymer	Yes	Pt100	Yes	-10 to 80°C	6 bars (87 PSI)	BNC+ Lead	5 m	PVDF
HI 1006-1005	0-12	Double	Teflon®	Polymer	Yes	-	-	-10 to 80°C	6 bars (87 PSI)	BNC	5 m	PVDF

Flat tip probe diagram

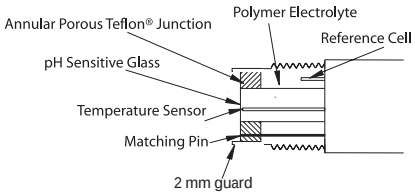
HI 6100405 HI 6100605
HI 6101405 HI 6101605

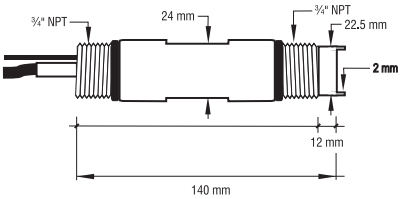




Flat tip probe (with guard) diagram

HI 1006-2005
HI 1006-1005





Heavy duty pH probes

High T° glass type pH sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6100805	0-14	Double	Teflon®	Polymer	Yes	-	Yes	0 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 6101805	0-14	Double	Teflon®	Polymer	Yes	Pt100	Yes	0 to 100°C	6 bars (87 PSI)	BNC+ Lead	5 m	PVDF
HI 1006-3005	0-14	Double	Teflon®	Polymer	Yes	-	-	0 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF

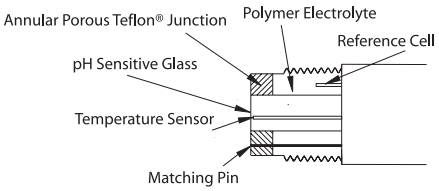
HF resistant glass type pH sensors

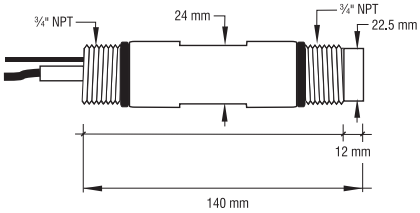
		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6100205	0-10	Double	Teflon®	Polymer	Yes	-	Yes	-5 to 60°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 6101205	0-10	Double	Teflon®	Polymer	Yes	Pt100	Yes	-5 to 60°C	6 bars (87 PSI)	BNC+ Lead	5 m	PVDF
HI 1006-4005	0-10	Double	Teflon®	Polymer	Yes	-	-	-5 to 60°C	6 bars (87 PSI)	BNC	5 m	PVDF

pH ELECTRODES FOR ACID SAMPLES WITH FLUORIDE IONS (F^- max 2 g/L, < 60°C, > 2 pH)*
*CONDITIONS LISTED ARE TRUE IN THE PRESENCE OR FLUORIDE

Flat tip probe diagram

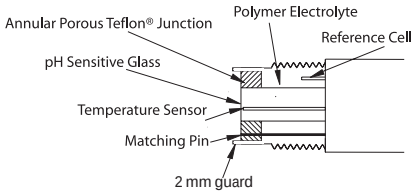
HI 6100205
HI 6101205

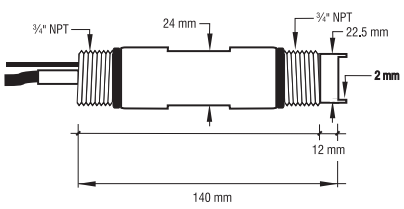




Flat tip probe (with guard) diagram

HI 6100805 HI 1006-3005
HI 6101805 HI 1006-4005





Heavy duty ORP probes

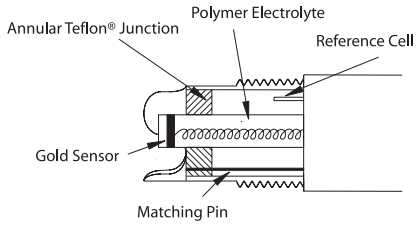
Platinum type ORP sensors

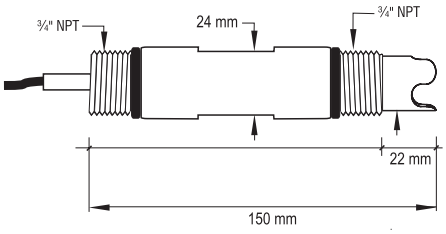
		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6200405	±2000 mV	Double	Teflon®	Polymer	Yes	-	Yes	-5 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 2004-1005	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF

Gold type ORP sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 6200505	±2000 mV	Double	Teflon®	Polymer	Yes	-	Yes	-5 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF
HI 2004-2005	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 100°C	6 bars (87 PSI)	BNC	5 m	PVDF

Platinum and gold probe diagram





pH & ORP probes

Standard glass type pH sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 1002/3	0-14	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 1002/5	0-14	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP
HI 1003/3	0-14	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 1003/5	0-14	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP

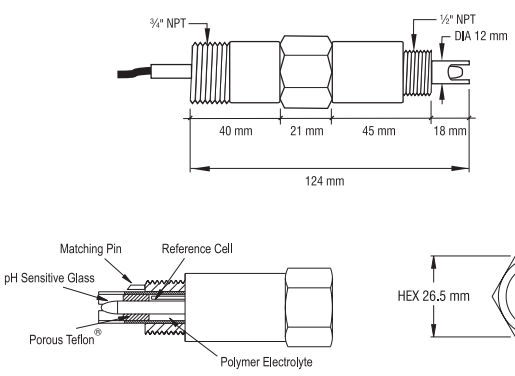
Platinum type ORP sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 2002/3	±2000 mV	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 2002/5	±2000 mV	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP
HI 2003/3	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 2003/5	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP

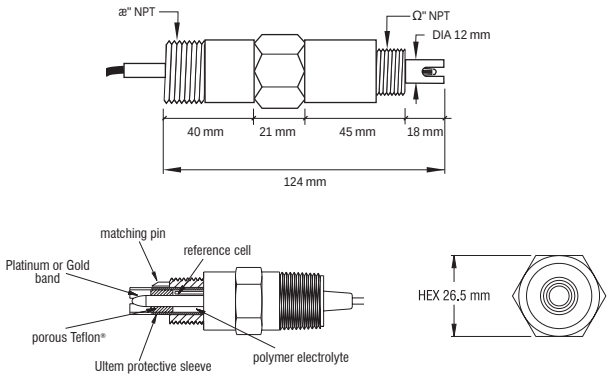
Gold type ORP sensors

		Reference System								Lead		
Part #	Range	Junction	Type	Electrolyte	M.Pin	ATC	AmpHel	T° Range	Pressure	Connector	Cable	Body
HI 2012/3	±2000 mV	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 2012/5	±2000 mV	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP
HI 2013/3	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP
HI 2013/5	±2000 mV	Double	Teflon®	Polymer	Yes	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	5 m	PP

pH probe diagram



ORP probe diagram

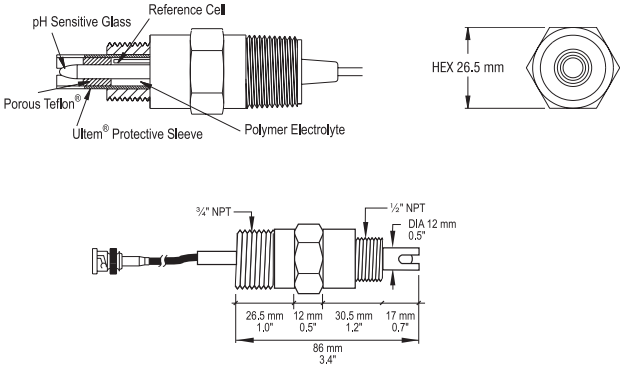


pH & ORP probes

Standard glass type pH sensors

Part #	Range	Reference System			M.Pin	ATC	AmpHel	T° Range	Pressure	Lead		Body
		Junction	Type	Electrolyte						Connector	Cable	
HI 1001	0-14	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP

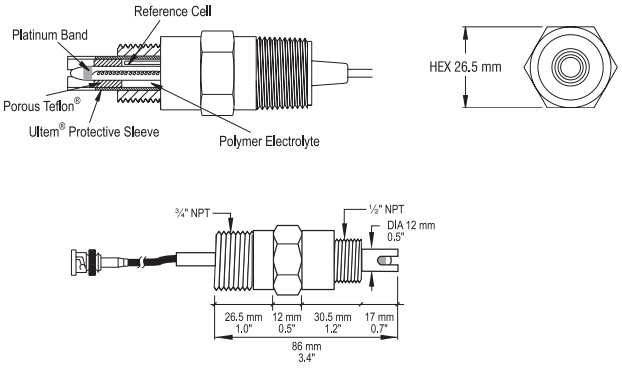
HI 1001 probe diagram



Platinum type ORP sensors

Part #	Range	Reference System			M.Pin	ATC	AmpHel	T° Range	Pressure	Lead		Body
		Junction	Type	Electrolyte						Connector	Cable	
HI 2001	±2000 mV	Double	Teflon®	Polymer	-	-	-	-5 to 80°C	6 bars (87 PSI)	BNC	3 m	PP

HI 2001 probe diagram



Conductivity/TDS probes

These probes combine the proven 4-ring potentiometric method with platinum sensors and a stainless steel external thread. The removable protective sleeve is made of Ultem® which resists the harmful effects of most chemicals and can be unscrewed for quick and simple maintenance. The probes withstand temperatures up to 120°C and pressures of up to 5 bars. HI 7638 incorporates an NTC sensor, while HI 7639 houses a 3-wire Pt 100 sensor. HI 7640 does not incorporate a temperature sensor. Also available with 10 m cable.

	HI 7638	HI 7639	HI 7640
Temp. Compensation	Automatic 0-50°C	Automatic 0-50°C	—
	NTC (4.7 kW)	RTD (Pt100)	—
Body Material	Ultem®	Ultem®	Ultem®
Working Temperature	0-120°C	0-120°C	0-120°C
Max. Pressure (@25°C)	5 bars	5 bars	5 bars

Submersible

The HI 3001 and HI 3011 4-ring probes measure conductivity with platinum sensors. They come with standard 12.5 mm external thread for flow-thru mounting and 3 m of cable. The protective cover is made of Ultem® and can be removed for quick maintenance. The probes can withstand temperatures up to 80°C and 6 bars of pressure. HI 3001 also houses an NTC temperature sensor for automatic temperature compensation.

	HI 3001	HI 3011
Temp. Compensation	Automatic from 0 to 60°C	—
	NTC (4.7 kW)	—
Body Material	Ultem®	Ultem®
Working Temperature	0-80°C	0-80°C
Max. Pressure (@25°C)	6 bars	6 bars

Submersible

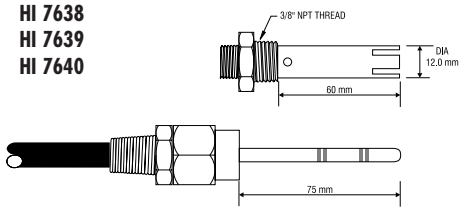
Conductivity/TDS probes

The HI 3002 and HI 3012 4-ring probes measure conductivity with platinum sensors and come with standard 12.5 mm external thread for submersion applications and 3 m of cable. The protective cover is made of Ultem® and can be removed for quick maintenance. The probes can withstand temperatures up to 80°C and 6 bars of pressure. HI 3002 also houses an NTC temperature sensor for automatic temperature compensation.

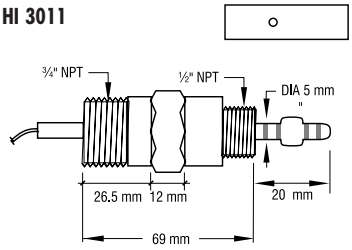
	HI 3002	HI 3012
Temp. Compensation	Automatic from 0 to 50°C	—
	NTC (4.7 kW)	—
Body Material	Ultem®	Ultem®
Working Temperature	0-80°C	0-80°C
Max. Pressure (@25°C)	6 bars	6 bars

Submersible

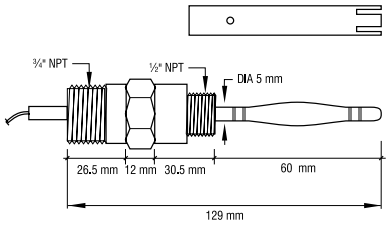
HI 7638
HI 7639
HI 7640



HI 3001
HI 3011



HI 3002
HI 3012



HI 931001 - pH & ORP simulator

It is sometimes difficult to work out whether a particular malfunction is due to the meter or the electrode. If you have been in this position and pondered on a simple way out, the Hanna precision HI 931001 pH/ORP electrode simulator might just be the solution for you. By simply connecting the HI 931001 to your meter's input socket and turning the dials, pH readings can be simulated from 0 to 14 pH in 0.01 steps. The output signals all correspond to pH values at 25°C and your pH meter should display the same values that can be seen on the simulators LCD. For the mV range, HI 931001 can simulate output from -1000 to +1000 mV in 1 mV steps.

SPECIFICATIONS		HI 931001
RANGE	pH	0.00 to 14.00
	mV	-1000 to 1000
RESOLUTION	pH	0.01
	mV	1
ACCURACY (@20°C/68°F)	pH	±0.01
	mV	±1
TEMPERATURE COMPENSATION		All outputs are simulated at 25°C (77°F)
BATTERY TYPE/LIFE		1 x 9V / approximately 500 hours of continuous use
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 95%
DIMENSIONS		180 x 83 x 40 mm (7.1 x 3.3 x 1.6")
WEIGHT		320 g (11.3 oz.)

ORDERING INFORMATION:

HI 931001 is supplied complete with HI 7858/1 extension cable (BNC/BNC) with 3 mm diameter (0.12"), 1 m (3.3') lead, 1 x 9V battery and instruction manual.

SUGGESTED ACCESSORIES:

HI 710001	Soft carrying case	**HI 7858/10**	Extension cable, 10 m (33') long
HI 740218	Hard carrying case	**HI 7858/15**	Extension cable, 15 m (49.5') long
HI 7858/1	Extension cable, 1 m (3.3') long	**HI 710009**	Blue rubber boot
HI 7858/3	Extension cable, 3 m (10') long	**HI 710010**	Orange rubber boot
HI 7858/5	Extension cable, 5 m (16.5') long		

HI 931002 - pH & ORP simulator & calibrator

HI 931002 is a portable instrument designed by the plant Repair and Maintenance Operator for the RMO! This portable simulator can monitor and regulate 4-20 mA from practically any process meter with or without a voltage generator. The communication bus from process instrumentation can be simulated in any of the following modes:

Passive Drive/Calibrator Mode:
HI 931002 can set the 4-20 mA current values and the user can then adjust the process meter accordingly.

Active Drive/Simulator Mode:
HI 931002 simulates the correct current values as above in addition to providing power to the bus communication. Power is provided through an external adapter (included) which is connected to the simulator. This mode is ideal to calibrate chart recorders, pressure transducer or current indicators.

Passive Measurement/Tester Mode:
HI 931002 practically becomes an Amperometer. It measures and displays the mA (or pH) values transmitted by the process meter.

Active Measurement/Tester Mode:
Same as passive above in addition to providing voltage to the 4-20 mA bus.

HI 931002 can measure incoming current, provide power and simulate 4-20 mA output to calibrate your process meter. A large LCD shows values on the display. You can select between drive and measurement modes through a switch on the front panel and two dials allow for quick adjustment of the current.

SPECIFICATIONS	HI 931002
RANGE	2.00 to 19.99 mA & -1.50 to 14.00 pH (active & passive drive mode); 0.00 to 19.99 mA & -3.50 to 14.00 pH (active and passive measuring mode)
RESOLUTION	0.01 mA & 0.01 pH
ACCURACY (@20°C/68°F)	±0.01 mA & 0.01 pH
INPUT RESISTANCE	20 Ohms (Ω)
BATTERY TYPE/LIFE	1 x 9V battery/approximately 1600 hours of continuous use; 12VDC power supply
ENVIRONMENT	0 to 50°C (14 to 122°F); max. RH 95% non-condensing
DIMENSIONS	180 x 83 x 40 mm (7.1 x 3.3 x 1.6")
WEIGHT	320 g (11.27 oz.)

ORDERING INFORMATION:

HI 931002 is supplied complete with 9V battery, 12VDC adapter, 1 meter (3.3') connection cables and instruction manual.

SUGGESTED ACCESSORIES:

HI 7862/1 Simulator 1 m (3.3') connector cables

Customized control panels

At Hanna, we want to make your life easier !

Buying process instrumentation is one easy thing. Getting it to do its task and interact with other devices is another thing. It requires engineers, electricians, instrumentation specialists and plumbers. Most large size companies have the resources in-house to built control panels and install them, but it may not be your case !

As a manufacturer, we understand that it may sometimes be difficult & expensive for a small size or even mid size company to seek or subcontract for those people. This is why we added a design department in our facility. At Hanna, we know what our products can do for you and we are committed to help you integrate these products into your projects.

