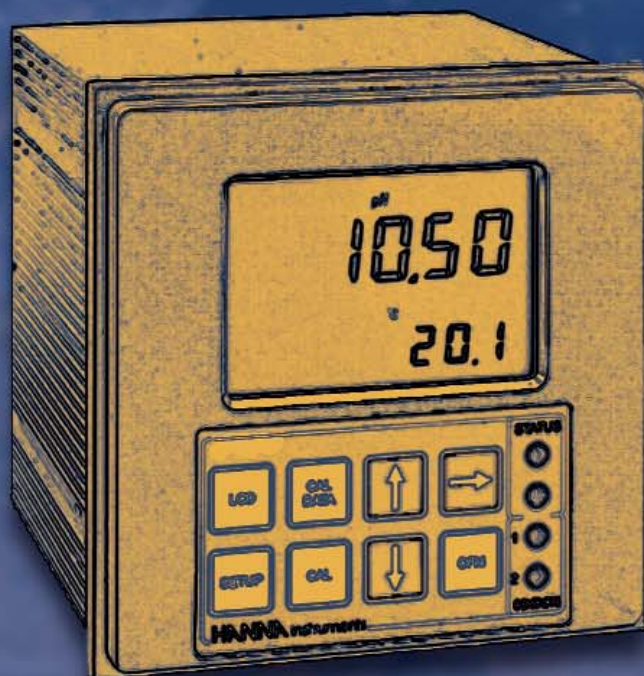


# Industrial Division Controllers



**HANNA**  
instruments  
C A N A D A



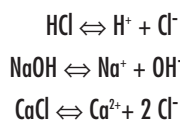
# Process Measurements

## pH, ORP & Conductivity Measurements

### Process pH measurement

pH measurement is a mean of determining whether a substance is acidic or basic (alkaline). In process applications, pH measurement and control are 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<sup>+</sup>) and hydroxyl ion (OH<sup>-</sup>) 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, alkalis 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:



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.

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

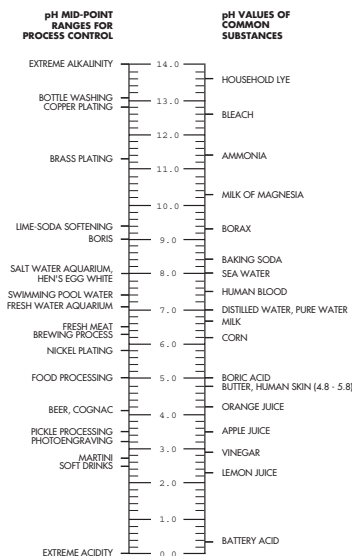
Therefore, when we know the hydrogen ion concentration, the hydroxyl ion concentration is also known. When a census of hydrogen ion activity is taken, we find that it is logarithmic. In 1909, the Danish scientist S.P.L. Sorensen proposed the original

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):

$$\text{pH} = -\log[\text{H}^+]$$

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



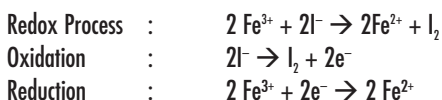
### Process ORP measurement

#### 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<sup>+++</sup>)



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.



### 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 ( $\mu\text{S/cm}$ ), 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:

$$1.4 \mu\text{S/cm} = 1 \text{ ppm} \quad \text{or} \quad 2 \mu\text{S/cm} = 1 \text{ ppm (part per million of CaCO}_3\text{)}$$

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  $\beta$  is used.  $\beta$  is expressed in percentage per degrees Celsius or  $\%/^\circ\text{C}$  and it varies accordingly to the solution being measured. In most applications, 2% per degree Celsius is used as an approximate value for  $\beta$ .

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

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  $\mu\text{S/cm}$  and 100 g/l.





# Controllers

## HI 504 - pH controllers

Hanna Instruments introduces the new innovating HI 504 series. The HI 504 offer elevated performance capabilities, rugged design and exploit an intelligent and advantageous use of tele-control technology. This technology supplies the means to control from whatever distance and in real time, one or more installations, creating the possibility to optimise operations such as maintenance cycles and reducing unscheduled and costly plant shutdowns. Operators can control the complete regulation process by the RS 485 output and Windows® compatible software. Measurement reliability is guaranteed by many self-diagnostic and troubleshooting functions. The different models of the HI 504 series are designed to fit your individual needs, able to satisfy whatever application of monitoring and regulation you might require. Coupled to Hanna industrial pH & ORP probes, all your industrial problems can be resolved.

- Sensor check pH/ORP
- RS 485 interface
- Digital transmitter input
- Programmable auto-cleaning cycle
- Fail safe alarm system
- Automatic Temperature Compensation
- Programmable Hold System



**AVAILABLE SOON!**



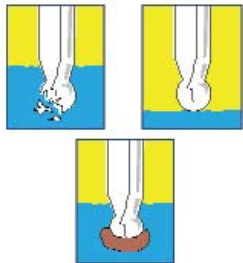
### Sensor check pH/ORP

Incorporated in the self-diagnostic functions of the instrument, the "sensor check system" provides a continuous inspection of the probe's condition. With this troubleshooting system, a precise reading is guaranteed. The test is not limited to a simple signal that indicates that an error is in progress, in fact, it reports the very nature of the breakdown, communicating directly on the instrument's display a code that corresponds to an individual error. With the accessory HI 504900 (cellular module) eventual errors or alarms can be sent directly to the operator's mobile phone under the form of an SMS message.

