# INSTALLATION & OPERATION MANUAL

# Gas-Fired Pool and Spa Heater

## Bronze ASME and Polymer Atmospheric Heat Exchanger Models: 206A, 266A, 336A and 406A

**NOTICE**

**SCAN WITH QR EQUIPPED SMART DEVICE FOR ONLINE MANUAL.**

**HLW**
BR models only

**⚠WARNING: If the information in the instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.**

**- Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.**

**- WHAT TO DO IF YOU SMELL GAS**

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

**- Installation and service must be performed by a qualified installer, service agency or the gas supplier.**

This manual should be maintained in legible condition and kept adjacent to the heater or in a safe place for future reference.

Effective:05-20-25
Replaces: 04-07-25
P/N: 241236 Rev. 48

# QUICK START GUIDE

## CLEARANCES

- ☐ Space required: See page **12**.
- ☐ Minimum and service clearances: See page **7** for clearances table. Note that local codes prevail.

## PIPING

- ☐ Pressure relief valve: See page **20** for recommended PRV orientation.
- ☐ Flow rates: See page **17** for flow rate values.

## GAS

- ☐ Distance to regulator (pipe lengths) and gas inlet sizes: See page **17**.
- ☐ Required pressure for Natural Gas: Min = 6" WC, Max = 10.5" WC
- ☐ Required pressure for Propane Gas: Min = 12" WC, Max = 13" WC
- ☐ Sediment trap is required for all installations. See page **15**.

## WATER CHEMISTRY

- ☐ Water chemistry requirements: See page **5**.

## POWER

- ☐ Supply voltage: See page **23** for acceptable input voltages.

## VENTING

- ☐ Materials: See page **11** and page **14**.
- ☐ D-2 Power Vent Kit: See page **14**.
- ☐ Indoor Stack: See page **11**.

## CONTROLS INTERFACE

- ☐ Wiring diagrams: See page **24** and **24**.
- ☐ User interface: See page **25** and **25**.
- ☐ Remote operation: See page **29**.

**Revision 48 reflects the following changes:**

IPL Item 4-B; updated all burner orifice kit numbers #50 thru #61. Removed 4-HM "**Option #2 Tube Bundle" kit 100-10002224 thru 100-10002227 (All sizes). For item 2-HM; added kit 018291F (all sizes) for a flow switch ready header manufactured from 07/2020.

# TABLE OF CONTENTS



**THIS INSTALLATION MANUAL MAY NOT BE THE LATEST REVISION PRINTED AT THE TIME OF PRODUCT SHIPMENT. VISIT THE RAYPAK WEBSITE TO VERIFY THE MANUAL DELIVERED WITH YOUR RAYPAK UNIT IS THE MOST UP-TO-DATE VERSION.**

# 1. WARNINGS

## Pay Attention to These Terms

| | |
|---|---|
| ⚠DANGER | Indicates the presence of immediate hazards which will cause severe personal injury, death or substantial property damage if ignored. |
| ⚠WARNING | Indicates the presence of hazards or unsafe practices which could cause severe personal injury, death or substantial property damage if ignored. |
| ⚠CAUTION | Indicates the presence of hazards or unsafe practices which could cause minor personal injury or product or property damage if ignored. |
| CAUTION | CAUTION used without the warning alert symbol indicates a potentially hazardous condition which could cause minor personal injury or product or property damage if ignored. |
| NOTE | Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards. |

**⚠DANGER: Failure to install the drafthood on indoor installation and properly vent the heater to the outdoors as outlined in the venting section of this manual can result in unsafe operation of the heater. To avoid the risk of fire, explosion, or asphyxiation from carbon monoxide, never operate this heater unless it is properly vented and has an adequate air supply for proper operation. Be sure to inspect the vent system for proper installation at initial start-up, and at least annually thereafter. Refer to the venting section of this manual for more information regarding vent system inspections.**

**⚠WARNING: To minimize the possibility of improper operation, serious personal injury, fire, or damage to the heater:**

- **Always keep the area around the heater free of combustible materials, gasoline, and other flammable liquids and vapors.**
- **Heater should never be covered or have any blockage to the flow of fresh air to the heater.**

**⚠WARNING: This unit contains refractory ceramic fiber (RCF) insulation in the combustion chamber. RCF, as manufactured, does not contain respirable crystalline silica. However, following sustained exposure to very high-temperatures [>2192°F (1200°C)], the RCF can transform into crystalline silica (cristabolite). The International Agency for Research on Cancer (IARC) has classified the inhalation of crystalline silica (cristabolite) as carcinogenic to humans.**

**When removing the burners or heat exchangers, take precautions to avoid creating airborne dust and avoid inhaling airborne fibers. When cleaning spills, use wet sweeping or High Efficiency Particulate Air (HEPA) filtered vacuum to minimize airborne dust. Use feasible engineering controls such as local exhaust ventilation or dust collecting systems to minimize airborne dust. Wear appropriate personal protective equipment including gloves, safety glasses with side shields, and appropriate NIOSH-certified respiratory protection, to avoid inhalation of airborne dust and airborne fiber particles.**

**⚠WARNING: Improper installation, adjustment, alteration, service, or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency, or the gas supplier.**

**⚠WARNING: Gasoline, as well as other flammable materials and liquids (adhesives, solvents, etc.), and the vapors they produce, are extremely dangerous. Do not handle, use, or store gasoline or other flammable or combustible materials in the vicinity of a heater.**

**⚠WARNING: Both natural gas and propane have an odorant added to aid in detecting a gas leak. Some people may not physically be able to smell or recognize this odorant. If you are unsure or unfamiliar with the smell of natural gas or propane, ask your local gas supplier. Other conditions, such as "odorant fade," which causes the odorant to diminish in intensity, can also hide, camouflage, or otherwise make detecting a gas leak by smell more difficult.**

**⚠WARNING: UL-recognized fuel gas detectors are recommended in all enclosed propane and natural gas applications wherein there is a potential for an explosive mixture of fuel gas to accumulate and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations, or customs.**

**⚠WARNING: Do not install within 3 feet (0.9 m) of a heat pump or an outdoor condensing unit. Strong air intake from this type of equipment can disturb the combustion process and cause damage or personal injury.**

**⚠WARNING: The heater shall not be located in an area where water sprinklers, or other devices, may cause water to spray through the cabinet louvers and into the heater. This could cause internal rusting or damage electrical components. Such damage is not covered under warranty.**

**⚠CAUTION: Elevated water temperature can be hazardous. The U.S. Consumer Product Safety Commission has these guidelines:**

1. **Spa water temperatures should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.**
2. **Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.**
3. **Pregnant Women Beware! Soaking in water over 102°F (39°C) can cause fetal damage during the first three months of pregnancy resulting in the birth of a brain-damaged or deformed child. Pregnant women should stick to the 100°F (38°C) maximum rule.**
4. **Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).**
5. **Persons with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should obtain a physician's advice before using pools or hot tubs.**
6. **Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, or anticoagulants, should not use spas or hot tubs.**

**⚠CAUTION: Propane gas is heavier than air and will settle on the ground. Since propane can accumulate in confined areas, extra care should be exercised when lighting propane heaters.**

**NOTE: It is recommended that the pump be run at least 5 minutes after the heater has been turned off. This helps in taking away residual heat from the heat exchanger, thus prevents the safety hi-limits from tripping due to residual heat after the heater is turned off.**

**WARNING: Risk of fire. It is recommended that CO monitor and fire alarm be utilized in rooms that contain gas fired appliances.**

# 2. WATER CHEMISTRY

**NOTE: Damage due to poor water chemistry is not a warrantable defect.**

Chemical imbalance can cause severe damage to your heater and associated equipment. Maintain your water chemistry according to **Table A**. If the mineral content and dissolved solids in the water become too high, scale forms inside the heat exchanger tubes, reducing heater efficiency and damaging the heater. If the pH drops below 7.2, this will cause corrosion of the heat exchanger and severely damage the heater. **Heat exchanger damage resulting from chemical imbalance is not covered by the warranty.**

For your health and the protection of your pool equipment, it is essential that your water be chemically balanced. The following levels must be used as a guide for balanced water.

**⚠CAUTION: Free chlorine must not exceed 5 ppm which can damage the heater and is not covered under warranty.**

- 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.
- Check valve should be installed between the heater outlet and a chlorinator or other chemical dosing device.
- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.

## Automatic Chlorinators and Chemical Feeders

All chemicals must be introduced and completely diluted into the pool or spa water before being circulated through the heater. Do not place sanitizing chemicals in the skimmer. High chemical concentrations will result when the pump is not running (e.g. overnight).

| Recommended Level(s) | Fiberglass Pools | Fiberglass Spas | Other Pool and Spa Types |
|---|---|---|---|
| Water Temperature | 68-88°F (20-31°C) | 89-104°F (31-40°C) | 68-104°F (20-40°C) |
| pH | 7.3-7.4 | 7.3-7.4 | 7.6-7.8 |
| Total Alkalinity (ppm) | 120-150 | 120-150 | 80-120 |
| Calcium Hardness (ppm) | 200-300 | 150-200 | 200-400 |
| Salt (ppm) | 4500 Maximum | 4500 Maximum | 4500 Maximum |
| Free Chlorine (ppm)* | 2-3 | 2-3 | 2-3 |
| Total Dissolved Solids (ppm) | 3000 Maximum** | 3000 Maximum** | 3000 Maximum** |

*Free Chlorine **MUST NOT EXCEED 5 ppm!**
**In saltwater chlorinated pools, the total TDS can be as high as 6000 ppm.

**Table A. Pool Water Chemistry**

Chlorinators must feed downstream of the heater and have an anti-siphoning device to prevent chemical backup into the heater when the pump is shut off.

See **"Plumbing Diagrams" on page 21**.

**NOTE: High chemical concentrates from feeders and chlorinators that are out of adjustment will cause rapid corrosion to the heat exchanger. Such damage is not covered under the warranty.**

# 3. BEFORE INSTALLATION

## Receiving Equipment

The manufacturer recommends that this manual be reviewed thoroughly before installing the pool/spa heater. If there are any questions that this manual does not answer, please contact the factory or your local representative.

On receipt of your equipment visually check for external damage to the carton. If the carton is damaged, a note should be made on the Bill of Lading when signing for the equipment. Remove the heater from the carton. If it is damaged, report the damage to the carrier immediately. Save the carton.

These items are shipped inside a box in the carton with the heater:

**Standard Unit (POLYMER HEADERS)**

1. “Pagoda” top
2. 2" CPVC union half with "O" rings (2)
3. Plastic pipe finish flange for gas line
4. Bonding lug with mounting screw (Digital) models only)

**ASME Unit (BRONZE HEADERS)**

1. “Pagoda” top
2. 2" CPVC union half with "O" rings (2)
3. Plastic pipe finish flange for gas line
4. Bonding lug with mounting screw (Digital models only)
5. Pressure Relief Valve (PRV)
6. Protek Shield™ Adapter with Protek Shield Assy, O-ring and wing nut

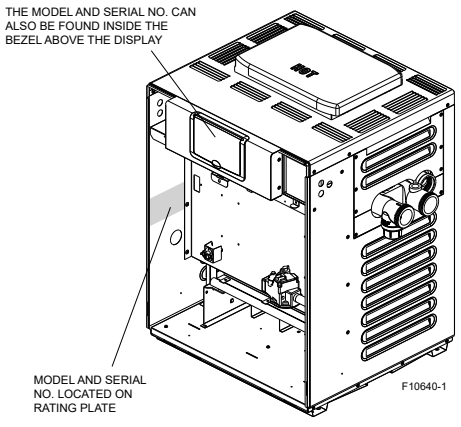
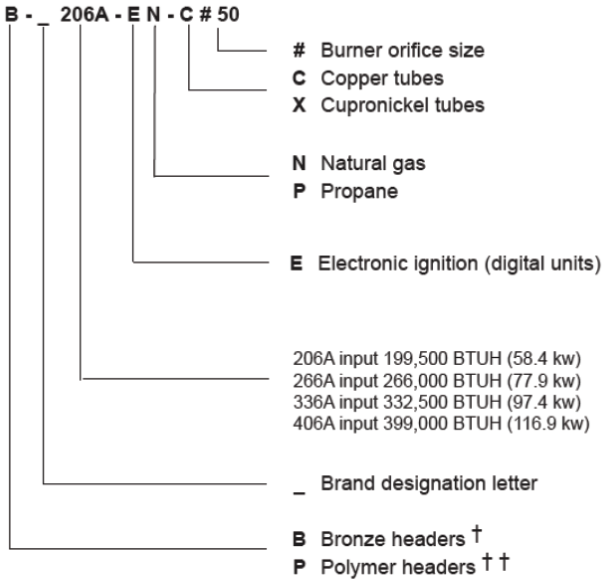



**Figure 1. Rating Plate Location**

Be sure that you receive the number of packages indicated on the Bill of Lading.

### Model Identification Number

The model number of a boiler can be found on the Sales Order and the boiler's rating plate. The example below identifies what the characters of the model number represent.




† For commercial installations, ASME-Certified.

† † Units with polymer headers do not meet building code requirements for commercial installations. Consult local code authorities before using any unit with polymer headers in a commercial environment.

When ordering parts, you must specify the model and serial numbers of the heater. See example below for location of serial number. When ordering under warranty conditions, you must also specify date of installation.


## Rating and Certifications

These heaters are design-certified and tested under the latest requirements of the ANSI Z21.56 / CSA 4.7 Standard for Gas-Fired Pool Heaters. All heaters can be used either indoor or outdoors when appropriate venting is installed.

The appropriate top designated for each type of use is required. If necessary, the top can be changed at a later date to change from outdoor to indoor or vice versa.

All Bronze header units have heat exchangers which are ASME-certified (BPV Section IV part HLW) and are registered with National Board.

## Elevation

Rated inputs are suitable for up to 2,000 ft (610 m) elevation. For elevations above 2,000 ft (610 m), reduce input 4% for each 1,000 ft (305 m) above sea level, as high elevation reduces combustion performance.

## Ambient Temperature Rating

### Heater Components

Electronic Ignition Heater* -32°F to 175°F (-35°C to 79°C)

*Requires 120 or 240VAC, 1 Ph, 60 Hz Power Supply

# 4. INSTALLATION

**⚠WARNING: This unit contains refractory ceramic fiber (RCF) insulation in the combustion chamber. RCF, as manufactured, does not contain respirable crystalline silica. However, following sustained exposure to very high-temperatures (>2192°F), the RCF can transform into crystalline silica (cristabolite). The International Agency for Research on Cancer (IARC) has classified the inhalation of crystalline silica (cristabolite) as carcinogenic to humans.**

**When removing the burners or heat exchangers, take precautions to avoid creating airborne dust and avoid inhaling airborne fibers. When cleaning spills, use wet sweeping or High Efficiency Particulate Air (HEPA) filtered vacuum to minimize airborne dust. Use feasible engineering controls such as local exhaust ventilation or dust collecting systems to minimize airborne dust. Wear appropriate personal protective equipment including gloves, safety glasses with side shields, and appropriate NIOSH-certified respiratory protection, to avoid inhalation of airborne dust and airborne fiber particles.**

**IMPORTANT NOTICE: These instructions are intended only for the use by qualified personnel, specifically trained and experienced in the installation of this type of heating equipment and related system components. Installation and service personnel may be required by some states to be licensed. If your state is such, be sure your contractor bears the appropriate license. Persons not qualified shall not attempt to fix the equipment nor attempt repairs according to these instructions.**

**⚠WARNING: Improper installation, adjustment, alteration, service or maintenance may damage the equipment, creating a hazard resulting in asphyxiation, explosion or fire. Such damage is not covered under warranty.**

**NOTE: The heater should not be located in an area where possible water leakage will result in damage to the area adjacent to the heater or to the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan, with adequate drainage, be installed under the heater. The pan must not restrict combustion air flow.**

**RECOMMENDATION: For regions with snow, Raypak recommends installing these units indoors.**

## Installation Codes

Installation must be in accordance with local codes, or, in the absence of local codes, with the latest edition of the National Fuel Gas Code, ANSI Z223.1/NFPA54 and National Electrical Code, ANSI/NFPA 70, and for Canada, the latest edition of CAN/CSA-B149 Installation Codes, and Canadian Electrical Code, CSA C22.1 Part 1 and Part 2.

## Clearances

### All Heaters

For indoor and outdoor clearances from combustible surfaces, see the chart below.

| Location | Indoor Installation |
|---|---|
| **Top *** | 30" (762 mm) Drafthood |
| **Front** | Alcove (Open) |
| **Vent** | 6" (152 mm) |
| **Floor **** | 0" |
| **Back** | 6" (152 mm) |
| **Right-Side** | 12" (305 mm) Water Side |
| **Left-Side** | 6" (152 mm) Opposite Water Side |

| Location | Outdoor Installation |
|---|---|
| **Top *** | Unobstructed (Outdoor Stack) |
| **Top ***** | 36" (914 mm) (Stackless Top) |
| **Floor** | 0" |
| **Back** | 6" (152 mm) |
| **Right-Side** | 12" (305 mm) Water Side |
| **Left-Side** | 6" (152 mm) Opposite Water Side |

* Clearance from top of vent terminal
** Do not install on carpeting
*** Clearance from top of heater

**Table B. Minimum Clearances from Combustible Surfaces**

When installed according to the listed minimum clearances from combustible construction, the pool heater can still be serviced without removing permanent construction around the heater.

However, for ease of servicing, we recommend a clearance of at least 24" (610 mm) in the front, and at least 18" (457 mm) on the water connection side. This will enable the heater to be serviced in its installed location, that is, without movement or removal of the heater.

| Description | Location | Distance in. (mm) |
|---|---|---|
| a. 3-1/2" (89 mm) thick masonry walls without ventilated air space | Back | 9 (229) |
| | Right | 9 (229) |
| | Left | 9 (229) |
| | Vent | 5 (127) |
| | Indoor Top | 39 (991) |
| | Outdoor Top | Unobstructed |
| b. 1/2" (13 mm)insulation board over 1" (25 mm) glass fiber or mineral wool batts | Back | 6 (152) |
| | Right | 6 (152) |
| | Left | 6 (152) |
| | Vent | 3 (76) |
| | Indoor Top | 30 (762) |
| | Outdoor Top | Unobstructed |
| c. 0.024" sheet metal over 1" (25 mm) glass fiber or mineral wool batts reinforced with wire on rear face with ventilated air space | Back | 4 (102) |
| | Right | 4 (102) |
| | Left | 4 (102) |
| | Vent | 3 (76) |
| | Indoor Top | 24 (610) |
| | Outdoor Top | Unobstructed |
| d. 3-1/2" (89 mm) thick masonry wall with ventilated air space | Back | 6 (152) |
| | Right | 6 (152) |
| | Left | 6 (152) |
| | Vent | 6 (152) |
| | Indoor Top | 39 (991) |
| | Outdoor Top | Unobstructed |
| e. 0.024" sheet metal with ventilated air space | Back | 4 (102) |
| | Right | 4 (102) |
| | Left | 4 (102) |
| | Vent | 2 (51) |
| | Indoor Top | 24 (610) |
| | Outdoor Top | Unobstructed |
| f. 1/2" (13 mm) thick insulation board with ventilated air space | Back | 4 (102) |
| | Right | 4 (102) |
| | Left | 4 (102) |
| | Vent | 3 (76) |
| | Indoor Top | 24 (610) |
| | Outdoor Top | Unobstructed |
| g. 0.024" sheet metal with ventilated air space over 0.024 sheet metal with ventilated air space. | Back | 4 (102) |
| | Right | 4 (102) |
| | Left | 4 (102) |
| | Vent | 3 (76) |
| | Indoor Top | 24 (610) |
| | Outdoor Top | Unobstructed |
| h. 1" (25 mm) glass fiber or mineral wool batts sandwiched between two sheets 0.024 sheet metal with ventilated air space | Back | 4 (102) |
| | Right | 4 (102) |
| | Left | 4 (102) |
| | Vent | 3 (76) |
| | Indoor Top | 24 (610) |
| | Outdoor Top | Unobstructed |

Derived from National Fuel Gas Code, Table 10.2.3

**Table C. Reduction of Clearances to Protected Surfaces**

Clearances less than these may require removal of the heater to service either the heat exchanger or the burner tray. In either case, the heater must be installed in a manner that will enable the heater to be serviced without removing any structure around the heater.

### Flooring

This heater can be installed on combustible flooring. The combustible clearances listed can be reduced by protecting the exposed combustible surfaces as shown in **Table C.**

## Outdoor Heater Installation

These heaters are design-certified for outdoor installation, when equipped with the approved tops designated for outdoor use.

**⚠WARNING: The heater shall not be located in an area where water sprinklers, or other devices, may cause water to spray through the cabinet louvers and into the heater. This could cause internal rusting or damage electrical components. Such damage is not covered under warranty.**

**⚠WARNING: Do not install within 3' (0.9 m) of a heat pump or an outdoor condensing unit. Strong air intake from this type of equipment can disturb the combustion process and cause damage or personal injury.**

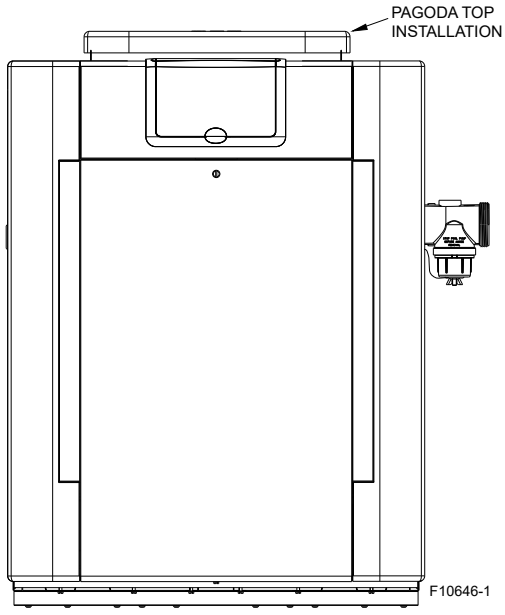



**Figure 2. Heater with Outdoor Stackless Top**

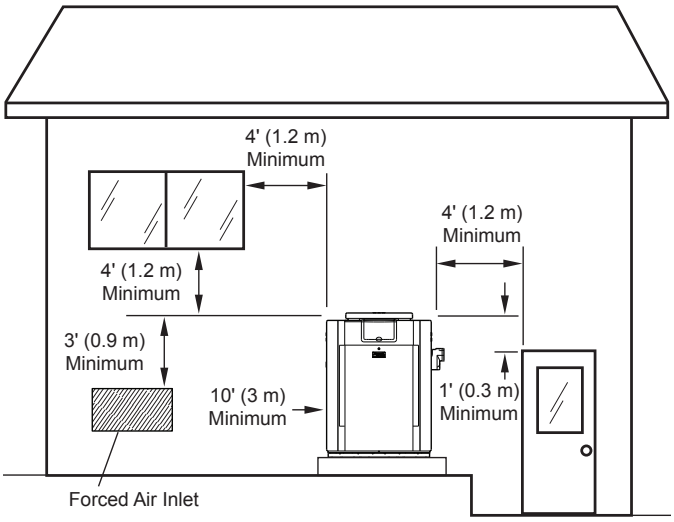



**Figure 3. Minimum Distances to Building Openings from Where Flue Products Exit the Boiler**

Heaters must not be installed under an overhang of less than 3' (0.9 m) from the top of the heater. Three sides must be open in the area under the overhang. Roof water drainage must be diverted away from the heaters installed under overhangs with the use of gutters.

