

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Extinguish any open flame.
6. Leave the building.
7. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
8. If you cannot reach your gas supplier, call the Fire Department.

⚠ WARNING

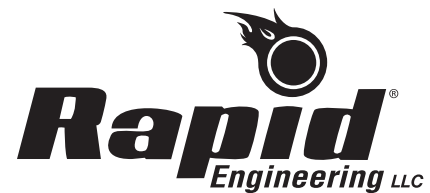


Fire Hazard

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.



UHD-Series Tubular Duct Furnace (Low Profile Range) Installation, Operation & Service Manual

Models UHD[X][S]
75, 100, 125



⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.

Installation must be done by a contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your service technician with necessary information.



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POUR VOTRE SECURITE

Si vous sentez une odeur de gaz:

1. Ouvrir les fenêtres.
2. N'essayer pas d'allumer un appareil.
3. N'utiliser pas d'interrupteurs électriques.
4. N'utiliser pas de téléphone dans votre bâtiment.
5. Eteindre flamme nue.
6. Quitter le bâtiment.
7. Après avoir quitté le bâtiment, appelez immédiatement votre fournisseur local de gaz.
Suivre les instructions du fournisseur de gaz.
8. Si vous ne pouvez pas joindre votre fournisseur de gaz, appeler le service d'incendie.

⚠ AVERTISSEMENT

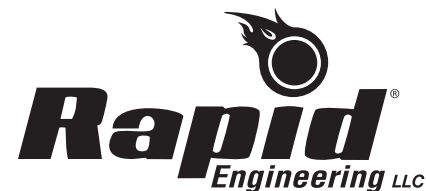


Risque d'incendie

Garder tous les objets, liquides ou vapeurs inflammables à la distance minimale de l'unité de chauffage requise avec les matériaux combustibles.

Certains objets prendront feu ou exploseront s'ils sont placés à proximité de l'unité de chauffage.

Le non respect de ces instructions peut entraîner la mort, des blessures corporelles ou des dommages matériels.



UHD-Series Appareil de chauffage conduit à échangeur tubulaire (Gamme compacte)

Manuel d'installation, d'operation, et de service

Modèles UHD[X][S]
75, 100, 125



⚠ AVERTISSEMENT

L'installation, le réglage, la modification, la réparation ou la maintenance inadapté peut entraîner la mort, des blessures ou des dommages matériels. Lire attentivement le manuel d'installation, d'utilisation et d'entretien avant d'installer ou de réparer cet équipement.

L'installation doit être effectuée par un entrepreneur qualifié dans l'installation et l'entretien d'appareils de chauffage au gaz ou par votre fournisseur de gaz.

Installateur

Vouloir prendre le temps de lire et de comprendre ces instructions avant toute installation. L'installateur doit donner un exemplaire de ce manuel au propriétaire.

Propriétaire

Garder ce manuel dans un endroit sûr pour fournir les informations nécessaires au personnel d'entretien.

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SECTION 1: HEATER SAFETY



Your Safety is Important to Us!
This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, service and, at a minimum, annual inspection of heater must be done by a contractor qualified in the installation and service of gas-fired heating equipment. Read this manual carefully before installation, operation or service of this equipment. Heaters are not approved for residential installations. These instructions, the layout drawing, local codes and ordinances and applicable standards that apply to gas piping, electrical wiring, venting, etc. must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operation and service in accordance to the Occupational Safety and Health Administration (OSHA). Gear must be in accordance to NFPA 70E, latest revision when working with electrical components. Thin sheet metal parts have sharp edges. To prevent injury, the use of work gloves is recommended.

Before installation, check that the local distribution conditions, nature of gas and pressure and adjustment of the equipment are compatible.

This heater must be applied and operated under the general concepts of reasonable use and installed using the best building practices.

This equipment is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the equipment by a person responsible for their safety. Children should be supervised to ensure that they do not play with the equipment.

For additional copies of the Installation, Operation and Service Manual, please contact Rapid Engineering LLC.

1.1 Manpower Requirements

To prevent personal injury and damage to the heater, two persons will be required for installation.

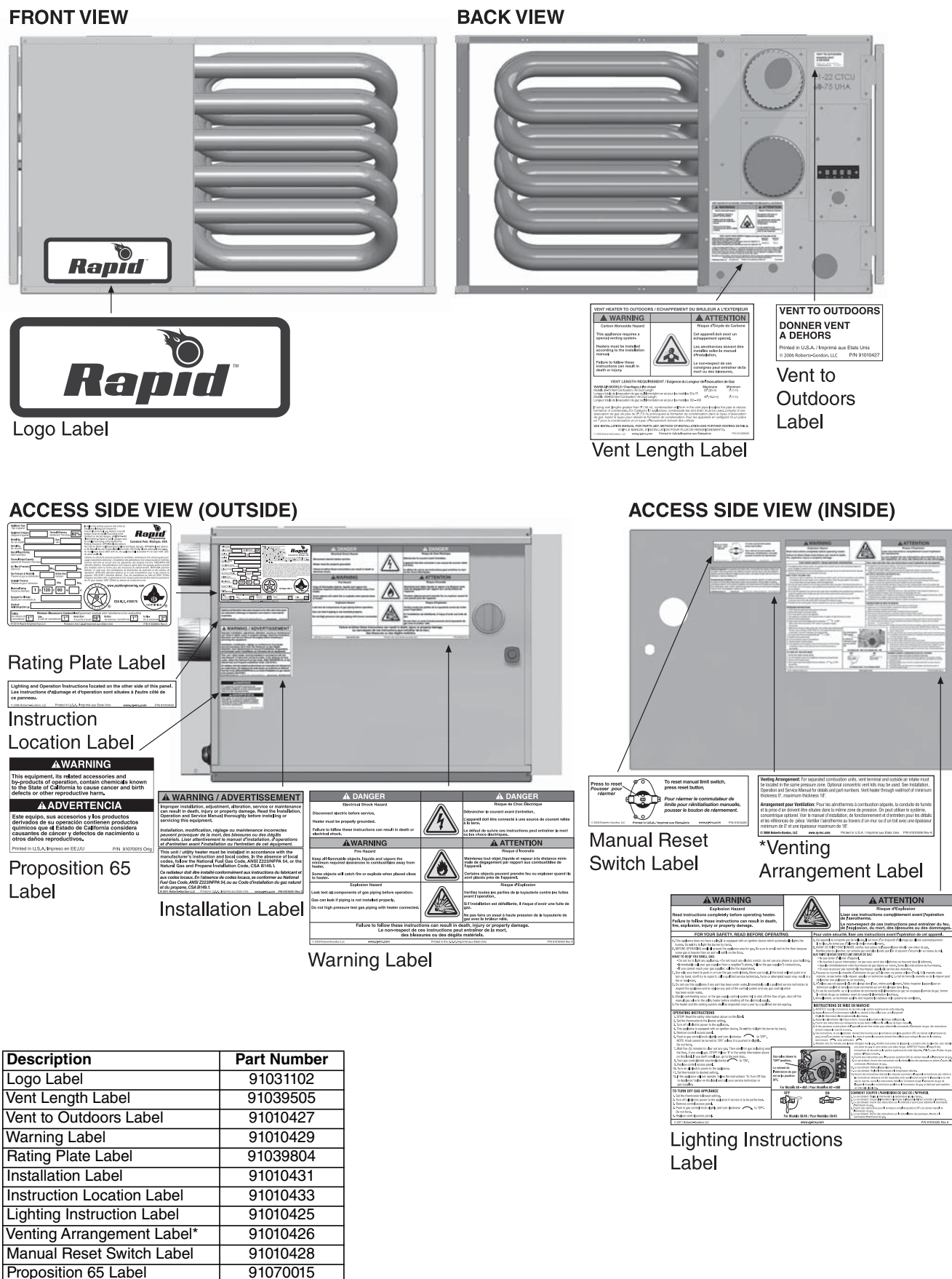
1.2 Safety Labels and Their Placement

Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Rapid Engineering LLC or your RAPID® independent distributor to obtain replacement signs or labels. See *Page 2, Figure 1 through Page 3, Figure 2*.

1.3 California Proposition 65

In accordance with California Proposition 65 requirements, a warning label must be placed in a highly visible location on the outside of the equipment (i.e. near equipment's serial plate). See label placement drawing on *Page 2, Figure 1 through Page 3, Figure 2* for label location. Avoid placing label on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact Rapid Engineering LLC or your RAPID® independent distributor.

Figure 1: UHD[X][S] 75 Label Placement

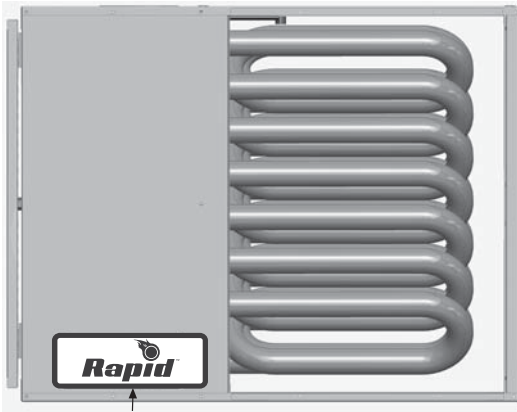


Description	Part Number
Logo Label	91031102
Vent Length Label	91039505
Vent to Outdoors Label	91010427
Warning Label	91010429
Rating Plate Label	91039804
Installation Label	91010431
Instruction Location Label	91010433
Lighting Instruction Label	91010425
Venting Arrangement Label*	91010426
Manual Reset Switch Label	91010428
Proposition 65 Label	91070015

* For separated combustion units only

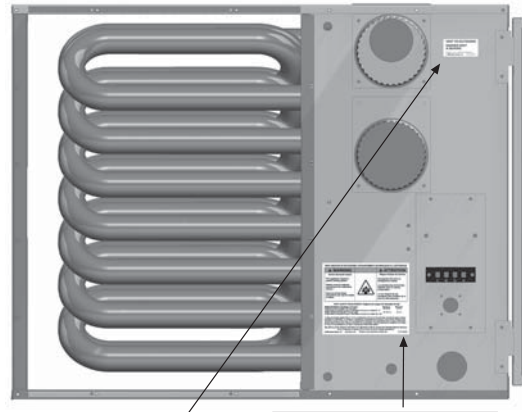
Figure 2: UHD[X][S] 100-125 Label Placement

FRONT VIEW



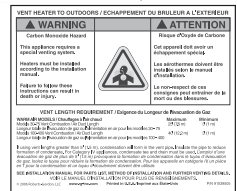
Logo Label

BACK VIEW



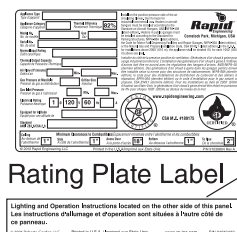
VENT TO OUTDOORS
DONNER VENT
A DEHORS

Vent to
Outdoors
Label



Vent Length Label

ACCESS SIDE VIEW (OUTSIDE)



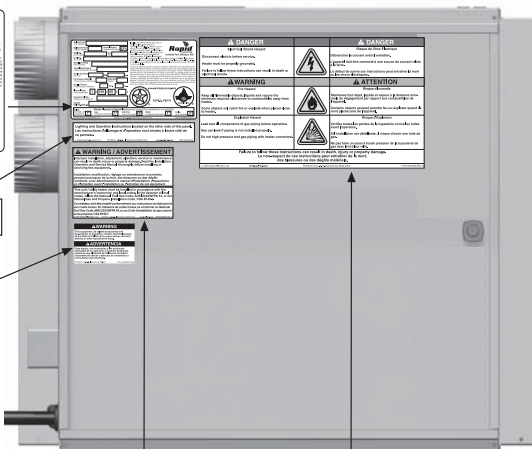
Rating Plate Label

Lighting and Operation Instructions located on the other side of this panel.
Les instructions d'allumage et d'opération sont situées à l'autre côté de ce panneau.

WARNING
This equipment, its related accessories and by-products of operation, contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

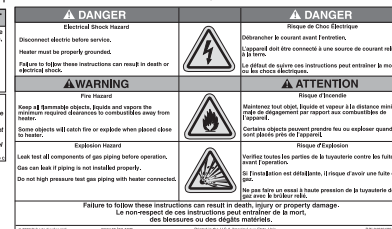
ADVERTENCIA
Este equipo, sus accesorios y los productos derivados de su operación contienen productos químicos que el Estado de California considera causantes de cáncer y defectos de nacimiento u otros daños reproductivos.

Proposition
65 Label



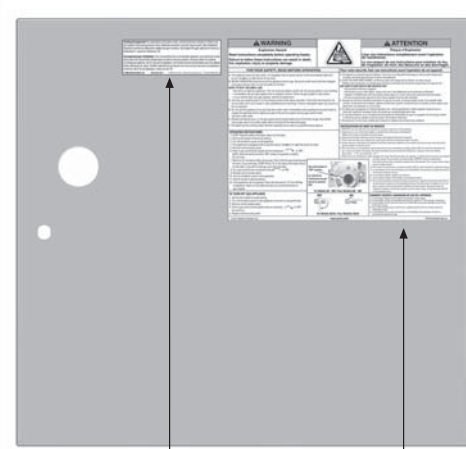
WARNING / AVERTISSEMENT
Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the Installation, Operation and Service Manual thoroughly before installing or servicing this equipment.
Installation, modification, réglage ou maintenance incorrecte peuvent provoquer de la mort, des blessures ou des dégâts matériels. Lire attentivement le manuel d'installation, d'opération et de service avant l'installation ou l'entretien de cet équipement.
This unit's utility heater must be installed in accordance with the manufacturer's instruction and local codes. In the absence of local codes, follow the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the National Gas and Propane Installation Code, CSA B149.1.
Ce réchauffeur doit être installé conformément aux instructions du fabricant et aux codes locaux. En l'absence de codes locaux, se conformer au National Fuel Gas Code, ANSI Z223.1/NFPA 54 ou au Code d'installation du gaz naturel ou du propane, CSA B149.1.

Installation Label



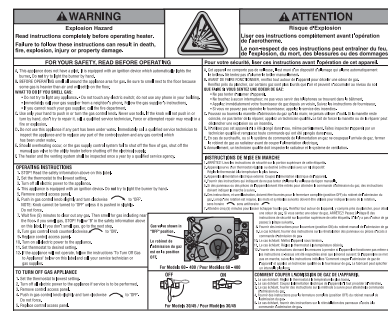
Warning Label

ACCESS SIDE VIEW (INSIDE)



Venting Arrangement
For separated combustion units, vent terminal and outside air intake must be located in the same room as the control compartment and the room must be vented to the outdoors through the roof or through the exterior wall.
Arrangement pour Ventilation: Pour les appareils à combustion séparés, le conduit de fumée et l'entrée d'air extérieur doivent être situés dans la même pièce que le compartiment de commande, le fonctionnement et l'entretien pour le conduit et la détection de gaz, les ventilateurs doivent être installés à l'extérieur de la pièce ou à l'extérieur du bâtiment à travers le toit ou à l'extérieur du bâtiment à travers le mur.

*Venting Arrangement Label



Lighting Instructions Label

Description	Part Number
Logo Label	91031102
Vent Length Label	91039505
Vent to Outdoors Label	91010427
Warning Label	91010429
Rating Plate Label	91039804
Installation Label	91010431
Instruction Location Label	91010433
Lighting Instruction Label	91010425
Venting Arrangement Label*	91010426
Proposition 65 Label	91070015

* For separated combustion units only

SECTION 2: INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- To install the heater, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Rapid Engineering LLC recommends the installer contact a Local Building Inspector or Fire Marshal for guidance.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To install the heater in accordance with the clearances to combustibles.
- To furnish all needed materials not supplied as standard equipment.
- To plan location of supports, vents and air intakes.
- To provide access for servicing.
- To provide the owner with a copy of this Installation, Operation and Service Manual.
- To never use heater as support for a ladder or other access equipment and never hang or suspend anything from heater.
- To ensure there is adequate air circulation around the heater and to supply air for combustion, ventilation and distribution in accordance with local codes.
- To provide a method that ensures that the air flow through the heat exchanger is within the acceptable range indicated on the serial plate prior to energizing the heater, and that such air flow continues at least 90 seconds after the heater is de-energized.
- To ensure the heater is placed in an approved application.

2.1 Wall Tag

A laminated wall tag is included with the heater as a permanent reminder of the safety instructions and the importance of the required clearances to combustibles. Affix the tag by peeling off the backing of the adhesive strips on the rear surface and position the tag on a wall near the heater.

A copy of the wall tag (P/N 91039833) is illustrated on the back cover.

Know your model number and installed configuration. Model number and installed configuration are found on the heater serial plate and throughout the Installation, Operation and Service Manual.

2.2 Corrosive Chemicals

 CAUTION

<p style="text-align: center;">Product Damage Hazard</p> <p>Do not use heater in area containing corrosive chemicals.</p> <p>Refer to appropriate Material Safety Data Sheets (MSDS).</p> <p>Failure to follow these instructions can result in product damage.</p>

Rapid Engineering LLC cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons* anywhere in the premises.

** **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the life span of the heater components will be greatly reduced. An outside air supply must be provided to the burners whenever the presence of these compounds is suspected. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.*

2.3 National Standards and Applicable Codes

All equipment must be installed in accordance with the latest revision of the applicable standards and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in public garages, aircraft hangars, etc. may be applicable. See Page 7, Section 5.

SECTION 3: CRITICAL CONSIDERATIONS

3.1 Basic Information

UHD[X][S] heaters have automatic ignition burners for ON/OFF operation only.

3.2 Manufactured Units

Gas-fired, power-vented duct furnace with tubular heat exchanger. Units shall have a minimum of 82% thermal efficiency. The standard unit shall consist of a non-separated combustion design with an aluminized heat exchanger and single stage gas valve. Design and heat exchanger alternatives shall be offered as follows:

- Separated Combustion: [S] A separated combustion unit shall consist of a sealed enclosure with a hinged door. Combustion air inlet on rear of heater allows for intake venting from outside of heated space to be attached. Combustion flue gasses shall be ducted from outside the heated space by ductwork connected to unit's outlet flange.
- Stainless Steel Heat Exchanger: [X] A stainless steel heat exchanger unit shall consist of heat exchanger tubes, heat exchanger tube supports and heat exchanger tube plates produced of 409 stainless steel. Air inlet temperatures below 40 °F (4.4 °C) are not recommended for this application.

3.3 Location and Suspension

All models:

- Must be installed indoors.
- Must be installed on the positive pressure side of the air circulation blower.
- Must be installed in a level position with horizontal discharge.
- May be mounted on a shelf of non-combustible material using shelf mounting brackets. See *Page 10, Figure 6 and Page 10, Figure 7* for details.
- May be suspended from above (See *Page 9, Section 6.2*) or from wall brackets of sufficient strength to support the heater as listed in the Technical Data Table on *Page 44, Section 16.2*.
- Drop rods must be a minimum of 3/8" diameter mild steel. Four suspension points (3/8" nuts) are located on top of the heater.

- Must be installed in a manner which allows access to all serviceable components.

3.4 Minimum Required Installation Clearances

Clearances around the heater and vent must be as indicated on *Page 6, Figure 3 and Page 11, Section 7* to ensure access for servicing and correct operation.

3.5 Ventilation

It is important to ensure that there is adequate air space around the heater to supply air for combustion, ventilation and distribution in accordance with local and national codes. See *Page 11, Section 7*.

3.6 Gas Supply

It is important that the gas supply pipe is sized correctly to provide the inlet pressure as stated on the heater serial plate. The gas supply pipe and electrical connections must not support any of the heater's weight. See *Page 19, Section 9*.