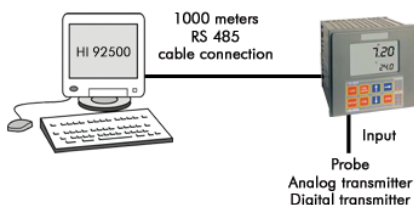
The types of breakdowns shown by the "sensor check system" are:

- pH probe damaged
- Reference probe contaminated
- Reference or matching pin not immersed in liquid
- Dirty or blocked junction
- Short circuit between the cable and the probe
- Loss of signal from the cable or the connector caused by humidity or dirt.

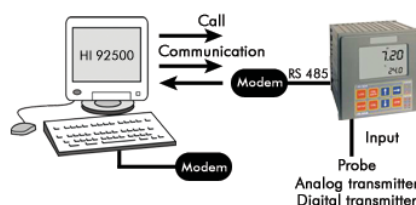
Some types of revealed breakdowns



### PC connection



### Traditional Modem Connection



### Wireless Modem Connection



### Programmable auto-cleaning cycle

Heavy-duty applications often require an almost continuous maintenance of the probe. In a brief period elements such as suspended solids, fat, oils, pigments and micro-organisms can deposit and soil the glass bulb of a pH probe, the sensor of an ORP probe or the reference junction of both. The *cleaning* function permits the control of these inconveniences by programming one or more wash cycles of the probe, a fundamental characteristic, especially in "batch production".

### Fail safe alarm system

Our exclusive "fail safe" alarm system represents an efficient protection both on a hardware and a software level against problems caused by interruption of the power supply or by human error, which are typical risks in an industrial ambient. The alarm goes into action when there is a loss of tension. On a software level, the "fail safe" function activates an alarm in the case of abnormal circumstances, for example, if the dosing contacts remain closed for an excessive period. During a "fail safe" alarm a red LED directly on the keyboard of the instrument starts to blink and can easily be seen for a distance.



**SPECIFICATIONS**

**HI 504 series**

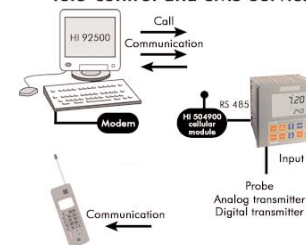
<b>RANGE</b>	-2.00 to 16.00 pH / -2000 to 2000 mV / -30 to 130.0°C
<b>RESOLUTION</b>	0.01 pH / 1 mV / 0.1°C above -10°C; 1°C below -10°C
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH / ± 2 mV / ± 0.5°C (-9.9 to 130.0°C); ± 1°C (-30 to -10°C)
<b>DIGITAL INPUT FOR pH/ORP/°C</b>	
<b>DIGITAL TRANSMITTER</b>	RS 485
<b>OTHER INSULATED INPUTS</b>	1 HOLD and 1 ADVANCED CLEANING; activated from 5 to 24 VDC
<b>OUTPUT ALIMENTATION</b>	-5V; +5V (for amplified probes with external power sources)
<b>DIGITAL INSULATED OUTPUT</b>	Contact closed with instrument in HOLD mode
<b>ANALOG OUTPUT</b>	1 or 2 independent outputs (0-2 mA or 4-20 mA)
<b>ANALOG OUTPUT RESOLUTION</b>	0.1% F.S.
<b>ANALOG OUTPUT ACCURACY</b>	± 2% F.S.
<b>RELAYS: 1/2/3/4</b>	Electromechanical with SPDT contacts; 5A-250VAC, 5A-30VDC (resistive load) Protection fuse: 5A, 250V Quick Blow Fuse
<b>ALARM RELAY</b>	Electromechanical with SPDT contacts; 5A-250VAC, 5A-30VDC (resistive load) Protection fuse: 5A, 250V Quick Blow Fuse
<b>TEMPERATURE COMPENSATION</b>	Automatic or manual from -30 to 130°C
<b>TEMPERATURE PROBE</b>	Pt 100 / Pt 1000 (with sensor check and automatic recognition)
<b>POWER SUPPLY</b>	230 ± 10% VAC, 115 ± 10% VAC or 100 ± 10% VAC; 50/60 Hz (depending on the model)
<b>POWER CONSUMPTION</b>	10 VA
<b>OVER CURRENT PROTECTION</b>	400 mA 250 V Quick Blow Fuse
<b>MAXIMUM OSCILLATION FREQUENCY</b>	8 MHz
<b>ENVIRONMENT</b>	0 to 50°C (32 to 122°F); max 85% RH non-condensing
<b>CASING</b>	IP20 (housing); IP54 (front panel)
<b>WEIGHT</b>	1.6 kg (3.5 lb)



