

Raypak[®]
A Rheem[®] Company



Digital Gas Heater

Tool Box Quick Reference Guide

Water Chemistry

For your health and the protection of your pool equipment, it is essential that your water be chemically balanced¹.

The following levels must be used as a guide for balanced water.

Recommended Levels	Fiberglass Pools	Fiberglass Spas	Other Pool & Spa Types
Water Temp. (Deg. F)	68 to 88	89 to 104	68 to 104
pH	7.3 to 7.4	7.3 to 7.4	7.6 to 7.8
Total Alkalinity (PPM)	120 to 150	120 to 150	80 to 120
Calcium Hardness (PPM)	200 to 300	150 to 200	200 to 400
Salt (PPM)	4500 MAXIMUM	4500 MAXIMUM	4500 MAXIMUM
Free Chlorine (PPM) ²	2 to 3	2 to 3	2 to 3
Total Dissolved Solids (PPM)	3000 MAXIMUM³	3000 MAXIMUM³	3000 MAXIMUM³







¹ Damage from corrosive water is not covered under warranty. Consult your product manual for more information.

² Free Chlorine MUST NOT EXCEED 5PPM.

³ In salt water chlorinated pools, the total TDS can be as high as 6000PPM.

- Occasional chemical shock dosing of the pool or spa water should not damage the heater providing the water is balanced.
- Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water, unless controlled, they can lead to excessive chlorine level which can damage your heater.
- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.
- Warning: Electrolytic Corrosion and pH instability may be present with salt chlorinated pools.

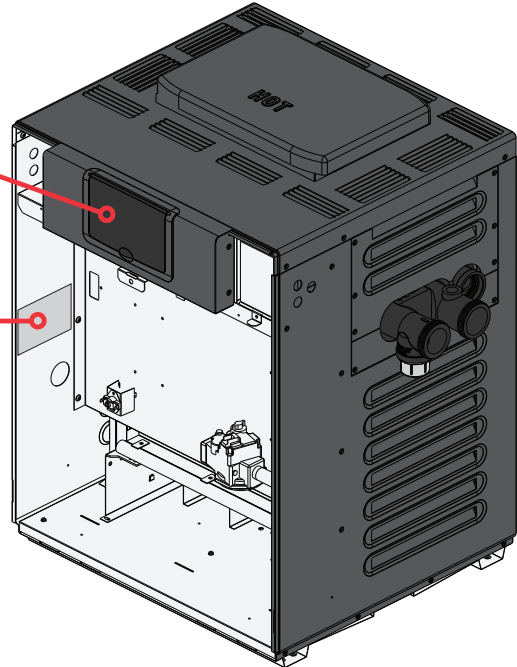
Model Number and Serial Number Location

	
Model: B-206A-MN-C ASME	Model: B-206A-MN-C ASME
Header: Bronze	Header: Bronze
Fuel: NAT	Fuel: NAT
Ignition: IID	Ignition: IID
Item Number:  0123456	Item Number:  0123456
Serial#:  0123456789	Serial#:  0123456789

Model & Serial number located on carton label.

Model & Serial number can also be found inside the control panel above digital display.

Model & Serial number located on rating plate.



Before you call Raypak service, make sure you have the MODEL NUMBER and SERIAL NUMBER.

Minimum Clearances

INDOOR	
View	in. (mm)
TOP (above Draffhood)	30 (762)
WATER SIDE	18 (456)
OPPOSITE SIDE	6 (152)
FRONT (Alcove)	Open
BACK	6 (152)
FLOOR	0
OUTDOOR	
View	in. (mm)
TOP (Stackless)	36 (914)
WATER SIDE	18 (456)
OPPOSITE SIDE	6 (152)
BACK	6 (152)
FLOOR	0

See product manual for more information.

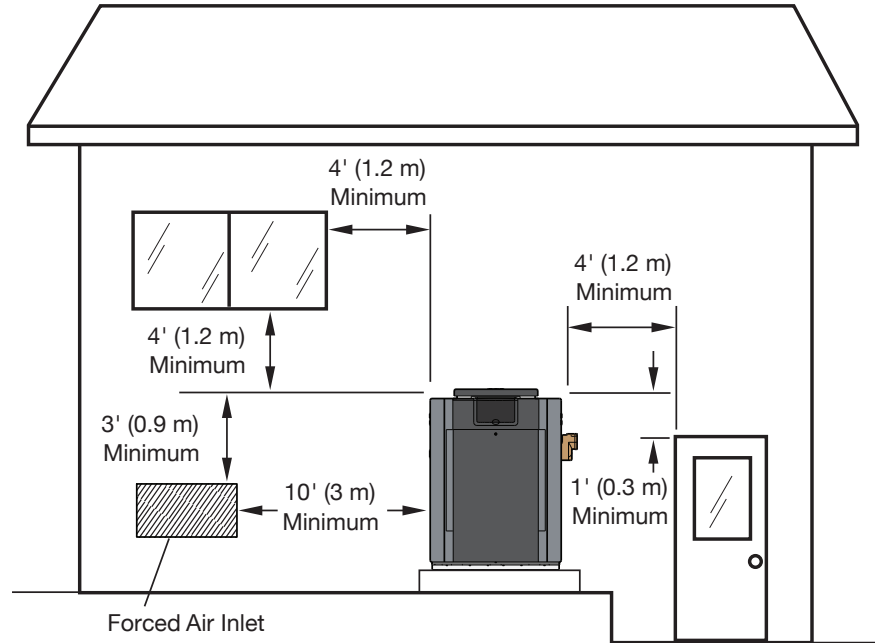


Minimum Clearances* – Outdoor

DO NOT install near sprinklers.

DO NOT install within 3 feet of a heat pump pool heater or air conditioning condensing unit.

*Check state and local codes before proceeding. The minimum clearances provided are defined by NFGC (National Fuel Gas Code).



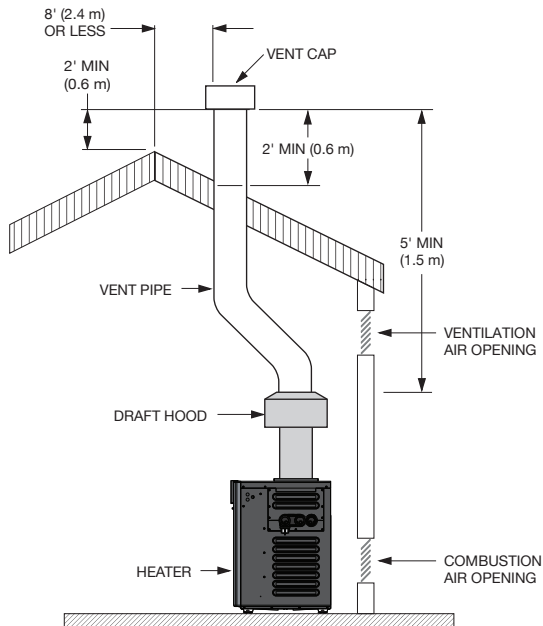
Minimum Clearances – Indoor

The heater must have **both** combustion air and ventilation air.

- Ventilation air opening 12”(305 mm) max from the ceiling
- Combustion air opening 12”(305 mm) max from the floor

All air from outdoors, each opening shall have a net free area as shown in table.

Model	Unrestricted Opening Sq. In. (m ²)	Typical Screened or Louvered opening Sq. In. (m ²)	Typical Screened and Louvered opening Sq. In. (m ²)
206/207	50 (0.03)	75 (0.05)	100 (0.06)
266/267	67 (0.04)	101 (0.06)	134 (0.09)
336/337	84 (0.05)	126 (0.08)	168 (0.11)
406/407	100 (0.06)	150 (0.1)	200 (0.13)



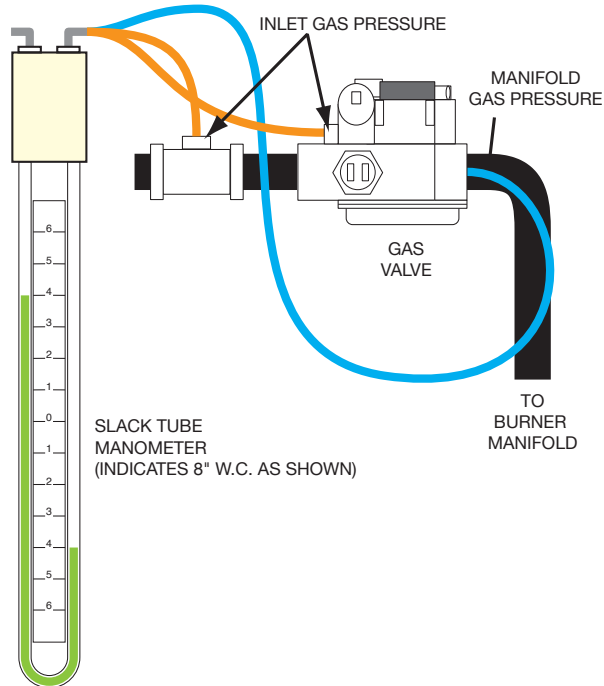
Gas Line Sizing

Maximum Equivalent Pipe Length									
Natural Gas 1000 BTU/FT³ 0.60 Specific Gravity @ 0.5 in. WC Pressure Drop									
Propane Gas 2500 BTU/FT³ 1.53 Specific Gravity @ 0.5 in. WC Pressure Drop									
Model	Input	3/4"		1"		1-1/4"		1-1/2"	
	(KBTU)	N	P	N	P	N	P	N	P
206/207	199.5	25	60	90	215	360			
266/267	266.0	15	35	50	125	210	480	445	
336/337	332.5	10	20	30	80	140	320	290	
406/407	399.0		15	20	55	95	225	215	480

EFFECTS OF LOW GAS PRESSURE

- Pulsating burner flame
- Delay Ignition/Hard light off
- Pilot won't light
- Exposure to condensation
- Emissions not at compliance levels
- Damage to Low NO_x burners

