AquaRite S3®

Technical Training Guide

TSG-AQRS3a

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Safety Precautions

High Voltage Electrocution Hazard

Hazardous voltage can shock, burn, cause serious injury and or death. To reduce the risk of electrocution and or electric shock hazards:

- Only qualified technicians should remove the panel
- Replace damaged wiring immediately
- Insure panel is properly grounded and bonded

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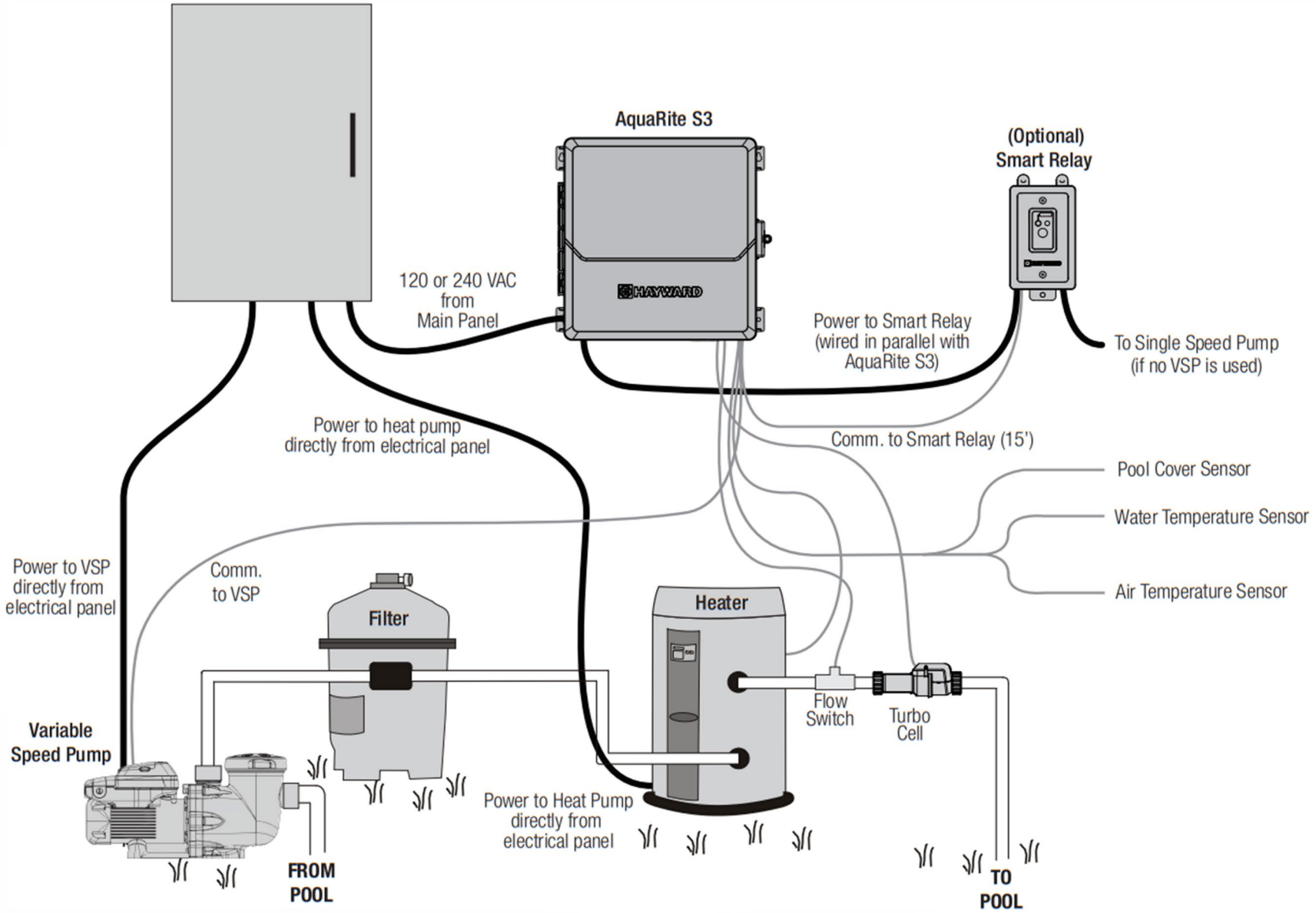
AquaRite S3 Overview

The AquaRite S3 offers the following features:

- **Can generate chlorine using a broad range of salt concentrations from 1200 PPM to 8000 PPM**
- **Can control and schedule a Hayward Variable Speed (VSP) pump using the internal RS-485 connection, a Pentair VSP using a Hayward HLPMPCONV converter (sold separately) or a single speed pump using a Hayward Smart Relay (sold separately)**
- **Can control a gas heater, heat pump or any other heater that uses a low voltage on/off remote connection (requires Hayward water temperature sensor sold separately)**
- **Inputs for water and air temperature sensors (temperature sensors sold separately)**
- **Connection for flow switch used to detect water flow (flow switch sold separately)**
- **Connection for pool cover detection (lowers chlorine production when the pool is covered)**
- **Can be powered by either 115 or 230 VAC**
- **Offers recirculation freeze control which turns on the filter pump automatically to prevent freezing (requires Hayward air temperature sensor sold separately)**

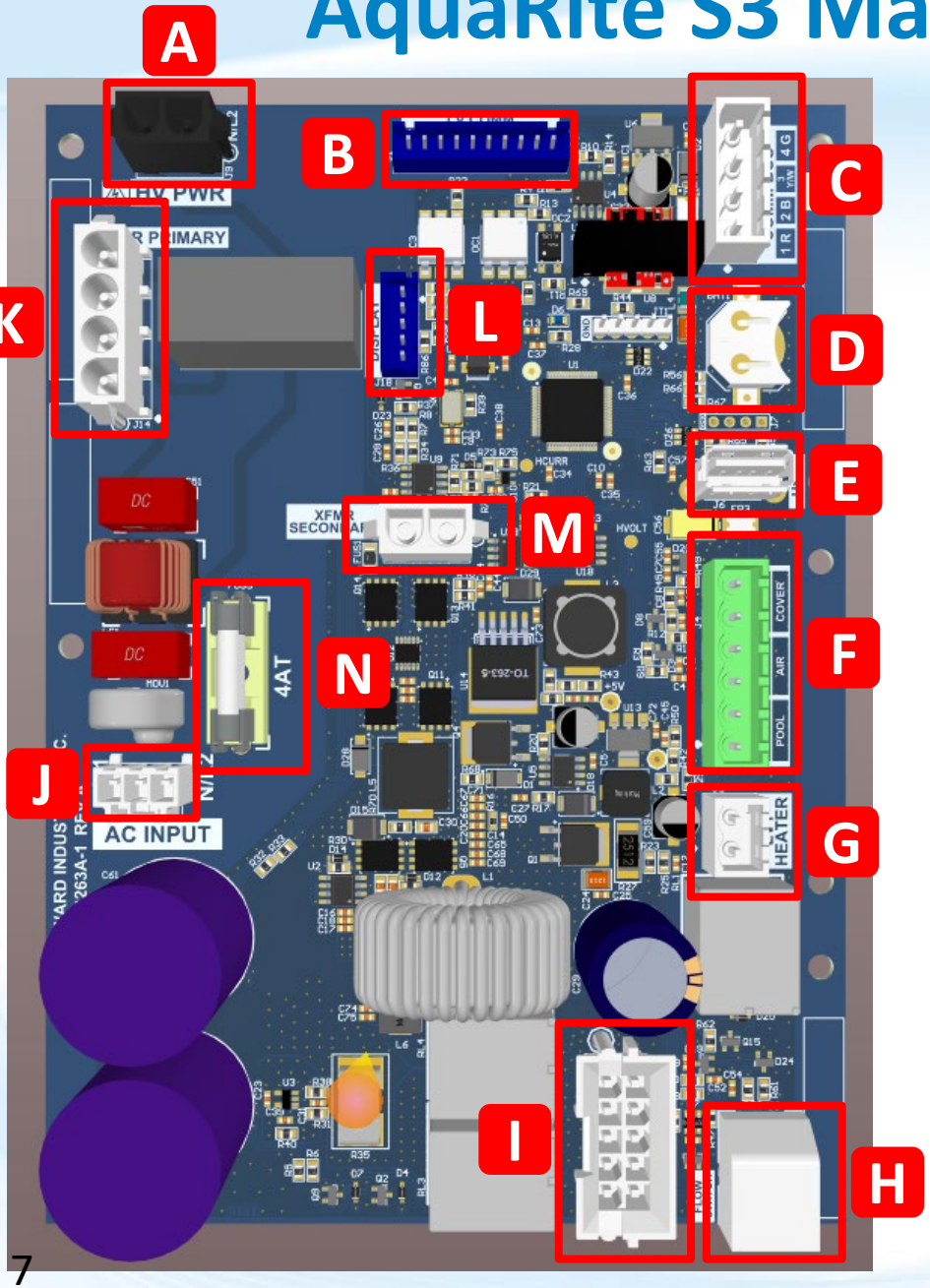
AquaRite S3 Overview



AquaRite S3: How It Works

- The AquaRite S3 Salt Chlorine Generator is designed to convert 99% pure salt into chlorine gas (CL2(g)).
- When CL2(g) is dissolved in water it creates Hypochlorous Acid (HOCL) to sanitize the pool.
- The conversion occurs in the electrolytic cell, also known as the cell (used throughout this guide).
- Power is sent from the AquaRite S3 control center to the cell when chlorine production is scheduled (based on time percentage).
- When power is applied to the cell, conductive plates produce a field; which in-turn establishes an electrochemical reaction between chloride ions & the water to create Hypochlorous Acid.

