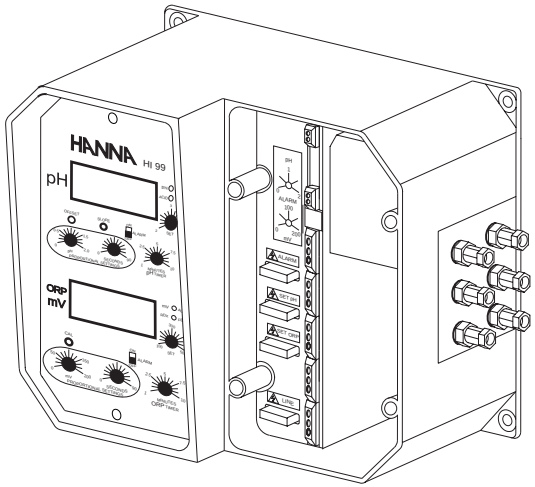
**Instruction Manual**

# HI 9912

## Wall Mounted Dual pH/ORP Controller




HANNA instruments
http://www.hannainst.com

CE
These Instruments are in Compliance with the CE Directives

Dear Customer,

Thank you for choosing a Hanna Product.

Please read this instruction manual carefully before using the instrument. This manual will provide you with the necessary information for a correct use of the instrument, as well as a more precise idea of its versatility. If you need more technical information, do not hesitate to e-mail us at tech@hannainst.com.

These instruments are in compliance with the CE directives.

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HANNA instruments

## PRELIMINARY EXAMINATION

Remove the instrument from the packing material and examine it carefully to make sure that no damage has occurred during shipping. If there is any noticeable damage, notify your Dealer.

**Note:** Save all packing materials until you are sure that the instrument functions correctly. Any defective item must be returned in the original packaging together with the supplied accessories.

**IMPORTANT:**

1. Read the instructions before using the instrument.
2. The instrument should be connected to a mains socket.
3. Never install the controller outdoors, in a wet or humid area or under direct sun light. Nor install the controller where liquids may be sprayed or poured on it.
4. The instrument's main power line as well as the dosage and alarm terminals are protected by separate 2A fuses. Use only 2A fuses for replacement.

## GENERAL DESCRIPTION

Hanna's **wall-mounted pH and ORP controller** with proportional control is designed to meet a variety of process control requirements, especially those in swimming pools and water conditioning.

HI 9912 provides for two separate relays, one for pH and another for ORP. In order to save on chemicals and due to the slow reaction of oxidants, the controller incorporates a Consent feature by which ORP measurements are adjusted *only after* pH has been corrected. The Consent feature makes the pH correction the master and the ORP adjustment the salve for a better control.

The electrodes can be installed quickly and easily. Simply plug the universal BNC connectors into the sockets and twist them into a secured position. Accurate measurements are displayed on large LCD's.

In order to avoid electrical noise and interference, HI 9912 provides for two ground probes (differential inputs.

The controllers come equipped with relays operating at a maximum of 2A (240V).

The Hanna controllers incorporate a triple contact alarm system. When activated, the alarm contacts will open or close, triggering the mechanism of your choice, whether a buzzer, light or any other electrical device.

The controller is housed in a rugged, modular, fiber-reinforced ABS housing.

All models can be wired to work with 110/115V or 220/240V 50/60 Hz power supplies.

## MECHANICAL LAYOUTS

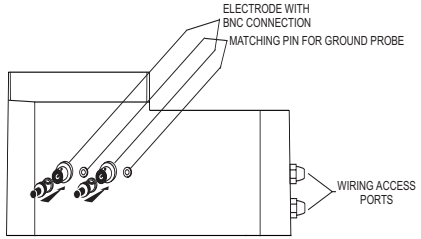



Fig. 1

Figure 1 illustrates the connectors for electrodes and the wiring access ports.

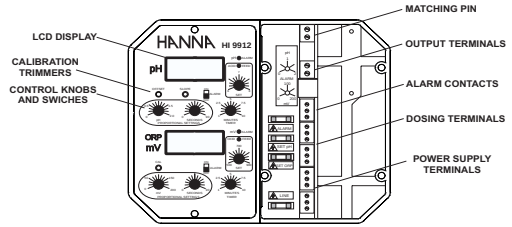



Fig. 2

Figure 2 illustrates the controls and terminals.

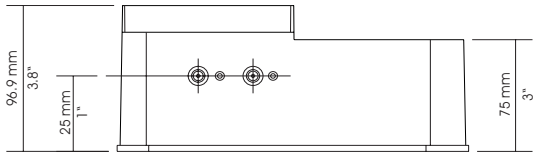



Fig. 3

Figure 3 is a dimensioned, bottom view of the Wall Mounted Controller. The modular design isolates the control circuitry from the contacts making it possible to make the connections and then close the compartment. Adjustments can then be made only in the control area, without having to open the contacts compartment.