**For U.S. installations,** the point from where the flue products exit the heater must be a minimum of 4' (1.2 m) below, 4' (1.2 m) horizontally from, or 1' (0.3 m) above any door, window or gravity inlet into any building. The top surface of the heater shall be at least 3' (0.9 m) above any forced air inlet, or intake ducts located within 10' (3 m) horizontally.

**For Canadian installations,** pool heaters shall not be installed with the top of the vent assembly within 10' (3 m) below, or to either side, of any opening into the building. Refer to the latest revisions of CAN/CSA-B149.

A minimum of 6**'** (1.8 m) is required from the heater to an inside corner wall for proper outdoor venting.

## Pagoda Top Installation

1. Insert tabs into keyhole (4 places). See **Figure 4**, detail A.
2. Snap tabs into keyholes so as not to pull out. See **Figure 4**, detail B.

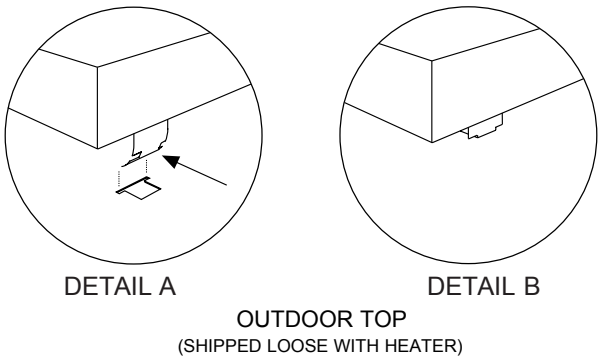



**Figure 4. Outdoor Top Installation**

**For installations in Florida and Texas,** that must comply with the Florida or Texas Building Code, follow the directions shown in **Figure 5** for the installation of hurricane tie-down brackets for all models.

## Indoor Heater Installation

The heater is also design-certified for indoor installation when equipped with the approved drafthood and a code-compliant vent stack.

For Canada, indoor installation is restricted to an enclosure that is not occupied and does not directly communicate with an occupied area. Refer to the latest edition of CAN/CSA-B149 for specific requirements. Locate heater as close as is practical to a chimney or gas vent. Heater must always be vented to the outside. See section **"Vent Piping" on page 14** for details. Minimum allowable space is shown on the nameplate.

**⚠WARNING: Indoor heaters require a drafthood that must be connected to a vent pipe and properly vented to the outside. Failure to follow this procedure can cause fire or fatal carbon monoxide poisoning.**

## Base Riser (for Canada only)

For all Canada installations, the unit must be installed on a base riser that is shipped along with the unit. This is in accordance with ANSI-Z21.56. See IPL for replacement kit information on page 52 (Item 14-S).

INSTRUCTIONS FOR THE STATE OF FLORIDA
AND FOR AREAS OF TEXAS DESIGNATED BY
THE TEXAS DEPARTMENT OF INSURANCE

WIND SPEED = 150 MPH, 3 SECOND GUST
EXPOSURE = C

| Model | B in. (mm) |
|---|---|
| **206A** | 20 (508) |
| **266A** | 23 (584) |
| **336A** | 26 (660) |
| **406A** | 29 (737) |

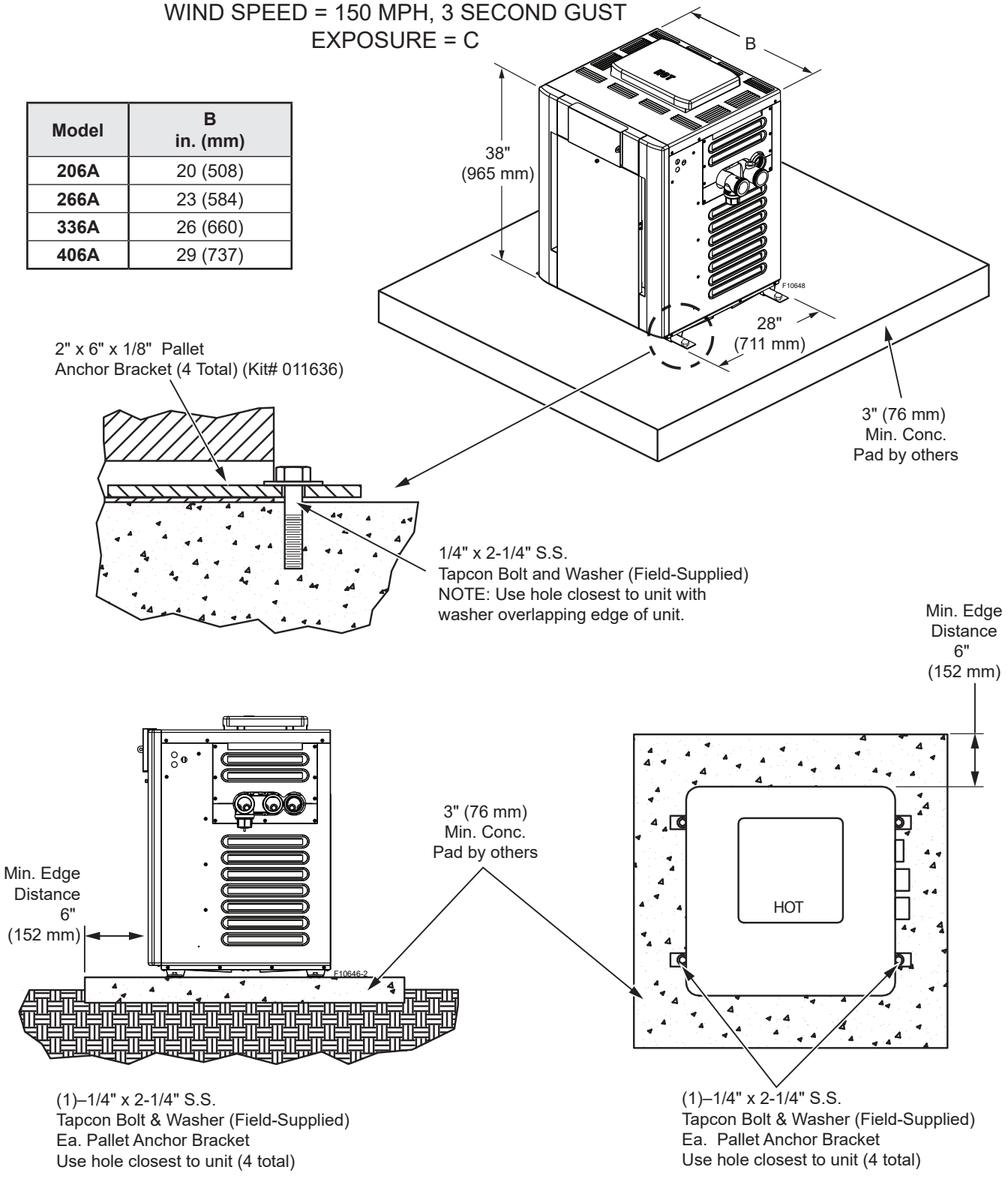



**Figure 5. Hurricane Tie-Down Bracket Installation**

## Outdoor and Indoor Stacks

The outdoor and indoor stacks are optional equipment and do not come standard with the heater. Refer to installation instructions inside box for instructions on how to install outdoor/indoor stack.

| Model | Outdoor Stack | Indoor Stack |
|---|---|---|
| **206A** | 009834 | 009838 |
| **266A** | 009835 | 009839 |
| **336A** | 009836 | 009840 |
| **406A** | 009837 | 009841 |

**Table D. Outdoor and Indoor Stack Kit Number**

**OUTDOOR STACK KIT**

(1) Outdoor drafthood, painted
(1) Adapter plate
(3) Mounting brackets (clips)
(1) Top panel cover
(2) 1-foot sections of metal tape
(3) Screws
(1) Instructions

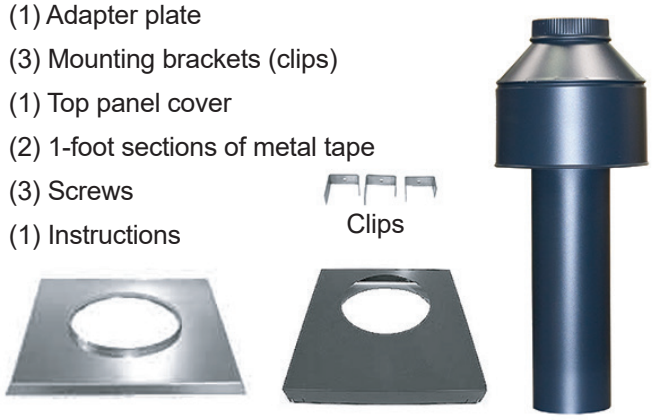



**Figure 6. Outdoor Stack Kit Components**

**NOTE: The outdoor drafthood kit does not require any additional vent pipe for proper operation. This drafthood functions as the vent termination.**

**INDOOR STACK KIT**

(1) Drafthood, unpainted
(1) Adapter plate
(3) Mounting brackets (clips)
(3) Screws
(1) Instructions


**Figure 7. Indoor Stack Kit Components**

# Combustion and Ventilation Air

## Indoor Units Only

The heater must have both combustion and ventilation air. The minimum requirements are listed in the latest edition of the National Fuel Gas Code (U.S. ANSI Z223.1 or Canada CAN/CSA-B149) and any local codes that may have jurisdiction. The most common approach is the "2-opening" method, with combustion air opening no more than 12" from the floor and the ventilation opening no more than 12" from the ceiling. For opening sizes using this method, see below.

### All Air from Inside the Building:

Each opening shall have a minimum net free area as noted:

| Model | Sq. in. ($m^2$) |
|---|---|
| **206A** | 200 (0.13) |
| **266A** | 266 (0.17) |
| **336A** | 333 (0.21) |
| **406A** | 399 (0.26) |

**Table E. Opening Minimum Net Free Requirements - Indoor Air**

### All Air from Outdoors:

When air is supplied directly from outside the building, each opening shall have a minimum net free area as noted:

| Model | Unrestricted Opening sq. in. ($m^2$) | Typical Screened or Louvered Opening sq. in. ($m^2$) | Typical Screened and Louvered Opening sq. in. ($m^2$) |
|---|---|---|---|
| **206A** | 50 (0.03) | 75 (0.05) | 100 (0.06) |
| **266A** | 67 (0.04) | 101 (0.06) | 134 (0.09) |
| **336A** | 84 (0.05) | 126 (0.08) | 168 (0.11) |
| **406A** | 100 (0.06) | 150 (0.1) | 200 (0.13) |

**Table F. Opening Minimum Net Free Requirements - Outdoor Air**

**⚠CAUTION: Combustion air must not be contaminated by corrosive chemical fumes which can damage the heater. Such damage will not be covered by the warranty.**

## Specifications and Dimensions

| Amp Draw | |
|---|---|
| 120 VAC, 1Ph, 60Hz | 240 VAC, 1Ph, 60Hz |
| 4 | 2 |

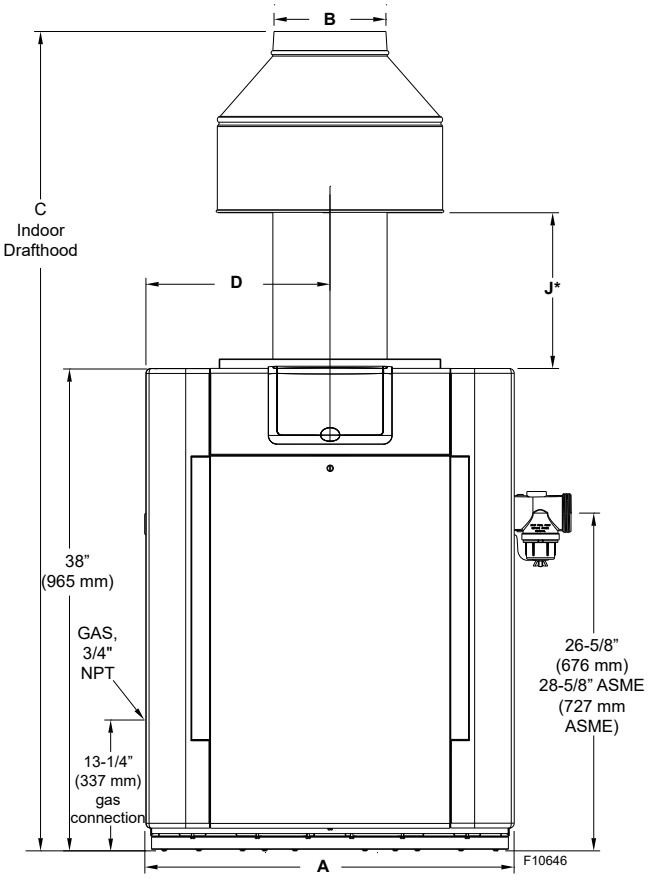



**Figure 8. Front View**

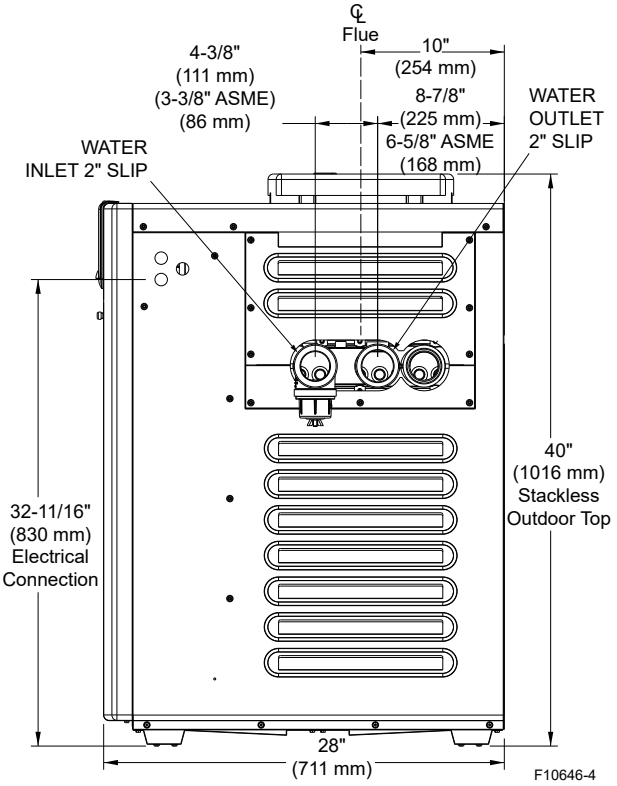



**Figure 9. Side View**

| Residential - Copper Heat Exchanger | | | | | | | Shipping Weights lbs. (kg) | |
|---|---|---|---|---|---|---|---|---|
| **Heater Mode** | **BTUH Input (kwh)** | **(A) Cabinet Width in. (mm)** | **(B) Flue Dia. in. (mm)** | **(C) Indoor Drafthood in. (mm)** | **(D) in. (mm)** | **(J)* in. (mm)** | **Standard Heater w/Stackless Top** | **Indoor Draft-Hood** |
| **P-206A-EN-C** | 199.5 (58.4) | 20 (508) | 6 (152) | 61-5/8 (1565) | 10.0 (254) | 11-3/4 (298) | 187 (85) | 14 (6.4) |
| **P-266A-EN-C** | 266.0 (77.9) | 23 (584) | 7 (178) | 62 (1575) | 11.5 (292) | 11 (279) | 210 (95) | 16 (7.3) |
| **P-336A-EN-C** | 332.5 (97.4) | 26 (660) | 8 (203) | 63 (1600) | 13 (330) | 10-5/8 (270) | 230 (104) | 19 (8.6) |
| **P-406A-EN-C** | 399 (116.9) | 29 (737) | 9 (229) | 64-9/16 (1640) | 14.5 (368) | 12-1/8 (309) | 249 (113) | 21 (9.5) |

*Note: For outdoor stack height, use "J" dimension for appropriate size **plus** 6 inches (152 mm).

**Table G. Residential - Copper Heater Specifications and Dimensions**

| Residential - Cupronickel Heat Exchanger | | | | | | | Shipping Weights lbs. (kg) | |
|---|---|---|---|---|---|---|---|---|
| Heater Mode | BTUH Input (kwh) | (A) Cabinet Width in. (mm) | (B) Flue Dia. in. (mm) | (C) Indoor Drafthood in. (mm) | (D) in. (mm) | (J)* in. (mm) | Standard Heater w/Stackless Top | Indoor Draft-Hood |
| **P-206A-EN-X** | 180.0 (52.7) | 20 (508) | 6 (152) | 61-5/8 (1565) | 10.0 (254) | 11-3/4 (298) | 187 (85) | 14 (6.4) |
| **P-266A-EN-X** | 240.0 (70.3) | 23 (584) | 7 (178) | 62 (1575) | 11.5 (292) | 11 (279) | 210 (95) | 16 (7.3) |
| **P-336A-EN-X** | 300.0 (87.9) | 26 (660) | 8 (203) | 63 (1600) | 13 (330) | 10-5/8 (270) | 230 (104) | 19 (8.6) |
| **P-406A-EN-X** | 360.0 (105.5) | 29 (737) | 9 (229) | 64-9/16 (1640) | 14.5 (368) | 12-1/8 (309) | 249 (113) | 21 (9.5) |

*Note: For outdoor stack height, use "J" dimension for appropriate size **plus** 6 inches (152 mm).

**Table H. Residential - Cupronickel Heater Specification and Dimensions**

| Commercial - ASME Copper or Cupronickel Heat Exchanger | | | | | | | Shipping Weights lbs. (kg) | |
|---|---|---|---|---|---|---|---|---|
| Heater Mode | BTUH Input (kwh) | (A) Cabinet Width in. (mm) | (B) Flue Dia. in. (mm) | (C) Indoor Drafthood in. (mm) | (D) in. (mm) | (J)* in. (mm) | ASME Heater w/Stackless Top | Indoor Draft-Hood |
| **B-206A-EN-(C)** | 199.5 (58.4) | 20 (508) | 6 (152) | 61-5/8 (1565) | 10.0 (254) | 11-3/4 (298) | 206 (94) | 14 (6.4) |
| **B-266A-EN-(C or X)** | 266.0 (77.9) | 23 (584) | 7 (178) | 62 (1575) | 11.5 (292) | 11 (279) | 229 (104) | 16 (7.3) |
| **B-336A-EN-(C or X)** | 332.5 (97.4) | 26 (660) | 8 (203) | 63 (1600) | 13 (330) | 10-5/8 (270) | 249 (113) | 19 (8.6) |
| **B-406A-EN-(C or X)** | 399 (116.9) | 29 (737) | 9 (229) | 64-9/16 (1640) | 14.5 (368) | 12-1/8 (309) | 268 (122) | 21 (9.5) |

*Note: For outdoor stack height, use "J" dimension for appropriate size **plus** 6 inches (152 mm).

**Table I. Commercial - Heater Specifications and Dimensions**

## Vent Piping

**⚠WARNING: Indoor heaters require a drafthood that must be connected to a vent pipe and properly vented to the outside. Failure to follow this procedure can cause fire or fatal carbon monoxide poisoning.**

When properly installed outdoors, only the outdoor stackless top (provided) is required. If installed indoors, a drafthood is required, connected to a CATEGORY I (a heater that operates with a non-positive vent static pressure and a vent gas temperature that avoids excessive condensate production in the vent.) vent per the National Fuel Gas Code and local requirements.

Vent piping the same size as the drafthood outlet is recommended, however, when the total vent height is at least 10 ft (3 m) (drafthood relief opening to vent terminal), the vent pipe size may be reduced by no more than one (1) size as specified in Chapter 13 of the National Fuel Gas Code, ANSI Z223.1 (Canada - CAN/CSA-B149).

As much as possible, avoid long horizontal runs of vent pipe and too many elbows. If installation requires horizontal runs, the vent pipe must have a minimum of 1/4 in. per ft rise (20.8 mm per meter rise) and should be supported at not more than 5 ft (1.5 m) intervals.

Plumber's tape, criss-crossed, will serve to space both horizontal and vertical piping. Gas vents supported only by the flashing and extending above the roof more than 5 ft (1.5 m) should be securely guyed or braced to withstand snow and wind loads. We recommend use of insulated vent pipe spacers through the roof and walls.

For protection against rain or blockage by snow, the vent pipe must terminate with a vent cap which complies with the local codes or, in the absence of such codes, to the latest edition of the National Fuel Gas Code, ANSI Z223.1 (Canada - CAN/CSA-B149).

The discharge opening must be a minimum of 2' (0.6 m) vertically from the roof surface and at least 2' (0.6 m) higher than any part of the building within 8' (2.4 m). Vent stack shall be at least 5 ft (1.5 m) in vertical height above the drafthood outlet. The vent cap location shall have a minimum clearance of 4 ft (1.2 m) horizontally from, and in no case below, unless a 4 ft (1.2 m) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

The weight of the vent stack or chimney must not rest on the heater drafthood. Support must be provided in compliance with applicable codes. The heater top and drafthood must be readily removable for maintenance and inspection. Vent pipe should be adequately supported to maintain proper clearances from combustible construction.

Flue materials must be certified to CATEGORY I or better. Type “B” double-wall or equivalent vent pipe is recommended. A draft of -0.01" to -0.08" WC must be maintained. However, single-wall metal vent pipe may be used as specified in the latest edition of the National Flue Gas Code, ANSI Z223.1 (Canada - CAN/CSA-B149).

## D-2 Power Vent Kit

Another option for an installation that requires horizontal runs is the D-2 power vent kit option.

| Model | 120 VAC P/N | 240 VAC P/N |
|---|---|---|
| **206A** | 010744 | 009832 |
| **266A** | 010744 | 009832 |
| **336A** | 010745 | 009833 |
| **406A** | 010745 | 009833 |

**Table J. Power Vent Kit Part Numbers**

**NOTE: The D-2 Power Vent operates with a positive vent static pressure and with a vent gas temperature that prevents excessive condensate production in the vent, and as such, is a CATEGORY III appliance. For more information consult the D-2 Power Vent manual, (P/N: 241243). CATEGORY I vent material such as B-vent must not be used under CATEGORY III conditions.**

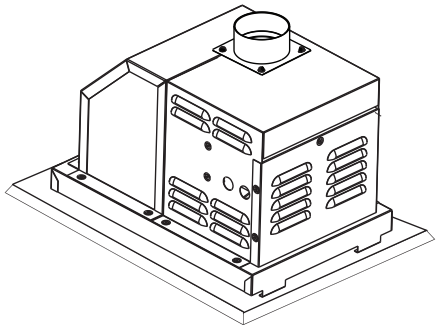


**Figure 10. D-2 Power Vent Option**

The power vent system is a fan-assisted vent system designed for use on models 266A-406A.