AquaRite S3 Main PCB Layout



A	AC Power for expansion board. If fuse is good AC mains voltage is present across contacts.
B	Low voltage and signals for expansion board. Inadvertent shorts can cause damage.
C	Standard Hayward RS-485 (HPN) connector.
D	12mm coin cell battery holder for real time clock. BR1225
E	USB for firmware update. Do not leave USB drive plugged in. No logging functionality.
F	Sensor inputs (pool, air, cover).
G	Heater low voltage dry contact relay.
H	Flow switch connection.
I	T-Cell connection. Only supports TCELLS3
J	AC input connection for pigtail leads
K	Transformer primary inputs. Auto voltage configured and same wire color scheme as AQR, OmniPL.
L	Display connector. 3.3V between pin 1 and 5.
M	Transformer secondary connector. 24VAC across pins. May see transient 12VAC during auto voltage select at boot or reset.
N	5 x 20mm 4AT mains input fuse.

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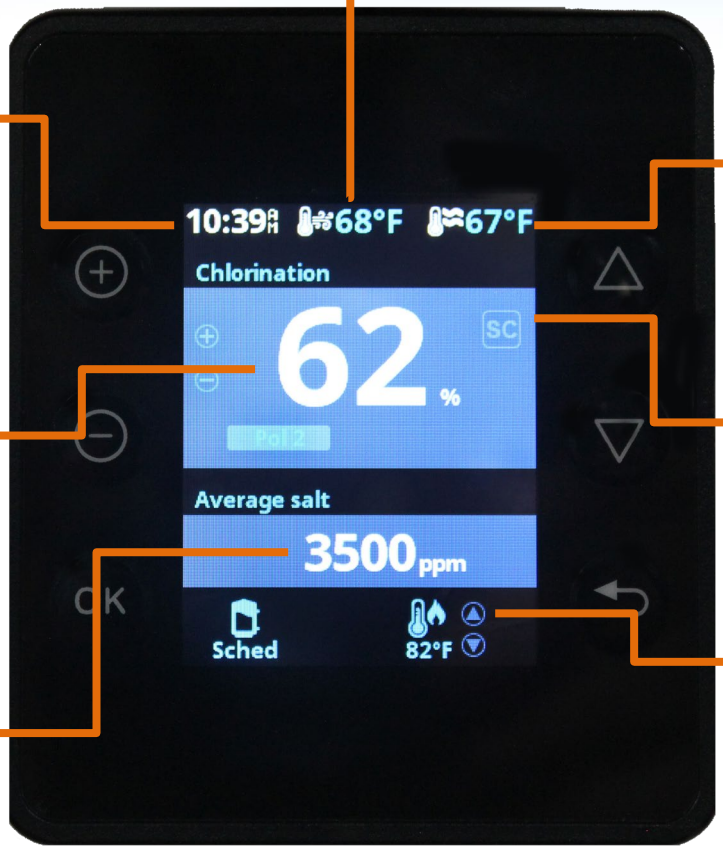
AquaRite S3 Main Menu

Air Temperature - Current air temperature reading at the AquaRite S3.

Current Time - If the AquaRite S3 controls the filter pump, the pump's schedule will reference this time.



Water Temperature - Current water temperature reading with pump operating.

Chlorination Setting - Displays the current chlorination setting between 0 – 100%.

Super Chlorinate - Displays when the AquaRite S3 is in super chlorination mode.

Salt Reading - This reading displays the average salt level in the pool/spa.

Heat Setting - The current heater temperature setting.

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AquaRite S3®

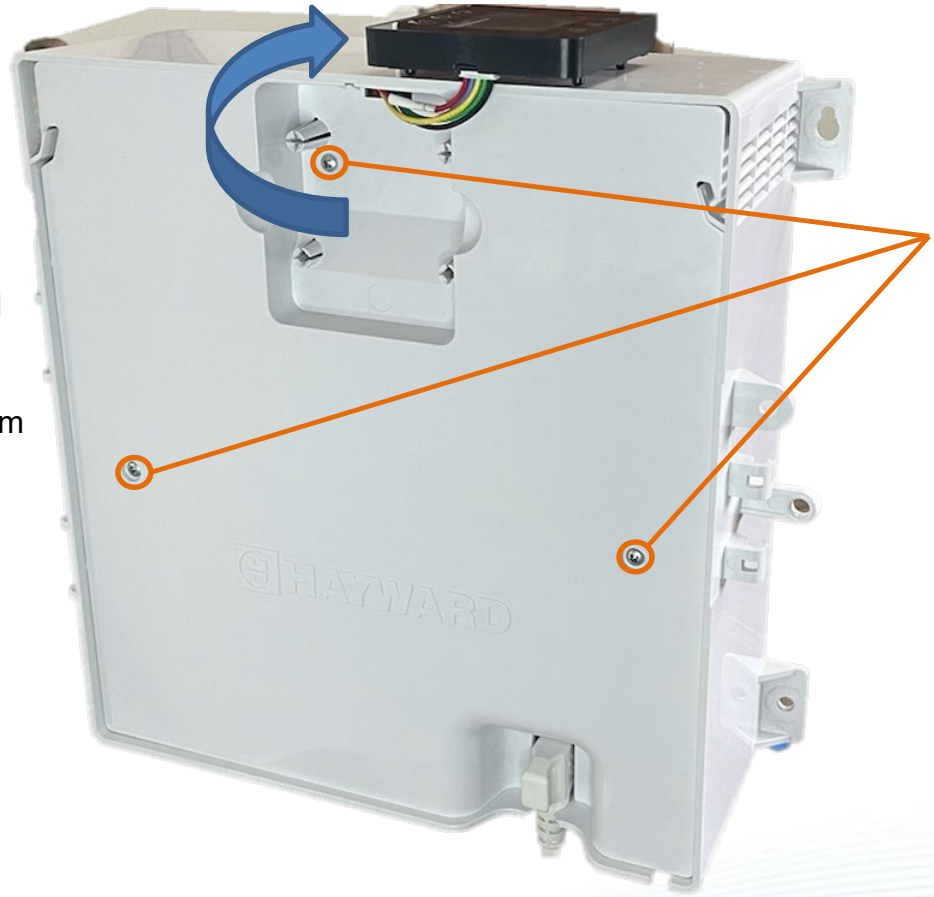
How To Guide:

How To: Remove Front Panel

To download the latest firmware to a USB drive go to www.Hayward.com Support Center>Automation>AquaRite S3>Firmware Updates

Front Panel Removal Instructions:

