



CAT-1000-ORP

Automated ORP Controller

Owner's Manual



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CAT-1000-ORP

IMPORTANT SAFETY INSTRUCTIONS

Basic safety precautions should always be followed, including the following: Failure to follow instructions can cause severe injury and/or death.



This is the safety-alert symbol. When you see this symbol on your equipment or in this manual, look for one of the following signal words and be alert to the potential for personal injury.



WARNING warns about hazards that could cause serious personal injury, death or major property damage and if ignored presents a potential hazard.



CAUTION warns about hazards that will or can cause minor or moderate personal injury and/or property damage and if ignored presents a potential hazard. It can also make consumers aware of actions that are unpredictable and unsafe.

The **NOTICE** label indicates special instructions that are important but not related to hazards.

Hayward Commercial Pool Products
10101 Molecular Drive, Suite 200
Rockville, MD 20850
www.haywardcommercialpool.com



⚠ WARNING - Read and follow all instructions in this owner's manual and on the equipment. Failure to follow instructions can cause severe injury and/or death.

⚠ WARNING – Suction Entrapment Hazard.



Suction in suction outlets and/or suction outlet covers which are, damaged, broken, cracked, missing, or unsecured can cause severe injury and/or death due to the following entrapment hazards:



Hair Entrapment- Hair can become entangled in suction outlet cover.



Limb Entrapment- A limb inserted into an opening of a suction outlet sump or suction outlet cover that is damaged, broken, cracked, missing, or not securely attached can result in a mechanical bind or swelling of the limb.

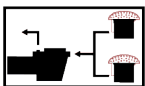


Body Suction Entrapment- A negative pressure applied to a large portion of the body or limbs can result in an entrapment.

Evisceration/ Disembowelment - A negative pressure applied directly to the intestines through an unprotected suction outlet sump or suction outlet cover which is, damaged, broken, cracked, missing, or unsecured can result in evisceration/ disembowelment.

Mechanical Entrapment- There is potential for jewelry, swimsuit, hair decorations, finger, toe or knuckle to be caught in an opening of a suction outlet cover resulting in mechanical entrapment.

⚠ WARNING - To Reduce the risk of Entrapment Hazards:



- o When outlets are small enough to be blocked by a person, a minimum of two functioning suction outlets per pump must be installed. Suction outlets in the same plane (i.e. floor or wall), must be installed a minimum of three feet (3') [1 meter] apart, as measured from near point to near point.
- o Dual suction fittings shall be placed in such locations and distances to avoid "dual blockage" by a user.
- o Dual suction fittings shall not be located on seating areas or on the backrest for such seating areas.
- o The maximum system flow rate shall not exceed the flow rating of as listed on Table 1.
- o Never use Pool or Spa if any suction outlet component is damaged, broken, cracked, missing, or not securely attached.
- o Replace damaged, broken, cracked, missing, or not securely attached suction outlet components immediately.
- o In addition two or more suction outlets per pump installed in accordance with latest ASME, APSP Standards and CPSC guidelines, follow all National, State, and Local codes applicable.
- o Installation of a vacuum release or vent system, which relieves entrapping suction, is recommended.

⚠ WARNING – Failure to remove pressure test plugs and/or plugs used in winterization of the pool/spa from the suction outlets can result in an increase potential for suction entrapment as described above.

⚠ WARNING – Failure to keep suction outlet components clear of debris, such as leaves, dirt, hair, paper and other material can result in an increase potential for suction entrapment as described above.

⚠ WARNING – Suction outlet components have a finite life, the cover/grate should be inspected frequently and replaced at least every ten years or if found to be damaged, broken, cracked, missing, or not securely attached.

⚠ CAUTION – Components such as the filtration system, pumps and heater must be positioned so as to prevent their being used as means of access to the pool by young children. To reduce risk of injury, do not permit children to use or climb on this product. Closely supervise children at all times. Components such as the filtration system, pumps, and heaters must be positioned to prevent children from using them as a means of access to the pool.



⚠ WARNING – Hazardous Pressure. Pool and spa water circulation systems operate under hazardous pressure during start up, normal operation, and after pump shut off. Stand clear of circulation system equipment during pump start up. Failure to follow safety and operation instructions could result in violent separation of the pump housing and cover, and/or filter housing and clamp due to pressure in the system, which could cause property damage, severe personal injury, or death. Before servicing pool and spa water circulation system, all system and pump controls must be in off position and filter manual air relief valve must be in open position. Before starting system pump, all system valves must be set in a position to allow system water to return back to the pool. Do not change filter control valve position while system pump is running. Before starting system pump, fully open filter manual air relief valve. Do not close filter manual air relief valve until a steady stream of water (not air or air and water) is discharged.