Gas Pressure Test



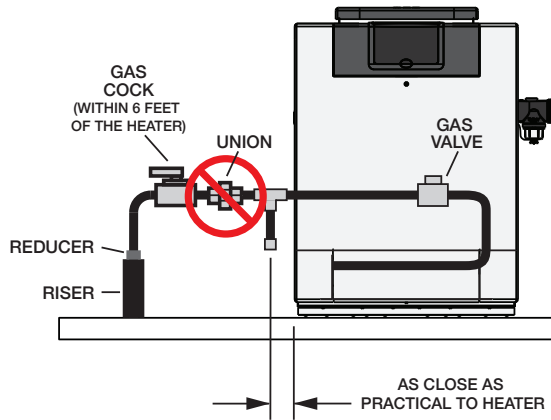
Gas	Unit Type	Supply Pressure		Manifold Pressure
		Min.	Max.	
Nat	ATM	6"	10.5"	4.0"
	Low NO _x	5"	10.5"	3.1"
Pro	ATM	12"	13"	10.5"

- Supply pressures given are under load (dynamic)
- 1 PSI = 27.7" Water Column
- Propane requires an external "pounds to inches regulator"

Gas Line Sediment Trap

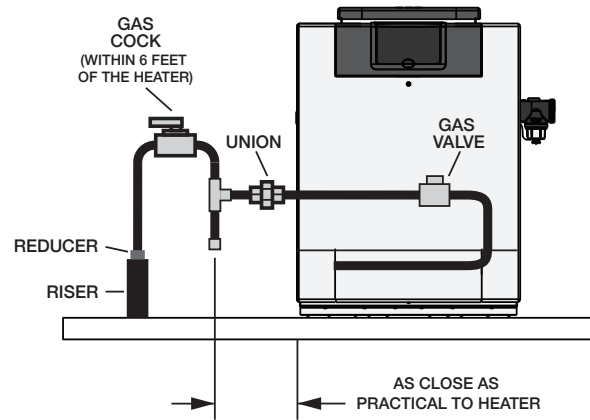
Sediment Trap should be located as close to the inlet of the appliance as practical.

INCORRECT



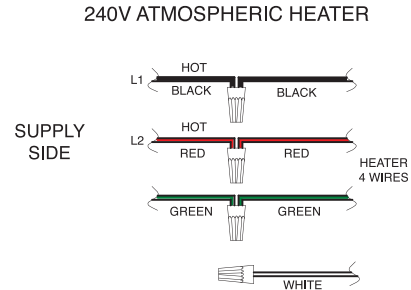
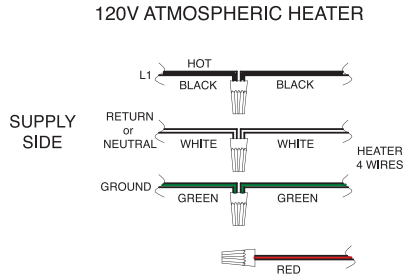
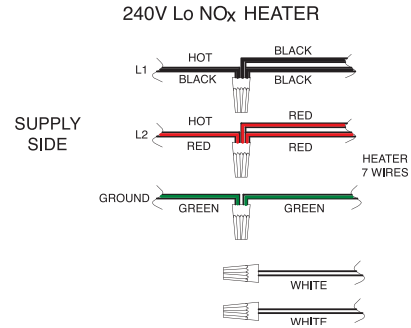
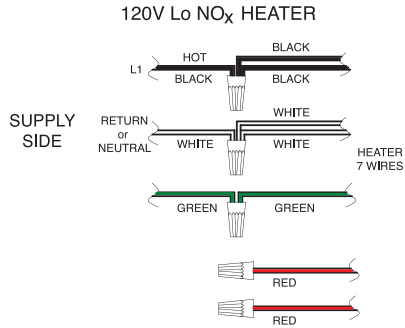
CORRECT

PROVIDE CHANGE OF DIRECTION IN GAS FLOW



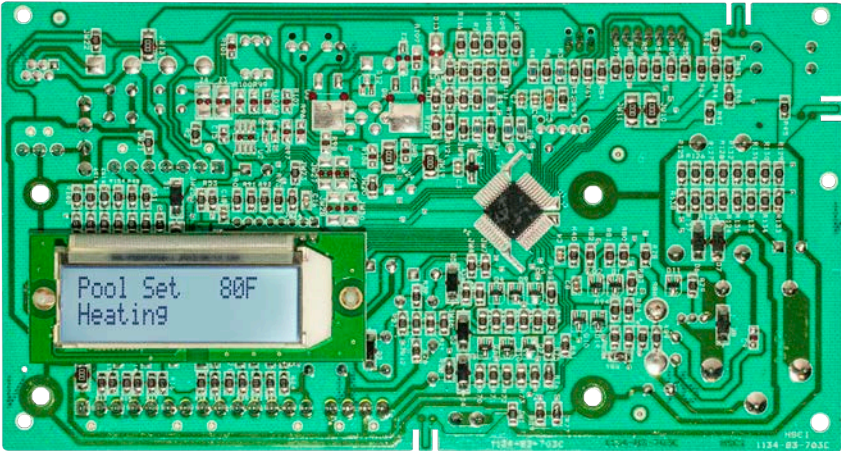
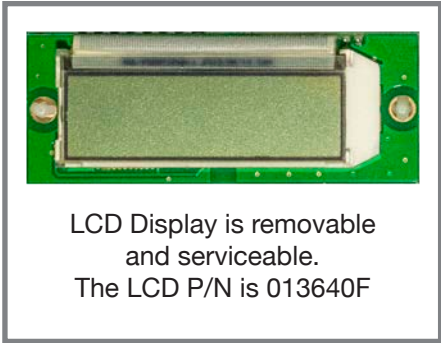
Check state and local codes before proceeding. Some states do not recognize the NFGC.

Power Connections



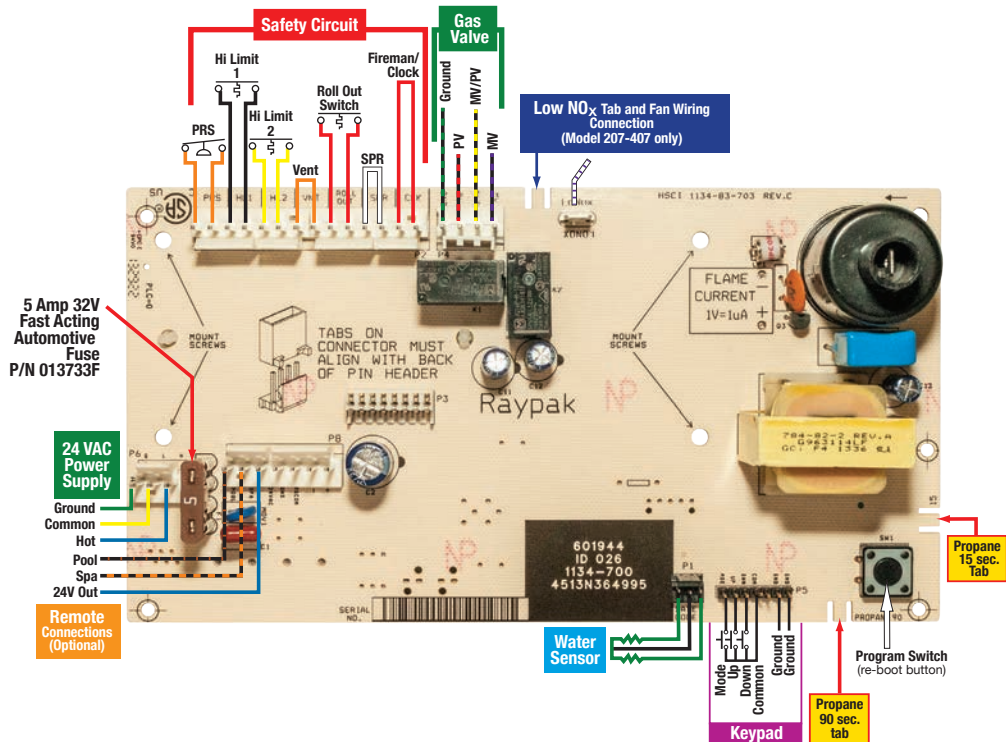
Note: Heater will not work properly if wired to a 208VAC power source.

Circuit Board



Printed circuit board. Fully updated and backwards compatible to all digital heaters manufactured since 2004.