**Message received!**



**Tele-control and SMS Service**



**HOW TO ORDER**

HI 504112-1	pH/ORP controller, 1 SP, on/off, 1 an-out, RS485 (115 VAC)
HI 504114-1	pH/ORP controller, 1 SP, on/off, 2 an-out, RS485 (115 VAC)
HI 504122-1	pH/ORP controller, 1 SP, on/off, 1 an-out, RS485 (115 VAC), & PID
HI 504124-1	pH/ORP controller, 1 SP, on/off, 2 an-out, RS485 (115 VAC), & PID
HI 504212-1	pH/ORP controller, 2 SP, on/off, 1 an-out, RS485 (115 VAC)
HI 504214-1	pH/ORP controller, 2 SP, on/off, 2 an-out (115 VAC)
HI 504222-1	pH/ORP controller, 2 SP, on/off, 1 an-out, RS485 (115 VAC), & PID
HI 504224-1	pH/ORP controller, 2 SP, on/off, 2 an-out, (115 VAC), & PID
HI 504812-1	pH/ORP controller, 2 SP, dig-tx, on/off, 1 an-out, RS485 (115 VAC)
HI 504814-1	pH/ORP controller, 2 SP, dig-tx, on/off, 2 an-out, (115 VAC)
HI 504822-1	pH/ORP controller, 2 SP, dig-tx, on/off, 1 an-out, RS485 (115 V) & PID
HI 504824-1	pH/ORP controller, 2 SP, dig-tx, on/off, 2 an-out, (115 VAC), & PID
HI 504912-1	pH/ORP controller, 2 SP, clean, dig-tx, on/off, 1 an-out, RS485 (115 V)
HI 504914-1	pH/ORP controller, 2 SP, clean, dig-tx, on/off, 2 an-out, (115 VAC)
HI 504922-1	pH/ORP controller, 2 SP, clean, dig-tx, on/off, 1 an-out, RS485 (115 V) & PID
HI 504924-1	pH/ORP controller, 2 SP, clean, dig-tx, on/off, 2 an-out, RS485 (115 V) & PID

**SUGGESTED ACCESSORIES**

HI 504910	pH/ORP digital transmitter.
HI 504920	Calibrator for digital transmitter

**GSM Cellular Module**

The ability to optimise the running of an industrial process plant, means more than anything else the reduction of costly unscheduled shutdown time. With this mind, Hanna Instruments have developed a GSM cellular module, HI 504900, used for sending SMS alarm messages, and on request from authorized plant personal live updates on actual process conditions.

The GSM cellular module permits the user to memorise one or two mobile phone numbers, to which alarm messages can be sent whenever a malfunction is revealed. The SMS message reports a clearly and immediately understandable phrase that expresses the nature of the alarm in course, for example:

- pH probe damaged
- High setpoint exceeded
- Temperature probe damaged
- Broken pH probe



# Advanced microprocessor pH, ORP, Conductivity & TDS

**HANNA**  
instruments  
C A N A D A  
1-800-842-6629

## 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

- 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

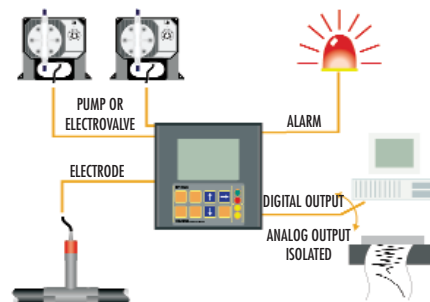
The large, dual-level LCD shows both main parameter (pH/ORP/Conductivity/TDS) and temperature, it guides operators through calibration and programming with step-by-step prompts. The choice of ON/OFF or proportional control provides extra versatility and makes it possible to pick the process controller 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, mV 600, mV 602 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.





- 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 RS 232C 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 RS 232 output allow computer compatibility, a necessity for process control instrumentation.

SPECIFICATIONS	pH 500/D	pH 500/U
<b>RANGE</b>	0.00 to 14.00 pH / -9.9 to 120.0°C	
<b>RESOLUTION</b>	0.01 pH / 0.1°C	
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH / ± 0.5°C	
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	
<b>CALIBRATION</b>	1, 2, or 3 points at pH 4.01, 7.01 and 10.01	
<b>TEMPERATURE COMPENSATION</b>	Automatic (with Pt100) or manual from -9.9 to 120°C	
<b>READOUT</b>	4 1/2-digit dual level LCD with graphic symbols and messages	
<b>OUTPUTS</b>	Digital: RS 232 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 5 VDC, 1 to 5 VDC and 0 to 10 VDC (min. resistive load 1KW)	
<b>SETPOINT RELAY(S)</b>	1 or 2: SPST NO contact outputs 5A-250 VAC, 5A-30 VDC (resistive load)	
<b>POWER SUPPLY</b>	230 V ±10% VAC; 50 Hz	115 V ±10% VAC; 60 Hz
<b>ENVIRONMENT</b>	0 to 50°C (32 to 122°F); max 85% RH non-condensing	
<b>PANEL CUTOUT</b>	140 x 140 mm (5.5 x 5.5")	
<b>DIMENSIONS</b>	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
<b>WEIGHT</b>	1.6 kg (3.5 lb)	

#### HOW TO ORDER

pH 500111	pH controller with single setpoint, ON/OFF control, analog output.
pH 500112	pH controller with single setpoint, ON/OFF control, RS 232 output.
pH 500121	pH controller with single setpoint, prop. control, analog output.
pH 500122	pH controller with single setpoint, prop. control, RS 232 output.
pH 500211	pH controller with dual setpoints, ON/OFF control, analog output.
pH 500212	pH controller with dual setpoints, ON/OFF control, RS 232 output.
pH 500211	pH controller with dual setpoints, prop. control, analog output.
pH 500212	pH controller with dual setpoints, prop. control, RS 232 output.