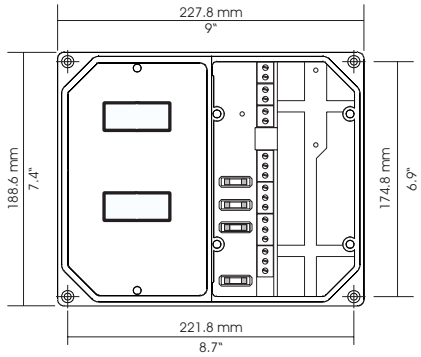


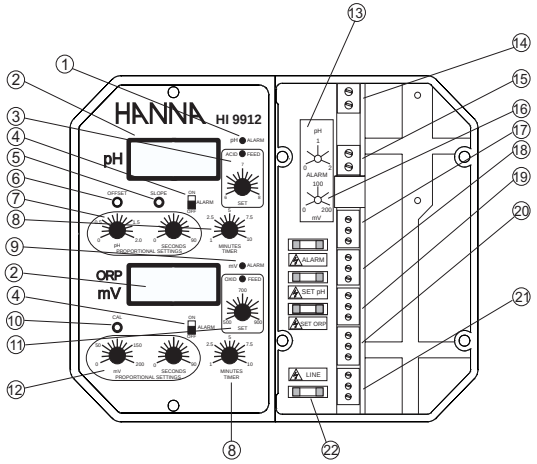

Fig. 4

Figure 4 is a dimensioned front view of the Wall Mounted Controller. The molded, mounting holes in the corners provide for quick and secure installation. No additional hardware is needed for mounting. All electrical connections and controls are located on the front of the instrument so that adjustment can be made without having to remove the unit.

# FUNCTIONAL DIAGRAM HI 9912

FRONT PANEL

## Left panel



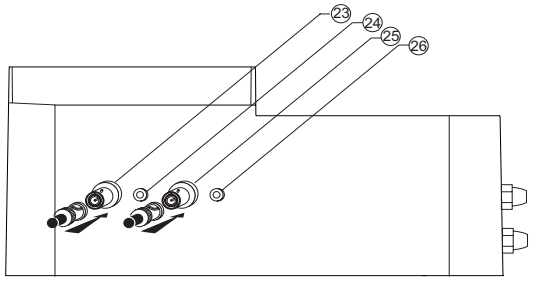

1. Alarm LED signal for pH
2. Liquid Crystal Displays for pH and ORP
3. Acid feed LED and dial to adjust the pH setpoint
4. Alarm disable switches for pH and ORP
5. Slope calibration trimmer for pH
6. Offset calibration trimmer for pH
7. Proportional pH band and time cycle settings
8. Two independent maximum dosage timers
9. Alarm LED for mV (ORP)
10. Calibration trimmer for mV
11. Oxidant feed LED and dial to adjust the ORP setpoint
12. Proportional mV band and time cycle settings

## Right panel

13. pH alarm setting from 0 to 2 pH
14. Short the terminals if a pH ground probe is not in use, or connect the ground probe wire to the Matching Pin terminal
15. Short the terminals if an ORP ground probe is not in use, or connect the ground probe wire to the Matching Pin terminal
16. ORP alarm setting from 0 to 200 mV

17. Triple contact alarm in a Normally Closed (NC) or a Normally Open (NO) position
18. Powered dosage terminals for pH correction
19. Powered dosage terminals for ORP correction
20. 110/115V or 220/240V power configuration
21. Incoming power terminals
22. Fuses

**BOTTOM VIEW**




23. Female BNC connector for a combination pH electrode
24. 4-mm Banana socket for the pH ground probe
25. Female BNC connector for a combination ORP electrode
26. 4-mm Banana socket for the ORP ground probe

⚠ Unplug the instrument from the power supply before wiring or replacing the fuses.

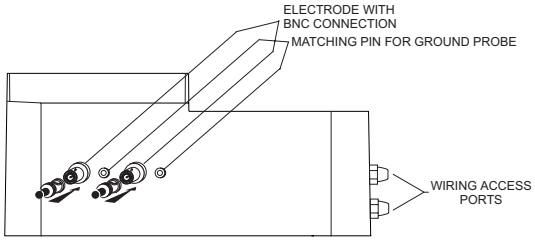
| Specifications | HI 9912 |
|---|---|
| RANGE | 0.00 to 14.00 pH and 0 to 1000 mV |
| RESOLUTION | 0.01 pH and 1mV |
| ACCURACY (@20°C/68°F) | ±0.02 pH and ±5 mV |
| TYPICAL EMC DEVIATION | ±0.1 pH and ±6 mV |
| CALIBRATION | Through "OFFSET" and "SLOPE" trimmers for pH and "CAL" for ORP |
| SETPOINT RANGE | From 6 to 8 pH and 500 to 900 mV |
| PROPORTIONAL CONTROL | Two independent controls: pH from 0.0 to 2.0 and ORP from 0 to 200 mV with two separate time cycle from 0 to 90 seconds |
| ALARM CONTACT | Relay can be configured as normally open or normally closed (isolated output Max. 2A, Max. 240V, resistive load, 1,000,000 strokes). The alarm is activated if pH varies by more than the user-selectable interval (0 to 2 pH), and/or ORP varies by more than the user selectable interval (0 to 200 mV) from the setpoints or due to overdosage |
| DOSING TERMINALS | Two sets of independent terminals (115 to 240V, Max.2A, 1,000,000 strokes) are activated whenever pH exceeds the pH setpoint or when ORP falls below the mV setpoint |
| POWER SUPPLY | 220/240V or 110/115V at 50/60Hz |
| ENVIRONMENT | -10 to 50°C (14 to 122°F)<br>max. 95% RH non-condensing |
| WEIGHT | 1.6 Kg (3.5 lb.) |
| ENCLOSURE | 181 x 221 x 142mm (7.1 x 8.7 x 5.6") |
| CASE MATERIAL | Fiber-reinforced, self-extinguishing ABS |

