Universal HC Series Heater ®

Troubleshooting Guide

TSG-UHC21a

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:

- Turn off power to unit before making repairs
- Only qualified technicians should service heater
- Replace damaged wiring immediately
- Ensure appliance is properly grounded and bonded

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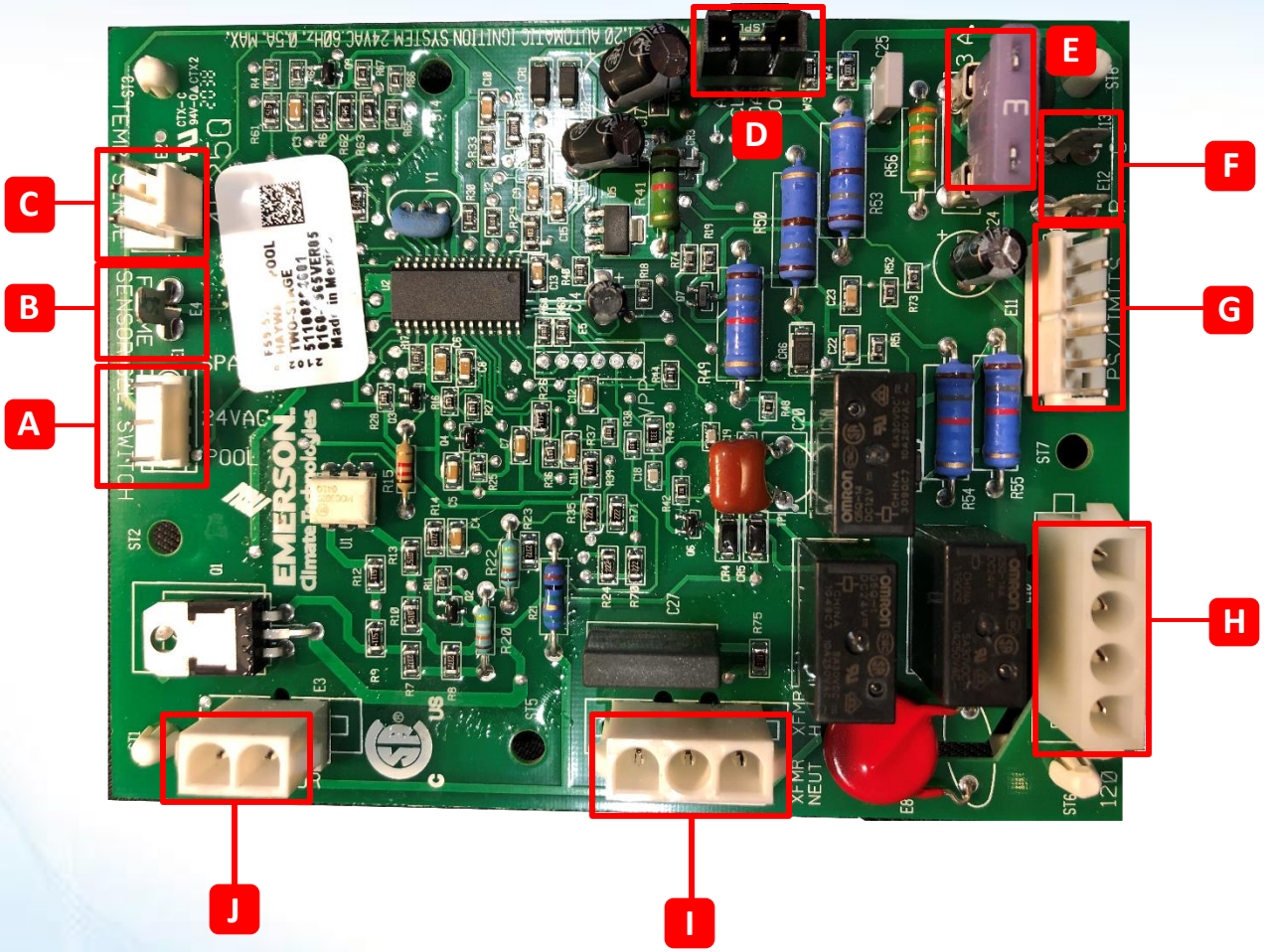
HAYWARD

Integrated Control Board Layout (ICB)

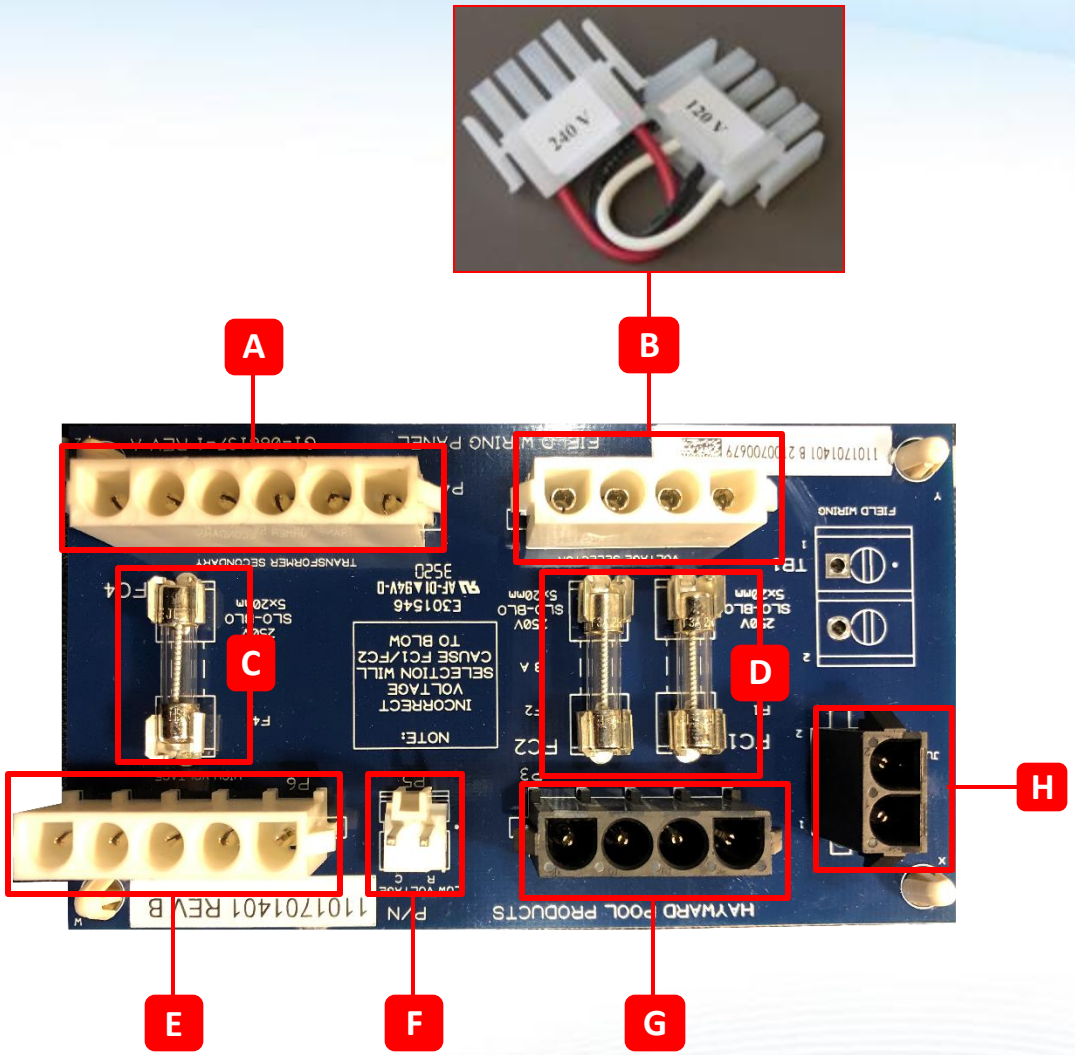


A	Remote Control: 24VAC (E1)
B	Flame Sensor (E4)
C	Temperature Sensor (E2)
D	Display Output: 24VAC (E7)
E	3A Fuse (F1)
F	Low Voltage R & C: 24VAC (E12, E13)
G	Gas Valve & Safety Switches: 24VAC (E11)
H	High Voltage: 120VAC (E10)
I	Blower/Inducer (E6)
J	Ignitor (E3)

HAYWARD

Field Wiring Panel Layout

A	Transformer Secondary: 24VAC (right) & 120VAC (left) (P4)
B	Voltage Selector 240 OR 120VAC determined by plug (P2): **NOTE: 240VAC plug factory installed**
C	Fuse: 3a protects transformer high voltage secondary, will fail with blower, ignitor or ICB failure (FC4)
D	Fuse: 3A protect primary input voltage, will fail with excessive voltage, improper wiring, shorted transformer or fuse board (FC1 & FC2)
E	High Voltage Output: 120VAC (P6)
F	Low Voltage Output: 24VAC (P5)
G	Transformer Primary: 120/240VAC (P3)
H	Power connection for junction boxes: 120/240VAC (P1)



UHC Sequence of Operation: Normal

The control continually compares the set temp to the actual water temp.
When the water temp is 1º below the set point the following sequence starts:

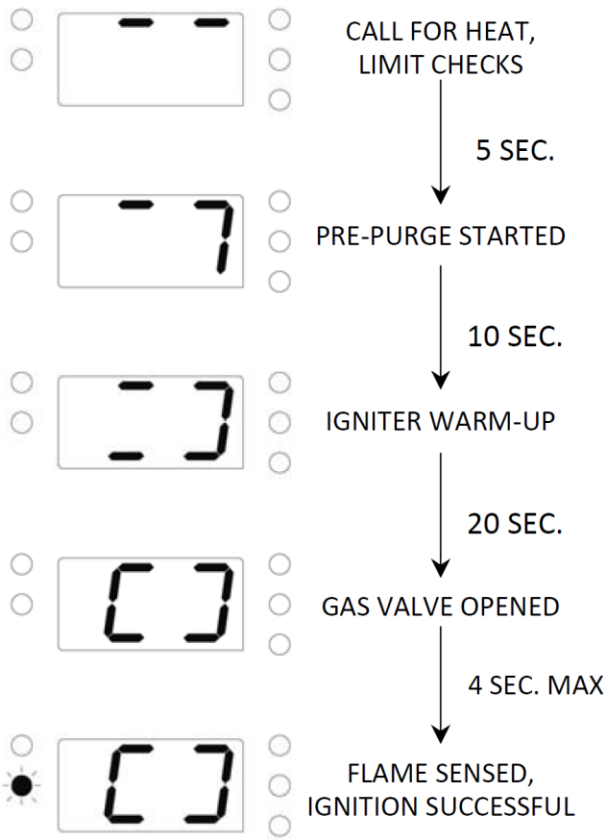
NORMAL OPERATION FOR POOL & SPA MODES:

The control continually compares the water temperature with the set point and the high limit temperature. When the sensed water temperature is more than 1°F below the set point, a call for heat is generated and a heating cycle is initiated. When a call for heat starts, the numeric display on the user panel will show a series of lines to indicate the progression of the unit's ignition sequence. The displayed indicators, along with approximate times between each step are shown in Figure A. When the ignition sequence completes successfully, the current water temperature will be displayed again. The temperature set point cannot be adjusted while the ignition sequence indicators are active.

1. The control checks the differential pressure switch for open contacts and then energizes the blower. After the blower is energized, the contacts are checked again to ensure they are closed and the 30 sec. pre-purge timer is started.
2. The control energizes the igniter during the pre-purge cycle and allows it to reach ignition temperature, approximately 20 seconds.
3. The control energizes the gas valve to permit the flow of gas for the 4 sec. trial for ignition and monitors flame current.
4. The igniter is turned off when flame current is sensed or when the trial for ignition is completed.

During a heating cycle, the differential pressure switch, limit string, water temperature sensor, and flame current are constantly monitored to assure the heater is operating properly. When the thermostat is satisfied and the call for heat ends, the control immediately de-energizes the gas valve and flame extinguishes. The control operates the blower an additional 30 seconds as a post-purge.

Figure A: Ignition Sequence Display



HAYWARD

UHC Electrical & Gas Connection

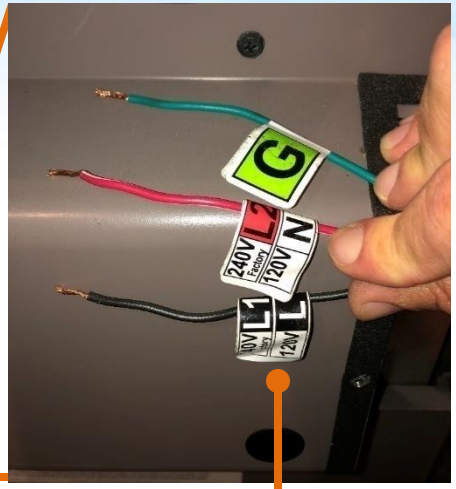
The low voltage and high/line voltage compartments can be reversed but NOT shared.

Gas Port

Alternate Gas Port

Low Voltage

Low Voltage Wiring

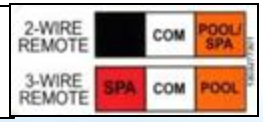


240V Factory Wired L1 L2 G

120V See Manual L N G

High/Line Voltage

Bonding Lug



HAYWARD

Universal HC Series Heaters®

How To:

How To: Program Heater Bypass Operation

Follow the included steps to place the heater in bypass operation for external control.

NOTE: the maximum temperature set point is 104° F.

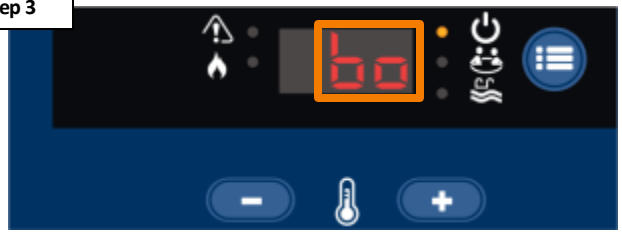
Step 1

Press the 'MENU ICON' button to place the heater in 'STANDBY'.

Step 2

Press and hold the 'MINUS' button and 'MENU ICON' button for 3 seconds.

Step 3



'bo' will appear on the display when the heater has successfully entered bypass operation.

Step 4

Once in bypass, press the 'MENU ICON ' button until 'POOL' or 'SPA' is illuminated.

HAYWARD

How To: Program Temperature Lock-Out

Follow the included steps to lock the maximum temperature allowed.

NOTE: The default Max temp set points are 90ºF (Pool) 104ºF (Spa).
When setting the max temp lock-out set point, the LEDs & display should flash rapidly.

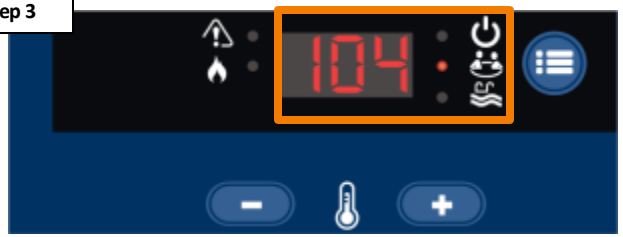
Step 1

Press the 'MENU ICON' button to place the heater in 'STANDBY' mode.

Step 2

Press and hold the minus & plus buttons for 3 seconds.

Step 3



The 'SPA' indicator will flash & the display should show the Max Temp set point.

Step 4

Raise or lower the temperature displayed using the minus or plus button.

HAYWARD

How To: Program Temperature Lock-Out (cont.)

NOTE: The default Max temp set points are 90ºF (Pool) 104ºF (Spa).
When setting the max temp lock-out set point, the LEDs & display should flash rapidly.

Step 5

Press the 'MENU ICON' button to toggle to the 'POOL' now that the 'SPA' is set.

Step 6

Raise or lower the temperature displayed using the minus or plus button.

Step 7

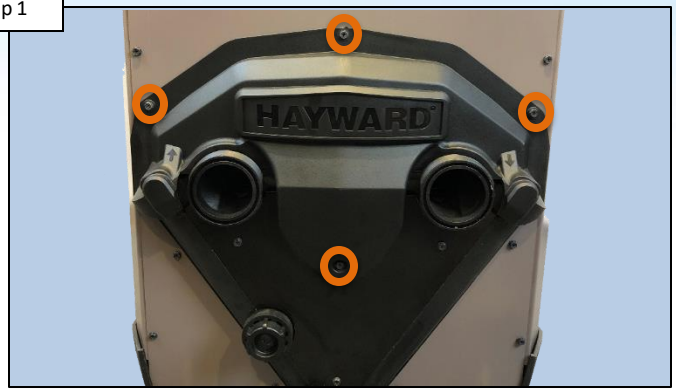
To finalize, press the 'MENU ICON' button until the heater goes back into 'STANDBY'.