#### SUGGESTED ACCESSORIES

HI 1006-1007	Low T° glass type pH probe, 0-12 pH, double Teflon® junction, polymer electrolyte, matching pin, -10 to 80°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7004L	pH 4.01 buffer solution, 460 ml
		HI 7007L	pH 7.01 buffer solution, 460 ml
		HI 7010L	pH 10.01 buffer solution, 460 ml
HI 6101805	High T° glass type pH probe, 0-14 pH, double Teflon® junction, polymer electrolyte, matching pin, AmpHel, 0 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 5 m cable.	HI 7074L	Cleaning solution for pH probe, 460 ml
		HI 70300L	Storage solution for pH probe, 460 ml



# Controllers

## pH 502 - pH controllers

**HANNA**  
instruments  
CANADA  
1-800-842-6629

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
<b>RANGE</b>	0.00 to 14.00 pH / -9.9 to 120.0°C	
<b>RESOLUTION</b>	0.01 pH / 0.1°C	
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH / ± 0.5°C	
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	
<b>CALIBRATION</b>	1, 2, or 3 points at pH 4.01, 7.01 and 10.01	
<b>TEMPERATURE COMPENSATION</b>	Automatic (with Pt100) or manual from -9.9 to 120°C	
<b>READOUT</b>	4 1/2-digit dual level LCD with graphic symbols and messages	
<b>OUTPUTS</b>	Digital: RS 485 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 5 VDC, 1 to 5 VDC and 0 to 10 VDC (min. resistive load 1KW)	
<b>SETPOINT RELAY</b>	1 SSR, 1 A, 12 VDC to 230 VAC ± 10% (resistive and inductive load)	
<b>POWER SUPPLY</b>	230 V ± 10% VAC; 50 Hz	115 V ± 10% VAC; 60 Hz
<b>ENVIRONMENT</b>	0 to 50°C (32 to 122°F); max 85% RH non-condensing	
<b>PANEL CUTOUT</b>	140 x 140 mm (5.5 x 5.5")	
<b>DIMENSIONS</b>	1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")	
<b>WEIGHT</b>	1.6 kg (3.5 lb)	

### HOW TO ORDER

pH 502113	pH controller, single setpoint, ON/OFF control, RS 485 & analog output.
pH 502123	pH controller, single setpoint, ON/OFF or prop. control, RS 485 & analog output.
pH 502213	pH controller, dual setpoint, ON/OFF control, RS 485 & analog output.
pH 502223	pH controller, dual setpoint, ON/OFF or prop. control, RS 485 & analog output.
pH 502321	pH controller, single setpoint, ON/OFF or prop. control, relay & analog output.
pH 502322	pH controller, single setpoint, ON/OFF or prop. control, relay & RS 485 output.
pH 502323	pH controller, single setpoint, ON/OFF or prop. control, relay, RS 485 & analog output.
pH 502421	pH controller, dual setpoint, ON/OFF or prop. control, relay & analog output.
pH 502422	pH controller, dual setpoint, ON/OFF or prop. control, relay & RS 485 output.
pH 502423	pH controller, dual setpoint, ON/OFF or prop. control, relay, RS 485 & analog output.
pH 502523	pH controller, dual setpoint, prop. & PID control, RS 485 through analog output.

### SUGGESTED ACCESSORIES

HI 1006-1007	Low T° glass type pH probe, 0-12 pH, double Teflon® junction, polymer electrolyte, matching pin, -10 to 80°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7004L	pH 4.01 buffer solution, 460 ml
		HI 7007L	pH 7.01 buffer solution, 460 ml
		HI 7010L	pH 10.01 buffer solution, 460 ml
HI 6101805	High T° glass type pH probe, 0-14 pH, double Teflon® junction, polymer electrolyte, matching pin, AmpHel, 0 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 5 m cable.	HI 7074L	Cleaning solution for pH probe, 460 ml
		HI 70300L	Storage solution for pH probe, 460 ml





- 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 mV 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
<b>RANGE</b>		-2000 to 2000 mV
<b>RESOLUTION</b>		1 mV
<b>ACCURACY (@20°C/68°F)</b>		± 2 mV
<b>INPUT</b>		High Impedance 10 <sup>12</sup> ohm
<b>CALIBRATION</b>		At 0 and 350 or 1900 mV
<b>READOUT</b>		4 1/2-digit dual level LCD with graphic symbols and messages
<b>OUTPUTS</b>	Digital: RS 232 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 5 VDC, 1 to 5 VDC and 0 to 10 VDC (min. resistive load 1KW)	
<b>SETPOINT RELAY</b>		SPST NO contact output 5A-250 VAC, 5 A-30 VDC (resistive load)
<b>POWER SUPPLY</b>	230 V ± 10% VAC; 50 Hz	115 V ± 10% VAC; 60 Hz
<b>ENVIRONMENT</b>		0 to 50°C (32 to 122°F); max 85% RH non-condensing
<b>PANEL CUTOUT</b>		140 x 140 mm (5.5 x 5.5")
<b>DIMENSIONS</b>		1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")
<b>WEIGHT</b>		1.6 kg (3.5 lb)

#### HOW TO ORDER

mV 600111	mV controller with single setpoint, ON/OFF control, analog output.
mV 600112	mV controller with single setpoint, ON/OFF control, RS 232 output.
mV 600121	mV controller with single setpoint, prop. control, analog output.
mV 600122	mV controller with single setpoint, prop. control, RS 232 output.