⚠ WARNING – Separation Hazard. Failure to follow safety and operation instructions could result in violent separation of pump and/or filter components. Strainer cover must be properly secured to pump housing with strainer cover lock ring. Before servicing pool and spa circulation system, filters manual air relief valve must be in open position. Do not operate pool and spa circulation system if a system component is not assembled properly, damaged, or missing. Do not operate pool and spa circulation system unless filter manual air relief valve body is in locked position in filter upper body. **Never operate or test the circulation system at more than 50 PSI.**



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⚠ WARNING – Risk of Electric Shock. All electrical wiring **MUST** be in conformance with applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can shock, burn, and cause death or serious property damage. To reduce the risk of electric shock, do **NOT** use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. Before working on any electrical equipment, turn off power supply to the equipment. To reduce the risk of electric shock replace damaged wiring immediately. Locate conduit to prevent abuse from lawn mowers, hedge trimmers and other equipment. Do **NOT** ground to a gas supply line.

⚠ WARNING – Risk of Electric Shock Failure to ground all electrical equipment can cause serious or fatal electrical shock hazard. Electrical ground all electrical equipment before connecting to electrical power supply.

⚠ WARNING – Risk of Electric Shock Failure to bond all electrical equipment to pool structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, see installation instructions and consult a professional electrician on how to bond all electrical equipment. Also, contact a licensed electrician for information on local electrical codes for bonding requirements.

Notes to electrician: Use a solid copper conductor, size 8 or larger. Run a continuous wire from external bonding lug to reinforcing rod or mesh. Connect a No. 8 AWG (8.4 mm²) [No. 6 AWG (13.3 mm²) for Canada] solid copper bonding wire to the pressure wire connector provided on the electrical equipment and to all metal parts of swimming pool, spa, or hot tub, and metal piping (except gas piping), and conduit within 5 ft. (1.5 m) of inside walls of swimming pool, spa, or hot tub.

IMPORTANT - Reference NEC codes for all wiring standards including, but not limited to, grounding, bonding and other general wiring procedures.

⚠ WARNING – Risk of Electric Shock . The electrical equipment must be connected only to a supply circuit that is protected by a ground-fault circuit-interrupter (GFCI). Such a GFCI should be provided by the installer and should be tested on a routine basis. To test the GFCI, push the test button. The GFCI should interrupt power. Push reset button. Power should be restored. If the GFCI fails to operate in this manner, the GFCI is defective. If the GFCI interrupts power to the electrical equipment without the test button being pushed, a ground current is flowing, indicating the possibility of an electrical shock. Do not use this electrical equipment. Disconnect the electrical equipment and have the problem corrected by a qualified service representative before using.

⚠ CAUTION – HAYWARD® pumps are intended for use with permanently-installed pools and may be used with hot tubs and spas if so marked. Do not use with storable pools. A permanently-installed pool is constructed in or on the ground or in a building such that it cannot be readily disassembled for storage. A storable pool is constructed so that it is capable of being readily disassembled for storage and reassembled to its original integrity.

SAVE THESE INSTRUCTIONS



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Introduction

Congratulations on your wise investment and welcome to the world of chemical automation. The product you have selected from the CAT 1000® line of automated controllers should provide you with substantially reduced chemical maintenance, improved compliance with safer water quality standards, chemical cost savings, and many years of reliable operation. All CAT Controllers® incorporate state of the art microprocessor-based design technology to provide sophisticated control functions at an affordable price.

Although CAT controllers are relatively simple to install, please take the time to read this entire manual, compare package contents with the parts list, and gather all tools required before beginning installation. Improper installation may void the warranty and create unnecessary hazards. Properly preparing for installation will also reduce facility down-time.

For the purposes of this manual, it is presupposed that the installer is familiar with the physical characteristics of the pool or spa to be automated. As is the case when installing any filtration system component, all recirculation pumps, heaters, etc. need to be turned off prior to the installation of the controller. If the filtration system is located below water level, additionally adjust all valves required to eliminate pressure from the system.

Physically, installation of a CAT controller is no more challenging than installation of a chemical feeder. Any Swimming pool contractor or maintenance engineer should have the tools and knowledge to perform the installation. Our technical support line can also be used to answer any question pertaining to the controller installation.

Remember that your new CAT controller is not a substitute for performing regular manual water testing. Never operate a water chemistry controller without a flow sensor, power interlock, or other means of ensuring that chemicals will not be fed without proper filtration system recirculation.

Congratulations on your purchase and welcome to the world of chemical automation. Please complete and return your warranty registration today.

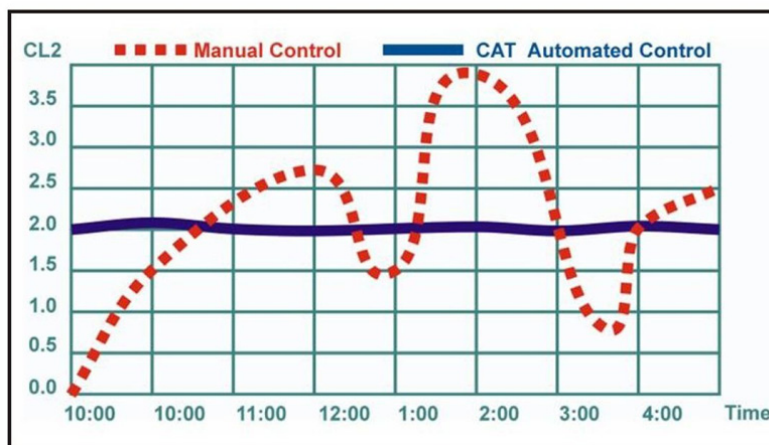
Important Information

Chemical Automation with the CAT-1000-ORP

A pool operator typically checks and adjusts pool and spa water chemistry hourly at best. The CAT 1000 continuously monitors the ORP/sanitizer activity and is constantly adjusting the feeding of the sanitizer on a basis proportional to the demand. The result includes the elimination of "human error", inaccuracies and provides reliable maintenance of chemical levels twenty-four hours a day. The controller also provides compliance with safer water chemistry standards, reduced burden on operating staff, and a reduction of chemical usage and costs.

