

# AutoPool® 4.0 Swimming Pool Water Chemistry Controller

## User Operations Guide

- Updated September 24, 2024

### General Notes:

1. Please reference the complete AutoPool Manual for additional details including safety precautions.
2. The sensors must not be allowed to stand dry.
3. The chlorine sensor is intended to be exposed to chlorinated water during operation. Prolonged periods without chlorine exposure may require service. Excessive chlorine >10 ppm has not been shown to have any negative effect on the sensor. When chlorine drops to a measurable range confirm the sensor tracks accordingly. Please note test kit accuracy at >3 ppm is significantly reduced.
4. The chlorine sensor requires time to polarize after power has been disconnected, we recommend keeping an initial feed delay of 5:00 for the chlorine feeder(s).
5. Never disconnect/connect chlorine sensor cable while the controller is powered on.
6. Standard Maintenance Requirements:
  - a. **Every Week:** Remove flow cell strainer and clean.
  - b. **Every 12 months:**
    - i. Clean/check ORP Sensor
    - ii. Clean/Calibrate pH Sensor
    - iii. Replace chlorine sensor membrane cap and fill with new electrolyte once per year (confirm electrolyte expiration date before using).
7. Sensor service dates or replacement prompts are shown on each sensor overview menu.
8. Prior to any calibration attempt, confirm flow is in the recommended range. **Use the throttle valve, not the isolation valve.**
  - a. OPEN DISCHARGE (direct drop to floor drain or suction tank): 0.5 – 0.6 LPM
  - b. CLOSED DISCHARGE (0.6 – 0.8 LPM)
9. Reactive calibration should be minimal. When evaluating the chemical controller accuracy, the water test must be taken from the flow cell sample port.
10. Typical tolerances for manual test kits:
  - a. pH indicator (phenol red) tolerance: +/- 0.20
  - b. Typical range Free Chlorine (DPD) tolerance: +/- 0.20 ppm
  - c. Excessive High Free chlorine (>3.0 ppm) is +/- 0.75 ppm
11. Before re-calibrating confirm consistency of test:
  - a. Re-Sample from basin side (area of good water flow)
  - b. Re-Sample from controller sample port
  - c. Evaluate all results for consistency or continue to re-test until consistent results can be confirmed at the flow cell sample port.
12. Follow calibration procedure steps if necessary.

**Throttle Valve**  
(set for recommended flow)

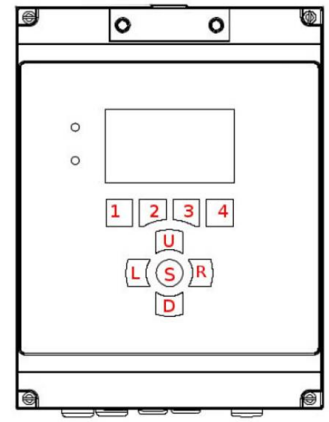
Isolation Valve



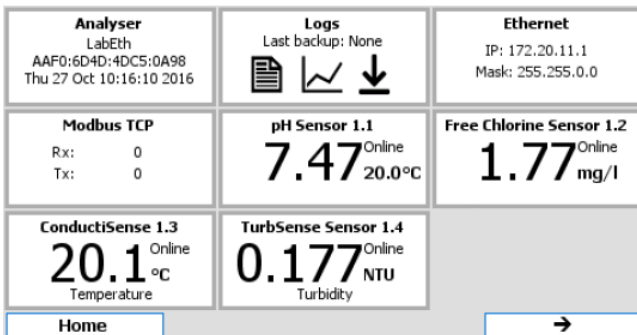
## Setpoint Adjustment:

Note: Setpoint adjustment cannot be completed in some alarm/error conditions.