The power vent system, when installed as directed, is capable of operating in applications such as through-the-wall venting with reduced horizontal and vertical vent pipe sizes in new and current installations. The unit is factory-wired for 240 VAC, with capability of field-rewiring for 120 VAC.

For more information consult the D-2 Power Vent manual, (P/N: 241243). This Manual can be viewed on your smart device. See QR Code on page 45. This manual can also be found in the document library at www.raypak.com.

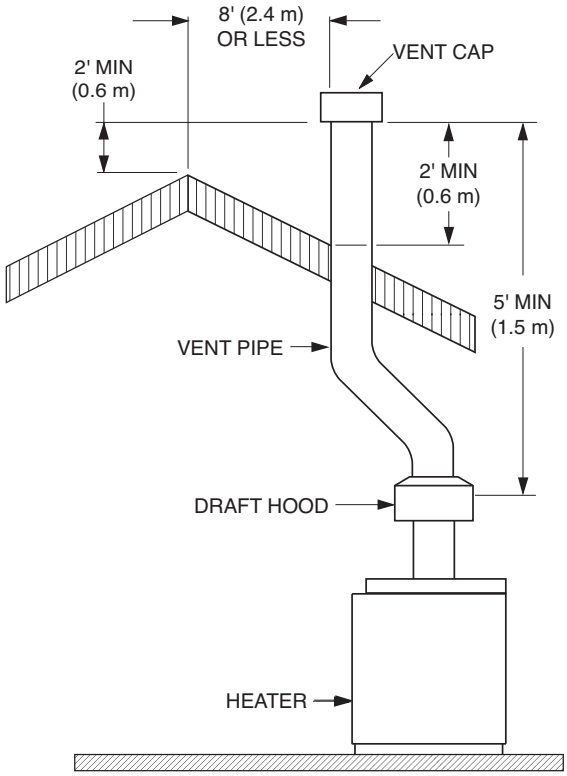



**Figure 11. Venting Clearances**

**NOTE: For common venting of two or more heaters, contact the factory.**

# Gas Supply Connections

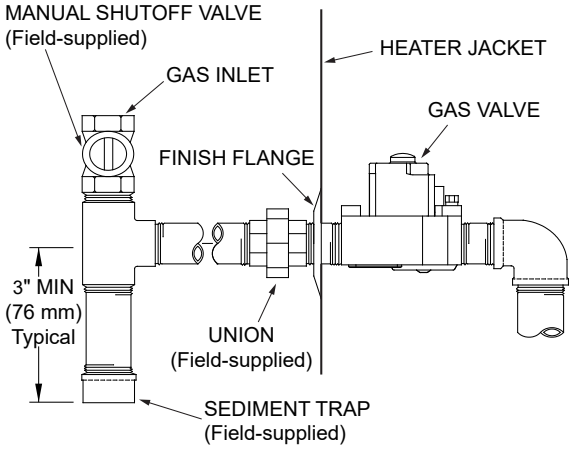



**Figure 12. Gas Supply Plumbing**

Gas piping must have a sediment trap ahead of the heater gas controls, and a manual shutoff valve located outside the heater jacket. All gas piping should be tested after installation in accordance with local codes.

**⚠CAUTION: The heater and its manual shutoff valve must be disconnected from the gas supply during any pressure testing of that system at test pressures in excess of 1/2 psi (3.45 kPa). Dissipate test pressure in the gas supply line before reconnecting the heater and its manual shutoff valve to gas supply line. FAILURE TO FOLLOW THIS PROCEDURE MAY DAMAGE THE GAS VALVE. OVER-PRESSURIZED GAS VALVES ARE NOT COVERED BY WARRANTY. The heater and its gas connections shall be leak tested before placing the appliance in operation. Use soapy water for leak test. DO NOT use open flame.**

## Supply Pressure

**⚠CAUTION: Do not use Teflon tape on gas line pipe thread. Only sealant tape or a pipe compound rated for use with natural and propane gases is recommended. Apply sparingly only on male pipe ends, leaving the two end threads bare.**

A minimum of 6 in. WC and a maximum of 10.5 in. WC upstream pressure under load and no-load conditions must be provided for natural gas. A minimum of 12 in. WC and a maximum of 13 in. WC are required for propane gas under load and no-load conditions.

## Gas Regulator Best Practices

From the gas pressure regulator it is recommended to have no less than 10 pipe diameters of straight smooth pipe downstream of the regulator discharge and to have no less than 10 linear feet (not including fittings) between the regulator and the inlet to the appliance for proper operation.

## Gas Pressure Regulator

The gas pressure regulator is preset at 4.0 in. WC for natural gas, and 10.5 in. WC. for propane gas. The pressure at the gas valve, taken with a manometer, should be about 4.0 in. WC natural gas and 10.5 in. WC propane gas. If an adjustment is needed, remove seal and turn adjustment screw clockwise ↷ to increase pressure or counter-clockwise ↶ to decrease pressure.

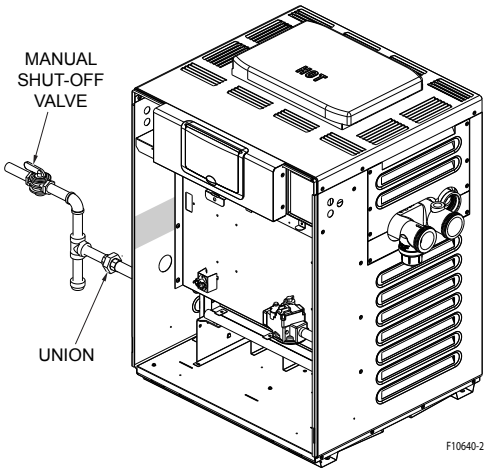



**Figure 13. Manual Shutoff Valve Installation**

## Gas Pressure Adjustment Locations

### Electronic Ignition Gas Valves

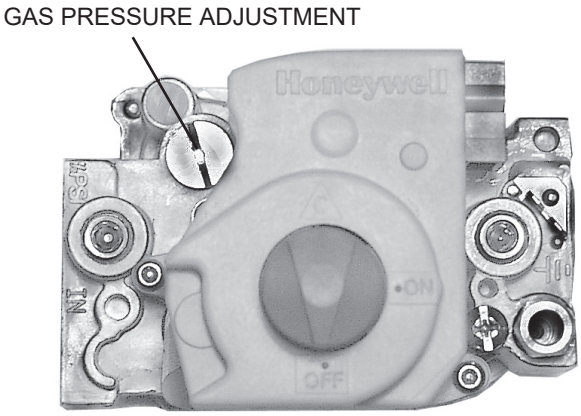



**Figure 14. Honeywell VR8340 (Heater Models 266A - 406A)**

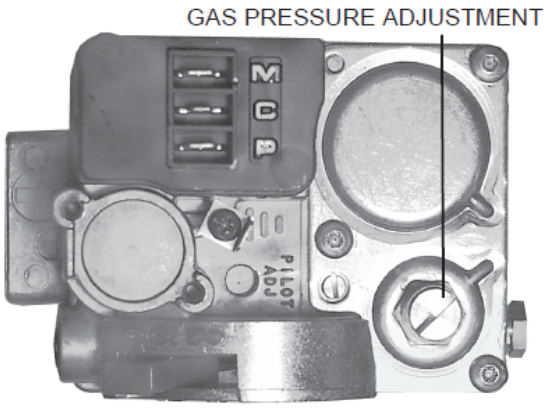



**Figure 15. Robertshaw 7200 (Heater Model 206A)**

## Pipe Sizing for Gas Connection

These capacities shown below based on using SCH 40 black iron pipe. For capacities using other materials, consult local code.

| Maximum Equivalent Pipe Length (ft) (m) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Natural Gas 1000 BTU/FT$^3$ 0.60 Specific Gravity @ 0.5 in WC Pressure Drop | | | | | | | | |
| Propane Gas 2500 BTU/FT$^3$ 1.53 Specific Gravity @ 0.5 in WC Pressure Drop | | | | | | | | |
| **Model** | **3/4"** | | **1"** | | **1-1/4"** | | **1-1/2"** | |
| | **NAT** | **PRO** | **NAT** | **PRO** | **NAT** | **PRO** | **NAT** | **PRO** |
| **206A** | 25 (7.6) | 60 (18.3) | 90 (27.4) | 215 (65.5) | 360 (109.7) | | | |
| **266A** | 15 (4.6) | 35 (10.7) | 50 (15.2) | 125 (38.1) | 210 (64.0) | 480 (146.3) | 445 (135.6) | |
| **336A** | 10 (3.0) | 20 (6.1) | 30 (9.1) | 80 (24.4) | 140 (42.7) | 320 (97.5) | 290 (88.4) | |
| **406A** | * | 15 (4.6) | 20 (6.1) | 55 (16.8) | 95 (29.0) | 225 (68.6) | 215 (65.5) | 480 (146.3) |

* A 3/4" gas line can be used for up to 5' (1.5 m) maximum length from the gas valve in addition to the sediment trap.

**Table K. Gas Pipe Sizing**

# Flow Rates

| Model | Pipe Size | Min. GPM (lpm) | Max. GPM (lpm) |
|---|---|---|---|
| **206A** | 1-1/4"–1-1/2"–2" | 20 (75) | 100 (378) |
| **266A** | 1-1/4"–1-1/2"–2" | 25 (95) | 100 (378) |
| **336A** | 1-1/4"–1-1/2"–2" | 35 (132) | 100 (378) |
| **406A** | 1-1/4"–1-1/2"–2" | 40 (151) | 100 (378) |

* When flow rates exceed maximum GPM an external auxiliary bypass valve is required. See external bypass valve section for details.

**Table L. Minimum and Maximum Flow Rates**

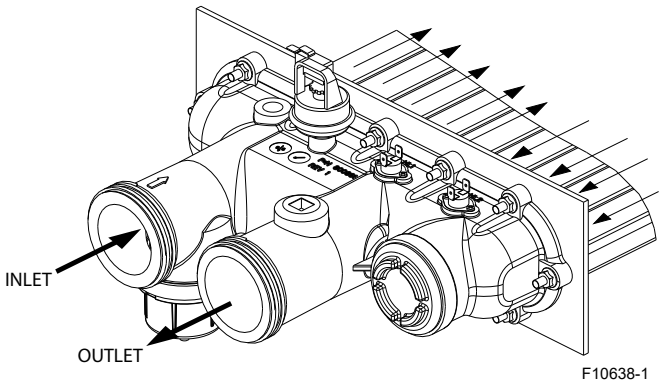



**Figure 16. Polymer Header Water Flow**

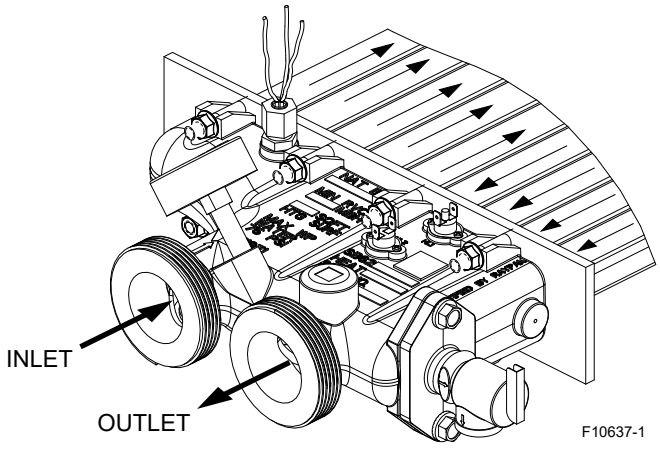



**Figure 17. Bronze Header (ASME) Water Flow**

| Flow GPM (lpm) | Pressure Drop (Ft. of Head) (m of Head) | | | |
|---|---|---|---|---|
| | **206A** | **266A** | **336A** | **406A** |
| 20 (75) | 4.0 (1.2) | | | |
| 25 (95) | 4.0 (1.2) | 4.6 (1.4) | | |
| 30 (113) | 4.0 (1.2) | 5.2 (1.6) | | |
| 35(132) | 4.0 (1.2) | 5.8 (1.8) | 5.2 (1.6) | |
| 40 (151) | 4.6 (1.4) | 5.8 (1.8) | 5.2 (1.6) | 5.2 (1.6) |
| 50 (189) | 4.6 (1.4) | 6.3 (1.9) | 6.9 (2.1) | 6.9 (2.1) |
| 60 (227) | 4.6 (1.4) | 6.9 (2.1) | 6.9 (2.1) | 6.9 (2.1) |
| 70 (265) | 4.6 (1.4) | 8.1 (2.5) | 9.2 (2.8) | 9.2 (2.8) |
| 80 (303) | 4.6 (1.4) | 9.2 (2.8) | 9.8 (3.0) | 9.8 (3.0) |
| 90 (340) | 6.9 (2.1) | 10.4 (3.2) | 10.4 (3.2) | 10.4 (3.2) |
| 100 (378) | 8.1 (2.5) | 11.0 (3.4) | 12.1 (3.7) | 12.1 (3.7) |

**Table M. Polymer Heat Exchanger Pressure Drop - Residential Models - (UG Fully Open)**

| Flow GPM (lpm) | Pressure Drop - Ft. of Head (m of Head) | | | |
|---|---|---|---|---|
| | 206A | 266A | 336A | 406A |
| 20 (75) | 8.2 (2.5) | | | |
| 30 (113) | 9.5 (2.90) | 9.5 (2.90) | | |
| 40 (151) | 9.7 (2.95) | 9.7 (2.95) | 11 (3.3) | 13.4 (4.08) |
| 50 (189) | 10 (3.0) | 9.8 (2.98) | 12.2 (3.7) | 13.4 (4.08) |
| 60 (227) | 11 (3.3) | 10.4 (3.17) | 13.7 (4.2) | 13.5 (4.1) |
| 70 (265) | 11.5 (3.5) | 10.9 (3.3) | 14.3 (4.3) | 14 (4.3) |
| 80 (303) | 12.6 (3.8) | 12 (3.6) | 15.5 (4.7) | 15 (4.6) |
| 90 (340) | 14 (4.3) | 13 (4.0) | 16.2 (4.9) | 16.2 (4.9) |
| 100 (378) | 15 (4.6) | 14.2 (4.3) | 17.5 (5.3) | 16.7 (5.1) |

**Table N. Bronze Heat Exchanger Pressure Drop - ASME Models (UG Closed)**

**NOTE: Table capacity is based on schedule 40 black iron pipe. For capacity using other material, consult local codes.**

## Polymer Headers (Residential Models)

Before attaching the 2-inch unions to the inlet/outlet header, make sure the O-rings are properly seated in the grooves. Use Aqualube or equivalent non-petroleum-based lubricant on the O-ring. **Hand tighten the unions**. Glue PVC piping directly to the unions.

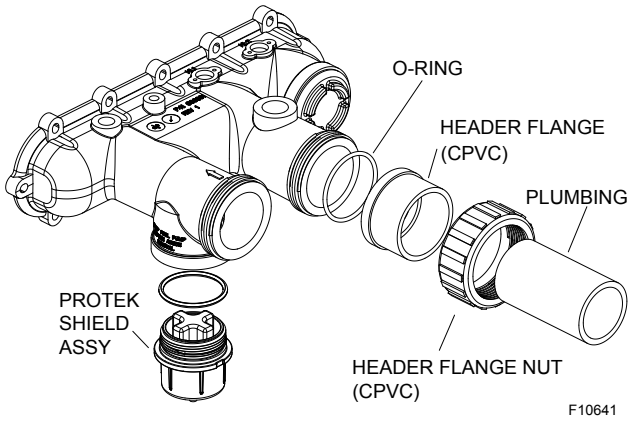



**Figure 18. Inlet/Outlet Header – Polymer**

High-temperature CPVC header flanges and header flange nuts are provided. If there is any possibility of back-siphoning when the pump stops, it is suggested that a check valve (or valves) also be installed in the system.

## Bronze Headers (ASME Models)

Heater must be located so that any water leaks will not damage the structure of adjacent area. Before attaching the ProTek Shield Adapter to the inlet connection and the 2-inch unions, make sure the O-rings are properly seated in the grooves. Use Aqualube or equivalent non-petroleum-based lubricant on the O-ring. **Hand tighten the unions**. Glue PVC piping directly to the unions.

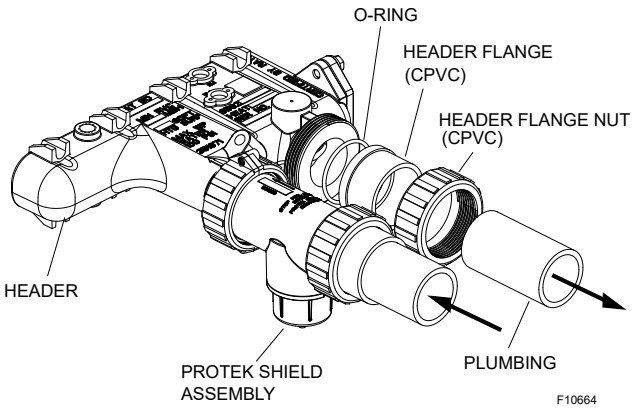



**Figure 19. Inlet/Outlet Header – Bronze**

**NOTE: Some jurisdictions require the addition of a flow switch on ASME installations. Kit# 015889F for flange connection or 015890F for NPT connection can be ordered that will allow a standard ASME unit to comply with the code requirements.**

# 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 bronze ASME headers.

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 #).

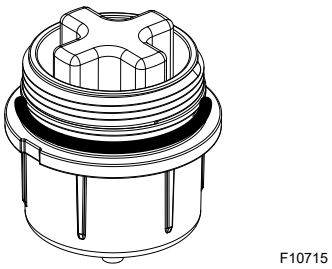



**Figure 20. ProTek Shield Assembly**

**⚠ 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 Assy:

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 Assy. clockwise (by hand) to unscrew it from the assembly.
6. Inspect/replace as necessary and reverse above procedure to reinstall. Hand tighten only! Do not use tools.

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

## Unitherm Governor Operation

**⚠CAUTION: The patented Unitherm Governor is a thermostatic mixing valve specifically designed to maintain constant heater internal temperature between 105°F (41°C) and 115°F (46°C) despite continually changing flow rates from the filter and changing pool temperatures. This narrow range is needed to prevent damaging condensation on the burners which will occur if the heater runs for any length of time below 100°F (38°C). It is also needed to inhibit scale formation in the tubes by maintaining temperatures well below accelerated scaling temperatures.**

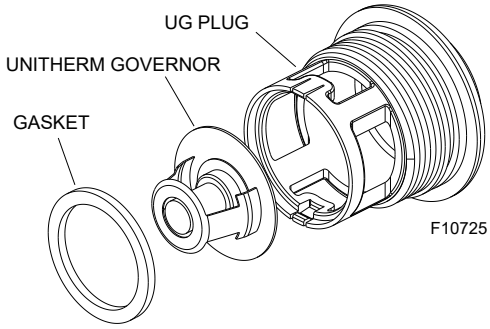



**Figure 21. Unitherm Governor - Polymer**

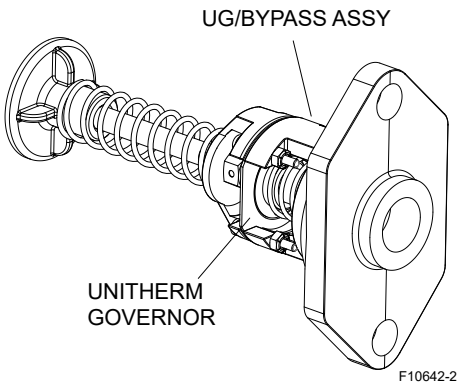



**Figure 22. Unitherm Governor - Bronze**

## Internal Automatic Bypass Valve

In addition to the Unitherm Governor, a built-in automatic bypass valve is provided in the In/Out header. While the Unitherm Governor responds to the changes in water temperature in the heater, the internal bypass valve automatically responds to changes in water pressure in the piping system. Proper amount of water flow is maintained through the heater under varying pressures dictated by the conditions of the pump and filter.

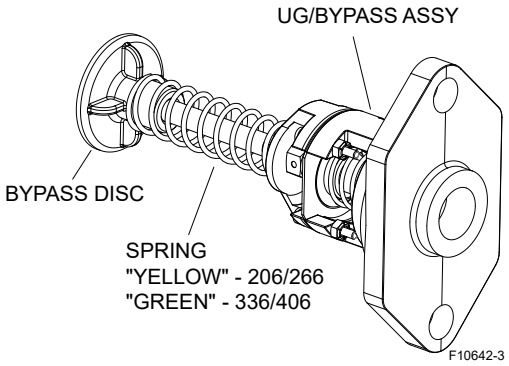
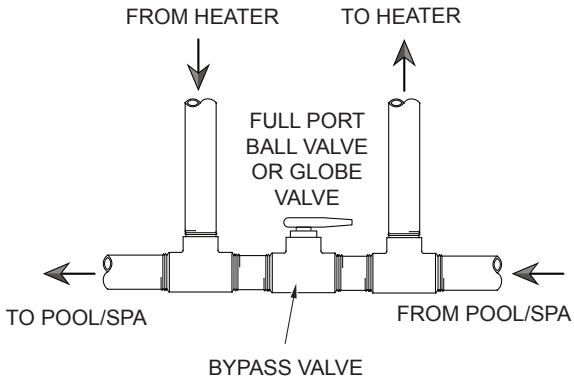



**Figure 23. Internal Automatic Bypass Valve - Bronze**

**NOTE: The Unitherm Governor and Bypass Valve Assy are not individually-replaced components on ASME units. If either needs to be replaced, the entire UG/ Bypass assy must be replaced. The "yellow" spring is used on models 206A, 266A. The "green" spring is used on models 336A, 406A.**

## External Auxiliary Bypass Valve

**Where Required** - An auxiliary bypass valve should be used when flow rates exceed 100 GPM (378 lpm). Usually a high-performance pump size larger than two horsepower will exceed this flow rate. This valve is required to complement the function of the automatic bypass valve, particularly when starting the heater in winter or early spring when the spa or pool temperature is below 50°F (10°C). It also serves to eliminate needless pressure drop through the heater and accompanying reduction in the flow rate to the spa jets, etc.




*Do not use a gate valve.