#### SUGGESTED ACCESSORIES

HI 2004-1007	Platinum ORP probe, ± 2000 mV, double Teflon® junction, polymer electrolyte, matching pin, -5 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7091L	Pretreatment reducing solution, 460 ml
HI 2004-2007	Gold ORP probe, ± 2000 mV, double Teflon® junction, polymer electrolyte, matching pin, -5 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7092L	Pretreatment oxidizing solution, 460 ml
		HI 7021L	Test solution @ 240 mV, 460 ml
		HI 7022L	Test solution @ 470 mV, 460 ml



## mV 602 - ORP controllers

**HANNA**  
instruments  
CANADA  
1-800-842-6629

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 RS 485 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
<b>RANGE</b>		-2000 to 2000 mV
<b>RESOLUTION</b>		1 mV
<b>ACCURACY (@20°C/68°F)</b>		± 2 mV
<b>INPUT</b>		High Impedance 10 <sup>12</sup> ohm
<b>CALIBRATION</b>		At 0 and 350 or 1900 mV
<b>READOUT</b>		4 1/2-digit dual level LCD with graphic symbols and messages
<b>OUTPUTS</b>	Digital:	RS 485 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 5 VDC, 1 to 5 VDC and 0 to 10 VDC (min resistive load 1KW)
<b>SETPOINT RELAY</b>		SPST NO contact output 5 A-250 VAC, 5 A-30 VDC (resistive load) or SSR, 1A, 12 VDC to 230 VAC ± 10% (resistive and inductive load)
<b>POWER SUPPLY</b>	230 V ± 10% VAC; 50 Hz	115 V ± 10% VAC; 60 Hz
<b>ENVIRONMENT</b>		0 to 50°C (32 to 122°F); max 85% RH non-condensing
<b>PANEL CUTOUT</b>		140 x 140 mm (5.5 x 5.5")
<b>DIMENSIONS</b>		1/2 DIN 144 x 144 x 170 mm (5.7 x 5.7 x 6.7")
<b>WEIGHT</b>		1.6 kg (3.5 lb)

### HOW TO ORDER

mV 602113	ORP controller, single setpoint, ON/OFF control, analog & RS 485 output.
mV 602123	ORP controller, single setpoint, ON/OFF or PID control, analog & RS 485 output.
mV 602321	ORP controller, single setpoint, ON/OFF or PID control, relay & analog output.
mV 602322	ORP controller, single setpoint, ON/OFF or PID control, relay & RS 485 output.
mV 602323	ORP controller, single setpoint, ON/OFF or PID control, relay, RS 485 & analog output.
mV 602523	ORP controller, single setpoint, PID control, RS 485 through analog output.

### SUGGESTED ACCESSORIES

HI 2004-1007	Platinum ORP probe, ± 2000 mV, double Teflon® junction, polymer electrolyte, matching pin, -5 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7091L	Pretreatment reducing solution, 460 ml
		HI 7092L	Pretreatment oxidizing solution, 460 ml
		HI 7021L	Test solution @ 240 mV, 460 ml
HI 2004-2007	Gold ORP probe, ± 2000 mV, double Teflon® junction, polymer electrolyte, matching pin, -5 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7022L	Test solution @ 470 mV, 460 ml



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

#### HOW TO ORDER

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 Pt100 probe and 3 m (9.9') cable	HI 7039L	5000 $\mu\text{S}$ EC solution, 460 ml
HI 7640	EC/TDS probe for tank applications and 3 m (9.9') cable	HI 7033L	84 $\mu\text{S}$ EC solution, 460 ml
HI 3011	EC/TDS in-line probe and 3 m (9.9') cable	HI 70038P	6.44 ppt (g/l) TDS single use calibration sachets, 25 x 20 ml
HI 3012	EC/TDS probe for tank applications and 3 m (9.9') cable	HI 7032L	1382 ppm EC solution, 460 ml
HI 7030L	12880 $\mu\text{S}$ EC solution, 460 ml	HI 70080P	800 ppm TDS single use calibration sachets, 25 x 20 ml
HI 7031L	1413 $\mu\text{S}$ EC solution, 460 ml		



# Economical Series pH, ORP & Conductivity controllers & indicators

## 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 !

1- Dual setpoint control

2- Sensor status test button

3- Meter calibration status test button



4- High and low alarm

5- Splash proof IP42 transparent protective cover

6- Accurate measurements with 0.01 pH & 1 mV resolution

### Technical superiority

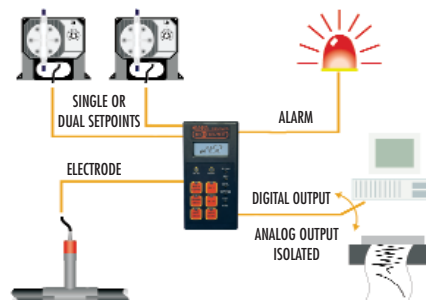
Hanna's panel mounted pH, ORP, and conductivity controllers are designed to meet your most demanding process control requirements. Where a direct electrode input is not suitable, the controller is available with a 4-20 mA input from the amplifier. This feature greatly improves the safety of your instrumentation 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 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.