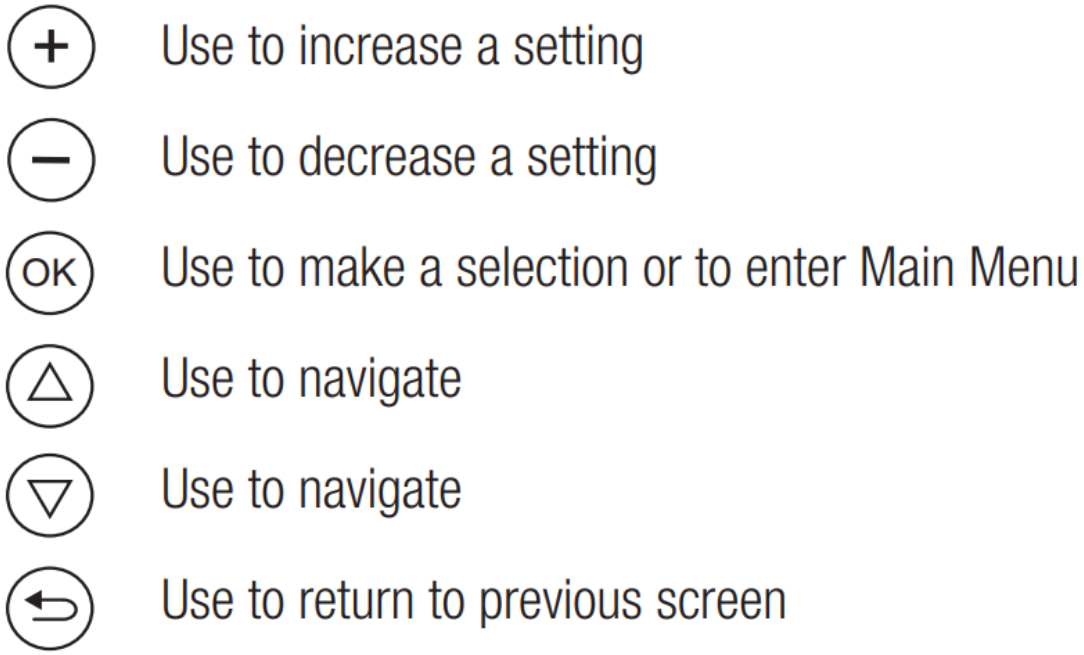
Pull the display away from the panel and place on top of the enclosure. Remove the 3 screws then pull the front panel from the enclosure. It is not necessary to disconnect the display wiring.



How To: Navigate the Menu

Navigation and Configuration Wizard:

Note that the AquaRite S3 uses 6 push buttons to navigate the menu and set values. The functions of these buttons are shown below.



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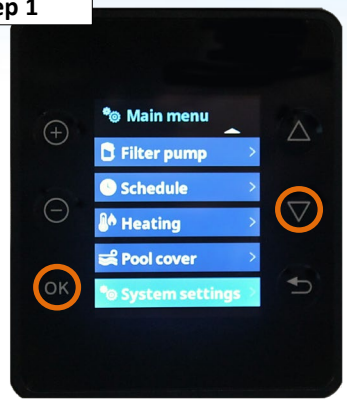
How To: Upgrade Firmware (Main Board)

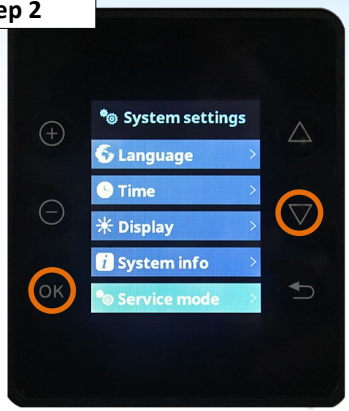
Remove the front panel (page 10) and Insert the USB drive into the USB Slot on the Main PCB (diagram on page 7) and follow the steps provided below:

Step 1



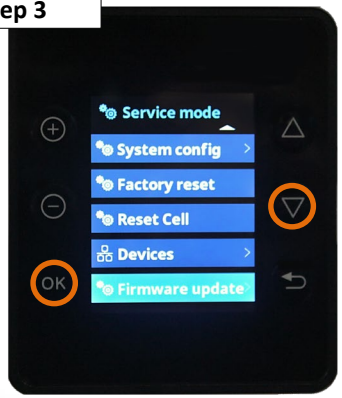
Press OK to enter the Main Menu, then scroll down to “System Settings” and press OK.

Step 2



Scroll down to the bottom of the Main Menu Screen and select “Service Mode” and press OK.

Step 3



Scroll down to “Firmware Update” and press OK.

Step 4

Select the component “Main Board” and press OK.

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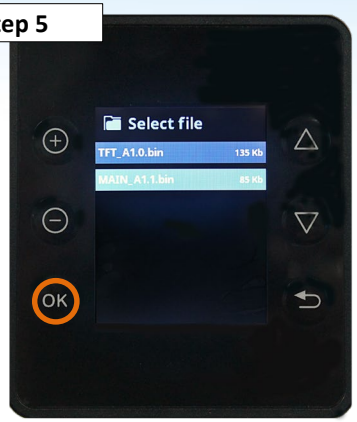
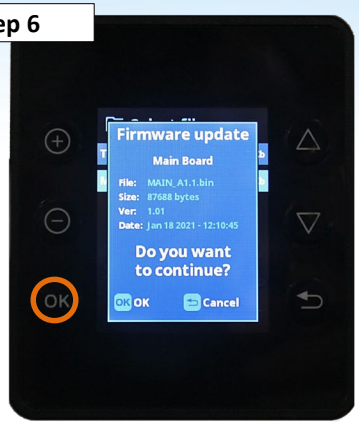
How To: Upgrade Firmware (Main Board)

Step 5



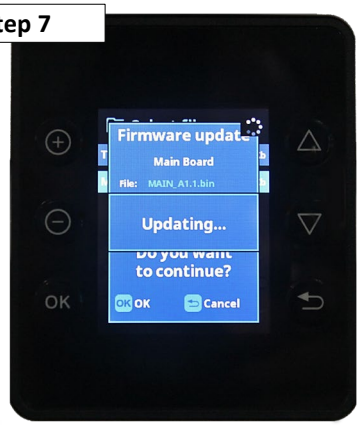
Select the firmware named MAIN for Main Board upgrade and press OK.

Step 6



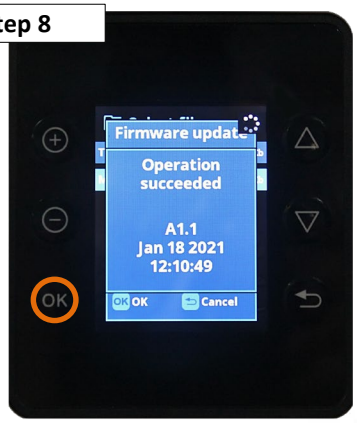
Confirm the firmware and press OK, if not press cancel to return to file selection menu.

Step 7



The system will now perform the update. This update may take up to 2 minutes.

Step 8



Upgrade complete. System will automatically go back to firmware screen when finished.

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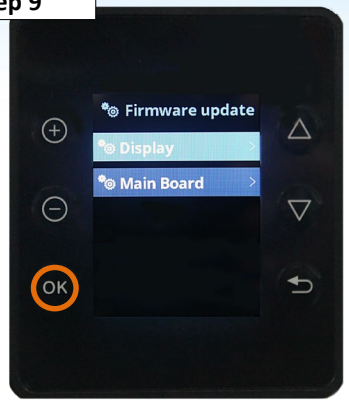
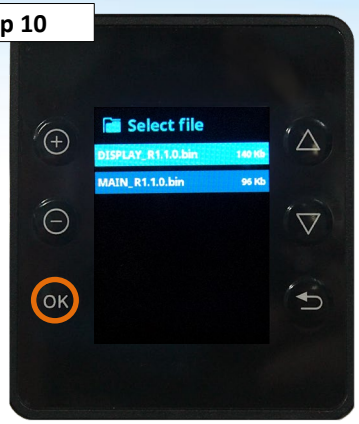
How To: Upgrade Firmware (Display)

Step 9



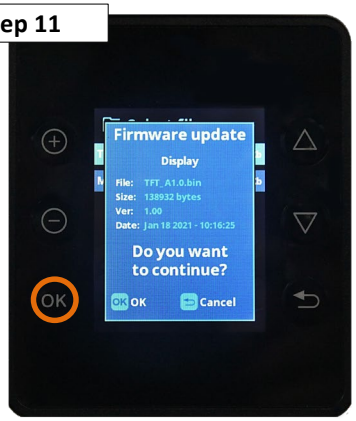
Complete Steps for Main Board Update then select the Display and press OK.

Step 10



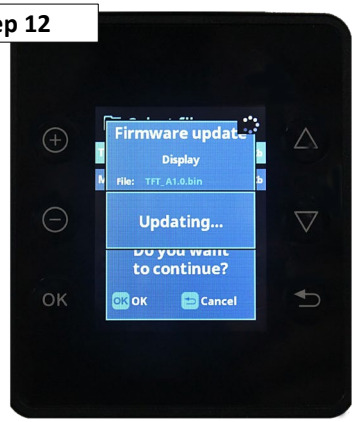
Select the firmware labeled DISPLAY and press OK.

Step 11



Confirm the firmware and press OK, if not press cancel to return to file selection menu.