3.7 Electrical Supply

A permanent 120 V / 1 Ø/ 60 Hz electrical supply is required for the main electrical power. The heater also requires suitable controls listed on *Page 21, Section 10*.

3.8 Vent

Choose heater orientation to allow for proper location of the vent. Each heater must be fitted with a correctly sized sealed vent system.

If vented horizontally, no other equipment may be connected to the vent. See *Page 11, Section 7*.

SECTION 4: CLEARANCES TO COMBUSTIBLES**4.1 Required Clearances to Combustibles****⚠ WARNING****Fire Hazard**

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

Clearances are the required distances that combustible objects must be away from the heater to prevent a fire hazard. Combustibles are materials that may catch on fire and include common items such as wood, paper, rubber, fabric, etc. Maintain clearances to combustibles at all times for safety. Clearances for all heater models are located on the serial plate, wall tag and throughout the manual. Check the clearances on the serial plate to make sure the product is suitable for your application and the clearances are maintained. Read and follow the safety guidelines below:

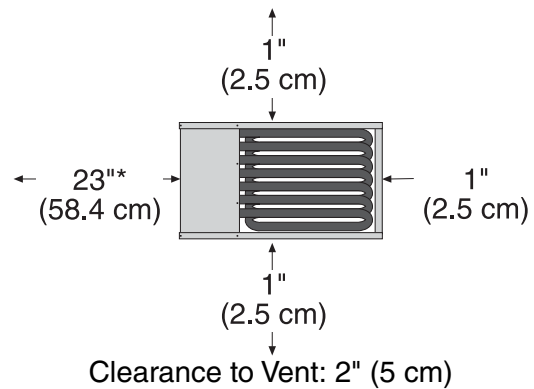
- Keep gasoline or other combustible material including flammable objects, liquids, dust or vapors away from this heater or any other equipment.
- Do not spray aerosols in the vicinity of this heater.
- The stated clearances to combustibles represents a surface temperature of 90° F (50° C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's and owner's responsibility to assure that adjacent materials are protected from degradation.
- Maintain clearances from heat sensitive equipment and work stations.
- Consult local Fire Marshal, Fire Insurance Carrier or other authorities for approval of proposed installation when there is a possibility

of exposure to combustible airborne materials or vapors.

4.2 Clearances to Combustibles

Clearances must be as indicated on *Page 6, Figure 3*. If clearances to combustibles are not indicated, then installation clearances apply.

All distances are minimum clearance requirements for service access, air flow and safety.

Figure 3: Clearances to Combustibles

*23" (58.4 cm) minimum is necessary for servicing.

SECTION 5: NATIONAL STANDARDS AND APPLICABLE CODES**5.1 Gas Codes**

The type of gas appearing on the serial plate must be the type of gas used. Installation must comply with national and local codes and requirements of the local gas company.

United States: Refer to NFPA 54/ ANSI Z223.1 - latest revision, National Fuel Gas Code.

Canada: Refer to CSA B149.1 Natural Gas and Propane Installation Code.

5.2 Aircraft Hangars

Installation in aircraft hangars must be in accordance with the following codes:

United States: Refer to Standard for Aircraft Hangars, NFPA 409 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code, Standard CSA B149.1 - latest revision.

5.3 Parking Structures and Repair Garages

Installation in garages must be in accordance with the following codes:

United States: Standard for Parking Structures, NFPA 88A - latest revision or the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code, Standard CSA B149.1 - latest revision.

5.4 Electrical

The heater must be electrically grounded in accordance with the following codes:

United States: Refer to National Electrical Code®, NFPA 70 - latest revision. Wiring must conform to the most current National Electrical Code®, local ordinances and any special diagrams furnished.

Canada: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

5.5 Venting

The venting must be installed in accordance with the requirements within this manual and the following codes:

United States: Refer to NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code.

Canada: Refer to CSA B149.1 Natural Gas and Propane Installation Code.

5.6 High Altitude

These heaters are approved (without modifications) for installations up to 2000' (610 m) in US and Canada. Heaters installed above 2000' (610 m) must be de-rated. For installations above 2000' (610 m) in US, consult factory for information on burner de-rating. For installations from 2000' (610 m) to 4500' (1370m) in Canada, high altitude conversion kits are available. Heaters installed over 4500' (1370 m) in Canada are not approved and must be approved by the local or provincial authority.

SECTION 6: DUCT HEATER INSTALLATION

6.1 General

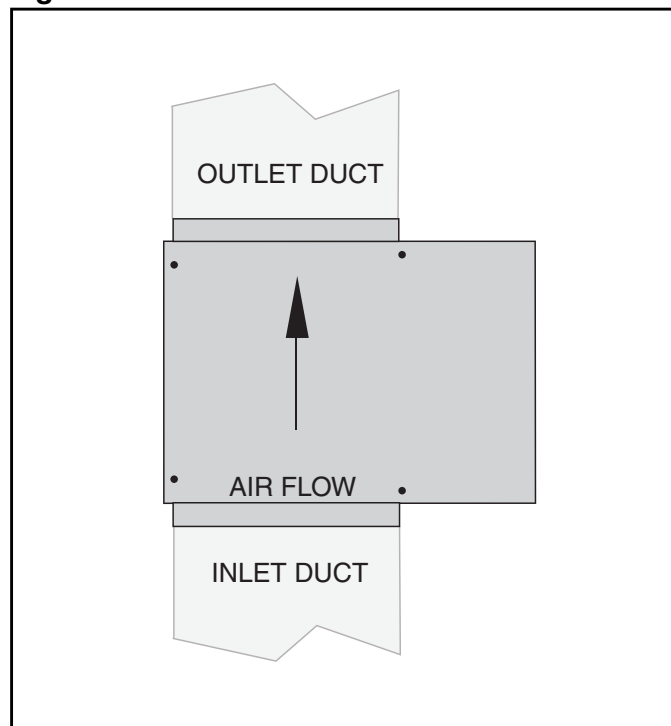
To connect the inlet and outlet ducts to the heater, Duct-Mate or similar flanges may be slid over the duct connector flanges supplied on the unit and secured with screws. The connection to the duct then can be made using the Duct-Mate clips. The ducts must have removable access panels upstream and downstream of the heater. These panels must be of appropriate size and placement so that smoke or reflected light could be observed to indicate the presence of leaks in the heat exchanger. Covers for these openings should be sealed to prevent leakage.

Any transition into the inlet of the heater should be smooth, with a taper of no more than 15 degrees. If elbows are required, they should be of either broad radius or fitted with properly designed turning vanes. Consult a professional to ensure turning vanes are properly designed.

The heater must be installed on the positive pressure side of the circulating air blower. Air flow through the heater must be as shown *on Page 8, Figure 4* and may not be reversed. The air flow must be adjusted such that it is within the acceptable range shown on *Page 8, Section 6.1.2*. The

minimum inlet duct lengths shown *on Page 8, Section 6.1.1* should be observed. Pressure drop through the heat exchanger at various air flows is given *on Page 8, Section 6.1.2*.

Figure 4: Air Flow Direction



6.1.1 Minimum Inlet Duct Length

Model	Duct Length	Duct Size (H x W)
UHD[X][S] 75	32" (81 cm)	16 3/4" x 15 7/8" (43 cm x 40 cm)
UHD[X][S] 100 & 125	37" (94 cm)	21 3/4" x 15 7/8" (55 cm x 40 cm)

6.1.2 Temperature Rise and Pressure Drop Ranges

UHD[X][S] 75			UHD[X][S] 100			UHD[X][S] 125		
Airflow (CFM)	Temperature Rise (°F)	Pressure Drop (in wc)	Airflow (CFM)	Temperature Rise (°F)	Pressure Drop (in wc)	Airflow (CFM)	Temperature Rise (°F)	Pressure Drop (in wc)
850	68	0.06	950	78	0.05	1,020	92	0.06
1,200	48	0.10	1,500	50	0.18	1,650	57	0.14
1,625	36	0.16	2,500	31	0.28	2,340	41	0.27
1,965	30	0.22	3,000	26	0.39	3,480	28	0.56
2,450	24	0.31	3,300	24	0.46	4,240	23	0.80
2,650	22	0.36	3,660	22	0.55	4,750	20	0.98

6.2 Shelf Mounting and Suspension

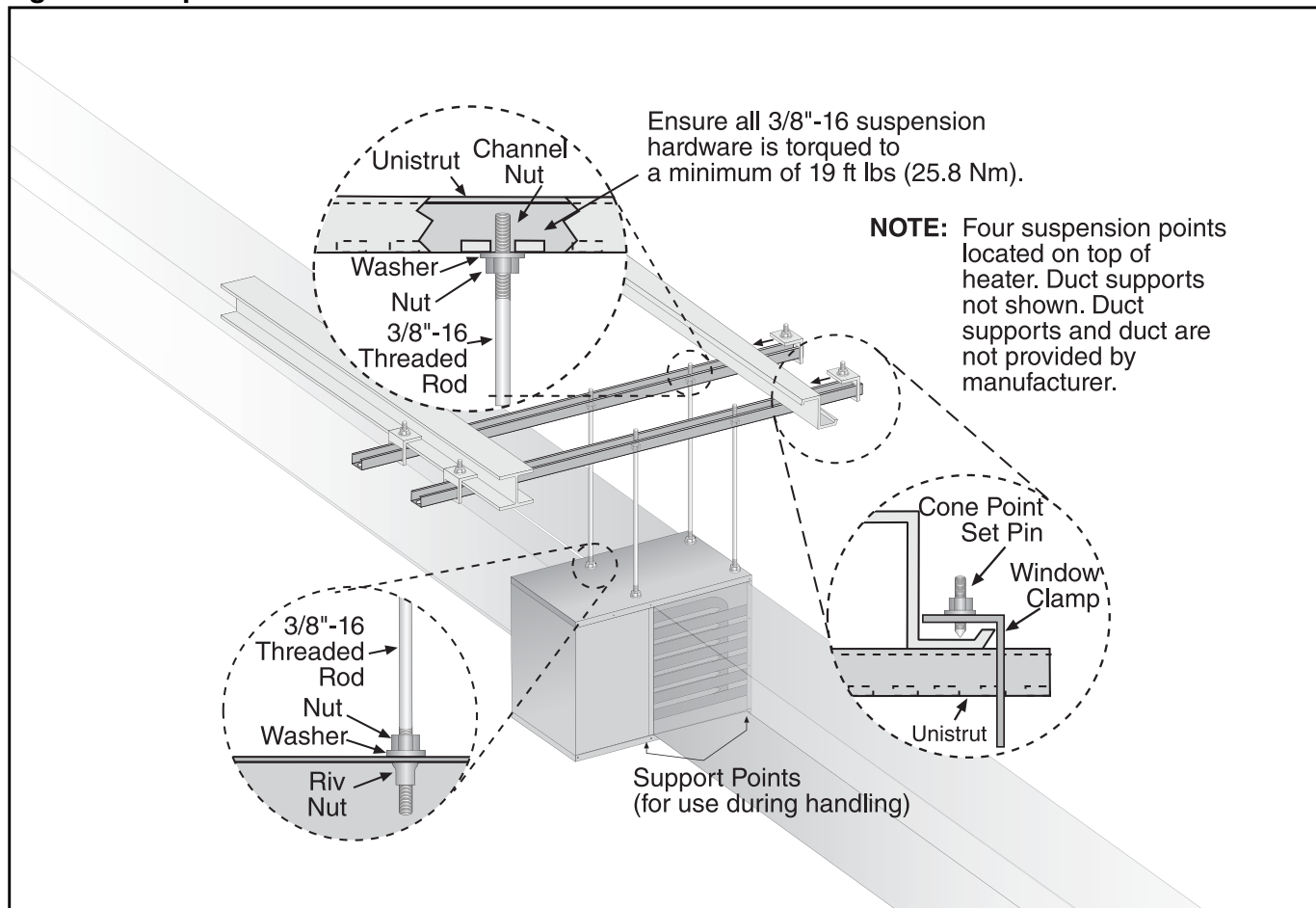


When handling or supporting the heater from below, ensure that the weight is taken at the support points. For typical suspension, See Page 9, Figure 5. For typical shelf mounting on existing shelf, See Page 10, Figure 6.

The gas or electrical supply lines must not be used to support the heater.

Do not locate the gas or electrical supply lines directly over the path of the flue products from the heater.

Figure 5: Suspension Methods



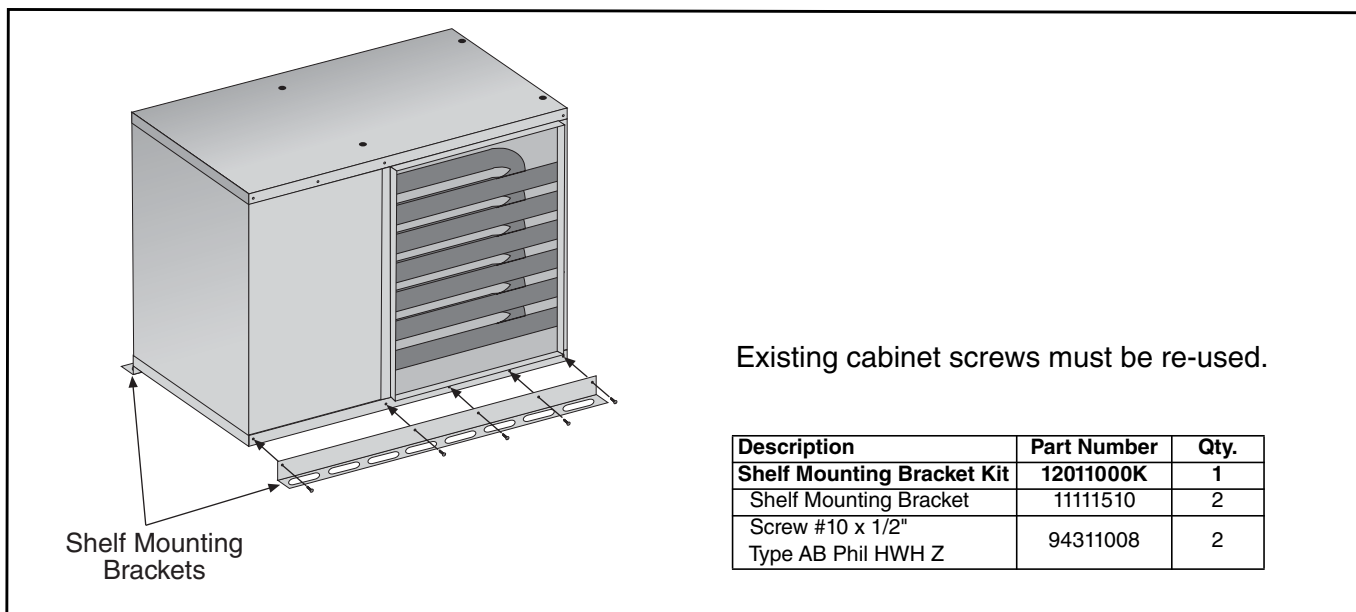
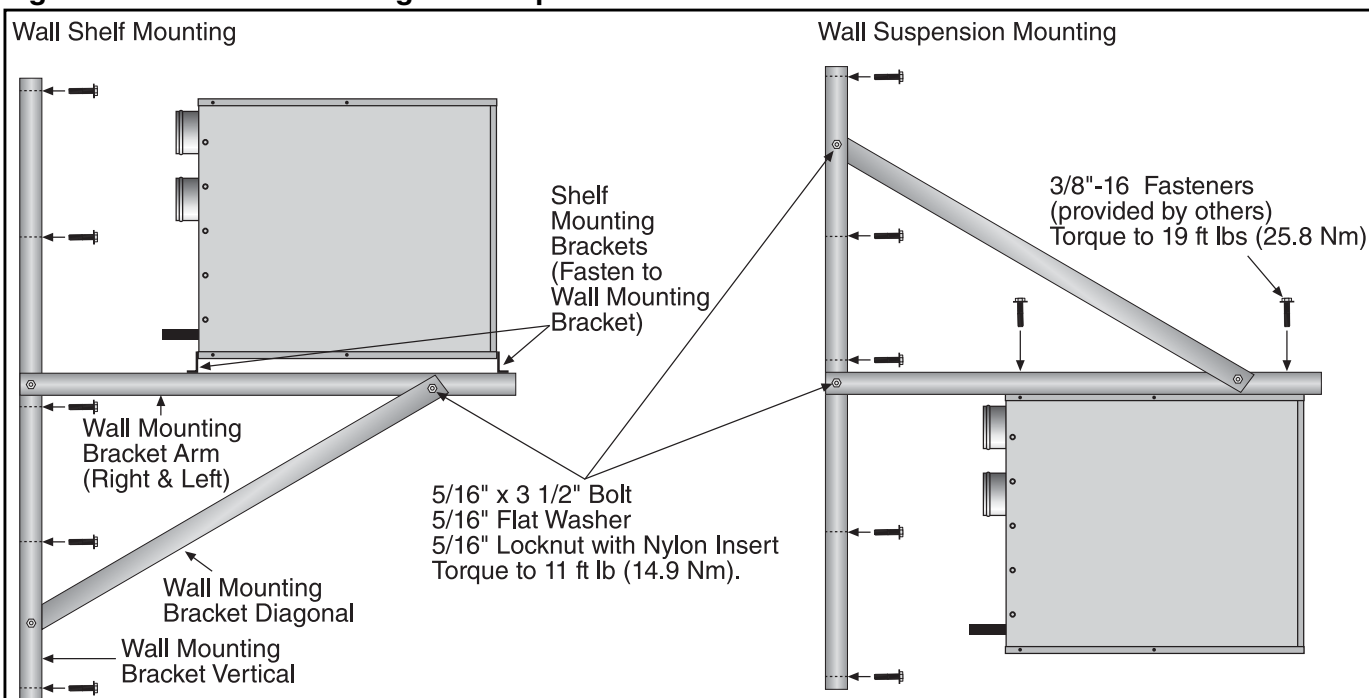
The heater must be installed in a location that is readily accessible for servicing.

The heater must be installed in accordance with clearances to combustibles as indicated on the serial plate, wall tag and throughout the manual. See Page 6, Section 4.

6.3 Wall Mounting

For typical suspension, See Page 10, Figure 7. Wall mounted heaters blowing parallel to the wall can only be installed with the service door away from the wall.

The wall mounting brackets must be attached to a suitable wall using all mounting holes. Screw sizes less than 3/8" may not be used. In order for the wall mounting brackets to adequately carry the weight of the heater, it must be installed according to best building practices.



Figure 6: Shelf-Mounting Methods**Figure 7: Wall Shelf Mounting and Suspension**

Hardware provided to construct mounting bracket assembly only.

Description	Part Number	Qty.
Wall Shelf Mounting Bracket Kit	12011002K	1
Wall Suspension Mounting Bracket Kit	12011001K	1
Shelf Mounting Bracket Kit	12011000K	1

Description	Part Number	Qty.
Wall Suspension Mounting Bracket Kit	12011001K	1
Wall Mounting Bracket Arm Left	111WALL1L	1
Wall Mounting Bracket Arm Right	111WALL1R	1
Wall Mounting Bracket Vertical	111WALL2	2
Wall Mounting Bracket Diagonal	111WALL3	2
5/16" x 3 1/2" Bolt	97213925	6
5/16" Lock Nut with Nylon Insert	92114000	6
5/16" Flat Washer	95211600	6
5/16" Lockwasher	96411600	6

SECTION 7: VENTING

 WARNING	
	Carbon Monoxide Hazard
	Heaters must be vented outdoors.
	Heaters must be installed according to the installation manual.
Failure to follow these instructions can result in death or injury.	

7.1 Changing Vent and Air Intake Orientation

The heater is sold with rear horizontal vent and air intake connections as standard. (only separated combustion models have air intake connection). If vertical vent and air intake connections are required, follow the instructions on *Page 41, Section 15.5*.