# CONNECTIONS & WIRING

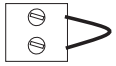
## GENERAL POINTS

- The **relay terminals** of the controller are **powered**. You can simply hook up your pumps or electrovalves directly to the controller and do not need additional power supply.
- Unscrew the 4 screws on the right hand panel and remove the cover and the gasket. Thread the wires through the access ports on the right hand side of the controller.
- ***Before*** **connecting the controller to the mains, wire the controller completely** and make all the connections for pumps, alarm, electrode, set the alarm threashold and adjust the settings. Upon completion **replace the cover**. *Only then* connect the controller to the power supply.

## ELECTRODE & GROUND PROBE CONNECTIONS




- Simply attach any combination **pH and ORP electrode** with a male BNC connector (such as HI 1002/3 and HI 2002/3) to the female BNC sockets located on the bottom of the casing and twist them into a secure position.
- HI 9912 also provides for Ground Probes (differential input) to reduce electrical noise and interference. The controller is shipped with the Matching Pin and Reference terminals shorted (see 14 and 15 - Functional Diagram). If you are not using a matching pin (ground probe), **leave the terminals shorted** and skip the next two paragraphs.



- It is recommended that only electrodes that incorporate a matching pin (such as HI 1003/3 and HI 2003/3) are utilized. In this case simply **attach the 4-mm banana connectors of the matching pins to the sockets** located next to the BNC connectors on the outer casing (see 24 and 26 - Functional

Diagram) and **remove the jumpers** shorting the matching pin terminals.

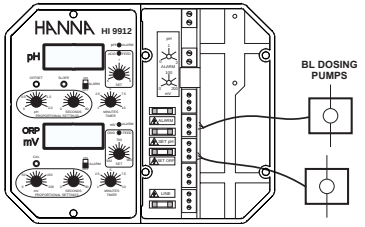
- When using a separate probe for grounding purposes, wire it to the Matching Pin terminals on the right hand panel and **remove the jumpers** (see 14 and 15 - Functional Diagram).

NOTE:

NEVER leave the jumper in when using an electrode with a matching pin. This can shorten the life of the electrode (reference) drastically.


## RELAY CONNECTIONS

- Wire the external devices (pumps or electrovalves) directly to the relay terminal strips of the controller (see 18 and 19 - Functional Diagram). The **terminals are powered** and hence you **do not need an external power supply** for the pumps or valves.

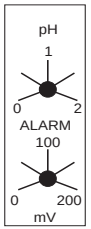



NOTE:

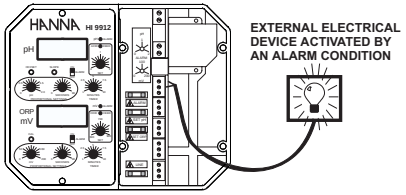
HI 9912 provides for two separate relays, one for pH and another for ORP. In order to save on chemicals and due to the slow reaction of oxidants, the controller incorporates a **Consent feature** by which ORP measurements are adjusted *only after* pH has been corrected. The Consent feature makes the **pH correction** the **master** and the **ORP adjustment** the **salve** for a better control.

## ALARM CONNECTIONS

- The operator can select an alarm threshold of 0.0 to 2.0 pH and 0 to 200 mV by turning the alarm knob (see 13 and 16 of Functional Diagram). The alarm can be selected as normally closed ("NC") by connecting the external device to the C and NC terminals or normally open ("NO") by connecting the external device to the C and NO terminals.



- If the actual measurements are above or below the setpoints by a margin greater than the user-selectable alarm threshold, the alarm terminal is activated, triggering the mechanism of your choice. The alarm LED lights also come on. Due to the **Consent feature**, if the pH is in alarm, both the pH and ORP relays will be disactivated. However, if only ORP is in an alarm condition, only the ORP relay will be disactivated.




- The alarm ON/OFF switch is only to **disable the alarm terminal** (e.g. the buzzer will not sound). However, all other functions such as disactivation of the dosing relays remain unvaried.