The following graph compares typical ORP levels when chemistry is adjusted manually versus automatically with the CAT-1000-ORP controller.

ILLUSTRATION 1.
MANUAL -VS- CAT AUTOMATED CONTROL





What is ORP?

When we are measuring ORP we are measuring the quality and the capability of the oxidizing component in the water. The oxidizing component can come from chlorine, bromine, Ozone, non-chlorine shocks, hydrogen peroxide, etc. As we all know sanitizers will only work upon the result of a properly balanced body of water. This is where ORP comes into play. ORP only measures specifically the ability and/or quality of the oxidizer present in the water. Its ability/quality are reduced or increased in relation to the other water chemistry variables, pH, total alkalinity, total dissolved solids, temperature, the presence cyanuric acid, the presence of chlorine neutralizers, etc. Simply put, it does not matter how much sanitizer is in your body of water, if the other chemistry variables are not balanced the sanitizer WILL NOT WORK to its full "potential".

Oxidation, in the past, was merely defined as the interaction between oxygen molecules and all dissimilar matter that they may come in contact with. Upon the discovery of electrons, oxidation came to be more accurately defined as the loss of an electron when two or more matters interact. When a sanitizer interacts with unwanted substances, it steals an electron from the substance changing its chemical make up in turn helping to burn the substance up. However, now that the sanitizer has gained an electron it has "reduced" the sanitizer's electrical energy making the sanitizer less effective.

Reduction occurs when a substance gains an electron after the oxidation process has occurred. The atom or oxidizer that gains the electron may lose their ability to further oxidize substances or they will combine with other substances in the water resulting in by-products and/or combined chlorine.

Potential is the concept of stored energy within. The potential as it relates to ORP, relates to the potential of the sanitizer present in the water to oxidize contaminants. The potential is measured in millivolts, a very small electrical reading. When an oxidizer is present in water it is attempting to steal negatively charged electrons from any substance. If the substance is a platinum or gold electrode (ORP Sensor), once the oxidizer steals the negatively charged electron from the electrode the electrode will then generate more positively charged energy, therefore increasing ORP. The more oxidizer present in the water the more positively charged the electrode becomes.

When discussing ORP, often times people like to leave out the reduction part of it. Why? Because we are measuring the potential of the oxidizer to steal electrons, not the potential of substance being reduced or gaining electrons. However, if there are exactly the same amount of reducers, oxidizer atoms that have gained electrons and oxidizer atoms that have not yet gained electrons, there will be no "Potential" for future oxidation. That is why we must continually sanitize water or eventually it will result in the sanitizer being used up.

pH is the most important factor in keeping the strength of your sanitizer. The Potential of Hydrogen or Power of Hydrogen relates to HOCL and OCL. If you have a lower pH, the HOCL (the stronger chlorine), will be more active and the sanitizer will be more effective. If the stronger part of your chlorine is working harder and is more active, the more oxidizing potential it will have. Lower pH means more available H⁺ in the water, which means that the water will not take the H⁺ as frequently from the HOCL, resulting in more HOCL and less OCL (your weaker free chlorine).

In conclusion, ORP (Oxidation Reduction Potential) is the measurement of the potential of the oxidizer present in the water to remove electrons from unwanted substances. Once the unwanted substance loses its electron its chemical structure is changed and it is "burned up". ORP is not tricked by the effects of other variables present in the water. ORP tells you the true effectiveness of your sanitizer based solely on its ability to oxidize in that specific body of water. The millivolt reading of 650mV has been designated as the potential needed for safe drinking water. The relationship of pH, FAC, and ORP are very important. We must keep a more acidic (7.5 or lower) pH in our water to make sure our HOCL is more active which gives it more oxidizing ability, in turn raising our ORP reading. Automated pH and ORP controllers constantly monitor both the pH and ORP in the water and make the necessary adjustments to keep a proper pH and a proper amount of oxidizer present in the water to keep your water safe 24/7.

Components of the CAT-1000-ORP System

The following is a description of the components incorporated in a typical CAT 1000 controller system:

The Professional-Series ORP Sensor samples water from the filtration system and sends signals to the controller indicating the Oxidation Reduction Potential (redox) of the water. ORP is an actual measure of sanitizer activity (chlorine, bromine, ozone etc.) and bacteriological water quality rather than an expression of chemical residual levels. The CAT 1000 controller is preset from the factory to maintain ORP at 650 millivolts.