7.2 Venting

This heater must be vented in accordance with the rules contained in this manual and with the following national codes and any state, provincial or local codes which may apply: **United States:** Refer to NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code; **Canada:** Refer to CSA B149.1 Natural Gas and Propane Installation Code. Any portion of vent pipe passing through a combustible wall must have a listed thimble to conform with the above codes.

The bottom of the vent or air intake terminal shall not be located less than 1' (.3 m) above grade level.

The vent shall not terminate less than 7' (2.1 m) above grade where located adjacent to public walkways.

Vent terminal must be installed at a height sufficient to prevent blockage by snow and building materials protected from degradation by flue gasses.

Vent terminal must be beyond any combustible overhang.

Secure all joints with corrosion resistant #8 x 3/8" sheet metal screws.

For single wall venting, pressure sensitive aluminum tape or silicone sealant must be used to seal all joints.

Aluminum tape shall have a minimum temperature rating of 400° F (204° C) and meet SMACNA AFTS-100-73 standards. High temperature silicone sealant must have a minimum temperature rating of 480° F (250° C).

7.2.1 United States Requirements

Vent must terminate at least 3' (.9 m) above any forced air inlet located within 10' (3.1 m).

Vent must terminate at least 4' (1.2 m) below, 4' (1.2 m) horizontally from, or 1' (.3 m) above any door, operable window, or gravity air inlet into any building.

NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code specifies a 4' (1.2 m) horizontal vent terminal clearance from gas and electric meters, regulators and relief equipment.

7.2.2 Canadian Requirements

The vent shall not terminate within 6' (1.8 m) of a mechanical air supply inlet to any building.

The vent shall not terminate within 3' (.9 m) of a window or door that can be opened in any building, any non-mechanical air supply inlet to any building, or of the combustion air inlet of any other piece of equipment.

7.3 Vent Installation

Maintain clearances to combustibles at all times for safety. Clearances are the required distances that combustible objects must be away from the heater to prevent serious fire hazard. *See Page 6, Figure 3*. For vented units, the vent must terminate outside of the building.

Vents must be fully sealed and correctly sized for the model. If the vent passes through a wall or ceiling of combustible material, it must be enclosed by a listed thimble and be separated from the thimble by at least a 2" (5 cm) air gap.

For separated combustion models, vents and air intakes must be a fully sealed system and correctly sized for the model. Vent should be assembled as detailed on *Page 13, Figure 8 through Page 17, Figure 13*. The joints between the vent terminal and the roof or wall must be properly sealed.

Vents and air intakes must be adequately supported so that the heater does not bear the weight of the pipes.

For vent termination *See Page 13, Figure 8 through Page 17, Figure 13*.

7.3.1 Standard Vented Heaters (Models UHD[X] 75 - 125)

The vent must be fitted with a low resistance terminal. See Page 13, Figure 8 through Page 15, Figure 10. Standard vented heaters do not allow outdoor air intake for combustion air.

7.3.2 Separated Combustion Heaters (Models UHD[X]S 75 - 125)

The heaters are designed to be installed as separated combustion heaters. The vent and air intake are run as separate pipes to the wall or roof terminals. See Page 16, Figure 11. As an option, the vent and air intake are run as separate pipes to a concentric vent box and a concentric vent/air intake pipe penetrates the wall or roof. See Page 16, Figure 12 and Page 17, Figure 13.

For separated combustion installation, the vent and air intake must be fitted with an individual and correctly sized sealed system and the vent and air intake must terminate at approved wall and roof terminals.

Separated combustion units may not be common vented.

7.4 Horizontal Venting

Horizontally vented heaters must be individually vented, no common venting.

Vent pipe must be sloped $\frac{1}{4}$ " (.6 cm) downward for every 1' (.3 m). For vent lengths greater than 10' (3 m), condensation will form. Insulation is recommended and condensation drains may be desired. For vents pitched up towards the vent terminal, place the condensation drain within 10' (3.0 m) of the heater.

In noncombustible walls only, vent terminal (P/N 02537801-1P) may be used.

For 4" (10 cm) vents in either combustible or noncombustible walls, use vent terminal (P/N 90502100) or equivalent insulated vent terminal. Follow the manufacturer's instructions for proper installation.

Instead of an insulated vent terminal, a listed thimble with 2" (5 cm) air gap may be used with a 4" (10 cm) vent cap (P/N 90502102).

7.5 Vertical Venting

Vertically vented standard-vented heaters can be common vented (up to four heaters). For vent lengths greater than 10' (3.0 m), condensation will form. Insulation is recommended and condensation drains may be desired. Venting

through the top of the heater cabinet is not recommended if vent lengths are longer than 10' (3 m) UHD[X]S75 only. In this case, vent from the rear of the heater cabinet then run the vent vertically and use a condensate drain at the bottom of the vertical vent.

For 4" (10 cm) common vent, an approved vent cap (P/N 90502102) must be used.

For 6" (15 cm) common vent, an approved vent cap (P/N 90502103) must be used.

For common vertical venting of more than two heaters, See Page 15, Figure 10.

A vent shall not extend less than 2' (.6 m) above the highest point where it passes through a flat roof of a building.

7.6 Length Requirements

If using vent lengths greater than 10' (3.0 m), condensation will form in the vent pipe. Insulation and additional sealing measures (high temperature silicone at all seams) are required.

The entire vent should be insulated with foil faced fiberglass insulation ($\frac{1}{2}$ " thick, 1-1/2# density minimum).

7.6.1 Maximum Vent Lengths Table

Model UHD[X]S 75 - 125	# of Elbows
30 ft (9.1 m)	1
25 ft (7.6 m)	2
20 ft (6.1 m)	3
15 ft (4.5 m)	4
10 ft (3.0 m)	5

7.7 Vent Material

Vent material may be single wall 26 ga. (minimum) galvanized steel or equal thickness stainless steel. Completely seal all joints, refer to Page 11, Section 7.3.

If penetrating a combustible wall or roof, a listed thimble with 2" (5 cm) clearance must be used. Where local codes permit, a single section of type B-1 vent material may be used at the roof or wall penetration instead of a thimble. Ensure vent manufacturer's clearance from vent material is maintained. Seal annular space of the type B-1 vent as well as all joints in the remaining vent.

7.8 Replacing an Existing Heater in a Venting System

When replacing an existing heater in a venting system, the venting system may not be properly sized to vent the new heater. The following steps must be followed with each piece of equipment connected to the venting system placed in

operation, while any other equipment connected to the venting system are not in operation.

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required by the NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code (US) or Standard CSA B149.1 Natural Gas and Propane Installation Code (Canada) and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Close all building doors and windows and all doors between the space in which the piece(s) of equipment connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any exhaust fans, such as range hoods and bathroom exhausts so that they shall operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Place the equipment being inspected in operation. Adjust thermostat so that the equipment will operate continuously.
5. For any equipment having a draft hood, test for draft hood equipment spillage at the draft hood relief opening after five minutes of main burner operation. Use the flame of a match or candle.
6. After it has been determined that each piece(s) of equipment connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning piece(s) of equipment to their previous conditions of use.
7. If improper venting is observed during any of the above tests, the venting system must be corrected by a contractor qualified in the installation and service of gas-fired equipment or your local gas supplier. If the venting must be resized, use appropriate tables in (US) Appendix G of NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code (US) or Standard CSA B149.1 Natural Gas and Propane Installation Code (Canada) to determine minimum size. All vent corrections must be in accordance with the appropriate local codes and the NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code (US) or

Standard CSA B149.1 Natural Gas and Propane Installation Code (Canada).

Figure 8: Vent and Roof Detail

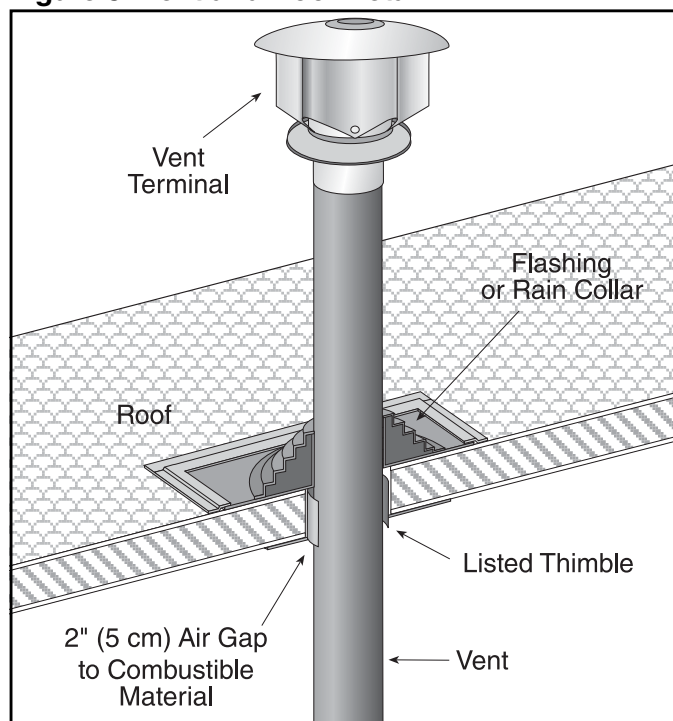


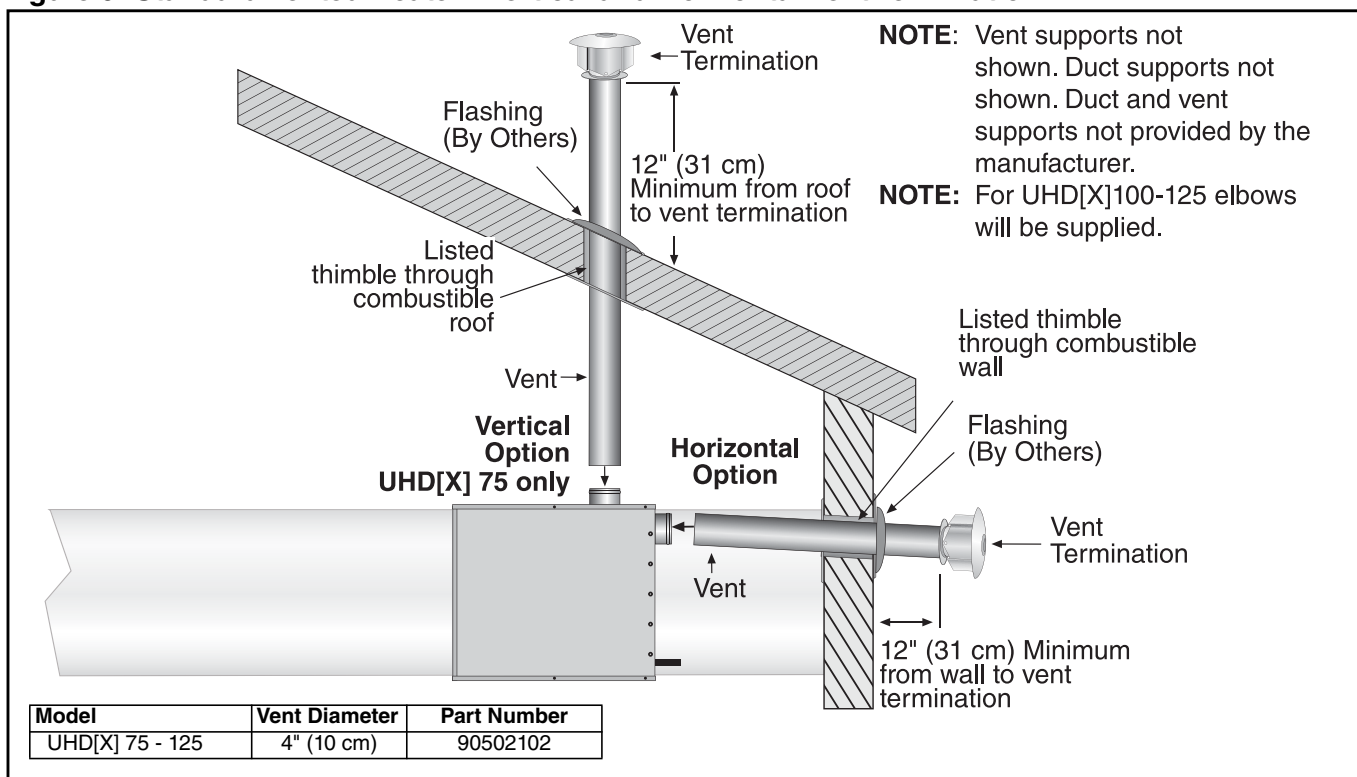
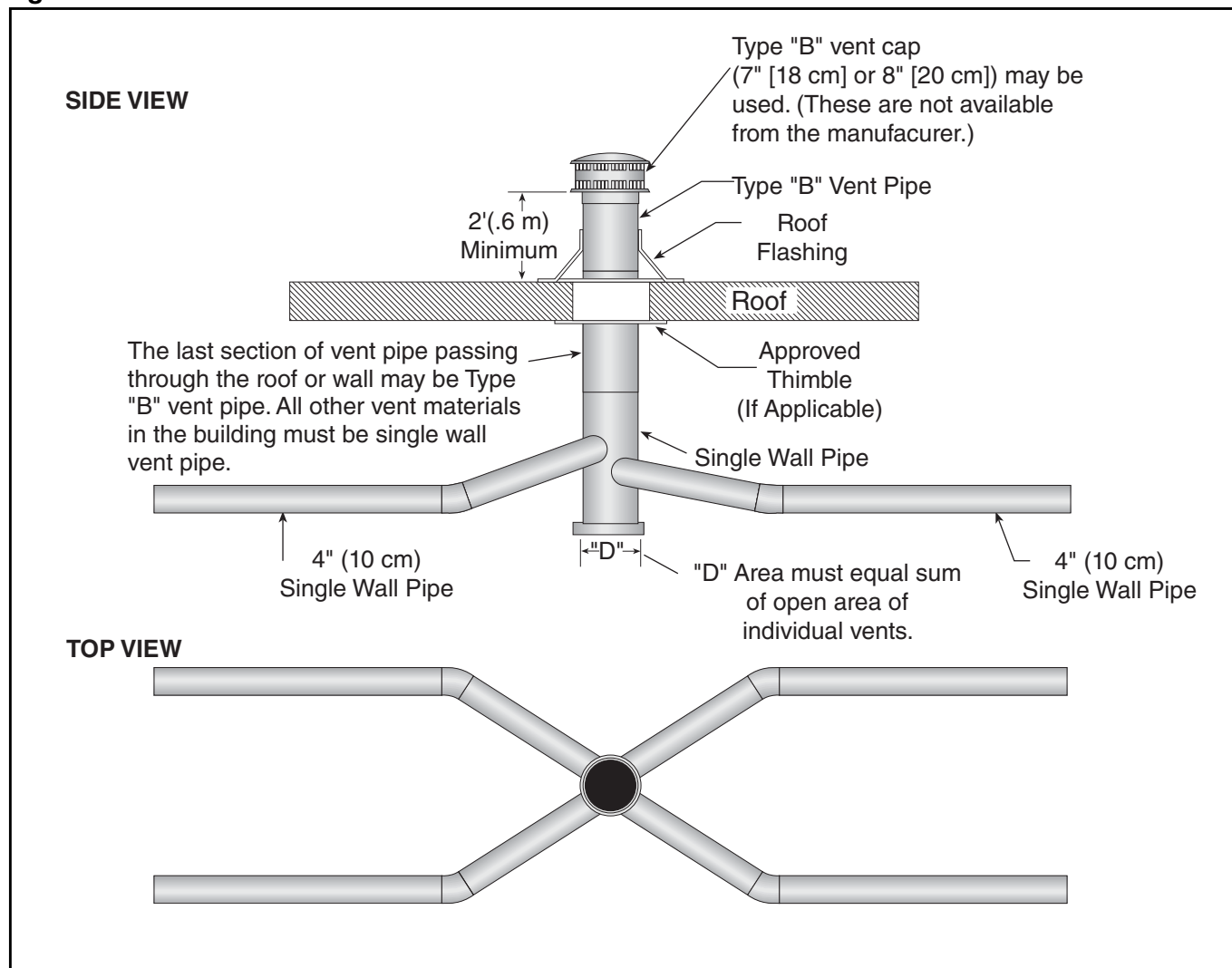
Figure 9: Standard Vented Heater - Vertical and Horizontal Vent Termination

Figure 10: Standard Vented Heater - Common Vertical Vent Termination**Requirements:**

- Maximum of four heaters can be commonly vented through the roof.
- Heaters must be of the same BTU output.
- Heaters must be controlled by a common thermostat.
- Connections to a common stack must be positioned to avoid direct opposition between streams of combustion gases.

Figure 11: Separated Combustion Heater - Vertical and Horizontal Vent Termination