Step 12

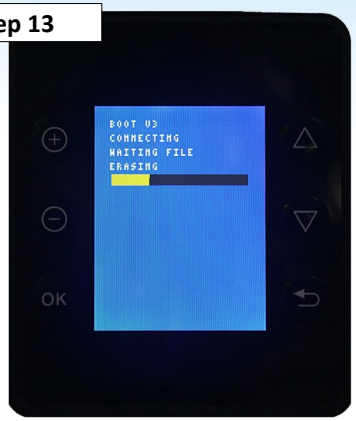


The system will now perform the update. This update may take up to 3 minutes.

HAYWARD

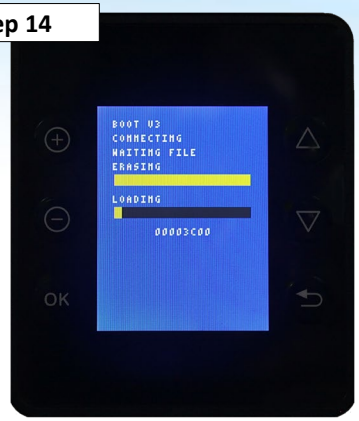
How To: Upgrade Firmware (Display)

Step 13



The system will delete the old Display firmware and continue with the upgrade.

Step 14

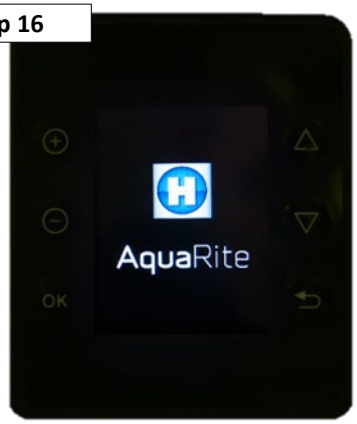


Now the system will install the updated Firmware.

Step 15

Once the update is complete you will hear 3 beeps and the system will reboot.

Step 16



The system is now updated and ready to use. You may remove the USB Stick.

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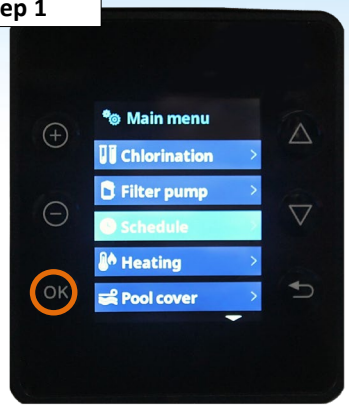
How To: Set Schedule

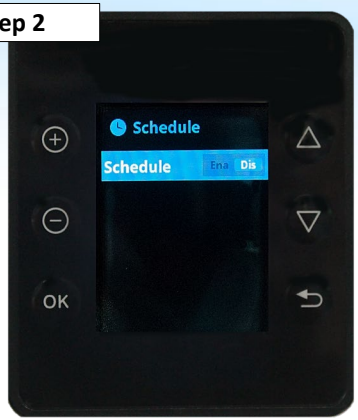
You can only set a schedule if you have a VS Pump or Smart Relay connected to the system.

Step 1



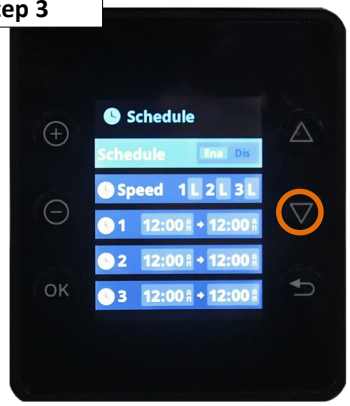
Press OK to enter the Main Menu. Scroll down to Schedule and press OK.

Step 2



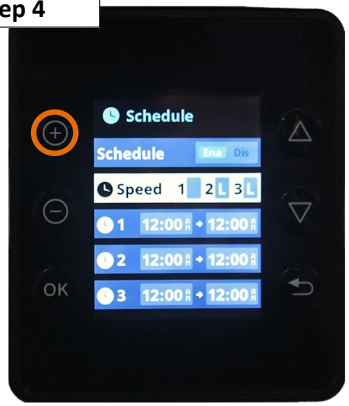
Press the + or - button to enable the schedule feature for the filter pump. Once Enabled continue.

Step 3



Press the down arrow to the speed options. This allows you the ability to select what speed each of the 3 schedule options will operate at.

Step 4



To adjust the speed press + then press + or - to go between options, then press Up arrow to move to the next speed.

*Always press OK to save the programming

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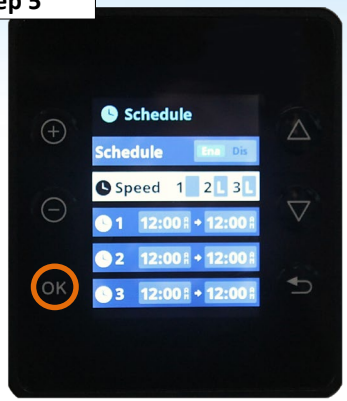
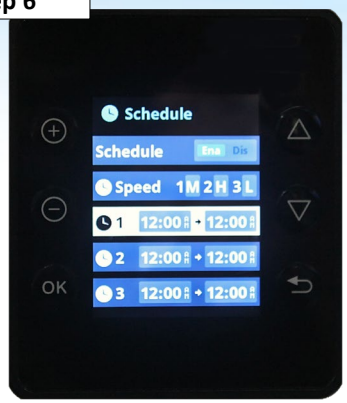
How To: Set Schedule

Step 5



Once all 3 speeds have been adjusted press OK to continue programming schedules.

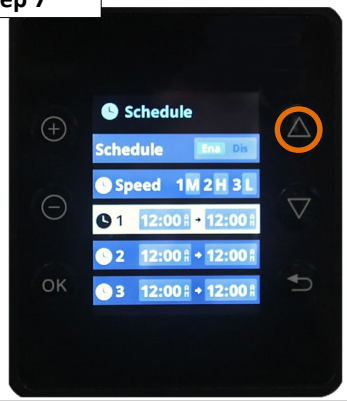
Step 6



Press down arrow to desired schedule. Once highlighted use + or - to edit the start time.

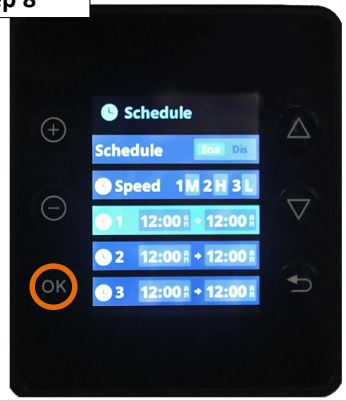
To disable schedule set 12:00 to 12:00

Step 7



Once the start time is set, use the up arrow to move to the stop time and adjust with + or - buttons.

Step 8



When finished adjusting the desired schedules press the OK button to Save.

*Always press OK to save the programming

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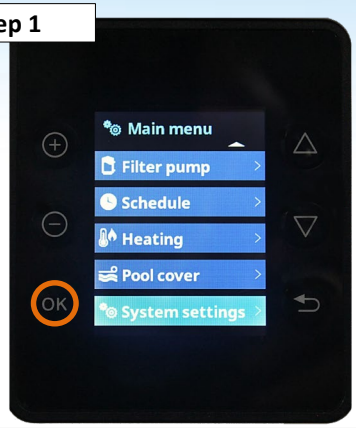
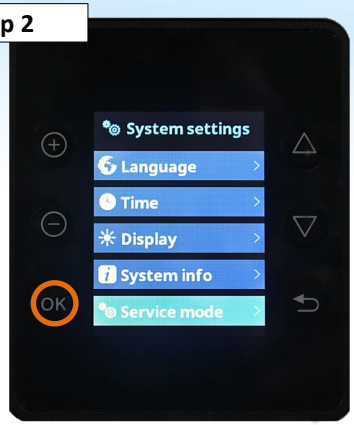
How To: Set Pump Speeds

Step 1



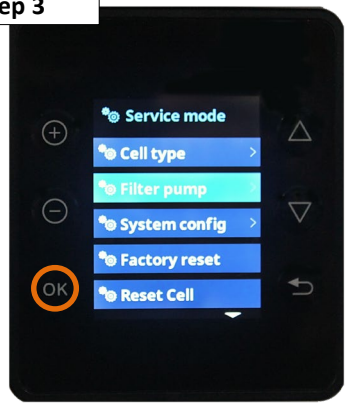
Press Ok to enter the Main Menu then scroll down to System settings and press OK.