HAYWARD

How To: Change/Replace Fuel/Air Mixer

Remove screws from header cover

Step 1



Turn power off, remove the 4 screws from the header controls cover and remove the panel.

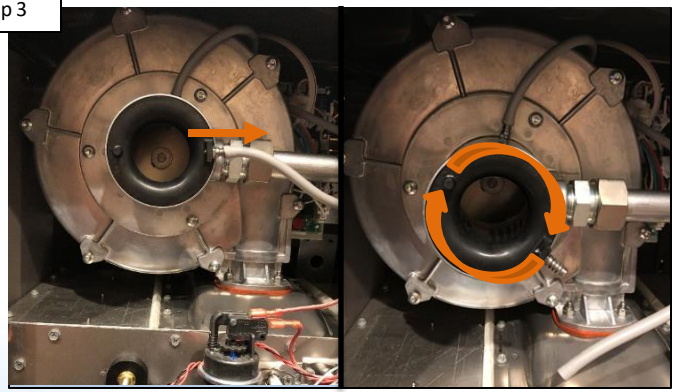
Remove screws from control cover

Step 2

Lift the cabinet top slightly, then remove the 4 screws from the control cover and remove.

Remove fuel/air mixer

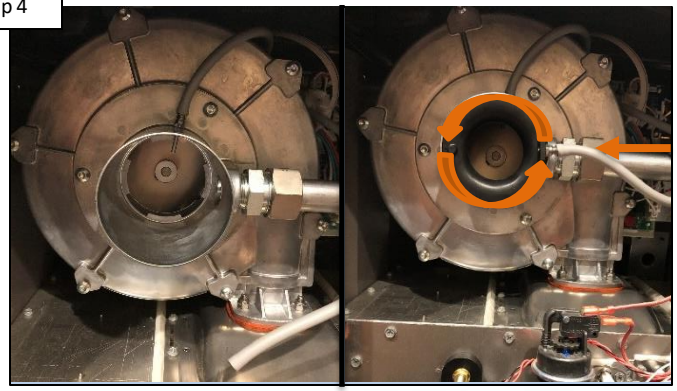
Step 3



Remove pressure hose from front of fuel/air mixer. Rotate mixer 45 degrees clockwise and pull straight out to remove.

Re-install/install fuel/air mixer

Step 4



Re-install/install new mixer back into blower and rotate 45 degrees counter clockwise to reinstall and reconnect pressure hose to front of fuel mixer.

HAYWARD

How To: Test/Adjust Gas Pressure

Turn off gas supply

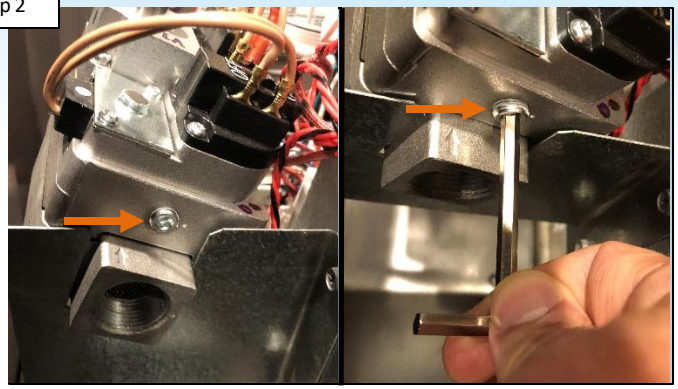
Step 1

Table 11: Required Gas Pressures (in. wc.)		
Measurement	Natural Gas	Propane
Manifold Pressure*	-0.1 to -0.3	
Inlet Pressure, Minimum	+4.0	+4.0
Inlet Pressure, Maximum	+14.0	+14.0

Turn off gas supply to heater. Gas readings should be in line with the chart above.

Inlet: Remove test plug from inlet

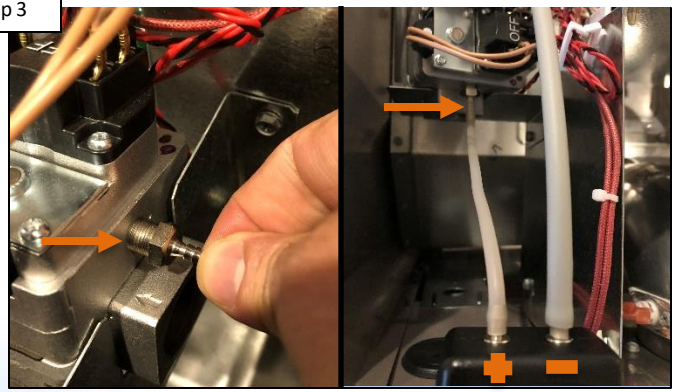
Step 2



Locate the inlet test port on the side of the gas valve, and remove the 1/8” Allen plug.

Connect Manometer

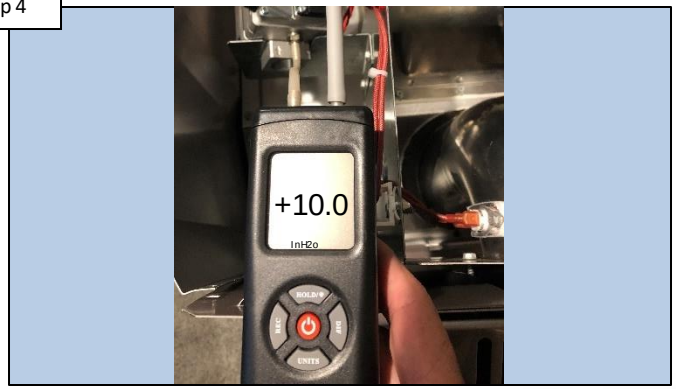
Step 3



Install a 1/8” barbed fitting and connect the positive (+) hose from the manometer to the barbed fitting. Turn the gas on to the heater.

Test Inlet Pressure

Step 4



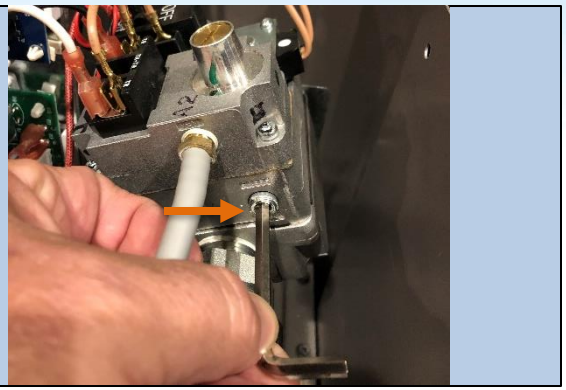
Leave the heater in “Stand By”, your static pressure should be no less than +4.0 and no greater than +14.0” WC.

HAYWARD

How To: Test/Adjust Gas Pressure

Turn off gas supply

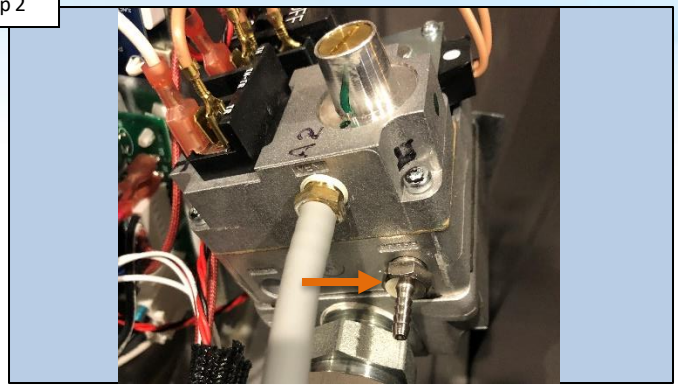
Step 1



Turn off gas supply to heater. Remove 1/8” Allen plug from the pressure port on the gas valve.

Locate test ports

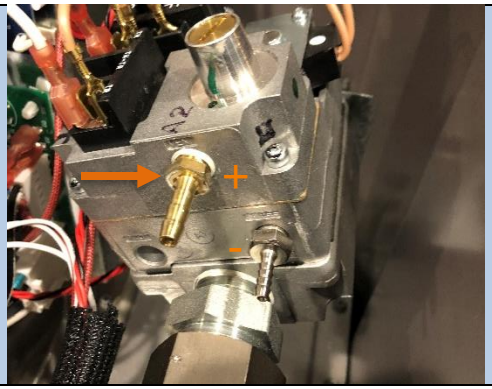
Step 2



Install barbed fitting from manometer in the pressure port of the gas valve..

Remove test port plug(s)

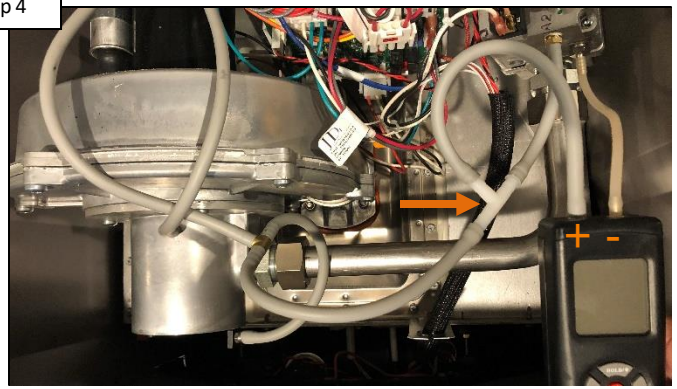
Step 3



Remove the silicone tubing from the vent port on the gas valve, leaving the barbed fitting installed on the gas valve.

Connect manometer

Step 4



Connect the negative side of your manometer to the pressure port. Connect the positive side to the vent port as show above. You will need a 3/16” barbed “T” for your manometer.

HAYWARD

How To: Test/Adjust Gas Pressure (cont.)

NOTE: IF incoming gas pressure is within range, then your manifold pressure should be correct per factory settings.

Manometer Connected

Step 5

Once the manometer is connected, turn gas back on & test inlet & manifold gas pressures. Go to Step 6.

Verify Pressures are correct

Step 6

Table 11: Required Gas Pressures (in. wc.)

Measurement	Natural Gas	Propane
Manifold Pressure*	-0.1 to -0.3	
Inlet Pressure, Minimum	+4.0	+4.0
Inlet Pressure, Maximum	+14.0	+14.0

IF inlet pressures are correct AND the manifold pressure is high or low, go to step 7.

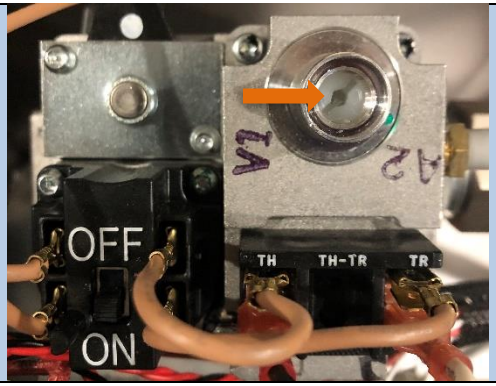
Remove plug from gas valve

Step 7

Remove plug from gas valve with a flat head screwdriver. Go to Step 8

Adjust gas pressure

Step 8



Once removed, increase pressure by rotating screw clockwise, (counter clockwise to reduce pressure).

HAYWARD

Clean/Replace Burner

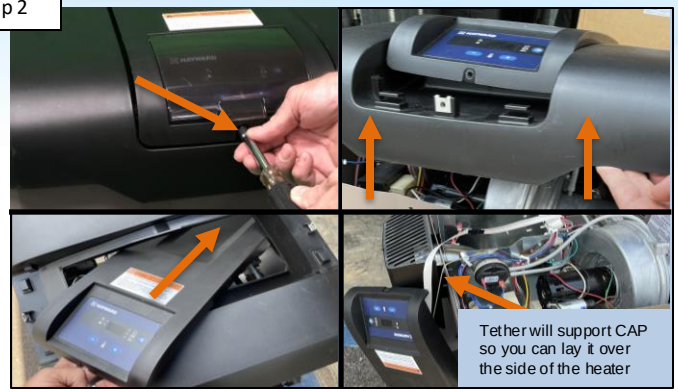
Remove screws from both sides

Step 1

Turn the Power and the gas off to the unit. Remove the 2 top screws on each side of the heater as shown above.

Remove cabinet top

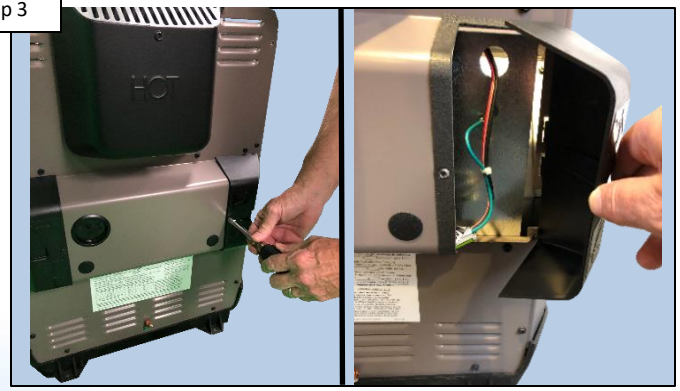
Step 2



Remove screw from front of control access panel (CAP). Lift cabinet top up and feed CAP through opening in top and remove the cabinet top.

Remove electrical cover

Step 3



Remove the one screw that holds the right side electrical cover and remove cover.

Remove right side sheet metal

Step 4

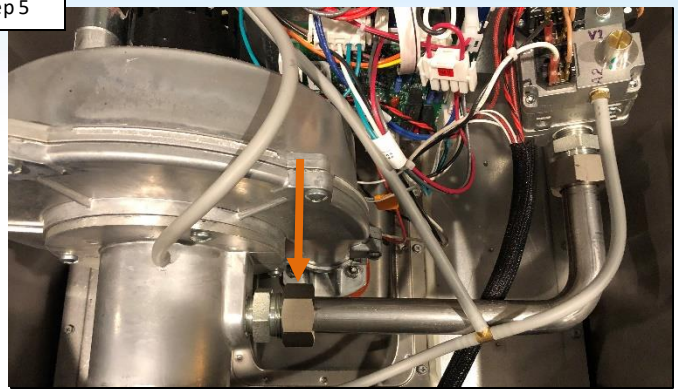
Locate and remove the 4 screws on the right side of the sheet metal and lift to remove the sheet metal.

HAYWARD

Clean/Replace Burner (cont.)

Loosen flare nut

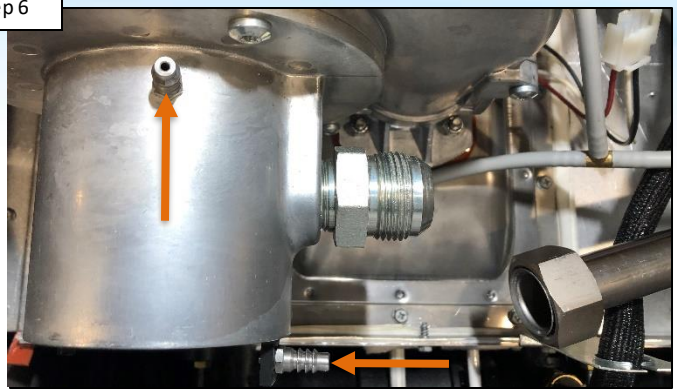
Step 5



Loosen the flare nut from the gas manifold closest to the blower. Gently pull the manifold out of blower.

Remove silicone tubing

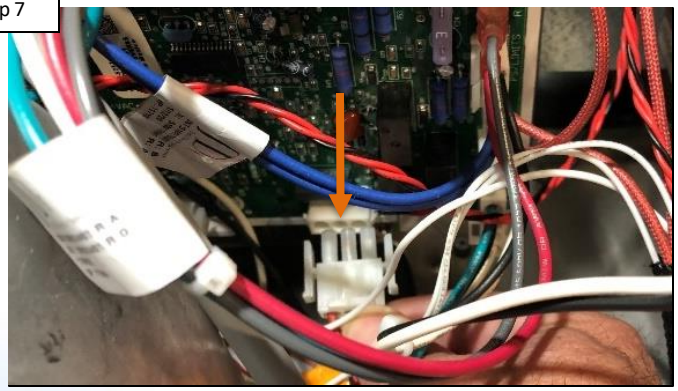
Step 6



Remove the silicone tubing from both ports on the blower. Make note of where each tube ends for re-installation.