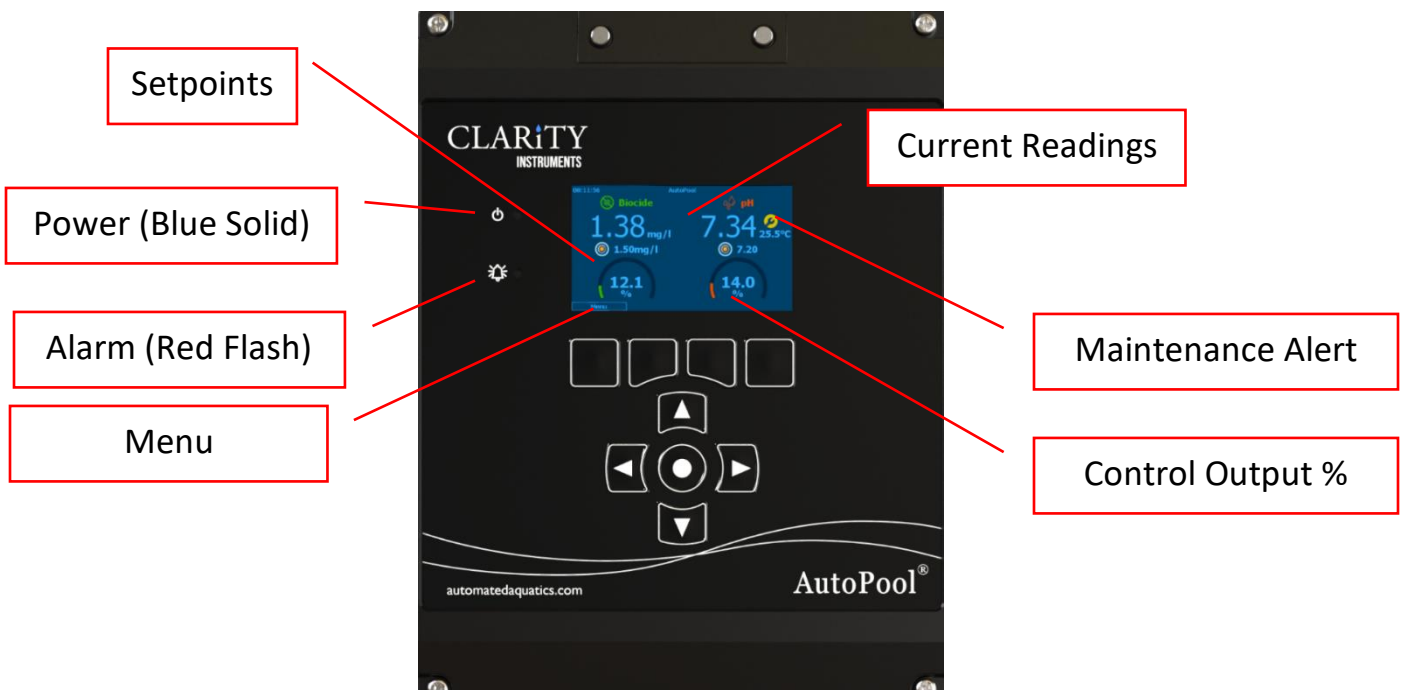
1. **Menu**
2. **Main Menu**
3. Use button **4** to change menu windows until the PID Control Tiles are visible.
  - By default there are 2 PID Controls: **CL PID** and **pH PID**
  - Alternative configurations may have multiple PIDs if there are multiple chlorination systems or multiple pH systems. For example, a **pH CO2 PID** and **pH Acid PID**
4. Select **CL PID** or **pH PID**
5. From Overview, press **D** to highlight **setpoint**
6. Press **S** to modify value.
7. Use **L/R** keys to select digit and **U/D** to change value.
8. Press **S** to save.
9. Press **HOME** and confirm the setpoint has changed.



Button Layout



Example Main Menu



## Calibration: pH & Chlorine

See general notes about tolerances before attempting to calibrate.

1. Confirm an accurate sample free chlorine measurement value with a calibrated photometer utilizing a tablet or powder reagent.
2. Starting from the **SETPOINT HOME SCREEN** (as shown on page 2) – press **MENU** (button 1)
3. **Calibration: Chlorine or pH**
  - a. Follow instructions and press **next** when the measurement is stable.
  - b. The AutoPool will countdown from 30 seconds.
  - c. At the end of the countdown the current value being read from the sensor is displayed. To calibrate the sensor change the value to the value given by the calibration device. To do this press the “Select/Enter” button and using the Up, Down, Left and Right arrows change each digit.
4. If the calibration is successful, follow the prompts. In the case of the chlorine sensor, confirm if the electrolyte and/or membrane cap were replaced (typically no, unless during annual service). In the case of the pH sensor, confirm if a new sensor was installed.