Circuit Board – Ignition and Temperature Control

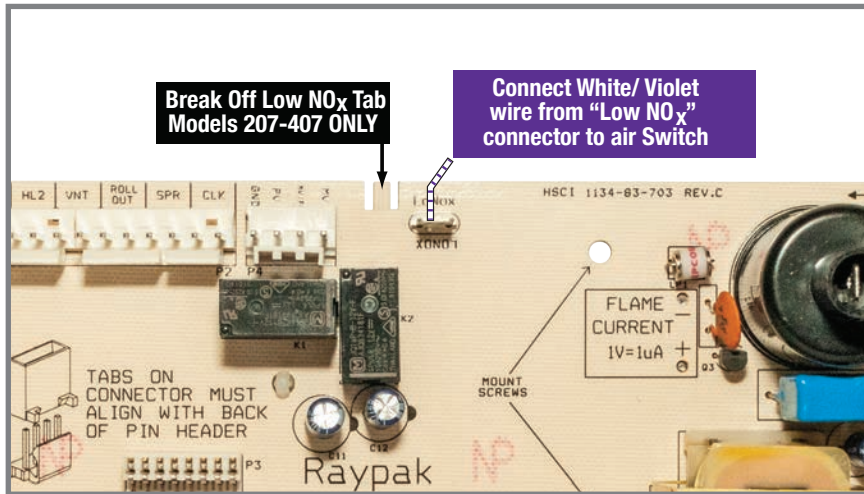


Low NO_x PC Board - Tab Configuration

1a

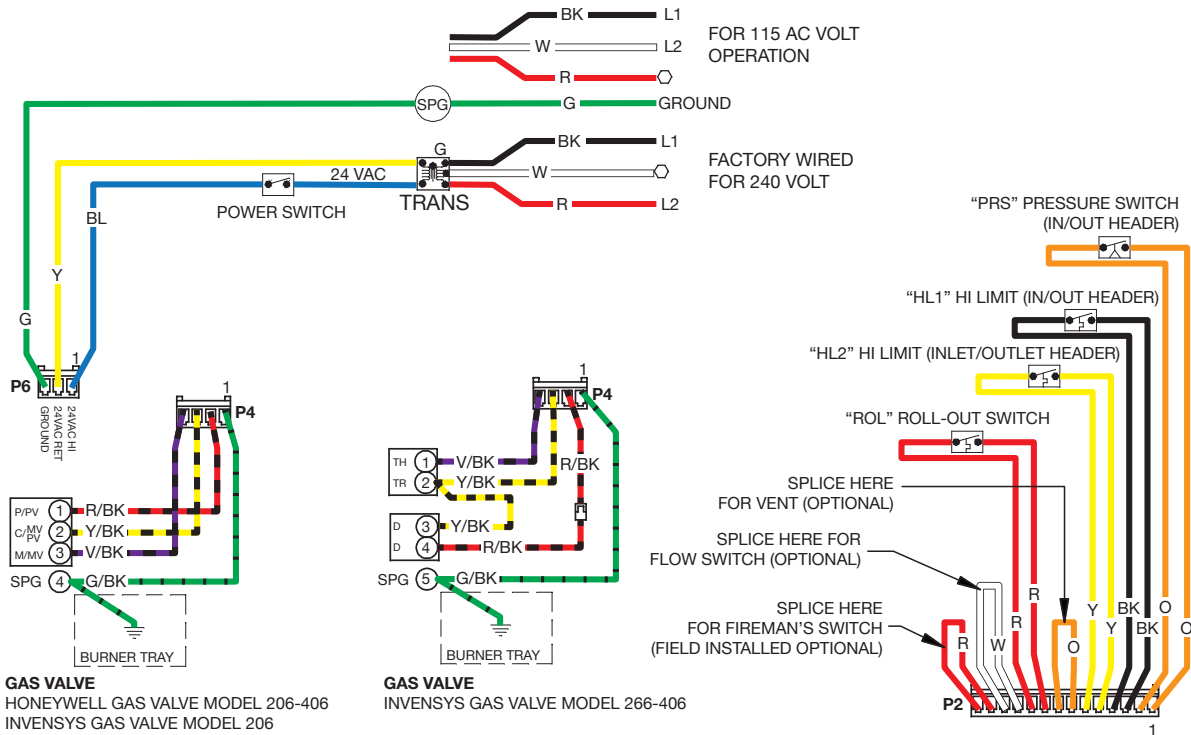
Spa Set	104F
LoNoX Tab	Fault

NOTE: If TAB is NOT broken and the board detects power at Low NO_x connector, Low NO_x Tab Fault is displayed and the heater will not operate.

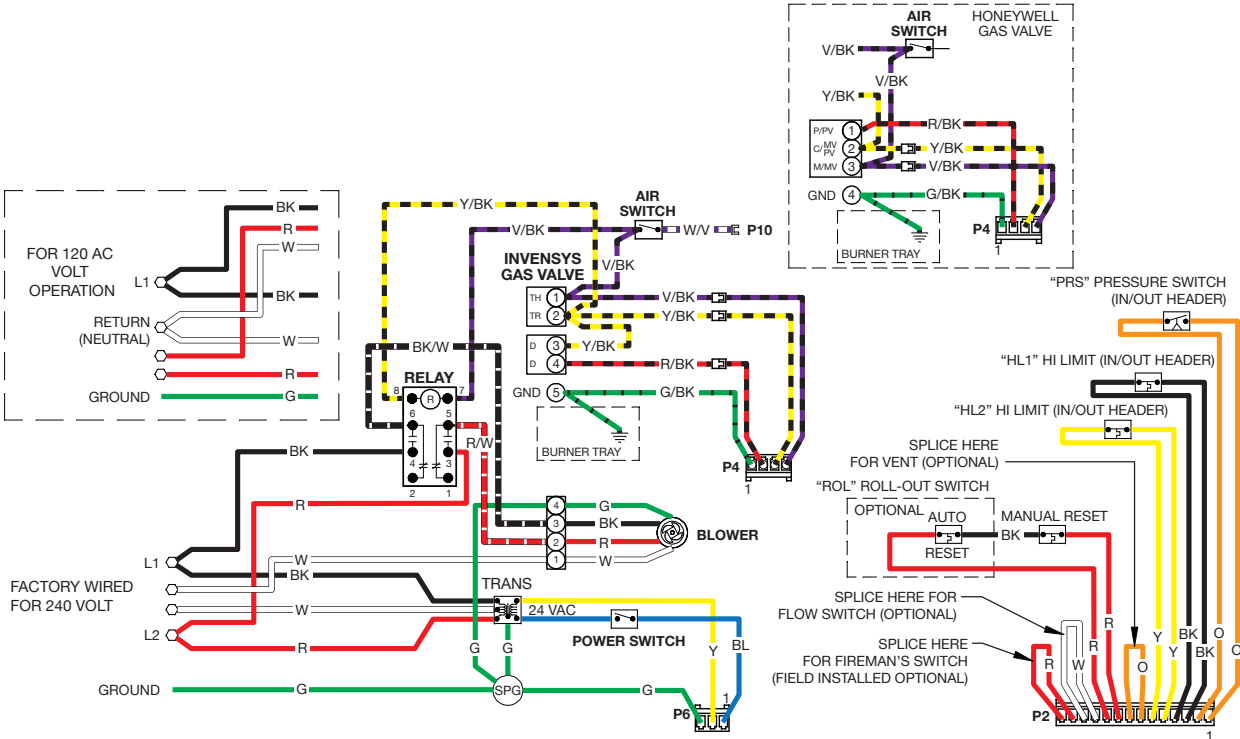


Break Low NO_x TAB for model 207-407 only. Do not break tab for atmospheric models, 206 - 406.

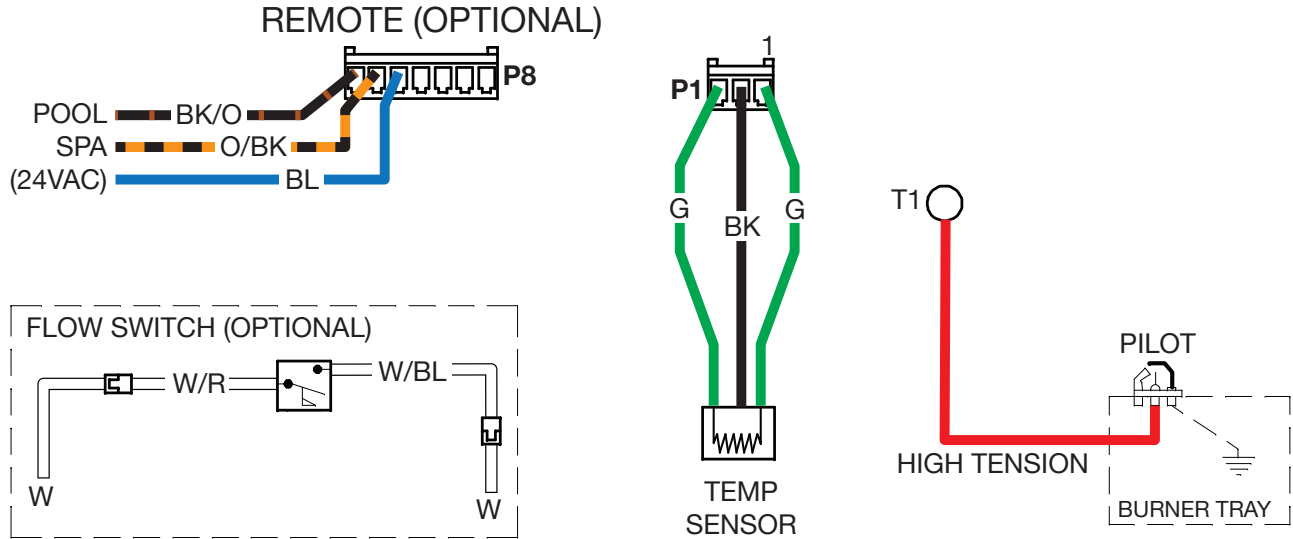
Wiring Diagram – Atmospheric



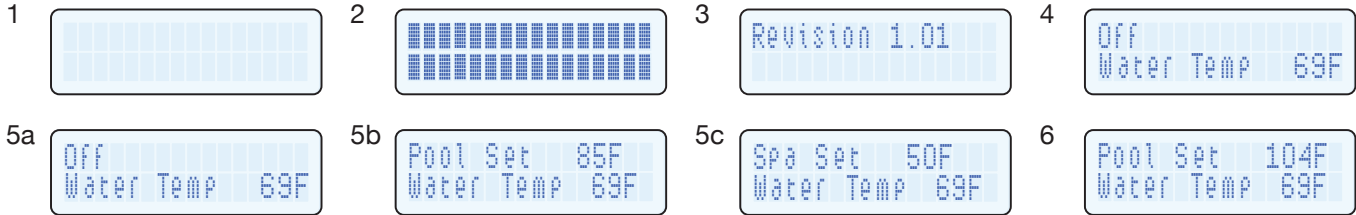
Wiring Diagram – Low NO_x



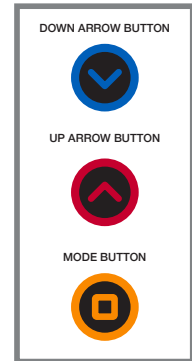
Wiring Diagram – Common Wiring



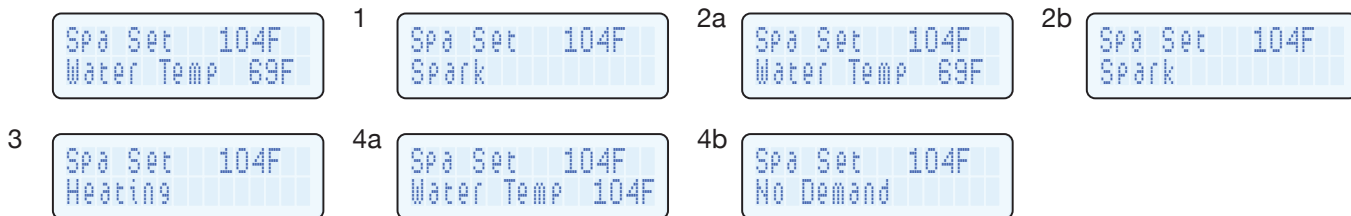
Start-Up Operating Displays



1. Backlit L.C.D. Display indicates power to PC Board (Microcontroller)
2. All Digits display 1 Second,
3. Software Revision Displays 1.5 Seconds
4. Normal Display Indicates Mode of Operation and Inlet Water Temperature from Pool or Spa
5. Press MODE button to Select OFF, SPA or POOL
6. Press Up and DOWN to adjust Temp Set between 50°F (10°C) minimum and 104°F (40°C) maximum