Simply call us, and tell us about your present or future applications. Our design department together with your authorized Hanna dealer will work with you to fill your needs, help solve your problems, and engineer turnkey solutions to your most complex problems. All systems are custom design to your specifications, pre-wired and ready to be installed, no complex wiring required.

Best value on the market, guaranteed !

Who knows the product better than the manufacturer? Well, this is why we make the extra mile for you. On top of this, we let you benefit from our large buying power to lower the cost of your customized control panel. Your local authorized Hanna dealer is teaming up with us to offer the best price, best service and fastest delivery ! Service contracts are also available for maintenance and calibration.

Fast delivery !

Need it for yesterday? Not a problem. We can build most panels within 10 open days or less. Let us show you how fast we are, and experience the Hanna way !

Customized control panel







Small or big, we're here to help !

For us, whether your needs are for a low cost mini-controller in a 6 x 6 in. box or for a 6 x 6 ft. complete control panel with 10 state-of-the art controllers in it, we will built it for you. At Hanna, no one is left on its own when it comes to customized control panels !

Applications

- Electroplating
- Water purification
- Cement industry
- Pools & spas
- Batching
- Printing
- Circuit board
- Chemical process
- Educational
- And many more...

Free and total Chlorine analyzers

Features

- *DPD method*
- *Adjustable set point*
- *Proportional dosing*
- *Recorder output*
- *Built-in pressure regulator*
- *Adjustable sampling time*
- *Automatic priming*
- *High accuracy*
- *RS-232 connection*
- *Long lasting reagents*
- *Quick maintenance*
- *User-friendly alarm system*
- *Large led with self-diagnostic messages*
- *Line filters*
- *Excellent quality/price*

Chlorine monitoring

These microprocessor-based process instruments can continuously monitor a sample stream for Free Chlorine or Total Chlorine content in the 0 to 5 mg/l range with a 0.01 resolution. The principle of operation is based on an adaptation of the EPA recommended DPD 330.5 method.

Indicator and buffer reagent bottles are placed directly into the instrument case. Using a sampling period of 10 minutes, reagents need not be replenished for a period of 5 to 6 weeks. The reagent bottles are also visible through the transparent window.
The operator can select chlorine dosing set point which will be activated when the measurement is below the set point. The alarm can also be selected above or below the set point. The set point controls a relay which can perform proportional dosage with a user-selectable delta from 0.1 to 2.0 ppm. A system alarm provides relay activation to signal the need for an operator intervention. A built-in regulator will reduce incoming pressure from up to 4 bars down to 1 bar.
Selectable voltage output levels of 0-10 mV, 0-100 mV, 0-1 V or a current output of 4-20 mA are provided to drive an external device such as a chart recorder or a regulator. Recorder span min. and max. values in mg/l can be easily programmed by the operator through the keyboard.

The instrument case meets NEMA 4X, 12 and 13 standards. Molded fiberglass polyester has outstanding chemical and temperature resistance. External mounting feet provide wall mounting capability and a seamless door gasket assures a watertight and dust-tight seal. Electrical connections (recorder, alarm and RS-232) are made through the side of the instrument. The front cover is secured with two lockable latches.

Method of Analysis

In the DPD Colorimetric method, N, N-Diethyl-p-phenylene-diamine indicator and a buffer are mixed with the sample. Free available Chlorine oxidizes the DPD indicator reagent at a pH between 6.3 and 6.6 to form a magenta-colored compound. The intensity of the resulting color is proportional to the concentration of Chlorine in the sample. The purpose of the buffer solution is to maintain the proper pH.

In Total Chlorine model PCA 301 (that measures Free available Chlorine plus combined Chloramines), Potassium Iodide is added. The Chloramines in the sample cause iodide ions to become iodine which reacts with free Chlorine to oxidize the DPD indicator. A pH of 5.1 is required for this reaction. Thus Total available Chlorine measurements require a different buffer solution containing Potassium Iodide. Once the chemical reaction is completed, the optical signal at 555 nm is compared to the signal measured through the sample before the reagents were added. From these measurements Chlorine concentration is calculated and displayed on a four-digit LED display.

PCA 300 - PCA 301 chlorine analyzers

SPECIFICATIONS	PCA 300	PCA 301
RANGE	0.00 to 5.00 mg/l **Free Chlorine**	0.00 to 5.00 mg/l **Total residual Chlorine**
ACCURACY	± 3% of reading or ± 0.03 mg/l, whichever is greater	
RESOLUTION	0.01 mg/l	
MINIMUM DETECTABLE LEVEL	0.05 mg/l	
REPEATABILITY	±0.05 mg/l	
REAGENTS	Life: 50 days with 10' as sampling rate	
RESPONSE TIME	Depends on the sampling time selected. Typical for a full scale step change and 5 minutes between two consecutive samples: one sampling cycle for 90% response and two sampling cycles for 100% response	
SAMPLING RATE	Adjustable from 3 to 102 minutes per sample	
SAMPLE INLET PRESSURE	From 1 psi (0.07 bar) to 58 psi (4 bars) with no external pressure regulator. For pressure exceeding 58 psi (4 bars) an external regulator is required	
SAMPLE FLOW RANGE	Flow rate of 300 ml/min is recommended. Minimum and maximum allowed are 100 ml/min and 500 ml/min, respectively	
SAMPLE TEMPERATURE RANGE	5 to 40°C	
INTERFERENCES	Oxidizing agents such as: Iodine, Bromine, Ozone, Chlorine Dioxide, Permanganate, Hexavalent Chromium. Hardness must not exceed 1000 mg/l as $CaCO_3$. Alkalinity must not exceed 400 mg/l for Free or 700 mg/l for Total Chlorine	
OPERATING TEMPERATURE RANGE	0 to 40°C	
RECORDER OUTPUT	Selectable: 0-10 mV, 0-100 mV, 0-1 V or 4-20 mA. Output span can be set anywhere in the 0-5 mg/l range	
PROPORTIONAL DOSING RELAY/ALARMS	Dosing relay/alarm: Low or High, one system error alarm. Each equipped with a SPDT relay with contacts rated for resistive load: 5 A at 250 VAC or 5 A at 30 VDC; inductive load: 2 A at 250 VAC or 3 A at 30 VDC	
POWER REQUIREMENTS	20 VA at 115 VAC/230 VAC; 50/60 Hz; frequency must be specified at order	
SAMPLE INLET CONNECTION	3 mm ID tubing	
DRAIN CONNECTION	10 mm barb fitting	
CASE	NEMA-4X molded fiberglass polyester with transparent GE Lexan window	
DIMENSIONS/WEIGHT	18 x 267 x 159 mm / 5 Kg w/o reagents	

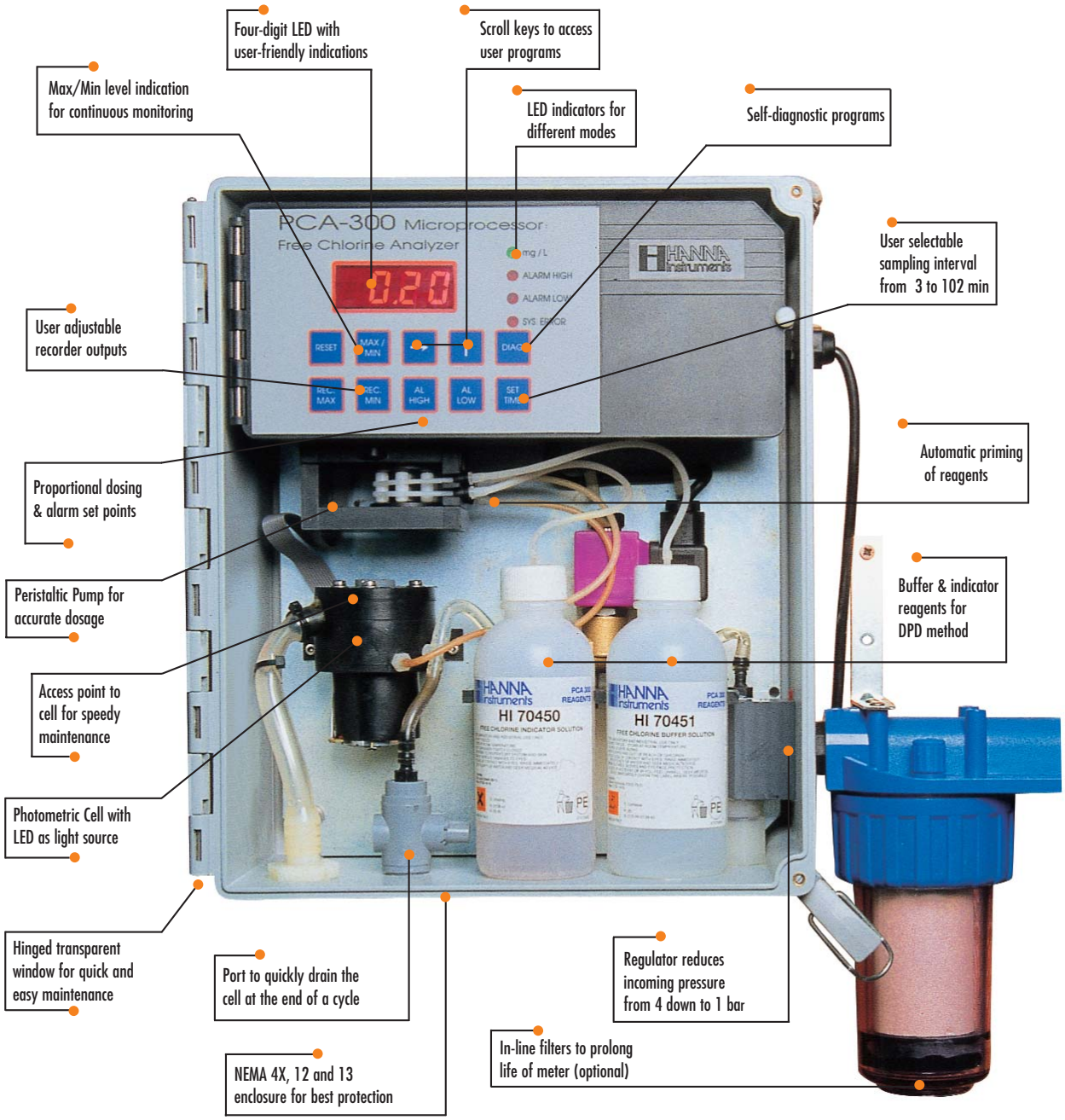
ORDERING INFORMATION:

PCA 300/U	Free Chlorine Analyzer complete with recorder and alarm outputs, NEMA casing, reagents & RS-232, 110 V
PCA 300A/U	Free Chlorine Analyzer with recorder and alarm outputs and NEMA casing, 110 V
PCA 301/U	Total Chlorine Analyzer complete with recorder and alarm outputs, NEMA casing, reagents & RS-232, 110 V
PCA 301A/U	Total Chlorine Analyzer with recorder and alarm outputs and NEMA casing, 110 V

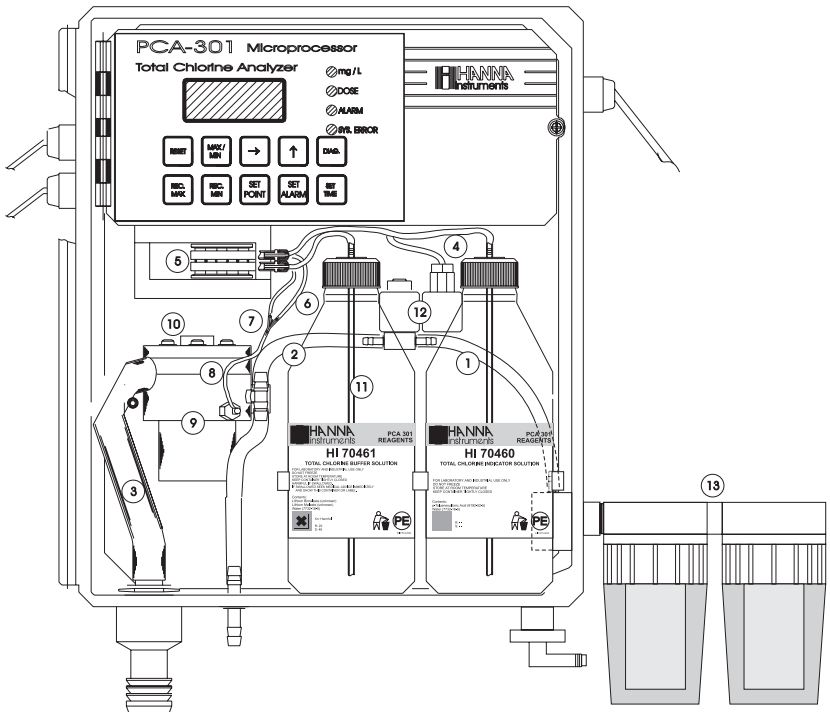
SUGGESTED ACCESSORIES:

HI 70480	Free Chlorine reagents set
HI 70481	Total Chlorine reagents set
HI 70482	Filter kit (housing & 2 filters)
HI 70496	Filter cartridge (0.5 µm)
HI 70497	Filter cartridge (50 µm)
HI 92000	Windows® compatible software

PCA 300 - PCA 301 chlorine analyzers



PCA 300 - PCA 301 Replacement parts



HI 70473	Tubing set from pressure regulator to drain (2 pcs) Each set includes 86 L x 3.2 ID mm (Length x Internal Diameter) clear Tygon tubing (# 1 and # 2) and 105 x 9.5 mm clear Tygon tubing (# 3).
HI 70474	Tubing set for peristaltic pump (6 pcs) Each set includes 55 L x 0.8 ID mm C-flex opaque tubing (# 5).
HI 70475	Tubing set for peristaltic pump (2 pcs) Each set includes 55 L x 0.8 ID mm C-flex opaque tubing (# 5).
HI 70476	Tubing set for reagent bottles (6 pcs) Each set includes 155 L x 0.8 ID mm C-flex opaque tubing (# 11).
HI 70477	Tubing set for measuring cell (2 pcs) Each set includes 50 L x 0.8 ID mm C-flex opaque tubing (# 8) and Y strainer (# 7).
HI 70478	Tubing set from bottle to pump (6 pcs) Each set includes 150 L x 0.8 ID mm C-flex opaque tubing (# 4).
HI 70479	Tubing set from pump to Y strainer (6 pcs) Each set includes 150 L x 0.8 ID mm C-flex opaque tubing (# 6).
HI 70480	Free chlorine reagent kit This kit includes buffer, indicator solution and DPD powder.
HI 70481	Total chlorine reagent kit This kit includes buffer, indicator solution and DPD powder.
HI 70482	Filter kit This kit includes 0.5 µm and 50 µm filters (# 13).
HI 70496	0.5 µm filter cartridge (# 13).
HI 70497	50 µm filter cartridge (# 13).
HI 70483	Complete tubing set This set includes 150 L x 0.8 ID mm C-flex opaque tubing (# 4 and 6 - 4 pcs), 55 L x 0.8 ID mm C-flex opaque tubing (# 5 - 2 pcs), 50 L x 0.8 ID mm C-flex opaque tubing (# 8) and Y strainer (# 7).
HI 70484	Complete tubing set (3 pcs) Each set includes 150 L x 0.8 ID mm C-flex opaque tubing (# 4 and 6 - 4 pcs), 55 L x 0.8 ID mm C-flex opaque tubing (# 5 - 2 pcs), 50 L x 0.8 ID mm C-flex opaque tubing (# 8) and Y strainer (# 7).
HI 70485	Cuvet stirrer motor
HI 70486	Stirring bar (2 pcs)
HI 70487	Measuring cell (# 9)
HI 70488	24 VAC/60 Hz electrovalve (# 12)
HI 70489	24 VAC/50 Hz electrovalve (# 12)
HI 70490	400 mA fuse
HI 70491	400 mA fuse (6 pcs)
HI 70494	Calibration port cap (# 10)

In the past untreated wastewater was allowed to runoff freely into surface waters. With increasing population and industrial activity in the world's cities, the water quality of the surrounding surface water steadily decreased. In these areas, the ecosystem was disturbed, bodies of water began to smell badly and aquatic flora and fauna languished and died. Eventually this became a huge environmental problem with the result that different waterborne human illnesses appeared more frequently in these areas.

Oxygen Demand and COD

Untreated wastewater is generally rich in organic matter. This organic matter feeds the bacteria and algae normally present in healthy surface waters. The presence of excessive amounts of nutrients that are discharged with untreated wastewater will cause an increase of bacterial growth as well as algae blooms. Beside organic matter, wastewater may also contain oxidizable inorganic compounds. These organic and inorganic compounds directly and indirectly consume the available oxygen present in the ecosystem. This process is called eutrification and will eventually kill all other living organisms (plants, animals, insects) in the aquatic system. Governments strictly control these oxygen demanding pollutants by setting standards for maximum levels of "oxygen demand" for all discharged wastewaters. There are different methods known for measuring the oxygen demand but BOD (Biological Oxygen Demand) and COD (Chemical Oxygen Demand) are the most widely accepted methods. The COD test has many advantages over the BOD method. The COD test is more accurate and faster than the BOD method. The BOD method requires a five to seven day incubation period and is more subject to operator errors. The COD method usually takes under three hours and is easy to perform by technical and non-technical personnel alike. Hanna's COD method also uses a special anti-interference agent that removes chloride interference.