Disconnect wiring

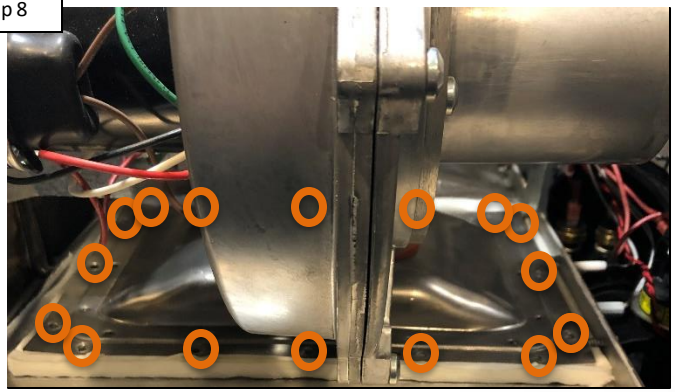
Step 7



Disconnect the Blower/Inducer (E6) wire harness from the ICB Board.

Remove burner screws

Step 8

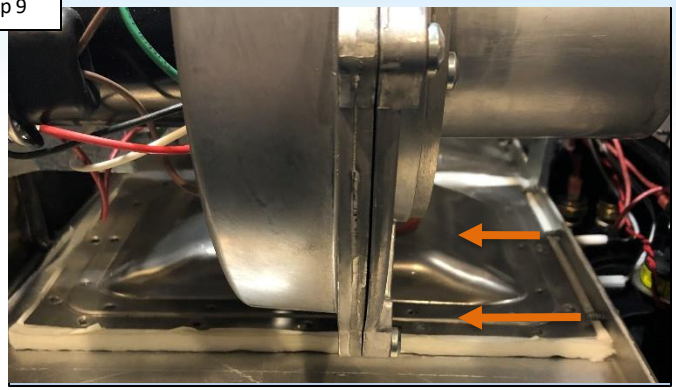


Remove the 16 screws from the burner to release the entire blower and burner assembly.

Clean/Replace Burner (cont.)

Remove blower/burner assembly

Step 9



Slide left slightly and then lift the blower / burner assembly straight up out of the heater.

Remove blower nuts

Step 10

Remove the 4 each 7/16” nuts that hold the blower assembly to the burner.

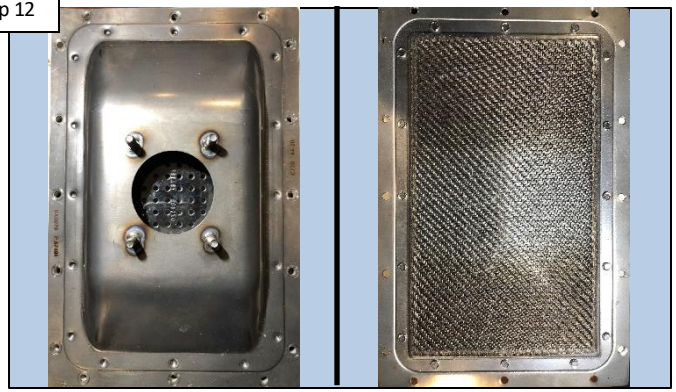
Remove blower assembly

Step 11

Lift straight up to remove blower assembly from the burner. Gently lay the blower aside.

Clean burner

Step 12



This is showing you a clean burner rear and front view.

Clean/Replace Burner (cont.)

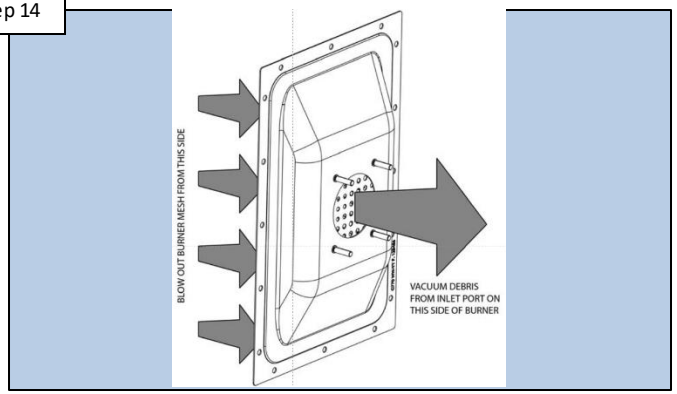
Blow out burner

Step 13

Using compressed air blow the burner out from the front to the rear. Make sure that you blow around all four corners.

Vacuum burner

Step 14



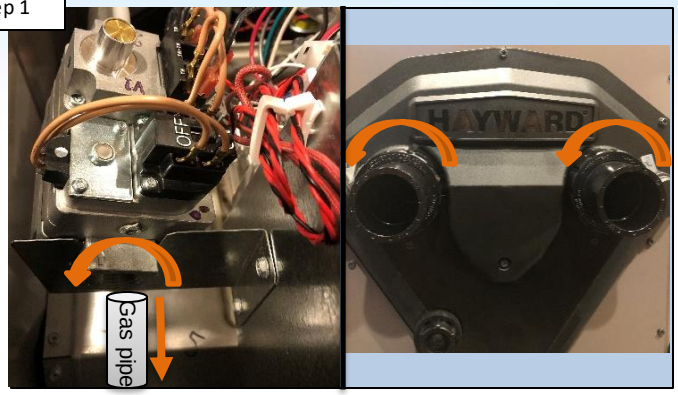
Turn the burner over and shake out any loose dirt and debris. You can use a wet dry vac to vacuum any smaller particles out of the burner.

HAYWARD

Change/Replace Combustion Chamber

Disconnect gas & water unions

Step 1



Turn Power and gas off to unit, disconnect the gas line and plumbing unions from the heater.

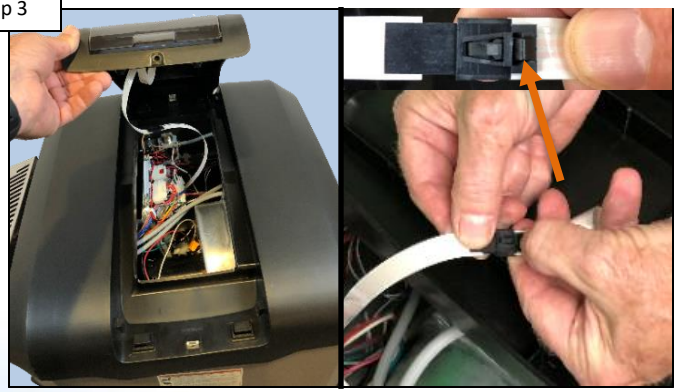
Remove screw from Display

Step 2

Using a 5/16 nut driver or #2 Phillips Head screwdriver, remove screw from below display.

Disconnect ribbon cable

Step 3



Lift cover and locate the quick disconnect for the ribbon cable. Press down on tab and pull apart.

Remove top cover screws

Step 4

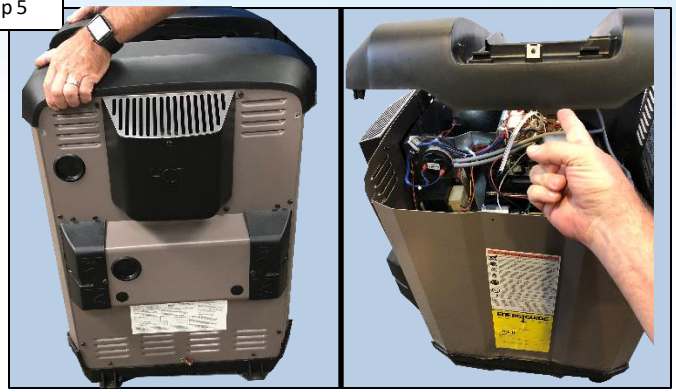
Locate and remove the 2 screws from the top of each side of the heater (shown above).

HAYWARD

Change/Replace Combustion Chamber (cont.)

Remove cabinet top

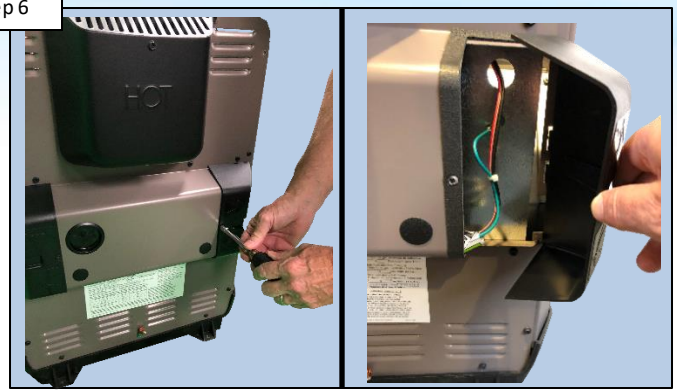
Step 5



Lift to remove top cover. Use caution when removing, so you do not lose the screw tabs.

Remove wiring cover

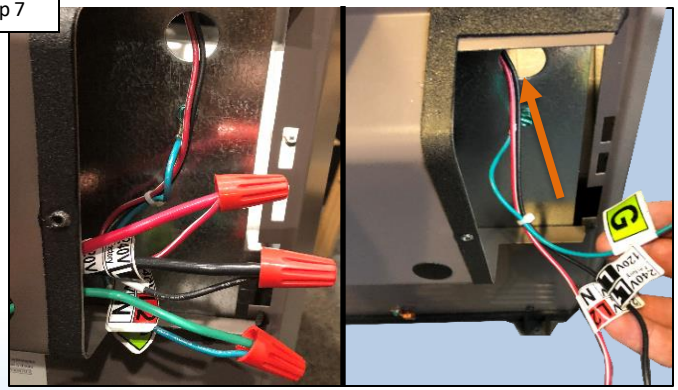
Step 6



Remove screw from front wiring cover (shown left) Remove plastic wiring cover (shown right).

Disconnect wiring

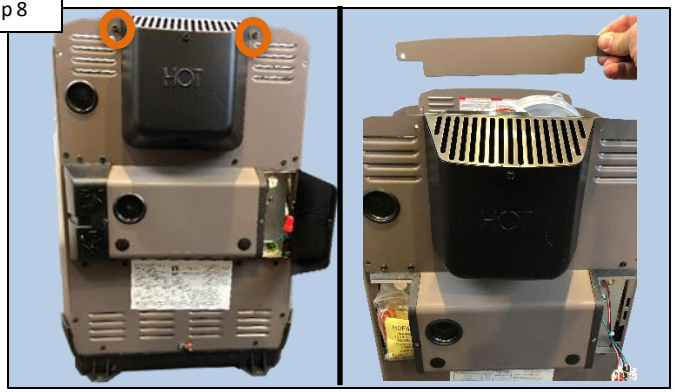
Step 7



Pull wires out of compartment. Remove wire nuts, disconnect electric from cabinet. Push heater supplied wiring into cabinet.

Remove top plate

Step 8



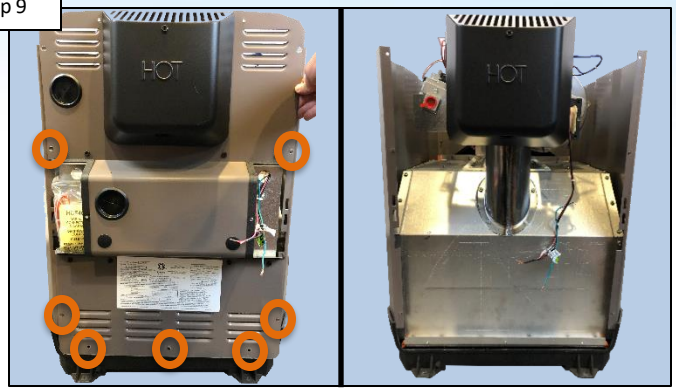
On the exhaust side of the heater, remove the 2 screws from top (left pic), remove the top plate. (right pic).

HAYWARD

Change/Replace Combustion Chamber (cont.)

Remove exhaust side cover

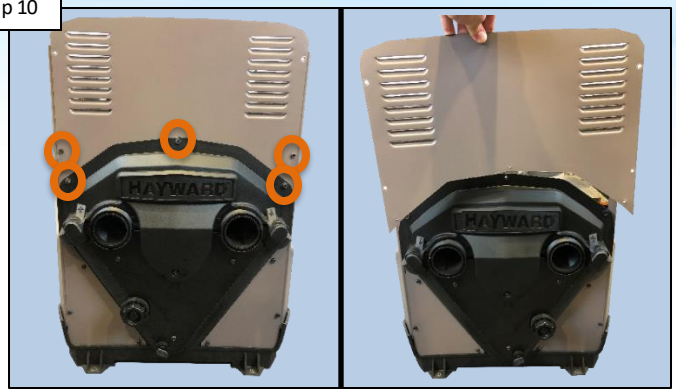
Step 9



Remove the 7 screws (left pic.). Lift up and then pull out on the bottom of the panel and slide down to remove.

Remove water side cover

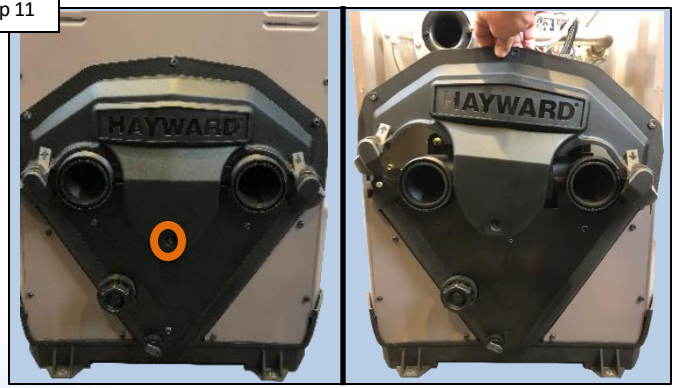
Step 10



On the water side of the heater, remove the 5 screws from the top panel & controls cover(left pic). Remove right top panel by lifting up on panel.

Remove header controls cover

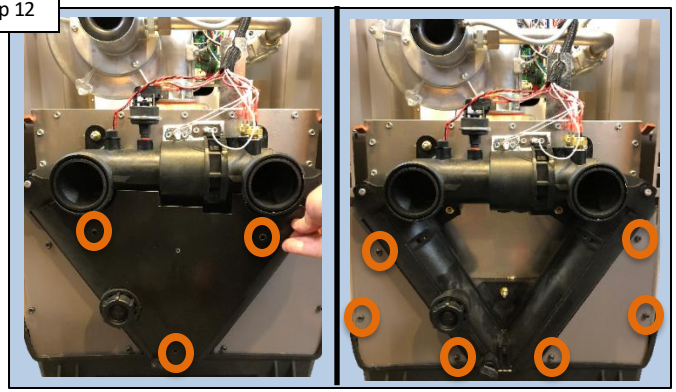
Step 11



Remove the center screw (left pic.) from the header controls cover. Remove controls cover (right pic) by lifting up on the cover.

Remove waterside trim panels

Step 12



Remove 3 screws on bottom header cover (left). Remove 3 screws from left & right lower trim panels, and remove all.

HAYWARD

Change/Replace Combustion Chamber (cont.)

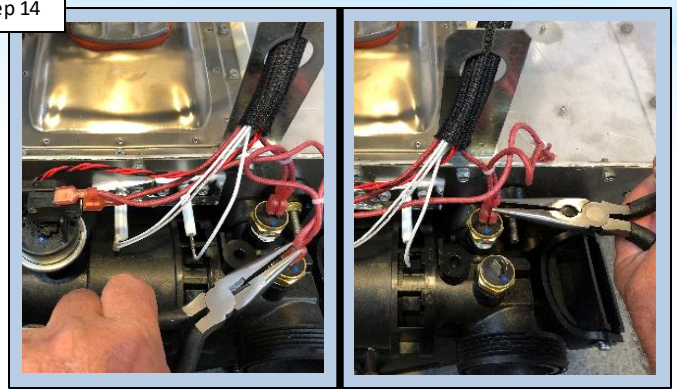
Remove front & rear panels

Step 13

Remove the 4 screws from the bottom of the front and rear panels and pull up and out to remove each one.

Remove wires from limit switches

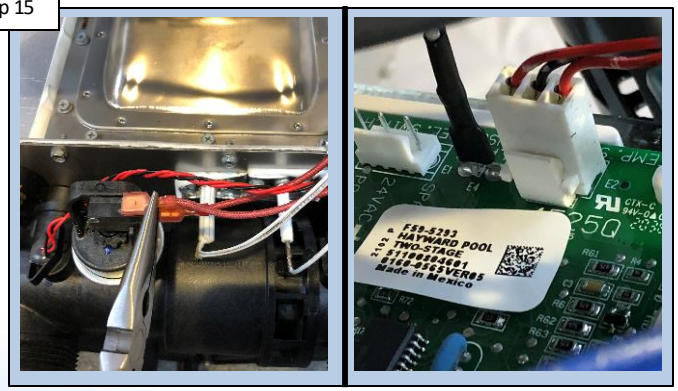
Step 14



Use needle nose pliers to remove the 2 red wires from each of the high limit switches.

