

## Pool Chemistry Controller

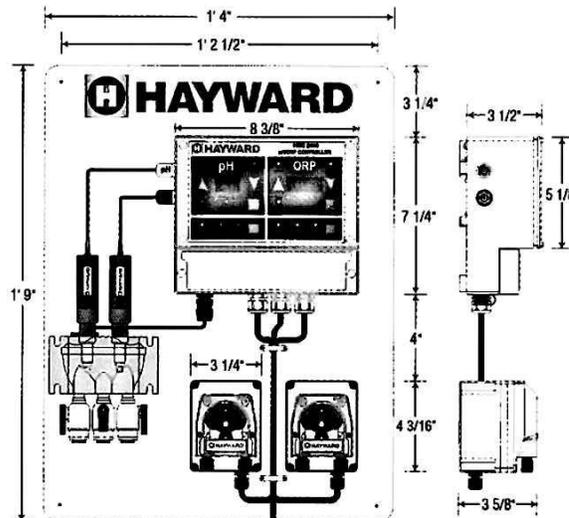
### General:

1. It is the intent of these specifications to describe a pool chemistry controller designed specifically for swimming pool, spa and other aquatic applications. The specifications are based on the **HCC 2000 Chemistry Controller** manufactured by Hayward Industries.
2. This specification includes criteria for the following CSI Master Format components:
  - 2.1. Division 13 – Special Construction
    - 131000 Special Facility Components
      - 131100 Swimming Pools
      - 131700 Tubs and Pools
  - 2.2. Division 22 - Plumbing
    - 220150 Operation & Maintenance of Pool & Fountain Plumbing Systems
    - 225000 Pool and Fountain plumbing.
    - 225119 Pool Water Treatment Equipment
    - 225219 Fountain Water Treatment Equipment



3. The pool chemistry controller shall meet the criteria of the following standards:
  - UL – Underwriters' Laboratory
  - NSF – National Sanitation Foundation
  - NEMA – National Electrical Manufacturers' Association
  - NEC – National Electrical Code
  - ASTM – American Society for Testing and Materials

4. The chemistry controller shall be supplied to its site of installation in its original manufacturer's packaging. The package shall clearly state the model name, model number and country of manufacture and include the relevant operating and installation instructions. The controller unit shall clearly indicate the manufacturer's name and logo.
5. The chemistry controller shall be a manufactured by a company with at least 10 years of proven product experience. The manufacturing facility shall be a permanent, established facility that meets the relevant codes.
6. The chemistry controller shall be guaranteed by the manufacturer for workmanship, materials and performance for a period of 1 year. The warranty will not include abusive or improper treatment of the controller during construction or under operation.



### Product:

1. The pool chemistry controller shall have microprocessor based control of the pool chemistry. The controller unit should scan and interpret the signals from the pH and ORP probes, display water quality readings in digital format, and activate chemical feeders in proportion to the demand required to maintain set point pH and ORP levels. The unit should incorporate audible and visual safeguard alarms for out of range conditions, calibration adjustment for pH, and mode selections to manually feed or disable feeding for either channel. All user entries and adjustments should be made through the front panel with touch-screen interface.

Requests for substitutions for the specified make and model will not be considered unless equal to the specified system in every respect.

#### a. Housing and Mounting

- i. The control system and touch screen display shall be housed in a glass filled poly carbonate NEMA 4X rated enclosure. The controller and the flow cell assembly shall be factory mounted on a CNC machined and beveled PVC backboard. The enclosure and connections shall be designed to eliminate any possibility of corrosion or damage to the internal components of the controller. Controller and external relays shall be factory wired and tested for functionality.

#### b. Display

- i. For enhanced viewing the controller should feature a "dead-front" display panel, so only illuminated indicators will be visible to the user. All lights and indicators should be activated during power-on.
- ii. The interface should be UV protected lexan membrane.
- iii. LED indicators should continuously display the following water chemistry information:
  1. pH within a range of 2-12 with a .1 pH resolution
  2. ORP within a range of 100-995 mV with a 5 mV resolution
  3. Alarm indication shall be a flashing red LED and LEDs should indicate whether feed pump are activated as chemicals are being fed. Green LEDs shall indicate that the chemical feed system is in automatic mode. Visual and audio alarms shall warn the operator of any alarms.
- iv. The controller shall have the following display indicators and buttons:
  1. pH Feed green LED illuminated whenever the pH chemical feeder is automatically or manually activated.
  2. pH Alarm red LED indicator indicating that pH is outside of the safe operating range.
  3. pH Digital Display - The red digital numeric display of the pH channel normally displays the current pH of the pool or spa water (as calibrated) passing through the filtration system.
  4. pH Setpoint Adjustment Button when pressed until the red "SET" LED is illuminated should display the pH setpoint.
  5. pH Setpoint Adjustment Mode green LED illuminated whenever the controller is in the pH setpoint adjustment mode. Setpoint adjustment should be allowed only when this LED is illuminated.
  6. pH Calibrate Mode green LED illuminated whenever the controller is in the pH calibration mode. Calibration of the pH display should be allowed only when this LED is illuminated.
  7. pH Automatic Control green LED illuminated when pH is under automated control.
  8. pH Manual On/Off red LED illuminated when pH feeding is manually activated/disabled.
  9. ORP Alarm red LED indicating that ORP is outside of the safe operating range.
  10. ORP Digital Display - The red digital numeric display of the ORP channel of the controller normally displays the current ORP of the pool or spa water passing through the filtration system.