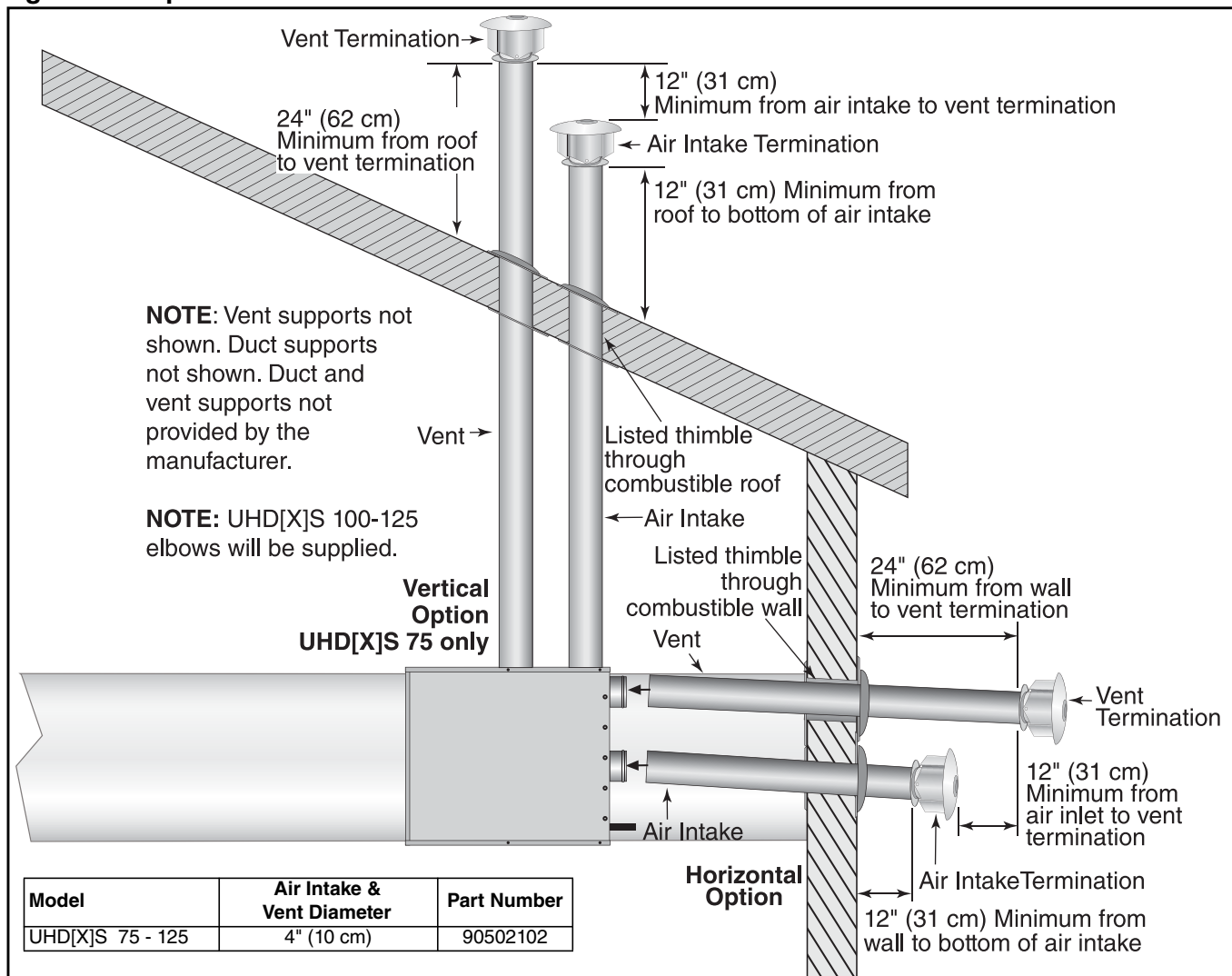


Figure 12: Concentric Vent Box

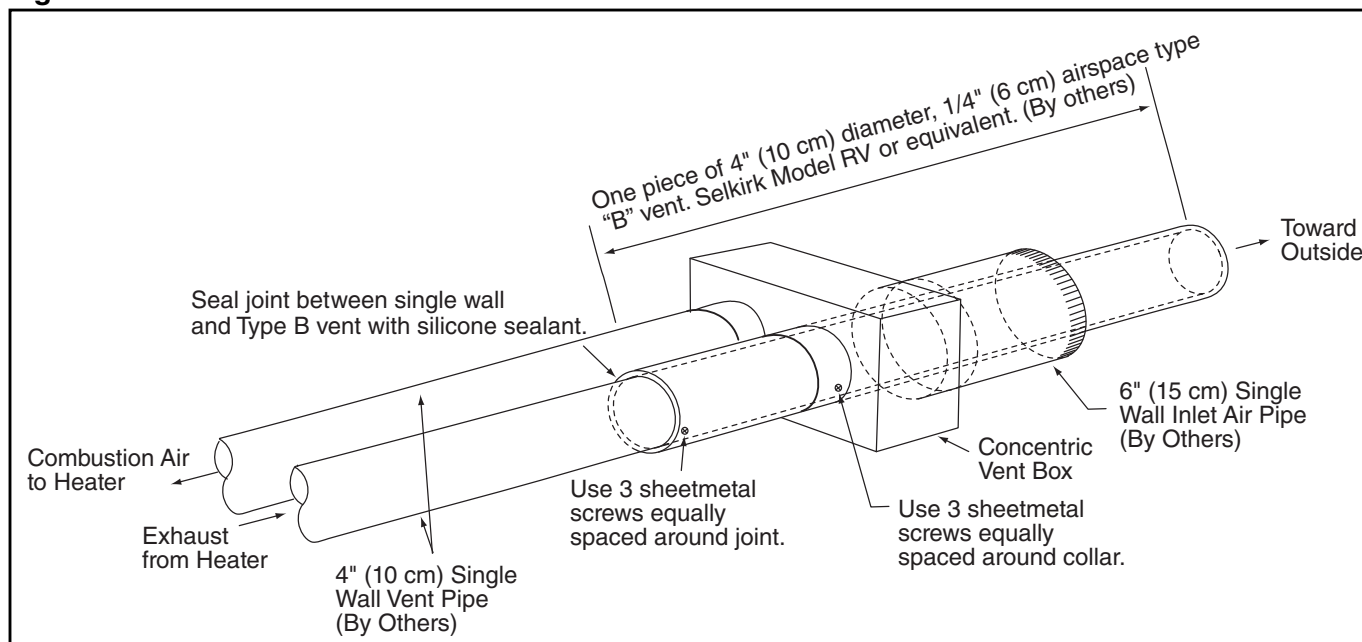
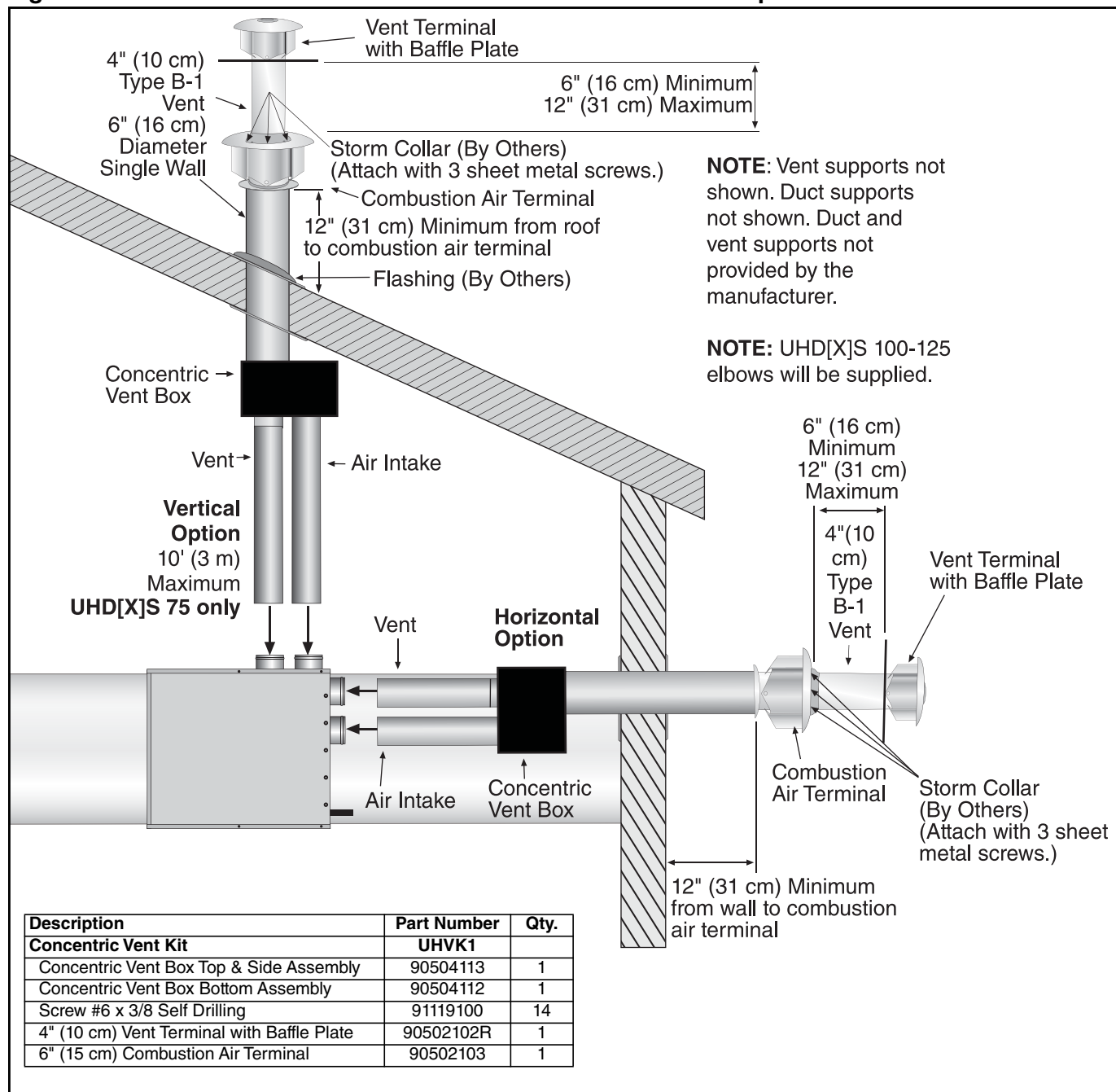


Figure 13: Concentric Vertical and Horizontal Vent Termination - Separated Combustion Heater

SECTION 8: AIR SUPPLY

⚠ WARNING

Explosion Hazard Equipment must have access to uncontaminated air at all times. Failure to follow these instructions can result in death, injury or property damage.

8.1 Separated Combustion Installation

When installed as a separated combustion heater (UHD[X]S), the air for combustion is drawn in from outside the building.

8.2 Building Ventilation

Where ventilation is required, air must be taken from an outside point where it is not likely to be contaminated or obstructed.

8.3 Outside Combustion Air Supply

If outside combustion air supply is required, separated combustion model (UHD[X]S) heaters must be used.

Caution: If the building has a slight negative pressure or corrosive contaminants such as halogenated hydrocarbons are present in the air, an outside combustion air supply to the heater is required. Seal all combustion air pipe joints. The outside air terminal must not be more than 1' (31 cm) above the vent terminal.

8.3.1 Length Requirements

Follow the constraints listed on *Page 12, Section 7.6*.

SECTION 9: GAS PIPING

! WARNING**Fire Hazard**

Connect gas supply according to Figure 14.

Do not use gas supply pipe and electrical connections to support the heater's weight.

Gas can leak if not installed properly.

Failure to follow these instructions can result in death, injury or property damage.

! WARNING**Explosion Hazard**

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with heater connected.

Failure to follow these instructions can result in death, injury or property damage.

A gas meter is connected to the service pipe by the gas supply company. An existing meter should be checked, preferably by the company, to ensure that the meter is adequate for the rate of gas supply required.

Installation pipes must be fitted in accordance with local and national codes. Pipes of smaller size than the heater inlet gas connection should not be used.

Gas lines must meet applicable codes:

United States: Flexible stainless steel gas hose (US models) is certified per the standard for connectors for gas applications. ANSI Z21.21/CSA 6.10 – latest revision.

Canada: Rubber type 1 gas hose (Canadian models) is certified as being in compliance with the

standard for elastomeric composite hose and hose couplings for conducting propane and natural gas, CAN/CGA 8.1 – latest revision.

9.1 Connections

Connect the heater to the gas supply ensuring that the final connections are as follows:

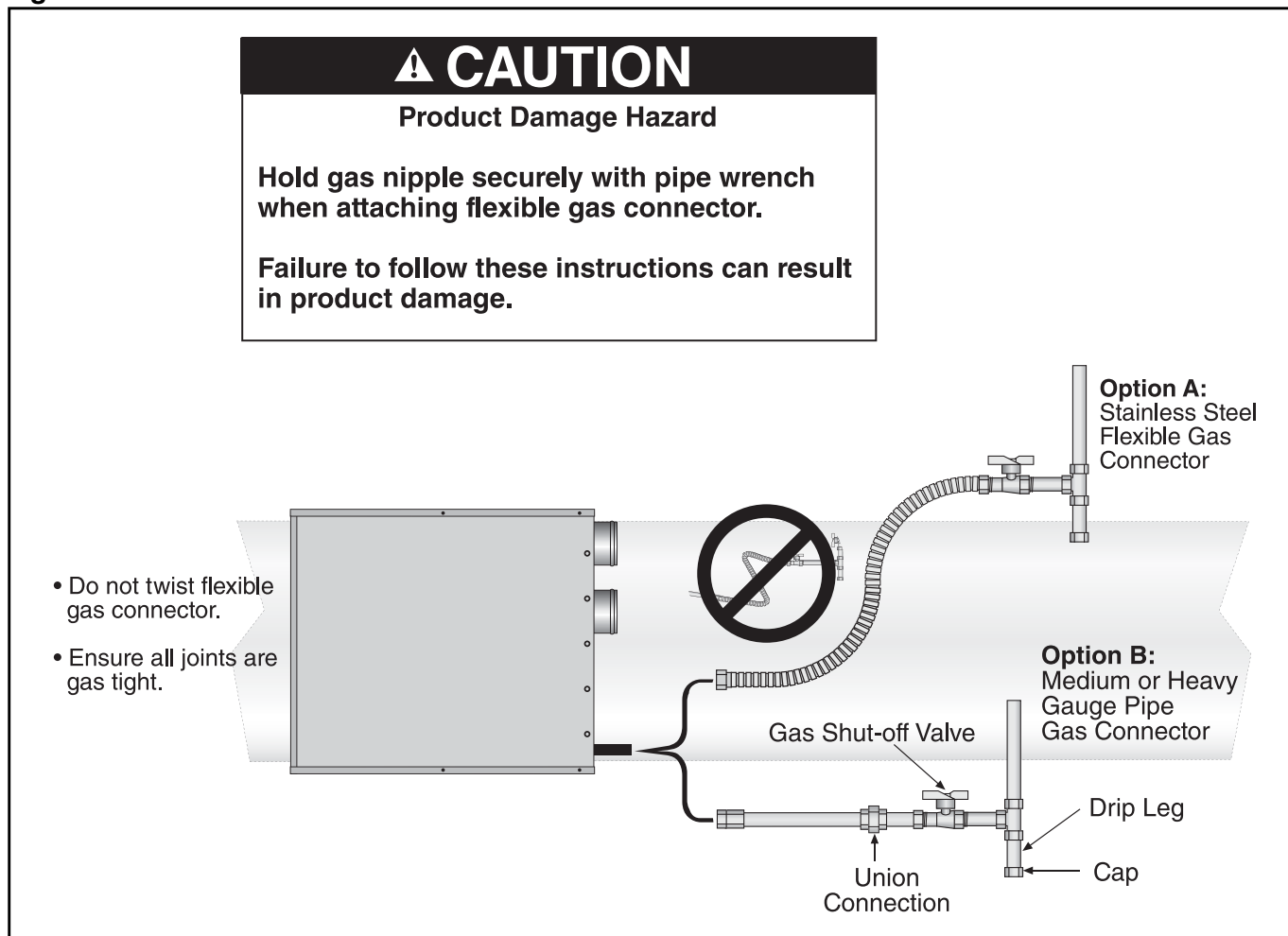
- Gas supply pipe work is run in medium or heavy gauge tubing in compliance with local and national codes.
- Meter and service must be large enough to handle all the burners being installed plus any other connected load. The gas pipe which feeds the system must be large enough to supply the required gas with a maximum pressure drop of 1/2 in wc. When gas piping is not included in the layout drawing, contact the local gas supplier.
- An isolating valve and union connection should be used and fitted into the supply adjacent to the heater.
- A minimum 1/8" NPT plugged tapping accessible for test connection must be installed immediately upstream of the gas supply connection to the heater.
- For suspended heaters, an approved metal flexible connection between the isolating valve and the heater may be used. **To reduce pressure loss, use one pipe size larger than the heater gas connection.**

IMPORTANT - The complete installation must be purged and tested for gas soundness in accordance with local and national codes.

Caution: Do not high pressure (in excess of 1/2 psi [14 in wc]) test the gas piping with the burner connected. Close manual shut-off valve during any pressure testing equal to or less than 1/2 psi (14 in wc).

Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use a soap and water solution; never use an open flame.

Figure 14: Gas Connection



SECTION 10: WIRING

⚠ DANGER**Electrical Shock Hazard**

Disconnect electric before service.

More than one disconnect switch may be required to disconnect electric from equipment.

Equipment must be properly grounded.

Failure to follow these instructions can result in death or electrical shock.

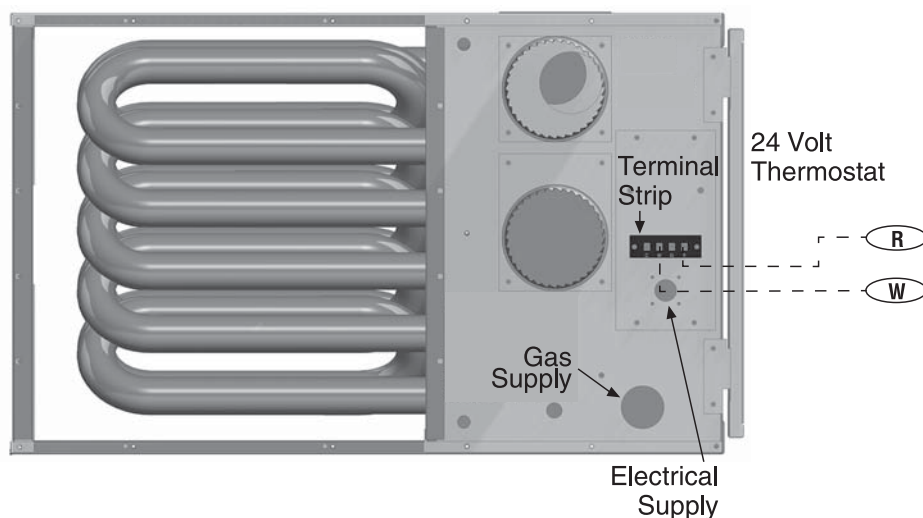
All heater models require constant 120 V/1Ø/ 60 Hz power supply. Check heater serial plate for electrical rating for proper circuit sizing. For servicing, a disconnect switch of proper electrical rating should be installed in the vicinity of the heater.

All heaters are equipped with thermostat connections suitable to power a 24 V thermostat. Heater must be wired and electrically grounded in accordance with local codes. In the absence of local codes in accordance with: United States: refer to National Electrical Code® NFPA 70 - latest revision; Canada: refer to Canadian Electrical Code CSA C22.1 Part I - latest revision.

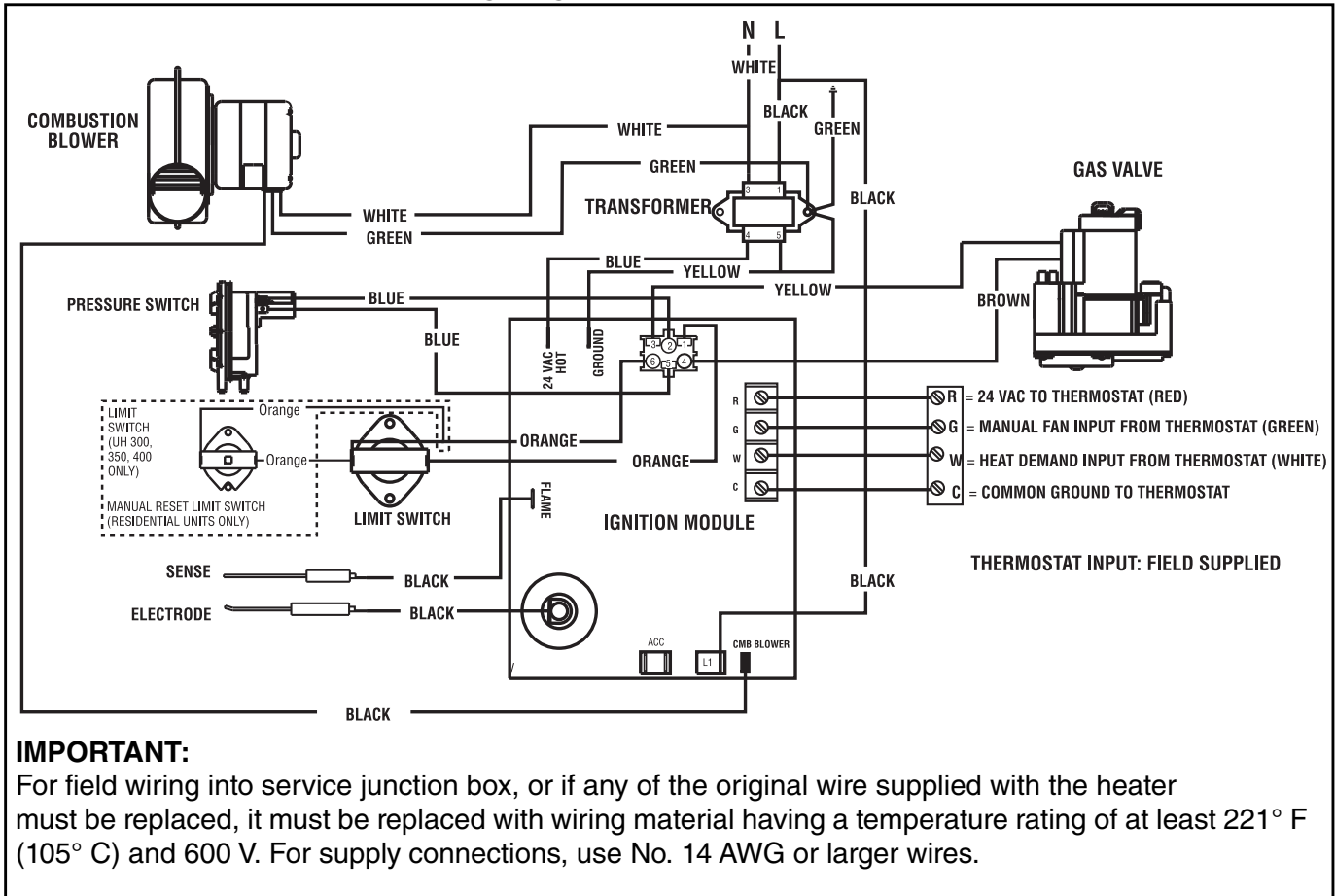
10.2 Low Voltage Thermostat with One Heater**10.1 Positioning Thermostats**

A room thermostat should be mounted on a vibration-free wall or column at a height of approximately 5' (1.5 m) from the floor to measure the ambient temperature. It should be clear of both cold drafts and the direct path of warm air from the heater.