Remove wires from water pressure switch

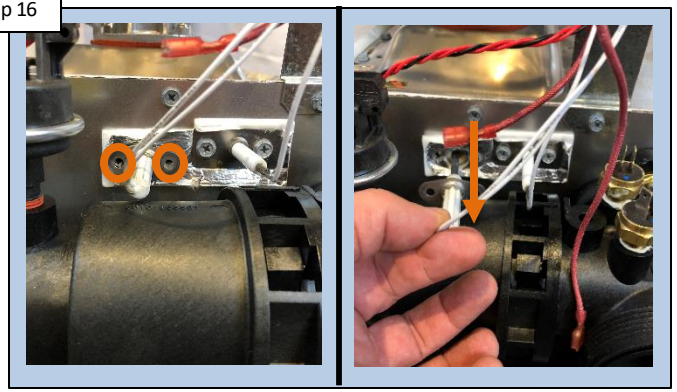
Step 15



Remove wires from water pressure switch (left) and disconnect the thermistor (temp sensor) from the ICB board (right).

Remove ignitor

Step 16



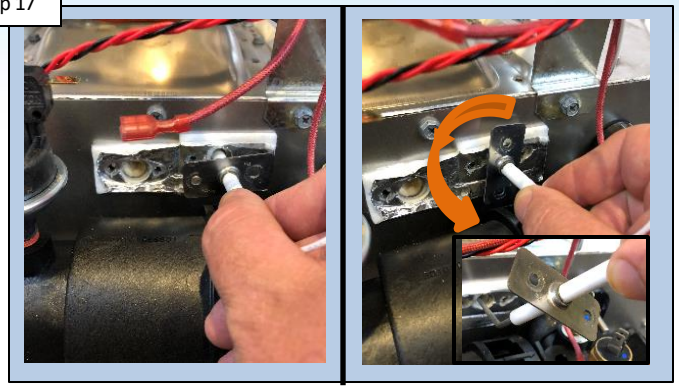
Remove the 2 screws from the ignitor and carefully pull the ignitor straight out of the cabinet.

HAYWARD

Change/Replace Combustion Chamber (cont.)

Remove flame sensor

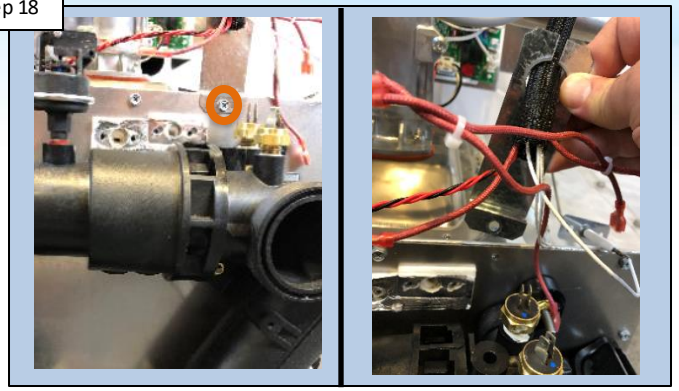
Step 17



Remove the 2 screws from Ignitor pull out slightly then rotate 180 degrees then pull rest of way out.

Remove wire harness screw

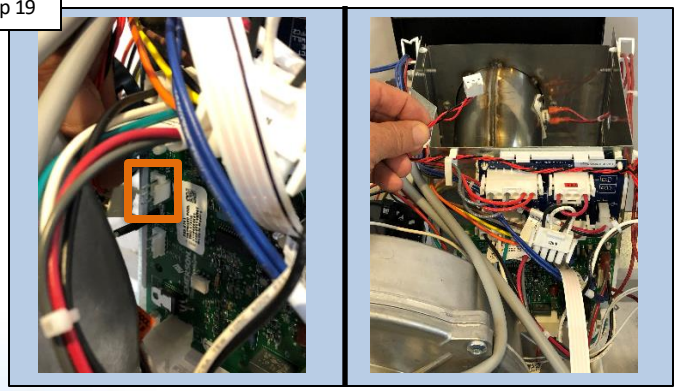
Step 18



Remove screw from the wire harness holder (left). Remove wires from holder and set aside.

Pull temp sensor wiring

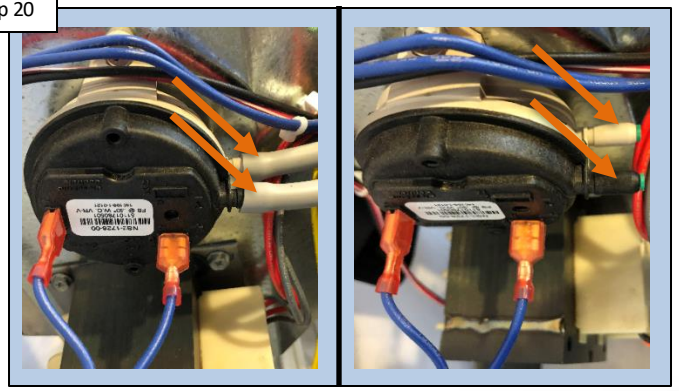
Step 19



Pull the thermistor (temperature sensor) wire out of the heater.

Remove diff. pressure switch tubing

Step 20

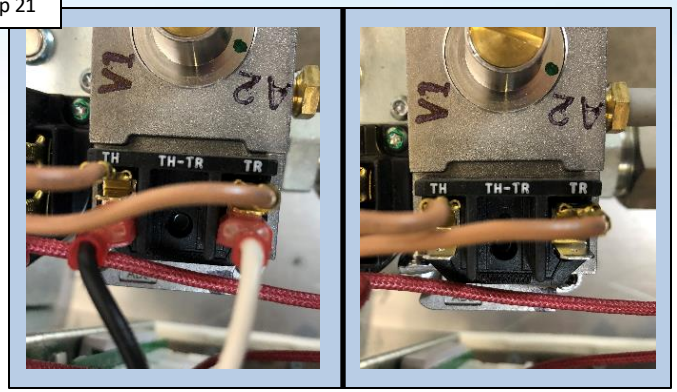


Remove silicone tubing from differential pressure switch. Front hose goes to the “T” connection and the rear hose goes to the blower.

Change/Replace Combustion Chamber (cont.)

Remove gas valve wiring

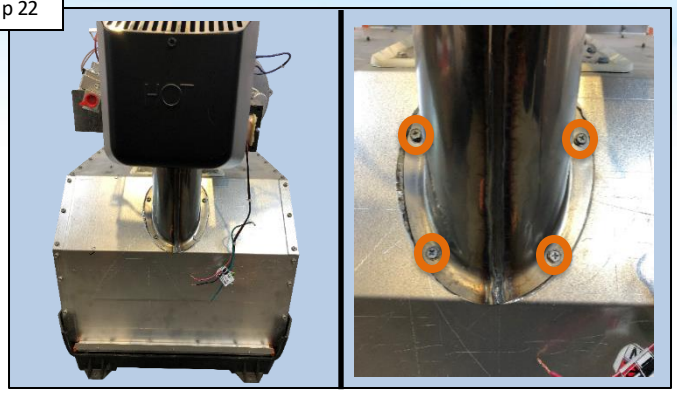
Step 21



Using needle nose pliers, remove the black and white wire from the gas valve.

Remove vent pipe

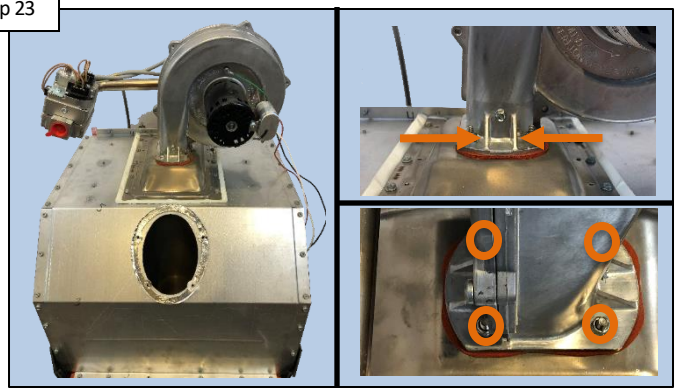
Step 22



Locate and remove the 4 screws (right) from the vent pipe assembly and remove.

Remove blower

Step 23



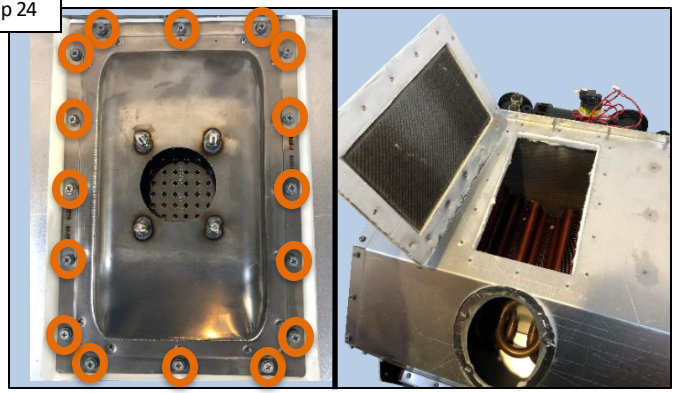
Remove the 4 nuts from the bottom of the blower (right) assembly and lift up to remove.

HAYWARD

Change/Replace Combustion Chamber (cont.)

Remove burner assembly

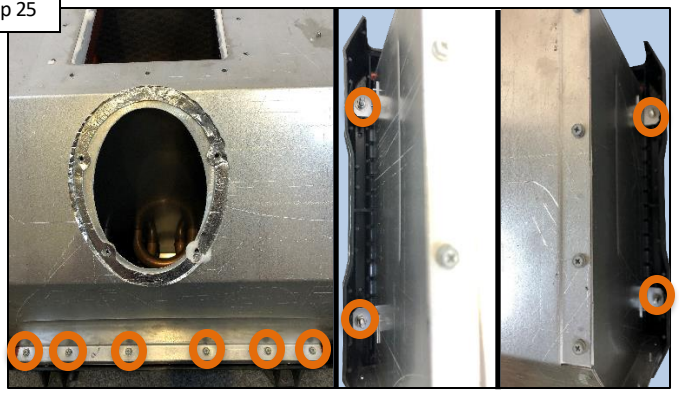
Step 24



Remove the 16 perimeter screws from the burner assembly. Lift up on the burner to remove (clean if necessary).

Remove heat exchanger

Step 25



Remove the 6 screws at bottom of combustion chamber. Remove 2, 7/16”nuts on each side of chamber (right pics). Remove combustion Chamber.

Universal HC Series Heater®

Troubleshooting:

Diagnostic Codes

Below is a list of all Diagnostic Codes for the HDF Heater. Troubleshooting Steps for each Code are covered on the following pages.

Diagnostic Code	Description
AC	Blower Vacuum Switch closed
A1	Air switch circuit open before ignitor warm-up
A2	Air switch circuit open after ignitor warm-up
A3	Air switch circuit open after post purge
b1	Ignition control board data error
b2	Gas valve sensed "ON" error
b3	Gas valve sensed "OFF" error
b4	Data retrieval error
bo	Bypass operation mode
CE	Communication Error Between Control Module and Display Interface Assembly
EE	Bad board
HF	Flame present with Gas Valve not energized.
HS	Maximum return water temperature exceeded and / or rapid water temperature rise.
IF	Ignition Failure
IO	Ignitor Circuit Open
LO	Water Pressure Switch, Vent Pressure Switch, or Temperature Limit Switch Fault
PF	Voltage polarity reversed, low voltage detected
SB	Keypad failure
SF	Temperature Sensor (thermistor) input failure

Part Numbers

The following outlines the various replacement parts required for this troubleshooting guide.

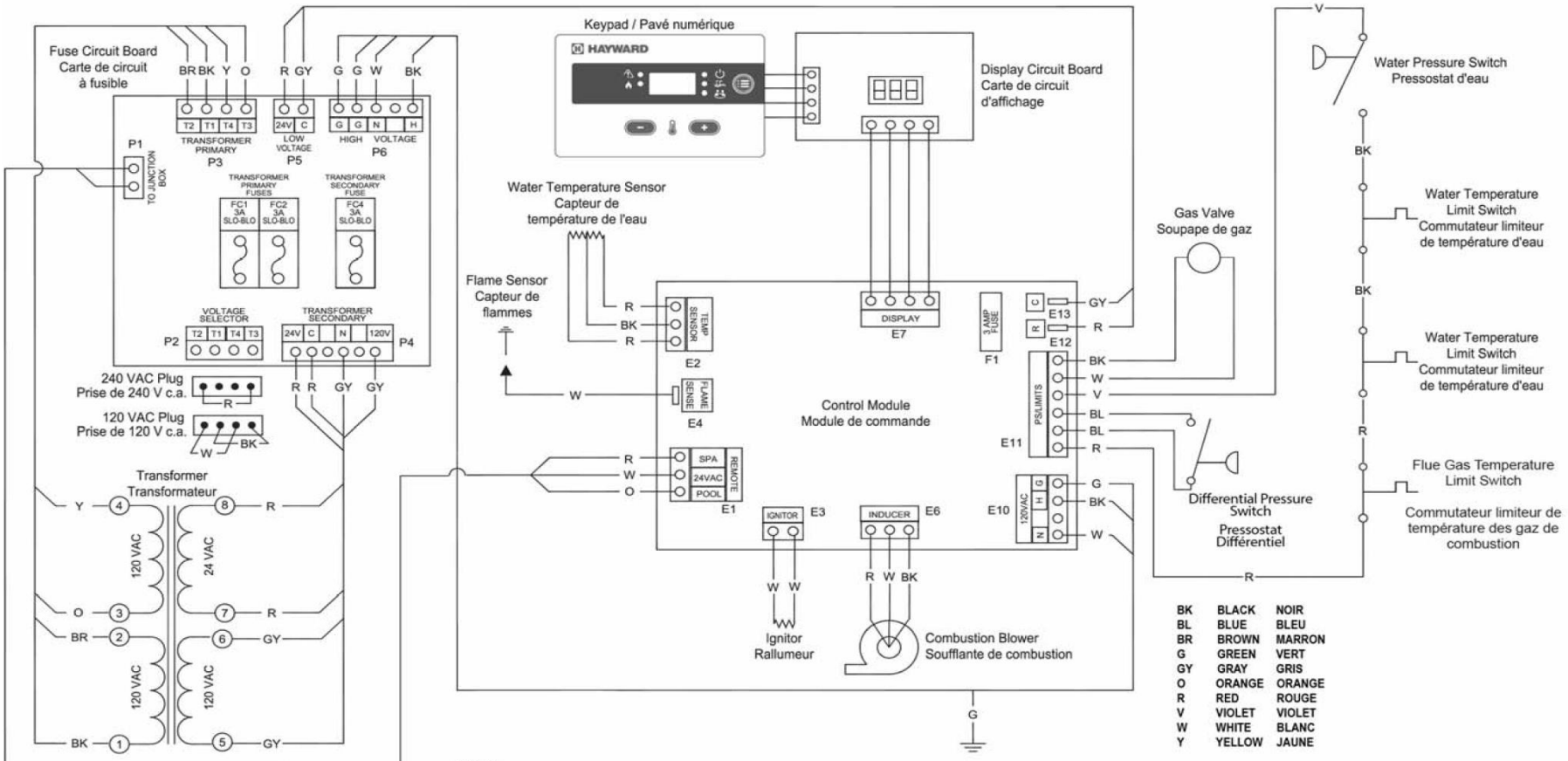
Description	Service Kit SKU
Cabinet Top	HDXFTOP001
Control Access Panel Assy.	HDXFCAP001
Header Controls Cover	HDXFHCC001
Water Side Trim Panels	HDXFWTP001
Cabinet Base	HDXFBOT001
Exhaust Box Assembly	HDXFEXB001
Ignition Control Board	HDXFICBRD001
Display Board & Ribbon Cable	HDXFUIBRD001
Field Wiring Panel (Fuse Board)	FDXLFWP1930
Thermistor	FDXLTER1931
Differential Pressure Switch	HDXFDPS400
Transformer	IDXL2TRF1930
Water Pressure Switch	FDXLWPS1931
HDF High Limit Kit 400K HDF High Limit Kit 275K	HDXFHLI001 HDXFHLI275
Ignitor & Flame Sensor	HDXFIGFS001
Exhaust Gas Temp. Limit	FDXLEGL1930
Gas Valve	HDXFGSV001
Gas Manifold	HDXFMAN001
Natural Gas Fuel/Air Mixer 400K Natural Gas Fuel/Air Mixer 275K Propane Fuel/Air Mixer 400K Propane Fuel/Air Mixer 275K	HDXFMXN400 HDXFMXN275 HDXFMXP400 HDXFMXP275

Description	Service Kit SKU
Burner	HDXFBRN001
Exhaust Pipe Assembly	HDXFEXP001
HDF Inlet/Outlet Header Kit	HDXFIOH001
V-Header Assembly	HDXFVHD001
Pressure Relief Port Plug	CHXPLG1930
Drain Plug with O-Rings	SPX400FG
Gasket Kit, Blower/Burner	HDXFBSGK400
Fuse Service Kit	FDXLFSK1930
Combustion Blower 400K Combustion Blower 275K	HDXFBWR400 HDXFBWR275
HDF Header Hardware Kit	HDXFHDW001
Union Flange Kit	SPX3200UNKIT
HDF Header O-Ring Kit	HDXFORK001
Voltage Selector Jumper	FDXLVSJ1930
Heat Exchanger 400K Heat Exchanger 275K	HDXFHXA400 HDXFHXA275
Fuse Kit, 3.0A FWP (Qty. 10)	FDXLFSKF1930
Fuse Kit, 3.0A ICB (Qty. 10)	FDXLFC1930
Wiring Harness Kit, Complete	HDXFWHA001
Silicone Tubing Kit	HDXFTUB001
Electrical Accessory Kit	HDXFEAK001

Wiring Connection Diagram

Wiring Connection Diagram / Schéma de Connexion de Câblage

HDFXXX Gas Heaters / Chaudière Gas à HDFXXX



BK	BLACK	NOIR
BL	BLUE	BLEU
BR	BROWN	MARRON
G	GREEN	VERT
GY	GRAY	GRIS
O	ORANGE	ORANGE
R	RED	ROUGE
V	VIOLET	VIOLET
W	WHITE	BLANC
Y	YELLOW	JAUNE

NOTE:

1. Heater is factory wired for 240VAC. To convert to 120VAC, install 120VAC plug inot mating connector on fuse circuit board.
2. For field power connections use 14 AWG or larger wire rated for at least 167°F (75°C).
3. For field remote thermostat connections use 22 AWG or larger wire.
4. If any of the original wire supplied with the heater must be replaced, it must be replaced with 18 AWG, UL or CSA approved wire, rated for 600V and 105°C.

