Schwank
INNOVATIVE HEATING SOLUTIONS

infrasave
radiant heaters

compactSchwank

Model P40-R

GAS-FIRED VENTED ROOM HEATER
VENTED OVERHEAD RADIANT TYPE

Compact Series

Model P40-R

GAS-FIRED VENTED ROOM HEATER
VENTED OVERHEAD RADIANT TYPE

INSTALLATION / OWNER'S MANUAL

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

- Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

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.

INSTALLER: Leave this manual with the appliance.

CONSUMER: Retain this manual for future reference.

FIELD CONVERTIBILITY:
This appliance is field convertible to LP gas.
Use only the optional gas conversion kit available from the manufacturer.

Keep this manual in a secure place .
Record for future reference:

Model #: _____

Serial #: _____
(located on heater rating label)

CERTIFIED ®

DESIGN CERTIFIED ®

P40-R I&O Manual
IM120801
RD: AUG 2013
RL: 1D

NOTICE:

This manual is current for this product.

Schwank Group

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INSPECT PRODUCT UPON RECEIPT

Inspect the carton and heater for concealed damage. Note any damage on the Bill of Lading and make any damage claim to the transport company as soon as possible.

P40-R
GAS-FIRED VENTED OVERHEAD HEATER

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FIGURES:

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

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

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

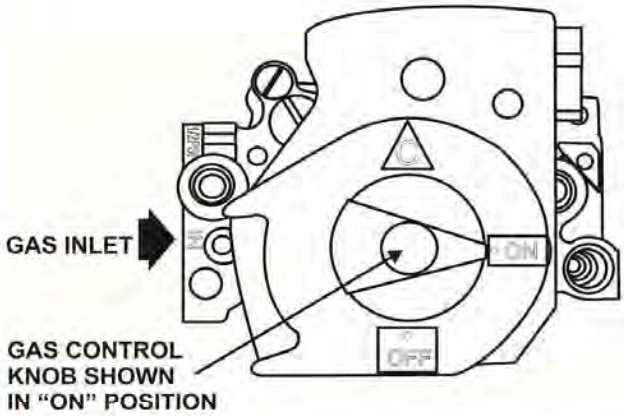
WHAT TO DO IF YOU SMELL GAS
- Do not try to light any appliance.
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

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, don't 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

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.



5. Remove screw at upper juncture of burner housing and fold down.
6. Turn gas control knob clockwise to "OFF". Do not force.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise to "ON".
9. Re-fasten Burner housing in closed position.
10. Turn on all electric 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.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove screw at upper juncture of burner housing and fold down.
4. Turn gas control knob clockwise to "OFF". Do not force.
5. Re-fasten Burner housing in closed position.

WARNING

- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read and understand this installation and operation manual thoroughly prior to assembly, installation, operation or service to this appliance.**
- **Installation and repair must be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning may be required due to excessive dust from activities in the heated space. It is imperative that control compartments, burners and air circulating passageways of the appliance be kept clean.**

- **Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.**

- **Due to high temperatures, this appliance should be located out of traffic and away from furniture and draperies.**
- **Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns or clothing ignition.**
- **Young children should be carefully supervised when they are in the same room as the heater.**
- **Clothing or other flammable material must not be placed on or near the appliance.**
- **Any safety screen or guard removed to service an appliance must be replaced prior to operating the appliance.**
- **This appliance has a blocked vent shut-off system (pressure switch). If the vent becomes blocked, the heater will not ignite. Do not tamper with this system. In the event that the appliance fails to operate, contact a qualified service agency.**
- **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.**
- **Failure to comply to these instructions could result in personal injury, death, fire and/or property damage.**
- **This appliance may have sharp edges and corners. Wear protective clothing such as gloves and protective eye wear when installing or servicing this appliance.**

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read and understand this installation and operation manual thoroughly prior to assembly, installation, operation or service to this appliance.

This heater must be installed and serviced only by a trained gas service technician.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

Failure to comply could result in personal injury, death, fire and/or property damage.