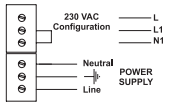

- If the pH ON/OFF switch is in the off position, the buzzer/light will not come on when the pH value is out. The alarm will be sounded for ORP, unless likewise, the ORP switch is in the off position.
- The controller provides for **automatic fail-safe** security by activating the alarm if there is a power failure, regardless of whether the NC or NO configurations were chosen.
- The alarm is also activated if one or both of the independent overdosage times are exceeded. The maximum time that the relay contacts remain active continuously (overdosage timers) can be set from 1 to 10 minutes.


- Once in an alarm condition, the alarm contact remain activated until the switch is manually put in the off position or the measurements return to normal values.

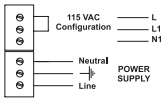
## MAIN POWER SUPPLY CONNECTION

- ***Before*** **connecting the unit to the mains, make sure that the controller is completely wired** and that all connections for pump, alarm, electrode, etc. have been made.

- For 220-240V, short the L1 and N1 terminals. Then wire the external power supply to the three terminals.



- For 110-115V, short the L and L1 terminals. Then wire the external power supply to the three terminals as shown.
- Replace the cover with the gasket and screw it tight with the 4 screws provided.




***Only then*** connect the controller to the mains.

## NORMAL OPERATION & MEASUREMENT

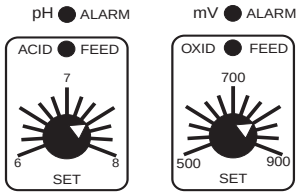
Make sure that the controller has been properly calibrated before commencing and that the pH and ORP setpoint(s) have been adjusted (see the following pages).

The pH and ORP electrodes and any ground probes must be properly connected and wired to the controller (see preceding pages).

Remove the protecteive caps if they are still on the tip of the electrodes and ensure that the electrodes are immersed in the solution (at least 4cm/1.5"). The electrodes should be installed in such a away that they permanently lie in the solution whether in a well, tank or on the discharge pipe.


The actual pH and ORP values will be displayed on the LCD's.


HI 9912 provides for visual dosing status through two LED's, one for pH and another for ORP. The LED's light up when the controller is in the pH or ORP dosage mode and the terminals are activated.



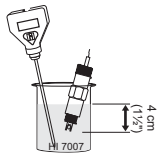

**NOTE:**

HI 9912 provides for two separate relays, one for pH and another for ORP. In order to save on chemicals and due to the slow reaction of oxidants, the controller incorporates a **Consent feature** by which ORP measurements are adjusted *only after* pH has been corrected. The Consent feature makes the **pH correction** the **master** and the **ORP adjustment** the **salve** for a better control.

# pH CALIBRATION

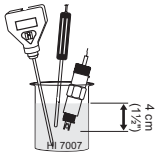
Make sure that the pH electrode and any ground probe have been properly connected and wired to the controller (see preceding pages) and that the meter is plugged to the mains.

Calibration should be performed at a temperature similar to that of the liquid to be monitored.




Use a Checktemp (or an accurate thermometer) as reference. Remove the electrode cap if it is still on the electrode.

During calibration, move the electrode and the separate ground probe (if in use) together from one buffer to the next.

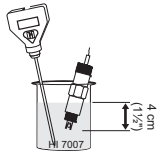



If no separate ground probe is being used, make sure that the Reference and the Matching Pin terminals are shorted (see 14 - Functional Diagram).

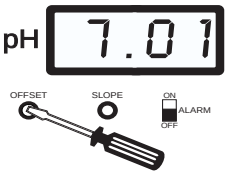
If the electrode (such as HI 1003/3) incorporates a ground probe (matching pin) then remove the jumper.

## OFFSET ADJUSTMENT:

- Rinse the tip of the electrode with pH 7.01 solution (**HI 7007**), then dip the bottom 4 cm (1.5") of the electrode (and ground probe) in the pH 7.01 buffer.
- Place the Checktemp thermometer in the buffer solution.

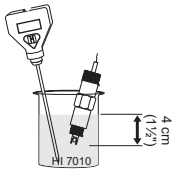



- Wait for the measurement to stabilize and then adjust the "OFFSET" trimmer (see 6 - Functional Diagram) to display pH 7.01 on the LCD if the temperature of the buffer solution is at 25°C (77°F).

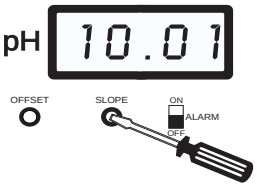



- If the temperature of the buffer solution is not 25°C (77°F), refer to the chart at the end of the manual for the appropriate buffer value at a given temperature.

## SLOPE ADJUSTMENT:




- Rinse the electrode (and ground probe) thoroughly with water and immerse the bottom 4 cm (1.5″) in a pH 10.01 (**HI 7010**) or a pH 4.01 (**HI 7004**) buffer solution.
- Stir the electrode and wait for the display to stabilize before adjusting the "SLOPE" trimmer (see 5 - Functional Diagram) to display pH 10.01 (or 4.01) on the LCD if the temperature of the buffer solution is at 25°C (77°F). Otherwise, refer to the chart at the end of the manual for the buffer value and adjust the trimmer accordingly.