The Flow Sensor (required) monitors the flow across the ORP sensor and signals the controller to disable automated chemical feeding during periods when the filtration system is off or low recirculation flow is detected.

The Flow Cell provides a convenient location for mounting the ORP sensor while ensuring ideal hydraulic conditions to maximize the sensor's performance and life.

The CAT 1000 Controller unit scans and interprets the signals from the ORP sensor, display water quality readings in digital format and activates the chemical feeder in proportion to the demand required to maintain the ORP setpoint level. The unit incorporates audible and visual safeguard alarms for the out of range conditions and mode selections to manually feed or disable feeding. The CAT 1000 controller unit also features an internal micro-computer for unsurpassed accuracy, adaptability and ease of use. All user-entries and adjustments are made through the touch-screen interface front panel.



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Please unpack your new controller system carefully. Do not use a razor sharp instrument to remove contents. Report any shipping or handling damage immediately to your shipping company. Enclosed in the packaging you should find all of the following:

- (1) CAT 1000 Water Chemistry Controller
- (1) Professional Series ORP Sensor with 24" Cable and BNC Connector
- (1) BNC Connector Protective Covers (Remove to Connect Sensor)
- (1) Sensor Storage Container
- (1) CAT 1000 Owner's Manual
- (1) PVC Backboard with Mounting Holes and Stainless Hardware
- (1) Round Machined Acrylic Flow Cell assembled with:
 - (2) 1/4" NPT x 3/8" Tubing Parker Ball Valves
- (1) Pressure Flow Switch with Cable
- (1) 30' Roll, Black Poly Installation tubing (3/8" OD)
- (2) 1/4" NPT x 3/8" Tubing True-Seal Connectors

Before commencing installation, please confirm that items listed above have been included. Please report any shortages immediately to the factory.

Installation

The following tools are recommended for installation:

- Drill (Cordless Preferred)
- 7/16" Drill Bit
- 1/4" NPT (National Pipe Tapered) Tap
- Masonry Drill Bit & Anchors (if required)
- 13/16" Wrench or Channel-Lock Pliers

Installation Procedures

The key to a successful flow cell installation is in the plumbing. A pressure differential is required to allow clean, untreated water to pass through the cell and across the sensor. We recommend using a CAT Flow cell and fittings to create a pressure-suction "loop" line.

1. Turn off Heater, chemical feeders, pump, and any other related equipment. Relieve pressure from filtration system.
2. Select a convenient mounting location for the controller unit which will meet the following criteria:
 - Facilitates a combined (influent and effluent) maximum tubing run of 30'.
 - Located a minimum of ten feet from pool or spa.
 - GFI protected power source available.
 - Easily accessible to pool or spa operator.
 - Away from corrosive materials and physical hazards.
3. Securely mount Controller or PVC Backboard on vertical wall.
4. Drill and tap a 1/4" NPT port at a location just downstream of the filter, but upstream from any chemical injection point. Install a tubing connector, and run the flex tubing to the influent flow cell port.



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5. Drill and tap a 1/4" NPT port at a location subject to vacuum or reduced pressure. Install the remaining tubing connector and run flex tubing to the effluent flow cell port.
6. Remove ORP sensor from the plastic storage bottle and save bottle and storage fluid for future use. Apply Teflon tape and thread sensor into flow cell.
7. Remove BNC protective cover from the left side of controller unit and store for future use. This cover protects the controller unit from electro-static discharge (ESD) and should be used whenever handling or transporting the controller unit.
8. Connect the ORP and Flow sensor cables to the controller unit as labeled. Sensor cables are constructed from a specialized material – never cut or splice.
9. If new or additional chemical feeders are to be used with the controller, install according to the manufacturer's instructions at this time.
10. Connect chemical feeder to the controller as labeled.
11. Check all electrical and mechanical connections. Resume filtration system operation and check for any leaks.

Preparing Water Chemistry

Now that your new controller has been physically installed, water chemistry should be tested and adjusted prior to initiating automated control of the pool or spa. Confirm that your pool or spa water conforms to the following ranges before powering on and setting up the CAT 1000.

TEST	MINIMUM	IDEAL	MAXIMUM
pH	7.2	7.5	7.8
Free Chlorine (PPM)	1	2	3
Bromine (PPM)	2	3	4
Cyanuric Acid (PPM)	0	-	100
ORP (mV)	650	-	-
Total Alkalinity	80	-	120
Calcium Hardness	200	-	400

All CAT water quality controllers maintain sanitizer levels (chlorine, bromine, ozone, etc.) based on ORP. Although ORP is a superior index of water quality compared to part per million sanitizer residual levels, factors such as pH, cyanuric acid concentration and total dissolved solids can affect sanitizer residual readings relative to ORP.

CAT strongly recommends establishing desired pH, sanitizer residual, calcium hardness, total alkalinity, temperature and cyanuric acid levels prior to initiating automated control of the pool or spa to facilitate securing to the rebar. Once the niche is tied in place, confirm that it is still plumb and that the distance from the outer wall to the niche flange is the correct beam dimension.