**Figure 24. Auxiliary Bypass Valve**

## Auxiliary Bypass Valve Adjustment

To set bypass, with clean filter, adjustment is made by feeling the inlet and outlet pipes at the heater. Outlet pipes should be slightly warmer than inlet and comfortable to the touch. If pipe is hot, close bypass; if cold, open bypass.

## Pressure Relief Valve Installation

To conform to local building codes, it may be necessary to install a pressure relief valve. A 3/4" pressure relief valve, having a capacity equal to or greater than to the BTU output of the model to be installed, is recommended for this heater.

A 3/4" NPT connection is provided in the Polymer header for installation of a pressure relief valve. The valve shall be installed in a vertical position. Do not over-tighten. Install pressure relief valve hand-tight plus 1/2 turn.

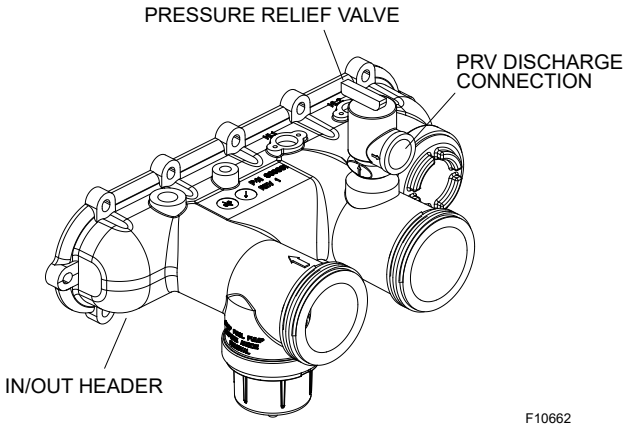



**Figure 25. Field-Supplied Pressure Relief Valve, Residential Units**

A 3/4" NPT connection is provided in the header for installation of a 75 PSI (517 kPa) pressure relief valve. The PRV is shipped loose in the accessory carton with the pagoda top. The pressure relief valve shall be installed in a vertical position.

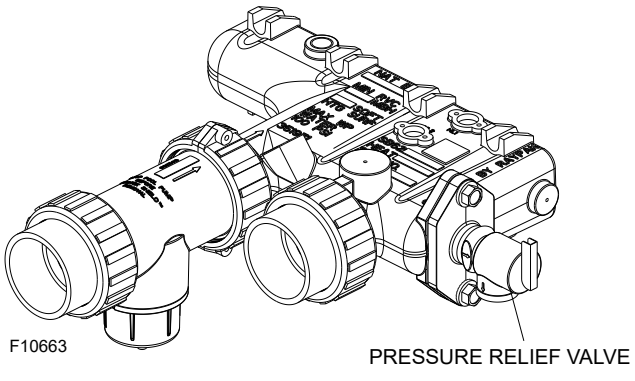



**Figure 26. Pressure Relief Valve, Commercial Units**

**NOTE: To avoid water damage or scalding due to valve operation, drain pipe must be connected to valve outlet and run to a safe place of discharge. Drain pipe must be the same size as the valve discharge connection throughout its entire length and must pitch downward from the valve. No shutoff valve shall be installed between the relief valve and the drain line. Valve lever should be tripped at least once a year to ensure that waterways are clear.**

The heater requires water flow and positive pressure to fire and operate properly. It must therefore be installed downstream of the discharge side of the filter pump. See **Figure 28** and **Figure 29**. A typical installation is plumbed as follows:

1. The inlet side of the filter is plumbed directly to the discharge side of the filter pump;
2. The outlet side of the filter is then plumbed to the inlet of the heater; and
3. The outlet of the heater is plumbed to the return line to the pool or spa. The pump, filter and heater are thus plumbed in series (Salt generators and chemical feeders must be downstream of the pool heater).

Plumbing from the heater back to the pool or spa must not have any valves or restriction that could prevent flow when the pump is operating.

**⚠CAUTION: An additional source of heated water, e.g. a solar system, must be connected to the main line ahead of the heater inlet pipe in order for it to act as the primary heat source. If the primary system provides adequate heat to maintain setpoint, the heater will not fire. Be advised that the control panel will then display sensed water temperatures downstream of the primary heating system, rather than the temperature of the water exiting the pool.**

Heater must be located so that any water leaks will not damage the structure of adjacent area. PVC pipe may be glued directly into the headers unions.

## Heat Exchanger Reversal

### Procedure for Residential Models

1. Remove right and left-side access panels. See **Figure 27.**

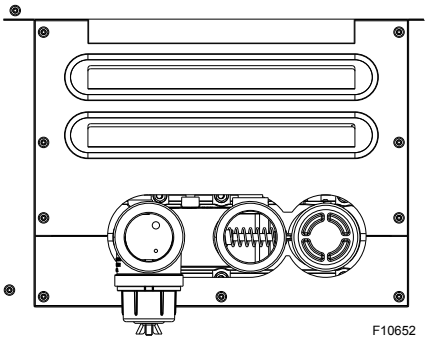
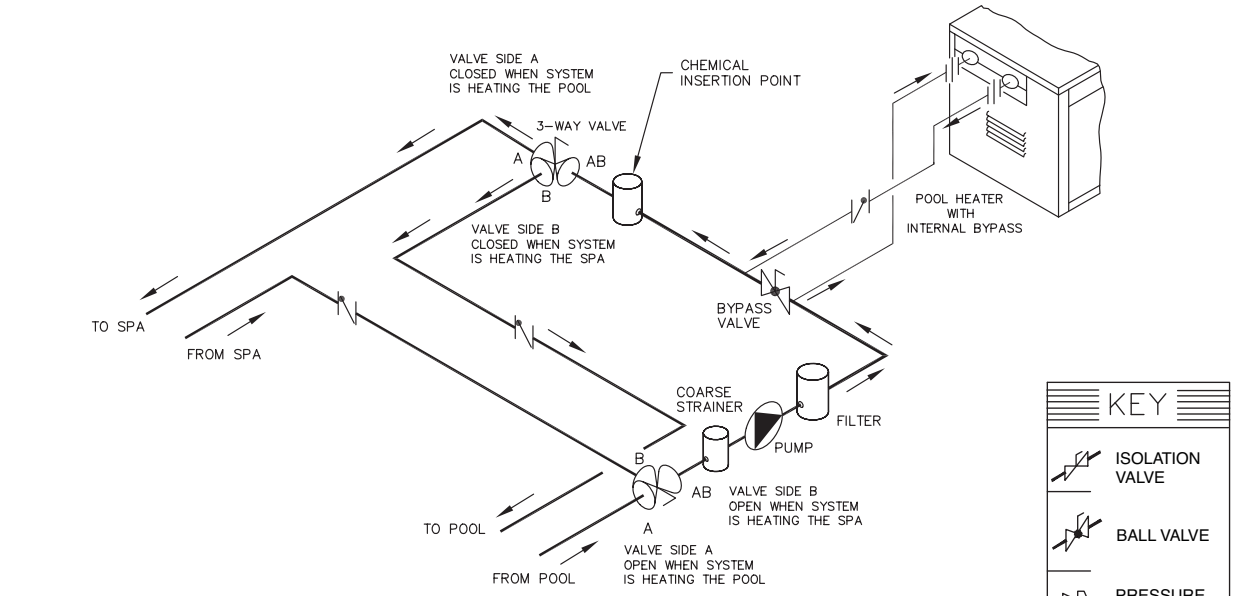



**Figure 27. Access Panels**

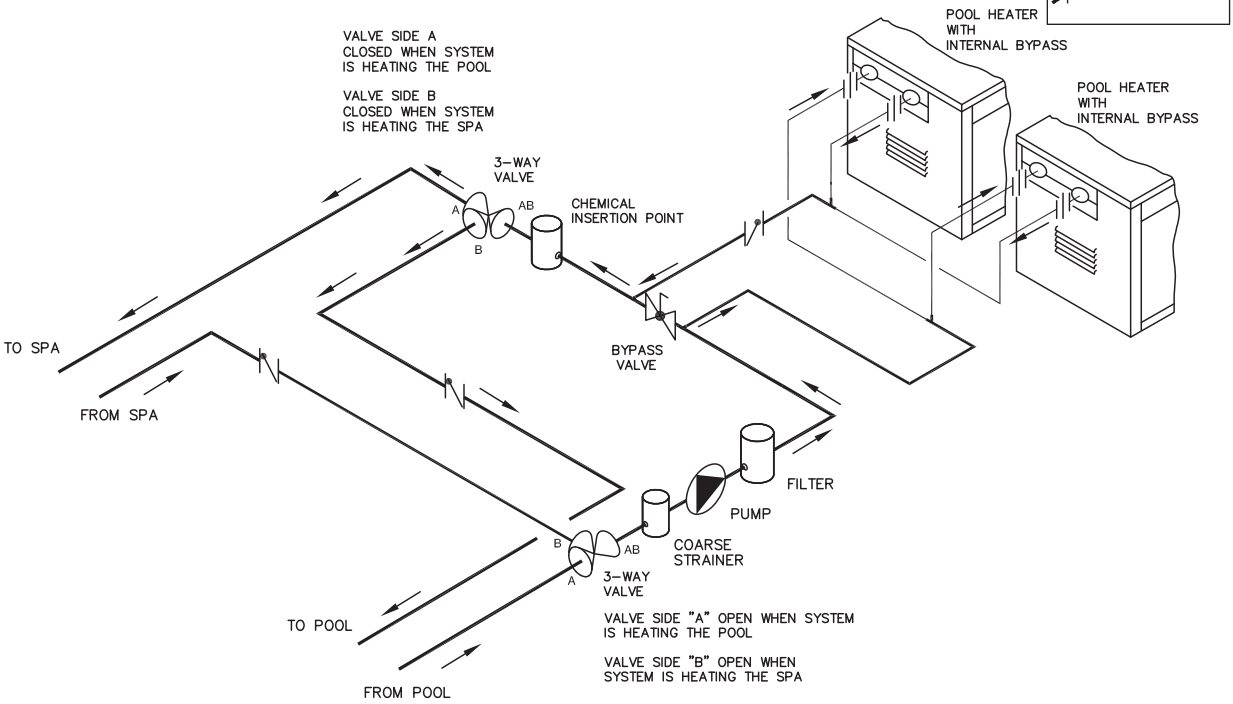
# Plumbing Diagrams

## Water Connection




THIS DIAGRAM IS A RECOMMENDATION AND IS NOT INTENDED
TO REPACE AN ENGINEERED PIPING SYSTEM BY A PROFESSIONAL ENGINEER

**Figure 28. Single Heater Installation**




THIS DIAGRAM IS A RECOMMENDATION AND IS NOT INTENDED
TO REPACE AN ENGINEERED PIPING SYSTEM BY A PROFESSIONAL ENGINEER

**Figure 29. Multiple Heater Installation**

2. Disconnect wires at high limit, AGS (automatic gas shutoff), water pressure switch on the in/out header and ProTek Shield bonding wire. See **Figure 30.**

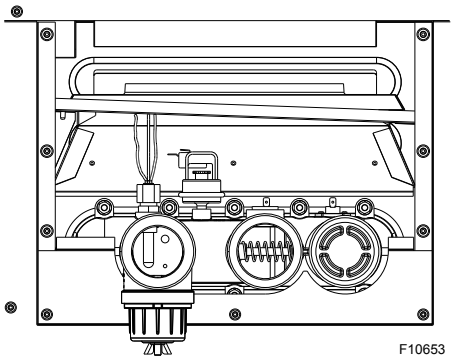



**Figure 30. Component Wiring Locations - In/out Header**

3. Remove the thermostat temperature sensor by loosening the compression fitting nut. Re-route the sensor to left-side of the heater. See **Figure 31**.

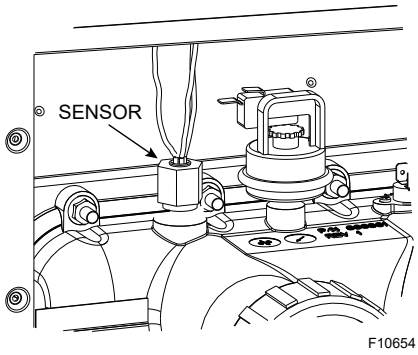



**Figure 31. Digital Temperature Sensor Location**

4. Remove (12) nuts holding the inlet/outlet and return headers to the tube sheets. Clean off tube sheet area where the gasket seats. Also clean off the header and the gasket. Apply a non-petroleum-based lubricant to the gasket such as Aqualube. Re-attach the headers to the opposite sides, making sure they are installed in an upright position. Do not over-tighten. Torque should not exceed 7 ft/lb. See **Figure 31.**
5. Reconnect high limit, AGS, water pressure switch wires, and ProTek Shield bonding wire.
6. Insert the temperature sensor into the compression fitting, so that the sensor is flush with the top of the fitting. Tighten 1/2 turn past hand-tight.
7. Allow for water flow through the heater and check for leaks.
8. Re-attach access panels to the opposite sides.

**For instructions on reversing the heat exchanger connections on ASME models, call your factory representative.**

# 5. ELECTRICAL WIRING

**NOTE: If it is necessary to replace any of the original wiring, use 105°C wire or its equivalent, and/or 150°C wire or its equivalent, like the original wiring.**

**⚠WARNING: Digital heaters are factory-wired for 240 VAC, 1 Ph, 60 Hz power supply. DO NOT attempt to operate at 208 VAC.**

The standard field-wiring connection is on the right-side of the heater.

To wire the heater from the left-side, follow these steps:

1. Remove the two (2) screws that hold the front door to the heater. Remove and set aside door for better access to wiring.
2. Remove the four (4) screws that hold down the junction box to the sway brace.
3. Remove the transformer cover located on the far right by removing one (1) screw.
4. Remove the two (2) screws that hold down the transformer.
5. Remove the one (1) screw that holds down the ground wires.
6. Disconnect P6 connector from PC board.
7. Remove transformer from its current location and relocate it on the far left-side of the heater.
8. Re-route all high-voltage wires and ground wires through the left jacket side of heater.
9. Re-install P6 connector, ground wires (SPG), transformer, junction box, front door, and plug right-side with the left-side's grommet plug.

**NOTE: 7/8" diameter holes not utilized on jacket and control box can be used for fireman switch, auxiliary control interface or power vent (D-2) wiring.**

## Electrical Power Draw

**⚠CAUTION: Heater must be electrically grounded and bonded. Bonding lug is provided loose with the heater. Install bonding lug on lower right or left-side of jacket as necessary for bonding the heater. Mounting hole is provided on the jacket.**

**NOTE: Failure to ground the heater electrically could affect the heater's electronics.**

**NOTE: See "Time Clock/Fireman's Switch" on page 30 for further instructions if using a time clock/ fireman's switch.**

The Electronic Intermittent Ignition Device automatically lights the pilot and main burners upon a call-for-heat. The heater is supplied with a dual-voltage transformer for 120 VAC or 240 VAC input power hookup.

When operating on 120 VAC power, units draw 4 amps. When operating on 240 VAC power, units draw 2 amps.

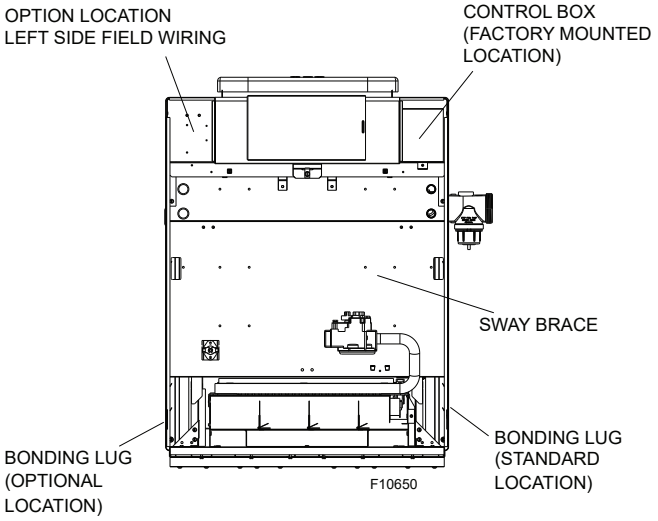



**Figure 32. Heater Wiring Locations**

## Transformer Wiring

### 120 VAC Wiring

For 120 VAC input power to the unit, connect the black wire to the L1 or hot leg of the power supply. Connect the white wire to the "Ret" or neutral leg of the power supply. **There should be no connection to the red wire for 120 VAC operation.** Attach a wire nut to the red wire.

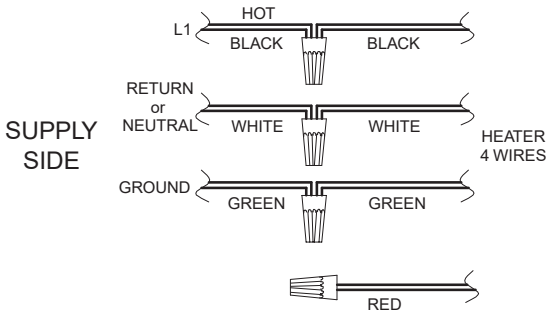



**Figure 33. 120 VAC Wire Connection**

### 240 VAC Wiring

For 240 VAC input power to the unit, connect the black wire to the "L1" or hot leg of the power supply. Connect the red wire to the L2 or second hot leg of the power supply. **There should be no connection to the white wire for 240 VAC operation.** Attach a wire nut to the white wire.

**⚠WARNING: DO NOT attempt to operate the heater at 208 VAC.**

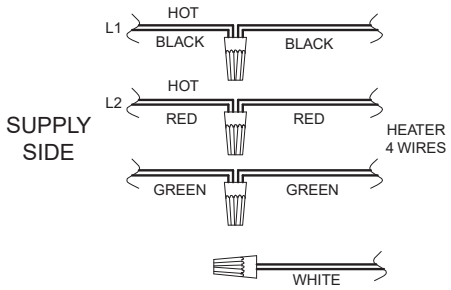


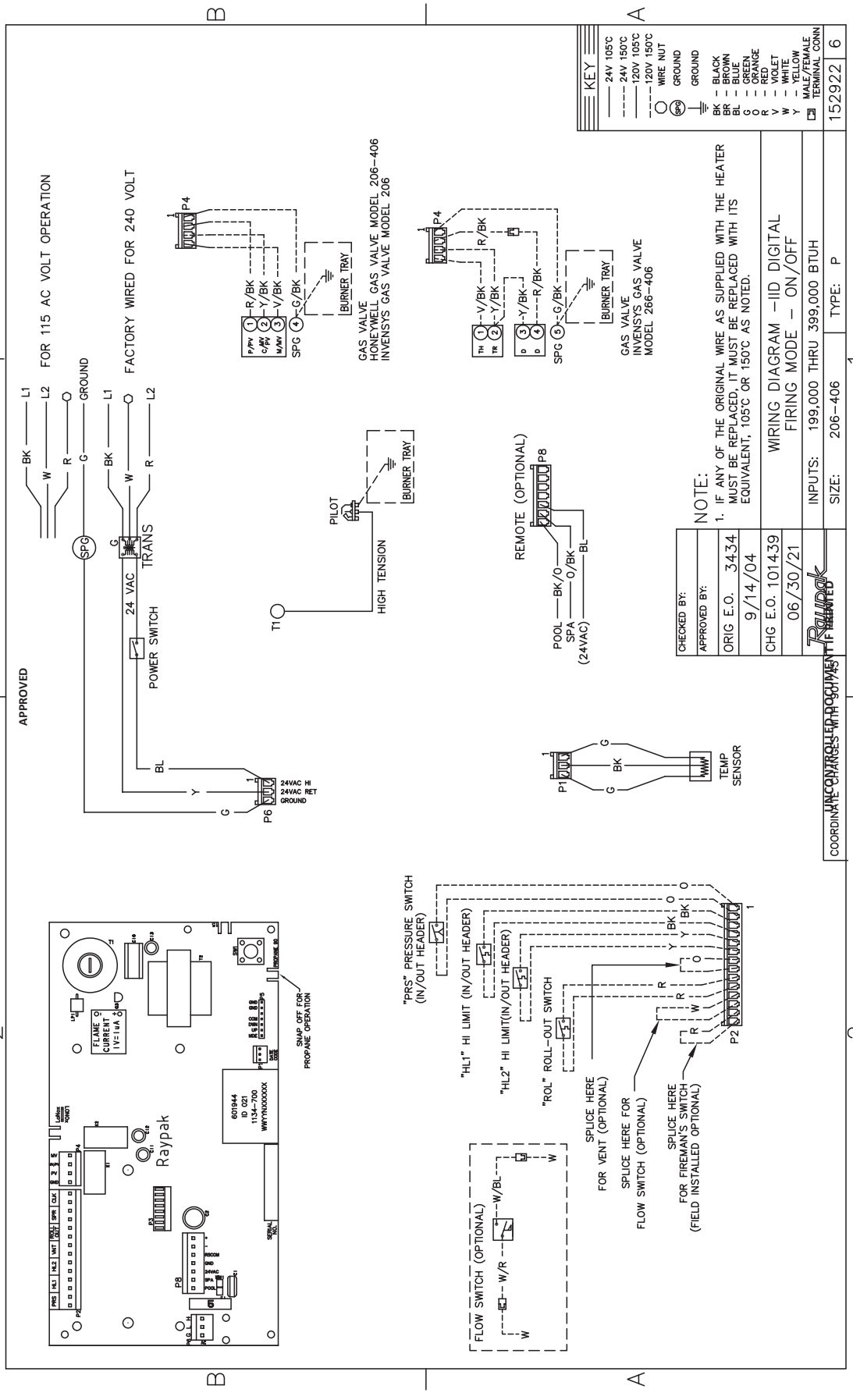

**Figure 34. 240 VAC Wire Connection**

Heater must be electrically grounded and bonded in accordance with local codes, or, in the absence of local codes, with the latest edition of the National Electrical Code, ANSI/NFPA 70. (Canada - Canadian Electrical Code, CSA C22.1, Part 1 and Part 2.)

**⚠CAUTION: If the transformer's primary side is wired for 120 VAC and 240 VAC is applied, damage to the transformer and PC board may result. Such damages are not covered under manufacturer's limited warranty.**

**NOTE:** Input power to the heater (120 or 240 VAC) can be supplied from the load (pump) side of time clock or directly from the GFCI power source. **It is preferred that full-time power be supplied to the heater from the GFCI power source, and that the heater be controlled by the fireman's switch connection or using a two or three-wire remote.** If using a switched GFCI power source, the heater could display false service indicators on the display panel if the pump is turned off.