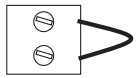

The pH calibration is now complete.

# ORP CALIBRATION

Make sure that the ORP electrode and any ground probe have been properly connected and wired to the controller (see preceding pages) and that the meter is plugged to the mains.

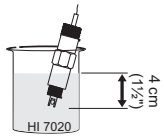
Remove the electrode cap if it is still on the electrode.

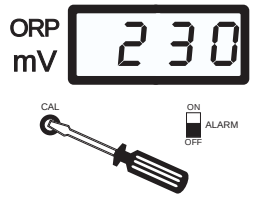
During calibration, introduce both the electrode and the separate ground probe (if in use) to the known solution. If no separate ground probe is being used, make sure that the Reference and the Matching Pin terminals are shorted (see 15 - Functional Diagram).



If the electrode (such as HI 2003/3) incorporates a ground probe (matching pin) then remove the jumper.

- Immerse the electrode in a **HI 7020** (or another known) ORP solution and wait until the reading stabilizes.
- Adjust the CAL trimmer to 230 ±20 mV.



## ADJUSTEMENT OF SETPOINT(S)

Make sure that the electrode (and any ground probe) is properly installed and calibrated (see the preceding pages).

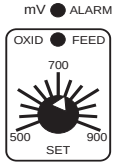
### FOR pH


Simply turn the pH ACID FEED dial (see 3 - Functional Diagram) and choose the desired value between 6 and 8 pH.

### DOSING DIRECTION

The dosing terminals are activated when the pH value exceeds the setpoint. HI 9912 will then dose acidic solutions until the user-selected setpoint is reached.

### FOR ORP



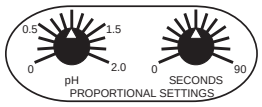

Simply turn the ORP OXID FEED dial (see 11 - Functional Diagram) and choose the desired value between 500 and 900 mV

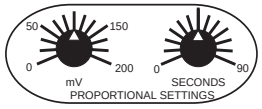
### DOSING DIRECTION

The dosing terminals are activated when the ORP falls below the setpoint. HI 9912 will dose oxidants until the user-selected setpoint is reached.

## PROPORTIONAL CONTROL

In order to optimize the controlling process and reduce the amount of chemicals used, it is recommended to use a proportional dosage appropriate for the system.




HI 9912 allows for a proportional band of 0 to 2.0 pH and 0 to 200 mV (delta) as well as two independent time cycles from 0 to 90 seconds. The proportional dosage is obtained by personalizing a current pulse whose height equals the pH or ORP proportional delta and the length corresponds to the selected time cycle.

The controller will enter **proportional dosage at setpoint minus** (in case of ORP) **or plus** (for pH) **the preselected delta**. It will then keep the dosing relays activated for a period proportional

to the difference between the measurement less the setpoint over the cycle.

NOTE:

- If the setting is left at 0 pH or 0 mV, the controller will operate as an ON/OFF control with no proportional dosage. In this case the controller will operate with a 0.1 pH or 7 mV hysteresis.
- **Do not set the time cycle to 0**. This causes the relay to chatter and can be detrimental to the controlling system and pump.

**e.g. pH proportional control**

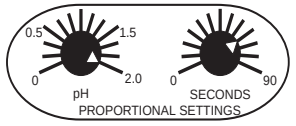
Setpoint = 7.4 pH

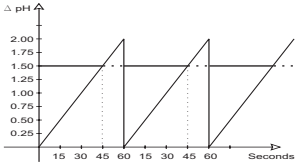
Measured value = 8.90 pH

Delta = 8.90 - 7.40 = 1.50 pH

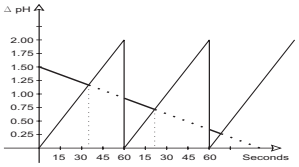
Proportional settings = pH set to 2 and time cycle to 60 seconds

The controller will be dosing acids to reduce pH to the desired limit. Since it is 1.50/2.00 = 75% away from the ideal setting, it will keep the dosing relay activated for 75% of the time over the predetermined 60 seconds. The terminals are hence theoretically activated for 45 seconds and off for 15 seconds.

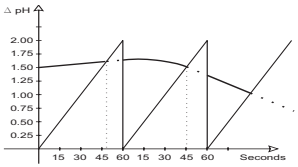



In order to avoid over dosage of fast responding samples or highly concentrated chemicals or under dosage with slow reacting or weak chemicals, the controller provides even a more accurate control.




As the graphs show, it does that by stopping the dosage as soon as the current pulse curve intersects the dosage curve. This means shortening the dosage period if the chemicals have reacted quickly or lengthening it if the measured pH continues to drift from the ideal setpoint as can be seen from the graphs.