Operation

Once the desired start up chemistry parameters have been established, you are ready to set the CAT 1000 to automatically maintain ORP. Please refer to illustration 3 for controller unit button designations. Button designations appear in bold type.

Changing the ORP Setpoint

The CAT 1000 is preset from the factory to maintain an ORP of 650 mV. This is the generally accepted world standard for safe drinking water. In order to meet Health Department standards for a particular pool or spa, the ORP setpoint may be changed to maintain a desired sanitizer level by performing the following:

1. Manually test pool or spa to confirm that the current sanitizer reading (chlorine, bromine, etc.) is the level you wish to maintain.
2. Note the ORP reading displayed by the controller.
3. Press the **ORP Setpoint Adjustment Button** (#4) until the green "SET" LED is illuminated.
4. Press the arrow-shaped **ORP Channel Increase Button** (#2) or **ORP Channel Decrease Button** (#3) until the digital display matches the ORP reading previously noted.
5. The controller will automatically return to the normal operating mode after twenty seconds, storing any changes.

The ORP setpoint should be changed as needed to maintain sanitizer residuals in conformance with Health Department standards.

Manually Activating ORP Feed

To manually enable the ORP chemical feeder press the **ORP Channel Mode Selection Button** (#5) until the green "MANUAL" LED is illuminated. The chemical feeder will operate continuously for 30 minutes, and then automatically revert to "Auto" to prevent accidental over-feeding.

Manually Disabling ORP Feed

To manually prevent operation of the ORP chemical feeder press the **ORP Channel Mode Selection Button** (#5) until the red "OFF" LED is illuminated. Automatic ORP feeding will be disabled. So that the user may have time to enter selections, the chemical feeding cycle will not be interrupted for approximately ten seconds.

Automatically Controlling ORP Feed

For automated control of the ORP chemical feeder press the **ORP Channel Mode Selection Button** (#5) until the green "AUTO" LED is illuminated. The chemical feeder will operate automatically in proportion to the chemical demand. So that the user may have time to enter selections, the chemical feeding cycle will not be interrupted for approximately ten seconds.

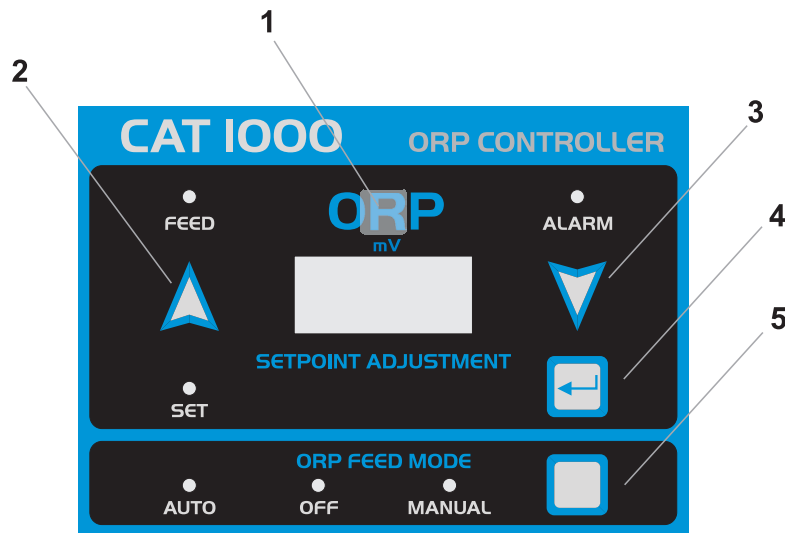
About Proportional Feed

The CAT 1000 features 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. This feature is highly valuable in maintaining precise control of water chemistry in most applications.

CAT-1000-ORP Switch and Keypad Functions

Refer to the illustration and the information below to determine the function of the CAT-1000-ORP push buttons.

- Button 1 - Hidden Button (Located behind "ORP" text)
Button 2 -ORP Channel Increase Button
Button 3 -ORP Channel Decrease Button
Button 4 -ORP Channel Setpoint Adjustment Button
Button 5 -ORP Channel Mode Selection Button





Advanced (Dealer) Setup Options

The CAT 1000 offers a host of advanced options to ensure compatibility with a wide variety of applications. The advanced programming menu contains features which are usually implemented during initial dealer setup and do not need to be routinely changed by the operator.

Enhanced No-Flow Alarm

When the flow sensor reads that there is no flow, the controller goes into a No-Flow alarm. The no-flow alarm sounds an audible alarm and disables all controller operation until flow has resumed. In addition, the LED display will flash the following prompt:

no Flow

Power on Display

At Power on, the controller displays the firmware version number. The firmware version number is displayed on the ORP channel LED display:

5.12 Firmware version number (or later)

Entering Advanced Setup Mode

Find the Hidden Button (#1) located behind the large ORP text over the ORP digital display.

1. Press and hold the Hidden Button (#1) for five seconds to enter the advanced setup mode.
2. Press the Up (#2) or Down (#3) arrow buttons to scroll through the programming options.
3. Press the Enter Button (#4) to make a selection.