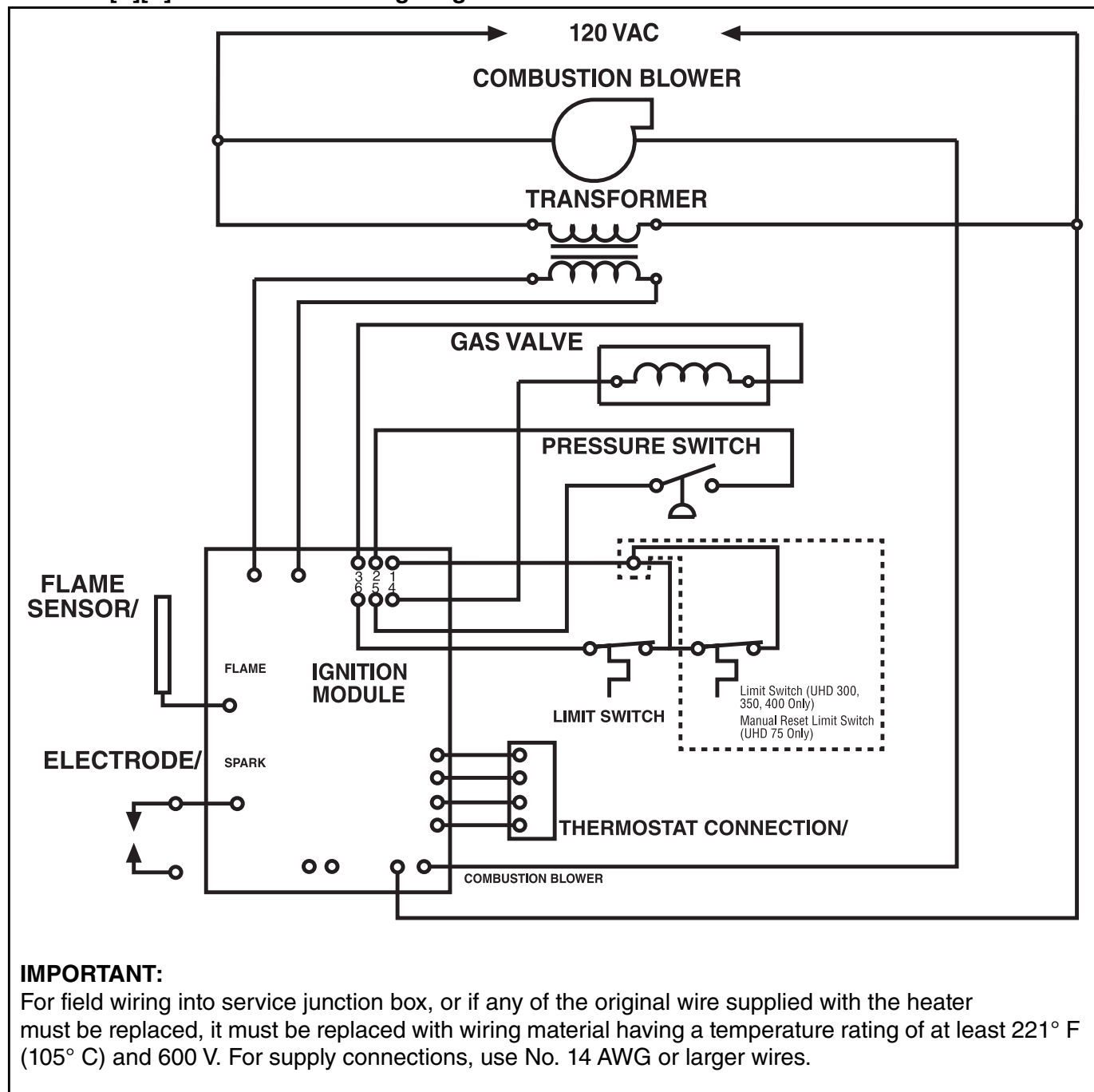
Avoid mounting thermostat on outside walls or in areas directly exposed to radiant heat or sunlight. Install wall tag in a visible location near thermostat. See Page 4, Section 2.1 for wall tag details.



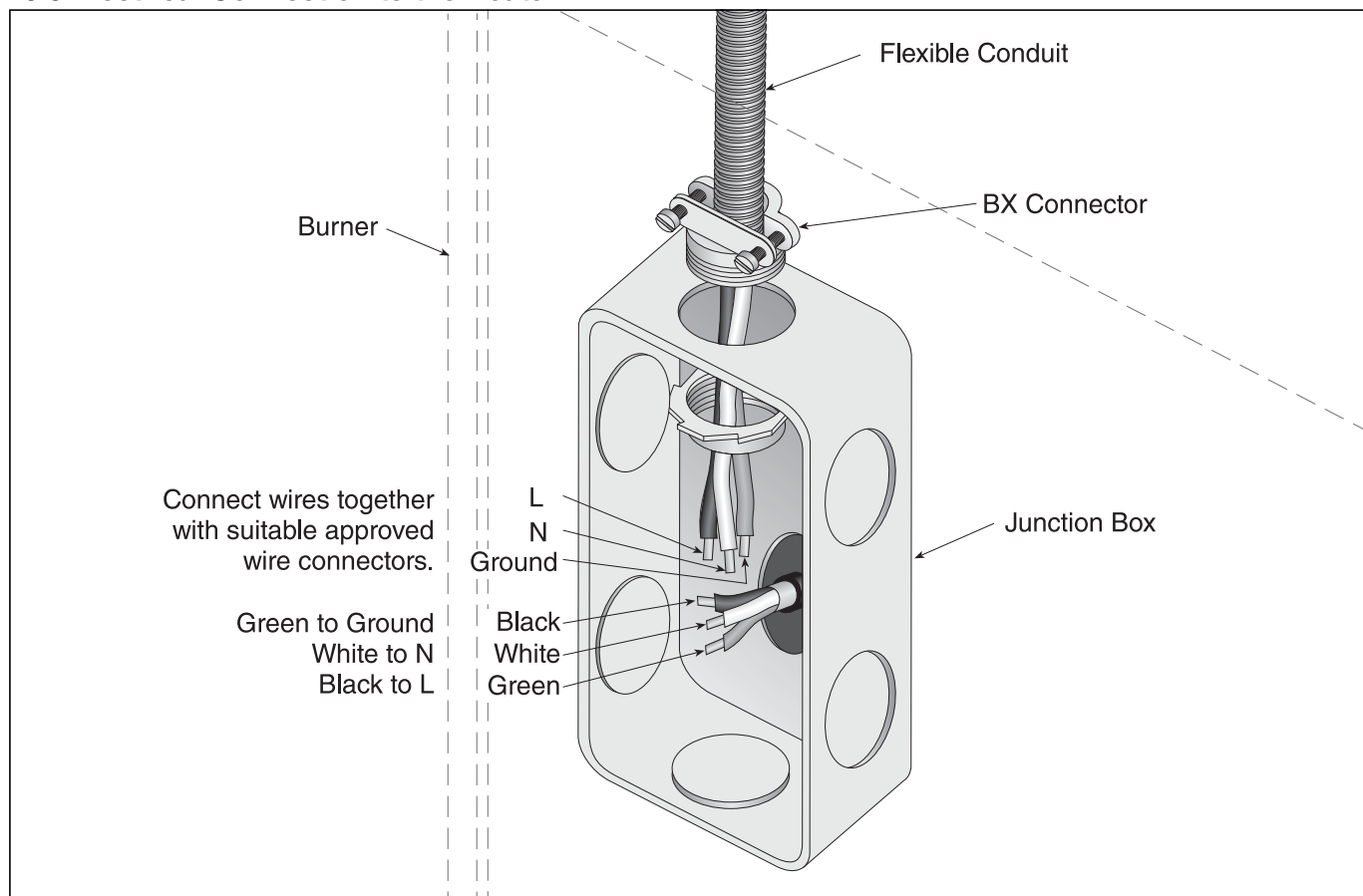
10.3 UHD[X][S] Series Internal Wiring Diagram



10.4 UHD[X][S] Series Ladder Wiring Diagram



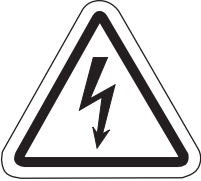



10.5 Electrical Connection to the Heater



IMPORTANT: Junction box is not provided with heater.

Conduit can also be attached directly to heater with wire junction made within the heater cabinet.

SECTION 11: OPERATION AND MAINTENANCE

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service. Heater must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service.	Burn Hazard Allow heater to cool before service. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

Read this manual carefully before installation, operation, or service of this equipment. All components are accessed via the hinged door. Opening the door exposes live electrical connections and hot components.

Prior to any maintenance or service of the heater, shut off, lockout and tagout the electrical disconnect and gas valve that supplies the unit in accordance with OSHA regulations.

11.1 Pre-Start-Up Checks

All pre-start-up checks must be carried out before lighting the heater.

Ensure that the heater and all controls are suitable for the gas, pressure and electrical supply to which they are to be connected.

11.1.1 Electrical Checks

1. Check that all site wiring is connected in accordance with the appropriate wiring diagram on Page 22, Section 10.3.

11.1.2 Gas Supply

All aspects of the gas installation including the gas meter must be inspected, tested for gas tightness and purged in accordance with local and national codes.

Ensure that the air is fully purged from the heater inlet pipe up to the main gas valve inlet test nipple.

11.1.3 Mechanical Checks

1. Check that the flue (and air intake for separated combustion units) is installed in accordance with the instructions in this manual and local regulations. See Page 11, Section 7.

11.2 Begin Start-Up

11.2.1 Before Operating the Heater

To ensure that all the controls are in safe working order, operate the heater for the first time with the isolating gas valve turned off and power supply turned on.

1. Turn off the isolating gas valve.
2. Turn up the thermostat above room temperature. The automatic ignition sequence will now begin as described on Page 26, Figure 15.

There will be no ignition of the burner and lockout will occur, which proves the controls are operating correctly.

Figure 15: Automatic Burner Control Sequence

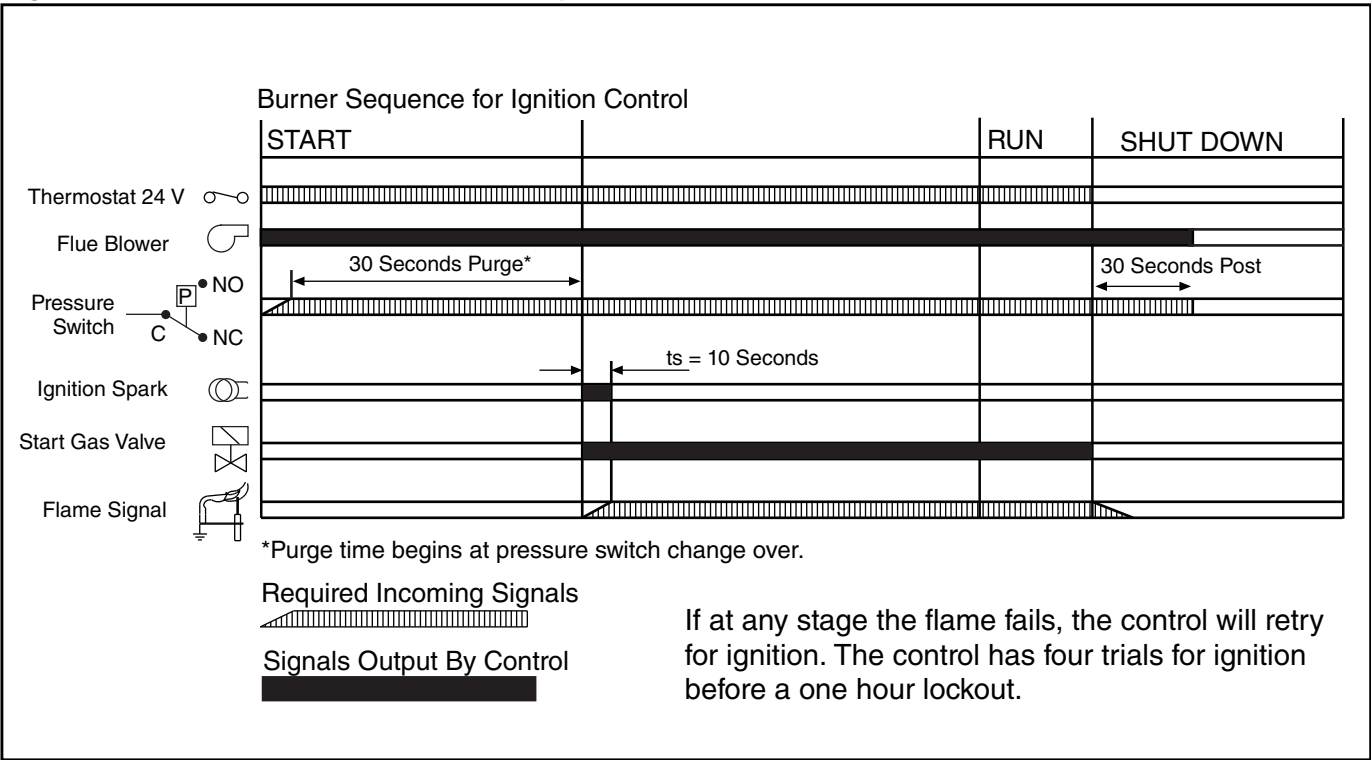
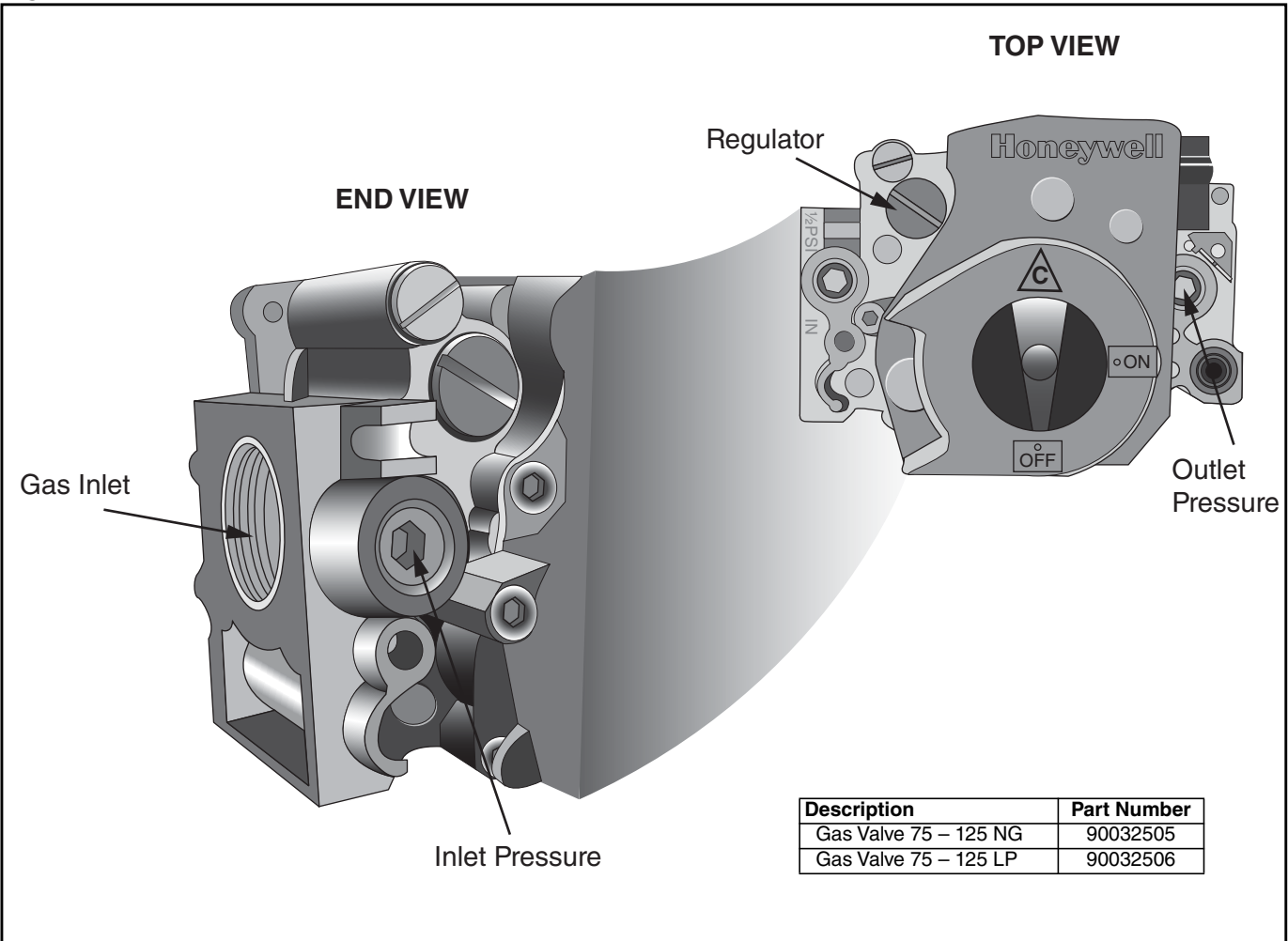


Figure 16: Gas Valve for Models UHD[X][S] 75 – 125



11.2.2 Start-Up the Gas Valve (All Gases)

11.2.2.1 Check Burner Gas Pressure

1. Remove the plug in the outlet (burner) pressure test point and connect a pressure tap and a manometer.
2. With the burner firing, measure the pressure on the manometer. To adjust the burner pressure, remove the regulator cover from the valve and turn the regulator adjustment screw to set the required burner pressure as stated in the Technical Data Table for the correct gas and model *on Page 44, Section 16.3*.

NOTE: If the correct burner pressure cannot be reached, then check the inlet pressure to the valve with the burner firing. See Technical Data Table *on Page 44, Section 16.3* for inlet pressure requirement.

Do not continue to adjust the regulator if the pressure is not changing.

If the inlet pressure is too low to allow correct burner pressure setting, then the gas inlet pressure must be corrected before completing the start-up.

11.2.2.2 Check Gas Rate

1. After burner pressure adjustment, allow the heater to operate for at least 15 minutes and then re-check settings. Adjust pressure setting if necessary.
2. Check gas flow rate at gas meter.
3. Turn off heater and electrical supply.
4. Remove the manometer and refit all covers to the valve and tighten the screw of the outlet pressure tap.

11.3 Pressure Switch

The pressure switch is factory pre-set for each model and is not adjustable.

11.4 Turning Off the Heater

Set the thermostat to the "OFF" position or lowest setting and the main burner will stop.