- 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<sup>12</sup> ohm), or input from a pH transmitter (4 to 20 mA)
- 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
<b>RANGE</b>		0.00 to 14.00 pH
<b>RESOLUTION</b>		0.01 pH
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH	± 0.5%
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	4 to 20 mA
<b>CALIBRATION</b>	Offset: ± 2 pH by Δ 0 trimmer / Slope: 80 to 100% by slope trimmer	
<b>TEMPERATURE COMPENSATION</b>	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
<b>READOUT</b>	4 digit LCD with graphic symbols	
<b>RECORDER OUTPUT</b>	0 to 20 mA or 4 to 20 mA (isolated)	
<b>POWER SUPPLY</b>	110/115 V or 220/240 V; 50/60 Hz	
<b>ENCLOSURE</b>	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	
<b>ENVIRONMENT</b>	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
<b>PANEL CUTOUT</b>	141 x 69 mm (5.55 x 2.71")	
<b>WEIGHT</b>	1 kg (2.2 lb)	

#### HOW TO ORDER

##### 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 1006-1007	Low T° pH probe, 0-12 pH, double Teflon® junction, polymer electrolyte, matching pin, -10 to 80°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7004L	pH 4.01 buffer solution, 460 ml
		HI 7007L	pH 7.01 buffer solution, 460 ml
		HI 7010L	pH 10.01 buffer solution, 460 ml
HI 1006-3007	High T° pH probe, 0-14 pH, double Teflon® junction, polymer electrolyte, matching pin, 0 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7074L	Cleaning solution for pH probe, 460 ml
		HI 70300L	Storage solution for pH probe, 460 ml



# Controllers

## HI 8710 - pH controllers

**HANNA**  
instruments  
CANADA  
1-800-842-6629

- 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.
- 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
<b>RANGE</b>		0.00 to 14.00 pH
<b>RESOLUTION</b>		0.01 pH
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH	± 0.5%
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	4 to 20 mA
<b>CALIBRATION</b>	Offset: ± 2 pH by Δ 0 trimmer / Slope: 80 to 110% by slope trimmer	
<b>TEMPERATURE COMPENSATION</b>	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
<b>READOUT</b>	4 digit LCD with graphic symbols	
<b>RECORDER OUTPUT</b>	0 to 20 mA or 4 to 20 mA (isolated)	
<b>SET POINT RELAY</b>	One, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes	
<b>ALARM RELAY</b>	One, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes	
<b>POWER SUPPLY</b>	110/115 V or 220/240 V; 50/60 Hz	
<b>ENCLOSURE</b>	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	
<b>ENVIRONMENT</b>	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
<b>PANEL CUTOUT</b>	141 x 69 mm (5.55 x 2.71")	
<b>WEIGHT</b>	1 kg (2.2 lb)	

### HOW TO ORDER

#### 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 1006-1007	Low T° pH probe, 0-12 pH, double Teflon® junction, polymer electrolyte, matching pin, -10 to 80°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7004L	pH 4.01 buffer solution, 460 ml
		HI 7007L	pH 7.01 buffer solution, 460 ml
		HI 7010L	pH 10.01 buffer solution, 460 ml
HI 1006-3007	High T° pH probe, 0-14 pH, double Teflon® junction, polymer electrolyte, matching pin, 0 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7074L	Cleaning solution for pH probe, 460 ml
		HI 70300L	Storage solution for pH probe, 460 ml



- 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.
- 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
<b>RANGE</b>	0.00 to 14.00 pH	
<b>RESOLUTION</b>	0.01 pH	
<b>ACCURACY (@20°C/68°F)</b>	± 0.02 pH	± 0.5%
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	4 to 20 mA
<b>CALIBRATION</b>	Offset: ± 2 pH by Δ 0 trimmer / Slope: 80 to 110% by slope trimmer	
<b>TEMPERATURE COMPENSATION</b>	Fixed or automatic with Pt100 from 0 to 100°C (32 to 212°F)	
<b>READOUT</b>	4 digit LCD with graphic symbols	
<b>RECORDER OUTPUT</b>	0 to 20 mA or 4 to 20 mA (isolated)	
<b>SET POINT RELAY</b>	Two, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes	
<b>ALARM RELAY</b>	One, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes	
<b>POWER SUPPLY</b>	110/115 V or 220/240 V; 50/60 Hz	
<b>ENCLOSURE</b>	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	
<b>ENVIRONMENT</b>	-10 to 50°C (14 to 122°F); RH 95% non-condensing	
<b>PANEL CUTOUT</b>	141 x 69 mm (5.55 x 2.71")	
<b>WEIGHT</b>	1 kg (2.2 lb)	

#### HOW TO ORDER

##### 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 1006-1007	Low T° pH probe, 0-12 pH, double Teflon® junction, polymer electrolyte, matching pin, -10 to 80°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7004L	pH 4.01 buffer solution, 460 ml
		HI 7007L	pH 7.01 buffer solution, 460 ml
		HI 7010L	pH 10.01 buffer solution, 460 ml
HI 1006-3007	High T° pH probe, 0-14 pH, double Teflon® junction, polymer electrolyte, matching pin, 0 to 100°C, 6 bars (87 PSI) pressure, PVDF body, BNC connector & 7 m cable.	HI 7074L	Cleaning solution for pH probe, 460 ml
		HI 70300L	Storage solution for pH probe, 460 ml