ORP Proportional Feed

0.PF ORP Proportional Feed. Selects either fixed setpoint or proportional control.

0.F.F Off. The ORP feed output is activated based on a simple above or below setpoint decision. When the measured ORP value is greater than or equal to the ORP setpoint the ORP feed output is turned off. When the measured ORP value is less than the ORP setpoint the ORP feed output is turned on.

0.n On (Default). The ORP feed output is activated based on the difference between the ORP setpoint and measured ORP value. As the difference increases, the duration the ORP feed output is turned on to increase to 20, 30, 40, and 50 seconds of the 60 second cycle, and then the ORP feed output is turned on continuously.

ORP Overfeed Timer

0.0.F ORP Overfeed Timer. Selects whether a time limit will be imposed on the ORP feed output.

0.F.F When ORP Overfeed Timer is set to OFF, the ORP feed output will remain activated as long as an ORP feed condition is indicated. When any other selection is made, an overfeed limit timer is enabled on the ORP feed output. After the ORP feed output has been turned on for a period of time greater than this limit, the ORP channel is turned off and placed into an overfeed alarm condition which must be manually reset.

0.n When ORP Overfeed Timer is set to ON, the ORP feed output must be on continuously for the overfeed time limit, rather than in the part of the proportional feed cycle in which the ORP feed output is on for only a portion of the 60 second proportional feed cycle.

After the ORP feed channel is placed into the overfeed alarm condition, the ORP channel is turned off and the ORP Feed Mode indicator flashes rapidly to indicate the alarm. Press the ORP Feed Mode button (#5) to return the ORP channel to the off, manual or automatic feed mode. This will reset the ORP overfeed alarm and restart the overfeed timer. The ORP overfeed alarm will also be reset if the controller is powered off and then back on.



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The ORP overfeed timer is disabled when the ORP Feed Mode button is used to place the ORP channel in the manual feed state.

OFF The ORP feed output will remain on for an unlimited amount of time

15 15 Minutes

30 30 Minutes

60 60 Minutes (1 Hour)

120 120 Minutes (2 Hours)

180 180 Minutes (3 Hours)

240 240 Minutes (4 Hours) - default

ORP Low Alarm Limit

ORL ORP Alarm Limit Low. Sets the low alarm point for the ORP channel. When the measured ORP value is less than this limit, the audible alarm will be activated and the ORP feed output will be disabled. The alarm will be cleared and feed will resume automatically when the measured ORP value returns to within the non-alarm range.

525 Use the UP and DOWN buttons to select a value between 200 and 995mV. The value must be less than the ORP alarm high value. The default value is 525mV

ORP Alarm High Limit

ORH ORP Alarm Limit High. Sets the high alarm point for the ORP channel. When the measured ORP value is greater than this limit, the audible alarm will be activated and the ORP feed output will be disabled. The alarm will be cleared and feed will resume automatically when the measured ORP value returns to within the non-alarm range.

900 Use the UP and Down buttons to select a value between 400 and 995mV. The value must be greater than the ORP alarm low value. The default value is 900mV.

Clear All Programming and Restore Factory Defaults

CLR Factory Clear. Returns all controller operating parameters to their values.

Demonstration Mode

DEMO Places the controller in Demo Mode for showroom display, presentations, etc.

Audible Alarm (Beeper)

BP The Beeper setting allows the audible alarm to be enabled (default) or disabled.

Serial Interface

SR The CAT 1000 includes a standard RS232 serial interface. A header assembly and cable are required to connect.

ON Online Communications. Use this selection when the controller is attached to a PC or building automation systems.

PR Printer (default). Use this selection when the controller is attached to a CAT serial Printer to make a hard-copy record of controller operating parameters. The printer is supplied with a cable to connect it to the controller. The CAT Serial Printer prints one data record at 15 minute intervals. Data recorded includes ORP measured values, and the feed output and alarm status.

When all desired settings have been entered, press the Hidden Button or wait 30 seconds and the controller will return to default operating mode.



Display Functions

Refer to the diagram below with reference to designations of the various LED indicator lights on the front panel. Please note that for enhanced viewing the CAT 1000 features a “dead-front” display panel, so only illuminated indicators will be visible to the user. All lights and indicators are activated during power-on.

DESIGNATION	COLOR/TYPE	DESCRIPTION
1	GREEN LED	ORP FEED INDICATOR
2	RED LED	ORP OUT OF RANGE ALARM
3	DIGITAL DISPLAY	ORP INDICATOR/SETPOINT
4	GREEN LED	ORP SETPOINT ADJUSTMENT MODE INDICATOR
5	GREEN LED	AUTOMATIC ORP MODE INDICATOR
6	RED LED	ORP FEED MANUALLY DISABLED
7	GREEN LED	ORP FEED MANUALLY ACTIVATED

ORP Feed Indicator (#1)

This green LED is illuminated whenever the ORP chemical feeder is automatically or manually activated.

ORP Alarm Indicator (#2)

Illumination of this red indicator is accompanied by an audible alarm and indicates that the ORP is outside of safe operating range. Check that the ORP chemical feeder is functioning properly and that an adequate chemical supply is available.