Step 2



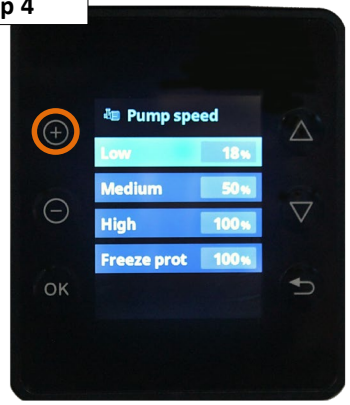
Once in System settings, scroll down to Service mode and press OK.

Step 3



In Service mode scroll down to filter pump and press OK.

Step 4



Use up or down arrow to navigate to the preset speed and press + to enter the adjustment menu.

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How To: Set Pump Speeds

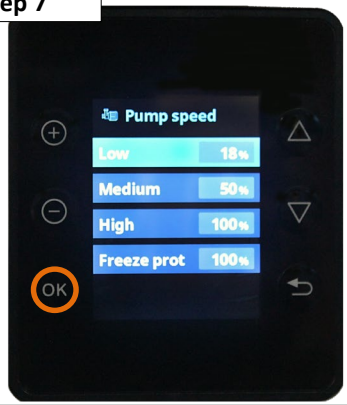
Step 5

Use the up or down arrows to navigate between the columns. Use the + or - menu to adjust the preset speed. Press OK to save.

Step 6

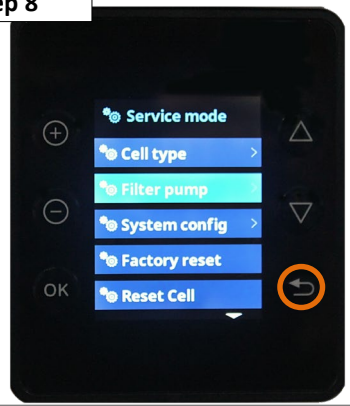
If you have enabled Freeze protection you can adjust the speed the same way you adjusted the preset speeds. Press OK to save.

Step 7



Once your settings are finished press OK to Save and return to the Service menu.

Step 8



Your pump speeds have been saved. You can now press the back arrow to exit Service mode.

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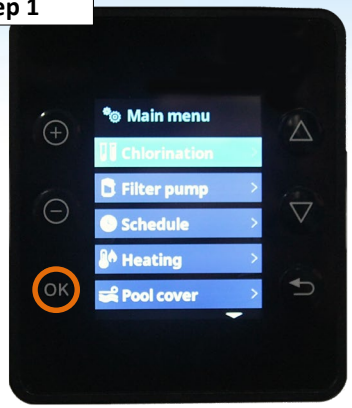
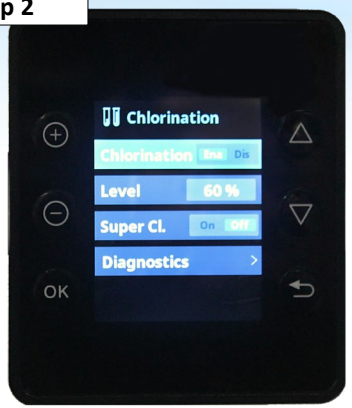
How To: Adjust Chlorinator Settings

Step 1



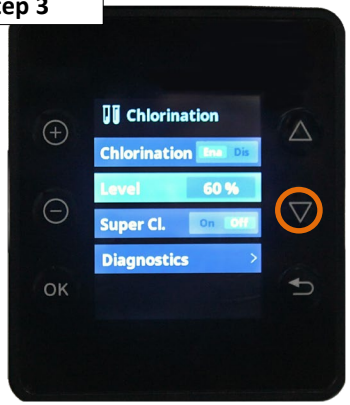
Press OK to enter the Main Menu, then press OK again to enter the Chlorination Menu.

Step 2



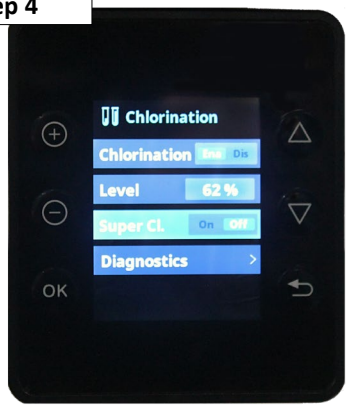
Once in the Chlorination Menu, you will need to enable the Chlorinator by pressing + or - button.

Step 3



Press the down arrow to Chlorine output level and press + or - to adjust. Press ok to save.

Step 4



Press the down arrow to enter super chlorinate. Press + to enable super chlorinate.

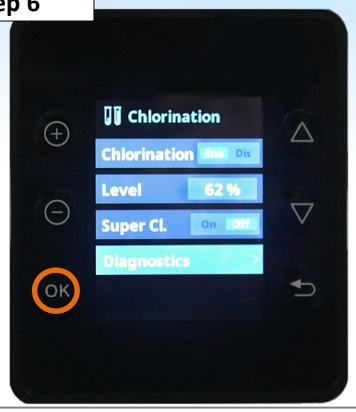
HAYWARD

How To: Adjust Chlorinator Settings

Step 5

Select the time by pressing Up or Down arrows. Press OK when desired time is highlighted.

Step 6



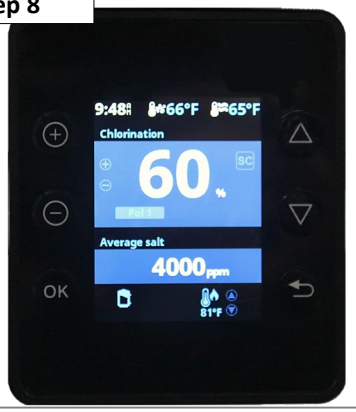
Press down button to go to Chlorination Diagnostics and press OK.

Step 7

In the diagnostics screen you can view everything with the S3 Cell. Once you have finished the diagnostics press OK.

Chlorinator Diagnostics on Page 22

Step 8



Once Chlorine output is changed, you can see the change appear on the main screen. You can also press + or - from main screen to adjust the output.

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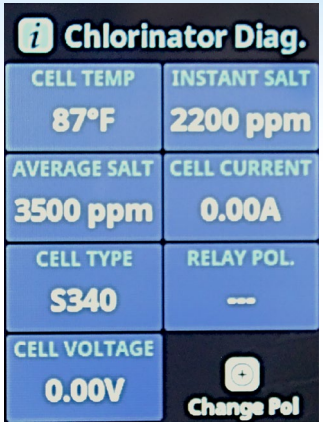
Chlorinator Diagnostics



Cell Type	100% Current
TCELLS315	3 A
TCELLS318	4.5 A
TCELLS325	5 A
TCELLS340	6 A

Heading	Description
CELL TEMP	Internal temperature of the T Cell. Used to scale back output for high and low water temperatures
INSTANT SALT	Instant Salt displayed and measured only while chlorinating.
AVERAGE SALT	Running average of instant salt readings. At initial startup will show a seed value of 2800 ppm.
CELL CURRENT	T-Cell type and output % dependent
CELL TYPE	Only supports “S3” family of T Cells
RELAY POL.	Indicates relay polarity and used to show status such as “No Flow” and “Off”.
CELL VOLTAGE	T-Cell type, salinity and output % dependent
+ Change Pol - Reset Salt	+ Initiates a polarity change that may take minutes. - Forces the average salt to the instant salt value.

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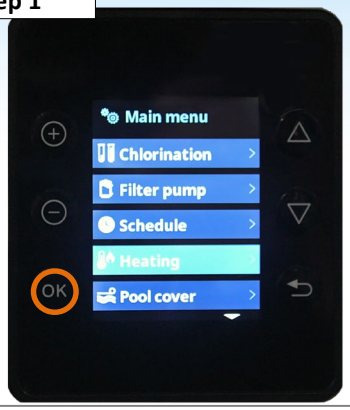
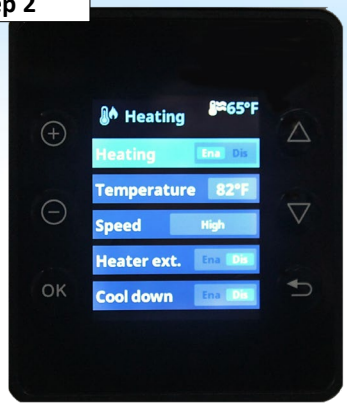
How To: Adjust Heating Settings

Step 1



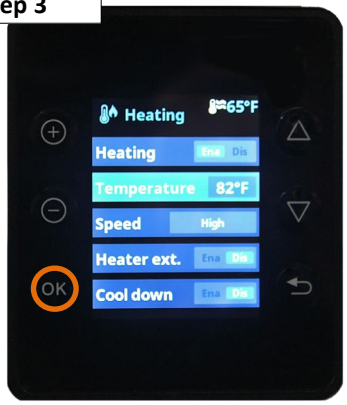
Press OK to enter Main Menu, then scroll down to Heating Menu and Press OK.