# Controllers

## 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
<b>RANGE</b>		-1000 to 1000 mV
<b>RESOLUTION</b>		1 mV
<b>ACCURACY (@20°C/68°F)</b>	± 5 mV	± 0.5%
<b>INPUT</b>	High Impedance 10 <sup>12</sup> ohm	4 to 20 mA
<b>CALIBRATION</b>		Slope: 90 to 110% by slope trimmer
<b>READOUT</b>		4 digit LCD with graphic symbols
<b>RECORDER OUTPUT</b>		0 to 20 mA or 4 to 20 mA (isolated)
<b>SET POINT RELAY</b>		Two, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes
<b>ALARM RELAY</b>		One, isolated, 2 A, max 240 V resistive load, 1,000,000 strokes
<b>POWER SUPPLY</b>		110/115 V or 220/240 V; 50/60 Hz
<b>ENCLOSURE</b>		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
<b>ENVIRONMENT</b>		-10 to 50°C (14 to 122°F); RH 95% non-condensing
<b>PANEL CUTOUT</b>		141 x 69 mm (5.55 x 2.71")
<b>WEIGHT</b>		1 kg (2.2 lb)

### HOW TO ORDER

#### INPUT FROM ELECTRODE

HI 8520E020 with 0 to 20 mA recorder output  
HI 8520E420 with 4 to 20 mA recorder output

#### INPUT FROM TRANSMITTER

HI8520T020 with 0 to 20 mA recorder output  
HI 8520T420 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 7 m cable. Range ± 2000 mV, -5 to 100°C (23 to 212°F)	HI 7091L	Pretreatment reducing solution, 460 ml
		HI 7092L	Pretreatment oxidizing solution, 460 ml
		HI 7021L	Test solution @ 240 mV, 460 ml
HI 2004-2007	Gold type ORP probe; PVDF body with guard, matching pin, double junction, polymer electrolyte, Teflon® annular junction, BNC connector and 7 m cable. Range ± 2000 mV, -5 to 100°C (23 to 212°F)	HI 7022L	Test solution @ 470 mV, 460 ml





- 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
<b>RANGE</b>	0.0 to 199.9 mS/cm	0.0 to 19.99 mS/cm	0 to 1999 $\mu$ S/cm	0.0 to 199.9 $\mu$ S/cm
<b>RESOLUTION</b>	0.1 mS/cm	0.01 mS/cm	1 $\mu$ S/cm	0.1 $\mu$ S/cm
<b>ACCURACY (@20°C/68°F)</b>			± 2% of full scale	
<b>TEMPERATURE COMPENSATION</b>		Automatic from 0 to 60°C (32 to 140°F) with 2% temperature coefficient		
<b>READOUT</b>		4-digit LCD plus graphic symbols		
<b>RECORDER OUTPUT</b>		4 to 20 mA (isolated)		
<b>SETPOINT RELAY</b>		One, isolated, 2 A, max 240 V, resistive load, 1,000,000 strokes		
<b>ALARM RELAY</b>		One, isolated, 2 A, max 240 V, resistive load, 1,000,000 strokes		
<b>POWER SUPPLY</b>		110/115 V or 220/240 V; 50/60 Hz		
<b>ENVIRONMENT</b>		-10 to 50°C (14 to 122°F); max 95% RH non-condensing		
<b>PANEL CUTOUT</b>		141 x 69 mm (5.55 x 2.71")		
<b>ENCLOSURE</b>		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.		
<b>WEIGHT</b>		1 kg (2.2 lb)		

**HOW TO ORDER**

HI 943500A	0.0 to 199.9 mS/cm controller	HI 943500C	0 to 1999 $\mu$ S/cm controller
HI 943500B	0.00 to 19.99 mS/cm controller	HI 943500D	0.0 to 199.9 $\mu$ S/cm controller

**SUGGESTED ACCESSORIES**

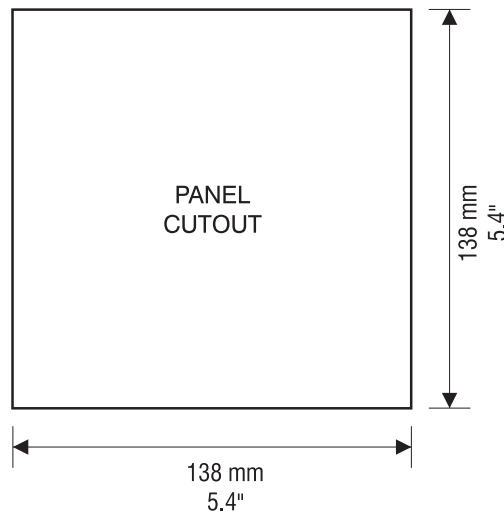
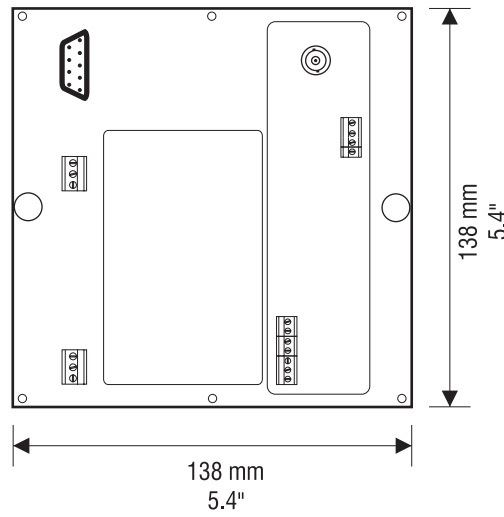
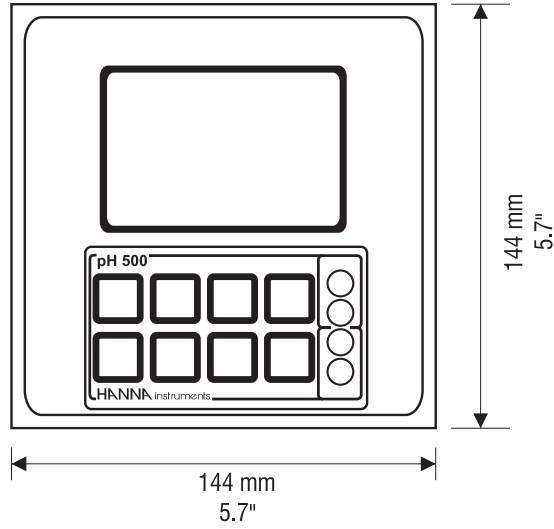
HI 7638	Platinum conductivity probe
HI 779/10	6 wire cable (10 m/33')
HI 7030L	EC solution, 12880 $\mu$ S, 460 ml
HI 7031L	EC solution, 1413 $\mu$ S, 460 ml
HI 7033L	EC solution, 84 $\mu$ S, 460 ml
HI 7034L	EC solution, 80000 $\mu$ S/cm, 460 ml