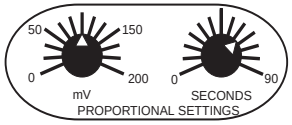
**e.g. ORP proportional control**

Setpoint = 750 mV

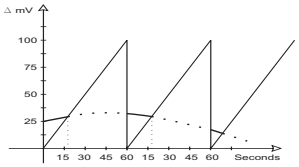
Measured value = 725 mV

Delta = 750 - 725 = 25 mV

Proportional settings = mV set to 100 and time cycle to 60 seconds

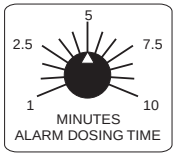



The controller will be dosing oxidants to increase redox to the desired value. Since it is 25/100 = 25% away from the ideal setting, it will keep the dosing contacts activated for 25% of the time over the predetermined 60 seconds. The terminals are hence activated for 15 seconds and off for 45 seconds until the next cycle.




## OVERDOSAGE TIMERS

HI 9912 provides for two independent overdosage timers. The operator can set the maximum amount of time that the dosage terminals should continuously remain activated from 1 to 10 minutes . Should this period elapse, the alarm terminals are activated (and dosage disactivated to ensure that chemicals have not run out or pumps or electrovalves have not ceased to function properly).



# pH VALUES AT VARIOUS TEMPERATURES

Please refer to the following chart for a more accurate pH calibration:

| TEMP | | pH VALUES | | | | |
|---|---|---|---|---|---|---|
| °C | °F | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 0 | 32 | 4.01 | 6.98 | 7.13 | 9.46 | 10.32 |
| 5 | 41 | 4.00 | 6.95 | 7.10 | 9.39 | 10.24 |
| 10 | 50 | 4.00 | 6.92 | 7.07 | 9.33 | 10.18 |
| 15 | 59 | 4.00 | 6.90 | 7.04 | 9.27 | 10.12 |
| 20 | 68 | 4.00 | 6.88 | 7.03 | 9.22 | 10.06 |
| 25 | 77 | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 30 | 86 | 4.02 | 6.85 | 7.00 | 9.14 | 9.96 |
| 35 | 95 | 4.03 | 6.84 | 6.99 | 9.10 | 9.92 |
| 40 | 104 | 4.04 | 6.84 | 6.98 | 9.07 | 9.88 |
| 45 | 113 | 4.05 | 6.83 | 6.98 | 9.04 | 9.85 |
| 50 | 122 | 4.06 | 6.83 | 6.98 | 9.01 | 9.82 |
| 55 | 131 | 4.07 | 6.84 | 6.98 | 8.99 | 9.79 |
| 60 | 140 | 4.09 | 6.84 | 6.98 | 8.97 | 9.77 |
| 65 | 149 | 4.11 | 6.85 | 6.99 | 8.95 | 9.76 |
| 70 | 158 | 4.12 | 6.85 | 6.99 | 8.93 | 9.75 |

For instance, if the buffer temperature is 25°C (77°F), calibrate the meter to read 4.01, 7.01 or 10.01 on the display.

If the buffer temperature is 20°C, calibrate it to 4.00, 7.03 or 10.06.

If the buffer temperature is 50°C, calibrate it to 4.06, 6.98 or 9.82.

# REDOX MEASUREMENT

Redox measurements allow the quantification of the oxidizing or reducing power of a solution, and are commonly expressed in mV.

Oxidation may be defined as the process during which a molecule (or an ion) loses electrons and reduction as the process by which electrons are gained.

Oxidation is always coupled together with reduction so that as one element gets oxidized, the other is automatically reduced, therefore the term oxidation-reduction is frequently used.

Redox potentials are measured by an electrode capable of absorbing or releasing electrons without causing a chemical reaction with the elements with which it comes into contact.

The electrodes most usually available for this purpose have a platinum surface. When a platinum electrode is immersed in an oxidizing solution a monomolecular layer of oxygen is developed on its surface. This layer does not prevent the electrode from functioning, but it increases the response time. The opposite effect is obtained when the platinum surface absorbs hydrogen in the presence of reducing mediums. This phenomenon is rough on the electrode.

To make accurate redox measurements the surface of the electrode must be clean and smooth. At certain mV and pH values, especially those found in pools, the ORP electrode requires a considerable amount of time before it reads the proper value. This is due to the fact that it is moving from a reducing to an oxidizing state. Once it reaches a stable condition though, it reacts rapidly to changes.

Hence when the process is first set up allow sufficient time for the ORP electrode to adapt itself to the sample stream.

As with pH electrodes, gel-filled redox electrodes are more suitable for industrial applications due to less maintenance requirements.

In order to test that the ORP electrode is functioning properly, immerse it into a **HI 7020** solution. The measured value should be between 200 and 250 mV.

When not in use, the electrode tip should be kept moist in order for the reference junction, especially Teflon models, to respond quickly. Otherwise, soak the electrode overnight in a **HI 70300** storage solution or allow more time upon installation for its stabilization. Also keep the electrode far from any type of mechanical stress which might cause damage.