Step 2



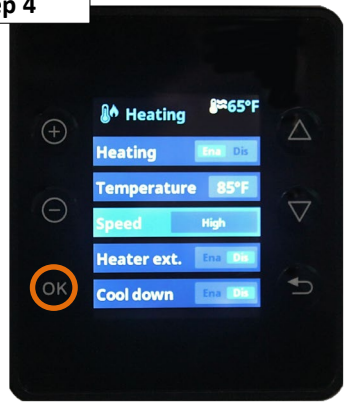
Use + or - to Enable or Disable the Heater then press down arrow to the temperature setting.

Step 3



To adjust the set temperature use + or - then press OK. This can also be done from the Main screen by pressing the + or - button.

Step 4

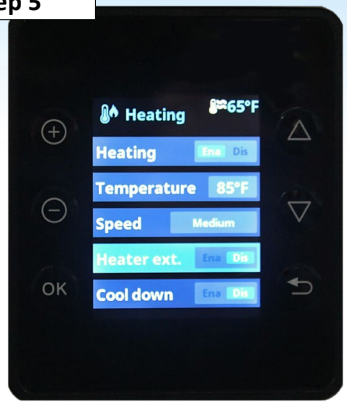


Scroll down to select the minimum operating speed for the heater by using the + or - and press OK to continue.

HAYWARD

How To: Adjust Heating Setting

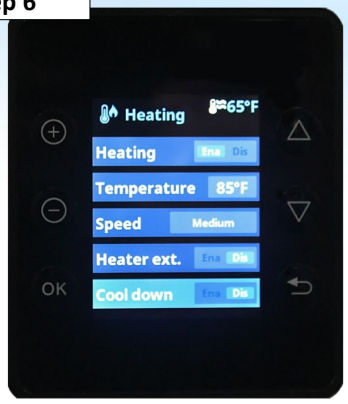
Step 5



Heater Extend will temporarily suspend the filter pump timer and allow the pump to run continually until the set temperature has been reached.

Select Heater ext and enable or disable by pressing + or - then press OK to save.

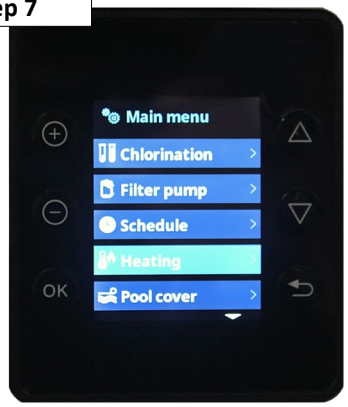
Step 6



Cool Down will not allow the pump to be shut off for 5 minutes while the heater is cooling down.

Select Cool Down and enable or disable by pressing + or - then press OK to save.

Step 7



Once finished press OK to save the setting and return to the Main Menu.

HAYWARD

AquaRite S3®

Troubleshooting Guide

TSG-AQR???

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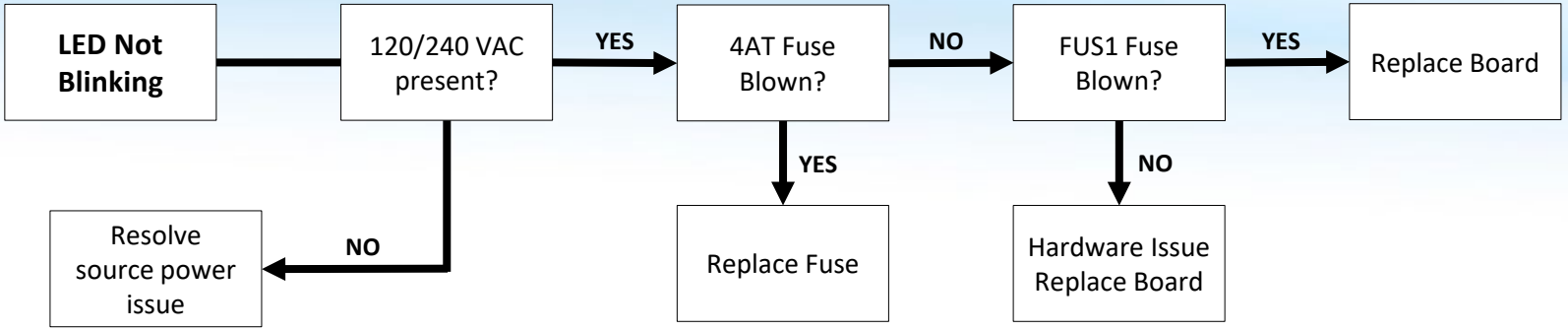
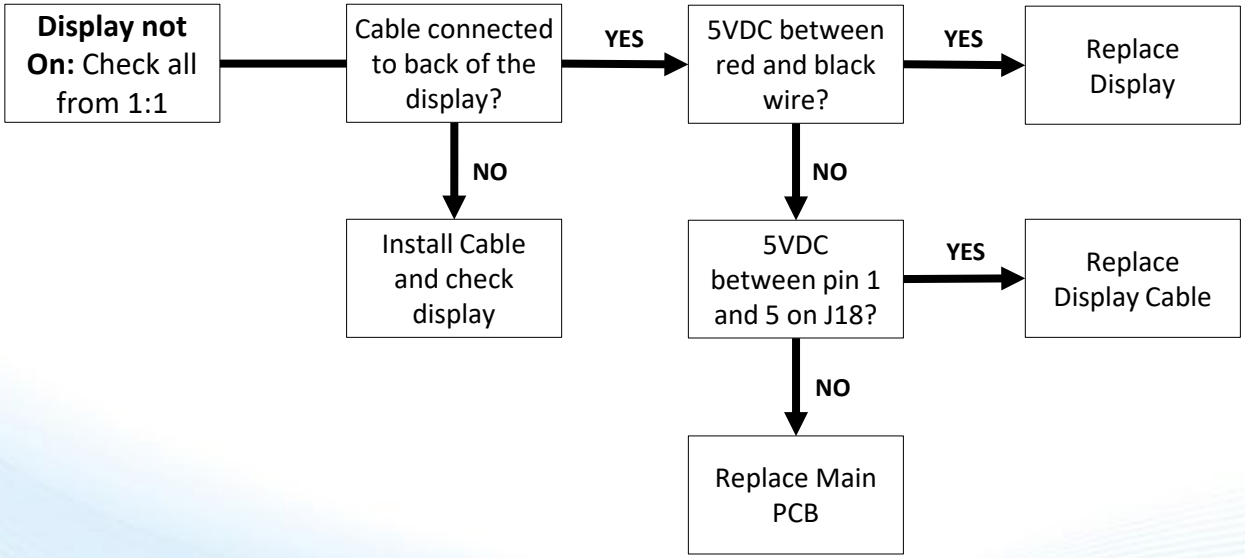
AQR S3 Troubleshooting