Official Reporting Method

Chemical Oxygen Demand (COD) is defined as the amount of specified oxidant that reacts with a sample under controlled conditions. The quantity of oxygen consumed is expressed in terms of its oxygen equivalent: mg/L of 02. The Hanna COD method is based on the well established 'closed dichromate-reflux colorimetric method', and is in concordance with the two main official courses for chemical analysis in water and wastewater: "Standard Methods for the Examination of Water and Wastewater" (20th ed.) method #5220D and "US Environmental Protection Agency, Methods and Guidance for Analyses of Water" (2nd ed.) EPA method #410.4. Moreover the US Environmental Protection Agency specifies that the dichromate reflux method is the only method acceptable for reporting purposes. The advantage in using this method includes certifiable results as well as high accuracy.

COD testing applied

COD is used as a measurement of pollutants in natural and waste waters to assess the strength of discharged waste such as sewage and industrial effluent waters. It is normally measured in both municipal and industrial wastewater treatment plants and gives an indication of the efficiency of the treatment process. COD is measured on both influent and effluent water. The efficiency of the treatment process is normally expressed as COD Removal, measured as a percentage of the organic matter purified during the cycle.

COD has further applications in power plant operations, chemical manufacturing, commercial laundries, pulp & paper mills, agriculture & animal waste runoff, environmental studies and general education.

Although the Hanna COD test is designed for Wastewater Treatment Professionals, it is applicable for both surface and wastewater testing. The measurement procedure has been designed for ease of use, by personnel at any skill level.

Chemical oxygen demand

Benefits of COD Analysis

Besides compliance with the regulations imposed by local governments, it is beneficial for the wastewater treatment operator to regularly monitor the efficiency of the treatment plant. Measuring both the influent water (before treatment) and the effluent water (after treatment), the plant operator has the tools to manage the amount of costly treatment necessary to meet regulations. Periodic testing of COD in surface waters, water for domestic use, or influent process water will also give valuable information with regard to the pollution levels in the ecosystem over time.

The Hanna COD System

The Hanna closed-reflux colorimetric COD system is fully compatible with the EPA recommended method, and all other recommendations based on the potassium dichromate method. The system components are individually designed to interface with an existing closed-reflux colorimetric test system or to give you everything you need to perform simple COD tests in a few hours. The Hanna COD reagents are pre-dosed in standard 16 mm cuvets significantly reducing the possibility of chemical contact. Our pre-dosed reagents have been developed to minimize the amount of required sample, reagent chemicals and the subsequent waste. A special anti-interference agent removes possible chloride interference.
As COD levels vary depending on the application and process measuring points, Hanna offers reagents to cover three separate ranges. Simply choose the best range for your application:

HI 93754A 0-150 mg/L
HI 93754B 0-1500 mg/L
HI 93754C 0-15000 mg/L

The organic and inorganic compounds present in the water sample are oxidized under strong chromic acid conditions during a two-hour digestion period at 150 degrees Celsius in a preheated reactor. The Hanna reactor C 9800 is a block heater type with an accurate temperature control system to ensure that the digestion temperature is exactly 150°C ±2°C as required by Standard Methods. The C 9800 features user selectable timing mode (timed or infinite) and an acoustic alarm to alert the user that the digestion period is completed. In the timed mode, the reactor automatically switches off after the digestion has completed. During the digestion period, your safety is guaranteed using the HI 740217 protective shield. After digestion, remove the vials from the reactor and place them in the HI 40216 cooling rack. When the vials are cooled down to about room temperature, direct COD readings can be obtained with the C 99 COD analyzer.Using the closed-reflux colorimetric method has many advantages over other COD methods. With the Hanna COD solution, no volume correction is necessary after digestion. The colorimetric method is also advantageous because you are not required to perform time intensive and reagent consuming titrations as with other methods. The C 99 multi-parameter photometer is a high precision instrument with an advanced optical system. A special microprocessor controlled tungsten lamp and narrow band optical filters allow extremely accurate and repeatable readings. This ion specific analyzer is programmed to test up to 39 parameters including COD. With the C 99, there is no need for complicated programming or installation of delicate filters. With a touch of a button, select the parameter you want to test and your photometer is ready for measurement.

Certified COD Reagents

Our reagents are available for three different ranges, covering the full range of measurement from 0 up to 15000 mg/L of oxygen demand! Each box of 25 vials is supplied with a Reagent Quality Certificate produced by our quality assurance team. The reagents are traceable to NIST SRM® 930e.

HI 93754A	Low Range	0-150 mg/L
HI 93754B	Medium Range	0-1500 mg/L
HI 93754C	High Range	0-15000 mg/L

C 99 - Compact photometer for chemical oxygen demand

Multi-parameter photometer is pre-calibrated to measure COD levels at three ranges at the touch of a key pad. Simply use the scroll button to select the desired range and begin reading. The C 99 automatically selects the correct wavelength for the chosen range.

- *Outstanding measurement quality: The C 99 employs an advanced optical system, assuring high accuracy measurements in the entire measurement range. The optics combine the power of a miniature light source with the precision of a narrow band interference filter.*
- *Save space in your laboratory: The compact size of the C 99 photometer allows the user to eliminate the clutter of bulkier an more costly spectrophotometers currently being used. Measuring 23 x 17 x 7 cm and weighing less than 700 grams, the C 99 can be easily transported from place to place.*

Hanna Instruments is proud to introduce the new C 99 COD meter. This new compactphotometer operates in three different ranges to cover virtually every application: 0-150 mg/L, 0-1500 mg/L and 0-15000 mg/L.

The C 99 meets the design requirements of USEPA 410.4, guaranteeing high quality measurements to be used for reporting purposes.

A built-in RS232 port allows the user to connect to a PC. The C 99 can be operated manually or from the PC and data can be downloaded for analysis and documentation purposes with Hanna's HI 92000 software.

SPECIFICATIONS	0 - 150 mg/L COD RANGE	0 - 1500 mg/L COD RANGE	0 - 15000 mg/L COD RANGE
RANGE	0 - 150 mg/L (ppm)	0 - 1500 mg/L (ppm)	0 - 15000 mg/L (ppm)
RESOLUTION	1 mg/L	1 mg/L	10 mg/L
PRECISION (STD. DEV.)	(@150 mg/L) ±4 mg/L	(@ 1000 mg/L) ±22 mg/L	(@10000 mg/L) ±220 mg/L
OPERATING WAVELENGTH	Tungsten lamp with narrow band interference filter @ 420 nm	Tungsten lamp with narrow band interference filter @ 610 nm	Tungsten lamp with narrow band interference filter @ 610 nm
METHOD	Adaptation of the EPA 410.4 approved method.		
COMPUTER INTERFACE	RS232C		
POWER SUPPLY	12 VDC power adapter / 2 x 9V battery		
DIMENSIONS	230 x 165 x 70 mm (9.0 x 6.5 x 2.8")		
WEIGHT	22.6 oz. (640 g)		

ORDERING INFORMATION:

C 99	supplied with 3 cuvets, transport cap, 2 x 9V battery, 12 VDC transformer and instruction manual

SUGGESTED ACCESSORIES:

HI 92000	Windows® compatible software
HI 920010	9 to 9 pins RS232 connector cable
HI 93754A-25	COD reagents low range (0 - 150 mg/L), 25 pcs
HI 93754B-25	COD reagents medium range (0 - 1500 mg/L), 25 pcs
HI 93754C-25	COD reagents high range (0 - 15000 mg/L), 25 pcs

C 99 : A complete laboratory at your fingertips !

C 99 is one of the most versatile photometers on the market. In addition to COD, this meter measures up to 36 of the most important water quality parameters. The C 99 runs for hours on two common inexpensive 9V batteries. In addition, it can operate continuously with input voltage of 12-20VDC. C 99 is also extremely simple to use. The front mask lists all the parameters in a numerical order and the display shows the same numbers for a quick reference during testing. The meter can be zeroed in seconds and the reagents cost much less than what you have been used to paying. All this and much more at a fraction of the cost of expensive and complex spectrophotometers!

TEST	RANGE	METHOD	REAGENT CODE
Aluminum	0.00 to 1.00 mg/L	Aluminon	HI 93712-01
Ammonia HR	0.00 to 9.99 mg/L	Nessler	HI 93715-01
Ammonia LR	0.00 to 3.00 mg/L	Nessler	HI 93700-01
Bromine	0.00 to 8.00 mg/L	DPD	HI 93716-01
Free Chlorine *	0.00 to 2.50 mg/L	DPD	HI 93701-01
Total Chlorine *	0.00 to 3.50 mg/L	DPD	HI 93711-01
Chlorine Dioxide	0.00 to 2.00 mg/L	Chlorophenol Red	HI 93738-01
Chromium VI HR	0 to 1000 µg/L	Diphenylcarbohydrazide	HI 93723-01
Chromium VI LR	0 to 300 µg/L	Diphenylcarbohydrazide	HI 93749-01
COD LR	0 to 150 mg/L	Dichromate	HI 93754A-25
COD MR	0 to 1500 mg/L	Dichromate	HI 93754B-25
COD HR	0 to 15000 mg/L	Dichromate	HI 93754C-25
Color	0 to 500 PCU	Chloroplatinate	—
Copper HR	0.00 to 5.00 mg/L	Bicinchoninate	HI 93702-01
Copper LR	0 to 990 µg/L	Bicinchoninate	HI 93747-01
Cyanide	0.000 to 0.200 mg/L	Pyridine-Pyrazalone	HI 93714-01
Cyanuric Acid	0 to 80 mg/L	Turbidimetric	HI 93722-01
Fluoride	0.00 to 2.00 mg/L	SPADNS	HI 93729-01
Ca Hardness	0.00 to 2.70 mg/L	Calmagite	HI 93720-01
Mg Hardness	0.00 to 2.00 mg/L	EDTA	HI 93719-01
Hydrazine	0 to 400 µg/L	p-Dimethylaminobenzaldehyde	HI 93704-01
Iodine	0.0 to 12.5 mg/L	DPD	HI 93718-01
Iron HR	0.00 to 5.00 mg/L	Phenantroline	HI 93721-01
Iron LR	0 to 400 µg/L	TPTZ	HI 93746-01
Manganese HR	0.0 to 20.0 mg/L	Periodate Oxidation	HI 93709-01
Manganese LR	0 to 300 µg/L	PAN	HI 93748-01
Molybdenum	0.0 to 40.0 mg/L	Mercaptoacetic Acid	HI 93730-01
Nickel HR	0.00 to 7.00 g/L	Photometric	HI 93726-01
Nitrate	0.0 to 30.0 mg/L	Cadmium Reduction	HI 93728-01
Nitrite HR	0 to 150 mg/L	Ferrous Sulfate	HI 93708-01
Nitrite LR	0.00 to 0.35 mg/L	Diazotization	HI 93707-01
Dissolved Oxygen	0.0 to 10.0 mg/L	Winkler	HI 93732-01
pH	6.5 to 8.5 pH	Phenol Red	HI 93710-01
Phosphate HR	0.0 to 30.0 mg/L	Amino Acid	HI 93717-01
Phosphate LR	0.00 to 2.50 mg/L	Ascorbic Acid	HI 93713-01
Phosphorus	0.0 to 15.0 mg/L	Amino Acid	HI 93706-01
Silica	0.00 to 2.00 mg/L	Heteropoly blue	HI 93705-01
Silver	0.000 to 1.000 mg/L	PAN	HI 93737-01
Zinc	0.00 to 3.00 mg/L	Zincon	HI 93731-01

C 9800-1 - COD reactor

Hanna Instruments C 9800 thermo-reactor is constructed of durable materials with a vial capacity to perform up to 25 digestions simultaneusly.

The reactor is equipped with a user-selectable temperature setting to allow for COD reactions at 150 °C and also 105 °C for total phosphorus and total nitrogen analysis.

To ensure the highest accuracy of digestion, a timer up to 120 minutes is incorporated. An audible alarm indicates when the incubating period is completed.
The C 9800 is also equipped with an ON/OFF LED and a heating LED which advises the user when the selected temperature has been reached. For added safety, an auto-off feature is incorporated and an internal temperature sensor prevents over-heating of the samples.

- *Time saving and increased productivity. With a 25 vial (16 mm) heating block, the C 9800 is ideal for performing large numbers of tests and consumes a minimum of bench space.*
- *Selectable temperature: The Hanna C 9800 reactor provides the additional benefit of two operating temperature ranges. Select the 150 °C range for COD digestions or 105 °C for total phosphorus and total nitrogen analysis. The heater is factory calibrated to maintain an accuracy of ±2 °C.*
- *Built-in timer & auto shut-off: C 9800 features a timer to allow the reaction to take place unattended. Set the timer to the desired digestion time and the unit will complete the digestion and shut off automatically.*

SPECIFICATIONS	C 9800-1
AMBIENT OPERATING TEMPERATURE	+5 to +50°C
STORAGE TEMPERATURE	-20 to +60°C
TEMPERATURE STABILITY	±0.5°C
CAPACITY	25, 16 x 100 mm vials, 1 receptacle for stainless steel probe thermometer
ACCURACY	±2°C @ 25°C ambient
WARM-UP TIME	30 - 40 minutes, depending on set temperature
TEMPERATURE SETTING	Selectable temperature @ 105°C or 150°C
OPERATING MODE	Timed procedure (0 - 20 min.) or infinity mode
TIMER	0 - 120 minutes with acoustic alarm and automatic shut-off mode
BLOCK	Aluminum
POWER REQUIREMENTS	115 VAC; 60Hz; 250W; Fuse 4A
DIMENSIONS	7.5 x 11.8 x 3" (190 x 300 x 95 mm)
WEIGHT	Approximately 10.6 lb (4.8 Kg)

ORDERING INFORMATION:

C 9800-1	supplied with an instruction manual.

SUGGESTED ACCESSORIES:

HI 740142	Graduated syringe
HI 740143	Graduated syringe (6 pcs)
HI 151-00	Pocket thermometer for reactor (°C)
HI 151-01	Pocket thermometer for reactor (°F)
HI 740216	Test tube cooling rack (25 holes)
HI 740217	Laboratory bench safety shield

COD test tubes

Official dichromate method:
Hanna Instruments' COD reagents have been developed under the highest quality control standards in accordance with Standard Methods 5220D and USEPA method 410.4.

Three ranges for different needs:
COD levels vary depending on the applications and process measuring points. Three ranges are available to meet all COD measuring applications.
- Low Range: 0-150 mg/L O2
- Medium Range: 0-1500 mg/L O2
- High Range: 0-15000 mg/L O2

Sample size:
Hanna's vial has a diameter of 16 mm and contains 3 mL of pre-dosed reagent. Only 2 mL of sample must be added for any range.

Pre-dosed vials minimize waste:
Hanna's high quality glass vials and caps are designed to avoid any danger of spills during handling and the reaction procedure. The vial also serves as a safe disposable container and contains a minimum of waste material.

Pre-dosed vials for fast measurements:
With Hanna's pre-dosed vials test preparation time is dramatically reduced. There is no time-consuming reagent preparation procedure or glassware cleaning.

Easy to use:
Hanna pre-dosed test tubes make COD measurement effortless. Even a novice can run accurate COD tests in just 3 simple steps:

1: Fill the pre-dosed vial with the sample.

2: Place the vial in the reactor and set the timer.

3: Place the vial in the Hanna C 99 and read the results.

ORDERING INFORMATION:

HI 93754A-25 (LR)	COD reagents low range (0 - 150 mg/L), 25 pcs
HI 93754B-25 (MR)	COD reagents medium range (0 - 1500 mg/L), 25 pcs
HI 93754C-25 (HR)	COD reagents high range (0 - 15000 mg/L), 25 pcs

* Box of 150 tubes also available

Accessories

Tailor-Made Accessories
Choose from an array of spare parts and accessories specially designed to make your measurements simpler and safer:

C 9800-01	Hanna Reactor (115 VAC)
C 9800-02	Hanna Reactor (230 VAC)
HI 740142	Graduated syringe
HI 740143	Graduated syringe (6 pcs)
HI 740216	Test tube cooling rack (25 holes)
HI 740217	Laboratory bench safety shield
HI 740219	COD test tube adapter
HI 93703-50	Cuvet cleaning solution (230 mL)
HI 731318	Tissue for wiping cuvets (4 pcs)
HI 731321	Measurement cuvets (4 pcs)
HI 731325	Cuvet caps (4 pcs)
HI 92000	Windows® compatible software for C 99 series
HI 920010	9 to 9-pin connection cable

Spare Reagents Kits:
Most of the spare reagents come in kits for 100 or 300 tests.