# 6. WIRING DIAGRAM - DIGITAL



# 7. CONTROLS

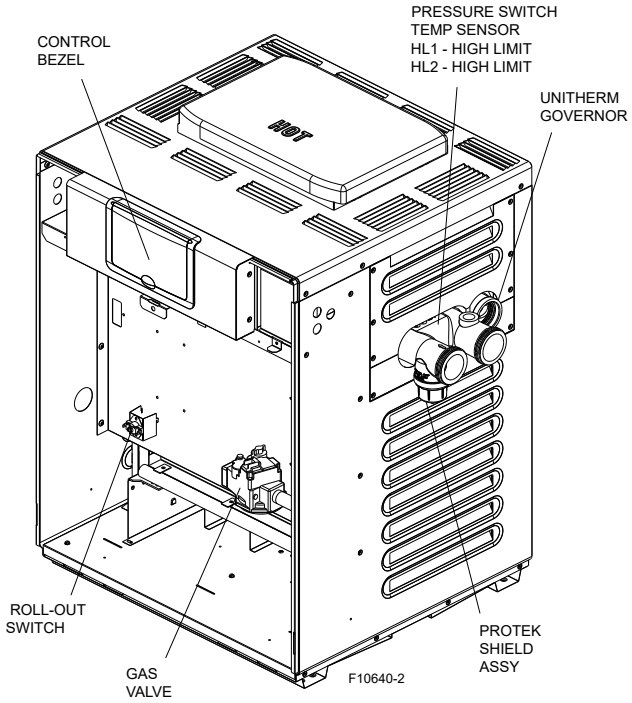



**Figure 35. Location of Controls (View One)**

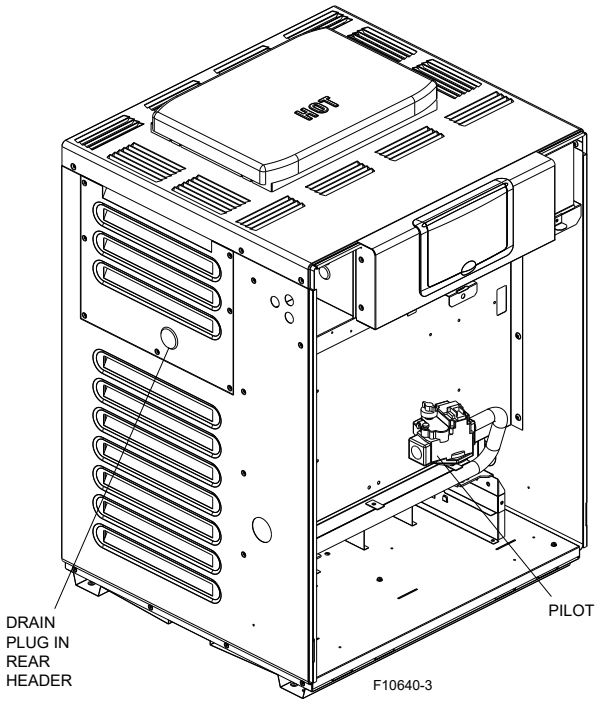



**Figure 36. Location of Controls (View Two)**

## Control Panel Removal

1. Remove screw from front door. Set aside door for serviceability.
2. Remove (4) screws from sides of control panel.
3. Rotate control panel down until panel stops. Do not force.

**NOTE: Caution must be used to not damage controls or wiring.**

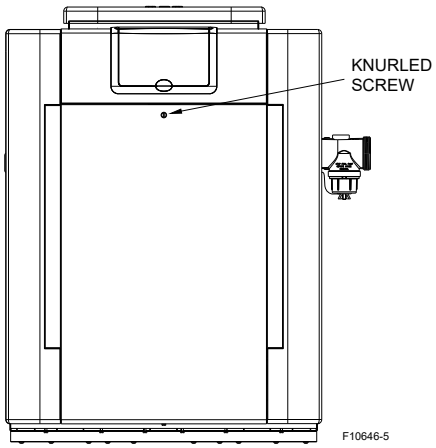



**Figure 37. Knurled Screw Location**

## Control Adjustments

The pool heater touch-pad located on the upper front panel of the heater, allows the user to select either POOL or SPA operation, and to adjust the setpoint temperature. The LCD display window indicates the mode (OFF, SPA, POOL) and the actual water temperature. A manual power switch provided below the touch-pad turns the control power ON or OFF. See **Figure 40.**

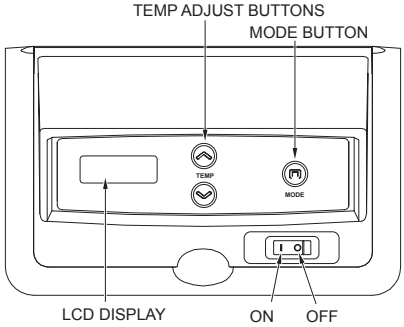



**Figure 38. Control Adjustment**

### Mode Button

The MODE button is used to select POOL or SPA operation. It also allows the user to turn the heater off electronically, allowing the LCD to remain energized and to continue showing the actual water temperature.

### Temp Buttons

If the heater is in POOL or SPA mode, the desired water temperature (SETPOINT) will be displayed and may be adjusted using the UP or DOWN buttons.

# Operation

In the POOL or SPA modes, the actual water temperature is displayed along with the desired water temperature (SETPOINT). When the water temperature is above the setpoint, “Water Temp” will alternate with “No Demand.” When the water temperature is below the setpoint and the heater is firing, “Water Temp” will alternate with “Heating.”

To adjust the setpoint temperature, make sure the control is in the appropriate mode (POOL or SPA) and push the UP or DOWN buttons.

By default, the setpoint range is 50-104°F (10-40°C). See MAX Settings on page **27** to increase the MAX setting, if necessary.

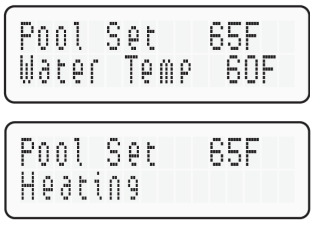



**Figure 39. Alternating Display During Heating**

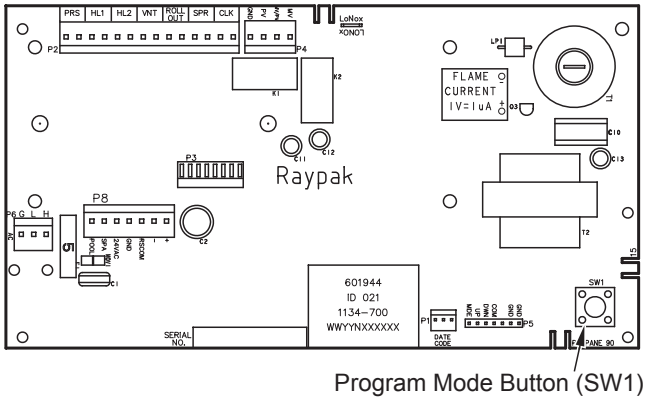



**Figure 40. Thermostat Program Button (SW1)**

## Service Menu and Fault History

To access the Service Menu and fault history, press the Mode and UP buttons simultaneously for 3 to 5 seconds. The heater will continue to operate while in the Service Menu. The first screen displayed is the Flame Strength indicator, which indicates the pilot flame current using a bar graph and numerical display. A signal of less than 4 bars indicates a weak flame signal and may require service. Refer to the Troubleshooting section for possible causes and corrections.

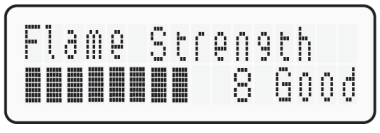



**Figure 41. Flame Strength Indicator**

Press the DOWN button. The Supply Voltage screen indicates the voltage supplied to the control board. Normal readings range from 24 to 29 volts.


**Figure 42. Supply Voltage Indicator**

Press the DOWN button. The Run Time indicates the total hours of operation for the pool heater, as measured by the amount of time that the main gas valve has been powered. The Cycle count indicates the number of on/off cycles of the heater, as measured by the number of times the pilot valve has been powered.

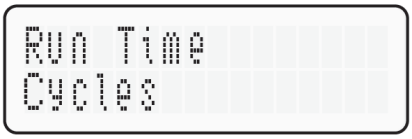



**Figure 43. Run Time/Cycles**

Press the DOWN button. The Fault History displays up to ten faults in memory. The order of the faults begins with “Fault Last,” which is the most recent fault, and proceeds through ten most recent messages in chronological order. The second line of the display shows the fault message. If there are no faults in the history buffer, the second line reads “All Faults Clear.”

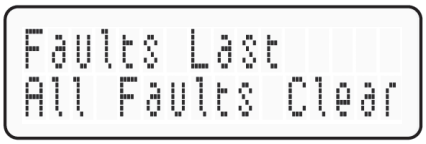
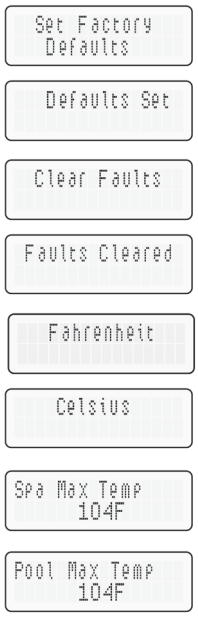



**Figure 44. Fault History Indicator**

## Program Button

1. Remove the four screws holding the control cover, and swing the panel down so the back side of the board is visible. Locate the Program Mode button (SW1). See **Figure 40**. Press and hold the button for 5-7 seconds until SET FACTORY DEFAULTS appears on the display. Release the program button.
2. Press the MODE button sequentially until the desired program event is reached. There are 5 different events that can be programmed. They appear in the sequence listed in **Figure 45**.




Resets board to factory default settings.

Resets faults in the History File.

Change from Fahrenheit to Celsius.

SPA setpoint maximum adjustment.

POOL setpoint maximum adjustment.

**Figure 45. Programmable Events**

### Set Factory Defaults

Refer to step one above to access the program screen. SET FACTORY DEFAULT should appear on the screen. If it does not, press the MODE button until it appears on the digital display. Press and hold both UP and DOWN buttons for 5-7 seconds until DEFAULT SET appears. This operation resets the operating program to its factory default values.

Both the POOL and SPA setpoints will revert to 65°F (18°C) and both POOL and SPA maximum temperature settings will be 104°F (40°C). The CONTROL LOCKOUT PIN will be cleared and the control will resume normal operation.

### Clear Faults

Refer to step one above to access the program screen. Press the MODE button until CLEAR FAULTS appears on the digital display. Press and hold both UP and DOWN buttons for 5-7 seconds until FAULTS CLEARED appears. This operation resets the Fault History file to “0” and clears all the stored faults.

### Fahrenheit or Celsius

Refer to step one above to access the program screen. Press the MODE button until FAHRENHEIT or CELSIUS appears on the digital display. The UP or DOWN buttons will select FAHRENHEIT or CELSIUS on the temperature display. Choose the desired temperature scale.

### Spa Max Temp – Spa Setpoint Maximum Adjustment

Refer to step one above to access the program screen. Press the MODE button until SPA MAX TEMP appears on the digital display. Using the UP and DOWN buttons will change the Maximum Temperature Setting to your desired value. The control can be set for a maximum of 107°F (42°C).

### Pool Max Temp – Pool Setpoint Maximum Adjustment

Refer to step one above access into the program screen. Press the MODE button until POOL MAX TEMP appears on the digital display. Using the UP and DOWN buttons will change the Maximum Temperature Setting to your desired value. The control can be set for a maximum of 107°F (42°C).

## Control Lockout

The heater is equipped with a Control Lockout feature to prevent unauthorized tampering or adjustment of the control settings. To lock out the controls, press the DOWN button and MODE button for 5 seconds. Choose a three digit PIN, using the UP and DOWN buttons to select the digits and the MODE button to lock in selections. Confirm your selection and record your PIN.

To unlock the controls, press any button to bring up the ENTER PIN menu. Enter the PIN that was used to lock the control. Note that power cycling will not clear the lockout. Successfully unlocking the control will display “LOCKOUT CLEARED.” Failure to enter the correct PIN will display “INVALID PIN.”

In the event that the user-selected PIN is lost or does not clear the Control Lockout, use the Program Button to SET FACTORY DEFAULTS. This will clear the PIN and allow normal operation and selection of a new PIN if desired.

**NOTE: Both the POOL and SPA setpoints will revert back to 65°F (18°C) and the POOL and SPA maximum temperature settings will be 104°F (40°C). These setpoints will need to be readjusted to desired settings.**

**NOTE: The LCD temperature display may not agree with the temperature reading of your pool or spa thermometer. The heater reads the water temperature at the inlet. Due to the circulation characteristics of any pool or spa, the water temperature at the inlet to the heater may differ from that observed at a given location in the pool or spa.**

# Status and Diagnostics

The digital models are programmed to display a variety of status and diagnostic messages, depending on the operating conditions.

The following heat status messages are displayed in Pool, Spa, and Remote modes when there are no active fault conditions.

| Display | Condition |
|---|---|
| **Heating** | Call-for-heat established, flame present. |
| **Spark** | Spark operating. |
| **No Demand** | Heat demand is satisfied. |

**Table O. Heater Status Messages - No Active Faults**

The following conditions are displayed in Pool, Spa and Remote modes.

| Display | Condition |
|---|---|
| **Sensor Failure** | Thermistor temperatures disagree by more than 2°F (1°C). |
| **Sensor Open** | Thermistor sensor failed open. Below -20°F (-29°C). |
| **Sensor Short** | Thermistor sensor failed short. Above 217°F (103°C). |
| **Flame w/o CFH** | Board is sensing flame when both main and pilot valves are commanded shut. |
| **PV Output Fault** | Pilot gas valve output is not in commanded state. |
| **LoNox Tab Fault** | Voltage is sensed at the Lo NOx terminal on a non -Lo- NOx heater (Lo NOx tab is intact). |
| **Internal Fault** | Board fault, replace board. |
| **EEPROM Fault** | Memory fault, reset setpoints, replace board if fault does not clear. |
| **Clock/Fireman Sw** | Time clock/fireman switch circuit is open. |
| **Low Temp Lockout** | Water temperature below 36°F (2°C). |

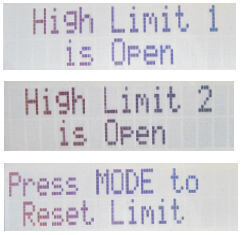
**Table P. Heater Status Messages - Active Faults**

The following conditions are displayed only while there is a demand for heat present.

| Display | Condition |
|---|---|
| **Water Sw Open** | Water pressure switch open. |
| **Vent/Field Sw #1** | Vent spill switch/field switch #1 open. |
| **Hi Limit 1 is open** | High limit 1 open. For ASME units ONLY, this is a manual-reset fault. Press the MODE button to reset. |
| **Hi Limit 2 is open** | High limit 2 open. For ASME units ONLY, this is a manual-reset fault. Press the MODE button to reset. |
| **Rollout Sw Open** | Rollout switch open. |
| **Flow/Field SW #2** | Field-supplied flow switch/field switch #2 open. |
| **Ignition Lockout (Propane Tab Broken)** | **Alternating with "No pilot sensed"** - Pilot flame not established within the required time (15 sec or 90 sec). **Alternating with "Main Ign Failure"** - Pilot flame lost during the 8 second trial to ignite the main burner. |
| **Ignition Failure (Propane Tab Not Broken)** | **Alternating with "No pilot sensed"** - Pilot flame not established within 90 seconds. |
| **Ign 60 min Delay (Propane Tab Not Broken)** | **Alternating with "Main Ign Failure"** - Pilot flame lost 4 times within the 8 second trial to ignite the main burner. Heater will lockout for 60 minutes before retrying. |

**Table Q. Heater Status Messages - Demand for Heat**

## High Limit Events




ASME units ONLY.

**Figure 46. High Limit Events**

| TO ELIMINATE HIGH LIMIT EVENTS |
|---|
| 1. Confirm circulation pump is running during heating cycle.<br>2. Pump should shutoff a minimum of 5-minutes after heating cycle ends.<br>Failure to follow these steps may cause residual heat buildup - triggering a High Limit event.<br><br>If issues persist, contact your service installer. |

## Remote Control Installation and Operation

**⚠CAUTION: Before installing remote controls to the digital heaters, read the following: The digital thermostat model is remote-ready in most cases. The digital liquid crystal display (LCD) shows the actual pool temperature, operating status, and service codes. See Figure 47. The touch pad on the control panel allows you to select the desired pool or spa temperature. It also indicates when a remote system is controlling the heater by displaying Remote in the display. When connecting the heater to a remote system, identify whether it is a two- or three-wire remote system. Select the appropriate instruction listed below to properly install the remote to the heater.**

## Remote Operation

The heaters are equipped with the ability to work with external remote controls. The supplied 7-pin remote wiring connector supplies power out to either a toggle switch or the switch contacts of a third-party remote. The remote works by either making or breaking the circuit created by the remote wiring. Typically, a remote does not supply power to the heater, it only provides a switching function to turn the heater On or Off. **If your remote is supplying its own voltage to the heater, it will not work with this heater and may damage the digital circuit board.**

For operation of the heater using the onboard thermostatic controls with a time clock. **See "Time Clock/Fireman's Switch" on page 30.**

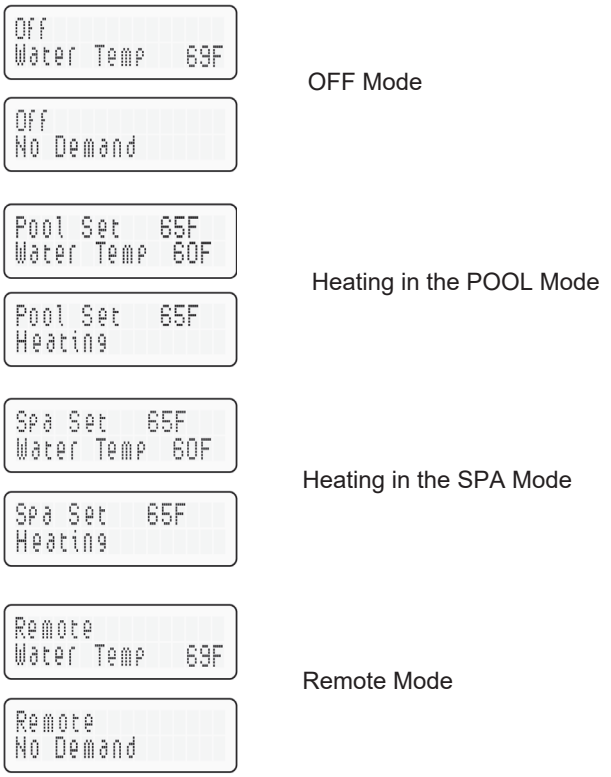



**Figure 47. Remote Control Menu - Remote Operation**

## Activating the Remote

To activate or deactivate the remote function:

1. Press and hold the UP and DOWN arrow buttons for 3 to 5 seconds.

The second line of the display will alternate even when the unit is off ("No Demand").

**NOTE: When in remote operation, the keypad mode and temp buttons are disabled.**

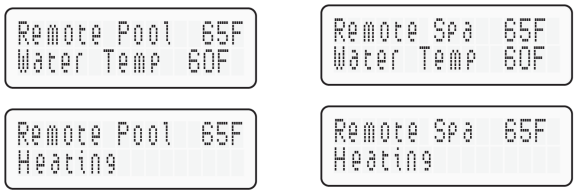



**Figure 48. Remote Control Menu - Activation**

# Remote Control Wiring


**⚠CAUTION: Electrostatic Discharge (ESD) damage can be caused by direct or indirect contact with the wiring or circuit board. When one walks to the heater area, an electrostatic charge accumulates on the body. Contact of a finger allows the body to discharge, possibly causing device damage. This damage can be limited if the service person discharges himself, following ESD preventive/removal practices, and holds on to the heater enclosure for 5 seconds before proceeding.**

**Important Installation Notes for Remote or External Wiring Configuration:**

- Remote wiring must be run in a separate conduit.
- Remote wiring must not be run parallel to high voltage lines.
- For runs of under 30' (9 m), remote wiring should have stranded conductors with a minimum of 22 AWG, 600V, cable twisting 1.5" to 2.5" (3.8 to 6.4 cm) lay and jacketed.
- For runs over 30' (9 m), the conductors should be a minimum of 20 AWG, 600V, cable twisting 1.5" to 2.5" (3.8 to 6.4 cm) lay that is shielded and jacketed.
- Maximum cable length is 200' (61 m).
- For both two- and three-wire remote systems, the provided 7-pin wiring connector must be utilized.

**NOTE: The remote wires must be connected to the 7-pin connector before the connector is plugged into the board.**

## 2-Wire Remote Control (On-Off)

This application assumes that only one heating function (pool or spa) is required.

1. Turn on power to the heater.
2. For a 2-Wire Remote Control from a remote without its own sensor, push the MODE button to the “POOL” or “SPA” mode and set the desired setpoint (e.g. 102 °F (39°C) for Spa).
3. For a 2-Wire Remote Control from a remote with its own sensor, push the MODE button “POOL” or “SPA” mode and set the temperature to the highest setting available on the control. The actual setpoint will be controlled by the remote control.
4. Turn the MODE button to “OFF” and remove power from the heater.
5. On the “Remote Interface Harness”, connect the BLUE wire to one side of the “REMOTE” switch and connect the other side to either the ORANGE/BLACK wire for “SPA” operation or the BLACK/ORANGE wire for “POOL” operation. See **Figure 49**.

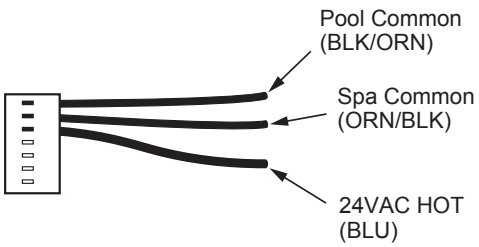



**Figure 49. 7-Pin Remote Interface Harness**

6. Attach wire nut on unused wire to the “Remote Interface Harness.”
7. Install the “7-Pin Remote Interface Harness” to the P8 connector and turn power “ON” to the heater. See **Figure 50**.

For activation of the remote control, see "Remote Operation" on **page 29.**

## 3-Wire Remote Control Using Three-Position Switch (Pool-Off-Spa, or Low-Off-High)

This application assumes that both heating functions (pool and spa) are required.

1. Turn on power to the heater.
2. Push the MODE button to the “POOL” or “SPA” mode and set the desired temperature for each (e.g. 80°F (27°C) for Pool and 102°F (39°C) for Spa).
3. Turn the MODE button to “OFF” and remove power from the heater.