Operating Displays



1. **Spark** confirms Call for Heat (CFH) and all Safeties CLOSED. Power applied to Ignition Controller which produces 3 Pulses of Spark and PV (Pilot Voltage).
2. Operating Status (2b) & Water Temp (2a) alternate every two seconds.
3. Heater continues to Spark until Pilot lights, Flame Sensing occurs and voltage is supplied to main valve. Heater fires... After 1.5 seconds, spark STOPS. If flame is present after 8 more seconds, steady **Heating** begins.
4. When Pool/Spa SET temperature is satisfied **No Demand** will display.

Sequence of Operations

SUPPLY (Power to Heater)

1. 120/240 VAC from circuit breaker/time clock to transformer.
2. 24 VAC out of transformer, toggle switch ON.
3. 24 VAC to PC board, fuse, interface controller.
4. LCD display ON.

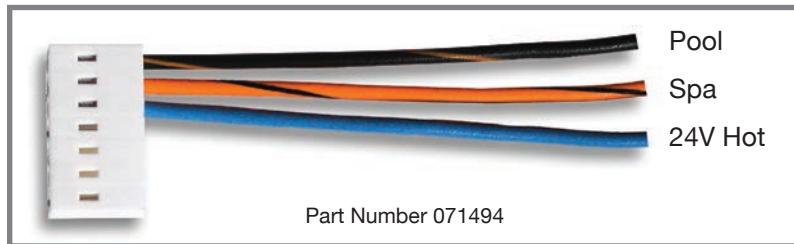
APPLY 24 VAC to Ignition/Gas Control

1. Call for Heat... Pool/Spa selected, TEMP set above water temp.
2. ALL SAFETIES CLOSED (Pressure Switch , High Limit Switch 1, High Limit Switch 2, Rollout Sensor).
3. Control board initiates spark sequence. “Spark” displayed.

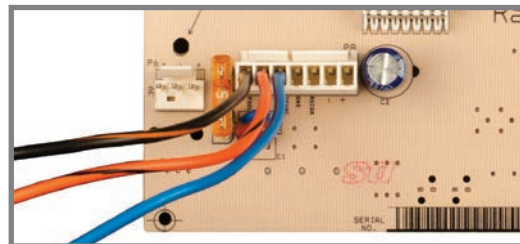
REPLY (Spark and 24 VAC to Gas Valve)

1. Control Board produces SPARK and PILOT VOLTAGE.
2. Pilot Valve energized, Gas supplied to PILOT, Pilot LIGHTS.
3. FLAME SENSING (Rectification) OCCURS.
4. Control Board supplies voltage to Main Gas Valve (and Low-NO_x Fan Relay, if applicable). Valve energized. Heater fires. Spark stops after 1.5 seconds.
5. “Heating” Displayed with steady Heating after 8 more seconds of Flame Sensing.

Remote Wiring Connections and Setup



7-Pin Remote Wire Harness



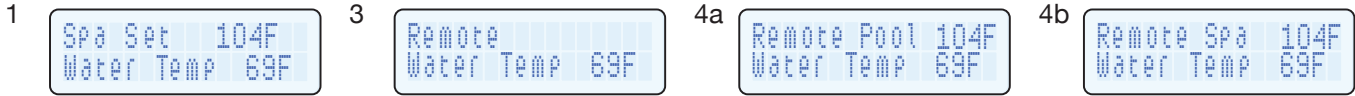
Wire Harness Connection

A remote may be wired to provide an “On-Off” switching function (two wire) or as a three-way “Pool-Off-Spa” selector switch (three wire).

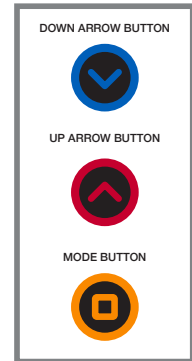
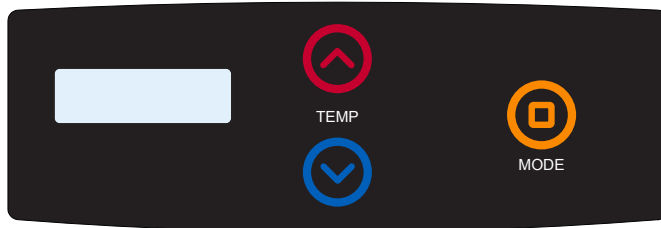
Modern automation systems use a two-wire configuration and can operate the heater in either Pool or Spa mode (See wiring, page 16). Water temp will not exceed the setting on the heater, regardless of the automation set temp.

To access the full range of temp settings with the remote, the heater should be set (at the control pad) to the maximum safe temperature.

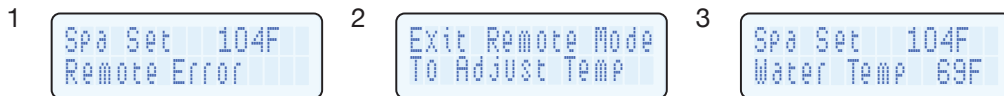
Remote Operation



1. Pre-set Pool/Spa Set temperature (Set at 104°F if Remote has independent thermostat).
2. Turn **Power OFF** to heater, wire **REMOTE** to 7-pin/3-wire pigtail, turn **Power ON**.
3. Set heater mode to **OFF** on touch pad. Press UP and DOWN buttons simultaneously for 3 seconds until **REMOTE** displays on LCD. (This will **ENABLE** remote operation and **DISABLE** the touchpad.)
4. **Remote Pool** or **Remote Spa** Displays when remote is activated.

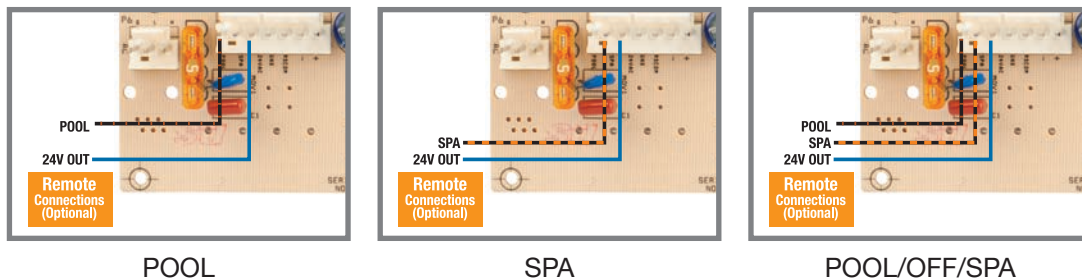


Remote Error Displays

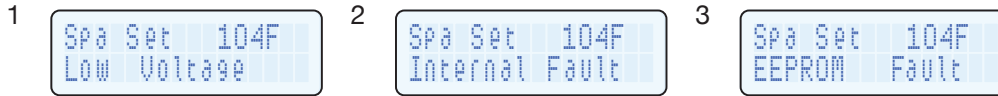


1. **Remote Error** - Remote is wired improperly. Orange/black (Spa) and black/orange (Pool) are connected together.
2. Remote operation has been initiated and touchpad is disabled
3. To Adjust Pool/Spa set temperature exit Remote operation. Press UP and DOWN buttons for 3 seconds until normal display appears.

Correct ways to connect remote wiring



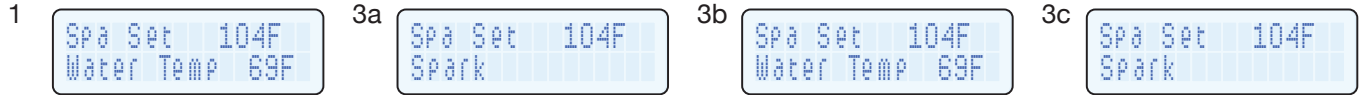
Microcontroller – Self-Diagnostics



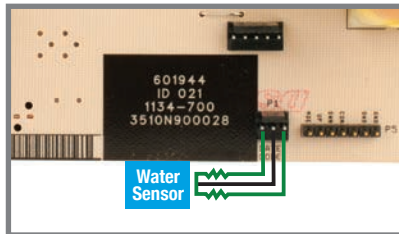
Can Be Displayed in Pool, Spa, Remote & EOL Modes

1. **Low Voltage** - Self Test indicates power supply from transformer is below 20 VAC. 24-28 VAC required for reliable operation! Verify correct 120/240 VAC power supply to heater. **208VAC IS NOT ACCEPTABLE.**
2. **Internal Fault** - Self Test of Internal Communication and Processor Functions - Turn Heater off and on, replace the control if the fault doesn't clear.
3. **EEPROM Fault** - Controller Memory Error. Reset Pool Set and Spa Set temperatures. Turn heater off and on. Replace control if fault re-occurs.