Do not store or use gasoline or other flammable vapours and liquids in the vicinity of this or any other gas fired appliance.

This appliance may have sharp edges and corners. Wear protective clothing such as gloves and protective eye wear when installing or servicing this appliance.

CAUTION

Start Up 'SMOKE' Condition

During start up, the heating of material coatings used in the production process of tubes and reflectors will create smoke during the initial period of operation. This condition is normal and temporary .

Ensure that there is sufficient ventilation to adequately clear any smoke from the space.

Check to ensure that any alarm system is not unduly activated during start up.

WARNING

Venting

Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. This heater must be directly vented from the space. Venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA; B149.1 in Canada) and as indicated in this manual. **Refer to Sections 11 & 12**

WARNING Gas Connection


Improper installation, connection, or adjustment can result in property damage, toxic gases, asphyxiation, injury or death. The gas supply must be connected and tested in accordance with all local, state, provincial, and national codes (*ANSI Z223.1/NFPA 54* in USA; *CSA B149.1* in Canada).

Refer to Section 13

WARNING Clearance to Combustibles

Location of flammable or explosive objects, liquids or vapors close to the heater may cause fire or explosion and result in property damage, injury or death. Do not use, store or locate flammable or explosive objects, liquids or vapors in the proximity of the heater.


The clearance to combustible material represents the minimum distance that must be maintained between the outer heater surface and a nearby surface. The stated clearance to combustibles represents a surface temperature of 117F° (65C°) above room temperature. It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.

A peel and stick sign is included with this heater to specify the required clearances from the heater to any combustible materials or vehicle. The sign must be posted either adjacent to the heater thermostat or in the absence of such thermostat in a conspicuous location. In addition to stored or stationary material, consideration must also be given to moveable objects such as vehicles and overhead doors, and structural objects such as shelving, sprinkler heads, electrical and gas lines, and electrical fixtures.

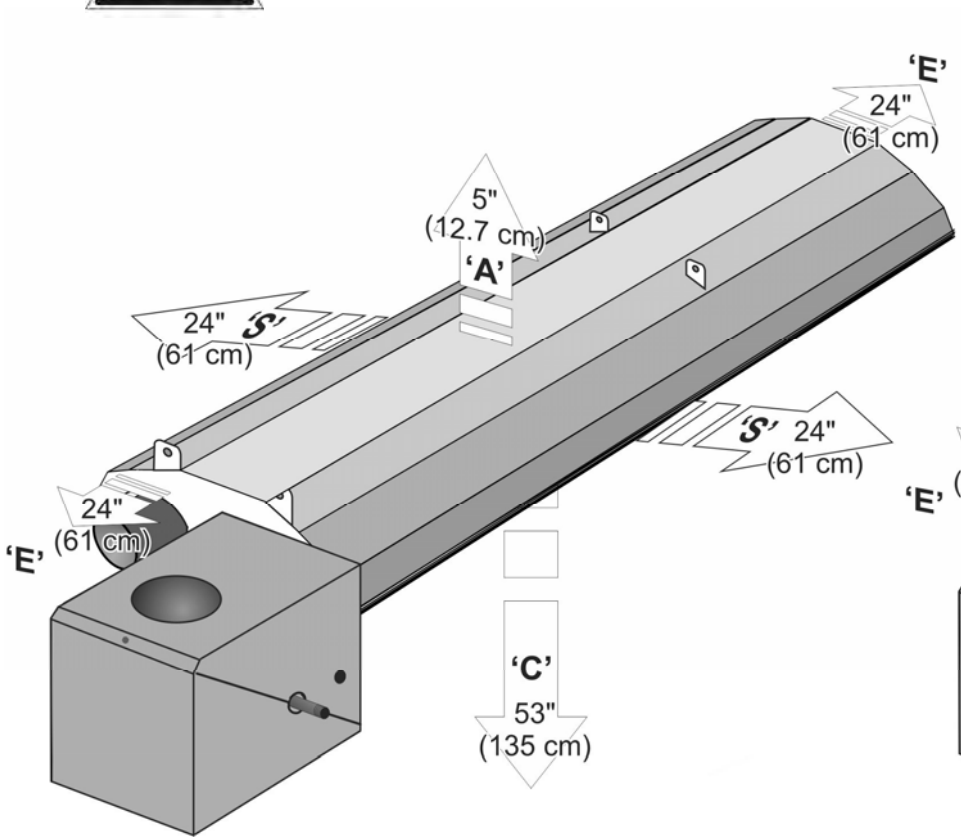
Do not store any combustible materials or install shelving or other projections within the "Clearance to Combustibles" box - see Figure 1 and Table 1 on the next pages.