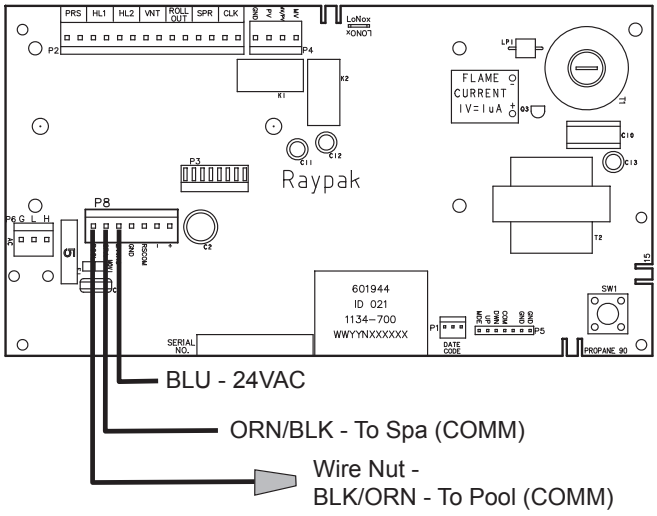



**Figure 50. 2-Wire Remote Harness Installation on the P8 Connector of the Board**

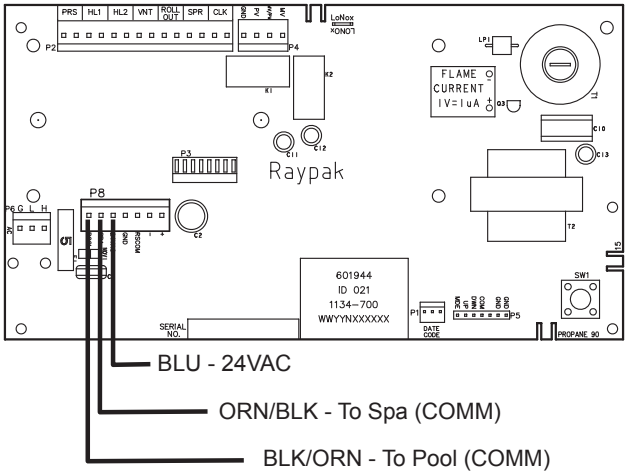



**Figure 51. 3-Wire Remote Harness Installation on the P8 Connector of the Board**

4. On the “Remote Interface Harness” connect the BLUE wire to one side of the “REMOTE” switch and connect the ORANGE/BLACK wire for “SPA” operation and the BLACK/ORANGE wire for the “POOL” operation. See **Figure 49**.
5. Install the “Remote Interface Harness” to the P8 connector and turn power ON to the heater. See **Figure 51**.

For activation of the remote control, see **"**Remote Operation" on **page 29.**

## Time Clock/Fireman’s Switch

To operate the heater with a time clock, connect the timer to the fireman’s switch connection in the heater’s wiring. The time clock should be of the dual switch type and set to shut off the call-for-heat to the pool heater (chauffe-piscine) 15 to 20 minutes prior to shutting down the pool pump.

For digital heaters, the fireman's switch connection is located on the 14-pin header connected to the digital control board. Splice into the red wire jumper tagged – Where necessary add "Fireman's" switch circuit here – to connect the time clock.

**The fireman's switch connection must be a dry contact and must not supply power to the heater. Powering the fireman's switch connection externally may damage the heater, and is not covered by warranty.**

Digital heaters: Do not exceed 50 ft (15 m) of total wiring using 18 AWG stranded copper wire rated for 105°C minimum.

**NOTE: When using a time clock, the digital heater will display "Clock/Fireman Sw" when the fireman's switch is open, indicating that the time clock has shut off the call-for-heat.**

## Water Pressure Switch

The water flow switch ensures that the heater operates only when the filter pump is in operation. It is located on the In/Out header. It is factory-set at 1.75 PSI for deck-level installations.

### Water Pressure Switch Adjustment

When the heater is located below the level of the spa or pool, it may be necessary to adjust the pressure switch to compensate for the no-flow static head. If it is necessary to adjust the water pressure switch, utilize the following procedure:

1. Make sure the pool filter is clean before adjusting the switch.
2. Set the heater control to the OFF mode.
3. Turn the filter pump ON and confirm that the pressure switch is closed (use a multimeter to check). If the pressure switch fails to close, either the switch setting is too high or not enough pressure is being supplied by the filter pump.
4. Turn the heater ON.
5. Manually turn the pressure adjustment knob clockwise until the heater shuts off. (A flat screwdriver may be necessary if knob is too tight.)
6. Slowly turn the adjustment knob counter-clockwise until the heater calls for heat again.
7. Turn an additional 1/2 turn counter-clockwise.
8. While the heater is running, check the adjustment by turning the pump off and on several times. The burners should shut off immediately when the pump is turned off. If it does not, repeat the above steps until proper operation is observed.

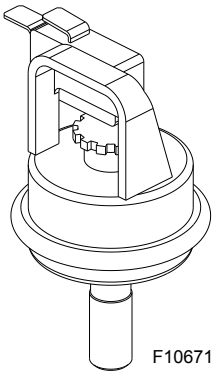



**Figure 52. Water Pressure Switch Assembly**

**NOTE: The sheet metal access panel should be in place at all times to protect the water pressure switch from rain and other environmental factors.**

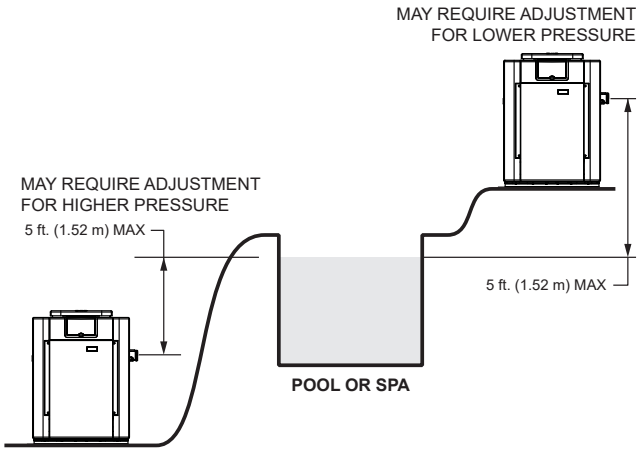



**Figure 53. Pressure Switch Adjustment Requirements**

**NOTE: : If heater is installed outside of the limits shown, a switch rated for a higher pressure (11 psi / 76 kPa) maybe used. A flow switch, mounted and wired adjacent to the heater, may be used in place of the factory-mounted pressure switch. See "ILLUSTRATED PARTS LIST" on page 47 for 11 psi / 76 kPa water pressure switch.**

### Two-Speed Pumps

In some cases, the flow on the low-speed is insufficient to operate the heater. This is apparent when the water pressure switch cannot be further adjusted or if the heater makes banging noises or shuts off on high limit. In these cases, the pump must be run at high speed when heating the water.

**⚠CAUTION: Do not operate the heater without the function of a properly-adjusted water pressure switch or flow switch.**

## Flame Roll-Out Safety Switch

Heaters are equipped with a thermal cutoff device to prevent flame roll-out in the event the heat exchanger becomes blocked. This is a “single-use” type fusible link or thermal fuse, that must be replaced when disabled by an over-temperature condition, caused by excessive restriction in the heat exchanger flue passage.

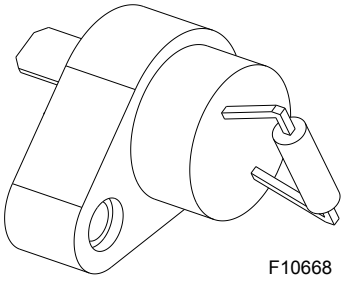



**Figure 54. Flame Roll-Out Safety Switch**

## High Limits

The heater is equipped with two high limits.

On residential units (polymer headers), both are automatic and are located in the inlet/outlet header. Both are set at 135°F (57°C).

On commercial units (bronze headers), both are located on the inlet/outlet header. HL1 is automatic reset and set to open at 160°F (71°C). HL2 is automatic reset and set to open at 135°F (57°C).

**NOTE: An erratic high limit is often characteristic of an internal heat exchanger problem, e.g. scale build-up, defective bypass. Refer to "TROUBLESHOOTING" on page 38.**

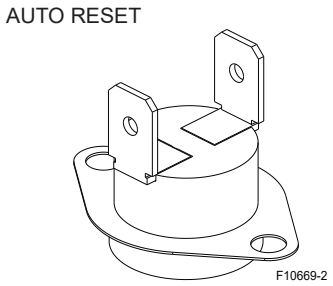



**Figure 55. High Limit Switches**

### High Limit Removal

1. Shut off main electrical power switch to heater.
2. Remove inlet/outlet sheet metal access panel.
3. Remove defective high limit and replace with the correct new high limit.
4. Replace access panel.

## Pilot Safety

The heater employs a pilot safety which closes the main gas valve within 8/10ths of a second whenever the pilot flame is interrupted. The pilot flame is automatically lit when the device is powered. The heater performs its own safety check and opens the main valve only after the pilot is proven to be lit.

## Burner Tray Removal

1. Shut off main electrical power switch to heater.
2. Shut off gas upstream of heater.
3. Remove front door.
4. Disconnect gas line from gas valve.
5. Remove (2) screws that mount burner tray to unit, and (2) screws that secure gas valve to jacket.
6. Disconnect wires that terminate at gas valve.
7. Disconnect hi-tension wire from PC board.
8. Carefully slide out burner tray assembly.
9. Reverse above procedure to reinstall.

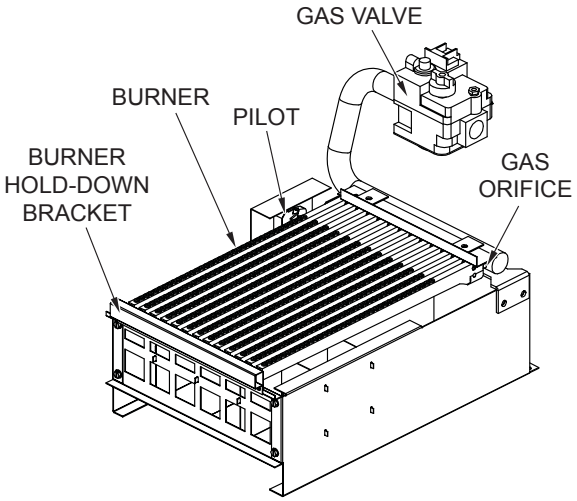



**Figure 56. Burner Tray Assembly**

## Gas Valve Removal

1. Shut off gas supply to the heater. Remove gas piping to gas valve inlet.
2. Disconnect wires, pilot tubing and bleed line, if required.
3. Remove burner tray from heater.
4. Turn vertical gas pipe from manifold slightly and unscrew gas valve.
5. Reverse above procedure to reinstall.

## Main Burner And Orifice Removal

1. Remove burner tray, following above procedure.
2. Remove screws and burner hold-down bracket.

**NOTE: If the heat exchanger is sooted badly, the burner hold-down bracket and spacer can become distorted from direct-flame impingement and this usually necessitates replacement of these parts.**

3. Lift burners from slotted spacers and slide from orifices. Clean with a wire brush.
4. Orifices usually do not need to be replaced. To clean, run either copper wire or wood toothpick through orifice. **Do not** enlarge hole. To remove orifice, use a socket wrench and remove from manifold. **DO NOT** over-tighten when reinstalling.

## Pilot Removal And Cleaning

1. Disconnect pilot tubing and wires from gas valve.
2. Remove pilot assembly from burner tray.
3. Remove pilot from bracket.
4. Remove pilot orifice and air opening, and clean with wire or small brush.

**⚠CAUTION! Do not enlarge hole in pilot orifice.**

5. Reverse above procedure to reinstall.

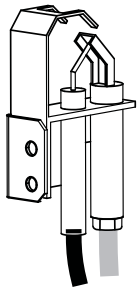


**Figure 57. Digital Pilot**

## Heat Exchanger Removal

1. Shut water, gas and electricity off, close valves and relieve pressure, then remove relief valve. Remove side access panels.
2. Remove top jacket holding screws.
3. Remove rear top panel.
4. Remove screws mounting the rain shield to the rear panel. Also remove the screws that mount the rain shield to the sway brace. Remove rain shield.
5. Remove the four (4) screws holding down the flue collector. Remove the flue collector.
6. If ProTek Shield Assy is attached to the heater; disconnect flange nuts on Inlet/Outlet header, remove ProTek Shield Assy bonding wire from heat exchanger stud, loosen union at gas pipe and slide heater away from piping.
7. Lift heat exchanger straight up using caution not to damage refractory.
8. Reverse above procedure to reinstall. Make sure the insulation strips are properly replaced on top of the refractory retainer.

## Tube Cleaning Procedure

Establish a regular inspection schedule, the frequency depending on the local water conditions and the severity of service. Do not let the tubes clog up solidly. Clean out deposits over 1/16" (1.6 mm) in thickness.

The heater may be cleaned from the return header side, without breaking pipe connections. It is preferable, however, to remove both headers for better visibility through the tubes and to be sure the ground-up lime dust does not get into the system. Note that you do not remove the top panel or the heater exchanger, generally.

After reaming, mount the wire brush in place of the auger and clean out debris remaining in the tubes.

Another method is to remove the heat exchanger, ream tubes and immerse heat exchanger in non-inhibited de-scale solvent for severe scale build-up.


**Figure 58. Tube Cleaning Kit (P/N: 052871F)**

## Desooting Procedure

**⚠WARNING: Soot Is Combustible. Exercise Extreme Care.**

Soot will clog areas between fins and cause eventual tube failure. Any sign of soot at the base of the burners or around the outer jacket indicates a need for cleaning.

1. Remove top and flue collector from cabinet.
2. Remove “V” baffles from heat exchanger.
3. Remove burner tray. See page **32**.
4. If ProTek Shield Assy is attached to the heater, remove ProTek Shield Assy bonding wire from heat exchanger stud.
5. Remove heat exchanger from the heater and wash with a garden hose, making sure soot is removed from spaces between fins.
6. Reverse above procedure to reinstall.

**NOTE: In extreme cases it may be necessary to do steam cleaning at the local car wash. DO NOT WIRE BRUSH.**

## Combustion Chamber Removal

To remove combustion chamber, you must first have removed the heat exchanger.

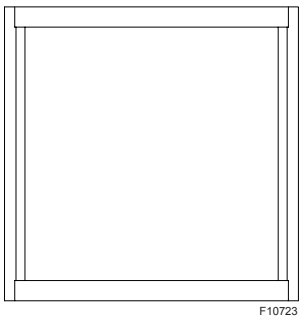



**Figure 59. Refractory Panels**

**⚠WARNING: When removing the burners or heat exchangers, take precautions to avoid creating airborne dust and avoid inhaling airborne fibers. When cleaning spills, use wet sweeping or High Efficiency Particulate Air (HEPA) filtered vacuum to minimize airborne dust. Use feasible engineering controls such as local exhaust ventilation or dust collecting systems to minimize airborne dust. Wear appropriate personal protective equipment including gloves, safety glasses with side shields, and appropriate NIOSH-certified respiratory protection, to avoid inhalation of airborne dust and airborne fiber particles.**

## Unitherm Governor (U.G.) Replacement

1. Shut water, gas and electricity off, close valves and relieve pressure.
2. Drain heat exchanger.
3. Remove retainer plug located next to the outlet pipe connection on polymer header models.
4. Unsnap old U.G. to remove from retainer plug. Snap in new U.G.
5. Reinstall retainer plug, taking care to lubricate gasket with a non-petroleum based grease such as AquaLube.

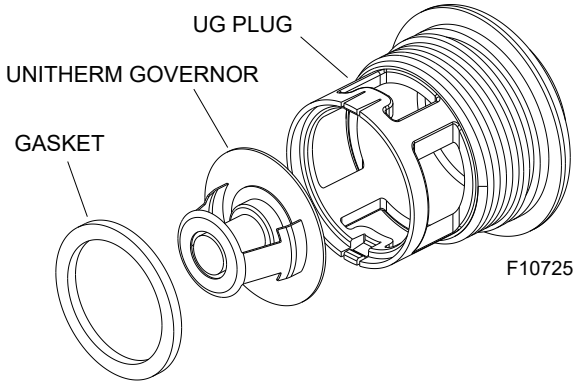



**Figure 60. Unitherm Governor - Polymer**

To test the operation of the Unitherm Governor - Polymer, place in hot water (over 110°F [43°C]) and watch for movement against spring. If there is no movement, replace unit.

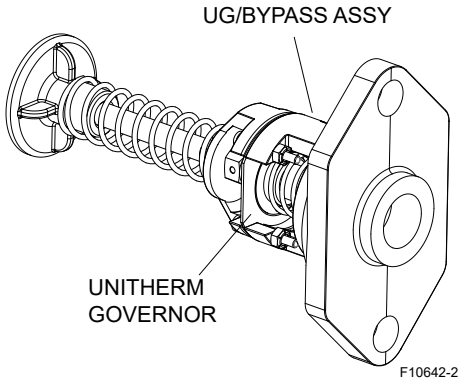



**Figure 61. Unitherm Governor/Bypass Valve Assy – ASME**

**NOTE: The U.G. on bronze header models (ASME) can only be replaced by replacing the entire Unitherm Governor/Bypass Valve Assembly.**

# 8. OPERATING INSTRUCTIONS

## Before Start-Up

### Burners

Keep heater area clear and free from combustibles, flammable liquids and chemicals. Do not obstruct the flow of combustion and ventilation air.

### Water

Water must be flowing through the heater during operation. Ensure that the system is filled with water and that the pump is operating.

## Start-Up Procedures

Your pool/spa heater has been designed for years of safe and reliable pool/spa water heating. It is available with electronic ignition. ASME-certified units typically used in commercial applications, are also available. This manual provides installation, operation, maintenance, and service information for these heaters.

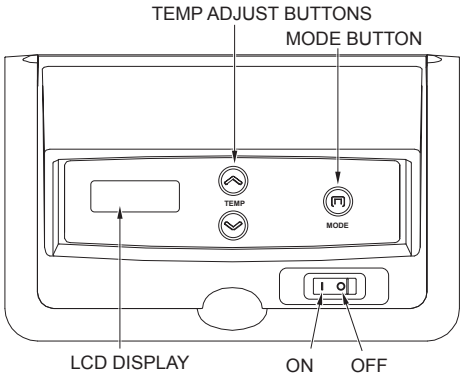



**Figure 62. Heater Control Toggle Switch**

If your heater has been installed correctly, operating the heater is an easy task. The upper front panel of the heater contains the control center that allows you to turn the heater On or Off and adjust the temperature settings for the pool or spa. The temperature range is factory set from 65°F (18°C) to 104°F (40°C). See **Figure 62** for location of toggle switch to turn the heater On and Off.

See **Section 7** for additional details about the use of the controls in the Control Adjustments subsection.

### After Start-Up

Feel the inlet and outlet pipes. Outlet pipe should be only slightly warmer than the inlet. It should not be hot.

**⚠WARNING: Should overheating occur or the gas supply fail to shut off, turn off the manual gas control to the appliance.**

## Visual inspection

With the heater on, remove the door and make a visual check of the pilot and burner. The flame should be blue with a well-defined pattern.

A yellow or "floating" flame indicates restricted air openings or incorrect orifice size. Should this occur, shut the heater off and contact your installer or gas supplier.

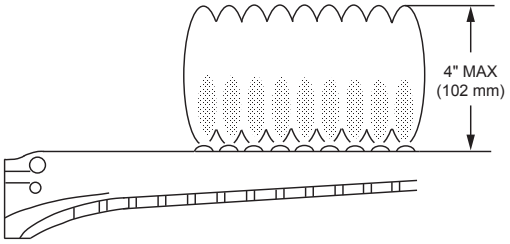



**Figure 63. Main Burner Flame**

## Water Pressure Switch

A water pressure switch is provided in the heater to shut off the burners in the event that water supply is interrupted. It is very important to verify that the switch electrically opens and shuts off the gas valve when water flow to the heater is interrupted. Otherwise rapid and severe damage will likely occur to the heater.

The water pressure switch should be checked and adjusted for proper operation by a qualified service person at the time of installation and periodically checked thereafter. Refer to **"Water Pressure Switch Adjustment" on page 31** of this manual.

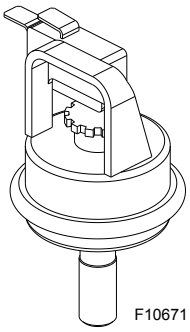



**Figure 64. Water Pressure Switch**

**⚠WARNING: Operation of the heater without water circulation will cause rapid and severe damage to the heater. Such damage is not covered under warranty.**

## OPERATING INSTRUCTIONS AND SHUTOFF PROCEDURES
## ELECTRONIC IGNITION DIGITAL MODELS
## (AUTOMATICALLY-LIGHTED PILOT)

### FOR YOUR SAFETY READ BEFORE LIGHTING

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell near the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS:
*Do not try to light any appliance.
*Do not touch any electric switch; do not use any phone in your building.
*Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
*If you cannot reach your gas supplier, call the fire department.

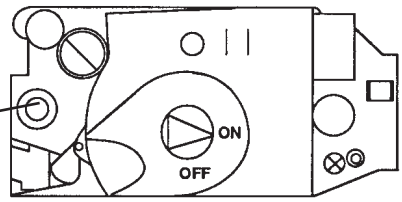
C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

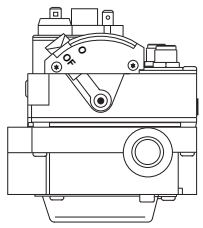
### LIGHTING INSTRUCTIONS

1. **STOP!** Read the safety information above.
2. Set the thermostat to the lowest setting.
3. Turn off all electrical power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
5. Remove heater door panel.
6. For **Honeywell valve**: Turn gas control knob clockwise ↷ to "OFF". For **Robertshaw valve**: Models 266/406: Turn gas control knob clockwise ↷ to "OFF". Model 206 Push in and move gas control lever counter-clockwise ↶ to "OFF" position.
7. Wait 5 minutes to clear out any gas. If you then smell gas, **STOP!** Follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Turn gas control knob counter-clockwise to "ON". (Honeywell VR8340 and Robertshaw 7000).
9. Replace heater door panel.
10. Turn on all electrical power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

**HONEYWELL VR8340 GAS VALVE IID**




**ROBERTSHAW 7200 GAS CONTROL LEVER SHOWN IN "OFF" POSITION**




### TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat at the lowest setting.
2. Turn off all the electrical power to the appliance if service is to be performed.
3. Remove heater door panel.
4. For **Honeywell VR8340 and Robertshaw 7000 gas valve.**
   Turn gas control knob clockwise ↷ to "OFF".
   Make sure knob rests against stop.
5. Replace heater door panel.

# 9. MAINTENANCE AND CARE

**⚠WARNING: Check the heater for possible rodent nests after long periods of non-use.**

To be followed one month after start-up and then semi-annually.

1. Inspect the top of the heater and drafthood for soot, a sticky black substance around finned tubes and “V” baffles, and open flue gas passageways. Any visible soot should be cleaned for proper operation.