ORP Digital Display (#3)

The red digital numeric display of the ORP channel normally indicates the current ORP of the pool or spa water passing through the filtration system. Pressing the ORP Setpoint Adjustment Button until the red “SET” LED is illuminated causes the ORP setpoint to be displayed.

ORP Setpoint Adjustment Mode Indicator (#4)

This green LED is illuminated whenever the controller is in the ORP setpoint adjustment mode. Setpoint adjustment is allowed only when this LED is illuminated.

ORP Automatic Control Indicator (#5)

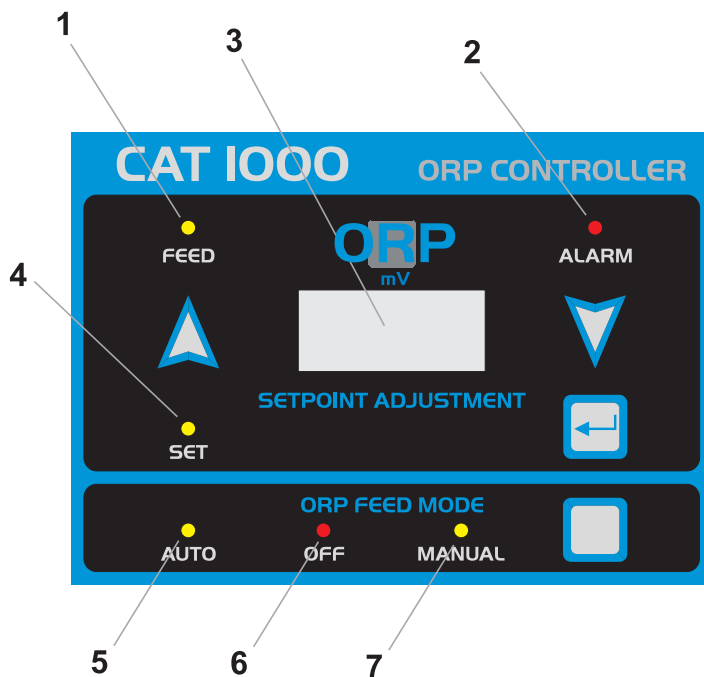
This green LED is illuminated when the ORP is under automated control.

ORP Manual OFF Indicator (#6)

This red LED is illuminated when the ORP feeding is manually disabled.

ORP Manual On indicator (#7)

This green LED is illuminated when the ORP feeding is manually activated.





Maintenance

CAT 1000 Controller

The CAT 1000 controller unit is virtually maintenance free. Cleaning of the enclosure, front panel and flow cell can be performed using a clean, soft cloth moistened with mild soap and water solution or glass cleaner. Use of abrasives or harsh chemicals may damage the enclosure and membrane switch panel.

Water Maintenance

Always test and record water chemistry readings in compliance with the Health Department requirements using a quality manual test kit.

Sensor Maintenance

The sensor must be clean and free from oil, chemical deposits and contamination to function properly. After saturation in pool or spa water, the sensor may need to be cleaned on a weekly or monthly basis depending on bather load and other facility-specific characteristics. Slow response and inconsistent readings are indications that the sensor is in need of cleaning.

To clean the sensor, disconnect from the controller and carefully remove the sensor from the flow cell. Clean the reference junction (the white Teflon ring at the bottom of sensor body) with a soft toothbrush and regular toothpaste. A household liquid dishwashing detergent may also be used to remove any oil. Rinse with fresh water, replace Teflon thread-seal tape and reinstall the sensor. Hand tighten only.

Never allow the ORP sensor to dry completely. Drying will damage the reference junction and void the sensor warranty.

Sensor Replacement

CAT Professional Series ORP sensors are engineered to provide the highest performance and longest possible functional service life. If a properly cleaned sensor provides unstable readings, the sensor should be replaced. For optimum controller performance, always use genuine CAT Professional Series sensors.

Sensor Storage

Exposure to atmospheric conditions will cause the sensors to dry out. Always remove and properly store the ORP sensor in the soaking cap provided whenever the sensor is to be removed or stored for one hour or longer. Although CAT Professional Series sensors are freeze-resistant, they must be protected from freezing temperatures when not in use.

Store the sensor in the soaking cap provided, making sure that the container is filled with the original storage solution or clean water. If the storage container has been misplaced, store the sensor in a small glass or plastic container with clean water covering sensor tips.

Controller Storage

The controller unit is subject to damage by electro-static discharge (ESD) when the sensor cables are disconnected. Always reinstall the BNC protective covers prior to storing or transporting the CAT 1000 controller unit.

Winterization

The ORP sensor should be prepared for storage as outlined above and protected from freezing temperatures. Although the CAT 1000 is designed to withstand a broad temperature range, winter storage in a secure location is desirable.

The flow cell and poly tubing must be drained prior to exposure to freezing temperatures. Either purge all water using compressed air or thoroughly drain through the valve ports and tubing connections.



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Troubleshooting

Each CAT 1000 controller is manufactured to the highest quality standards and then thoroughly tested before leaving the factory. State of the art design and fabrication technology ensure years of trouble free operation. Most apparent malfunctions can be solved through the following corrective actions.