Temperature Sensor



1. Heat Demand is when water temperature is 1°F (0.5°C) or more below Pool/Spa SET Temperature
2. Temperature display accurate within 0.5°F (0.3°C)
3. **Sensor Failure**
 Temperature readings more than 2°F (1°C) different from each sensor see (3a)
 Sensor Open (cut wire/bad connection) see (3b)
 Sensor Short (bare wire touching cabinet) see (3c)



Sensor Connection



Part Number 009577F

100,000 OHM Dual Thermistor

Temperature Sensor – Lockout



1. **Low-Temp Lockout** - Inlet Water Temperature below 36°F (2°C). Heater will not operate (Prolonged operation with inlet temperatures below 50°F (10°C) will create condensation that will damage the heater).
2. For cold weather operation, consider maintaining a preset temperature of 50°F to 70°F (10°C - 21°C), or the lowest point at which condensation does not occur. Set temperature can then be raised to the desired swim temp.

For convenience, a remote switch may be connected to allow temperature setting with a three-way switch located inside house. (See remote operation, page 21).

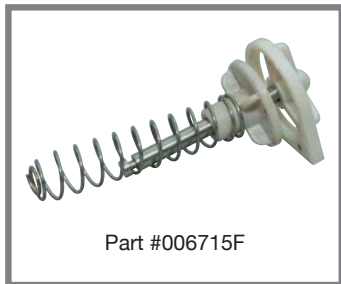
Safety Circuit



1. WATER PRESSURE SWITCH - verify adequate water flow and pressure (CLEAN POOL FILTER / STRAINER BASKET)
2. HIGH LIMIT SWITCHES 1 and 2 Fault - Verify adequate water flow. Adjust (close) external bypass. Check Unitherm Governor and internal bypass. Inspect for scale, restricted flow.
3. ROLLOUT SWITCH - verify gas pressure, combustion air, blocked heat exchanger, proper vent size/connections, high wind conditions.

Safety Circuit – Components

Part numbers below apply to polymer header models. For part numbers applicable to specific models, refer to the parts list in your Instructions and Operation manual.



Part #006715F

Bypass Assembly



Part #005899F

Atmospheric Rollout Switch



Part #006035F

Low NO_x Rollout Switch



Part #006725F

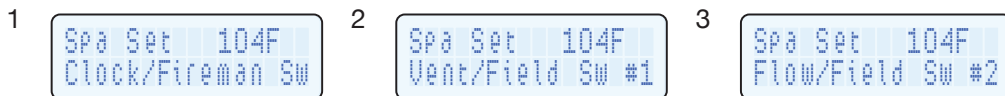
Limit Switch



Part #006719F

Unitherm Governor

Safety Circuit



1. Fireman's Switch (Time Clock) wired to CLK (red) loop on 14 pin connector, P2, is open. Connection is used in order to turn heater OFF 10-20 minutes prior to turning Pump OFF. Cool-down cycle.
2. Vent Switch (Sail Switch, Air Pressure Switch) wired to VNT (orange) loop on 14 pin connector, P2, is open Indicates Draft Inducer/Power Vent is Off or reduced Vent Pressure.
3. Flow Switch (ASME Code Kit) wired to SPR (WHITE) loop on 14 pin Connector, P2, is open Indicates Pump OFF or restricted flow to heater.

Ignition Sequence – Natural Gas

1a

```
Spa Set 104F
Ignition Failure
```

1b

```
Spa Set 104F
No Pilot Sensed
```

(1a & 1b Displays alternate every two seconds)

1. Ignition Failure – NATURAL GAS. No pilot flame detected within first 90 seconds. natural gas heaters continue to spark indefinitely – or until pilot lights / flame sensing occurs. Probable cause: no gas to heater, gas valve off, obstructed pilot, bad gas valve, flame sensing fail.

2a

```
Spa Set 104F
Main Ign Failure
```

2b

```
Spa Set 104F
No Pilot Sensed
```

(2a & 2b Display alternate every two seconds)

2. Main Ignition Failure – NATURAL GAS. Pilot Initially lit but flame signal lost within 8 second trial ignition (after Main Voltage). Natural gas heaters will re-start spark sequence. Probable cause: weak/distorted pilot flame, windy conditions.

3a

```
Spa Set 104F
Main Ign Failure
```

3b

```
Spa Set 104F
Ign 6min Delay
```

(3a & 3b Display alternate every two seconds)

3. Ignition 6min Lockout – NATURAL GAS. Flame signal lost within 8 second main trial for ignition 4 times in one heat demand. Probable cause: extreme wind conditions.

Ignition Sequence – Propane

1a

Spa Set 104F
Ignition Lockout

1b

Spa Set 104F
No Pilot Sensed

(1a & 1b Displays alternate every two seconds)

1. Ignition Lockout – PROPANE. No pilot flame within first 15/90 seconds (which Tab is broken). The control will not attempt another ignition trial until power is cycled (24V Rocker Switch). Probable cause: empty propane tank, gas valve off, obstructed pilot, flame sensing fail.

2a

Spa Set 104F
Ignition Lockout

2b

Spa Set 104F
Main Ign Failure

(2a & 2b Display alternate every two seconds)

2. Ignition Lockout – PROPANE. Main ignition failure. Pilot initially lit but flame signal lost within 8 second trial ignition (after Main Voltage). Propane heaters will not re-start spark sequence. Probable cause: Weak/distorted pilot flame, windy conditions.
3. If flame is lost during steady heating (main valve has been powered for more than 8 seconds), main valve is shut off and pilot lighting process begins again. Natural gas or propane (15 OR 90 TAB broken).

Temperature Sensor – Lockout

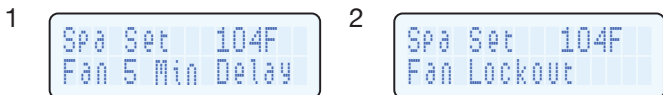


1. **Flame w/o CFH** - Pilot flame detected with no Call for Heat. Control Remains locked out until flame is not present. Gas valve (pilot) may be stuck open.
2. **PV/MV Output Fault** -
 - Cause A** - Power detected to Pilot Valve and/or Main Valve when not commanded.
 - Cause B** - NO Power detected to Pilot Valve and/or Main Valve with commanded.
 - * All outputs shut off for one hour “soft” lockout.
 - * If no power is detected after one hour, normal operation resumes.

Probable cause:

1. 24Volt power wired directly to gas valve.
2. Pilot valve or main valve relay (circuit board) failed open or closed. Replace PC board.

Low NO_x PC Board – Configuration



1. Low NO_x Air Switch not closed within 20 seconds of supplying main voltage. Control provides 5 minute soft “lock out”, then re-starts Pilot Ignition.
2. If three (3) Lockouts occur in one heat demand, control goes into “Hard Lockout” and power must be removed and re-applied to reset.

Possible Cause:

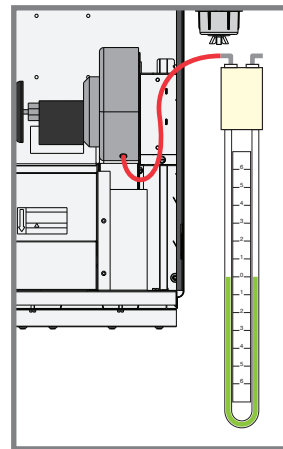
- Air Switch Fail / Disconnected Tube
- Fan Motor Fail / Blocked Air Intake vent
- Fan Relay Fail / Incorrect Power Supply to Relay/Fan

Note: Fan will not run on correct speed if wired 208VAC

	207	267	337	407
Activation Pressure W.C.	-1.50±.08	-1.05±.06	-0.75±.08	-0.25±.05

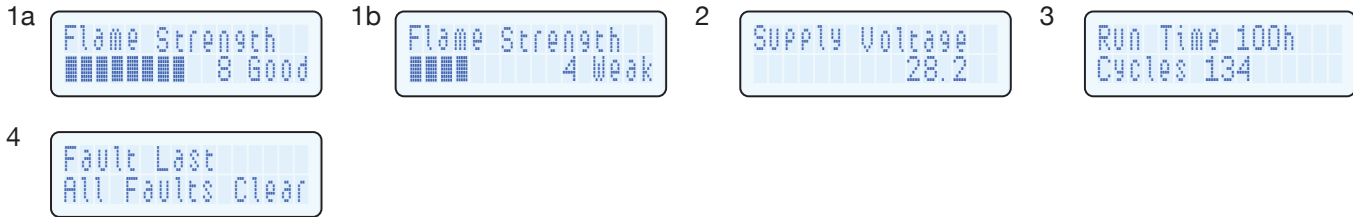
Note: Pressure is negative, not positive.

Note: See page 51 for air pressure switch information.



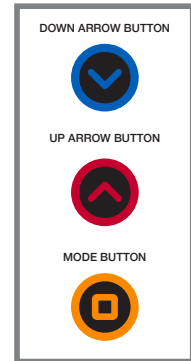
How to read pressure on Low NO_x Fan.

Service Displays

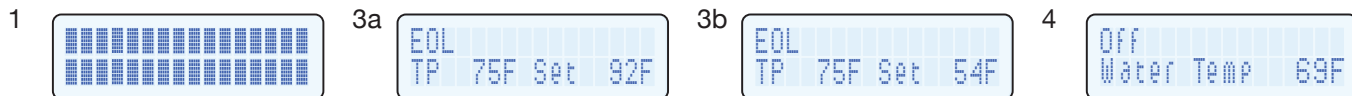


Service Displays provide critical performance data on the operation of the heater. This information can be viewed from Off, Pool, Spa and Remote Modes by holding the UP and MODE buttons simultaneously until display changes (about 3 seconds).

1. Flame (Pilot Signal) Strength. 5 Bars and above GOOD(1a). 4 Bars and below WEAK(1b). Check Gas Pressure, Pilot Flame, loose/disconnected/corroded ground wire connections.
2. Supply Voltage from transformer. Ideal range 24-29 VAC – verify correct power supply to heater. **208VAC IS NOT ACCEPTABLE.**
3. Run time is the cumulative time the main valve has been energized. Cycle count records the number of times the pilot valve has been cycled on and off.
4. The order of the faults starts with “Fault Last” which is the most recent fault. If not the most recent fault, numerical order (2–10) of fault is displayed with the higher digits being older faults. The second line of the display shows the fault message.
5. To exit Service Mode and return to previous display press MODE button or wait 15 seconds.