REMARQUE:

1. Le réchauffeur est câblé à l'usine pour 240 V c.a. Pour le convertir à 120 V c.a., installer la prise de 120 V c.a. dans le connecteur correspondant sur la carte de circuit à fusible.
2. Pour les connexions d'alimentation de terrain, utiliser un fil de calibre 14 AWG ou plus gros, homologué pour 75°C (167°F) au moins.
3. Pour les connexions de thermostat de tarrain à distance, utiliser un fil de calibre 22 AWG ou plus gros.
4. Si tout fil fourni initialement avec le réchauffeur doit être remplacé, il faut le remplacer par un fil de calibre 18 AWG, approuvé UL ou CSA, homologué pour 600 V et 105°C.

Figure 2: Wiring Diagram

1. Heater Not Powering Up

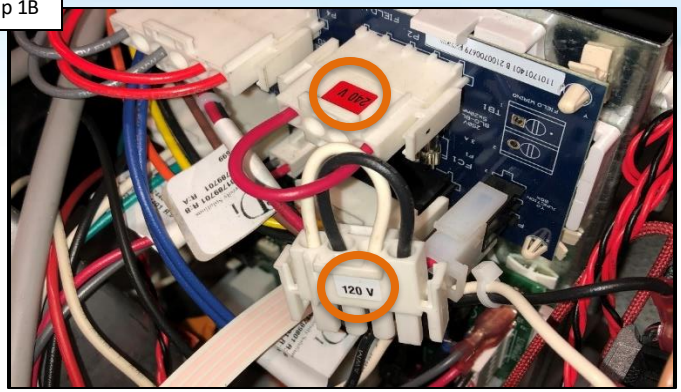
Check Incoming Power

Step 1A

IF voltage is present, go to step 1B. IF voltage is incorrect, correct source power.

Voltage selector plug

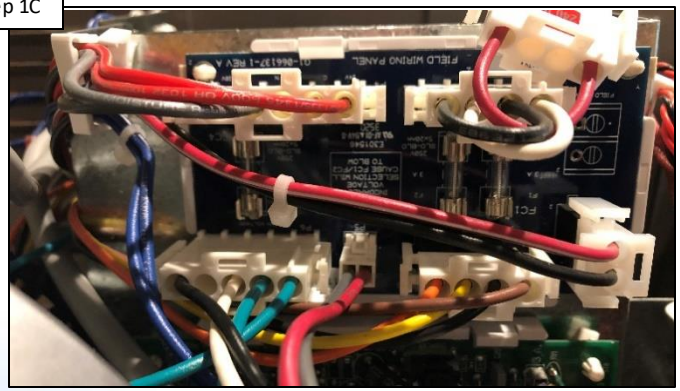
Step 1B



Verify selector plug matches incoming line power. IF it does not, power OFF & correct. IF OK, go to 1C.

Inspect connections

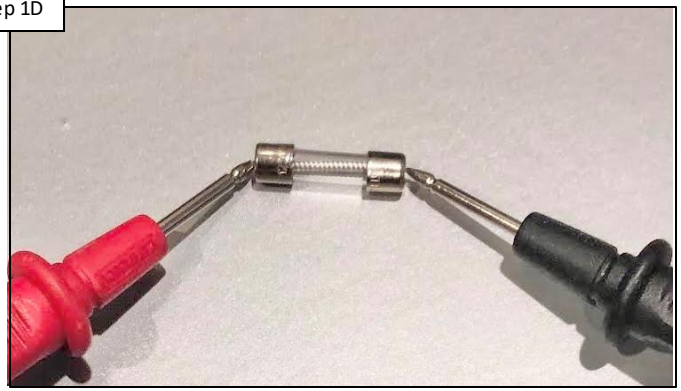
Step 1C



Inspect Field Wiring Panel, ensuring all plugs are securely fastened (pg. 5). IF correct, proceed to step 1D.

Test Fuses

Step 1D



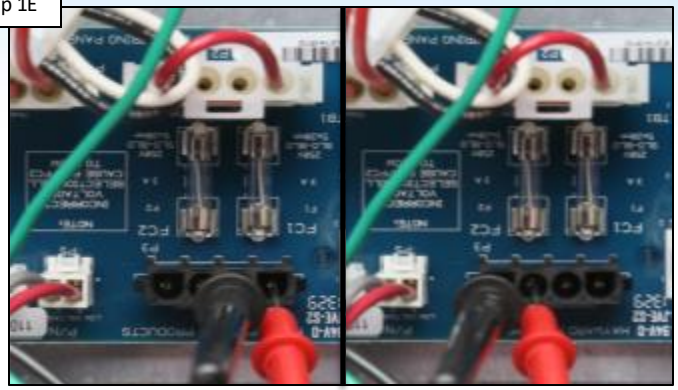
Verify that FC1 & FC2 fuses aren't blown. Replace all blown fuses & go to Page 29. IF correct, go to step 1E.

HAYWARD

1. Heater Not Powering Up (cont.)

Test transformer input

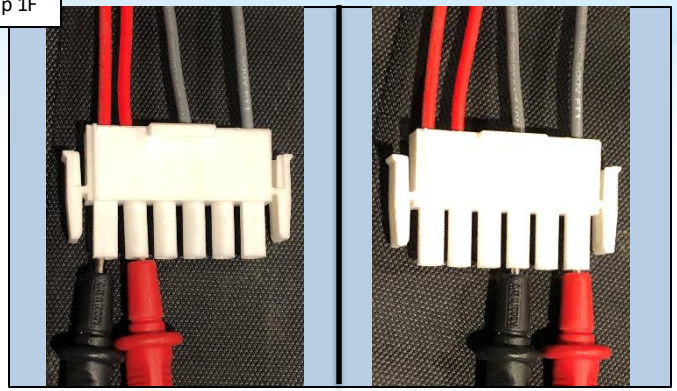
Step 1E



Disconnect the P3 plug from field wiring panel (FWP). Test 110-125VAC between pins 1&2 and 3&4 on the board. IF good, go to 1F. IF NOT, replace the field wiring panel (pg. 25).

Test transformer output

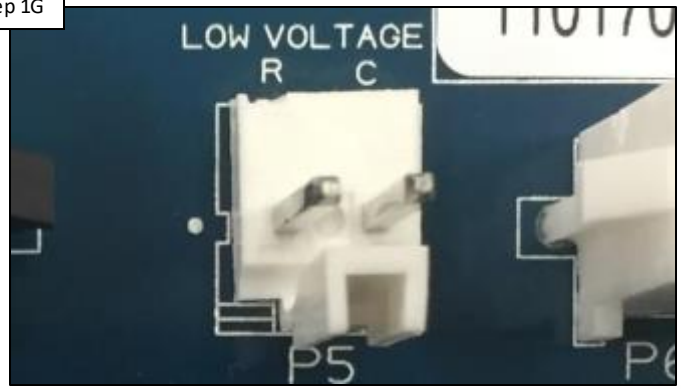
Step 1F



Disconnect P4 plug from FWP. Verify 22-28VAC between pins 1 & 2 (red wires), then 110-125VAC between pins 4-6 (grey wires). IF correct, go to 1G. IF incorrect replace transformer (pg.25).

Test P5 (low voltage)

Step 1G



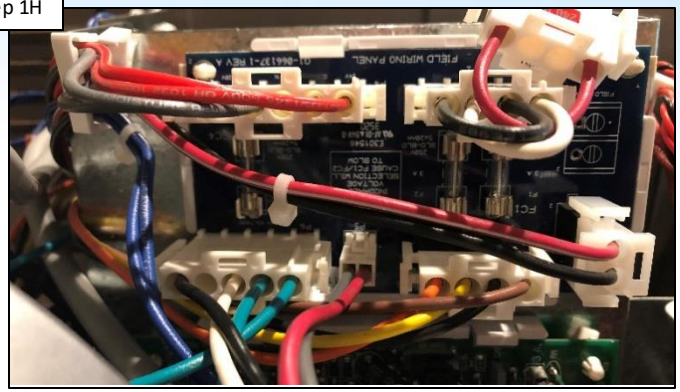
Disconnect the plug from P5 (on fuse board). Test 22-28VAC between R & C. IF no voltage, replace field wiring panel (pg. 25). If correct, go to step 1H.

HAYWARD

1. Heater Not Powering Up (cont.)

Inspect wiring

Step 1H



Inspect ICB wiring, ensuring all plugs are securely fastened. IF wiring is OK go to Step 1I. IF NOT, secure wiring/plugs then retest.

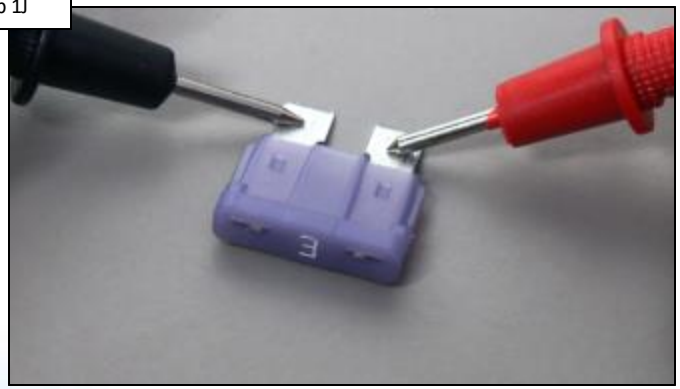
Test ICB input (low voltage)

Step 1I

Disconnect and test the red and grey wires from the ICB. IF 22-28VAC is present go to step 1J. IF NOT, replace wire harness (pg. 25).

Test F1 (3AMP) fuse

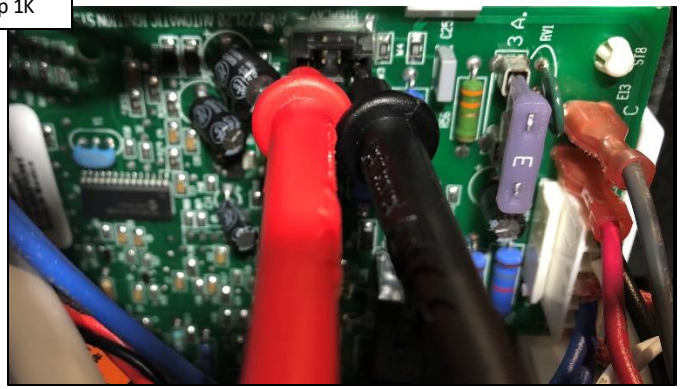
Step 1J



On the ICB, locate and test the 3A fuse for continuity. IF fuse is blown, replace it and go to Page 30. IF Ok, go to step 1K.

Test ICB's display output

Step 1K



On the ICB, verify 22–28VAC between AC & COM terminals (pins 1 & 4). IF voltage is present, replace display/bezel/keypad. IF no voltage, replace ICB (pg. 25).

HAYWARD

2. Open FC1 &/or F2 Fuse

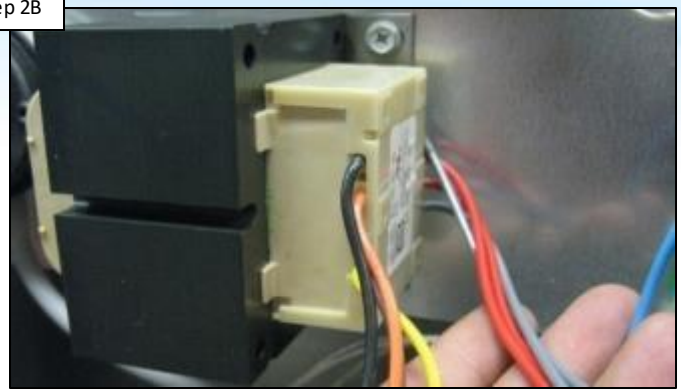
Verify voltage selector plug

Step 2A

IF voltage selector plug matches voltage, go to step 2B. IF not, power down, replace FC1 & FC2 fuses, & switch plug to proper voltage.

Inspect transformer wiring

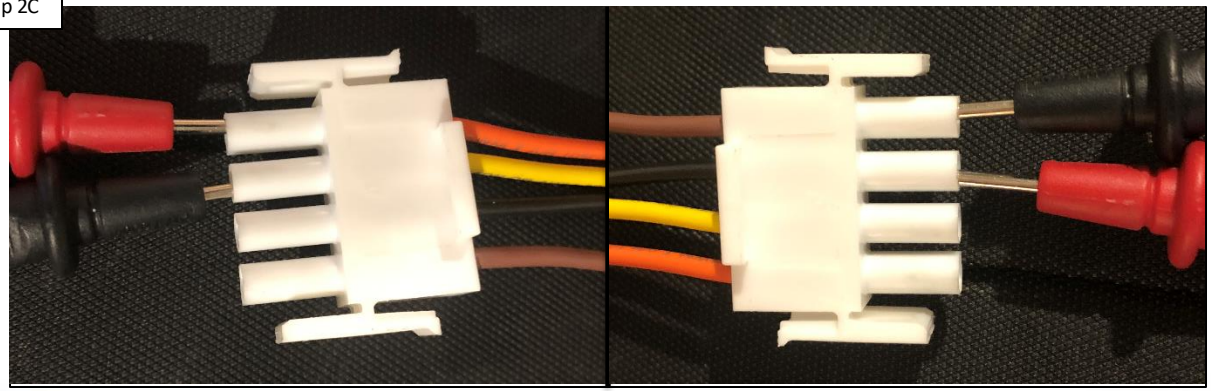
Step 2B



Inspect transformer wiring, ensuring the insulation on the wiring is not damaged. IF damaged replace transformer (pg. 25). IF OK go to 2C.

Test transformer resistance

Step 2C



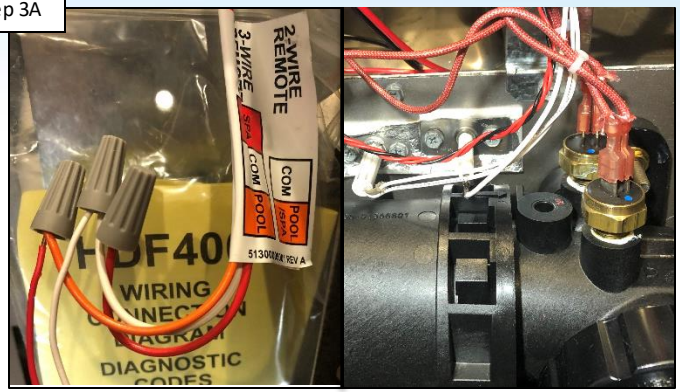
With power off, remove the P3 & P4 plugs. On the P3 plug measure resistance between the orange & yellow wires for 1.9 – 2.9 Ohms, then do the same between the black and brown wires. IF resistance is out-of-range, replace transformer (pg. 25). IF OK and problem still persists, contact technical support: (908) 355.7995.