No lights are illuminated when the controller is powered on

1. Check circuit breaker and/or receptacle for proper operation. Connect to a functional ground-type GFCI protected power source.
2. Check for damaged power cord or connector
3. Check controller fuses.

Alarm light(s) and tone are observed

1. Ensure that the filtration system is functioning properly, flow is adequate and water chemistry is in balance.
2. Ensure that the sensor and power cables are properly connected to their respective connectors on the controller unit.
3. Check chemical feeders for proper operation.
4. Ensure that the flow sensor is properly installed and connected.

ORP chemical feeder is not activated as expected

1. Ensure that "auto" ORP feed mode is selected.
2. Check the ORP setpoint and make sure that the ORP is within range.

ORP readings are inconsistent or slow in response

1. Ensure that the sensor cables are properly connected to their respective BNC connectors on the controller unit.
2. Clean the sensors as outlined in the maintenance section. If sensors continue to provide unstable readings after cleaning, replace sensors.
3. Check to ensure that all electrical equipment in the facility pump room is properly bonded.

ORP chemical feeder runs continuously

1. Make sure "auto" feed mode is selected.
2. Ensure that the chemical feeders are properly connected to their respective connectors on the control unit.

Chlorine or bromine residual is too high or too low

1. pH, cyanuric acid concentration, total dissolved solids and use of additional or alternative sanitizers will all effect the sanitizer residual level relative to ORP. Consider the effect of any chemicals recently added to the pool or spa.
2. Check and adjust the ORP setpoint.

ORP is overshooting the setpoint

1. Ensure that each chemical feeder is properly sized.
2. Check that the output of the chemical feeder is appropriate for the size of your body of water.
3. Make sure that you have the correct setpoint for your body of water.

ORP feeding does not reach the setpoint

1. Ensure that each chemical feeder is properly sized.
2. Check that the output of the chemical feeder is appropriate for the size of your body of water.
3. Make sure that you have the correct setpoint for your body of water.
4. Check chemical injection points for proper operation.

Your display is flashing an alarm status

1. Check the flow sensor for any damage or irregularities and make sure that there is no dirt or debris that is stuck on the flow sensor.
2. Make sure that you are getting enough flow in your circulation.
3. Ensure that there are no clogs or foreign object in and around the flow cell.



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Limited Warranty

Hayward Commercial Pool warrants the CAT 1000 automated controller to be free of defects in material and workmanship for a period of 5 years from the date of shipment from our factory or authorized distributors. Liability under this warranty is limited to the repair or replacement of any device or component which is returned to the factory within 5 years of delivery to the original purchaser, shipping pre-paid, and which is found to be defective upon examination.

Hayward Commercial Pool warrants all flow sensors, fittings and accessories to be free of defects in material and workmanship for a period of one year from date of shipment from our factory or authorized distributor. Professional Series ORP sensors are warranted for a period of two years from date of shipment from our factory or authorized distributor. Liability under this warranty is limited to the repair or replacement of any device or component which is returned to the factory within the warranty period, shipping, and which is found to be defective upon examination.

Hayward Commercial Pool disclaims all liability for damage during transportation, for consequential damage of whatever nature, for damage due to handling, improper installation or operation, and for determining suitability for the use intended by the purchaser. Hayward Commercial Pool makes no warranties, either expressed or implied other than those state above. No representative has authority to change or modify this warranty in any respect. After obtaining a Return Merchandise Authorization form, any warranty claims should be directed to the following address:

Hayward Commercial Pool
10101 Molecular Drive Suite 200
Rockville, MD 20850 (USA)



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Product Registration

(Retain For Your Records)

DATE OF INSTALLATION _____

Retain this Warranty Certificate (upper portion) in a safe and convenient location for you records.



DETACH HERE: Fill out bottom portion completely and mail within 10 days of purchase/installation or register online.

Commercial Automation

Please Print Clearly:

First Name _____ Last Name _____

Street Address _____

City _____ State _____ Zip _____

Phone Number _____ Purchase Date _____

E-Mail Address _____

Serial Number (may not be applicable)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Model Number _____

Pool Capacity _____ (U.S. Gallons)

☐ Please include me on all e-mail communications regarding Hayward® Equipment or promotions.

Mail to: Hayward Pool Products, 620 Division Street, Elizabeth, NJ 07207

Attn: Warranty Dept

or REGISTER YOUR WARRANTY ON-LINE AT WWW.HAYWARDCOMMERCIALPOOL.COM

Warranty Card Registration

Years Pool has been in service

☐ < 1 year ☐ 1-3 ☐ 4-5 ☐ 6-10 ☐ 11-15 ☐ >15

Purchased from _____

☐ Builder ☐ Retailer ☐ Pool Service ☐ Internet/Catalog

Company Name _____

Address _____

Type of Pool:

☐ Concrete/Gunite

☐ New Installation

☐ Replacement

Installation for:

☐ In Ground

☐ Spa

For further information, visit our website at
www.haywardcommercialpool.com



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