**⚠CAUTION: Soot may be combustible. Wet sooted surfaces completely prior to cleaning. Do not use steel wire brush.**

2. Clean main burners and pilot burner of dust and lint.
3. Inspect and operate all controls, gas valve and pressure relief valve (if equipped).
4. Make visual check of the burner and pilot flames. Yellow flame means restriction of the air openings. Lifting or blowing flame indicates high gas pressure. Low flame means low gas pressure. Should the latter occur, shut the heater off and contact your gas supplier or qualified service agency. See **Figure 63** and **Figure 72.**
5. On indoor heaters, clean room intake openings to ensure adequate flow of combustion and ventilation air.

**⚠CAUTION: Combustion air must not be contaminated by corrosive chemical fumes which can damage the heater. Such damage is not covered under warranty.**

6. Keep area around heater clear and free from combustible materials, gasoline and other flammable and corrosive vapors and liquids.

**If Heater Will Not Fire:**

If you have no electrical power, it may be that your “circuit breaker” has tripped. Try re-setting it.

If you have electrical power but the heater will not fire check the following or see **"TROUBLESHOOTING" on page 38**.

1. The time clock must be in the “ON” position.
2. Your pump strainer basket may be full. If so remove debris.
3. Your filter may be dirty. If so, backwash or clean filter. (To tell if your filter is dirty, look to see if the filter pressure is higher than usual).
4. The pump may have lost its prime and be running dry. Check the pressure on the filter. If there is no pressure, then you are not moving water (or your gauge is broken). Try to get the pump to run at its normal flow rate.

# Cold Weather Operation

## Important Freeze Information

**MODERATE CLIMATE:** Heater operation can continue during short-term cold spells. When temperatures are between 0°F (-18°C) and 32°F (0°C), flow (continuous pump operation) must be maintained.

**⚠CAUTION: Do not use the heater to maintain water temperatures just above freezing or for freeze protection. When heater is used during freezing weather, care must be taken to avoid freeze-ups. Continuous pump operation is a must. Additional protection may be required. The heater is not warranted against freeze-ups.**

**COLD CLIMATE:** Prolonged operation with water temperatures below 50°F (10°C) is not recommended. When starting the heater with water temperatures below 50°F (10°C), operate the heater continuously until higher temperatures are reached. Operating the heater for prolonged periods with pool water below 50°F (10°C) can seriously damage the heater, and is not covered by the warranty. For cold climate areas, please follow the winterizing procedures listed below.

## Winterizing the Pool and Spa Heater

Heaters installed outdoors in freezing climate areas may be shut down for the winter. Observe the following procedure for winterizing the heater:

1. Turn off gas valve, manual gas valve, and electrical supply to the heater.
2. Remove the ProTek Shield™ Assembly (if attached). Remove the heat exchanger inspection panel on the side opposite water piping to gain access to the drain plug on the return header. Open drain plug on return header. See **Figure 65** and **Figure 66.**

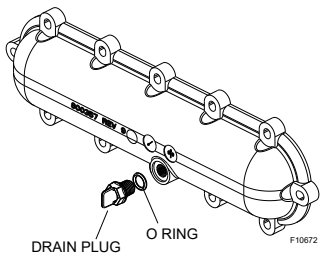



**Figure 65. Return Header Drain Plug - Residential ("P" Prefix Model)**

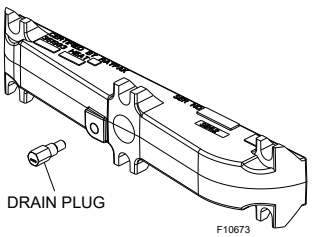



**Figure 66. Return Header Drain Valve - Commercial ("B" Prefix Model)**

# 10. TROUBLESHOOTING

**IMPORTANT NOTICE: These instructions are intended for the use of qualified personnel who are specifically trained and experienced in the installation of this type of heating equipment and related system components. Installation and service personnel may be required by some states to be licensed. Persons not qualified shall not attempt to install this equipment nor attempt repairs according to these instructions.**

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| **Harmonics, or whining noise** | U.G. inoperative | Check movement by putting in hot water (110°F [43°C] or higher) |
| | *Debris or restriction in system | Locate the restriction and remove. Flush system and clean |
| | *Debris in gas line | Remove debris or blow out gas line |
| | Low flow | Scale forming in heat exchanger - clean heat exchanger and check pool pH and total alkalinity |
| | When the above listed recommendations do not generate acceptable results, the following service kits are recommended: | |
| | **105F UG Service Kit:** | **Used on Models:** |
| | 018759F | 206-207 |
| | 018759F | 266-267 |
| | 018758F | 336-337 |
| | 018758F | 406-407 |
| **Heater going on and off continuously** | Dirty filter | Clean or replace filter |
| | Low water level in pool | Raise water level |
| | External bypass setting out of adjustment | Adjust bypass |
| | *Pressure switch out of adjustment | Adjust pressure switch |
| **Liming or scale forming in exchanger** | Pool water | See Water Chemistry on page **5** |
| | Bypassing too much water | Inspect bypass for movement, if no movement, replace |
| | U.G. not functioning | Replace if no movement when heated |
| **Sooting** | High flow rates | Reduce by adding manual bypass valve<br>Adjust manual bypass valve until heater outlet water temp is between 105°F and 110°F (40°C and 43°C) |
| | U.G. inoperative | Check movement by putting in hot water (110°F [43°C] or higher). If no movement, replace |
| | *Air starvation | Refer to installation instructions |
| | *Improper venting | Follow recommended installation instructions |
| | *Insects or debris clogging burner intake ports | Clean burners |
| **Pilot outage or “Weak Flame” signal** | Low gas pressure | Adjust gas pressure |
| | Restricted/dirty pilot | Clean pilot |
| | Weak pilot generator | Replace pilot |
| **Yellow lazy flame** | Low gas pressure | Adjust gas pressure |
| | *Insects or debris clogging burner intake ports | Clean burners |
| **Outer jacket very hot (paint blistered)** | *Broken refractory caused by shipping damage or improper combustion | Replace refractory panels |
| | Excessive sooting of heat exchanger | Determine cause of sooting and correct |

* Indicates symptom which usually occurs on initial start-up.

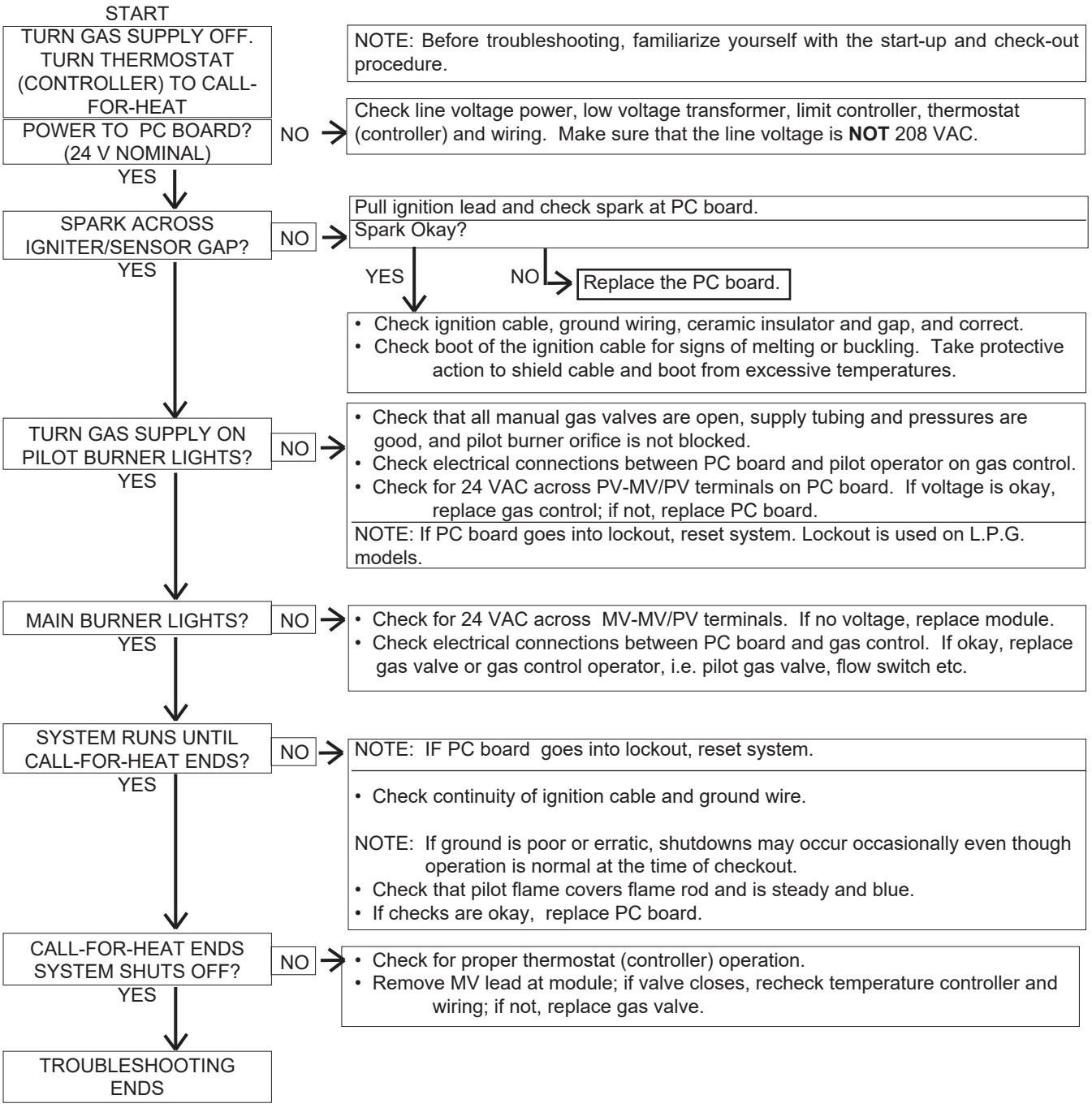
# TROUBLESHOOTING (CONT:)

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| **Takes too long to heat pool or spa** | Under-sized heater | Calculate heating capacity of heater<br>$\frac{\text{Htr. output (BTUH)}}{\text{Pool gallonage x 8.33}}$<br>or refer to heater sizing chart<br>This does not take into account heat loss due to weather |
| | Filter not running long enough | Reset time clock |
| | Dirty filter | Clean filter |
| | Gas line or meter undersized | Refer to installation instructions |
| **Leaking at well** | Overacid | Replace well and maintain proper water chemistry |
| **Leaking at heat exchanger** | Overacid | Replace heat exchanger and maintain proper water chemistry |
| **Gasket brittle and leaking - (overheated)** | Heater running after pump shuts off | See Pressure switch adjustment |
| | Refractory damage | Replace refractory |
| | Sooted heater | Determine cause of sooting and correct |

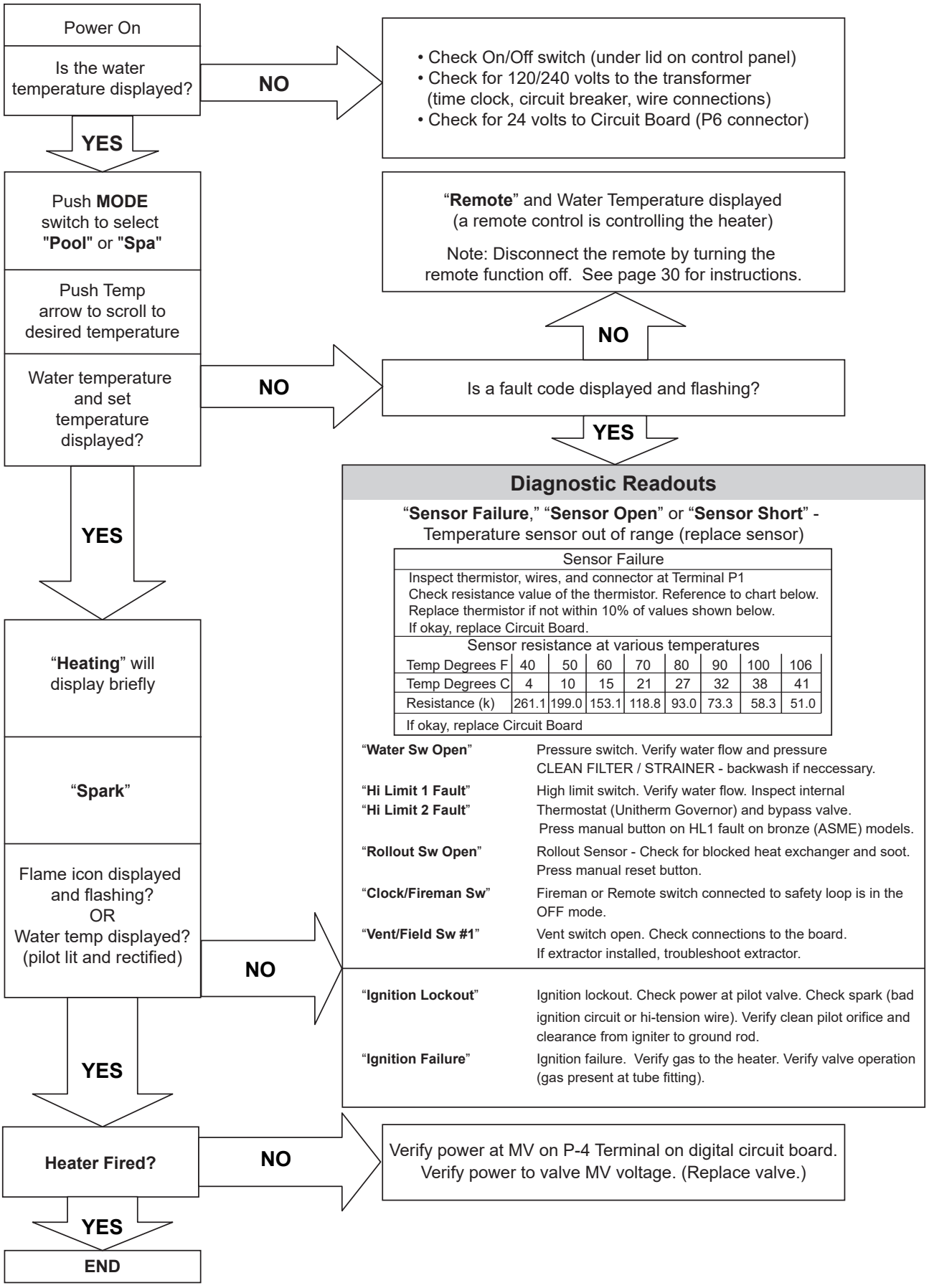
# Digital - Flow Chart

**⚠WARNING: HIGH VOLTAGE**
**For qualified technicians ONLY**

**NOTE: Some heaters may be equipped with an ignition module that shuts off pilot gas if pilot fails to light. To reset, interrupt power to heater.**



# Control Logic - Flow Chart - Digital



# 11. REPLACEMENT PARTS

**NOTE: To supply you with the correct part, it is important that you supply the heater model number, serial number and type of gas when applicable.**

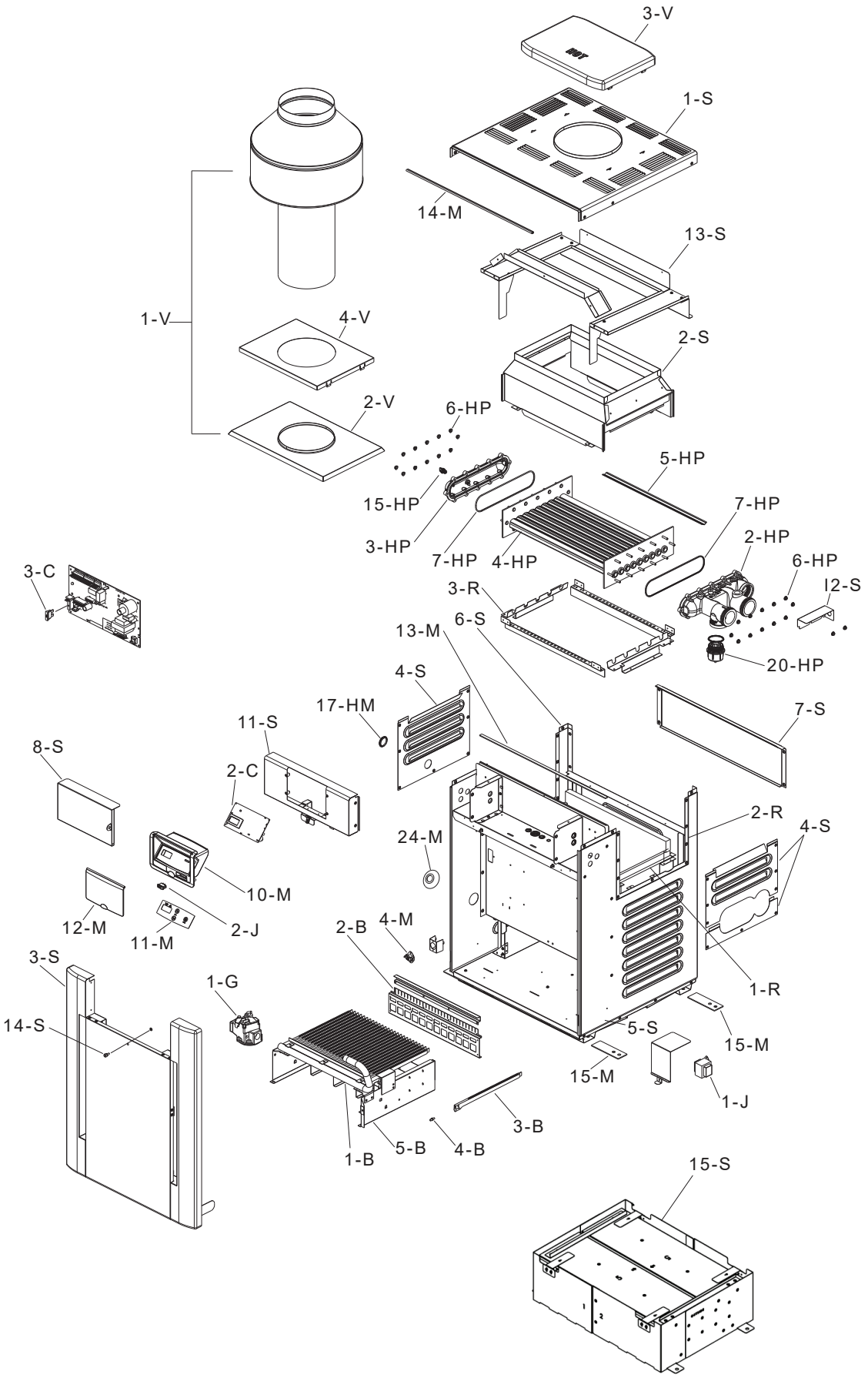
Any part returned for replacement under standard company warranties must be properly tagged with a return parts tag, completely filled in with the heater serial number, model number, etc., and shipped to the Company freight prepaid.

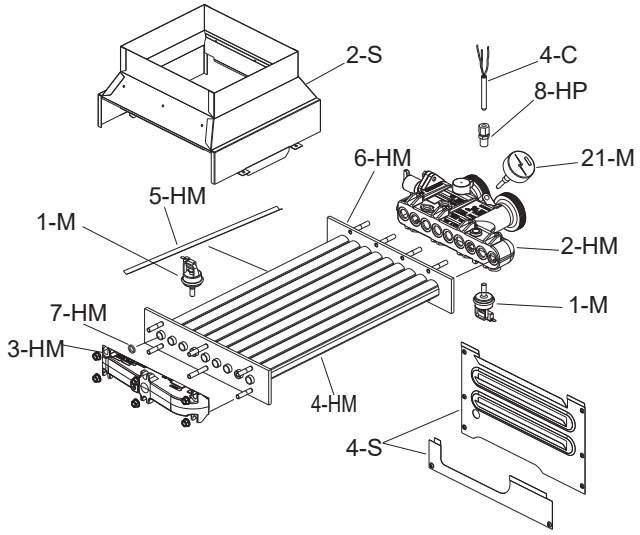
If determined defective by the Company and within warranty, a like part or equal substitution will be returned, freight collect. Credit will not be issued.