1.1



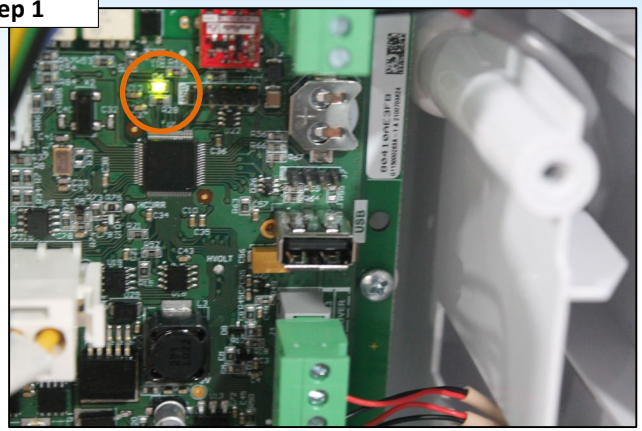
2.1



HAYWARD

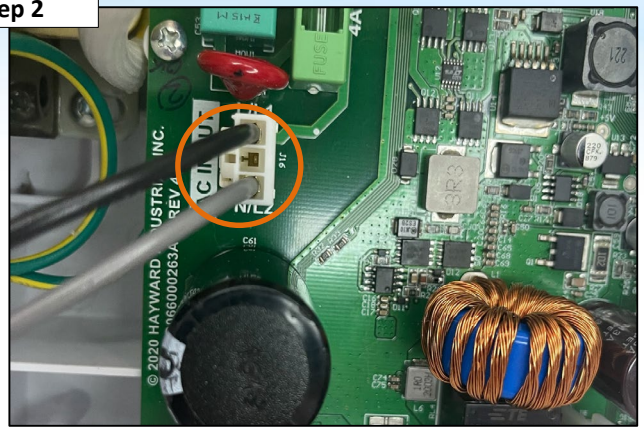
Troubleshooting: LED Not Blinking

Step 1



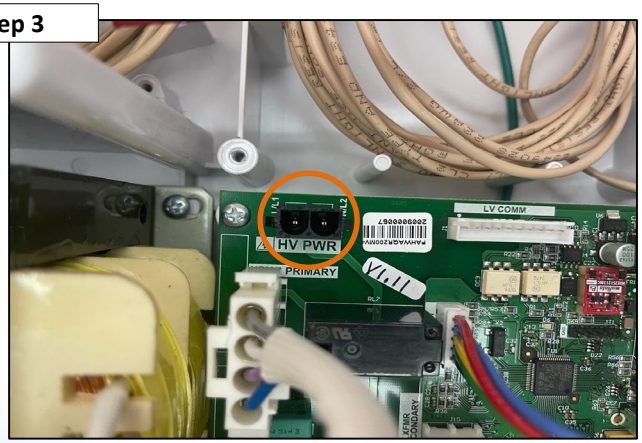
Verify the LED on the Main Board is blinking for a duration of 3 seconds on and 3 seconds off.
If not, go to Step 2.

Step 2



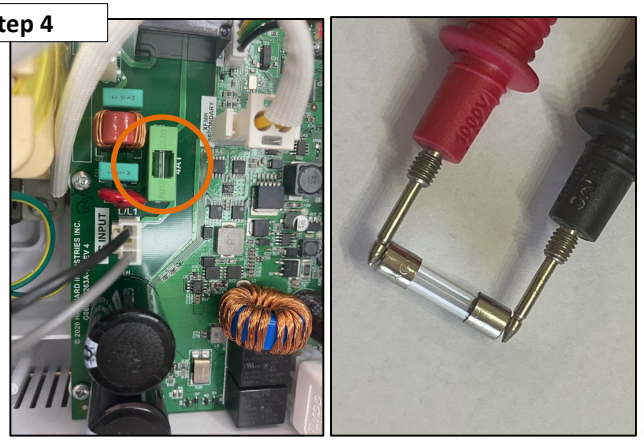
Check that proper power is supplied to board through the pigtail connector, correct if necessary.
If power is correct, go to Step 3.

Step 3



Check that proper AC Power is present at the HV PWR Connector. If proper power is not present replace board. If proper, go to Step 4.

Step 4

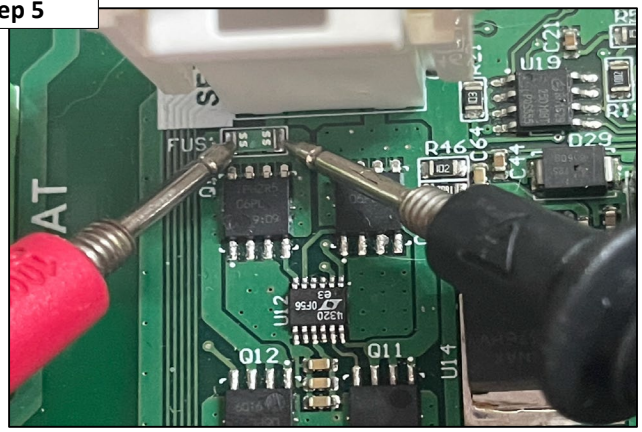


Verify that FUS3 Glass fuse isn't open. If open unplug transformer connection at J14 and replace the fuse then test AQR. If closed, go to Step 5.

HAYWARD

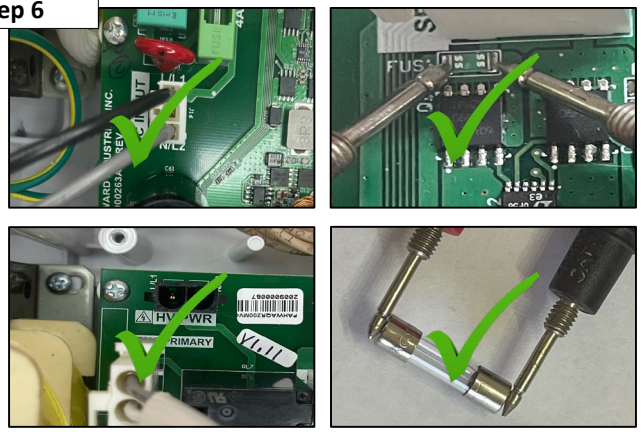
Troubleshooting: LED Not Blinking

Step 5



Verify that surface mount FUS1 isn't open. If open then replace the board, otherwise go to Step 6.

Step 6

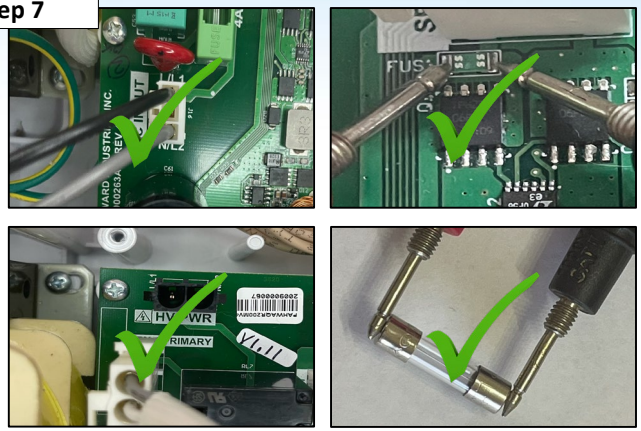


If power is present and fuses have continuity, then this is a hardware failure. Replace main PCB

HAYWARD

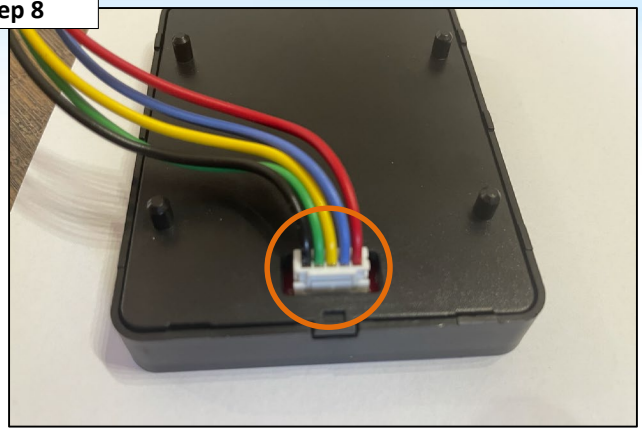
Troubleshooting: Blank Display

Step 7



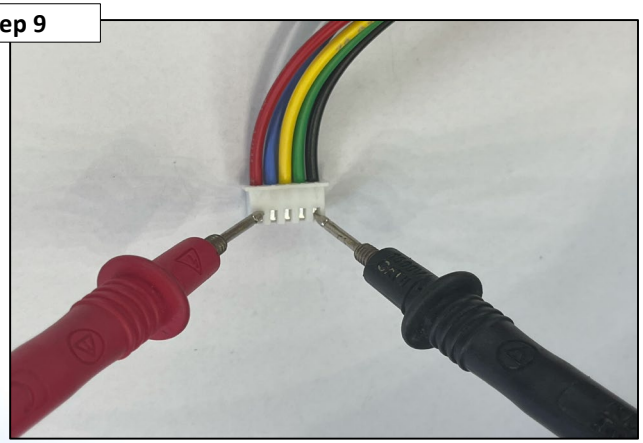
Check everything from section “LED Not Blinking” pages 27-28 then proceed to Step 8.

Step 8



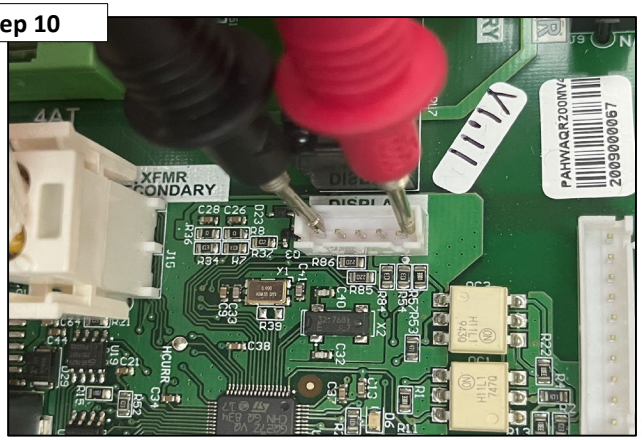
Cable connected at back of display and in good condition, if not replace the harness. Go to Step 9.