HAYWARD

3. Open F1 Fuse

Inspect connections/high limits

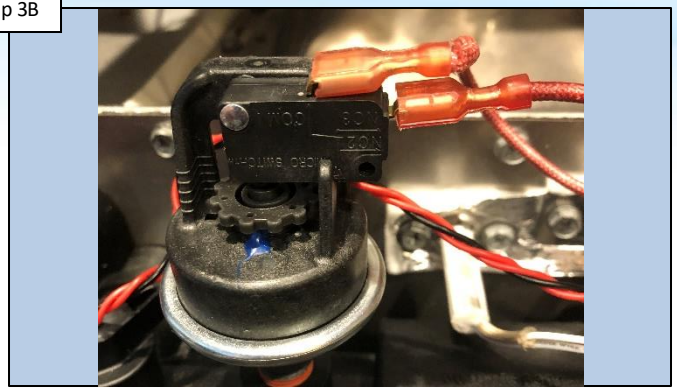
Step 3A



Power down and inspect all remote connections and high limit wiring for damage. IF damaged, repair/replace (pg. 25). IF OK, go to step 3B.

Inspect water pressure switch

Step 3B



With power off, inspect the water pressure switch wiring for damage. IF damaged, replace the wire harness (pg. 25). IF OK, go to step 3C.

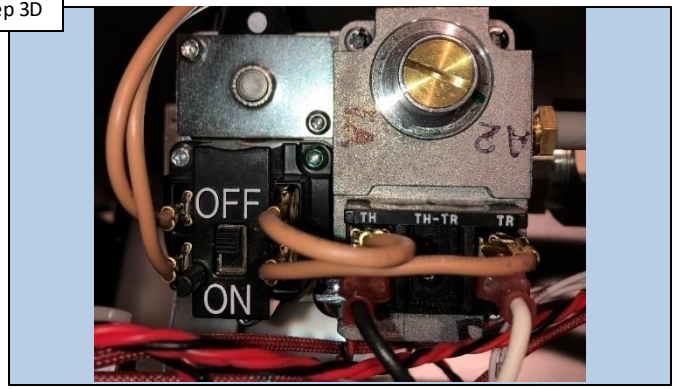
Inspect differential pressure switch

Step 3C

With power off, inspect the diff. pressure switch wiring for damage. IF damaged, replace the wire harness (pg. 25). IF OK, go to step 3D.

Inspect gas valve wiring

Step 3D



With power off, inspect the gas valve wiring for damage. IF damaged, replace the wire harness (pg. 25). IF OK, go to step 3E.

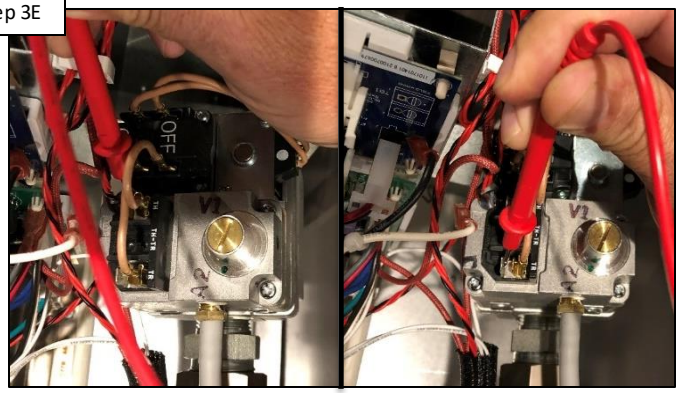
HAYWARD

3. Open F1 Fuse (cont.)

When testing the gas valve, if continuity appears between any wires and ground, then this implies a short has occurred and the gas valve will need to be replaced.

Verify gas valve is not shorted

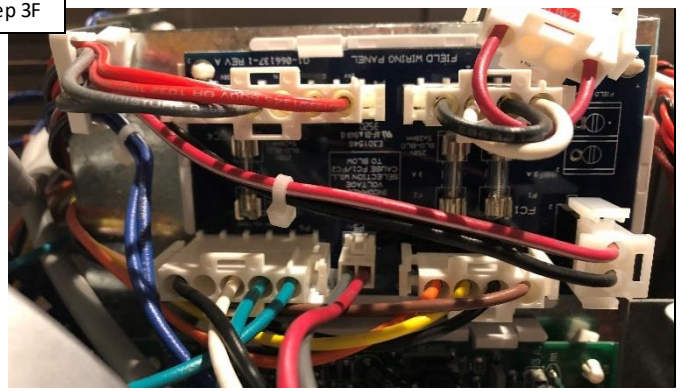
Step 3E



With power off, measure resistance, comparing each terminal to ground. IF any terminal shows continuity, replace the gas valve (pg. 25). IF OK, go to step 3F.

ICB wiring

Step 3F



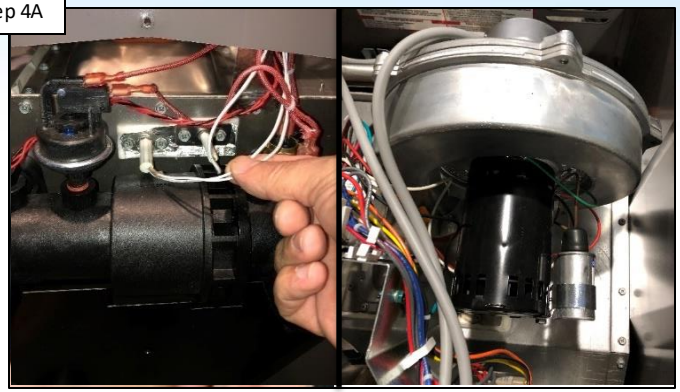
Inspect ICB wiring. IF wiring is damaged, replace the wire harness with a new wire harness kit (pg. 25). IF OK and the problem still exists, replace the ICB (pg. 25)

HAYWARD

4. Open FC4 Fuse

Ignitor and blower wiring

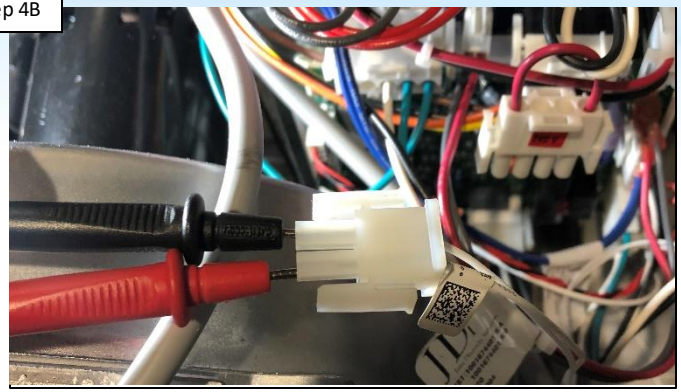
Step 4A



Inspect the Ignitor & Blower wiring. Verify insulation is not damaged. IF wires are damaged, replace the damaged part (pg. 25). IF OK, go to 4B.

Verify ignitor resistance

Step 4B



Disconnect ignitor from ICB & measure resistance of ignitor. Verify 8-25 ohms between 20°-140°F. IF correct, go to 4C. IF NOT, replace ignitor (pg. 25).

Measure blower resistance

Step 4C

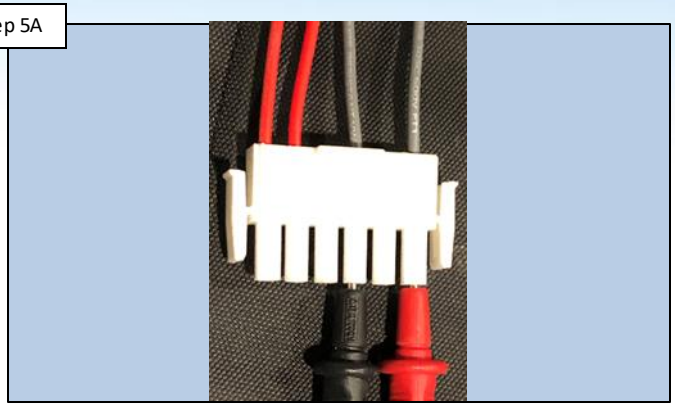
Measure for 13-18 ohms across the black and white (red wire not used) terminal wires. IF out-of-range, replace blower (pg. 25). IF correct, contact technical support (908)355-7995.

HAYWARD

5. Service LED ON: 'BD' Code

Verify transformer output

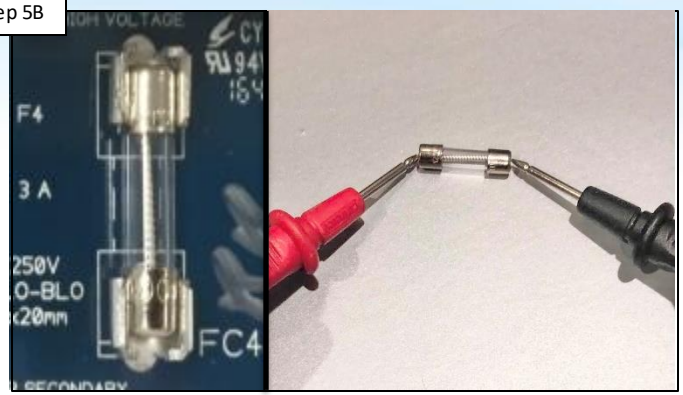
Step 5A



Disconnect P4 from fuse board. Verify 110-125VAC between 4-6 (grey wires). IF OK, replace fuse board. IF NOT, replace transformer (pg. 25).

Test the FC4 fuse (continuity)

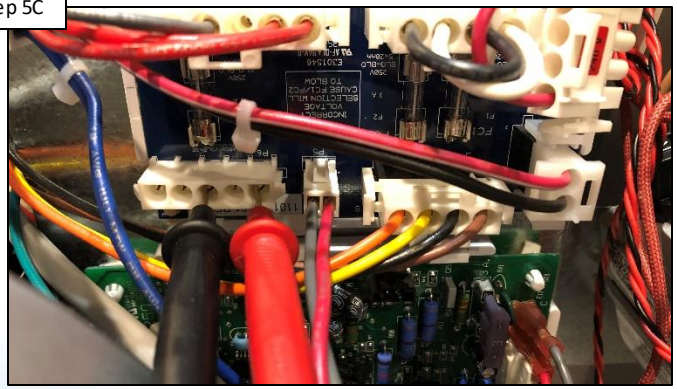
Step 5B



With power off, verify the FC4 fuse has continuity. IF fuse is good, go to 5B. IF fuse is blown, go to Page 33.

Verify ICB output

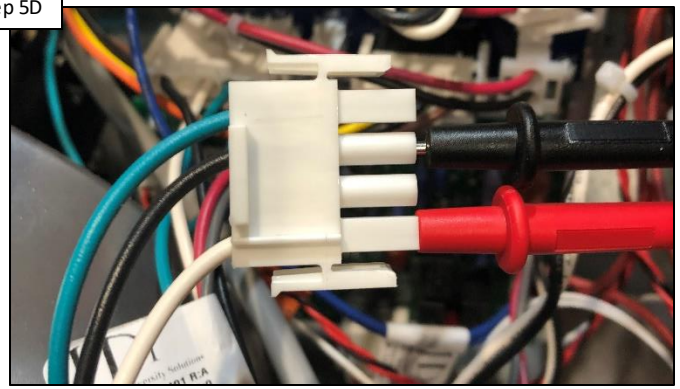
Step 5C



Disconnect the P6 connector and test voltage for 110-125VAC between pins 3-5. IF no/low voltage, go to step 5D. IF correct, go to 5D.

Verify ICB input

Step 5D



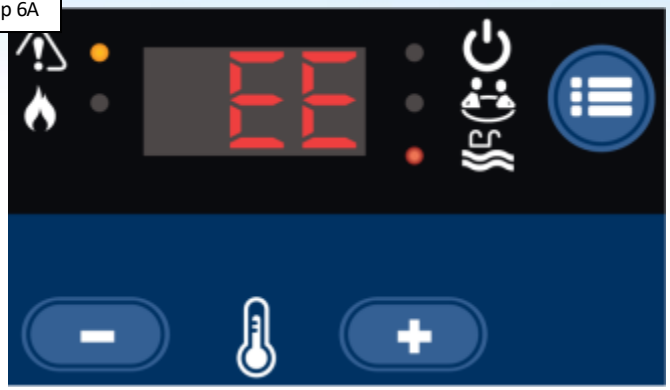
Disconnect the E10 connector from ICB. Verify 110-125VAC between 1-3 (white & black). IF present, replace ICB. IF NOT, replace wire harness (pg. 25).

HAYWARD

6. Service LED ON: “EE” OR “CE” Code

“EE” Code

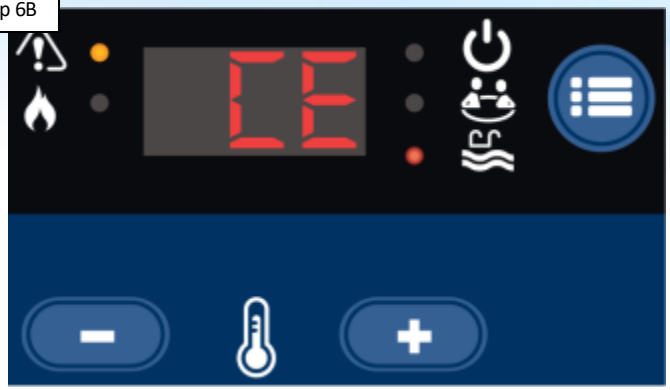
Step 6A



“EE” error indicates the you have a defective ICB board. IF this error appears, replace ICB (pg. 25). IF no EE error, go to 6B.

“CE” Code

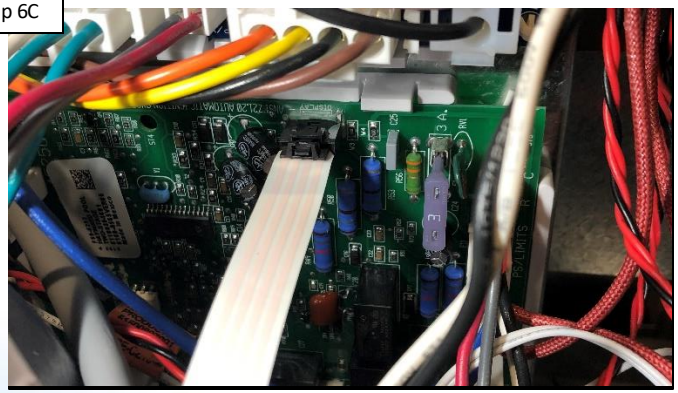
Step 6B



“CE” (communication error) indicates a problem between the ICB & display board. Cycle power OFF/ON. IF error persists, go to 6C.

Display board and ribbon cable

Step 6C



Verify ribbon cable is secure. IF cable is secure, replace display/bezel/keypad assy. (pg. 25) then go to 6D. IF NOT secured, reconnect.

Display board

Step 6D

IF after replacing display/bezel/keypad, “CE” error persists, replace ICB (pg. 25). IF replacing ICB fails to solve problem, contact support (908) 355-7995.

HAYWARD

7. Service LED ON: “IO” OR “SB” Code

“IO” Code

Step 7A

“IO” error indicates ignitor open. IF this error appears, go to step 7B. IF “IO” does not appear, go to step 7D.

Inspect ignitor wires

Step 7B

Verify ignitor is securely attached to ICB. If OK, inspect wires for damage. If damaged/worn, replace ignitor (pg. 25) IF OK, go to step 7C.

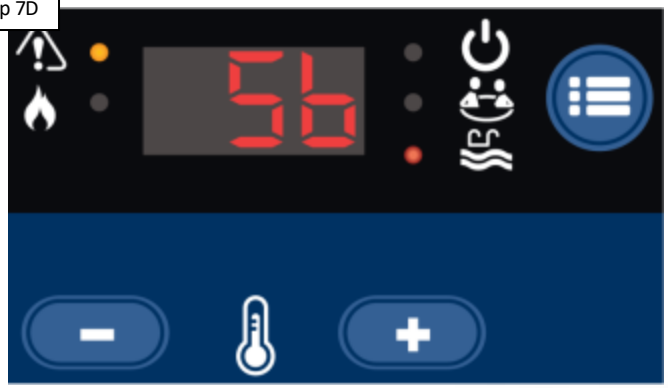
Ohm out ignitor

Step 7C

With power off, verify ignitor ohm resistance (8-25 ohms between 20°- 140°F). IF correct, replace ICB. IF out-of-range, replace ignitor (pg. 25).

“SB” Code

Step 7D



“Stuck Button” indicates display board is acting as if the button is being pressed and held. Replace display/bezel/key pad (pg. 25).