11.5 External Controls

External controls may include time switch, interlock switch, room thermostat and frost thermostat. Operate each control to ensure that they function correctly. Set the switches (if equipped) and thermostat(s) to the users' requirements.

11.6 Complete Start-Up

Ensure that all covers are fitted correctly and all test points are properly sealed.

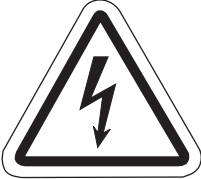



11.7 Instruction to the User

Explain the controls of the heater to the user including how to turn it on and off, using the controls equipped on site.

Give this manual to the user.

Ensure that the user is shown and understands the importance of maintaining clearances to combustibles *on Page 6, Figure 3*, installer responsibility *on Page 4, Section 2*, user instructions *on Page 28, Section 12* and all warnings defined in this manual.

SECTION 12: USER INSTRUCTIONS

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service. Heater must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service.	Burn Hazard Allow heater to cool before service. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

The UHD[X][S] Series heaters are fully automatic and operate from the external controls fitted on site. The only user control at the heater is the Manual Reset Limit Switch - See Page 28, Section 12.2. See Page 40, Section 15.3 for manual reset limit switch location inside control housing.

12.1 Heater Operation

When the heater has been switched on by the thermostat installed on site, the main burner will automatically turn on.

The burner control module will control the safe ignition of the flame.

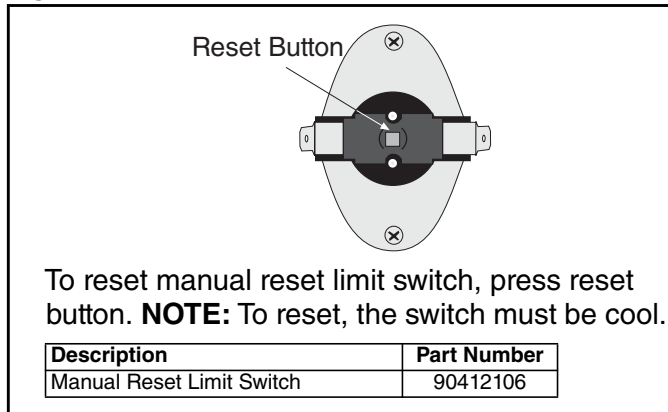
All heaters require a constant gas and electricity supply which must not be interrupted during the normal operation of this heater.

12.2 Common User Controls**12.2.1 Manual Reset Limit Switch**

⚠ WARNING

Explosion Hazard Do not make more than one attempt to restart the heater if manual reset limit switch locks out. The vent or heat exchanger may be blocked. The fault must be traced and repaired. Failure to follow these instructions can result in death, injury or property damage.

The limit thermostat is located inside the hinged access door of the heater. See Page 40, Section 15.3. This control protects against excessive heat build-up inside the burner compartment.

Figure 17: Manual Reset Limit Switch

To reset manual reset limit switch, press reset button. **NOTE:** To reset, the switch must be cool.

12.3 Lighting Instructions

12.3.1 To Turn On Heater

1. Ensure that the electrical and gas supplies to the heater are on. Check that the on site controls are "ON".

IMPORTANT: The thermostat setting must be above the ambient temperature for the heater to operate.

2. The automatic firing sequence will begin as described on Page 26, Figure 15. The heater will now operate automatically under the control of the on site controls.

12.3.2 To Turn Heater Off

Set the thermostat to the "OFF" position or lowest setting. The burner will turn off immediately.

To restart, turn the thermostat on or above room temperature.

12.4 Simple Troubleshooting

Some possible reasons for the heater not operating are:

1. Gas supply not "ON".
2. Electricity supply not "ON".
3. The time and/or temperature controls are not "ON".
4. A limit switch may have operated. This may be caused by an interruption of the electrical supply, failure of the distribution fan or vent or heat exchanger blockage.

If a temperature limit switch persistently trips, there is a fault which must be investigated by a contractor qualified in the installation and service of gas-fired heating equipment.

12.4.1 Simple Troubleshooting (Burner Faults)

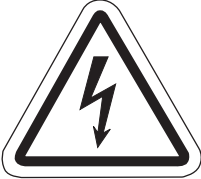



If the burner fails to ignite for any reason, it will retry for ignition (four trials total). After four unsuccessful ignition trials, the control will put the heater into lockout for one hour.

Lockout should not occur during normal operation of the heater and indicates there is a fault condition which must be corrected. There is an LED light on the ignition control that flashes codes to assist in fault correction. See Page 29, Figure 18 for LED indication codes.

Figure 18: LED Diagnostic Codes

LED INDICATION	FAULT MODE
Slow Flash	Normal Operation - No call for heat.
Fast Flash	Normal Operation - Call for heat.
2 Flashes	Ignition Lockout - No flame detected.
3 Flashes	Airflow Fault - Pressure switch open or closed.
4 Flashes	Temperature Limit or Manual Reset Limit Switch Open
5 Flashes	Flame Sense Error - Gas valve not energized.
Steady On	Internal Control Failure

SECTION 13: SERVICING

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service. Heater must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service.	Burn Hazard Allow heater to cool before service. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

13.1 Servicing Instructions

After start-up, the heater will require maintenance to be carried out, at a minimum, annually. If the heater is used in a dirty or dusty area, more frequent maintenance may be required.

IMPORTANT: Prior to any maintenance or service of the heater, shut off, lockout and tagout the electrical disconnect and gas valve that supplies the unit in accordance with OSHA regulations. After any maintenance or repair work, always test fire the heater in accordance with the start-up instructions on Page 25, Section 11 through Page 27, Section 11.7 to ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts on Page 33, Section 14 through Page 37, Section 14.5.

IMPORTANT: Check all gas pipes and pipe joints to ensure there are no cracks or gas leaks. Any cracks in the pipes or pipe joints must be repaired.

IMPORTANT: Inspect all suspended components and hardware. Ensure that they are in good condition, properly tightened, and corrosion free.

13.2 Burner Maintenance

1. Open the hinged door via tooled access and remove from the hinges. Set door aside. See Page 39, Section 15.2
2. Remove burner side panel. Electrode and flame probe should remain attached. See Page 40, Section 15.3.
3. Remove burner assembly from cabinet via four screws, two on top and two on bottom. Clean

any deposits from the main burner which may have formed in the injectors or venturi of the burner.

4. Check condition of ignition electrode and flame probe. Clean off any deposits which may have formed, check condition of ceramic insulators. Replace as necessary. See Page 40, Section 15.3.

13.3 Heat Exchanger Maintenance

The heat exchanger will remain clean unless a problem has developed with combustion. Inspect the heat exchanger. Look for signs of overheating at the front of the tubes which may indicate burner over firing or persistently low air flows.

13.4 Gas Valve Maintenance

No regular maintenance is required on this device. To change gas control valves, See Page 38, Section 15.1.

Do not repair or disassemble gas valve.

Replace faulty gas valves with replacement parts sold and supplied by Rapid Engineering LLC.

13.5 Flue Blower

The flue blower should not require maintenance. However, if the air pressure switch is causing burner lockout, then remove the flue blower from the vent box by unscrewing the screws at the mounting plate. Screw quantity will vary by model size. Remove the screws attaching the mounting plate to the fan inlet See Page 41, Section 15.5. Ensure that the fan is free to run and that the fan wheel is clean.

13.6 Venting and Air Intake Pipe

Inspect all venting and air intake pipe. Ensure that all seams are sealed and suspension points secure. Repair suspension points if any part of the venting or combustion air pipe is sagging. Check to make sure any insulation is not missing or in poor condition. Replace as necessary. Check all venting and air intake components to ensure they are in good condition, gas tight and corrosion-free.

supplied by Rapid Engineering LLC and conform to all requirements set forth in the RAPID® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment.

To help facilitate optimum performance and safety, Rapid Engineering LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your RAPID® equipment and perform service where necessary, using only replacement parts sold and supplied by Rapid Engineering LLC.

13.7 Maintenance Checklist





Installation Code and Annual Inspections:

All installation and service of RAPID® equipment must be performed by a contractor qualified in the installation and service of equipment sold and

Annual Fall Start-up	Follow entire start-up procedure at this time and check control settings and operation.
The Vicinity of the Heater	Do not store or use flammable objects, liquids or vapors near the heater. Immediately remove these items if they are present. <i>See Page 5, Section 3.</i>
Vehicles and Other Objects	Maintain the clearances to combustibles. Do not hang anything from, or place anything on, the heater. Make sure nothing is lodged in between the heat exchanger tubes. Immediately remove objects in violation of the clearances to combustibles. <i>See Page 6, Section 4.</i>
Vent Pipe/Terminals	Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Remove any carbon deposits or scale using a wire brush. If the vent terminal has a screen built in, remove any dirt, dust or deposits from the screen. <i>See Page 11, Section 7 through Page 18, Section 8.</i>
Cabinet Exterior	After installation, touch up scratches. Periodic painting should be done thereafter as required. Warning labels and logo labels should be legible and accurate. Please contact Rapid Engineering LLC or RAPID® independent distributor if you need replacement warning labels or logo labels. <i>See Page 2, Figure 1 through Page 3, Figure 2</i>
Combustion Air Intake Pipe	Intake pipe and inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Clean and reinstall as required. <i>See Page 18, Section 8.</i>

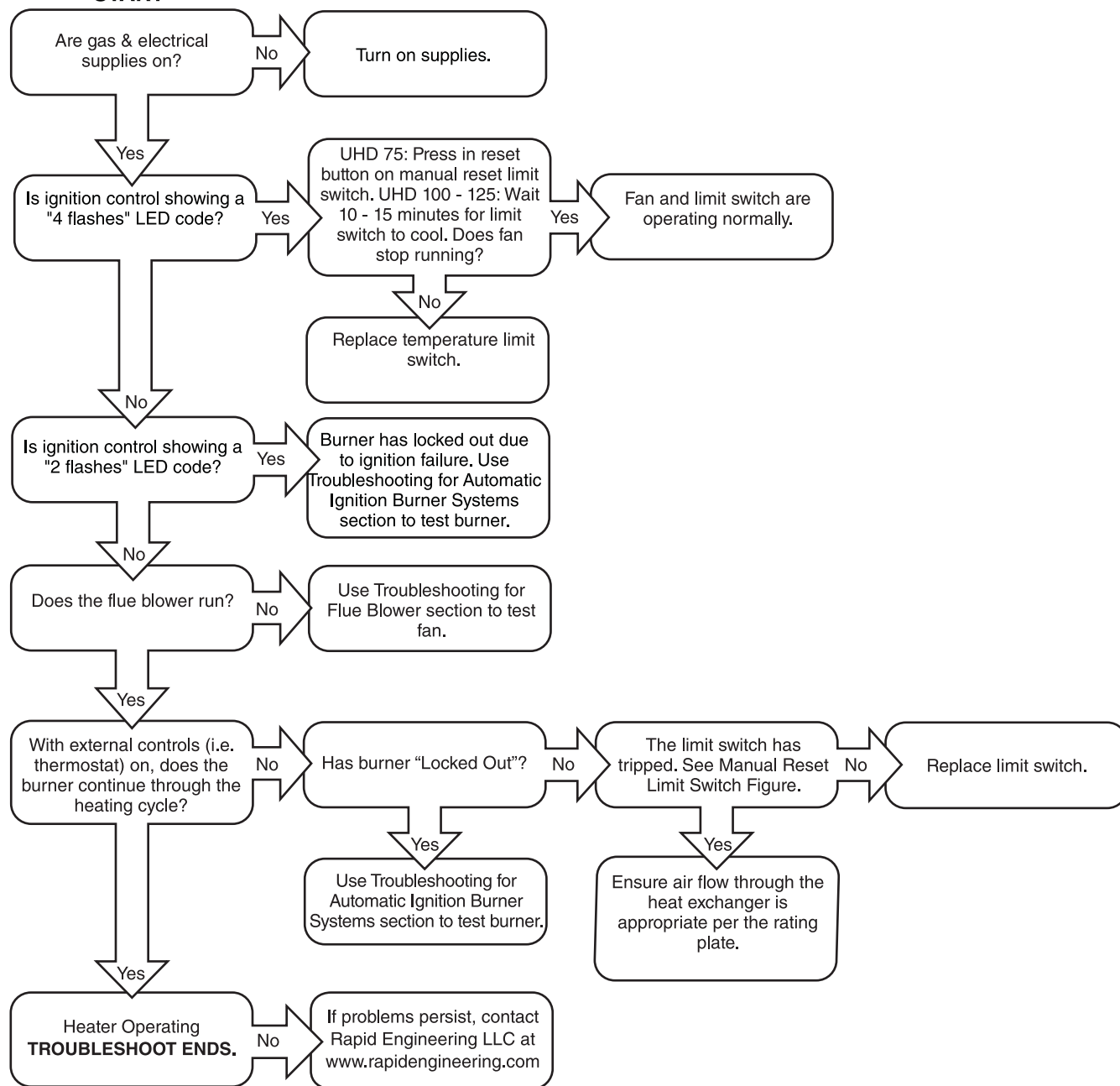
Heat Exchanger	Make sure there are no cracks. Make sure there is no sagging, bending or distortion. Clean or replace as required.
Gas Line and Shut-off Valves	Check for gas leaks. <i>See Page 19, Section 9.</i>
Burner Observation Window	Make sure it is clean and free of cracks or holes. Clean and replace as required.
Flue Blower Scroll, Wheel and Motor	Compressed air or a vacuum cleaner may be used to clean dust and dirt.
Inshot Burners and Orifices	Clear obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
Direct-Spark Igniter	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode. The electrode gap should be 1/8" (3.2 mm).
Thermostat	There should be no exposed wire or damage to the device or wiring. <i>See Page 21, Section 10.</i>
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the suspension materials or ceiling. <i>See Page 9, Figure 5.</i>
Silicone Tubing	Ensure tight, secure fit on all pressure fittings at pressure switch and vent box.
Gas Valve	Verify that cap covering pressure regulator adjustment screw is secure and has not been tampered with. Verify all wiring connections.
Condensate Drain (when installed)	Flush drain and clear any obstructions.
Ductwork	Consult an indoor air quality professional for proper cleaning procedures.
Air Circulation Blower	For a complete inspection, see the manufacturer's installation, operation and service manual.
Wall Tag	If wall tag is present, make sure it is legible and accurate. Please contact Rapid Engineering LLC or your RAPID® independent distributor if you need a wall tag. <i>See Page 4, Section 2.1.</i>

SECTION 14: TROUBLESHOOTING

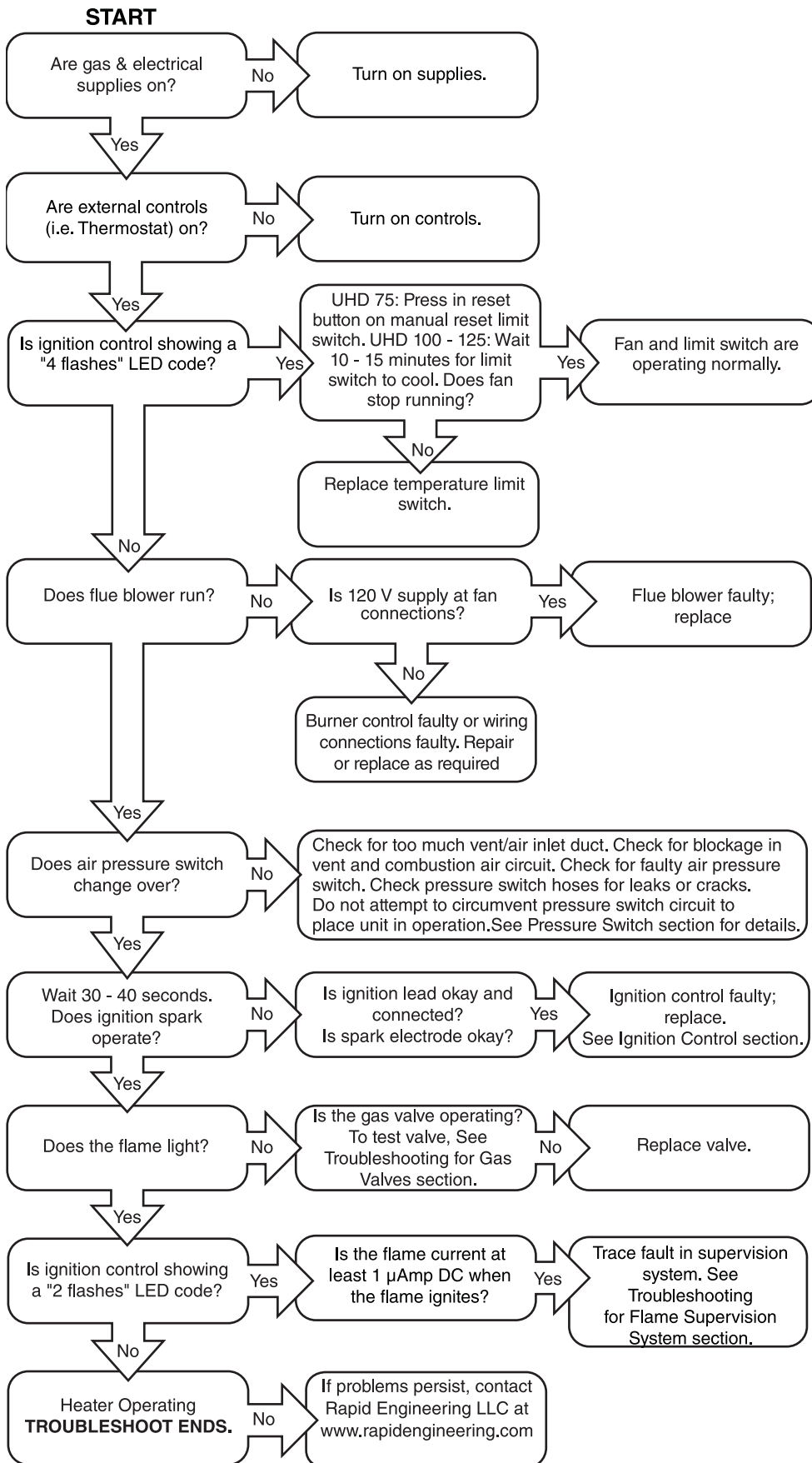
⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard Disconnect electric before service. Heater must be connected to a properly grounded electrical source.	Explosion Hazard Turn off gas supply to heater before service.	Burn Hazard Allow heater to cool before service. Tubing may still be hot after operation.	Cut/Pinch Hazard Wear protective gear during installation, operation and service. Edges are sharp.
Failure to follow these instructions can result in death, electric shock, injury or property damage.			