## Calibration: Temperature

1. **Main Menu**
2. Select the **pH** Tile
3. **Maintenance – Calibration**
4. *Do you want to calibrate temperature first? - YES*
5. When you finish the temperature calibration and it asks about pH, press Home to skip the full pH buffer solution calibration procedure.

## Boost Function: Standard

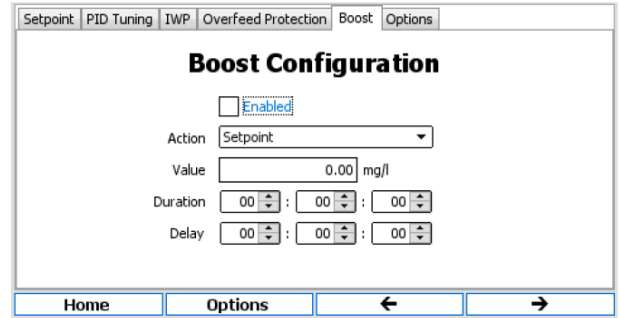
Boost allows for a temporary secondary setpoint or a fixed control output. This can be used for example, for the shock dosing of a swimming pool. When activated the boost function will either change the PID setpoint to the secondary value (usually higher) or set the control output to the selected level and will maintain it for a pre-determined time. It will then disable the function for a configurable period to prevent overuse.

The boost must be programmed initially before it can be used.

1. From the PID program tile -> Setup PID -> Boost Tab:
2. Enable boost
3. Action: **Setpoint**
  - a. Enter the desired alternate boost set point, duration and delay. Time format is HH:MM:SS
4. Action: **Output**
  - a. Enter the desired control output %. In the case of a **pulse width relay** this will be the % of the full on cycle that the output will run at. Enter duration and delay values.
  - b. In the case of a **pulse frequency relay** the % will be the fixed speed of the dosing pump

**To Initiate a boost cycle:**

1. Menu
2. Boost -> **Cl** or **pH**
  - a. Setpoint
  - b. Output
3. The desired boost method will run for the previously configured duration before reverting to automatic.



**NOTE:** A boost cycle may not start immediately, the **OFF** segment of a previous feed cycle may have to finish before the boost is active. Depending on programming this may be a portion of a 5-10 minute total cycle. The delay is a time (HH:MM:SS) required to lapse before a second boost cycle can be activated.

**Boost Function: CT**

The chlorine boot can be setup to be more dynamic and calculate a CT (concentration time) target end point to accommodate regional contamination response procedures.

For example, if the response to a fouling of the pool requires a CT of 50 the boost cycle will run until the CT is achieved and then revert back to the automatic default set point.

Additional limits can be implemented (Output % and duration) to prevent situations where an aggressive chlorine dosing system will surpass even the alternate set point. Temperature and pH limits may be applicable as per regulation. Deviance from acceptable pH/temperature ranges will stop the CT calculation in accordance with those regional requirements. Consult with your local health standards to confirm. Higher range chlorine set points are limited by the sensor range (confirm on sensor label). Typical free chlorine sensors are 0-10 ppm. Higher CT targets like 15,3000 can be achieved but with the sensor range as a limitation. When chlorine exceeds the maximum range it should be re-evaluated and calibration may be necessary when the range is back to typical operating levels with sufficient manual DPD test kit accuracy (< 3 ppm).