Install the electrode in such a way that it is constantly in a well filled with the sample (stream or tank) and does not dry up.

The protective cap should also be filled with a few drops of **HI 70300** storage solution if the electrode is not being used at all.

**Note:** With industrial applications, it is always good practice to keep at least one spare electrode handy. When anomalies are not resolved with a simple maintenance, change the electrode to see if the problem is alleviated.

# ELECTRODE CONDITIONING & MAINTENANCE

## PREPARATION

Remove the protective cap.

DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT.

This is normal with electrodes and they will disappear when rinsed with water.

During transport tiny bubbles of air may have formed inside the glass bulb (membrane). Shake down the electrode as you would do with a glass thermometer to remove these bubbles.

If the bulb and/or junction are dry, soak the electrode in a **HI 70300 Storage Solution** overnight.

## STORAGE

To minimize clogging and assure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out. This can be achieved by installing the electrode in such a way that it is constantly in a well filled with the sample (stream or tank).

When not in use, pour a few drops of **HI 70300** Storage Solution or, in its absence, **HI 7007** pH 7.01 Buffer Solution in the protective cap and replace it on the electrode.

**Note:** NEVER STORE THE ELECTRODE IN DISTILLED OR DEIONIZED WATER.

## PERIODIC MAINTENANCE

Inspect the electrode and the cable. The cable used for the connection to the controller must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb.

The connector must be clean and dry. If any scratches or cracks are present, replace the electrode. Rinse off any salt deposits with water.

## CLEANING PROCEDURE

Soak in Hanna HI7061 General Cleaning Solution for ½ hour.

For more specific cleaning procedures, refer to the electrode's instruction manual.

**IMPORTANT:** After performing any of the cleaning procedures rinse the electrode thoroughly with distilled water and recalibrate the controller.

## TROUBLESHOOTING

Evaluate your electrode performance based on the following.

- **Noise** (Readings fluctuate up and down) could be due to - clogged/dirty junction: Refer to the Cleaning Procedure above.
- **Dry Membrane/Junction:** Soak in Storage Solution **HI 70300** overnight. Check to make sure the installation is such as to create a well for the electrode bulb to constantly remain moist.
- **Low Slope:** Refer to the cleaning procedure above.
- **No Slope:** - Check the electrode for cracks in glass stem or bulb (replace the electrode if cracks are found).
  - Make sure cable and connections are not damaged nor lying in a pool of water or solution.
- **Slow Response/Excessive Drift:** Soak the tip in Hanna Solution **HI 7061** for 30 minutes, rinse thoroughly with distilled water and then recalibrate the meter.
- **For ORP Electrodes:** Polish the metal tip with a lightly abrasive paper (paying attention not to scratch the surface) and wash thoroughly with water.

**Note:** With industrial applications, it is always recommended to keep at least one spare electrode handy. When anomalies are not resolved with a simple maintenance, change the electrode (and recalibrate the controller) to see if the problem is alleviated.

# SUGGESTED INSTALLATIONS for pH/ORP ELECTRODES

The electrodes should be installed in such a away that they always lie in the solution, whether in a well, tank or on the discharge pipe.

## SHORT DISTANCE, INDOOR INSTALLATION

Due to the low currents involved, a very high grade of insulation is required. A dry environment is needed in order to obtain a level of insulation not lower than $10^{12}\ \Omega$.

This type of connection is very delicate and requires constant attention to maintain proper operating conditions.

The conventional electrodes may be used for indoor applications but the cable length should not exceed 10 m (33').

### MEDIUM DISTANCE, INDOOR/OUTDOOR INSTALLATION

When an outdoor installation is required, it is normally necessary to install a transmitter to obtain accurate readings at distances from 10 to 50 m (33-165').

Since the introduction of AmpHel electrodes these distances are no longer a problem. You can now connect your meter directly to an AmpHel electrode, saving the cost of a transmitter.

The standard cable length of the AmpHel electrode is 5 m (16.5'). Additional lengths of regular cable up to 50 m (165'), can be installed without special connectors. It is recommended to use coaxial cables due to their excellent insulation, even though, Amphel electrodes can operate with both.

AmpHel electrodes have a micro-amplifier in the electrode cap to boost the signal, drastically reducing susceptibility to noise and drift.

For more details about these or other specially made electrodes, consult the Hanna process and water treatment literature, or call the Hanna Office nearest to you.

## ACCESSORIES

### pH ELECTRODES

**HI 1002/3** Double Teflon junction with external threads
**HI 1003/3** Double Teflon junction with matching pin
**HI 2911B/5** Preamplified, double Teflon junction

### ORP (Pt) ELECTRODES

**HI 2002/3** Double Teflon junction with external threads
**HI 2003/3** Double Teflon junction with matching pin
**HI 2931B/5** Preamplified, double Teflon junction

### ORP (AU) ELECTRODES

**HI 2012/3** Double Teflon junction with external threads
**HI 2013/3** Double Teflon junction with matching pin

Hanna manufactures hundreds of pH and ORP electrodes for a wide variety of process and water treatment applications. Consult the

specific handbooks for process instrumentation, or simply call the Hanna office nearest to you for a complete list.