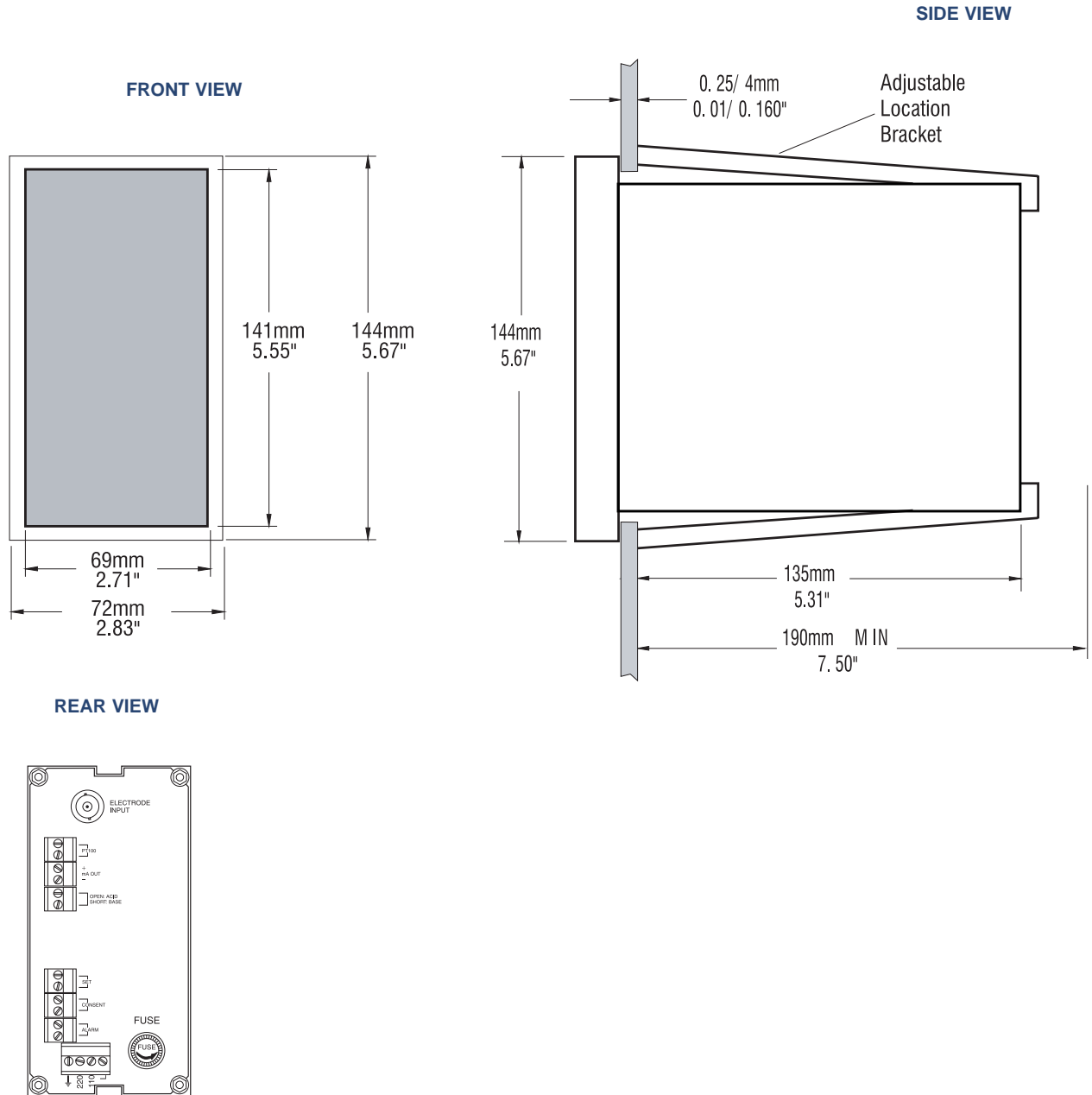
# Controllers

Mechanical dimensions

Diagram for pH 500, pH 502, mV 600, mV 602, HI 700, HI 705 & HI 710 series



**Diagram for HI 8510, HI 8512, HI 8710, HI 8711, HI 932500, HI 8720, HI 8931 & HI 943500 series**





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