<b>Enabled</b>	Yes
<b>Default Action</b>	Setpoint
<b>Setpoint</b>	2.00mg/l
<b>Output</b>	90.0%
<b>Contact Time Enabled</b>	Yes
<b>Contact Time Target</b>	50.0mg.min/l
<b>Limits Sensor</b>	pH Sensor 1.2
<b>Maximum pH</b>	7.50
<b>Minimum Temperature</b>	25.0°C
<b>Maximum Duration</b>	1:00:00
<b>Delay</b>	0:00:00

## Temporary Shutdown & Storage

- **The chlorine sensor** may be responsive at the time of startup if stored in pool water (some chlorine present) depending on the length of shutdown and condition of sensor at the time of shutdown.
- For seasonal storage the sensor is to be removed and stored dry. A new membrane cap and refill of electrolyte is required to re-start. The re-start is identical to the annual service procedure. Be aware that the sensor is to be carefully removed (avoid creating a vacuum):
  - Ensure spares are on hand prior to the anticipated start up: Electrolyte (100ml bottle can do 8-10 refills, note expiration date / storage conditions on bottle) and 1 spare membrane cap per chlorine sensor.
  - The AutoPool® **must be powered off** before disconnecting/re-connecting the chlorine sensor.
  - Disconnect sensor wire (threaded cable connection)
  - With the flow cell discharge line open to atmosphere – or removal of one of the top flow cell plugs (hex key wrench), loosen the compression bushing on the chlorine sensor.
  - Loosen the sensor compression bushing (upper nut only) counter clockwise and remove sensor straight out – observe compression sleeve/o-ring placement. Once removed, lift the vent seal and unscrew then discard the membrane cap, proceed to rinse the electrode finger (gold tip) in warm water. Detailed instructions are as per “changing the electrolyte” section in the user manual.
- **ORP/pH Sensors:** isolate the flow cell to retain water in the flow cell. Visually confirm the ORP and pH sensors remain submerged in liquid, so the internal permanent electrolyte does not dry out. Check daily that liquid level is present. For longer term (>1 week) we recommend removing the sensors and store upright in a container of solution to submerge the sensor tips, using pH 7.0 buffer or a probe storage solution. When removing, twist the sensor cable connection counterclockwise to remove the cable before removing the sensor via loosening the compression fitting.
- See annual service recommendations for other considerations.

## Advanced Control Setup:

### Change of Chlorine Control: Change between ORP and Free Chlorine (ppm) control variables

1. Select **CI PID** Control Tile
2. Select **Process Variable**
3. Select **Sensor** and change to desired input value (ORP or Free Chlorine)
4. Configure new setpoint in **PID Settings**
5. **Scale factor should be modified to account for the significantly different measurement ranges:**
  - a. **Free Chlorine scale factor: 1.0** for most systems, **0.1** may be appropriate for systems requiring tighter control.
  - b. **ORP scale factor: 100** (to reflect larger changes in ORP measurements compared to the free chlorine scale)
6. Assess several feed cycles to determine if other adjustments are required (Proportional factor, pulse width, maximum pulse %, deadband etc.)

## Dual pH Control Setup

- The AutoPool® is extremely modular and gives the ability to fine tune individual dosing control programs specific to the type of chemical feeder. Pool chemical feed systems utilizing dual pH control (neutralizing alkalinity) can adjust several control functions so that an acid feed (alkalinity reducer) can feed at an appropriate ratio with CO<sub>2</sub> gas (alkalinity increaser) to achieve neutral alkalinity without hand feeding chlorine.
- The setup of these systems takes some trial and error however in general an acid feed should be set less aggressive than the CO<sub>2</sub> but is dependant on the properties of a specific pool system: Capacity of chemical feeders, volume of water, flow rate. Contact our office for specific guidance on fine tuning your dual pH control system for optimal success.
- We recommend using the data log and graphic functions from Control InSite (remote access) to identify opportunities to optimize chemical use.

Coming soon: The AlkaSense and automatic alkalinity regulation with dual pH chemical feeders.





### Flow Cell Chamber Plugs

- Remove for open flow cell configuration to prevent formation of air cavities

### Flow Cell Discharge

#### 2 Options:

- OPEN FLOW CELL (shown): a discharge isolation valve is not recommended.
- CLOSED FLOW CELL (multiple configurations)

### Flow Cell Strainer

#### To Clean:

1. Close supply valve
2. Open sample valve
3. Remove clear housing (counter clockwise)
4. Rinse/brush inside of strainer screen
5. Replace screen, hand tighten housing

### Flow Cell Supply Valve

### Flow Control (Dole) Valve

### Water Sample Valve