14.1 General

START



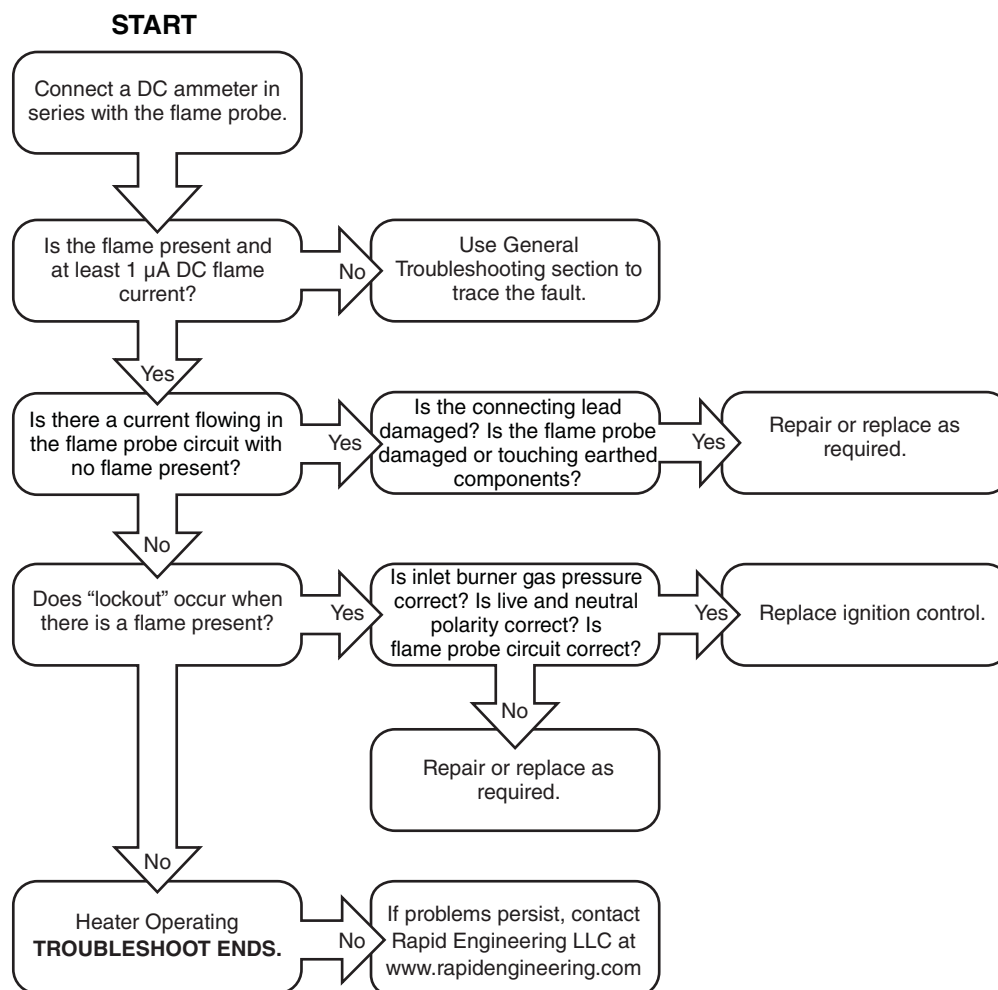
14.2 Troubleshooting For Automatic Ignition Burner Systems



For optimum heater performance, use only replacement parts sold and supplied by Rapid Engineering LLC. **Conduct start-up procedure as shown on Page 25, Section 11.**

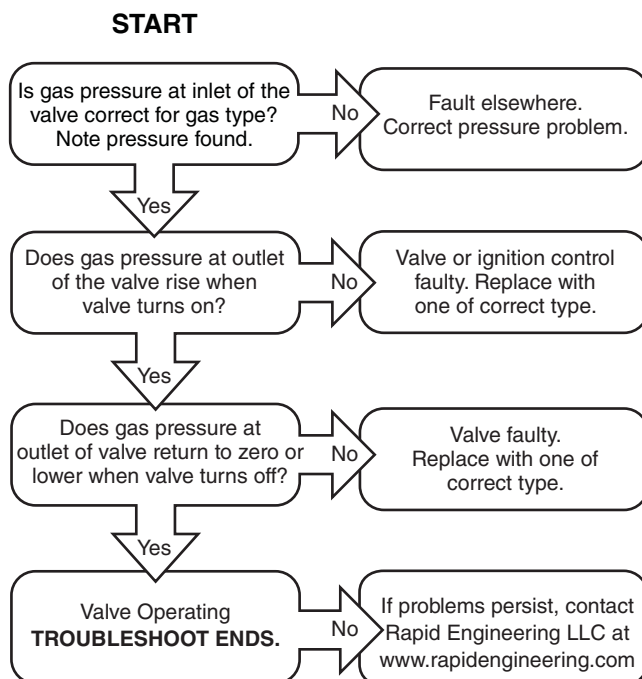
14.3 Troubleshooting for Flame Supervision System

To measure flame current, connect a 0 - 50 μA DC meter in series with the flame probe. If the meter reads negative values, then reverse the test leads.

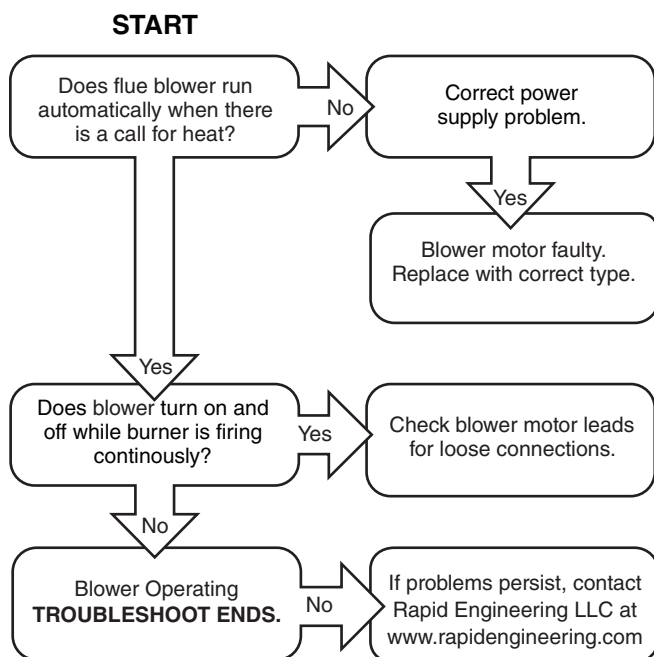


NOTE: Minimum flame probe current 1 μA DC. Typical flame probe current 3-5 μA DC.

14.4 Troubleshooting for Gas Valves



14.5 Troubleshooting for Flue Blower



For optimum heater performance, use only replacement parts sold and supplied by Rapid Engineering LLC.

Conduct start-up procedure as shown on Page 25, Section 11.

SECTION 15: REPLACEMENT PARTS

! DANGER**Electrical Shock Hazard****! WARNING****Explosion Hazard****Fire Hazard****Carbon Monoxide Hazard**

Use only genuine RAPID® replacement parts per this installation, operation and service manual.

Failure to follow these instructions can result in death, electric shock, injury or property damage.

See warnings and notes on *Page 30, Section 13* before removing or replacing parts

Burner Components

All serviceable burner parts are accessed by the hinged door on the side of the heater.

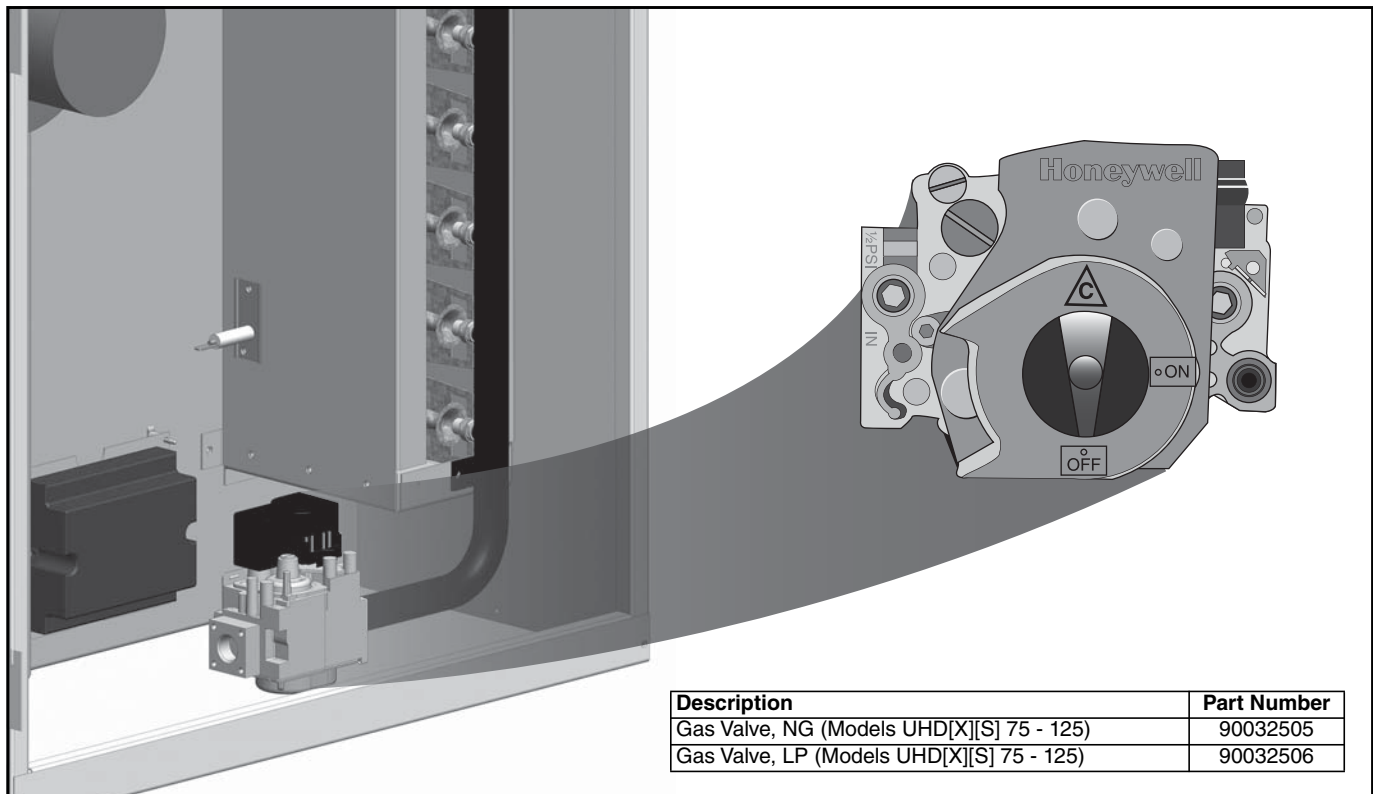
15.1 Gas Valve

Remove the gas supply pipe at the heater inlet.

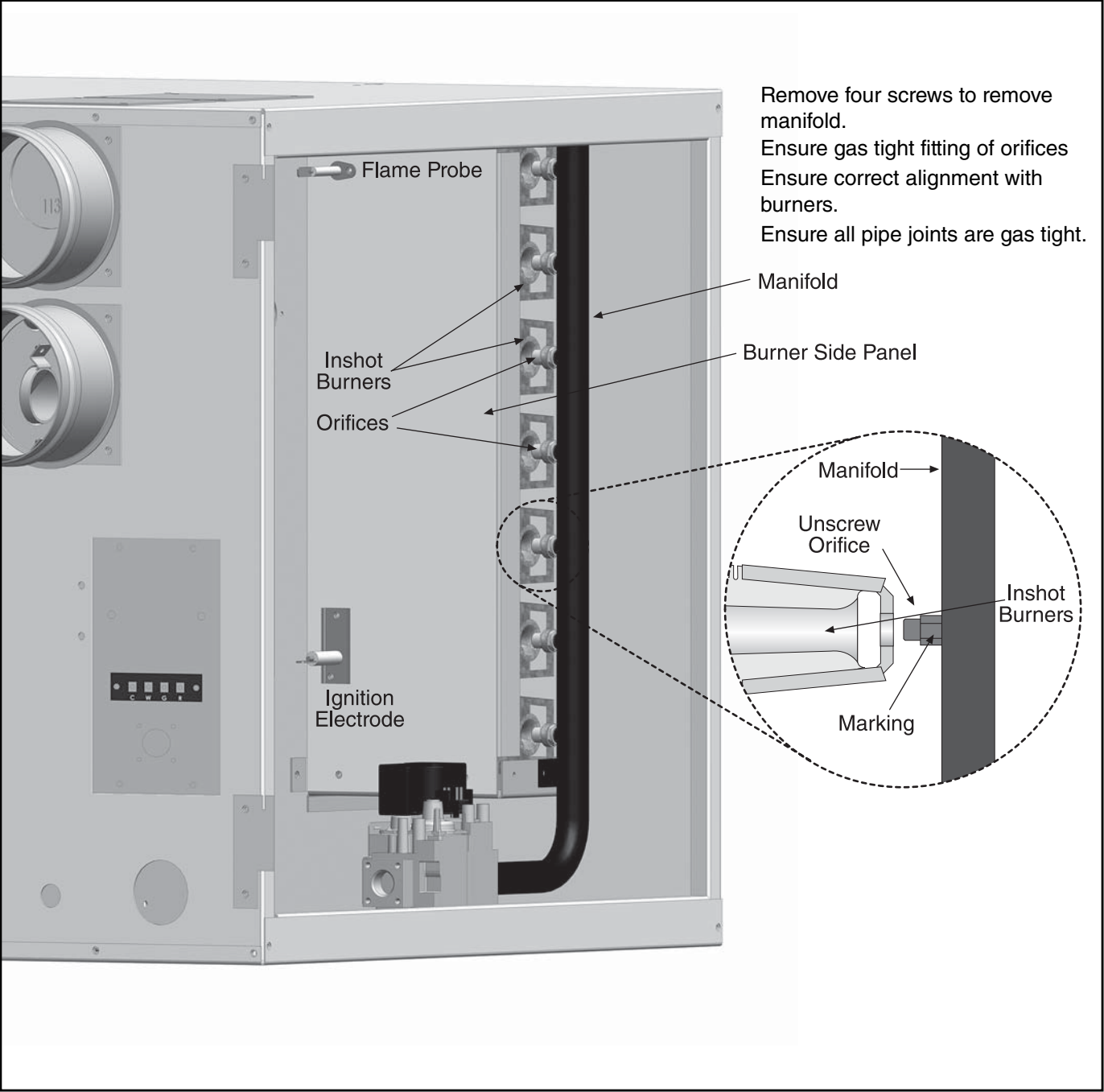
Follow instructions on *See Page 39, Section 15.2* to remove gas valve/manifold.

Replace in reverse order. Verify that the gas flow direction of the valve is correct. Use a minimum amount of gas seal on the thread joint. Check that all the joints are leak free. Reset gas valve. See *Page 27, Section 11.2.2*.

IT IS IMPORTANT THAT ONLY THE CORRECT GAS VALVE IS USED WHEN REPLACING THESE CONTROLS.

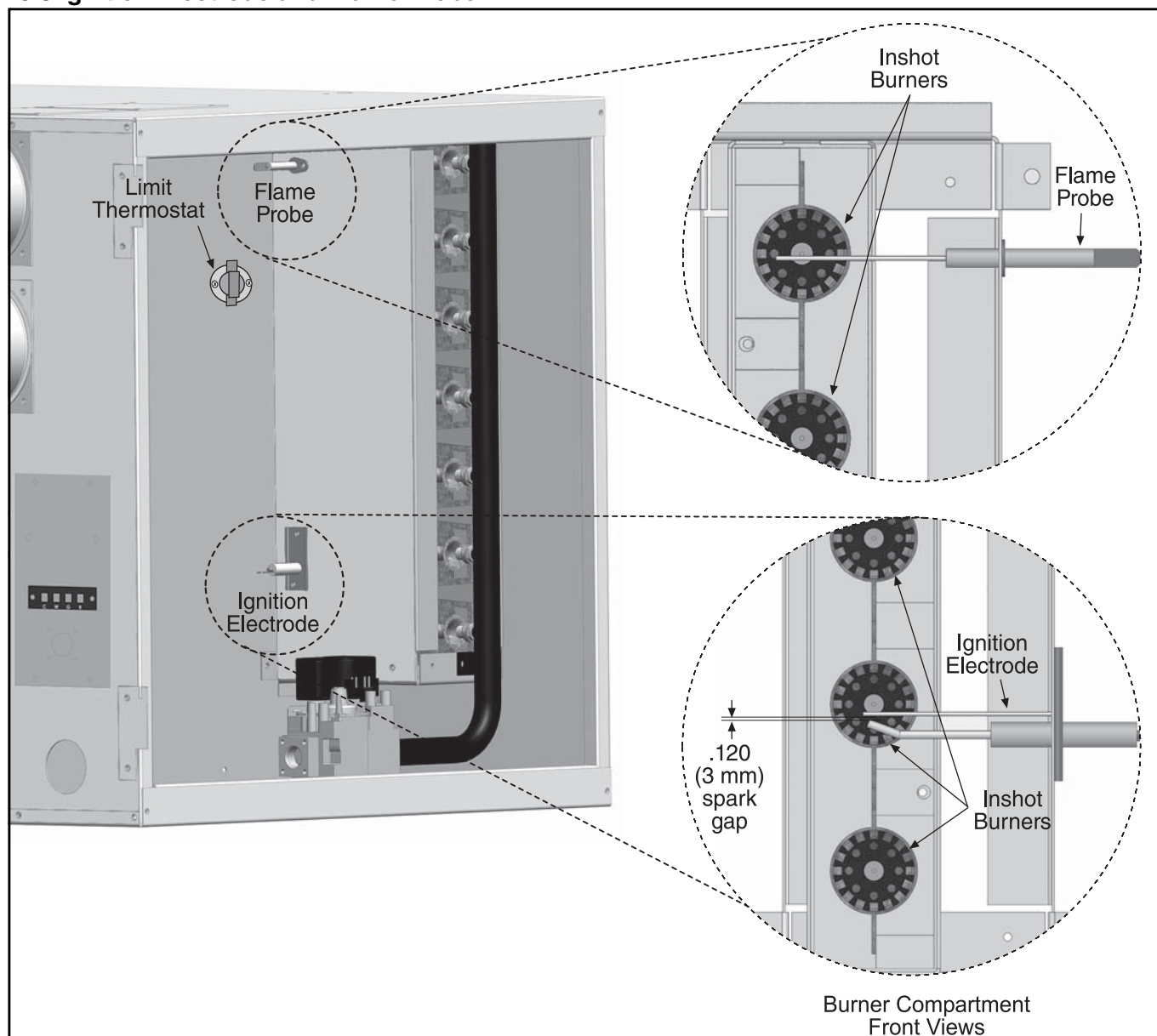


15.2 Burner Injectors



MODEL	UHD[X][S] 75	UHD[X][S] 100	UHD[X][S] 125
Orifice Quantity	5	6	7
Natural Gas			
Orifice Marking	49	46	46
P/N	91930049	91930046	91930046
Propane			
Orifice Marking	1.15 mm	1.25 mm	1.25 mm
P/N	91930115	91930125	91930125

15.3 Ignition Electrode and Flame Probe



To replace the electrode or flame probe, remove the electrical lead and screw.

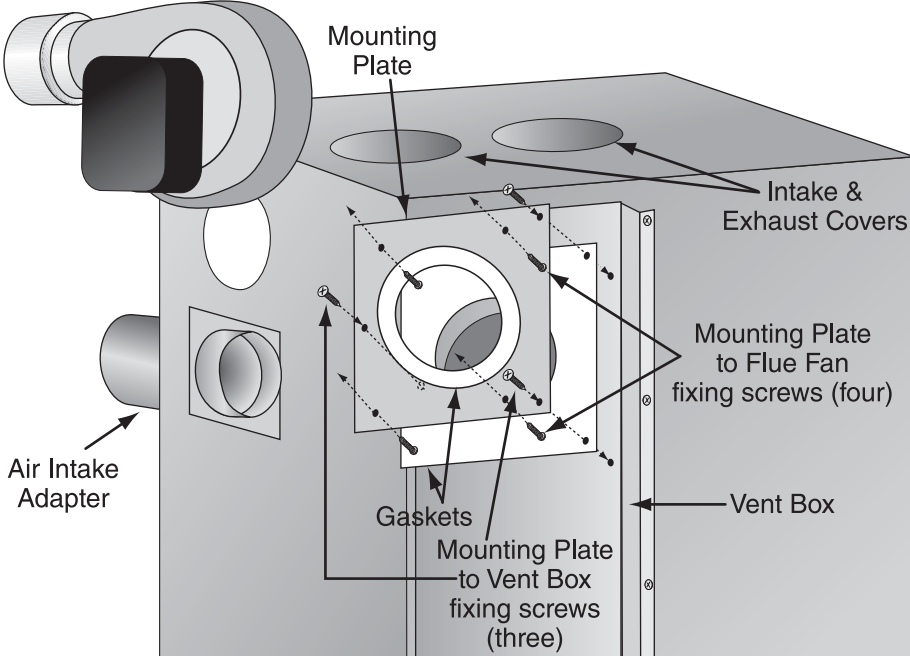
Pull out from mounting. Refit in reverse ensuring that the gap to burner is as shown in the front view of the burner compartment.