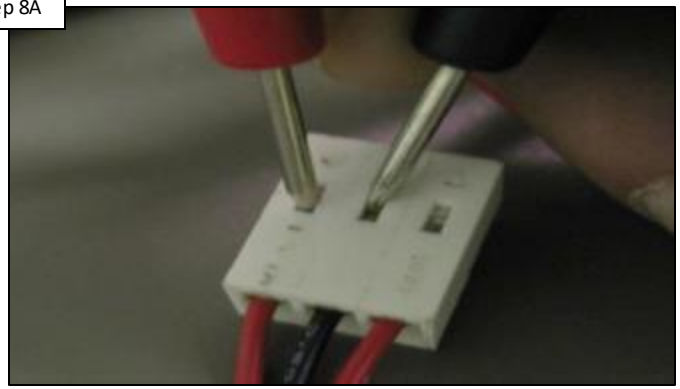
HAYWARD

8. Service LED ON: “SF” OR “HS” Code

The “HS” (High Sense (water temperature)) will appear if the water sensor is reading above 105° OR if the sensor detects an increase of more than 6° with-in 60 seconds. Verify the pump is running & adequate water is flowing through heater.

“SF” Code

Step 8A



The “SF” (Sensor Failure) indicates that the thermistor (or temp sensor) is reading out of range. Ohm temp sensor, checking each red to black. IF the two readings differ, replace thermistor. IF NOT, replace ICB (pg. 25).

“HS” Code

Step 8B

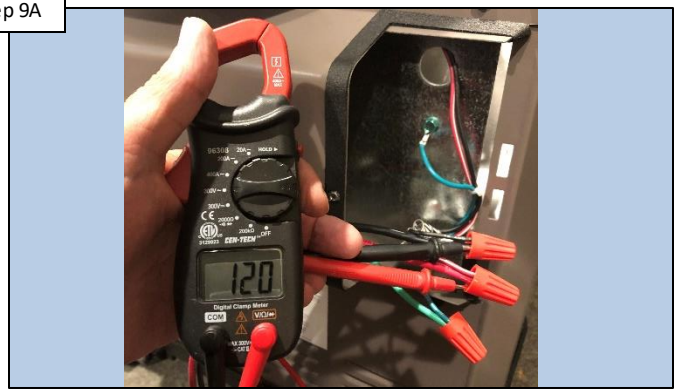
Verify the water inlet & outlet are not reversed; reversing plumbing will cause the “HS” error code. Follow the steps outlined in 8A. IF the thermistor is good, replace the ICB (pg. 25).

9. Service LED ON: “PF” Code

“Polarity Failure” This code will display if low voltage is detected, if the ground path is not sufficient, or the ICB is defective. Reset is immediate after error is corrected.

Verify incoming power

Step 9A



Ensure voltage is within 10% + or – of required voltage. IF voltage is correct, go to step 9B. IF NOT, then the problem is related to source power and must be corrected before error will clear.

Line voltage connections

Step 9B

Verify both neutral and ground connections (both internal and external) are clean and secured. IF ground and neutral connections check-out, then replace the ICB (pg. 25).

HAYWARD

10. Service LED ON: “HF” Code

“HF” (heat or flame sensed) will occur if flame is sensed when the gas valve is off, the control will go into lockout. The blower will continuously run until corrected. When corrected, control will run blower for 5 seconds then restart heater after 2 minutes.

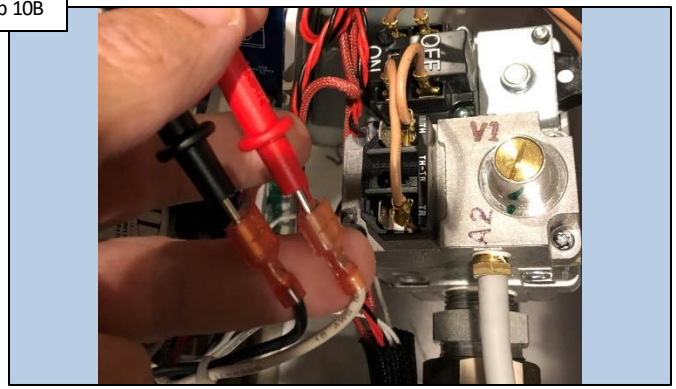
Power cycle heater

Step 10A

Power cycle the heater, in an attempt to clear the “HF” code. IF power cycling clears to the “HF” code and the heater fires, drop the temperature to suspend heating, IF “HF” reappears, go to step 10B.

Call for heat and test gas valve

Step 10B



Press the mode button to toggle the heater and call for heat. IF 24VAC is not present at gas valve AND manifold pressure is present, gas valve is defective and needs to be replaced. Otherwise, replace the ICB (pg. 25).

HAYWARD

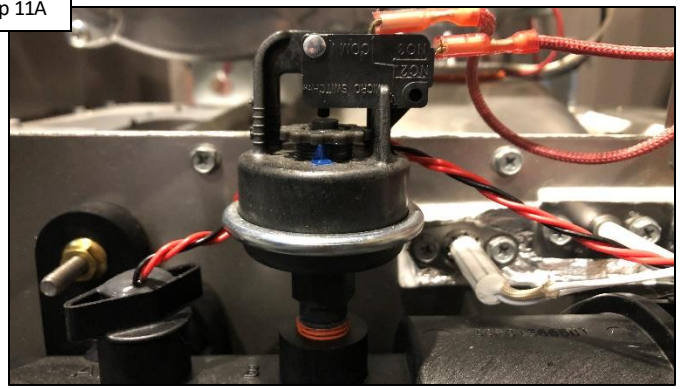
11. Service LED ON: “LO” Code

“LO” Code (Limit Open) may relate to water flow. Verify the pump is running & adequate water is flowing through heater.

“LO” is NORMAL when the pump is turned off or there is insufficient water flow.

Inspect water pressure switch

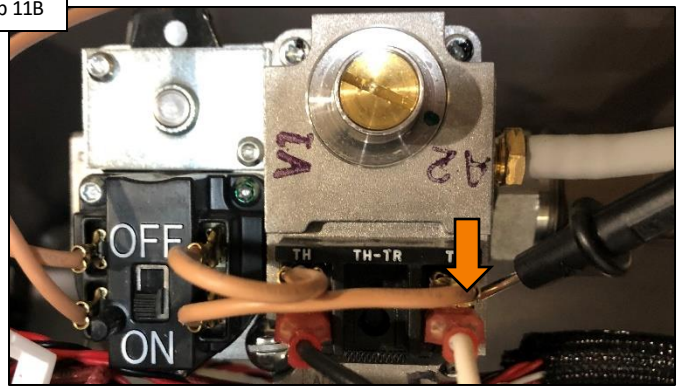
Step 11A



Inspect the water pressure switch wiring, ensuring wire harness terminals are securely fastened. IF damaged, replace wire harness (pg. 25). IF secure and free of damage, go to step 11B.

Voltage test

Step 11B



With filter pump running, take one lead from your multi-meter and place it on the terminal with the white wire on the gas valve, then Go To Step 11C.

HAYWARD

11. Service LED ON: “LO” Code

“LO” Code (Limit Open) may relate to water flow. Verify the pump is running & adequate water is flowing through heater.

“LO” is NORMAL when the pump is turned off or there is insufficient water flow.

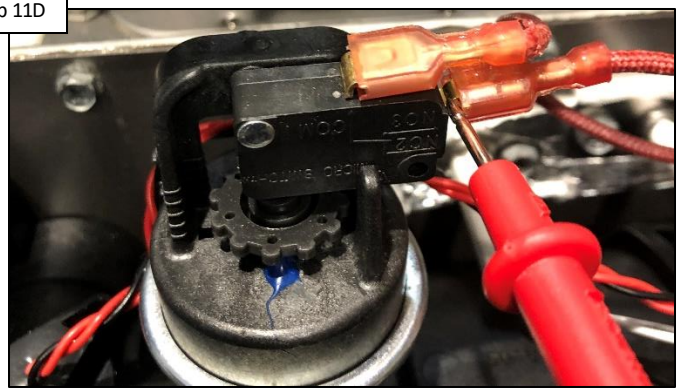
Test pressure switch voltage

Step 11C

Next take the other lead on your multi-meter and test for 24V AC on one of the terminals on the water pressure switch, then Go To Step 11D.

Test pressure switch voltage (cont.)

Step 11D



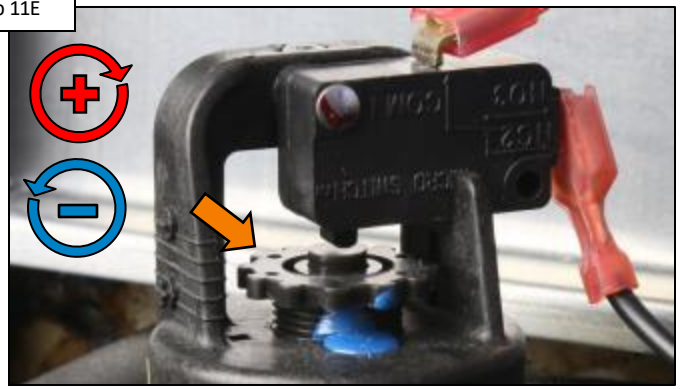
Test for 24V AC on the opposite terminal on the water pressure switch. IF no voltage, replace water pressure switch (pg. 25). IF OK, go to Step 11E.

11. Service LED ON: “LO” Code (cont.)

The water pressure switch should not need adjusting, some sites may require a water pressure switch adjustment

Pressure switch adjustment

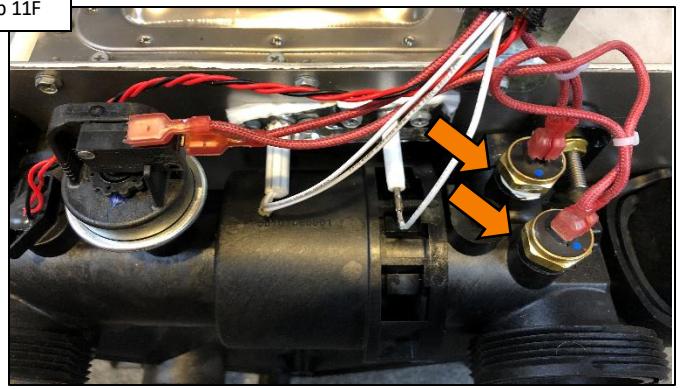
Step 11E



If adjustment is required refer to the water pressure switch test/adjustment section in the I/O Manual. IF adjustment does not correct or was not required, go to 11F.

Inspect and test high limits

Step 11F



Inspect & test high limits. Verify continuity across the temperature limit switches. IF open or wire is damaged, replace (pg. 25). IF OK, go to 11G.

11. Service LED ON: “LO” Code (cont.)

Note: This exhaust gas limit switch is a one time safety. Once the switch has tripped then it NEEDS to be replaced and the combustion chamber should be inspected for soot or damage.

Indoor/Outdoor

Step 11G

With one meter lead on the gas valve white wire (page 40, Step 11B), take other meter lead and test for 24V AC across both terminals on the exhaust gas limit switch. IF no voltage is present, replace switch (pg. 25). IF problem still persists, contact support: (908) 355-7995

12. Service LED ON: “IF” Code

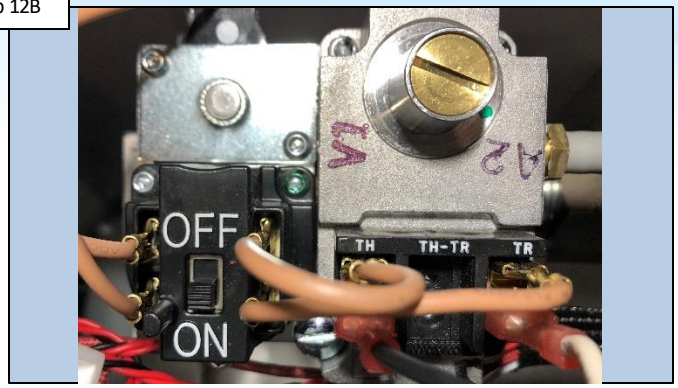
Inspect main gas supply

Step 12A

IF “Ignition Failure”, Ensure main gas supply is in the ON position. IF ON, go to step 12B. IF NOT, open gas supply.

Verify gas valve is ON

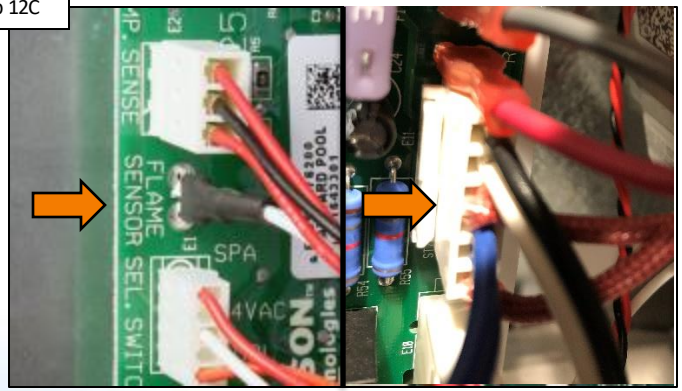
Step 12B



Verify that the gas valve, inside the heater, is in the “ON” position. IF correct, go to step 12C. IF NOT, slide switch to “ON” position.

Flame sensor & gas valve

Step 12C



Ensure both flame sensor and gas valve are both securely fastened to the ICB. IF correct, proceed to step 12D. IF NOT, fasten securely.

Verify gas pressure

Step 12D

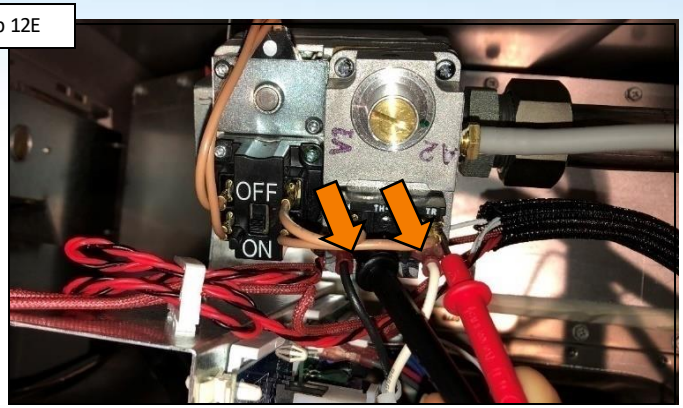
Ensure gas static, load, and manifold pressures are correct (Pg. 13). IF OK, go to Step 12E. IF NOT, go to Step 12F.

HAYWARD

12. Service LED ON: “IF” Code (cont.)

Voltage/pressure off gas valve

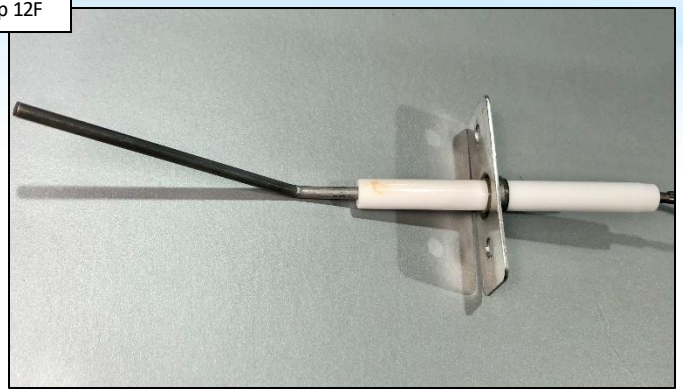
Step 12E



Verify 22-28VAC on gas valve (black & white wires) during ignition trial. IF present & no pressure (manometer attached), replace valve. Otherwise, replace ICB (pg. 25).

Verify correct flame sensor

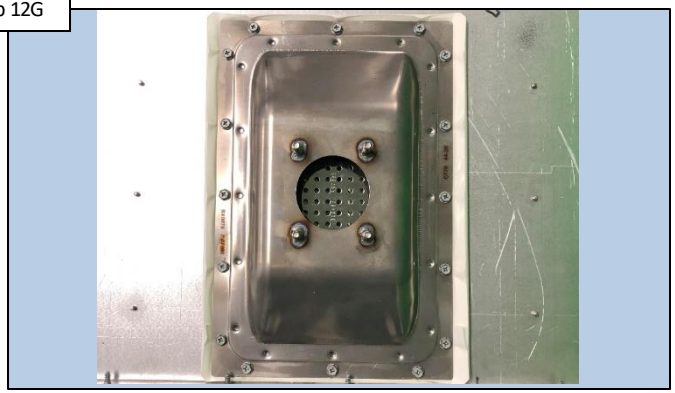
Step 12F



Verify that the installed flame sensor is clean and free of any damage, if flame sensor is damaged replace (pg. 25). IF good, go to step 12G.

Inspect burner

Step 12G



Inspect burner for cleanliness. Clean as required (pg. 15). IF damaged, replace (pg. 25). IF NOT damaged, contact tech support (908) 355-7995.