Each kit contains all the necessary reagents properly marked to avoid any use out of sequence (A, B, C etc.).

Most of them are in powder form. These powder packets are pre-weighed. No time is wasted during the measurements: just open the packet and add the entire contents to the cuvet.

Liquid reagents are supplied with a graduated syringe to precisely dose them.

HI 991001 - pH meter

The new HI 991001 portable meter from Hanna offers IP 67 waterproof protection in a compact casing. The 3-in-1 HI 1296D pH electrode (included) has a built-in temperature sensor and amplifier. The large display shows readings in an extended range from -2.00 to 16.00 pH and simultaneously shows temperature in °C or °F. This meter has a stability indicator and hold feature that prompts you when to take the reading & freezes the display for easy and accurate recording. HI 991001 uses extensive graphic symbols and acoustic prompts to guide you through all operations. The battery life of the meter guarantees over 1500 hours of continuous use. At startup, it performs a self-check and then displays the remaining battery level to assure proper working condition. Calibration is performed automatically at one or two points using standard or N.I.S.T. buffers. Use the optional shockproof rubber boot for optimum impact protection. For those users that need to verify the quality status of the pH electrode, Hanna offers the HI 991002 and HI 991003 with a mV scale that will check the condition of the electrode.

SPECIFICATIONS		HI 991001
RANGE	pH	-2.00 to 16.00
	Temperature	-5.0 to 105.0°C or 23 to 221°F
RESOLUTION	pH	0.01
	Temperature	0.1°C or 0.1°F
ACCURACY (@20°C/68°F)	pH	±0.02
	Temperature	±0.5°C up to 60°C, ±1°C up to 105.0°C / ±1.0°F up to 140°F, ±2°F up to 221°F
CALIBRATION		Automatic 1 or 2 points with 2 sets of standardized buffers (4.01,7.01, 10.01 or 4.01, 6.86, 9.18)
TEMPERATURE COMPENSATION		Automatic
ELECTRODE		HI 1296D Combination amplified pH/temperature electrode with DIN connector and 1 m (3.3') cable
BATTERY TYPE / LIFE		3 x 1.5V AA / approximately 1500 hours of continuous use
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%
DIMENSIONS		143 x 80 x 38 mm (5.6 x 3.1 x 1.5")
WEIGHT		320 g (11.3 oz.)

ORDERING INFORMATION:

HI 991001 is supplied complete with HI 1296D pH/ temperature electrode, 3 x 1.5V AA batteries, carrying case and instructions.

SUGGESTED ACCESSORIES:

HI 1296D	Combination amplified pH/temperature electrode with DIN connector and 1 m (3.3') cable
HI 710004	Soft carrying case
HI 721312	Hard carrying case
HI 710007	Blue shockproof rubber boot
HI 710008	Orange shockproof rubber boot
HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 7074L	Cleaning solution for pH probe , 460 ml
HI 70300L	Storage solution, 460 mL

HI 99131 - pH meter

The new HI 99131 from Hanna is a waterproof, portable pH/temperature meter ideal for use in plating baths. HI 62911 double junction pH electrode (included) has a stainless steel body and utilizes proven recessed flat tip technology. The body of the probe also functions as a potential matching pin to assure stable readings and an extended sensor life. The probe tip incorporates an annular Teflon® junction for maximum surface contact giving increased response and stability, as well as an integral temperature sensor eliminating the need for an additional temperature probe. The recessed flat tip is easy to clean and prevents solids in solution from collecting on the sensor. This advanced electrode also contains a mini amplifier to boost the electrode signal rendering the meter impervious to noise and interference. The meter reads from -2.00 to 16.00 pH while simultaneously showing the temperature in °C or °F. Graphic icons guide operations and a stability indicator with hold feature determines when to freeze the reading for easy record keeping. Calibration is performed automatically at one or two points with standard or NIST calibration buffers. Battery life is over 1500 hours and at startup, the LCD shows the remaining battery power. In addition, BEPS (Battery Error Prevention System) prevents bad readings due to low voltage and an 8 minute auto-off period saves battery power.

Designed especially for plating baths

- *The application specific electrode HI 62911 is designed for continuous use in the harshest of industrial environments.*
- *Over 1500 hours of battery life.*
- *The HI 99131 features a Stability Indicator. To simplify your measurement process, the LCD shows when the pH electrode has stabilized*
- *Easy to use: graphic symbols and automatic buffer recognition simplify your pH monitoring.*
- *Automatic Temperature Compensation: With ATC, pH readouts are always accurate and precise.*
- *At startup the HI 99131's LCD shows the percentage of battery power remaining and shuts down after 8 minutes automatically to save battery reserve.*

Plating Baths

SPECIFICATIONS		HI 99131
RANGE	pH	-2.00 to 16.00
	TEMPERATURE	-5.0 to 105.0°C or 23.0 to 221.0°F
RESOLUTION	pH	0.01
	TEMPERATURE	0.1 °C and °F
ACCURACY (@20°C/68°F)	pH	±0.02 pH
	TEMPERATURE	±0.5°C up to 60°C; ±1°C outside ±1°F up to 140°F; ±2°F outside
pH CALIBRATION		Automatic 2 points with 2 sets of buffers (pH 4.01/7.01/10.01 or 4.01/6.86/9.18)
TEMPERATURE COMPENSATION		Automatic
ELECTRODE		HI 62911 amplified pH electrode w/built-in temperature sensor & matching pin (included)
BATTERY TYPE/LIFE		3 x 1.5V AA/approximately 1500 hours. Auto-off after 8 minutes
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%
DIMENSIONS		150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
WEIGHT		207 g (7.3 oz.)

ORDERING INFORMATION:

HI 99131	is supplied complete with HI 62911 double junction pH electrode, 3 x 1.5V AA batteries, instruction manual and carrying case.

SUGGESTED ACCESSORIES:

HI 62911	Stainless steel double junction pH electrode	HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 710004	Soft carrying case	HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 721312	Hard carrying case	HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 710007	Blue shockproof rubber boot	HI 7074L	Cleaning solution for pH probe , 460 ml
HI 710008	Orange shockproof rubber boot	HI 70300L	Storage solution, 460 mL

HI 99141 - pH meter

Boilers & Cooling Towers

Designed for boilers & cooling towers

- *The rugged HI 72911 electrode is nearly unbreakable and even stands up to solutions containing fluoride.*
- *Over 1500 hours of battery life.*
- *Automatic Calibration: Choose between five memorized buffers to automatically calibrate the instrument.*
- *Messages on the Display: The operator is guided through operations on the LCD.*
- *Automatic Temperature Compensation: with ATC, pH readouts are always accurate and precise.*
- *At startup the HI 99141's LCD shows the percentage of battery power remaining and shuts down after 8 minutes automatically to save battery reserve.*

Hanna's new HI 99141 is a waterproof, portable pH/temperature meter specifically designed for boiler & cooling tower applications. HI 72911 double junction pH electrode (included) has an unbreakable stainless steel body and a flat tip that is made of fluoride resistant glass. Hanna's fluoride resistant glass is a special type of glass developed to stand up to concentrations of fluoride found in water, which would destroy standard glass pH sensors. The electrode also features an annular Teflon® junction for maximum surface contact giving increased response and stability. The stainless steel body of the probe functions as a shield and adds to the sensor's life. The flat tip is easy to clean and prevents solids in solution from collecting on the sensor. This advanced electrode also contains an integral temperature sensor and a mini amplifier to boost the electrode signal eliminating the effects of noise and interference.

The meter reads from -2.00 to 16.00 pH while simultaneously showing the temperature in °C or °F. Graphic icons guide operations and a stability indicator with hold feature determines when to freeze the reading for easy record keeping. Calibration is performed automatically at one or two points with standard or NIST calibration buffers. Battery life is over 1500 hours and at startup, the LCD shows the remaining battery power. In addition, BEPS (Battery Error Prevention System) prevents bad readings due to low voltage and an auto-off period of 8 minutes saves battery power.

SPECIFICATIONS		HI 99141
RANGE	pH	-2.00 to 16.00
	TEMPERATURE	-5.0 to 105.0°C or 23.0 to 221.0°F
RESOLUTION	pH	0.01
	TEMPERATURE	0.1 °C and °F
ACCURACY (@20°C/68°F)	pH	±0.02 pH
	TEMPERATURE	±0.5°C up to 60°C; ±1°C outside ±1°F up to 140°F; ±2°F outside
pH CALIBRATION		Automatic 1 or 2 points with 2 sets of standard buffers (pH 4.01/7.01/10.01 or 4.01/6.86/9.18)
TEMPERATURE COMPENSATION		Automatic
ELECTRODE		HI 72911 amplified pH electrode w/built-in temperature sensor & matching pin (included)
	RANGE	0 to 10 pH
	CRITICAL CONDITIONS	At 2 g/L F : T < 60°C; pH > 2
BATTERY TYPE/LIFE		3 x 1.5V AA/approximately 1500 hours. Auto-off after 8 minutes
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%
DIMENSIONS		150 x 80 x 36 mm (5.9 x 3.1 x 1.4")
WEIGHT		207 g (7.3 oz.)

ORDERING INFORMATION:

HI 99141	is supplied complete with HI 72911 double junction pH electrode, 3 x 1.5V AA batteries, instruction manual and carrying case.

SUGGESTED ACCESSORIES:

HI 72911	Stainless steel double junction pH electrode	HI 70004P	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 710004	Soft carrying case	HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 721312	Hard carrying case	HI 70010P	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 710007	Blue shockproof rubber boot	HI 7074L	Cleaning solution for pH probe , 460 ml
HI 710008	Orange shockproof rubber boot	HI 70300L	Storage solution, 460 mL

HI 9835 - conductivity / TDS meter

The HI 9835 combines the more important parameters you need for measuring conductivity. Now you can sample Electro-Conductivity (EC), Total Dissolved Solids (TDS), sodium chloride (NaCl) and temperature all at once. Hanna's probe design innovation uses 4 rings enhanced with platinum for greater stability while increasing the range of measurable concentrations and temperature. You can choose between automatic and manual temperature compensation to facilitate your operating requirements. In addition, you can also select from a range of TDS factors from 0.40 to 0.80 and a range of temperature coefficients 0.00 to 6.00% for greater consistency and reproducibility. The housing is completely waterproof and built to survive the harsh conditions of field use. For extended time studies, this meter can be connected to the available 12 VDC power supply.

SPECIFICATIONS	EC	TDS	NaCl	TEMPERATURE
RANGE (autoranging)	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	0.00 to 14.99 ppm 15.0 to 149.9 ppm 150 to 1499 ppm 1.50 to 14.99 ppt 15.0 to 100.0 ppt Up to 400.0 ppt	0.0 to 400.0%	0.0 to 60.0°C
RESOLUTION	0.01 µS/cm (0.00 to 29.99 µS/cm) 0.1 µS/cm (30.0 to 299.9 µS/cm) 1 µS/cm (300 to 2999 µS/cm) 0.01 mS/cm (3.00 to 29.99 mS/cm) 0.1 mS/cm (Over 30.0 mS/cm)	0.01 ppm (0.00 to 14.99 ppm) 0.1 ppm (15.0 to 149.9 ppm) 1 ppm (150 to 1499 ppm) 0.01 ppt (1.50 to 14.99 ppt) 0.1 ppt (over 15.0 ppt)	0.1%	0.1°C
ACCURACY	±1% of reading ±(0.05 µS/cm or 1 digit, whichever is greater)	±1% of reading ±(0.03 ppm or 1 digit, whichever is greater)	±1% of reading	+0.4°C
COND. CALIBRATION	1 point with 6 memorized buffers			
NaCl CALIBRATION	1 point with HI 7037 buffer (optional)			
TEMP. CALIBRATION	2 points at 0 and 50°C (plus ±1°C adjustment)			
TEMP. COMP.	Automatic or manual from 0 to 60°C (can be disabled to measure actual conductivity)			
TEMP. COEFFICIENT	0.00 to 6.00%/°C (for cond. and TDS only) Default value is 1.90%/°C			
TDS FACTOR	0.40 to 0.80 (default value is 0.50)			
PROBE	HI 76309 4-ring probe, K=1 nominal and built-in temperature sensor (included)			
POWER SUPPLY	4 x 1.5V AA or 12 VDC adapter			
ENVIRONMENT	0 to 50°C; RH 100%			
WEIGHT/DIMENSIONS	18 oz. (500 g)/7.7 x 3.1 x 2.4" (196 x 80 x 60 mm)			

ORDERING INFORMATION:

HI 9835	is supplied complete with HI 76309 4-ring conductivity probe with 1 m (3.3') screened cable, 4 x 1.5V AA batteries and instruction manual in a rugged case.

SUGGESTED ACCESSORIES:

HI 76309	Conductivity probe
HI 740218	Hard carrying case
HI 710005	110V to 12VDC adapter
HI 710006	220V to 12VDC adapter
HI 7030L	12880 µS/cm calibration solution (460 mL)
HI 7031L	1413 µS/cm calibration solution (460 mL)
HI 7033L	84 µS/cm calibration solution (460 mL)
HI 7037L	NaCl calibration solution (460 mL)

HI 98321 & HI 98322 - conductivity / TDS meters

Microprocessor-based meter with a built-in funnel

- *Waterproof*
- *Built-in funnel*
- *% battery illumination*
- *Dual-level LCD Readout*
- *Stability indicator*
- *Automatic Calibration*
- *Automatic Temperature Compensation*
- *Automatic shut-off*
- *Rugged and easy to use*

The new HI 98321 & HI 98322 portable meters from Hanna are designed for quick and easy, high accuracy EC, TDS and temperature measurements. These new waterproof instruments have a dual-level LCD that displays EC or TDS and °C or °F. These microprocessor meters have been developed in direct response to the requests of users in water treatment, boilers and cooling towers, reverse osmosis and agriculture. The rugged, easy-to-use HI 98321 & HI 98322 feature an on board sample cell with built-in funnel, digital readout, push button automatic calibration and automatic temperature compensation. The EC/TDS conversion factor and temperature coefficient (β) are user adjustable for application-specific measurements.

At startup the HI 98321 & HI 98322 perform a self-check and then display the battery level to assure proper working condition. They also have a stability indicator and hold feature to prompt the user when to take the reading and freeze the display for easy and accurate recording. Choose your model according to the EC/TDS range of your application.

SPECIFICATIONS		HI 98321	HI 98322
RANGE	EC	0 to 3999 µS/cm	0.00 to 20.00 mS/cm
	TDS	0 to 2000 ppm	0.00 to 10.00 ppt
	Temperature	0.0 to 60.0°C or 32.0 to 140.0°F	0.0 to 60.0°C or 32.0 to 140.0°F
RESOLUTION	EC	1 µS/cm	0.01 mS/cm
	TDS	1 ppm	0.01 ppt
	Temperature	0.1°C or 0.1°F	0.1°C or 0.1°F
ACCURACY (@20°C/68°F)	EC	±2% F.S.	±2% F.S.
	TDS	±2% F.S.	±2% F.S.
	Temperature	±0.5°C or ±1°F	±0.5°C or ±1°F
EC/TDS CALIBRATION		Automatic 1 point at: 1413 µS/cm	Automatic 1 point at: 12.88 mS/cm
EC/TDS CONVERSION FACTOR		Adjustable from 0.45 to 1.00	
TEMPERATURE COMPENSATION		BETA β = adjustable from 0.0 to 2.4	
BATTERY TYPE/LIFE		4 x 1.5V AA batteries with BEPS (Battery Error Prevention System) /100 hours, auto shut-off after 8 minutes of non use	
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%	
DIMENSIONS		120 x 53 x 81 mm (4.7 x 2.1 x 3.1")	
WEIGHT		225 g (7.8 oz)	

ORDERING INFORMATION:

HI 98321	is supplied complete with 4 x 1.5V batteries and instructions.
HI 98322	is supplied complete with 4 x 1.5V batteries and instructions.

SUGGESTED ACCESSORIES:

HI 70031P	1413 µS single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70032P	1382 ppm single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70038P	6.44 ppt single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 70039P	5000 µS single use calibration sachets, 25 x 20 ml (25 calibrations)

HI 991300 & HI 991301 - multiparameters (pH / conductivity / TDS / T° meters)

One probe for all your measurements

Welcome the new generation of unparalleled versatility and simplicity in pH, EC, and TDS measurements. Hanna offers you a choice of 2 meters to meet your exacting requirements. The HI 991300 and HI 991301 offer you the combination of pH, electro-conductivity, total dissolved solids and temperature measurements. To increase precision, you can select the meter which will work best with your range of conductivity, from purified to brackish waters. There are only 2 buttons, yet you can select from a range of calibration buffers and even the temperature scale (°C or °F) most familiar to you. The housing is waterproof and rated for IP 67 conditions. The multi-functional probe includes pH, EC/TDS and temperature in one convenient, rugged handle.