11. ORP Setpoint Adjustment Mode green LED illuminated whenever the controller is in the ORP setpoint adjustment mode. ORP Setpoint adjustment should be allowed only when this LED is illuminated.
  12. ORP Automatic Control green LED illuminated when ORP is under automated control.
  13. ORP Manual ON/OFF red LED illuminated when ORP feeding is manually activated/disabled.
- c. Output Circuits
- i. The controller shall have the following fuse protected outputs:

pH Feed	4 Amp / 120 VAC or 4 Amp / 240 VAC 1 Amp / Dry Contact
ORP Feed	4 Amp / 120 VAC or 4 Amp / 240 VAC 1 Amp / Dry Contact
Remote Alarm	1 Amp / Dry Contact
  - ii. Automatic outputs shall be capable of being manually overridden for pH and ORP to allow for direct and complete manual override.
- d. Chemical Feed Programming
- i. The controller should feature an advanced proportional feed algorithm which constantly analyzes demand for chemicals and initiates feeding in intervals based on the relationship between setpoint and actual water sample values to ensure precise control of water chemistry.
  - ii. To manually enable the pH chemical feeder the pH Channel Mode Selection Button should be pressed until the green "MANUAL" LED is illuminated. Automated control of the pH should be accomplished by pressing the pH Channel Mode Selection Button until the green "AUTO" LED is illuminated. The pH adjustment feeder should operate automatically in proportion to chemical demand. The chemical feeding cycle should not be interrupted for approximately ten seconds to give the user time to enter selections.
  - iii. To manually enable the ORP chemical feeder the ORP Channel Mode Selection Button should be pressed until the green "MANUAL" LED is illuminated. Automated control of ORP should be accomplished by pressing the ORP Channel Mode Selection Button until the green "AUTO" LED is illuminated. The ORP adjustment feeder should operate automatically in proportion to chemical demand.
  - iv. The chemical feeding cycle should not be interrupted for approximately ten seconds to give the user time to enter selections.
- e. Chemical Failsafe Indicators, Alarms, and Warnings
- i. The control system shall be provided with pH and ORP feed indicators, which shall be activated when respective chemicals are being fed.
  - ii. System shall be provided with visual and audio pH and ORP alarms.
  - iii. The system shall provide a low flow warning message to alert operator when no flow situation exists in the sample stream. The no-flow alarm should display the prompt on the LED displays in addition to activating both channel alarm indicators and sounding the audible alarm. Should a no flow condition exist, the system shall disable all chemical feed functions.
  - iv. The control system shall be provided with an internal microprocessor based failsafe . The feed output should remain activated as long as a feed condition is indicated. When the overfeed limit timer is enabled on the feed output and after the feed output has been turned on for a period of time greater than this limit, the channel is turned off and placed into an overfeed alarm condition which must be

manually reset. During a proportional feed setting feed output must be ON continuously for the overfeed time limit. After the feed channel is placed into the overfeed alarm condition, the channel should turn off and the Feed Mode indicator should flash rapidly to indicate the alarm. Pressing the Feed Mode button should return the channel to the off, manual or automatic feed mode. This should reset the channel overfeed alarm and restart the overfeed timer. The overfeed alarm should also be reset if the controller is powered off and then back on. Separate channels are required for pH and ORP.

f. Data Logging and remote monitoring

The chemical controller should include a standard RS232 serial interface connected by a header assembly and cable that can be connected to the building automation system. The controller should make a hard-copy record of controller operating parameters when it is attached to a serial printer. The serial Printer should print data records at 15 minute intervals. Data recorded should include pH and ORP measured values, and the feed output and alarm status of both channels.

g. Flow cell and Sensor Assembly:

The control system shall include a flow cell with a flow switch, and sensor assemblies, all of which shall incorporate the following features:

- i. The flow cell shall be injection molded clear polycarbonate with integral baffles. All plumbing, consisting of shut off valves sampling cocks and flow switch shall be included.
- ii. The flow switch shall be a float style magnetic type.
- iii. pH and ORP sensor shall be commercial grade injection molded with ½" NPT body with Poly-Pro™ solid polymer reference technology and matched with patented porous Teflon® fluid junction for high performance longevity.
- iv. The ORP sensor should be of pure platinum for regular applications and gold tipped for salt generator applications.
- v. The probes shall be connected to the controller with shielded BNC connectors labelled appropriately pH and ORP.