## pH CALIBRATION SOLUTIONS

| | |
|---|---|
| **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 |

## ORP SOLUTIONS

| | |
|---|---|
| **HI 7020L** | 200-275mV ORP solution, 460 mL |
| **HI 7092L** | Pretreatment oxidizing solution, 460 mL |

## ELECTRODE STORAGE SOLUTION

| | |
|---|---|
| **HI 70300L** | Storage solution, 460 mL |

## ELECTRODE CLEANING SOLUTIONS

| | |
|---|---|
| **HI 7061L** | General purpose cleaning solution, 460 mL |
| **HI 7073L** | Protein cleaning solution, 460mL |

## OTHER ACCESSORIES

| | |
|---|---|
| **BL PUMPS** | Dosing pumps (several models are available with flow rates from 1.5 to 18.3 lph / 0.4 to 4.8 gph) |
| **ChecktempC** | Pocket-size thermometer (range -50.0 to 150.0°C) |
| **ChecktempF** | Pocket-size thermometer (range -58.0 to 302.0°F) |
| **HI 6050** | Submersible electrode holder (605 mm/23.8" total length) |
| **HI 6051** | Submersible electrode holder (1105 mm/43.5" total length) |
| **HI 6054B** | Electrode holder for in-line applications |
| **HI 8427** | pH and ORP Electrode Simulator and high impedance tester with 1 m (3.3') Coaxial Cable ending in a male BNC connector (HI 7858/1) |
| **HI 931001** | pH and ORP Electrode Simulator with LCD display and 1 m (3.3') Coaxial Cable ending in a male BNC connector (HI 7858/1) |

# WARRANTY

All Hanna **controllers are warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to instructions.

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered. This warranty is limited to free of charge repair or replacement of the meter only, if any malfunctioning is due to manufacturing defects.

If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charges incurred. If the instrument is to be returned to Hanna Instruments, first obtain a Returned Goods Authorization Number from the Customer Service department and then send it with shipment costs prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.



Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

## OTHER PRODUCTS FROM HANNA

- CABLES AND CONNECTORS
- CALIBRATION AND MAINTENANCE SOLUTIONS
- CHEMICAL TEST KITS
- CHLORINE METERS
- CONDUCTIVITY/TDS METERS
- DISSOLVED OXYGEN METERS
- HYGROMETERS
- ION SPECIFIC METERS (Colorimeters)
- MAGNETIC STIRRERS
- Na/NaCl METERS
- pH/ORP/Na ELECTRODES
- pH METERS
- PROBES (DO, $\mu$S/cm, RH, T, TDS)
- PUMPS
- REAGENTS
- SOFTWARE
- THERMOMETERS
- TITRATORS
- TRANSMITTERS
- TURBIDITY METERS
- Wide Range of ACCESSORIES

Most Hanna meters are available in the following formats:

- BENCH-TOP METERS
- POCKET-SIZED METERS
- PORTABLE METERS
- PRINTING/LOGGING METERS
- PROCESS METERS (Panel and Wall-mounted)
- WATERPROOF METERS
- METERS FOR FOOD INDUSTRY

For additional information, contact your dealer or the nearest Hanna Customer Service Center.
You can also e-mail us at tech@hannainst.com.

# CE DECLARATION OF CONFORMITY

HANNA instruments

CE

DECLARATION OF CONFORMITY

We

Hanna Instruments Srl
V.le delle industrie 12
35010 Ronchi di Villafranca (PD)
ITALY

herewith certify that the wall-mounted instrument:

**HI 9912**

has been tested and found to be in compliance with the following regulations:

| | |
|---|---|
| **IEC 801-2** | Electrostatic Discharge |
| **IEC 801-3** | RF Radiated |
| **IEC 801-4** | Fast Transient |
| **EN 55022** | Radiated, Class B |
| **EN 61010-1** | User Safety Requirement |

Date of Issue: 07-06-1999

D.Volpato - Engineering Manager

On behalf of
Hanna Instruments S.r.l.

## Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used.

Operation of this instrument in residential areas could cause unacceptable interference to radio and TV equipment.

Any variation introduced by the user to the supplied equipment may degrade the instruments' EMC performance.

Unplug the instrument from power supply before replacing the fuse or making any electrical connections.

## HANNA LITERATURE

Hanna publishes a wide range of catalogs and handbooks for an equally wide range of applications. The reference literature currently covers areas such as:

- Water Treatment
- Process
- Swimming Pools
- Agriculture
- Food
- Laboratory
- Thermometry

and many others. New reference material is constantly being added to the library.

For these and other catalogs, handbooks and leaflets, contact your dealer or the Hanna Customer Service Center nearest to you. To find the Hanna Office in your vicinity, check our home page at www.hannainst.com.

MAN9912R1
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HANNA instruments

http://www.hannainst.com