Other user selectable features include different TDS factors from 0.45 to 1.00, and a range of temperature coefficients β from 0.0 to 2.4% for greater consistency and reproducibility. Also selectable are standardized buffer recognition values. To ensure against interference from transient electrical noise, a solid-state amplifier is integrated into the probe.

SPECIFICATIONS		HI 991300	HI 991301
RANGE	pH	0.00 to 14.00	0.00 to 14.00
	EC	0 to 3999 µS/cm	0.00 to 19.99 mS/cm
	TDS	0 to 2000 ppm	0.00 to 10.00 ppt
	Temperature	0.0 to 60.0°C or 32.0 to 140.0°F	0.0 to 60.0°C or 32.0 to 140.0°F
RESOLUTION	pH	0.01	0.01
	EC	1 µS/cm	0.01 mS/cm
	TDS	1 ppm	0.01 ppt
	Temperature	0.1°C or 0.1°F	0.1°C or 0.1°F
ACCURACY (@20°C/68°F)	pH	±0.01	
	EC/TDS	±2% F.S.	
	Temperature	±0.5°C or ±1.0°F	
EC/TDS RATIO		Selectable from 0.45, 0.50 (default), 0.55, 0.60, 0.65, 0.68, 0.70, 0.75, 1.00 ppm = 1 µS	
pH CALIBRATION		Automatic 1 or 2 points with 2 sets of memorized standard buffers (pH 4.01, 7.01, 10.01 or 4.01, 6.86, 9.18)	
EC/TDS CALIBRATION		Automatic 1 point at 1382 ppm (conv.=0.5; 1500 ppm (conv.=0.7); 1413 µS/cm (others)	Automatic 1 point at 6.44 ppt (conv.=0.5; 9.02 ppt (conv.=0.7); 12880 µS/cm (others)
TEMPERATURE COMPENSATION	pH	Automatic from 0 to 60°C	
	EC/TDS	Automatic from 0 to 60°C with a selectable β of 0.0, 1.8, 1.9 (default) 2.0, 2.1, 2.2, 2.3, 2.4% per °C	
PROBE		HI 1288 pH/EC/TDS probe with built-in temperature sensor, DIN connector and 1 m (3.3') cable (included)	
BATTERY TYPE/LIFE		4 x 1.5V AA batteries with BEPS (Battery Error Prevention System)/100 hours, auto shut-off after 8 minutes of non use	
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%	
DIMENSIONS		143 x 80 x 38 mm (5.6 x 3.1 x 1.5")	
WEIGHT		320 g (11.3 oz)	

ORDERING INFORMATION:

HI 991300	is supplied complete with HI 1288 pH/EC/TDS/°C probe, batteries, instruction manual in hard carrying case.
HI 991301	is supplied complete with HI 1288 pH/EC/TDS/°C probe, batteries, instruction manual in hard carrying case.

SUGGESTED ACCESSORIES:

HI 1288	pH/EC/TDS/°C probe	**HI 77100P**	1413 µS & pH 7 sol., 20 mL, 10 pcs each
HI 710004	Soft carrying case	**HI 77200P**	1500 ppm & pH 7 sol., 20 mL, 10 pcs each
HI 710007	Blue shockproof rubber boot	**HI 77300P**	1382 ppm & pH 7 sol., 20 mL, 10 pcs each
HI 710008	Orange shockproof rubber boot	**HI 77400P**	pH 4 & 7 sol., 20 mL, 5 pcs each
HI 70030P	12880 µS cal. sol. (25 x 20 mL)	**HI 7074L**	Cleaning solution for pH probe , 460 ml
HI 70038P	6.44 ppt cal. sol. (25 x 20 mL)	**HI 70300L**	Storage solution, 460 mL

HI 991002 & HI 991003 - multiparameters (pH / ORP / T° meters)

Hanna's new waterproof HI 991002 offers 3 ranges of measurement: pH, ORP and Temperature. The advanced 4-in-1 HI 1297D probe (included) incorporates a pH, ORP and temperature sensor all in one unit allowing you to perform all measurements with a single probe.

HI 991002 measures pH in an extended range from -2.00 to 16.00 pH or ORP from -1999 to 1999 mV while simultaneously showing temperature in °C or °F. This multi-parameter instrument has a stability indicator, hold feature and a large display with graphic symbols to guide you through all operations. pH calibration is performed automatically at one or two points using standard or N.I.S.T. buffers. The electrode also contains an amplifier for pH to render your measurements impervious to noise and electrical interference.

The mV scale of HI 991002 can be used with the available HI 1296D pH/temperature electrode to check the condition of the pH electrode or with HI 3617D to measure ORP.

Hanna also offers the HI 991003 with all the advanced features of HI 991002 plus an integral pH (in mV) scale that allows the user to check the condition of the pH electrode in the HI 1297D pH/ORP/Temperature probe (included).

SPECIFICATIONS		HI 991002	HI 991003
RANGE	pH	-2.00 to 16.00	-2.00 to 16.00
	pH (in mV)	-	±825 mV
	ORP	±1999 mV	±1999 mV
	Temperature	-5.0 to 105.0°C or 23 to 221°F	-5.0 to 105.0°C or 23 to 221°F
RESOLUTION	pH	0.01	0.01
	pH (in mV)	-	1 mV
	ORP	1 mV	1 mV
	Temperature	0.1°C or 0.1°F	0.1°C or 0.1°F
ACCURACY (@20°C/68°F)	pH	±0.02	±0.02
	pH (in mV)	-	±2 mV
	ORP	±2 mV	±2 mV
	Temperature	±1.0°F up to 140°F, ±2°F up to 221°F	±1.0°F up to 140°F, ±2°F up to 221°F
pH CALIBRATION		Automatic 1 or 2 points with 2 sets of standardized buffers (4.01, 7.01, 10.01 or 4.01, 6.86, 9.18)	
TEMPERATURE COMPENSATION		Automatic	
ELECTRODE		HI 1297D combination amplified pH/ORP/temperature electrode with DIN connector and 1 m (3.3') cable	
BATTERY TYPE/LIFE		3 x 1.5V AA / approximately 1500 hours of continuous use	
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%	
DIMENSIONS		143 x 80 x 38 mm (5.6 x 3.1 x 1.5")	
		320 g (11.3 oz.)	

ORDERING INFORMATION:

HI 991002 is supplied complete with HI 1297D pH/ORP/temperature electrode, 3 x 1.5V AA batteries, carrying case and instructions.
HI 991003 is supplied complete with HI 1297D pH/ORP/temperature electrode, 3 x 1.5V AA batteries, carrying case and instructions.

SUGGESTED ACCESSORIES:

HI 1297D	Combination amplified pH/ORP/temperature electrode with DIN connector and 1 m (3.3') cable	**HI 70004P**	pH 4.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
		HI 70007P	pH 7.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
HI 3617D	Combination ORP/temperature electrode with DIN connector and 1 m (3.3') cable	**HI 70010P**	pH 10.01 single use calibration sachets, 25 x 20 ml (25 calibrations)
		HI 70300L	Storage solution, 460 mL
HI 1296D	Combination pH/temperature electrode with DIN connector and 1 m (3.3') cable	**HI 7074L**	Cleaning solution for pH probe , 460 ml
		HI 7021L	Test solution @ 240 mV, 460 ml
HI 721312	Hard carrying case	**HI 7022L**	Test solution @ 470 mV, 460 ml
HI 710007	Blue shockproof rubber boot		

HI 9142 - dissolved oxygen meter

The ever increasing demand for instant results for on-site analysis has created a constant need for waterproof portable meters. Measurements in the field can subject the instrumentation to the inclemency of the weather. The cold, rain, snow and dust associated with use in the field, can damage the meter, rapidly deteriorating its performance and life. HI 9142 is a rugged, waterproof meter that solves the common problems of field use. It is very simple to use: calibration is performed with HI 7040 zero oxygen solution while 100% calibration is done in air. There is no need to use chemical solutions or go through time consuming calibration procedures. The polarographic probe (HI 76407/4) will take measurements accurate to 0.3 ppm in minutes and is supplied with a 4 m (13') cable that allows measurements to be taken in even hard to reach places. For applications that require longer probe cables, the HI 76407/10 and HI 76407/20 probes with a 10 m (33') or 20 m (67') cable are available.

Waterproof, rugged and simple-to-use

- *One point calibration provides calibration in saturated air without the need for chemical solutions.*
- *The meter's built-in Automatic Temperature Compensation circuitry will adjust all readings to provide the utmost accuracy.*
- *The rugged, waterproof casing makes the HI 9142 indispensable in the biological water treatment industry.*
- *The low battery indicator gives the user advanced notice to avoid taking an erroneous reading due to low power.*

SPECIFICATIONS	HI 9142
RANGE	0.0 to 19.9 mg/L
RESOLUTION	0.1 mg/L
ACCURACY (@20°C/68°F)	±1.5% F.S.
CALIBRATION	Manual 1 or 2 points (zero & slope)
TEMPERATURE COMPENSATION	Automatic from 0 to 30°C (32 to 86°F)
PROBE	HI 76407/4 polarographics D.O probe with 4 m (13') cable (included)
BATTERY TYPE/LIFE	4 x 1.5V AA/approximately 500 hours of continuous use.
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 100%
DIMENSIONS	196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
WEIGHT	425 g (15 oz.); kit: 1.4 kg (3.1 lb.)

ORDERING INFORMATION:

HI 9142	is supplied complete with HI 76407/4 D.O. probe with 4 m (13') cable, 2 spare membranes, HI 7041S electrolyte solution, 4 x 1.5V AA batteries and instruction manual in a rugged case.

SUGGESTED ACCESSORIES:

HI 7040L	Zero oxygen solution (460 mL)
HI 7041S	Refilling electrolyte solution (30 mL)
HI 76407/4	D.O. probe with 4 m (13') cable
HI 76407/10	D.O. probe with 10 m (33') cable
HI 76407/20	D.O. probe with 20 m (67') cable
HI 76407A/P	Pack of 5 replacement membranes

HI 9143 - dissolved oxygen meter

Measurements in the field can subject the instrumentation to the inclemency of the weather. Cold, rain, snow, dust and humidity associated with use in the field can cause condensation which may damage the meter, rapidly deteriorating its performance and life. The HI 9143 is designed for outdoor applications, especially waste water treatment. Simple on-site calibration requires no chemical solutions. Just expose the probe to air and press the CAL button. In a few minutes, the meter is calibrated and ready to use. Auto-calibration eliminates the need to use a screwdriver or other devices to adjust the reading. The HI 9143 also measures and displays O_2 from 0 to 300%, 0 to 45 mg/L and temperature from 0 to 50°C. This meter also supplies the user with compensation of salinity and altitude factors and compensates for the effects of temperature.

SPECIFICATIONS		HI 9143
RANGE	mg/L O_2	0.00 to 45.00
	% SATURATION O_2	0.0 to 300.0
	°C	0.0 to 50.0
RESOLUTION	mg/L O_2	0.01
	% SATURATION O_2	0.1
	°C	0.1
ACCURACY (@20°C/68°F)	mg/L O_2	±1.5% F.S.
	% SATURATION O_2	±1.5% F.S.
	°C	±0.5
TYPICAL EMC DEVIATION	mg/L O_2	±0.3
	% SATURATION O_2	±3.5%
	°C	±0.5
CALIBRATION		Automatic in air at 100%
TEMPERATURE COMPENSATION		Automatic from 0 to 50°C (32 to 122°F)
ALTITUDE COMPENSATION		0 to 1900 m (0 to 6230'); 100 m (328') resolution
SALINITY COMPENSATION		0 to 40 g/L; 1 g/L resolution
PROBE		HI 76407/4 polarographics D.O probe with 4 m (13') cable (included)
POWER SUPPLY		4 x 1.5V AA/approximately 200 hours of continuous use. Auto shut-off after 4 hours. Power plug for 12VDC supply
ENVIRONMENT		0 to 50°C (32 to 122°F); RH 100%
DIMENSIONS		196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
WEIGHT		425 g (15 oz.); kit: 1.4 kg (3.1 lb.)

DESIGNED FOR FIELD USE
The HI 9143 features a waterproof case that protects the instrument from harsh weather conditions.

ORDERING INFORMATION:

HI 9143	is supplied complete with HI 76407/4 D.O. probe with 4 m (13') cable, 2 spare membranes, HI 7041S electrolyte solution, 4 x 1.5V AA batteries and instruction manual in a rugged case.

SUGGESTED ACCESSORIES:

HI 7041S	Refilling electrolyte solution (30 mL)	**HI 76407A/P**	Pack of 5 replacement membranes
HI 76407/4	D.O. probe with 4 m (13') cable	**HI 721317**	Rugged carrying case
HI 76407/10	D.O. probe with 10 m (33') cable	**HI 710005**	110V to 12VDC adapter
HI 76407/20	D.O. probe with 20 m (67') cable	**HI 710006**	220V to 12VDC adapter

Ions specific meters (colorimeters)

Easy to use colorimeters. As simple as 1-2-3 !
The Hanna line of colorimeters was developped with simplicity of use in mind. All you need to do to operate these meters is zero your sample, dissolve a readily soluble powder or add a few drops of a reagent in the cuvet and take a reading.

Parameter	Code	Range	Increment	Method	Accuracy
Aluminum	HI 93712	0.00 to 1.00 mg/l	0.01 mg/l	Aluminon	±0.02 mg/l ±4% of reading
Ammonia, High Range	HI 93733	0.0 to 50.0 mg/l	0.1 mg/l	Nessler	±0.5 mg/l ±5% of reading
Ammonia, Medium Range	HI 93715	0.00 to 9.99 mg/l	0.01 mg/l	Nessler	±0.5 mg/l ±5% of reading
Ammonia, Low Range	HI 93700	0.00 to 3.00 mg/l	0.01 mg/l	Nessler	±0.04 mg/l ±4% of reading
Bromine	HI 93716	0.00 to 8.00 mg/l	0.01 mg/l	DPD	±0.08 mg/l ±3% of reading
Chlorine, Free, LR	HI 93701	0.00 to 2.50 mg/l	0.01 mg/l	DPD	±0.03 mg/l ±3% of reading
Chlorine, Free and Total, HR	HI 93734	0.00 to 9.99 mg/l	0.01 mg/l	DPD	±0.03 mg/l ±3% of reading
Chlorine Dioxide	HI 93738	0.00 to 2.00 mg/l	0.01 mg/l	Chlorophenol Red	±0.1 mg/l ±5% of reading
Chromium VI, High Range	HI 93723	0 to 1000 µg/l	1 µg/l	Diphenylcarbohydrazide	±5 µg/l ±4% of reading
Chromium VI, Low Range	HI 93749	0 to 300 µg/l	1 µg/l	Diphenylcarbohydrazide	±1 µg/l ±4% of reading
Color	HI 93727	0 to 500 PCU	10 PCU	Chloroplatinate	±10 PCU ±5% of reading
Copper, High Range	HI 93702	0.00 to 5.00 mg/l	0.01 mg/l	Bicinchoninate	±0.02 mg/l ±4% of reading
Copper, Low Range	HI 93747	0 to 990 µg/l	1 µg/l	Bicinchoninate	±10 µg/l ±5% of reading
Cyanide	HI 93714	0.000 to 0.200 mg/l	0.001 mg/l	Pyridine-Pyrazalone	±0.005 mg/l ±3% of reading
Cyanuric Acid	HI 93722	0 to 80 mg/l	1 mg/l	Turbidimetric	±1 mg/l ±15% of reading
Fluoride, High Range	HI 93739	0.0 to 20.0 mg/l	0.1 mg/l	SPADNS	±0.5 ppm ±3% of reading
Fluoride, Low Range	HI 93729	0.00 to 2.00 mg/l	0.01 mg/l	SPADNS	±5% of reading
Hardness, Ca	HI 93720	0.00 to 2.70 mg/l	0.01 mg/l	Calmagite	±0.11 mg/l ±5% of reading
Hardness, Mg	HI 93719	0.00 to 2.00 mg/l	0.01 mg/l	Colorimetric	±0.11 mg/l ±5% of reading
Hardness, Total	HI 93735	0 to 250 mg/l	1 / 5 mg/l	EPA 130.1	±5 mg/l ±4% of reading
		200 to 500 mg/l	1 / 5 mg/l	EPA 130.1	±7 mg/l ±3% of reading
		400 to 750 mg/l	1 / 5 mg/l	EPA 130.1	±10 mg/l ±2% of reading
Hydrazine	HI 93704	0 to 400 µg/l	1 mg/l	p-Dimethylaminobenzaldehyde	±3% full scale
Iodine	HI 93718	0.0 to 12.5 mg/l	0.1 mg/l	DPD	±0.1 mg/l ±5% of reading
Iron, High Range	HI 93721	0.00 to 5.00 mg/l	0.01 mg/l	Phenantroline	±0.04 mg/l ±2% of reading
Iron, Low Range	HI 93746	0 to 400 µg/l	1 µg/l	TPTZ	±10 µg/l ±8% of reading
Manganese, High Range	HI 93709	0.0 to 20.0 mg/l	0.1 mg/l	Periodate Oxidation	±0.2 mg/l ±4% of reading
Manganese, Low Range	HI 93748	0 to 300 µg/l	1 µg/l	PAN	±2 µg/l ±3% of reading
Molybdenum	HI 93730	0.0 to 40.0 mg/l	0.1 mg/l	Mercaptoacetic Acid	±0.3 mg/l ±5% of reading
Nickel, HR	HI 93726	0.00 to 7.00 g/l	0.01 g/l	Photometric	±4% of reading
Nickel, LR	HI 93740	0.000 to 1.000 mg/l	0.001 mg/l	PAN	±0.010 mg/l ±5% of reading
Nitrate	HI 93728	0.0 to 30.0 mg/l	0.1 mg/l	Cadmium Reduction	±0.5 mg/l ±10% of reading
Nitrite, High Range	HI 93708	0 to 150 mg/l	1 mg/l	Ferrous Sulfate	±4 mg/l ±4% of reading
Nitrite, Low Range	HI 93707	0.00 to 0.35 mg/l	0.01 mg/l	Diazotation	±0.02 mg/l ±4% of reading
Oxygen, Dissolved	HI 93732N	0.0 to 10.0 mg/l	0.1 mg/l	Modified Winkler	±0.2 mg/l ±3% of reading
Phosphate, High Range	HI 93717	0.0 to 30.0 mg/l	0.1 mg/l	Amino Acid	±1 mg/l ±4% of reading
Phosphate, Low Range	HI 93713	0.00 to 2.50 mg/l	0.01 mg/l	Ascorbic Acid	±0.04 mg/l ±4% of reading
Phosphorus	HI 93706	0.0 to 15.0 mg/l	0.1 mg/l	Amino Acid	±0.3 mg/l ±4% of reading
Potassium	HI 93750	0.00 to 10.0 mg/l	0,05 mg/l	Turbidimetric	±0.05 mg/l ±5% of reading
		10.0 to 50.0 mg/l	0,1 mg/l	Turbidimetric	±1 mg/l ±5% of reading
Silica	HI 93705	0.00 to 2.00 mg/l	0.01 mg/l	Heteropoly Blue	±0.03 mg/l ±3% of reading
Silver	HI 93737	0.000 to 1.000 mg/l	0.001 mg/l	PAN	±0.005 mg/l ±4% of reading
Sulfate	HI 93751	0 to 150 mg/l	1 mg/l	Turbidimetric	±1 mg/l ±5% of reading
Zinc	HI 93731	0.00 to 3.00 mg/l	0.01 mg/l	Zincon	±0.03 mg/l ±3% of reading