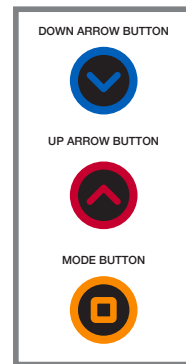


Service Display – EOL



“End-Of-Line” is a test conducted by Raypak before the heater is shipped. We connect water, gas and power to every heater to ensure they are firing and functional.

1. To initiate the EOL Test press and hold the MODE button at power-up. This Initiates a self-test of the Microprocessor Control and all digits display while button is pressed.
2. Release, all break-off tab configurations, all safeties and ignition functions are checked and displayed.
3. Set Temp of 92°F is displayed and will toggle to 54°F by pressing UP/ DOWN Button. Heater will fire if Heat Demand is present.
4. To exit EOL test and select OFF press MODE Button.



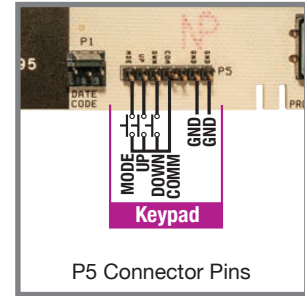
Touchpad Evaluation



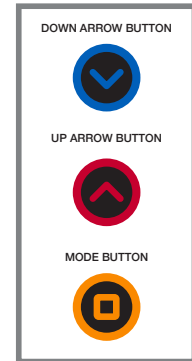
If EOL Self-Test was NOT Initiated by a service technician, display may indicate a STUCK MODE button.

1. Disconnect blue ribbon connector, P5 from touchpad. Cycle heater on and off (power switch).
2. To select MODE, jump COM to MDE, each touch alternates MODE, OFF - Spa - OFF - Pool. (See pins in box lower right). If the Set Temp goes to 50°F or 104°F when not prompted, this may indicate a stuck UP or DOWN button.
 - To Lower Temp Set, jump COM to DOWN. 1 touch = 1 degree
 - To Raise Temp Set, jump COM to UP. 1 touch = 1 degree

Note: Once MODE is selected and TEMP is SET heater will permanently retain programming information. If POWER is ON heater will operate even with Touchpad disconnected (unplugged).



P5 Connector Pins

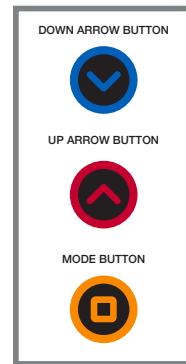


Service Display – Fault History



The ability to recall the MOST RECENT Service Displays. Can be read ANY TIME heater is operational in Off, Pool, Spa and Remote modes by holding the UP and MODE buttons simultaneously until the display changes (about 3 seconds). Press UP or DOWN buttons to scroll through displays until you see Faults Last.

1. First Line displays the actual fault that occurred, followed by numerical listing in the order they occurred: Last, 2,3,4,5,6,7,8,9,10 (oldest)
2. Second line displays the fault. Press UP button to scroll through operating history of heater.
3. Helps identify chronic cycling problems that may not be evident when servicing heater.
4. To EXIT Service Mode and return to previous display press MODE button or wait 15 seconds.
5. To CLEAR Fault History see page 38.

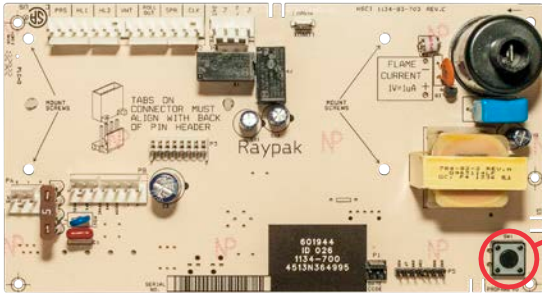


Helps to identify chronic/repeat problems that may not be evident while servicing heater.

Program Mode

Allows Customizing SOFTWARE Program

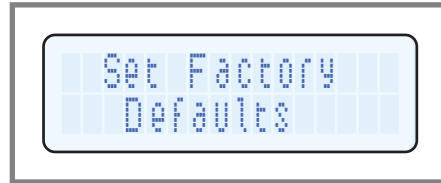
1. Set Factory Defaults
2. Clear Service Faults
3. Fahrenheit/Celsius
4. Maximum Spa Set
5. Maximum Pool Set



Program Button

To Initiate Programming Mode:

1. Select OFF mode of operation
2. Hold PROGRAM BUTTON for 5 seconds until “Set Factory Defaults” appears
3. Press MODE button to select items



Program Mode

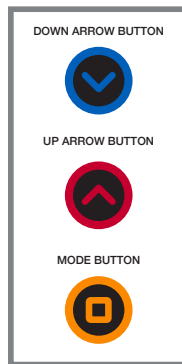
Select Program Item with MODE Button



1. To CLEAR all stored faults press both UP and DOWN buttons for 5 seconds until “Faults Cleared” appears on display.



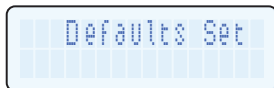
2. To Select Fahrenheit or Celsius temperature display push UP or DOWN button. (Fahrenheit is the default setting).
3. To Exit Program Mode press PROGRAM BUTTON or wait 15 seconds.



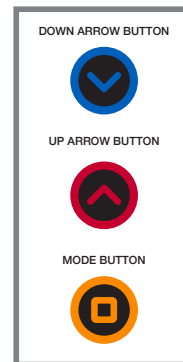
Program Mode – Max Temperatures



1. Displays MAXIMUM available Temp Set temperatures (Pool or Spa) and allows adjustment from 50°F (10°C) (lowest) up to 107°F (42°C) (highest) by pressing UP or DOWN Buttons.



2. Resets all adjustable settings back to original factory default. Press and hold UP and DOWN buttons simultaneously for 5 Seconds until Defaults Set is displayed.



In compliance with Consumer Products Safety Commission standards, do not set temperature above 104°F (40°C) in operating mode.

Control Lockout – Lock Box Backdoor



Lockbox override

Touch any button to display "PIN."

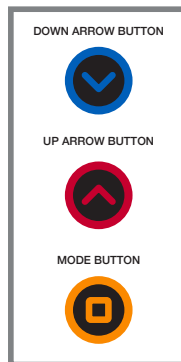
- Enter "101" to override Lock Box until power is reset.



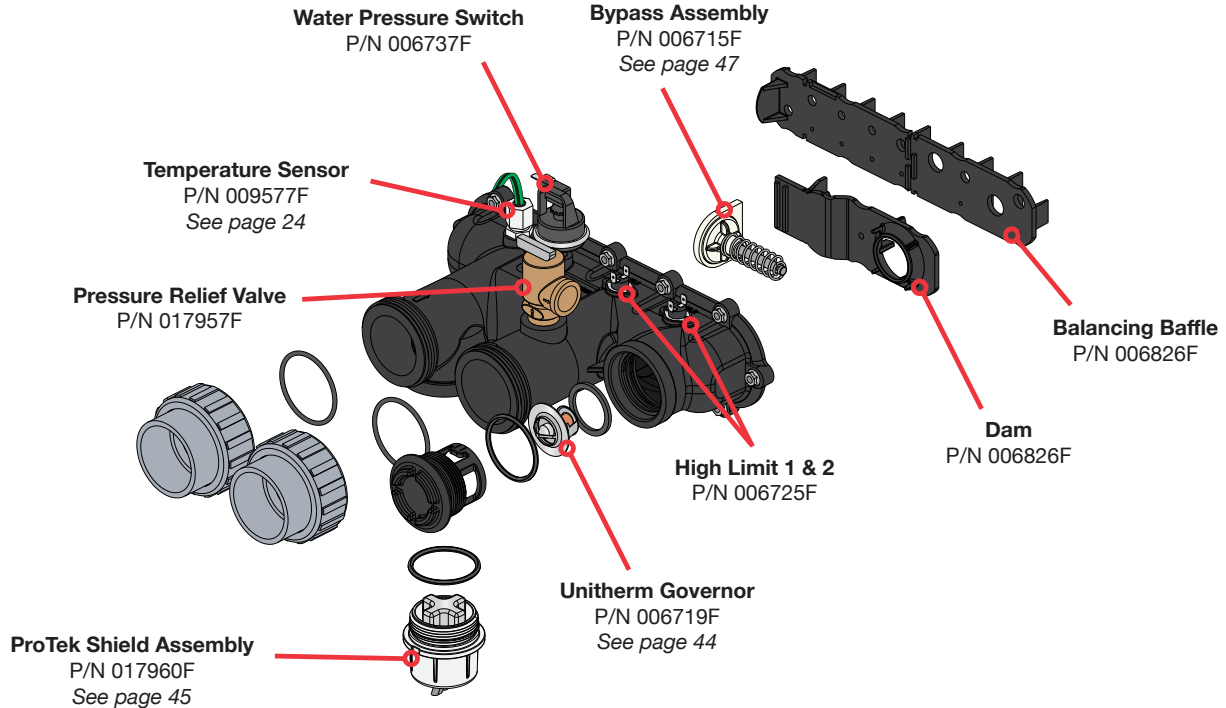
Set factory defaults

Initiate PROGRAM MODE, Set Factory Defaults.