HAYWARD

13. Service LED ON: “AC” Code

“AC” Code stands for “Air Switch Closed”. The differential pressure switch is closed, when it was expected to be open.

Verify blower operation

Step 13A

With the heater off (in “Stand By”), IF the blower continues to run/operate, replace the ICB (pg. 25). IF blower cuts off, go to Step 13B.

Test differential pressure switch

Step 13B

Isolate the diff. pressure switch. Measure continuity between switch terminals. IF continuity exist, replace the blower vacuum switch (pg. 25).

14. Service LED ON: “A1, A2, & A3” Code

“A1” Code stands for “Air switch circuit open before ignitor warm up”. Differential Pressure Switch (DPS) open when expected closed. The switch circuit never closed when the blower turned on or re-opened within 10 seconds of blower starting.

“A2” Code stands for “Air switch open after ignitor warm up”. Differential Pressure Switch (DPS) open when expected closed. The switch opened during the heating cycle.

“A3” Code stands for “Air switch open during post purge”. Differential Pressure Switch (DPS) open when expected closed. The switch opened after heating cycle ended but before the post purge time (30 sec.) completed.

14. Service LED ON: “A1, A2, & A3” Code (cont.)

Verify voltage selector plug

Step 14A

Verify selector plug matches incoming line power. IF it does not, power OFF & correct. IF OK, go to Step 14B.

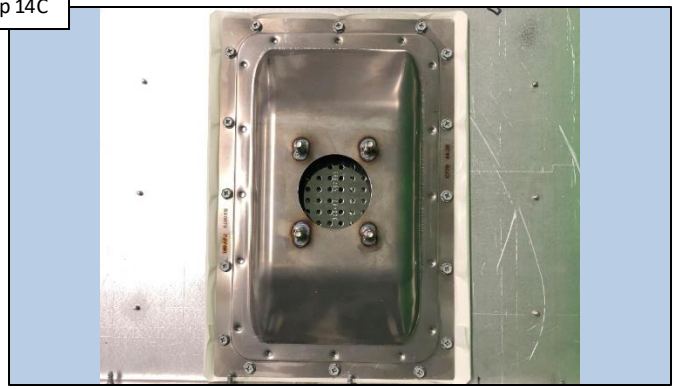
Check blower tubing

Step 14B

Check blower tubing for damage/loose fit. IF damaged, replace tubing (pg. 25). IF correct, go to Step 14C.

Verify burner is clear

Step 14C



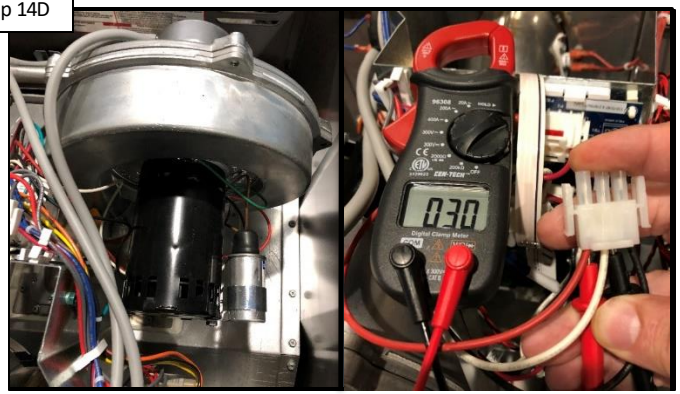
Verify burner is clean and not damaged. If dirty clean (pg. 15). damaged replace (pg. 25). IF OK, go to Step 14E.

HAYWARD

14. Service LED ON: “A1, A2, & A3” Code (cont.)

Test blower

Step 14D



Test the blower for the proper resistance. Measure for 30 - 50 ohms across red and white terminal wires. IF out-of-range, replace blower (pg. 25). IF OK, go to Step 14F.

Test differential pressure switch

Step 14E

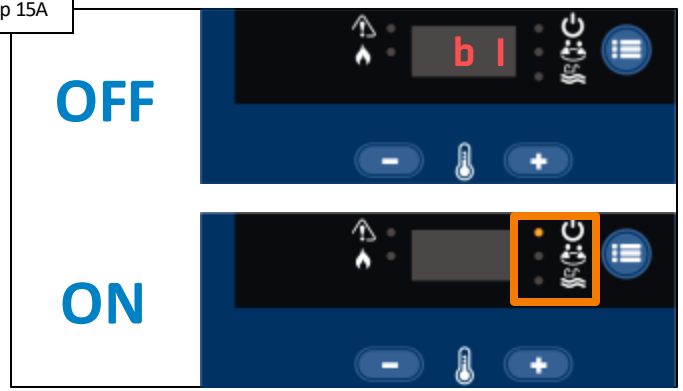
Verify diff. pressure switch is open when blower is off, turn heater on and check to see if dps switch closes. IF NOT, replace switch. IF problem persists, contact Technical Support at (908) 355-7995.

15. Service LED ON: “b1” Code

“b1” Code stands for “Ignition Control Board (ICB) data error”. If the ICB does not satisfy self-diagnostic on power up or initial trial for ignition, the ICB will lock out until error condition is corrected.

Power cycle heater

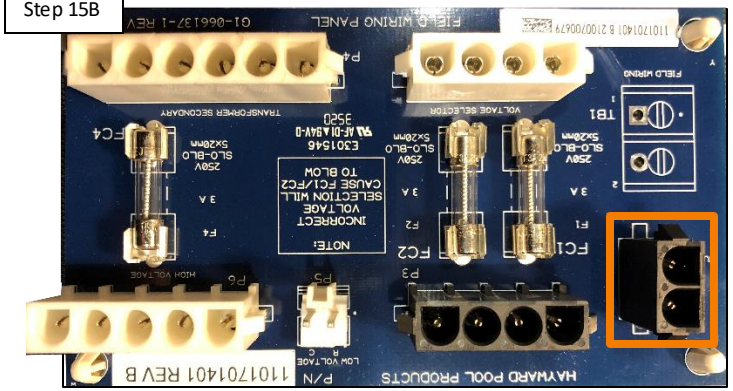
Step 15A



Power cycle the heater, in an attempt to clear the “b1” code. IF power cycling clears to the “b1” code and heater fires, drop temperature to suspend heating. IF “b1” reappears, go to step 15B.

Test incoming power

Step 15B



Unplug the wire harness from the P1 terminal and test voltage on the harness (115VAC or 230VAC). IF incoming voltage is out of range (+/-10%), correct incoming voltage. Otherwise, replace the ICB (pg. 25).

HAYWARD

16. Service LED ON: “b2” Code

“b2” Code stands for “Gas valve sensed as “ON” error. If gas valve is powered when it should be off, the heater will shut down and go into lock out. The blower will operate until error condition is corrected.

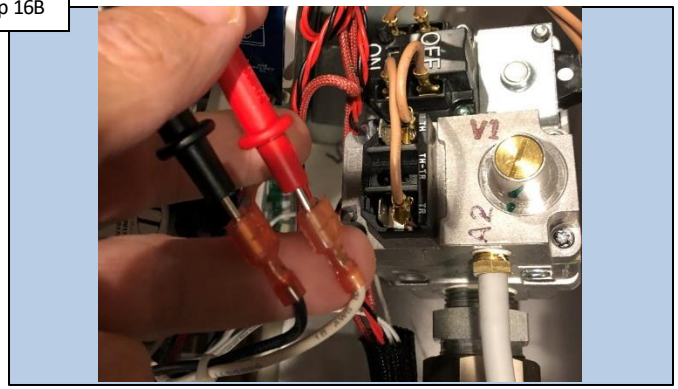
Power cycle heater

Step 16A

Power cycle heater, in an attempt to clear the “b2” code. IF power cycling clears to the “b2” message and the heater fires, drop the temperature to suspend heating. IF “b2” reappears, go to step 16B.

Call for heat and test gas valve

Step 16B



With heater in standby mode, test for 24VAC on the gas valve (black & white wires), IF 24VAC is present, replace gas valve (pg. 25). Otherwise, replace the ICB (pg. 25).

HAYWARD

17. Service LED ON: “b3” Code

“b3” Code stands for “Gas valve sensed as “OFF” error. If gas valve is unpowered but flame is sensed, the blower will run for 5 seconds then start a new ignition sequence. If error occurs 10 times during a call for heat, the ICB will go into lockout.

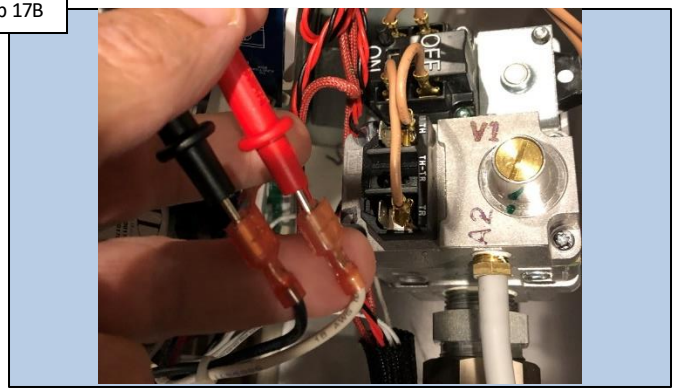
Power cycle heater

Step 17A

Power cycle heater, in an attempt to clear the “b3” code. IF power cycling clears to the “b3” message and the heater fires, drop the temperature to suspend heating. IF “b3” reappears, go to step 17B.

Call for heat and test gas valve

Step 17B



With heater in standby mode, test for 24VAC on the gas valve (black & white wires), IF 24VAC is present, replace gas valve (pg. 25). Otherwise, replace the ICB (pg. 25).

HAYWARD

18. Service LED ON: “b4” Code

“b4” Code stands for “data retrieval error”. If input data values are corrupted on power up or initial trial for ignition, the ICB will lockout until error condition is corrected.

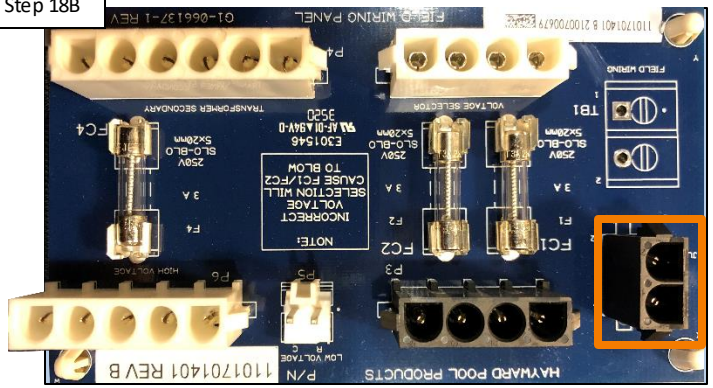
Power cycle heater

Step 18A

Power cycle heater, in an attempt to clear the “b4” code. IF power cycling clears to the “b4” message and the heater fires, drop the temperature to suspend heating. IF “b4” reappears, go to step 18B.

Test incoming power

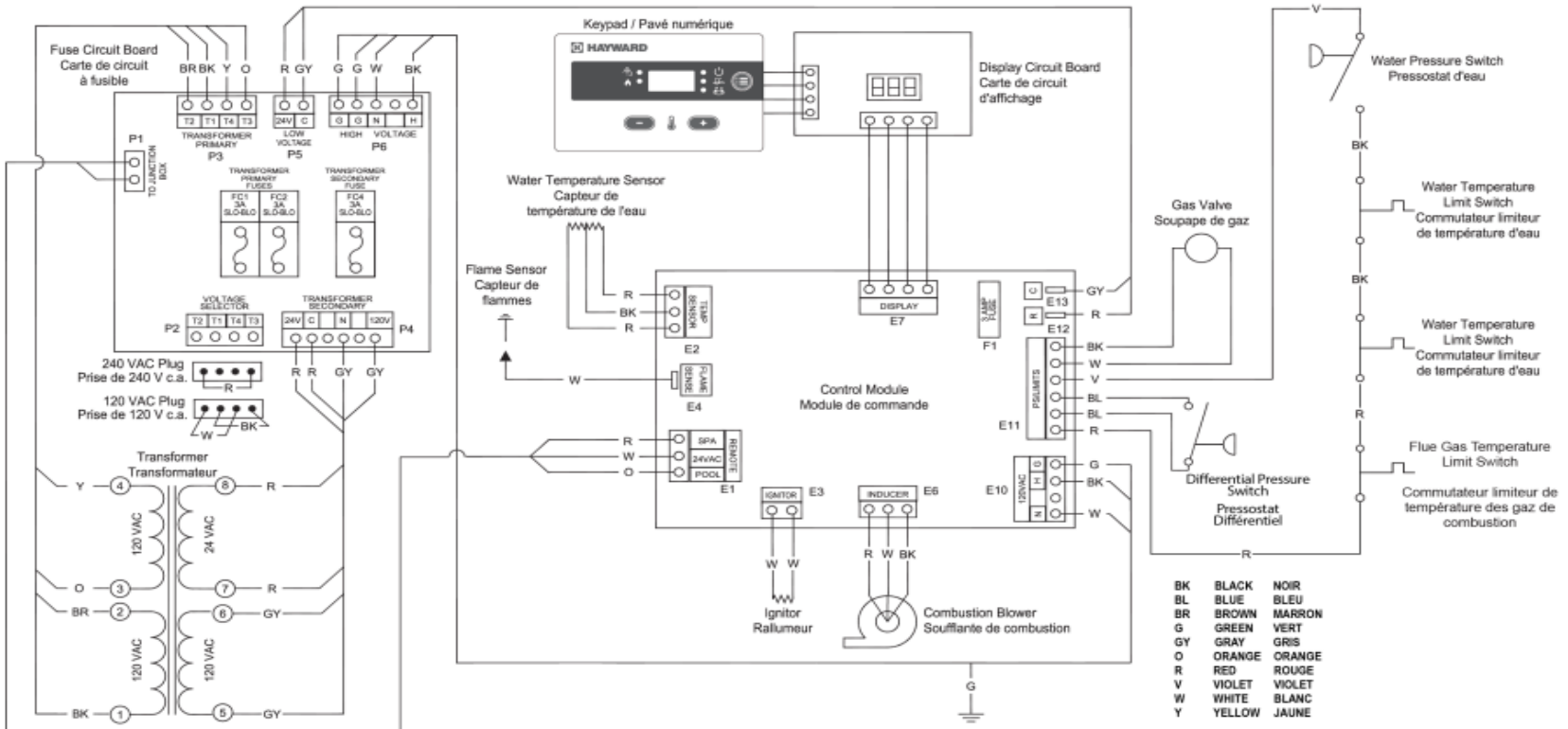
Step 18B

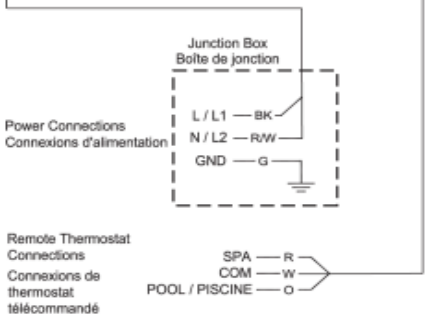


Unplug the wire harness from the P1 terminal and test voltage on the harness (115VAC or 230VAC). IF incoming voltage is out of range (+/-10%), repair incoming voltage. Otherwise, replace the ICB (pg. 25).

Wiring Connection Diagram / Schéma de Connexion de Câblage

HDFXXX Gas Heaters / Chaudière Gas à HDFXXX





NOTE:

1. **Heater is factory wired for 240VAC. To convert to 120VAC, install 120VAC plug inot mating connector on fuse circuit board.**
2. **For field power connections use 14 AWG or larger wire rated for at least 167°F (75°C).**
3. **For field remote thermostat connections use 22 AWG or larger wire.**
4. **If any of the original wire supplied with the heater must be replaced, it must be replaced with 18 AWG, UL or CSA approved wire, rated for 600V and 105°C.**

REMARQUE:

1. **Le réchauffeur est câblé à l'usine pour 240 V c.a. Pour le convertir à 120 V c.a., installer la prise de 120 V c.a. dans le connecteur correspondant sur la carte de circuit à fusible.**
2. **Pour les connexions d'alimentation de terrain, utiliser un fil de calibre 14 AWG ou plus gros, homologué pour 75°C (167°F) au moins.**
3. **Pour les connexions de thermostat de tarrain à distance, utiliser un fil de calibre 22 AWG ou plus gros.**
4. **Si tout fil fourni initialement avec le réchauffeur doit être remplacé, il faut le remplacer par un fil de calibre 18 AWG, approuvé UL ou CSA, homologué pour 600 V et 105°C.**

NOTES