Multiparameters also available. For specific reagents (liquid or powder), see page 107.

HI 99550 - thermometer

- *Ideal for hard-to-reach places*
- *Non-contact and non-destructive measurement of temperature*
- *Highly affordable instrument made to simplify your work*
- *Especially suitable for quick and repetitive measurements*

Infrared radiation emitted from an object depends on its temperature. The Hanna HI 99550 infrared thermometer employs this technology to measure the surface temperature. Infrared measurements are extremely practical with an instantaneous response time. Another main advantage is the non-intrusive nature of the measurements. This feature can translate itself into substantial savings in industries where products are sealed or pre-wrapped. In order to measure the temperature, simply point to the product or the spot and hold down the measurement key. The measured value will be immediately displayed on the LCD. This type of non-intrusive measurement is also useful when the surface temperature is high, for difficult-to-reach places or due to hygiene requirements. Hanna's HI 99550 is designed with a wrist-strap and HOLD function for greater ease of use. The fast response time coupled with these features, makes the Hanna infrared meter particularly attractive for repetitive tests in the factory or on the production line.

SPECIFICATIONS	HI 99550
RANGE	-10 to 300°C
RESOLUTION	1°C
ACCURACY	±2% of reading or ±2°C (whichever is greater)
EMISSIVITY	0.95 (fixed)
TYPICAL RESPONSE TIME	1 second
OPTIC COEFFICIENT	3:1 (ratio of distance to diameter of target)
BATTERY TYPE	1 x 9V
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%
DIMENSIONS	143 x 80 x 38 mm (5.6 x 3.2 x 1.5")
WEIGHT	320 g (11.3 oz.)

ORDERING INFORMATION:

HI 99550	is supplied with wrist strap, 1 x 9V battery and instructions.

SUGGESTED ACCESSORIES:

HI 710004	Soft carrying case
HI 710007	Blue shockproof rubber boot
HI 710008	Orange shockproof rubber boot
HI 721316	Rugged carrying case
HI 740029	9V battery

HI 935005 - thermometer

HI 935005 is a hand-held thermometer that uses a K-type sensor together with an advanced microprocessor to deliver accurate temperature measurement with an extraordinary 500 hour battery life. The meter is housed in a rugged case for maximum protection anywhere. The splashproof keypad with rubber keys will wipe clean easily. The powerful microprocessor furnishes this meter with advanced memory functions. Simply press a key and the meter will recall the highest or lowest temperature measured in the cycle. A hold key will guarantee the user plenty of time to record the readings. The °C/°F button makes it possible to switch between the Celsius and Fahrenheit ranges instantly.

A wide variety of interchangeable probes are available to meet your specific application. The Hanna exclusive shockproof rubber boots, HI 710007 and HI 710008, are particularly recommended for heavy-duty applications.

- ***Min & Max Functions***
  HI 935005 will recall the highest or lowest reading taken at the touch of a button. There is also a hold key to freeze the display.
- ***High Range***
  The K-type thermocouple measures temperature from -50 to 950°C and from -58 to 1742°F.
- ***°C/°F Button***
  By simply pressing a button, your thermometer will switch from measurements in the Celsius range, to readings in Fahrenheit.

SPECIFICATIONS	HI 935005	
RANGE	-50.0 to 150.0°C -50 to 950°C	-58.0 to 302.0°F -58 to 1742°F
RESOLUTION	0.1°C (-50.0 to 150.0°C) 1°C (-50 to 950°C)	0.2°F (-58.0 to 302.0°F) 1°F (-58 to 1742°F)
ACCURACY	±0.2% F.S. for one year, excluding probe error	
PROBE	K-type thermocouple (optional)	
BATTERY TYPE / LIFE	1 x 9V / approx. 500 hours of continuous use	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%	
DIMENSIONS	143 x 80 x 38 mm (5.6 x 3.1 x 1.5")	
WEIGHT	320 g (11.3 oz.)	

ORDERING INFORMATION:

HI 935005	is supplied complete with wrist-strap, 9V battery and instruction manual.

SUGGESTED ACCESSORIES:

HI 710004	Soft carrying case
HI 710007	Blue shockproof rubber boot
HI 710008	Orange shockproof rubber boot

** See page 101 for a complete line of thermocouple probes.*

HI 93532 - thermometer

- ***Dual Probe Inputs***
  The meter has two K-type probe connectors for use with two separate temperature probes.
- ***Design***
  A compact, ergonomic design and a wrist-strap make HI 93532 easy to carry anywhere. The rubber key-pad protects the meter from accidental splashes.
- ***HOLD Function***
  The HOLD function freezes the reading on the display and stores it into memory.

Engineering tests often require that two different samples be measured simultaneously. For this reason, HI 93532 has two built-in K-type probe connectors. By simply pressing a button, the meter switches between the two readings on the display. A "Delta-T" button will display the difference between the two temperatures. This reading can then be stored into memory at the touch of a button. HI 93532 can read with a resolution of 0.1°C in the range of -200.0 to 999.9°C, this was once only possible in sophisticated equipment used in research and industry.

The meter is also equipped with a MEM/HOLD function that freezes the current reading on the screen and stores it into memory. The MR key will then recall the stored reading from memory.

K-type thermocouple probes should be ordered separately to meet your specific application.

SPECIFICATIONS	HI 93532
RANGE	-200.0 to 999.9°C 1000 to 1370°C
RESOLUTION	0.1°C (-200.0 to 999.9°C) 1°C (1000 to 1370°C)
ACCURACY	±0.2% F.S. for one year, excluding probe error
PROBE	K-type thermocouple (optional)
BATTERY TYPE / LIFE	1 x 9V / approx. 100 hours of continuous use
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%
DIMENSIONS	143 x 80 x 38 mm (5.6 x 3.1 x 1.5")
WEIGHT	320 g (11.3 oz.)

ORDERING INFORMATION:

HI 93532	is supplied complete with wrist-strap, 9V battery and instruction manual.

SUGGESTED ACCESSORIES:

HI 710004	Soft carrying case
HI 710007	Blue shockproof rubber boot
HI 710008	Orange shockproof rubber boot

** See page 101 for a complete line of thermocouple probes.*

HI 955501 & HI 955502 - thermometers

Pt100 models are widely recognized as the most accurate with the best stability, repeatability and linearity among thermometers. Add to this the four-wire system that is practically impervious to lead-wire length error and you have a powerful tool to measure temperature accurately.

We have designed two affordable models for you to choose from: HI 955501 with the interchangeable HI 768 Pt100 probes and HI 955502 with the fixed general-purpose probe and 1 m (3.3') lead, at a very attractive price.

HI 955501 and HI 955502 measure temperatures with an 0.1°C resolution in the -199.9 to 199.9°C range and then automatically switch to 1°C from 200 to 850°C. Press RANGE and the resolution switches to 1°C at any time. A compact, ergonomic design and a wrist-strap make it easy to carry them anywhere in the lab or plant.

- ***Accuracy***
  Pt100 and 4-wire system guarantee stability, repeatability and accuracy, every time.
- ***Wide Range***
  Read with 0.1 resolution from -199.9 to 199.9°C. The sensitivity can also be changed to 1°C for this range as well as measurements all the way to 850°C.

SPECIFICATIONS	HI 955501	HI 955502
RANGE	-200 to 850°C	
RESOLUTION	0.1°C (-199.9 to 199.9°C) 1°C (200 to 850°C)	
ACCURACY	±0.2°C & ±1 digit (-120 to 200°C); ±1°C & ±1 digit (-170 to 450°C); ±1% F.S. & ±1 digit (outside) for one year, excluding probe error	
PROBE	HI 768 interchangeable Pt100	Direct nondetachable probe with 1 m (3.3') lead (included)
BATTERY TYPE / LIFE	1 x 9V / approx. 150 hours of continuous use	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%	
DIMENSIONS	143 x 80 x 38 mm (5.6 x 3.2 x 1.5")	
WEIGHT	320 g (11.3 oz.)	

ORDERING INFORMATION:

HI 955501	is supplied with 9V battery and instruction manual.
HI 955502	is supplied with general purpose fixed 4-wire Pt100 probe, 9V battery and instruction manual.

SUGGESTED ACCESSORIES:

HI 768A	Air/Gas probe with 1 m (3.3') cable (see page 100)
HI 768L	Gen. purpose/Liquid probe w/ 1 m (3.3') cable (see page 100)
HI 768P	Gen. purpose/Penetration probe w/ 1 m (3.3') cable (see page 100)
HI 710004	Soft carrying case
HI 710007	Blue shockproof rubber boot
HI 710008	Orange shockproof rubber boot

HI 9063 - thermometer

- ***Waterproof Housing***
  The rugged waterproof housing will resist the harmful effects of dusty and humid environments where condensation could harm the internal electronics.
- ***High Accuracy***
  HI 9063 measures within ±0.3% of Full Scale. This type of accuracy is normally found in research-grade and costly instruments.
- ***Hold, HI, LO and °C/°F Functions***
  The HOLD function freezes the reading on the display, the HI and LO keys recall the temperature extremes and the °C/°F function switches from Celsius to Fahrenheit.

On-site measurements in the field or industry can subject the instrumentation being used to the inclemency of the weather. The cold, rain, snow, dust and humidity can damage the meter, rapidly deteriorating its performance and shortening its life.

Due to these problems, Hanna Instruments has developed HI 9063 to satisfy all of your heavy-duty application needs.

Because it is often necessary to be aware of the highest and lowest temperatures measured during a certain process, Hanna has incorporated extensive memory functions into HI 9063. These functions are especially useful when the test engineer cannot be near the thermometer throughout the entire process.

HI 9063 reads with a resolution of 0.1°C in the range of -50.0 to 150.0°C and 0.1°F in the range of -58.0 to 302.0°F.

SPECIFICATIONS	HI 9063	
RANGE	-50.0 to 150.0°C -50 to 950°C	-58.0 to 302.0°F -58 to 1742°F
RESOLUTION	0.1°C (-50.0 to 150.0°C) 1°C (-50 to 950°C)	0.1°F (-58.0 to 302.0°F) 1°F (-58 to 1742°F)
ACCURACY	±0.3% Full Scale for one year, excluding probe error	
PROBE	K-type thermocouple (optional)	
BATTERY TYPE / LIFE	4 x 1.5V AA / approx. 500 hours of continuous use	
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 100%	
DIMENSIONS	196 x 80 x 60 mm (7.7 x 3.1 x 2.4")	
WEIGHT	425 g (15 oz.)	

ORDERING INFORMATION:

HI 9063 is supplied with 4 x 1.5V AA batteries and instruction manual.

SUGGESTED ACCESSORIES:

HI 721317 Rugged carrying case

** See page 101 for a complete line of thermocouple probes.*

HI 91532 - thermometer

On-site measurements in the field can subject the instrumentation being used to inclement weather. The cold, rain, snow and dust associated with use in the field, can damage the meter, rapidly deteriorating its performance and life. Due to these demands, Hanna Instruments has developed HI 91532K to satisfy all of your field application needs.

Because engineering tests often require that two different samples be measured simultaneously, HI 91532K has two mini-connectors. By simply pressing a button, the meter will switch between the different readings. A "Delta-T" button will display the difference between the two readings.

Upon request HI 91532K/C model is available. It come supplied with a Factory Calibration Certificate against an NIST Standard. Recalibration service is available at your nearest Hanna service center.

- ***Waterproof Housing***
  The rugged waterproof housing will resist the harmful effects of dusty and humid environments and even if accidentally dropped into water.
- ***High Accuracy***
  ±0.2% Full Scale. This type of accuracy was once only achievable with research-grade equipment.
- ***Hold, HI, LO and °C/°F Functions***
  The HOLD function freezes the reading on the display, the HI and LO keys recall the temperature extremes and the °C/°F function switches from Celsius to Fahrenheit. (HI 91531K)

SPECIFICATIONS	HI 91532
RANGE	-200.0 to 999.9°C 1000 to 1370°C
RESOLUTION	0.1°C (-200.0 to 999.9°C) 1°C (1000 to 1370°C)
ACCURACY	±0.2% Full Scale for one year, excluding probe error
PROBE	K-type thermocouple (optional)
BATTERY TYPE / LIFE	4 x 1.5V AA / approx. 500 hours of continuous use
ENVIRONMENT	-10 to 50°C (14 to 122°F); RH 100%
DIMENSIONS	196 x 80 x 60 mm (7.7 x 3.1 x 2.4")
WEIGHT	425 g (15 oz.)

ORDERING INFORMATION:

HI 91532K	is supplied with 4 x 1.5V AA batteries and instruction manual.
HI 91532K/C	is supplied with *Factory Calibration Certificate against NIST Standard*, 4 x 1.5V AA batteries and instruction manual.

SUGGESTED ACCESSORIES:

HI 721317	Rugged carrying case

** See page 101 for a complete line of thermocouple probes.*

HI 98801 & HI 98804 - thermometers

HI 98801 and HI 98804 combine high resolution and extended temperature range with extensive logging capabilities and an infrared data transfer system. In addition to supplying the user with instant printouts of date, time and temperature, they can log the data without supervision at predetermined interval or simply through the log-on-demand feature. The stored information can later be displayed, downloaded and/or printed. The meters also incorporate GLP (Good Laboratory Practice) features which enable you to retrieve the date and details of the last calibration. With the backlight feature, measurements in poorly lit and even unlit areas become a reality. HI 98801 accepts one temperature probe while HI 98804 can take up to 4 separate probes. The sophisticated software allocates up to 14000 temperature readings to maximize available space, regardless of the number of channels in use. The LCD shows temperature in large digits with a secondary level of readout displaying logging interval, channel, time and date.

Upon request HI 98801/C and HI 98804/C models are available supplied with a Factory Calibration Certificate against NIST Standard. Recalibration service is available at your nearest Hanna Service Center.