Step 9



Unplug cable from display and check for 5 VDC between red and black wire. If Yes, then replace the display. If no, proceed to Step 10.

Step 10



Check that there is 5 VDC between pin 1 and 5 on J18 Display socket. If Yes then bad display cable. If no replace the main board.

HAYWARD

AQR S3 Troubleshooting

Cell Messages: 3.1

Reason	Possible Action
Inspect Cell	Message occurs every 500 hours. Press OK to dismiss the message and resets the cell.
Cell Exhausted	Cell has operated beyond its service life and requires replacement.
Cell Missing	Cell cable is unplugged or damaged or the connector is damaged.
Invalid Cell	• The attached cell is not compatible with the chlorinator • Defective S3 cell • Can test using an S3 cell or S3 cell cable to determine if it is the mainboard or a truly unauthenticated cell.

HAYWARD

AQR S3 Troubleshooting

Chlorination Output: 4.1

Reason	Possible Action
Output won't go above 20%	Cell temperature is 60F or below
Output won't turn on	• Cell temperature is below 50F or above 120F • Chlorinator is disabled • Insufficient water flow • Filter pump not on. If S3 is configured to operate a filter pump then the pump must be shown as running for chlorination to start. • Flow switch not connected or defective.

HAYWARD

AQR S3 Troubleshooting

Freeze Protect: 5.1

Reason	Possible Action
Freeze Protect	• Allows equipment to continue running when entering freeze protect. • Super chlorinate will pause during freeze protect • If the system is in freeze protect manual setting changes will require disabling freeze protect. • A faulty AIR temperature sensor could trigger Freeze protect.

Date and Time: 7.1

Reason	Possible Action
Date and Time Not Persistent	Replace Coil Cell Battery

HAYWARD

AQR S3 Troubleshooting

Firmware Update: 6.1

Reason	Possible Action
Firmware Wont Appear	• USB drive must be FAT32 format • Firmware files must be in root directory • Must be less that 32 files on USB drive • Some USB drives may not be compatible.

“No USB drive found”	• Incompatible USB drive
	• Not FAT32
	• Navigated through menus too fast
	  • It takes many seconds for the system to detect and load the USB drive.
	  • Navigate back to the home screen then back to firmware update
	  • If that doesn’t work try another USB drive

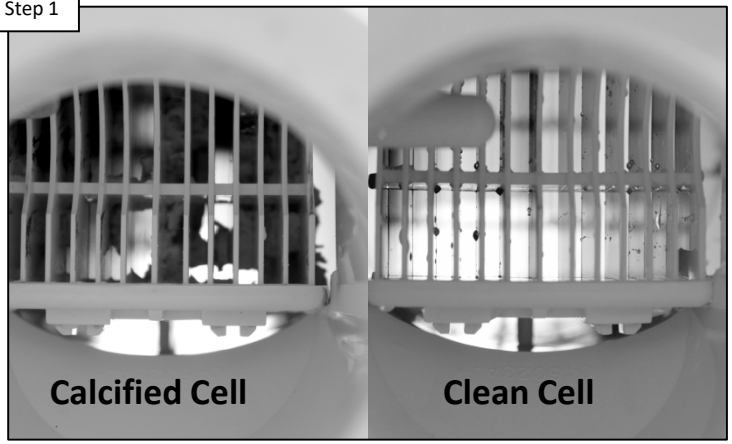
HAYWARD

Cleaning the S3 Cell

Cell cleaning frequency is dependent on several factors; pH & calcium levels have the greatest effect on how often cells requires cleaning. In pH environments between (7.2 - 7.8) cells typically require cleaning 3-4 times a year (with moderate calcium levels).

Turn Pump Off & Remove Cell

Step 1



Holding the cell up to a light source, inspect for calcium deposits. Even if a S3 Cell appears clean, it may still require cleaning if salt accuracy is off AND/OR chlorine production has diminished.

Wear Protective Equipment

Step 2

If the cell requires cleaning, please wear protective equipment. It is highly recommended to use a Hayward Cell Cleaning Stand as shown (GLX-CELLSTAND)

NOTE: ALWAYS WEAR PROPER EYE PROTECTION AND PROTECTIVE GLOVES.
MIX SOLUTION AND CLEAN THE CELL ONLY IN A WELL VENTILATED AREA.
MURIATIC AND OTHER ACIDS CAN CAUSE SEVERE INJURY, BURNS AND RESPIRATORY PROBLEMS IF NOT HANDLED PROPERLY. REFER TO THE MANUFACTURER'S DIRECTIONS FOR SAFE HANDLING.

HAYWARD

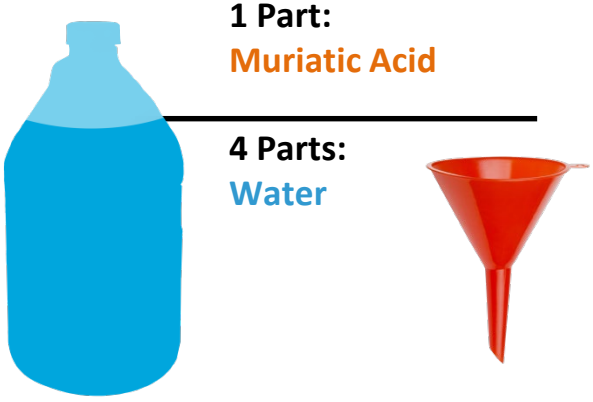
Cleaning the S3 Cell (Cont.)

The S3 draws amperage when power is applied, during chlorination. The amperage draw will be impaired when calcium and other debris exist within the cell's electrolytic grid; this in turn effects the salt reading and chlorination efficiency.

NOTE: ALWAYS ADD ACID TO WATER! NEVER ADD WATER TO ACID.

Mix: 4 Parts H_2O / 1 Part Muriatic Acid

Step 3



Mix a solution comprised of 4 parts water to 1 part Muriatic Acid. Always Add Acid to Water. Once mixed turn the turbo up vertically either in a plastic bucket or using the recommended cell cleaning stand.

Carefully Pour Solution into Cell

Step 4

Carefully pour the solution into the cell until it reaches the top of the plates. The solution should remain in the cell until the reaction is complete. Carefully, pour solution back into approved container.

When the solution is depleted, follow the manufacturer's instructions for proper disposal.

HAYWARD

Salt Addition Chart: lbs. required for 3200ppm

Current Salt Level	Pool Size - Gallons																
	8,000	10,000	12,000	14,000	16,000	18,000	20,000	22,000	24,000	26,000	28,000	30,000	32,000	34,000	36,000	38,000	40,000
0	213	267	320	373	427	480	533	587	640	693	747	800	853	907	960	1013	1067
200	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000
400	187	233	280	327	373	420	467	513	560	607	653	700	747	793	840	887	933
600	173	217	260	303	347	390	433	477	520	563	607	650	693	737	780	823	867
800	160	200	240	280	320	360	400	440	480	520	560	600	640	680	720	760	800
1000	147	183	220	257	293	330	367	403	440	477	513	550	587	623	660	697	733
1200	133	167	200	233	267	300	333	367	400	433	467	500	533	567	600	633	667
1400	120	150	180	210	240	270	300	330	360	390	420	450	480	510	540	570	600
1600	107	133	160	187	213	240	267	293	320	347	373	400	427	453	480	507	533
1800	93	117	140	163	187	210	233	257	280	303	327	350	393	397	420	443	467
2000	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400
2200	67	83	100	117	133	150	167	183	200	217	233	250	267	283	300	317	333
2400	53	67	80	93	107	120	133	147	160	173	187	200	213	227	240	253	267
2600	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2800	27	33	40	47	53	60	67	73	80	87	93	100	107	113	120	127	133
3000	13	17	20	23	27	30	33	37	40	43	47	50	53	57	60	63	67
3200	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal	Ideal
3400	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
3600+	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute	Dilute

Note: Prior to adding salt, always test water with independent tests to determine current salt and stabilizer levels.

Brushing the salt around will speed up the dissolving process. DO NOT allow the salt to sit in a pile at the bottom of the pool. Salt water is heavier than fresh water, so the salt water will tend to accumulate at the deepest part of the pool. Run the filter system with the suction coming from the main drain for 24 hours to evenly distribute the salt throughout the pool

Note: Refer to the Plasters recommendations for cure time before adding salt.

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