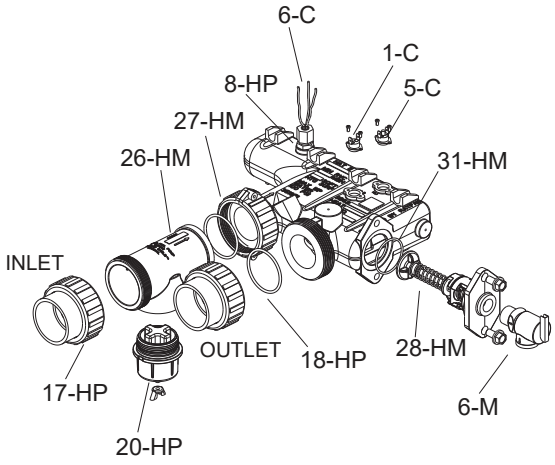
**MANUFACTURER:**

**2151 Eastman Avenue**
**Oxnard, Ca 93030**

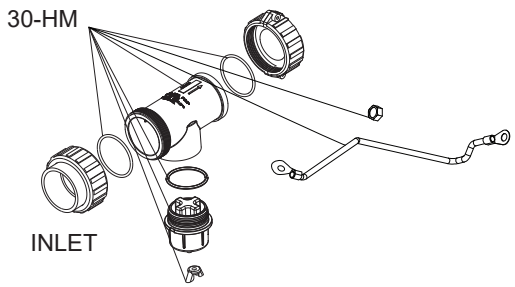
# 12. ILLUSTRATED PARTS LIST



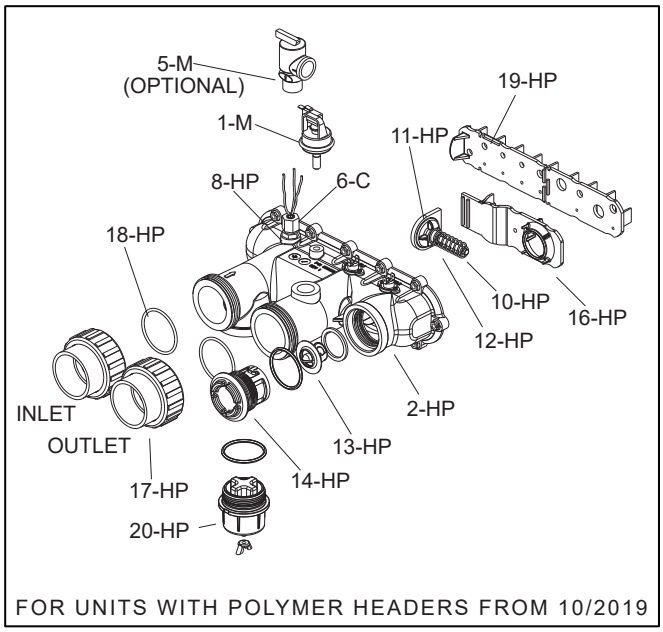


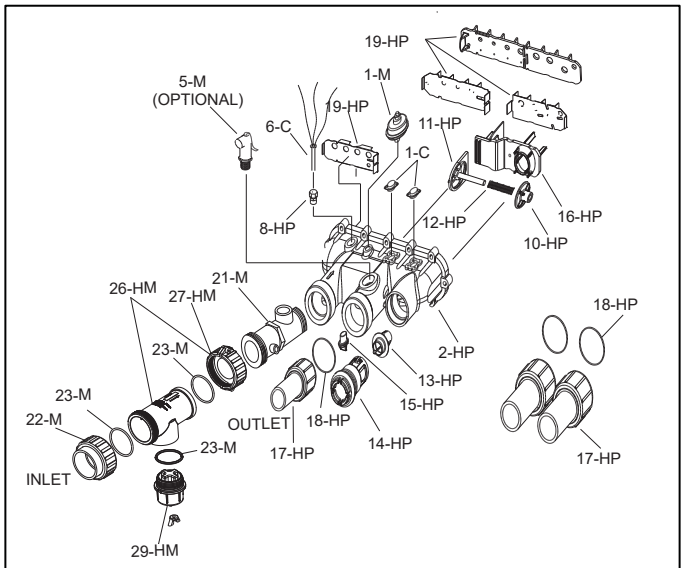

FOR UNITS WITH ASME BRONZE HEADERS FROM 12/2019
(PROTEK SHIELD AVAILABLE ON ASME HEATERS AFTER END OF Q3 2020)



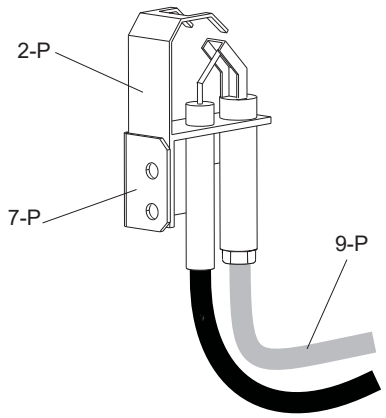

PROTEK SHIELD ADAPTER KIT




FOR UNITS WITH POLYMER HEADERS FROM 10/2019




PROTEK ADPTER AND POLYMER UNITS PRIOR TO 10/2019




HONEYWELL IID ATMOSPHERIC PILOT

| CALL OUT | DESCRIPTION | | 206A | 266A | 336A | 406A |
|---|---|---|---|---|---|---|
| **B** | **BURNER TRAY - SPECIFY ELEVATION*** | | | | | |
| 1-B | Polymer Cu HX, or | Burner Tray w/Burners Nat (sea level)* | 010391F | 010392F | 010393F | 010394F |
| | NAT #50 ORIFICE | Burner Tray w/Gas Valve Nat IID (sea level)* | 010407F | 010408F | 010409F | 010410F |
| | Polymer Cu HX, or | Burner Tray w/Burners Pro (sea level)* | 019206F | 019207F | 019208F | 019209F |
| | PRO #57 ORIFICE | Burner Tray w/Gas Valve Pro IID (sea level)* | 010411F | 010412F | 010413F | 010414F |
| | Polymer Cupro HX | Burner Tray w/Burners Nat (sea level)* | 019210F | 019211F | 019212F | 019213F |
| | NAT #51 ORIFICE | Burner Tray w/Gas Valve Nat IID (sea level)* | 019218F | 019219F | 019220F | 019221F |
| | Polymer Cupro HX | Burner Tray w/Burners Pro (sea level)* | 019222F | 019223F | 019224F | 019225F |
| | PRO #58 ORIFICE | Burner Tray w/Gas Valve Nat IID (sea level)* | 019226F | 019227F | 019228F | 019229F |
| | | Burner Tray w/Gas Valve Pro IID (sea level)* | 019230F | 019231F | 019232F | 019233F |
| 2-B | Burner Spacer/Hold Down Kit | | 010415F | 010416F | 010417F | 010418F |
| 3-B | Burner | | 100-10000414/QTY13 | 100-10000414/QTY18 | 100-10000414/QTY22 | 100-10000414/QTY27 |
| 4-B | Burner Orifice (TO BE ORDERED BASED ON RATING PLATE AND ELEVATION) | | | | | |
| | **NOTE**: Orifice kits are sold in quantities of 5. | | | | | |
| | Natural Gas | | | | | |
| | Burner Orifice #50* (0-1999 ft elevation) | | 100-10006050/QTY13 | 100-10006051/QTY18 | 100-10006052/QTY22 | 100-10006053/QTY27 |
| | Burner Orifice #51* (2000-5999 ft elevation) | | 100-10006054/QTY13 | 100-10006055/QTY18 | 100-10006056/QTY22 | 100-10006057/QTY27 |
| | Burner Orifice #52* (6000-8999 ft elevation) | | 100-10004695/QTY13 | 100-10004696/QTY18 | 100-10004697/QTY22 | 100-10004698/QTY27 |
| | Burner Orifice #53* (9000 + ft elevation) | | 100-10006058/QTY13 | 100-10006059/QTY18 | 100-10006060/QTY22 | 100-10006061/QTY27 |
| | Propane Gas | | | | | |
| | Burner Orifice #57* (0-1999 ft elevation) | | 100-10006062/QTY13 | 100-10006063/QTY18 | 100-10006064/QTY22 | 100-10006065/QTY27 |
| | Burner Orifice #58* (2000-2999 ft elevation) | | 100-10006066/QTY13 | 100-10006067/QTY18 | 100-10006068/QTY22 | 100-10006069/QTY27 |
| | Burner Orifice #59* (3000-4999 ft elevation) | | 100-10006070/QTY13 | 100-10006071/QTY18 | 100-10006072/QTY22 | 100-10006073/QTY27 |
| | Burner Orifice #60* (5000-6999 ft elevation) | | 100-10004699/QTY13 | 100-10004700/QTY18 | 100-10004701/QTY22 | 100-10004702/QTY27 |
| | Burner Orifice #61* (7000-7999 ft elevation) | | 100-10006074/QTY13 | 100-10006075/QTY18 | 100-10006076/QTY22 | 100-10006077/QTY27 |
| 5-B | Burner Tray w/o Manifold w/o burners | | 010421F | 010422F | 010423F | 010424F |
| **C** | **CONTROLS** | | **206A** | **266A** | **336A** | **406A** |
| 1-C | High Limit Auto-Reset 135°F Deg Surface Mount | | 006725F | 006725F | 006725F | 006725F |
| 2-C | P.C. Board/Control | | 100-10000345 | 100-10000345 | 100-10000345 | 100-10000345 |
| 3-C | Fuse 5 AMP (P.C. Board) | | 013733F | 013733F | 013733F | 013733F |
| 4-C | Temperature Sensor IID Units | | 009577F | 009577F | 009577F | 009577F |
| 5-C | High Limit Auto-Reset 160°F Surface Mount (ASME Only) | | 018304F | 018304F | 018304F | 018304F |
| **G** | **GAS VALVE** | | **206A** | **266A** | **336A** | **406A** |
| | Combination Valve - Nat. IID | | 003900F | 003900F | 003900F | 003900F |
| | Combination Valve - Pro. IID | | 004306F | 004306F | 004306F | 004306F |
| **HP** | **HEAT EXCHANGER - POLYMER (RESIDENTIAL ONLY)** | | **206A** | **266A** | **336A** | **406A** |
| 1-HP | Heat Exchanger Assy Copper *** | | | | | |
| | Units manufactured from 10/2019 | | 017994F | 017995F | 017996F | 017997F |
| | Heat Exchanger Assy Cupronickel *** | | | | | |
| | Units manufactured from 10/2019 | | 017998F | 017999F | 018000F | 018001F |
| 2-HP | Inlet/Outlet Header Complete | | | | | |
| | Units manufactured from 10/2019 | | 017959F | 017959F | 017959F | 017959F |
| | Inlet/Outlet Header (Includes 6-HP) | | | | | |
| | Units manufactured from 10/2019 | | 017965F | 017965F | 017965F | 017965F |
| 3-HP | Return Header (Includes 6-HP) | | 015095F | 015095F | 015095F | 015095F |
| 4-HP | Tube Bundle Copper ** & *** | | 010059F | 010060F | 010061F | 010062F |
| | Tube Bundle Cupronickel ** & *** | | | | | |
| | Units manufactured from 7/2013 | | 014930F | 014931F | 014932F | 014933F |
| 5-HP | Baffle (Copper Heat Exchanger) | | 010038F | 005261F | 010040F | 010041F |
| | Baffle (Cupronickel Heat Exchanger) | | | | | |
| | Units manufactured from 6/2013 | | 014934F | 014935F | 014936F | 014937F |
| | Units manufactured prior to 6/2013 | | 010038F | 005261F | 010040F | 010041F |
| 6-HP | Flange Nut Kit (1/4-20) | | 008259F | 008259F | 008259F | 008259F |
| 7-HP | O-Ring Gasket (2) | | 006713F | 006713F | 006713F | 006713F |
| 8-HP | Sensor Adapter Digital Electronic | | 006714F | 006714F | 006714F | 006714F |
| 9-HP | Bypass Kit | | 006715F | 006715F | 006715F | 006715F |
| 10-HP | Bypass Valve | | 006716F | 006716F | 006716F | 006716F |
| 11-HP | Bypass Dam / Shaft | | 006717F | 006717F | 006717F | 006717F |
| 12-HP | Bypass Spring (All Sizes Included) | | 006718F | 006718F | 006718F | 006718F |
| 13-HP | Unitherm Governor | | 006719F | 006719F | 006719F | 006719F |
| 14-HP | Unitherm Governor Plug | | 006720F | 006720F | 006720F | 006720F |
| 15-HP | Drain Plug | | 006721F | 006721F | 006721F | 006721F |
| 16-HP | Inlet/Outlet Header Dam | | N/A Use 19-HP | N/A Use 19-HP | N/A Use 19-HP | N/A Use 19-HP |
| 17-HP | 2" CPVC Connector & Nut (2) | | 006723F | 006723F | 006723F | 006723F |
| 18-HP | O-Ring (2) | | 006724F | 006724F | 006724F | 006724F |
| 19-HP | Inlet/Outlet Header Baffle w/Header Dam | | 006826F | 006826F | 006826F | 006826F |
| 20-HP | ProTek Shield™ Assembly | | 017960F | 017960F | 017960F | 017960F |

*FOR INSTALLATION AT OVER 2,000 FEET ABOVE SEA LEVEL, DERATE 4% PER 1,000 FEET ABOVE SEA LEVEL. Refer to the heater's rating plate.

**WARNING: The Hydraulic conditions or water chemistry that caused the tube bundle to fail have very likely also damaged the bypass valve and Unitherm Governor. Raypak recommends you replace the Unitherm Governor and inspect the bypass assembly. Failure to do so could cause premature failure of this replacement part.

***WARNING: Copper and Cupronickel heat exchangers and tube bundles are not interchangeable. Units with suffix "C" must use copper replacement parts and units with suffix "X" must use Cupronickel replacement parts.

| CALL OUT | DESCRIPTION | 206A | 266A | 336A | 406A |
|---|---|---|---|---|---|
| **HM** | **HEAT EXCHANGER - METAL (ASME-CERTIFIED, FOR COMMERCIAL USE)** | | | | |
| 1-HM | Heat Exchanger Assy. Copper ASME (Bronze) | | | | |
| | Units manufactured from 12/2019 | 017983F | 017984F | 017985F | 017986F |
| | Heat Exchanger Assy. Cupronickel ASME (Bronze) | | | | |
| | Units manufactured from 12/2019 | 017987F | 017988F | 017989F | 017990F |
| | **Option #2: Units manufactured from 12/2019 (Bronze) | 100-10002250 | 100-10002251 | 100-10002252 | 100-10002253 |
| 2-HM | Inlet/Outlet Header ASME Complete (Bronze) | | | | |
| | Units manufactured from 7/2020 | 018740F | 018740F | 018741F | 018741F |
| | Inlet/Outlet Header ASME (Bronze) | | | | |
| | Units manufactured from 7/2020 (Flow Switch Ready Header) | 018291F | 018291F | 018291F | 018291F |
| | Units manufactured from 7/2020 | 018739F | 018739F | 018739F | 018739F |
| | Units manufactured from 12/2019 | 017966F | 017966F | 017966F | 017966F |
| | Flange Gasket 2" Connections - prior to 12/2019 | 800080B | 800080B | 800080B | 800080B |
| 3-HM | Return Header ASME (Bronze) | | | | |
| | Units manufactured from 7/2020 | 018738F | 018738F | 018738F | 018738F |
| 4-HM | Tube Bundle Copper ASME * | | | | |
| | Units manufactured from 12/2019 | 017974F | 017975F | 017976F | 017977F |
| | Tube Bundle Cupronickel ASME * | | | | |
| | Units manufactured from 12/2019 | 017978F | 017979F | 017980F | 017981F |
| 5-HM | Baffle (1.060"-1.065" width) | 010038F | 005261F | 010040F | 010041F |
| | Baffle (0.85" width) | 100-10001116 | 100-10001117 | 100-10001118 | 100-10001119 |
| 6-HM | Stud Bolt Kit | | | | |
| | Units manufactured from 12/2019 | 017982F | 017982F | 017982F | 017982F |
| 7-HM | Header Gasket (9) | 800014B | 800014B | 800014B | 800014B |
| 8-HM | Unitherm Governor | 062234B | 062234B | 062234B | 062234B |
| 9-HM | U.G. Retainer Spring | 013792F | 013792F | 013792F | 013792F |
| 18-HM | U.G. Plug (Brass) | 013738F | 013738F | 013738F | 013738F |
| 10-HM | Bypass Valve | 016194F | 016194F | 016194F | 016194F |
| 12-HM | Drain Valve (1/8" NPT) | 013793F | 013793F | 013793F | 013793F |
| 13-HM | Sensor Well | 003765F | 003765F | 003765F | 003765F |
| 14-HM | Well Retaining Clip | 100-10000413 | 100-10000413 | 100-10000413 | 100-10000413 |
| 17-HM | Rear Drain Plug & Cover | 005264F | 005264F | 005264F | 005264F |
| 19-HM | Adapter CPVC 2" | 005393F | 005393F | 005393F | 005393F |
| 26-HM | Adapter - ProTek Shield (Includes 27-HM) from end of Q3 2020 | 018006F | 018006F | 018006F | 018006F |
| 27-HM | Nut - ProTek Shield Adapter - 2-Pcs from end of Q3 2020 | 018007F | 018007F | 018007F | 018007F |
| 28-HM | U.G./Bypass Assembly (Units manufactured from 12/2019) | 018759F | 018759F | 018758F | 018758F |
| 29-HM | ProTek Shield Assembly from end of Q3 2020 | 018766F | 018766F | 018766F | 018766F |
| 30-HM | ProTek Shield Adapter Assembly - from end of Q3 2020 | 018006F | 018006F | 018006F | 018006F |
| 31-HM | Bypass O-Ring (Units manufactured from 12/2019) | 016230F | 016230F | 016230F | 016230F |
| **J** | **CONTROL BOX** | **206A** | **266A** | **336A** | **406A** |
| 1-J | Transformer 120/240/24V | 006736F | 006736F | 006736F | 006736F |
| 2-J | Rocker Switch | 009493F | 009493F | 009493F | 009493F |
| **M** | **MISCELLANEOUS COMPONENTS** | **206A** | **266A** | **336A** | **406A** |
| 1-M | Pressure Switch 1.75 PSI | 006737F | 006737F | 006737F | 006737F |
| | Pressure Switch 11 PSI (Special-See Water Pressure Switch Adj.) | 009133F | 009133F | 009133F | 009133F |
| 4-M | Thermal Fuse | 005899F | 005899F | 005899F | 005899F |
| 5-M | PRV (75 PSI) | 017957F | 017957F | 017957F | 017957F |
| 6-M | Deliming Kit (Not Shown) | 052871F | 052871F | 052871F | 052871F |
| | Wire/Harness IID | 009490F | 009490F | 009490F | 009490F |
| 10-M | Control Bezel (Includes Switch Decal) | | | | |
| | Units manufactured from 5/2011 | 013491F | 013491F | 013491F | 013491F |
| 11-M | Switch/Decal-Membrane | | | | |
| | Units manufactured from 5/2011 | 013492F | 013492F | 013492F | 013492F |
| 12-M | Control Bezel Cover | 009487F | 009487F | 009487F | 009487F |
| 13-M | Gasket Insulation (Swaybrace & Jacket Top) | 010350F | 010350F | 010350F | 010350F |
| 14-M | Touch-up Paint (Not Shown) | | | | |
| | Green | 100-10000659 | 100-10000659 | 100-10000659 | 100-10000659 |
| | Dark Gray | 100-10000660 | 100-10000660 | 100-10000660 | 100-10000660 |
| | Cool Dark Gray | 100-10000534 | 100-10000534 | 100-10000534 | 100-10000534 |
| | Warm Dark Gray | 100-10000535 | 100-10000535 | 100-10000535 | 100-10000535 |
| 15-M | Tie Down Bracket (Optional) | 011636 | 011636 | 011636 | 011636 |
| 18-M | Flow Switch | 007142F | 007142F | 007142F | 007142F |
| 19-M | Flow Switch Paddle | 010026F | 010026F | 010026F | 010026F |
| 20-M | T & P Gauge | 014647F | 014647F | 014647F | 014647F |
| 21-M | 2" CPVC Adapter (Outlet Plumbing) | | | | |
| | NPT Connection | 013795F | 013795F | 013795F | 013795F |
| | Flanged Connection | 015883F | 015883F | 015883F | 015883F |
| 22-M | 2" CPVC Connector & Nut (2) | 006723F | 006723F | 006723F | 006723F |
| 23-M | O-Ring (2) | 006724F | 006724F | 006724F | 006724F |
| 17-M | PC Board Shield (Optional) | 015557F | 015557F | 015557F | 015557F |
| 24-M | Gas Line Finish Flange | 016160F | 016160F | 016160F | 016160F |

***WARNING**: The Hydraulic conditions or water chemistry that caused the tube bundle to fail have very likely also damaged the bypass valve and Unitherm Governor. Raypak recommends you replace the Unitherm Governor and inspect the bypass assembly. Failure to do so could cause premature failure of this replacement part.

****Option #2**: For Tube Bundle and Heat Exchanger kit assemblies that use the "5-HM" 0.85" width baffles.

| CALL OUT | DESCRIPTION | 206A | 266A | 336A | 406A |
|---|---|---|---|---|---|
| **P** | **PILOT** | | | | |
| 2-P | Pilot Nat & Pro IID | 002003F | 002003F | 002003F | 002003F |
| 4-P | Pilot Orifice Nat. IID .020 | 003903F | 003903F | 003903F | 003903F |
| | Pilot Orifice Pro. IID .012 | 004308F | 004308F | 004308F | 004308F |
| 7-P | Pilot Mounting Bracket IID | 100-10000419 | 100-10000419 | 100-10000419 | 100-10000419 |
| 10-P | Hi Tension Wire IID with Pilot Electrode | N/A | N/A | N/A | N/A |
| 11-P | Pilot Shield | 010351F | 010351F | 010351F | 010351F |
| **R** | **REFRACTORY** | **206A** | **266A** | **336A** | **406A** |
| 1-R | Refractory Common Lt & Rt | 010088F | 010088F | 010088F | 010088F |
| 2-R | Refractory Uncommon (Front & Rear) | 010089F | 010090F | 010091F | 010092F |
| 3-R | Refractory Retainer Kit | 010387F | 010388F | 010389F | 010390F |
| **S** | **SHEET METAL** | **206A** | **266A** | **336A** | **406A** |
| 1-S | Jacket Top (Louvered) | 010047F | 010048F | 010049F | 010050F |
| 2-S | Flue Collector (Units with Polymer Header) | 010071F | 010072F | 010073F | 010074F |
| | Flue Collector (Units with Metal ASME Header) | 010075F | 010076F | 010077F | 010078F |
| 3-S | Door Assy | | | | |
| | Raypak | | | | |
| | Cool Dark & Warm Dark Gray | 013859F | 013860F | 013861F | 013862F |
| | Rheem | | | | |
| | Cool Dark & Warm Dark Gray | 013863F | 013864F | 013865F | 013866F |
| 14-S | Screw & Retainer | 006744F | 006744F | 006744F | 006744F |
| 4-S | Access Panel Set (3 Pcs Units with Polymer Header) | 010311F | 010311F | 010311F | 010311F |
| | Access Panel Set - ASME | | | | |
| | Access Panel Set (3 Pcs. for BR Header) - from 12/2019 | 017967F | 017967F | 017967F | 017967F |
| 5-S | Jacket Side Panel Right | 010376F | 010376F | 010376F | 010376F |
| 6-S | Jacket Side Panel Left | 010377F | 010377F | 010377F | 010377F |
| 7-S | Jacket Rear Panel (2 Pcs.) | 010372F | 010373F | 010374F | 010375F |
| 8-S | Poolstat Cover/Lock Box | 009505 | 009505 | 009505 | 009505 |
| 11-S | Up Front Control Panel | | | | |
| | Cool Dark Gray | 013887F | 013888F | 013889F | 013890F |
| | Warm Dark Gray | 013891F | 013892F | 013893F | 013894F |
| 12-S | High Limit Shield | 010342F | 010342F | 010342F | 010342F |
| 13-S | Weather Shield | 010325F | 010326F | 010327F | 010328F |
| 15-S | Base Riser (Canada only) | 019444F | 019444F | 019444F | 019444F |
| **V** | **VENTING** | **206A** | **266A** | **336A** | **406A** |
| 1-V | Indoor Stack Kit (Includes inner adapter panel) | 009838 | 009839 | 009840 | 009841 |
| | Outdoor Stack Kit (Includes inner adapter panel) | 009834 | 009835 | 009836 | 009837 |
| 2-V | Stack Adapter | 010330F | 010331F | 010332F | 010333F |
| 4-V | Outer Stack Adapter | 011461F | 011462F | 011463F | 011464F |
| 3-V | "Pagoda" Top | | | | |
| | Cool Dark Gray | 013883F | 013884F | 013885F | 013886F |
| | Green | 010334 | 010335 | 010336 | 010337 |
| **ATMOSHPERIC CONVERSION KITS*** | | | | | |
| Gas Conversions | | | | | |
| Nat. to Pro. IID Pilot | | ** | ** | ** | ** |
| Pro. to Nat. IID Pilot | | ** | ** | ** | ** |

* Gas conversions are to be done only by a qualified agency.
** Conversion must be made with complete burner tray and gas valve (see item 1-B).

If you need information for an older model heater, go to the Raypak website's model number history: https://www.raypak.com/technical-resources/documents/ link; or contact your Raypak representative for assistance.

Find a Raypak representative for Commercial or Pool product: https://www.raypak.com/commercial-sales-rep/ or https://www.raypak.com/pool-heater-sales-rep/.