SPECIFICATIONS	HI 98801	HI 98804
RANGE	**K:** -200.0 to 999.9°C; 1000 to 1370°C; -300.0 to 999.9°F; 1000 to 2500°F **J:** -200.0 to 760.0°C; -300.0 to 999.9°F; 1000 to 1400°F **T:** -200.0 to 400.0°C; -300.0 to 750.0°F	
RESOLUTION	**K:** 0.1°C (-99.9 to 999.9°C); 1°C (1000 to 1370°C); 0.2°C (-200.0 to -100.0°C); 0.2°F (-199.9 to 999.9°F); 1°F (1000 to 2500°F); 0.3°F (-300.0 to -200°F) **J:** 0.1°C (-149.9 to 760.0°C); 0.2°C (-200.0 to -150.0°C); 0.1°F (32.0 to 999.9°F); 1°F (1000 to 1400°F); 0.2°F (-300.0 to 32.0°F) **T:** 0.1°C (-99.9 to 400.0°C); 0.2°C (-200.0 to -100.0°C); 0.1°F (300.0 to 750.0°F); 0.2°F (-149.9 to 300.0°F); 0.3°F (-300.0 to -150°F)	
ACCURACY	±0.5°C (-200.0 to 999.9°C); ±1°C (outside); ±1°F; for one year, excluding probe error	
CHANNELS	1 channel	4 channels
PROBE	K,J,T-type thermocouple (optional)	
COLD JUNCTION	NTC 10 K; 0.1°C resolution; ±0.3°C accuracy	
PRINTER	Low-power impact type-belt, 14 characters per line using 38 mm plain paper (HI 710034)	
PRINTING INTERVALS/LOGGING	Selectable from 1, 2, 5, 10, 15, 30, 60, 120 and 180 minutes	
COMPUTER INTERFACE	With HI 9200 infrared transmitter, RS232	
POWER SUPPLY	4 x 1.5V AA batteries / approx. 350 of continuous use (without printing and backlight). Auto-off selectable after 5, 10, 15, 30, 45 or 60 minutes of non-use. Socket for 12VDC.	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%	
DIMENSIONS	220 x 82 x 66 mm (8.7 x 3.2 x 2.6")	
WEIGHT	500 g (18 oz.)	

ORDERING INFORMATION:

HI 98801 & HI 98804 are supplied with 5 paper rolls, 4 x 1.5V AA batteries and instruction manual in a rugged carrying case.

HI 98801/C & HI 98804/C are supplied with *Factory Calibration Certificate*, 5 paper rolls, 4 x 1.5V AA batteries and instruction manual in a rugged carrying case.

SUGGESTED ACCESSORIES:

HI 710005	110V to 12VDC adapter	**HI 92000**	Windows® compatible software
HI 710006	220V to 12VDC adapter	**HI 710034**	Paper roll (10 rolls)
HI 9200/9	Infrared transmitter (9-pin)	**HI 710035**	Ink cartridge (1 pc)

** See page 101 for a complete line of thermocouple probes.*

HI 955301 & HI 955302 - thermometers

HI 955301C and HI 955302C combine the high resolution and extended temperature range of the HI 955201C series with extensive logging capabilities and an infrared data transfer system. In addition to supplying the user with instant printouts of date, time and temperature, they also provide data logging facilities that store data for transfer to a computer system for retrieval and/or printing at a later date.

HI 955301C accepts one temperature probe while HI 955302C can take 2 separate Pt100 probes. The sophisticated software allocates up to 16000 temperature readings to maximize available space, regardless of the number of channels in use. The LCD shows temperature in large easy-to-read digits with a secondary level of readout displaying logging interval, channel, time and date. Due to extensive use of advanced electronics, all of these features can be housed in a package weighing just 500 grams!

These meters are calibrated against a certified standard. A Factory Calibration Certificate and recalibration service are available upon request.

Hanna offers a variety of optional 4-wire Pt100 HI 768 temperature probes to fit your application.

- ***Multi-Channel Logger***
  Datalogger is ideal for accurate monitoring in the higher temperature ranges with up to 2 channels.
- ***Computer Compatible***
  HI 9200 infrared data transfer system allows downloading into a computer by simply placing your meter on the transmitter.
- ***High Resolution***
  From -200.0 to 850.0°C with 0.1°C resolution, or user selectable 1°C sensitivity!

SPECIFICATIONS	HI 955301	HI 955302
RANGE	-200.0 to 850.0°C	
RESOLUTION	0.1°C	
ACCURACY	±0.1°C ±0.1% of the actual reading, for one year, excluding probe error	
CHANNELS	1 Channel	2 Channels
PROBE	(optional) 4-wire Pt100 Platinum RTD (a = 0.00385)	
PRINTER	Low-power impact type-belt, 14 characters per line using 38 mm plain paper (HI 710034)	
PRINTING INTERVALS	1, 2, 5, 10, 30, 60, 120 and 180 minutes	
POWER SUPPLY	4 x 1.5V AA batteries / approx. 500 hours with 60' printing interval. Auto shut-off after 5 minutes of non-use. Power socket for 12VDC	
ENVIRONMENT	0 to 50°C (32 to 122°F); RH 95%	
DIMENSIONS	220 x 82 x 66 mm (8.7 x 3.2 x 2.6")	
WEIGHT	500 g (18 oz.)	

ORDERING INFORMATION:

HI 955301C &
HI 955302C are supplied with 5 paper rolls, 4 x 1.5V AA batteries and instruction manual.
HI 955301C/C &
HI 955302C/C are supplied with *Factory Calibration Certificate*, 5 paper rolls, 4 x 1.5V AA batteries and instruction manual.

SUGGESTED ACCESSORIES:

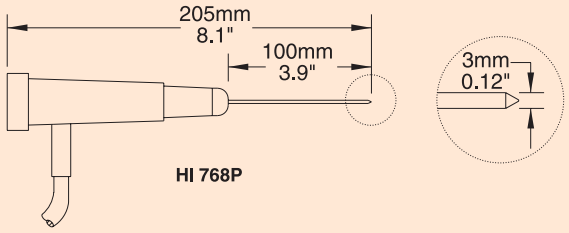
HI 710005	110V to 12VDC adapter	**HI 9200/9**	Infrared Transmitter (9-pin)
HI 710006	220V to 12VDC adapter	**HI 92000**	Windows® compatible Software
HI 768A	Air/Gas probe with 1 m (3.3') cable (see page 100)	**HI 710034**	Paper roll (10 rolls)
HI 768L	General Purpose/Liquid probe with 1 m (3.3') cable (see page 100)	**HI 710035**	Ink cartridge (1 pc)
HI 768P	General Purpose/Penetration probe with 1 m (3.3') cable (see page 100)		

HI 768 - probes (Pt 100)

General Specifications for HI 768 Probes:
Range: -30 to 350°C (-58 to 302°F)
Accuracy: ±.25°C (±0.8°F) ±3% of reading
Probe Handle: Carilon
Probe: Stainless steel AISI 316
T.C.: 30 seconds

HI 768P
GENERAL PURPOSE/PENETRATION PROBE

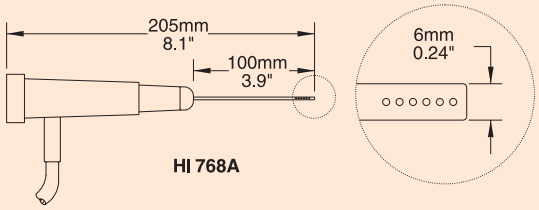
Pt100 sensor for applications such as liquid, air and penetration of semi-solids. Probe has a 1 meter (3.3') cable and an integral handle



HI 768P

HI 768A
AIR/GAS PROBE

Pt100 sensor for the specific application of measuring the temperature of air and gases, with 1 meter (3.3') cable and handle

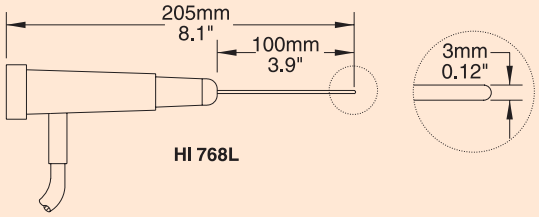


HI 768A

HI 768L
GENERAL PURPOSE/LIQUID PROBE

Pt100 sensor for applications such as liquid and air.

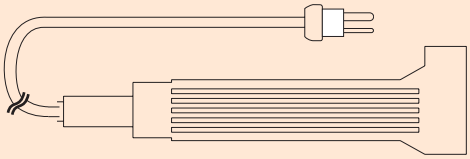
HI 768L Probe with 1 meter (3.3') cable and handle
HI 768L/3 Probe with 3 meter (10') cable and handle
HI 768L/5 Probe with 5 meter (16.5') cable and handle



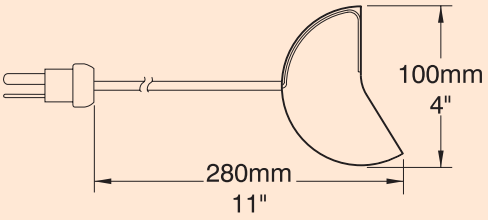
HI 768L

HI 766 - probes (thermocouple)

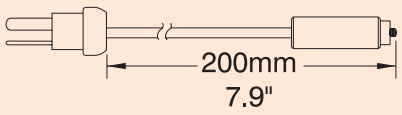
HI 766HD
PROBE HANDLE
This rugged handle is supplied with a PVC, 1 meter (3.3') cable fitted with a miniature male thermocouple connector. Any probe with a mini-connector can be used with it. The probe/handle set can be used with any K-type thermocouple thermometers.



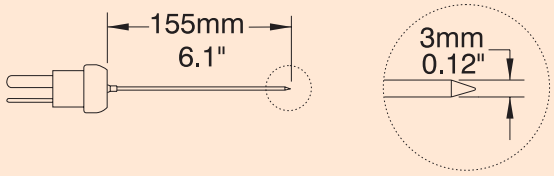
HI 766PA
ROLLER SURFACE PROBE
- Use: convex surfaces, moving rollers, etc.
- MAX temperature: 320°C/600°F
- Response time (90% of final value): 7 sec.
- Probe length: 280 mm (11")
- Tube in stainless steel



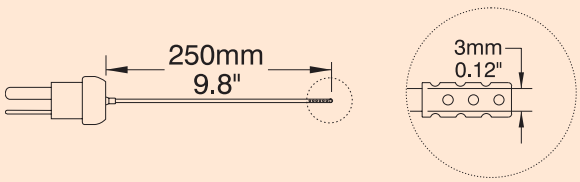
HI 766PB
SURFACE TEMPERATURE PROBE
- Use: hot solids, furnaces, molds, etc.
- MAX temperature: 650°C/1200°F
- Response time (90% of final value): 8 sec.
- Probe length: 200 mm (7.9"); dia 16 mm (0.6")
- Tube in stainless steel



HI 766PC
PENETRATION PROBE
- Use: semi-solid, meat, rubber, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 15 sec.
- Probe length: 155 mm (6.1"); dia 3 mm (0.12")
- Tube in stainless steel

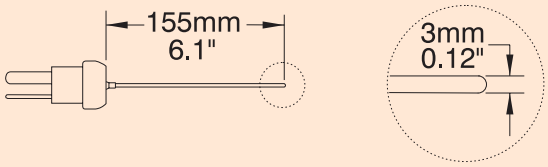


HI 766PD
AIR TEMPERATURE PROBE
- Use: gases
- MAX temperature: 300°C/570°F
- Response time (90% of final value): 20 sec.
- Probe length: 250 mm (9.8"); dia 3 mm (0.12")
- Tube in stainless steel

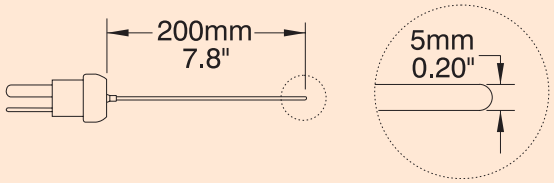


HI 766 - probes (thermocouple)

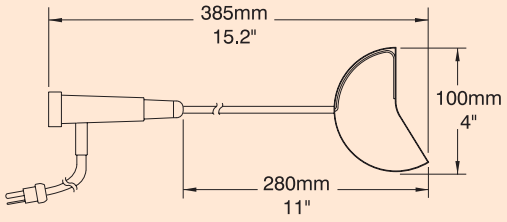
HI 766PE1
GENERAL PURPOSE PROBE
- Use: liquids, gases, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 6 sec.
- Probe length: 155 mm (6.1"); dia 3 mm (0.12")
- Tube in stainless steel



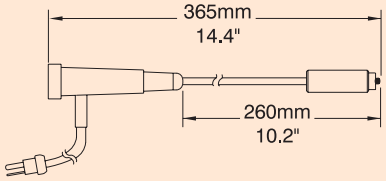
HI 766PE2
GENERAL PURPOSE PROBE
- Use: liquids, gases, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 6 sec.
- Probe length: 200 mm (7.8"); dia 5 mm (0.20")
- Tube in stainless steel



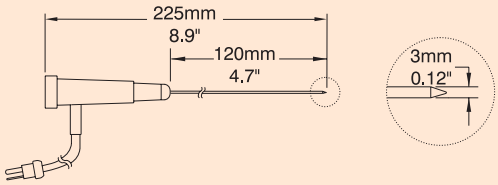
HI 766A
ROLLER SURFACE PROBE
- Use: convex surfaces, moving rollers, etc.
- MAX temperature: 320°C/600°F
- Response time (90% of final value): 7 sec.
- Probe length: 280 mm (11")
- Length of flexible surface: 100 mm (4")
- Flexible surface tube in stainless steel



HI 766B
SURFACE TEMPERATURE PROBE
- Use: hot solids, furnaces, molds, etc.
- MAX temperature: 650°C/1200°F
- Response time (90% of final value): 8 sec.
- Probe length: 260 mm (10.2"); dia 16 mm (0.6")
- Tube in stainless steel



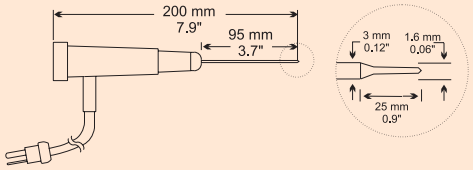
HI 766C
PENETRATION PROBE
- Use: semi-solids, meat, rubber, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 15 sec.
- Probe length: 120 mm (4.8"); dia 3 mm (0.12")
- Tube in stainless steel



HI 766 - probes (thermocouple)

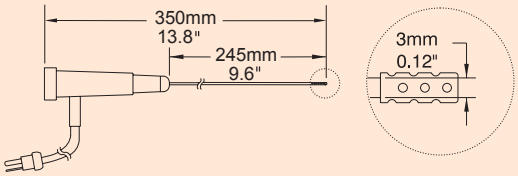
HI 766C1
ULTRA-FAST PENETRATION PROBE

- Use: semi-solids, food
- MAX temperature: 300°C/570°F
- Response time (90% of final value): 4 sec.
- Probe length: 95 mm (3.7"); diam. 1.6 mm (0.06")
- Tube in stainless steel



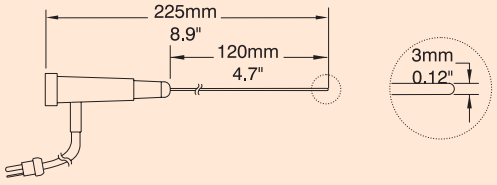
HI 766D
AIR TEMPERATURE PROBE

- Use: gases
- MAX temperature: 300°C/570°F
- Response time (90% of final value): 20 sec.
- Probe length: 245 mm (9.6"); dia 3 mm (0.12")
- Tube in stainless steel



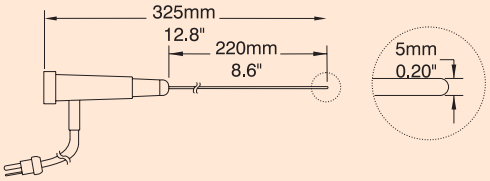
HI 766E1
GENERAL PURPOSE PROBE

- Use: liquids, gases, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 6 sec.
- Probe length: 120 mm (4.7"); dia 3 mm (0.12")
- Tube in stainless steel



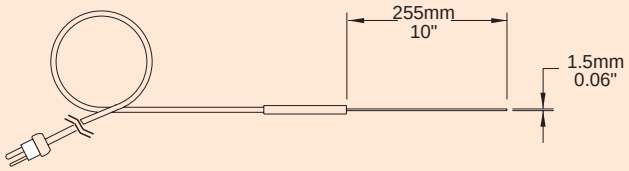
HI 766E2
GENERAL PURPOSE PROBE

- Use: liquids, gases, etc.
- MAX temperature: 900°C/1650°F
- Response time (90% of final value): 6 sec.
- Probe length: 220 mm (8.5"); dia 5 mm (0.2")
- Tube in stainless steel



HI 766F
HIGH TEMPERATURE PROBE

- Flexible sheath
- MAX temperature: 1100°C/2000°F
- Response time (90% of final value): 4 sec.
- Probe length: 255 mm (10"); dia 1.5 mm (0.06")
- Tube in AISI 316 stainless steel (no-handle)

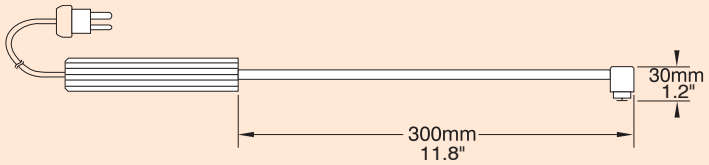


HI 766 - probes (thermocouple)

These probes are all specially constructed for an excellent contact with the surface being measured. The several different options below are designed to meet all of your surface temperature needs. Due to the high surface temperature, it is important that the probe handle does not reach a temperature above 150°C (302°F). If this happens, the probe may be damaged. Response times all refer to 63.2% of measuring range.