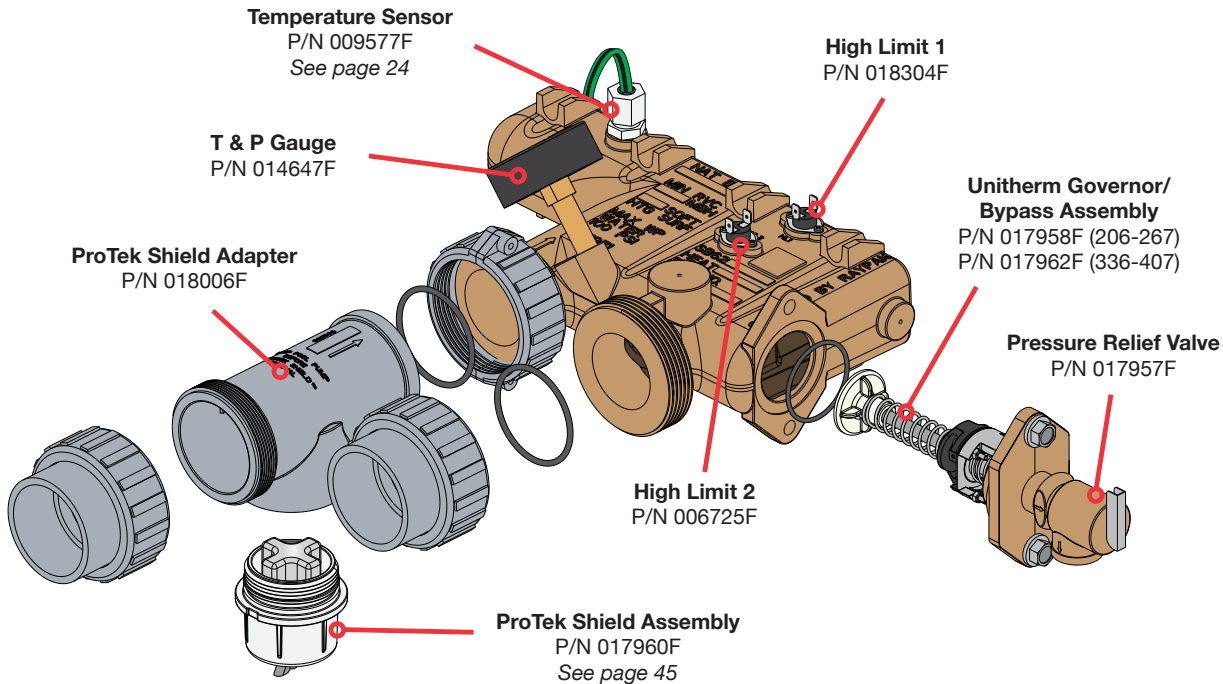
- Press UP and DOWN BUTTON, simultaneously, for 5 seconds until "Defaults Set" is displayed.



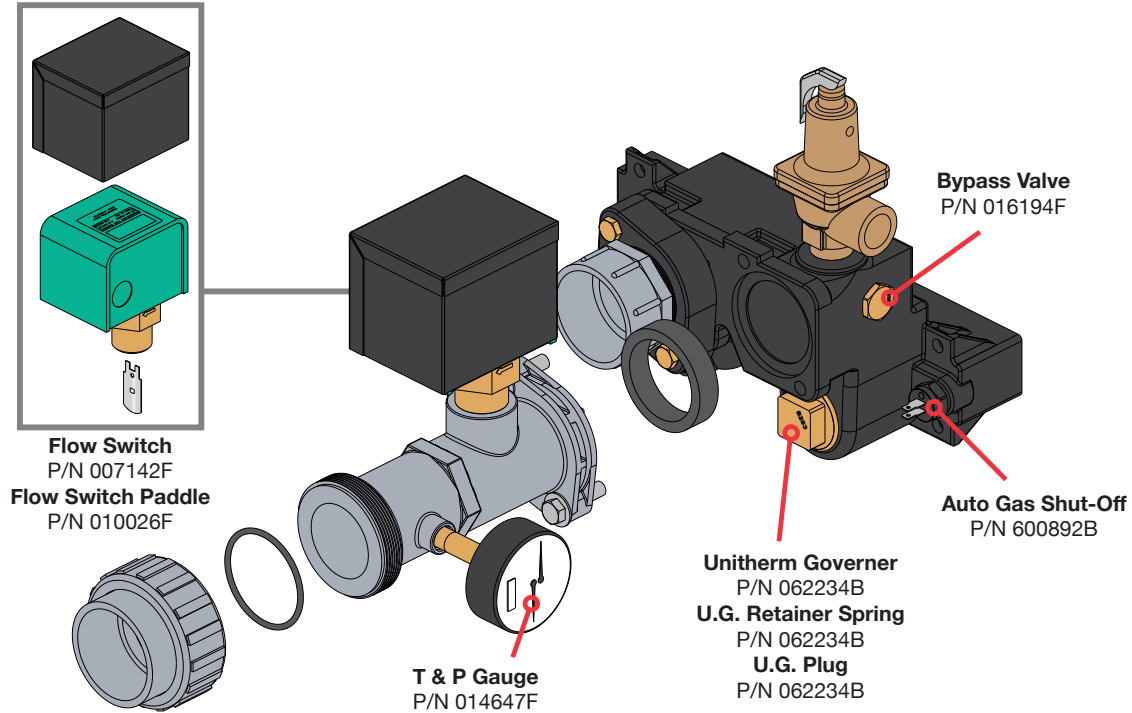
Inlet-Outlet Header – Polymer



Inlet-Outlet Header – Bronze



Inlet-Outlet Header – Cast Iron

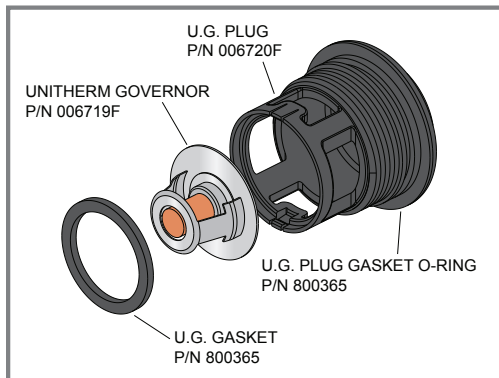


Unitherm Governor

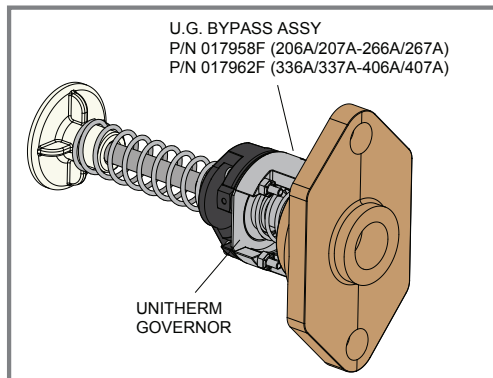
The UNITHERM GOVERNOR helps prevent condensation and scale. It is a thermostatic mixing valve used to control and regulate the water temperature in the heat exchanger.

Low temperatures in the exchanger can cause condensation.

This indicates that the heat exchanger is running cool. This may be caused by too much flow. Make sure the pump is not supplying more than 125GPM (100GPM max flow for ASME models). Adjust flow accordingly. Also check the U.G. to make sure it is working properly and not damaged from chemical corrosion or stuck.



Residential U.G. Bypass Assembly



ASME U.G. Bypass Assembly

Tech Tip: Test a U.G. by placing it in a bowl of hot water (water temp 105°F / 44.5°C or higher). Use 130°F / 54°C or higher for ASME version. If working properly, it will open as it warms up.

*Do NOT heat U.G. using open flame.

ProTek Shield Assembly

This heater is equipped with a ProTek Shield Assembly (located under the inlet connection on polymer headers) and in the ProTek Shield Adapter assembly shipped loose in the accessory carton for field installation on brass ASME headers.

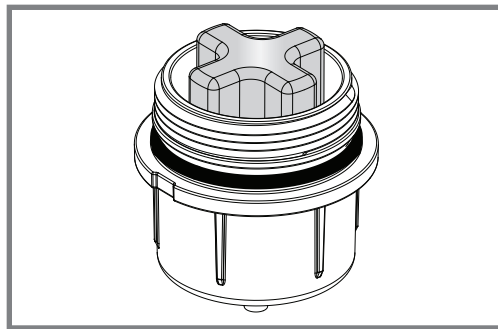
NOTE: ProTek Shield available on ASME models Manufactured in March 2020 or later.

This component provides protection to the heat exchanger against galvanic corrosion, when properly bonded to the heat exchanger. It should be replaced when the weight of the ProTek Shield is reduced to about 40% of the original weight (1.46 #).

NOTE: Make sure the O-ring is properly seated in the O-ring groove before installation.

CAUTION: STOP the pool pump before attempting to remove ProTek Shield Assy. Failure to do so may result in damage to ProTek Shield Assy, loss of pool water, or personal injury.

CAUTION: Do not use tools to remove (twist) the ProTek Shield Assy or the wing nut on the stud of the ProTek Shield Assy. Non-warrantable damage may occur.



Follow the steps below to replace the ProTek Shield Assembly:

1. Shut off the pool pump and bleed pressure from the system.
2. Close isolation valves to minimize pool/spa water loss.
3. Remove wing nut from bottom stud on ProTek Shield Assy.
4. Remove bonding wire ring terminal from stud.
5. Rotate ProTek Shield assembly clockwise (by hand) to un-screw it from the assembly.
6. Inspect/replace as necessary and reverse above procedure to reinstall. Hand tighten only! **Do not use tools.**

Flow Rates and Pressure Drops

Polymer Header (Residential Models)				
Plastic Internal Baffle (UG Fully Open)				
Flow GPM	Pressure Drop (Ft of Head)			
	206/207	266/267	336/337	406/407
20	4.0			
25	4.0	4.6		
30	4.0	5.2		
35	4.0	5.8	5.2	
40	4.6	5.8	5.2	5.2
50	4.6	6.3	6.9	6.9
60	4.6	6.9	6.9	6.9
70	4.6	8.1	9.2	9.2
80	4.6	9.2	9.8	9.8
90	6.9	10.4	10.4	10.4
100	8.1	11.0	12.1	12.1
110	10.4	11.5	13.3	13.3
120	11.0	12.7	17.9	17.9
125	11.5	13.8	20.2	20.2

Polymer Header (Residential Models)		
Pressure Drop (Ft of Head)		
Model	Min GPM	Max GPM
206/207	20	125
266/267	25	125
336/337	35	125
406/407	40	125