Description	Part Number	Qty
Spark Electrode	90427411	1
Automatic Ignition Flame Probe	90439300	1
Transformer	90436900K	1
Ignition Module	90434008	1
Inshot Burners UHD[X][S] 75	92000002	5
Inshot Burners UHD[X][S] 100	92000002	6
Inshot Burners UHD[X][S] 125	92000002	7
Limit Switch	90412104	1
Manual Reset Limit Switch (75 only)	90412106	1

15.4 Heat Exchanger

The heat exchanger consists of a six-pass design with 1.5" outer diameter [aluminized steel] [409 stainless steel] tube. The tube plates are made of [aluminized steel] [409 stainless steel]. The tube supports are made of [aluminized steel] [409 stainless steel].

15.5 Flue Blower Vertical Installation for UHD[X][S]75 Only



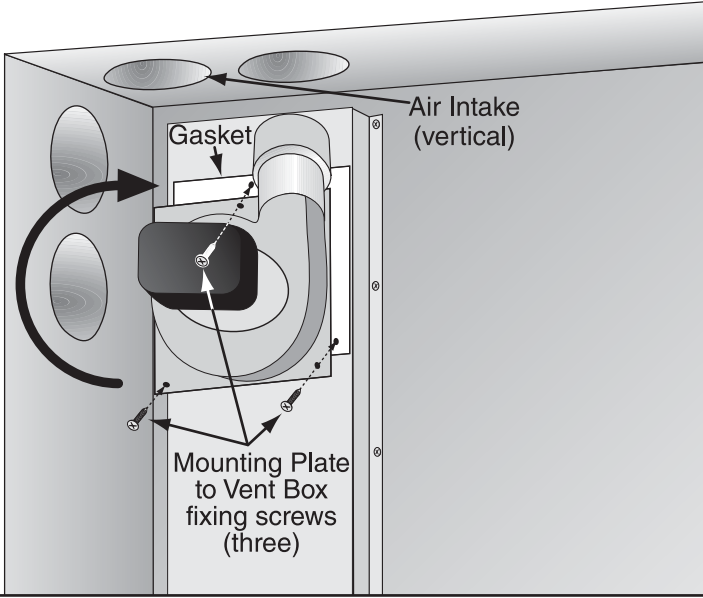
To remove the blower, remove screws securing the fan and mounting plate to the vent box.

To remove the blower from the mounting plate, remove screws.

Refit in reverse order.

To change the vent and air intake orientation from back to top, remove the blower and mounting plate as above.

Remove intake and exhaust covers from top of the heater.



Rotate the blower, mounting plate and gasket clockwise until the flue adapter lines up with the top hole. Secure screws.

If applicable, remove the air intake adapter from the back of the heater and install in the appropriate hole on top.

Install intake and exhaust covers over the back holes.

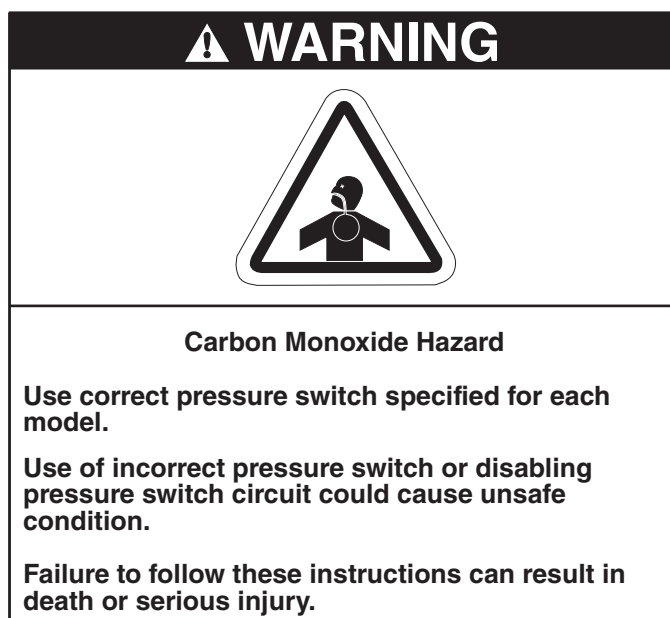
Ensure sealed joints. Ensure mounting plate orifice is clear and not obstructed.

MODEL	UHD[X][S] 75	UHD[X][S] 100-125
Flue Blower P/N	90710404	90710403

IT IS IMPORTANT THAT ONLY THE CORRECT FLUE BLOWER SPECIFIED FOR EACH MODEL TYPE IS USED WHEN REPLACING THESE ITEMS.

Carry out a start-up after working on or changing a flue blower. See *Page 25, Section 11*.

15.6 Pressure Switch



Pull off 3 way connector. Spring open plastic clips of mounting cradle. Replace with correct type of pressure switch for model. The pressure switches are color coded for each pressure setting.

Carry out a start-up after working on or changing a pressure switch. See *Page 25, Section 11*.

MODEL	UHD[X][S] 75	UHD[X][S] 100	UHD[X][S] 125
Pressure Switch Kit P/N	90439804	90439805	90439810
Color Code	white	blue	black
Set Point in wc	0.47	0.55	0.35
Pressure Switch Snap Ring P/N	90439850	90439850	90439850

15.7 Ignition Control

The control mounts to the heat exchanger plate. Pull out ignition cable and wiring from board, noting their positions. Release the four mounting standoffs. Refit in reverse. Ensure correct location of ignition cable and all other wiring.

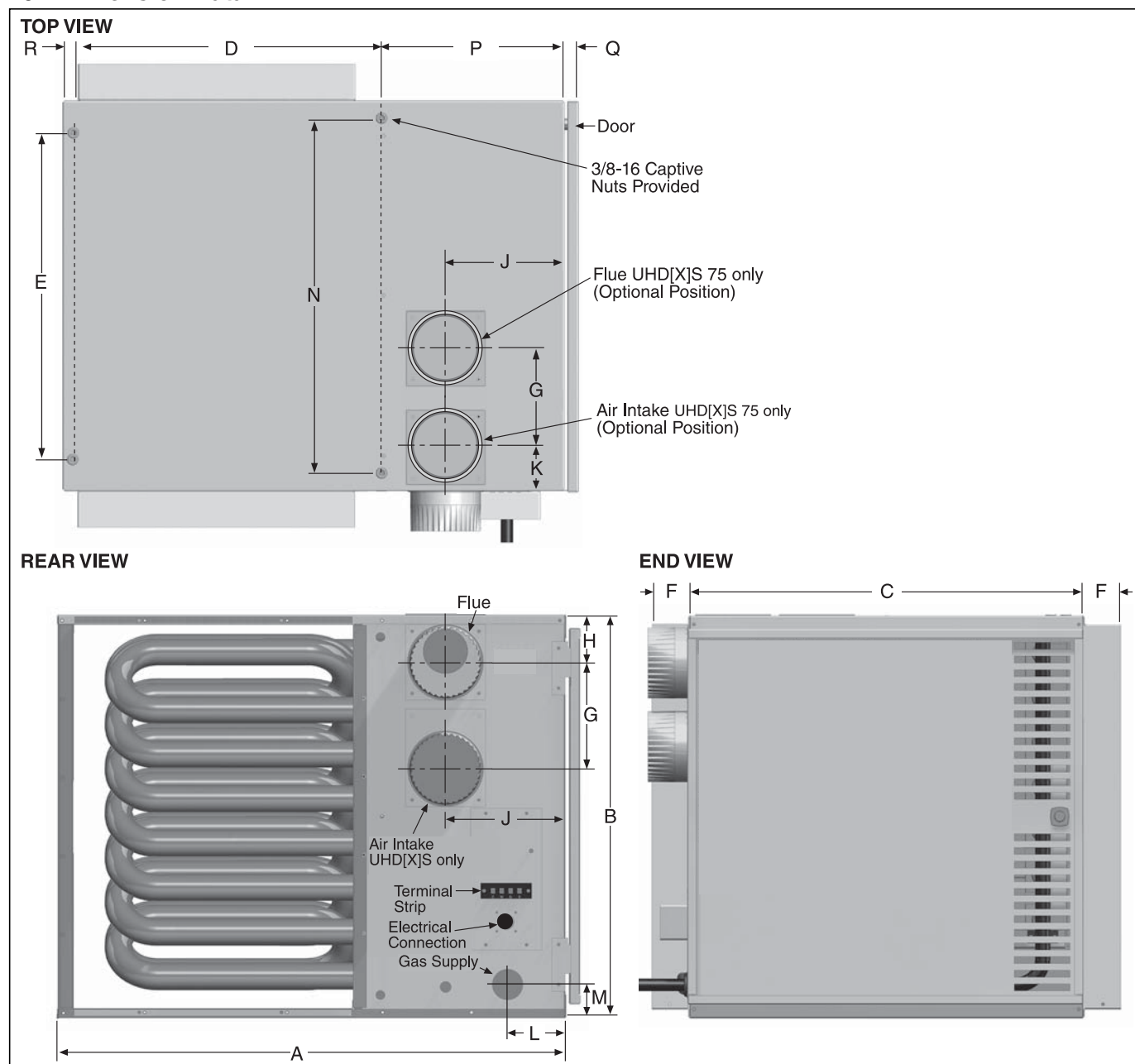
15.8 Limit Switches

15.8.1 Removal and Replacement

1. Remove the electrical connections to the switch.
2. Unscrew the two screws securing the switch.
3. Fit a new switch with two screws.
4. Reconnect the electrical connections and test operation.

SECTION 16: SPECIFICATIONS

16.1 Dimension Data



Models		A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
UHD[X][S] 75	in	28.7	17.7	22.3	17.6	18.6	2.0	6.0	2.8	6.8	2.5	3.3	1.9	20.3	10.4	0.6	0.5
	cm	73.0	45.0	56.6	44.7	47.2	5.0	15.2	7.1	17.3	6.4	8.4	4.8	51.6	26.4	1.5	1.4
UHD[X][S] 100	in	28.7	22.7	22.3	17.6	18.6	2.0	6.0	2.7	8.6	-	3.3	1.9	20.3	10.4	0.6	0.5
	cm	73.0	57.6	56.6	44.7	47.2	5.0	15.2	6.9	21.8	-	8.4	4.8	51.6	26.4	1.5	1.4
UHD[X][S] 125	in	28.7	22.7	22.3	17.6	18.6	2.0	6.0	2.7	8.6	-	3.3	1.9	20.3	10.4	0.6	0.5
	cm	73.0	57.6	56.6	44.7	47.2	5.0	15.2	6.9	21.8	-	8.4	4.8	51.6	26.4	1.5	1.4

16.2 General Technical Data Table

	Model	UHD[X][S] 75	UHD[X][S] 100	UHD[X][S] 125
Full Load Amps @ 120 V	A	1	2	2
Minimum Air Volume	CFM	850	950	1020
Temperature Rise @ Minimum Air Volume	°F (°C)	68 (37)	78 (43)	92 (51)
Heat Exchanger Pressure Drop @ Minimum Air Volume	in wc	0.06	0.05	0.06
Maximum Air Volume	CFM	2650	3660	4750
Temperature Rise @ Maximum Air Volume	°F (°C)	22 (12)	22 (12)	20 (11)
Heat Exchanger Pressure Drop @ Maximum Air Volume	in wc	0.36	0.55	0.98
Flue Size/Air Intake**	in (cm)	4 (10)-All models		
Duct Size (Width)	in (cm)	16 3/4 (43)	21 3/4 (55)	21 3/4 (55)
Duct Size (Height)	in (cm)	15 7/8 (40)	15 7/8 (40)	15 7/8 (40)
Weight	lb (kg)	81 (36.7)	92 (41.7)	97 (44)
Recommended Mounting Height to Heater Base	ft (m)	12 (3.66)	20 (6.10)	20 (6.10)

**Do not exceed the maximum length of flue stated or heater may not operate properly.*

16.3 Technical Data Table

	Model	UHD[X][S] 75	UHD[X][S] 100	UHD[X][S] 125
Total Input	(Btu/h) x (1000)	75	100	125
Total Output	(Btu/h) x (1000)	61.5	82	102.5
Efficiency	%	82-All models		
Natural Gas Data - Inlet Pressure 5.0 in wc Min., 14 in wc Max.				
Burner Pressure	in wc	3.2	2.7	3.0
LPG / Propane Data - Inlet Pressure 12.0 in wc Min., 14 in wc Max.				
Burner Pressure	in wc	10.1	8.9	9.15

SECTION 17: RAPID® UHD-SERIES WARRANTY

RAPID ENGINEERING LLC WILL PAY FOR:

Within 24 months from date of purchase by buyer or 27 months from the date of shipment by Rapid Engineering LLC (whichever comes first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

Rapid Engineering LLC will require the part in question to be returned to the factory. Rapid Engineering LLC will, at its sole discretion, repair or replace after determining the nature of the defect and disposition of part in question.

RAPID® Replacement Parts are warranted for a period of 18 months from date of shipment from Rapid Engineering LLC or the remaining RAPID® UHD-Series warranty.

RAPID ENGINEERING LLC WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Claims where the total price of the goods have not been paid.

Damage due to:

- Improper installation, operation or maintenance.
- Misuse, abuse, neglect, or modification of the RAPID® UHD-Series in any way.
- Use of the RAPID® UHD-Series for other than its intended purpose.
- Incorrect gas or electrical supply, accident, fire, floods, acts of God, war, terrorism, or other casualty.
- Improper service, use of replacement parts or accessories not specified by Rapid Engineering LLC.
- Failure to install or maintain the RAPID® UHD-Series as directed in the Installation, Operation and Service manual.
- Relocation of the RAPID® UHD-Series after initial installation
- The use of the RAPID® UHD-Series in a corrosive atmosphere containing contaminants.
- The use of the RAPID® UHD-Series in the vicinity of a combustible or explosive material.
- Any defect in the RAPID® UHD-Series arising from a drawing, design, or specification supplied by or on behalf of the consumer.
- Damage incurred during shipment. Claim must be filed with carrier.

WARRANTY IS VOID IF:

The RAPID® UHD-Series is not installed by a contractor qualified in the installation and service of gas-fired heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ownership of the RAPID® UHD-Series is moved or transferred. This warranty is nontransferable.

Rapid Engineering LLC is not permitted to inspect the damaged controller and/or component parts.

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL

If you have questions about your controller, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write:

Rapid Engineering LLC

1100 Seven Mile Road NW

Comstock Park, MI 49321

Telephone: +1.616.784.0500

Fax: +1.616.784.1910

Toll Free: 800.536.3461

www.rapidengineering.com

Rapid Engineering LLC' liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty. Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

Rapid Engineering LLC shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the RAPID® UHD-Series. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Rapid Engineering LLC shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to war, fire, flood, strike, government or court orders, acts of God, terrorism, unavailability of supplies, parts or power. No person is authorized to assume for Rapid Engineering LLC any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Rapid Engineering LLC, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Rapid Engineering LLC's duly authorized Executive Officer.



OWNER WARRANTY REGISTRATION CARD

Mail or Fax to:

Rapid Engineering LLC • 1100 Seven Mile Road NW • Comstock Park, MI 49321 • Phone: +1.616.784.0500 • Fax: +1.616.784.1910
Toll Free: 800-536-3461 • www.rapidengineering.com

About the Owner:

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

About the Installer:

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

Purchased From (if different than installer):

Name: _____
Address: _____ City: _____ State: _____ Zip Code: _____
Phone: _____ Fax: _____ E-mail: _____

About your Heater:

Model #: _____ Serial #: _____ Fuel: _____ Installation Date: _____

Type of Installation (check one):

☐ Automotive ☐ Manufacturing ☐ Warehouse ☐ Recreational ☐ Aircraft
☐ Public Building ☐ Office ☐ Retail ☐ Agricultural ☐ Other _____

Installation Code and Annual Inspections: All installation and service of RAPID® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Rapid Engineering LLC and conform to all requirements set forth in the RAPID® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety, Rapid Engineering LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your RAPID® equipment and perform service where necessary, using only replacement parts sold and supplied by Rapid Engineering LLC.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through RAPID® representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

These products (with the exception of the models UHA[X][S] 30 - 75) are not approved for residential use.

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Printed in the U.S.A.

Attach this information to the wall near the RAPID® heater



Read the Installation, Operation and Service Manual thoroughly before installation, operation or service.

OPERATING INSTRUCTIONS

1. STOP! Read all safety instructions on this information sheet.
2. Open the manual gas valve in the heater supply line.
3. Turn on electric power to the heater.
4. Set the thermostat to desired setting (above ambient temperature).
The automatic starting sequence begins.

TO TURN OFF THE HEATER

1. Turn the thermostat/time switch to 'OFF' or lowest setting. The burner will turn 'OFF' immediately, but fans will continue to cool heat exchanger until the fan thermostat switches off.

IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER

1. Set the thermostat to off or the lowest setting.
2. Turn off electric power to the heater.
3. Turn off the manual gas valve in the heater supply line.
4. Call your installer/contractor qualified in the installation and service of gas-fired heating equipment.

⚠ WARNING



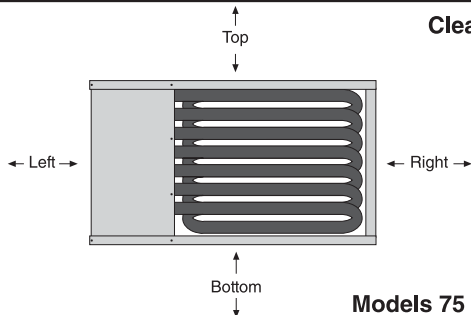
Fire Hazard

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from air handler.

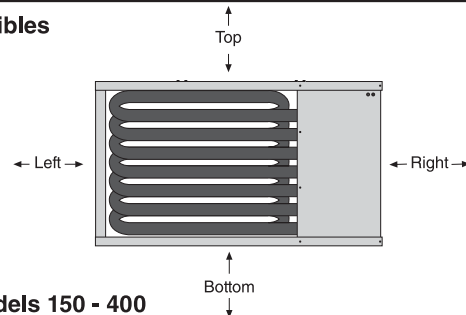
Some objects can catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

Clearances to Combustibles



Models 75 - 125



Models 150 - 400

Models	75 - 125	150 - 400
Top	1" (2.5 cm)	6" (15 cm)
Bottom	1" (2.5 cm)	6" (15 cm)
Right	1" (2.5 cm)	31"* (79 cm)*
Left	23" (58.4 cm)*	6" (15 cm)
Vent	2" (5 cm)	2" (5 cm)

* Clearance needed for servicing.

Installation Code and Annual Inspections: All installation and service of RAPID® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Rapid Engineering LLC and conform to all requirements set forth in the RAPID® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety, Rapid Engineering LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your RAPID® equipment and perform service where necessary, using only replacement parts sold and supplied by Rapid Engineering LLC.

For installation at elevations above 2000' (610m), the appliance shall be derated 4% for each 1000' (305m) of elevation above sea level.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through RAPID® representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

These products are not approved for residential use.

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