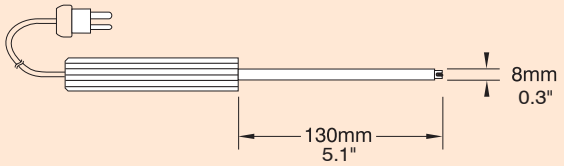
HI 766B1
90° ANGLE SURFACE PROBE

- Use: Hard to reach areas
- MAX temperature: 450°C/840°F
- Response time: 8 sec.
- Probe length: 300 mm (11.8")
- Tube in stainless steel
- Sensor is spring-loaded



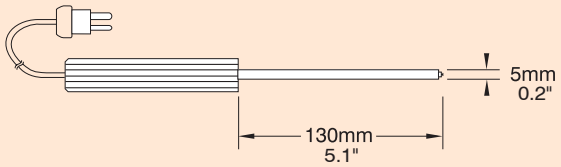
HI 766B2
SURFACE TEMPERATURE PROBE

- Use: Hot solids, furnaces, molds, etc.
- MAX temperature: 900°C/1650°F
- Response time: 3 sec.
- Probe length: 130 mm (5.1"); dia 8 mm (0.3")
- Tube in stainless steel
- Sensor is spring-loaded



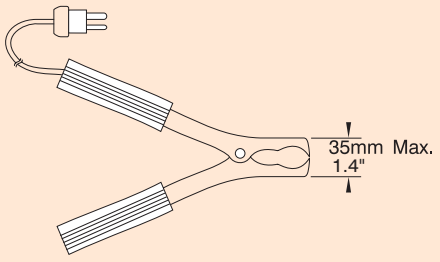
HI 766B3
SMALL SURFACE TEMPERATURE PROBE

- Use: Hot surfaces
- MAX temperature: 200°C/390°F
- Response time: 6 sec.
- Probe length: 130 mm (5.1"); dia 5 mm (0.2")
- Tube in stainless steel and insulated to prevent electric shocks
- Sensor is spring-loaded



HI 766TV1
PIPE CLAMP TEMPERATURE PROBE

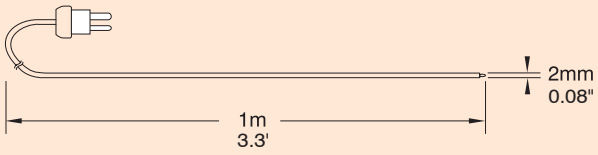
- Use: Hot pipes, tubes, etc.
- MAX temperature: 200°C/390°F
- Response time: 8 sec.
- Max clamp opening diameter: 35 mm (1.4")
- Sensor is housed inside the clamp



HI 766 - probes (thermocouple)

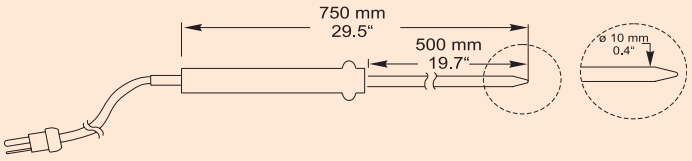
HI 766F1
WIRE TEMPERATURE PROBE

- Use: Hard to reach places
- MAX temperature: 480°C/900°F
- Response time: 1 sec.
- Wire length: 1000 mm (3.3'); dia 2 mm (0.08")
- Sensor wires are exposed



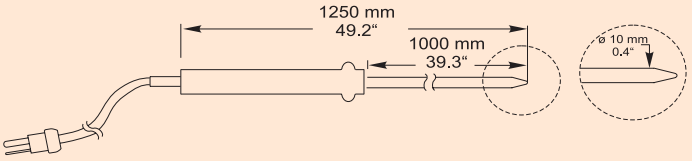
HI 766TR1
PENETRATION PROBE

- Use: semisolids, liquids.
- MAX temperature: 250°C/482°F
- Response time (90% of final value): 10 sec.
- Probe length: 500 mm (19.7"); dia 10 mm (0.4")
- Tube in stainless steel



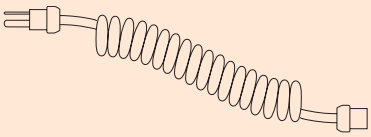
HI 766TR2
PENETRATION PROBE

- Use: semisolids, liquids.
- MAX temperature: 250°C/482°F
- Response time (90% of final value): 10 sec.
- Probe length: 1000 mm (39.3"); dia 10 mm (0.4")
- Tube in stainless steel



HI 766EX
EXTENSION CABLE

This item extends up to 1 m (3.3'), the same length as cables provided with any K-type thermocouple probe. The coiled cable comes with a male thermocouple connector at one end and a female connector at the other.
HI 766EX can be used with any K-type thermocouple thermometers.



It is difficult to exaggerate the importance of buffer and maintenance solutions.
Expensive equipment is often utilized well below its full capabilities due to lack of proper maintenance of sensors. With Hanna solutions, this is no longer a problem.

Single use, field calibration sachets

pH

CODE	DESCRIPTION	SIZE
HI 7007/1G	pH 7.01 calibration buffer, colored	4 liter
HI 7007/1L	pH 7.01 calibration buffer, colored	1 liter
HI 7007L	pH 7.01 calibration buffer	460 ml
HI 7007M	pH 7.01 calibration buffer	230 ml
HI 70007P	pH 7.01 calibration buffer	25 x 20 ml
HI 7004/1G	pH 4.01 calibration buffer, colored	4 liter
HI 7004/1L	pH 4.01 calibration buffer, colored	1 liter
HI 7004L	pH 4.01 calibration buffer	460 ml
HI 7004M	pH 4.01 calibration buffer	230 ml
HI 70004P	pH 4.01 calibration buffer	25 x 20 ml
HI PHKIT	pH calibration starter kit	3 x 20 ml (pH 7) + 3 x 20 ml (pH 4)
HI 7061L	Cleaning solution for pH testers/meters	460 ml
HI 7061M	Cleaning solution for pH testers/meters	230 ml
HI 70300L	Storage solution for pH testers/meters	460 ml
HI 70300M	Storage solution for pH testers/meters	230 ml
HI MTNKIT	Maintenance kit (cleaning & storage)	1 x 230 ml (cleaning) + 1 x 230 ml (storage)

Maintenance Kit — Calibration Starter Kits

TDS

CODE	DESCRIPTION	SIZE
HI 7032L	1382 ppm calibration solution, 0.5 conv. factor	460 ml
HI 7032M	1382 ppm calibration solution, 0.5 conv. factor	230 ml
HI 70032P	1382 ppm calibration solution, 0.5 conv. factor	25 x 20 ml
HI TDSKIT	1382 ppm calibration starter kit	5 x 20 ml

EC

CODE	DESCRIPTION	SIZE
HI 7030L	12880 µS/cm calibration solution	460 ml
HI 7030M	12880 µS/cm calibration solution	230 ml
HI 70030P	12880 µS/cm calibration solution	25 x 20 ml
HI 7039L	5000 µS/cm calibration solution	460 ml
HI 7039M	5000 µS/cm calibration solution	230 ml
HI 70039P	5000 µS/cm calibration solution	25 x 20 ml
HI 7031L	1413 µS/cm calibration solution	460 ml
HI 7031M	1413 µS/cm calibration solution	230 ml
HI 70031P	1413 µS/cm calibration solution	25 x 20 ml
HI ECHKIT	12880 µS/cm calibration starter kit	5 x 20 ml
HI ECLKIT	1413 µS/cm calibration starter kit	5 x 20 ml

4 Liters Size
1 Liter Size
460 ml Size
230 ml Size

ORP

CODE	DESCRIPTION	SIZE
HI 7091L	Pretreatment reducing solution	460 ml
HI 7092L	Pretreatment oxydizing solution	460 ml
HI 7021L	Test solution 240 mV	460 ml
HI 7022L	Test solution 470 mV	460 ml

Reagents for ISM

Test	Reagent Kit Part No.	No. of Tests
Aluminum	HI 93712-01	100
	HI 93712-03	300
Ammonia, high range	HI 93733-01	100
	HI 93733-03	300
Ammonia, medium range	HI 93715-01	100
	HI 93715-03	300
Ammonia, low range	HI 93700-01	100
	HI 93700-03	300
Bromine	HI 93716-01	100
	HI 93716-03	300
Ca & Mg, high range	HI 93752-01	100
Chlorine, Free & Total, high range	HI 93734-01	100
	HI 93734-03	300
Chlorine, Free, low range	HI 93701-01*	100
	HI 93701-03*	300
	HI 93701-F**	300
Chlorine, Total, low range	HI 93711-01*	100
	HI 93711-03*	300
	HI 93701-T**	300
Chlorine Dioxide	HI 93738-01	100
	HI 93738-03	300
Chromium VI, high range	HI 93723-01	100
	HI 93723-03	300
Chromium VI, low range	HI 93749-01	100
	HI 93749-03	300
Copper, high range	HI 93702-01	100
	HI 93702-03	300
Copper, low range	HI 93747-01	100
	HI 93747-03	300
Cyanide	HI 93714-01	100
	HI 93714-03	300
Cyanuric Acid	HI 93722-01	100
	HI 93722-03	300
Fluoride, low range	HI 93729-01	100
	HI 93729-03	300
Fluoride, high range	HI 93739-01	100
Hardness, Calcium	HI 93720-01	100
	HI 93720-03	300
Hardness, Magnesium	HI 93719-01	100
	HI 93719-03	300
Hardness, Total, low range	HI 93735-00	100
Hardness, Total, medium range	HI 93735-01	100
Hardness, Total, high range	HI 93735-02	100
Hardness, Total, full range	HI 93735-0	100

* Powder reagent
** Liquid reagent

CALIBRATION OF A pH METER WITH ITS PROBE

All pH meters need to be calibrated periodically.

As all pH meters have different features (automatic calibration, manual calibration, auto buffer recognition, etc.), the best calibration explanation of your Hanna meter is in the instruction manual. If you no longer have the instruction manual, please download your free copy from the technical section at www.hannacan.com.

General procedure

If your pH electrode is new or has not been used for a while, proceed with conditioning of your pH electrode prior to use (store overnight into HI 70300L storage solution).

Dip your pH electrode into HI 7007 pH 7.01 buffer first. Wait for the reading to stabilize and adjust the pH meter to read 7.01 on the display.

Rinse the pH electrode with distilled or tap water.

Dip the pH electrode into HI 7004 pH 4.01 or HI 7010 pH 10.01 buffer and wait for the reading to stabilize. Then adjust to read accordingly. Calibration is done and your meter is ready to use.

Note: Always start calibrations at pH 7 first and 4 or 10 second. The choice of the second buffer depends on your application: if you measure values below pH 7, use pH 4 as a second buffer. If you measure values above pH 7, use pH 10 as your second buffer. Some of our pH meter use 3 points calibration, keep in mind to always start with pH 7 first and others after.

VERIFICATION OF A pH ELECTRODE

First look for scratches on sensor (glass bulb). If the sensor seems to be OK, make sure your pH sensor is well conditioned (soak sensor into HI 70300 storage solution overnight).

When conditioning is completed, dip your electrode into pH 7 and wait for the reading to stabilize. If it does not stabilize, perform the cleaning procedure (see page 109). Adjust the reading to read 7.0 pH and switch to mV readings on your pH meter. You should have a reading of 0.0mV, ± 30mV. If the reading is higher than ± 50mV, you need to replace the electrode. If reading is below ± 50mV, proceed to rinse electrode with distilled or tap water and dip into pH 4 or pH 10 buffer. Switch in pH measurement mode and wait for the reading to stabilize. Adjust the reading to read 4.0 pH and switch to mV readings on your pH meter. You should have a reading of 180mV, ± 30mV. If the reading is higher than ± 50mV, you need to replace the electrode.

CLEANING & STORAGE OF A pH ELECTRODE

Note: By cleaning the electrode with the help of the proper cleaning solution, you insure optimum results and longer life to your valuable instrument.

Product	Application
HI 7074	Cleaning Solution for Inorganic Substances
	This solution is especially made for inorganic substances but will be very effective in other applications as well. It is usually used in industrial applications. Probably the fastest cleaning solution you can use.
	Cleaning time: 5 to 15 minutes
	Frequency: Once or twice a month or more depending on application
HI 7077	Cleaning Solution for Oils
	An oily or greasy substance makes usually a difficult task for taking pH from sample to sample without contaminating the next one (because oils and greases are difficult to rinse with water). By rinsing the electrode with the HI 7077 and with distilled water after each measurement, you will be ready for the next sample.
HI 7073	Cleaning Solution for Protein
	This cleaning solution will stop the problem of having junction clogged with protein. The only thing you have to do is dip the tip of the electrode for 15 minutes, each time the response time begins to slow down.
	Use 1g. of the supplied powder for each 100 ml of solution.
HI 7061	Cleaning Solution for General Use
	This solution can be used for about any applications. It is not aggressive, so you should use it regularly and your electrode will be ready whenever you need to use it.
	Cleaning time: 30 minutes to 1 ½ hour
	Frequency: Once or twice a month or more depending on application

Storage of pH electrode

AFTER USE: Always clean the pH electrode with plenty of clean water and store it in the storage solution (fill the cap with storage solution and put it back on). Verify the level regularly, as the solution will evaporate. Whenever you need to take measurements, the pH electrode will be ready to use as it will already be conditioned.

VERIFICATION OF ORP ELECTRODES

First look for broken sensor (platinum ring or tip). If the sensor seems to be OK, make sure your ORP sensor is well conditioned (soak sensor into HI 7091 or HI 7092 solution for 15 minutes). If the sensor is still giving bad readings, see cleaning procedure and preparation & testing of ORP electrodes.

CLEANING & STORAGE OF ORP ELECTRODES

ORP electrodes are cleaned with the same cleaning procedure used for pH electrodes (see page 109). On ORP electrodes, this cleaning procedure will clean the electrode's junction.

In addition to that, platinum or gold tips & rings can be clean as follow:

Platinum tip or ring: Soak the electrode into HI 7092 solution for 30 minutes.

Gold tip or ring: Soak the electrode into HI 7091 solution for 30 minutes.

It is recommended to make a quick test with HI 7021 or HI 7022 prior to use.

When not used, ORP electrodes should be stored into HI 70300 storage solution.

PREPARATION & TESTING OF ORP ELECTRODES

ORP electrodes need to be conditioned prior to use.

When the electrode is new, soak the tip in warm tap water. This will enhance the flow of the reference junction. To check function of the electrode, immerse the tip in ORP solution HI 7021 or HI 7022. The reading should be ± 50mV from the value indicated on the bottle.

If the reading is not within ± 50mV, oxidizing or reduction treatment with HI 7092 or HI 7091 respectively is required. It will also prepare the electrode's surface and speed initial response time. Since in-line process electrodes are already in a solution, a simple test with either HI 7021 or HI 7022 will show you the electrode's condition.

Should your probe not be accurate enough after conditioning & testing, follow the cleaning procedure.

Cleaning & storage of EC/TDS/Resistivity probes

Conductivity probes are simple to clean. Use a cotton swab with alcohol for dual pin sensors (amperometric) and a cloth with alcohol for 4 ring type sensors (potentiometric).

Probes can be stored dry in a clean environment.

Hanna Instruments products are manufactured in our ISO 9001 facilities meeting the highest quality standards in the industry. Hanna's high standards also apply should a product be returned due to defects in material or workmanship. Our extensive warranty extends up to 2 years on some products.

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

The warranty period commences from the original date of sale to the end-user buyer. Warranty is valid only when the product is used under normal conditions and in accordance with operating limitations and prescribed maintenance procedures. The express warranty stated previously is the only expressed warranty given by Hanna to the end-user buyer. Hanna expressly disclaims any warranties implied by law, including but not limited to warranty of merchantability of fitness for a particular purpose. Hanna shall not be liable for any kind of breach of any warranty, negligence, on the basis of strict liability or otherwise.

HANNA Instruments warranty periods are :

2 Years	Portable Meters
2 Years	Bench Meters
2 Years	Printing Meters
2 Years	Stirrers
2 Years	On-line Instruments
1 Year	Waterproof Testers
6 Months	Testers & Pocket-size Thermometers
6 Months	Electrodes & Probes

Chemical test kits

Pocket meters

Water monitoring

pH meters

Titrators

pH & ORP electrodes

pH & ORP solutions

Conductivity meters

ISM - colorimeters

Turbidity meters

DO meters

Hygrometers

Thermometers

Temperature probes

Magnetic stirrers

HACCP products

Process meters

Your authorized Hanna dealer