New Bronze Header (ASME Models)				
Manufactured after 12/2019 (UG Closed)				
Flow GPM	Pressure Drop (Ft of Head)			
	206/207	266/267	336/337	406/407
20	8.2			
30	9.5	9.5		
40	9.7	9.7	11.0	13.4
50	10.0	9.8	12.2	13.4
60	11.0	10.4	13.7	13.5
70	11.5	10.9	14.3	14.0
80	12.6	12.0	15.5	15.0
90	14.0	13.0	16.2	16.2
100	15.0	14.2	17.5	16.7

Bronze Header (ASME Models)		
Pressure Drop (Ft of Head)		
Model	Min GPM	Max GPM
206/207	20	100
266/267	25	100
336/337	35	100
406/407	40	100

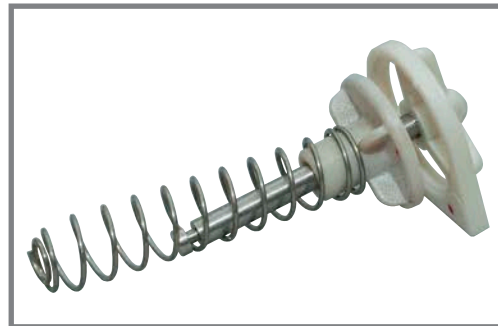
Old Bronze/Cast Iron Header (ASME Models)				
Manufactured before 12/2019 (UG Closed)				
Flow GPM	Pressure Drop (Ft of Head)			
	206/207	266/267	336/337	406/407
20	1.8			
30	2.2	8.0		
40	2.5	9.0	9.0	9.0
50	2.7	9.8	9.8	9.8
60	3.3	10.5	10.5	10.5
70	4.3	11.0	11.0	11.0
80	5.5	11.5	11.5	11.5
90	6.8	14.0	14.0	14.0
100	8.2	17.0	17.0	17.0

Internal Bypass Valve

The Automatic Bypass Assembly allows the heater to be connected to a wide variety of pumps.

With every job site having different flow rates, the Bypass automatically adjusts to provide the proper flow rate to the heater, up to 125GPM max (100GPM for ASME models). If the flow rate exceeds 125GPM condensation may form and erosion of the copper tubes may occur. It is then recommended that an external bypass be installed before the heater.

If the heater is making a knocking noise or cycling the high limits, it may be that the Bypass is missing, stuck open or damaged. It is also possible that the wrong Bypass spring is installed. See table for correct bypass spring assignment.



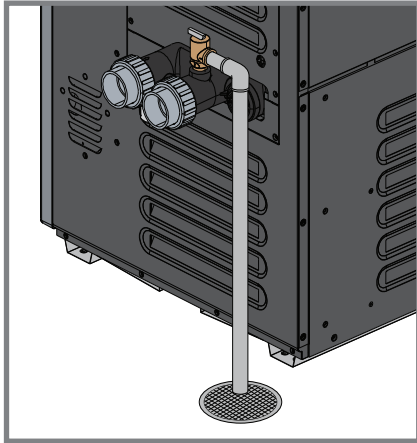
Tech Tip: You can feel the Bypass by placing your fingers down into the inlet of the header. You can feel the Bypass spring back as you push on it.

Note: This tip applies to the polymer bypass only.

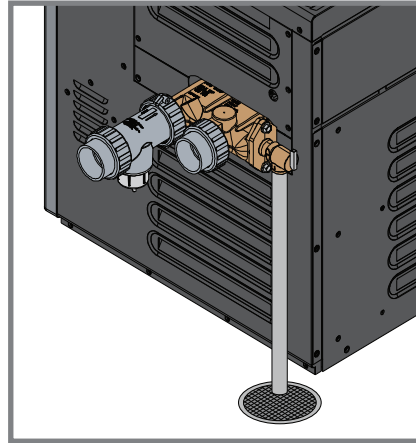
Header Style	Polymer		New Bronze*		Old Bronze/Cast Iron	
Model	206-267	336-407	206-267	336-407	206-267	336-407
Spring Color	Red	Silver	Yellow	Green	Silver	Black
Part Number	006718F	006718F	017958F	017962F	016196F	016196F

*Bypass valve for New Bronze headers is part of the ASME U.G. assembly (see page 44).

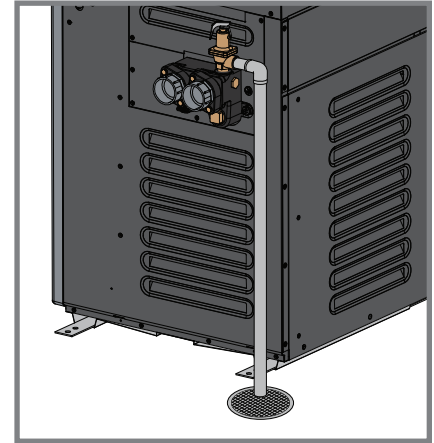
PRV Installation



Polymer Header
(Residential Models)



Bronze Header
(New ASME Models)



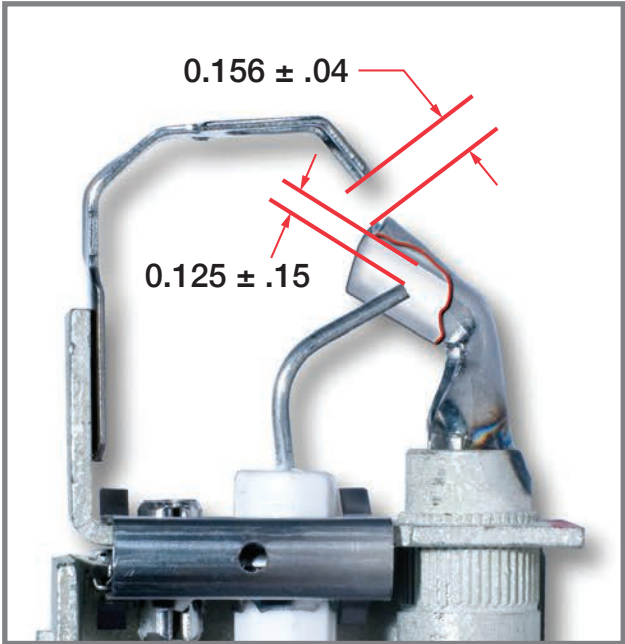
Bronze/Cast Iron Header
(Old ASME Models)

These illustrations depict the correct installation of a PRV (pressure-relief valve). All piping must be of suitable metal construction by applicable code.

Larger PRVs may require additional additional plumbing components for fit. Smaller PRV's can be mounted directly into the header.

Be sure to consult your local building code regarding distance of effluent from floor.

Pilot Assemblies – Spark Gap

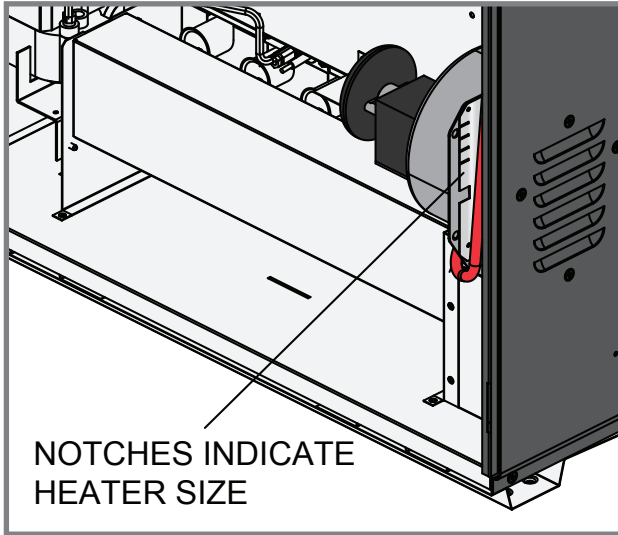


Atmospheric Pilot



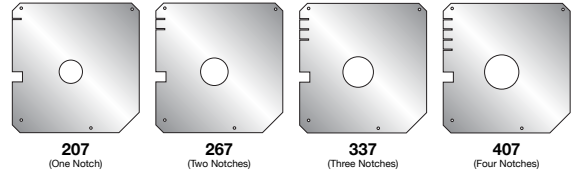
Low NO_x Pilot

Blower Location and Combustion Air Orifice Plate



Blower Location

Notches Indicate Heater Model Size:



If replacing blower, remove the combustion air orifice plate and remount it onto the new blower. Refer to illustrations to distinguish between different sizes of combustion air orifice plates if supplied with a new blower.

Note: There is a small 5/16 hex screw holding the blower onto the heater cabinet, behind the blower on the far right hand side at bottom. Removal of burner tray may be required to access.

Low NO_x Air Pressure Switch

There are 4 different air pressure switches for the Low NO_x heaters. None of the switches are interchangeable.

Each switch has a colored decal to help identify the switch. See chart below for proper switch choice.

Note: See page 32 for blower pressure measurement.



Tech Tip: The air pressure switch senses negative pressure (suction). Testing the air switch by blowing on it will not work. You need to apply light suction. Also to measure the air pressure while the unit is running, you must install a tee fitting in the air hose and connect it to your manometer. See page 32 every switch has a different activation pressure, see chart.

	207	267	337	407
Color	Blue	Red	Yellow	Green
Part Number	008062F	008135F	010354F	010355F
Activation Pressure W.C.	-1.50±.08	-1.05±.06	-0.75±.08	-0.25±.05



Digital Gas Heater

Tool Box Quick Reference Guide

Check our FAQ section on our website for answers to common problems. EMAIL us with technical questions, we pride ourselves on quick answers.

BEFORE YOU CALL

1. What is the incoming power 120 or 240VAC? 208 will not work properly.
2. What is the power at the circuit board?
3. What is the incoming gas pressure?
4. If the unit can fire, what is the pressure at the manifold (burner pressure)?
5. Is the gas line rigid or flex-line?

**THIS IS NOT A SUBSTITUTE FOR THE INSTALLATION AND OPERATION MANUAL.
THIS MANUAL IS INTENDED TO HELP THE SERVICE TECHNICIAN WITH BASIC TROUBLESHOOTING.**

Learn more at Raypak.com