It is beyond the scope of these instructions to consider all conditions that may be encountered. Consult local authorities such as the Fire Marshall, insurance carrier, or safety authorities if you are uncertain as to the safety or applicability of the proposed installation.

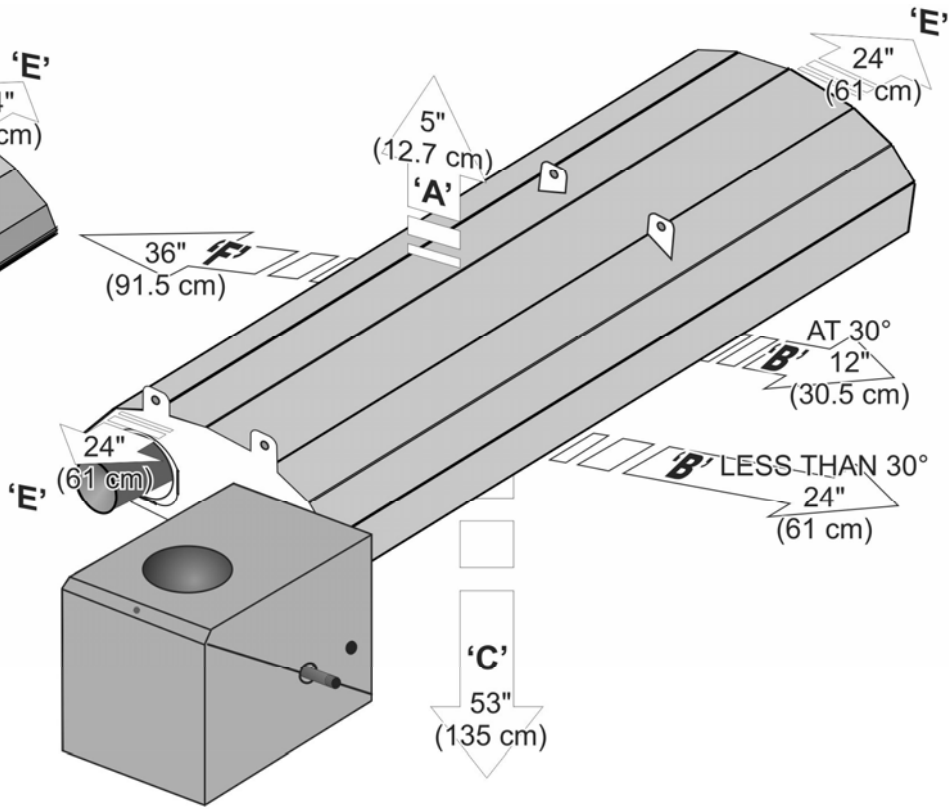
Refer to Figure 1 and Table 1 in this manual, and/or the rating label affixed to the burner housing for the certified clearances to combustibles for the heater.

FIGURE 1 MINIMUM CLEARANCES TO COMBUSTIBLES* 3D VIEW - *Table 1 also lists values next page*

Always maintain at least the minimum clearance from any combustible material or vehicle.



TUBE/REFLECTOR
MOUNTED HORIZONTALLY



TUBE/REFLECTOR
MOUNTED UP TO 30° ANGLE

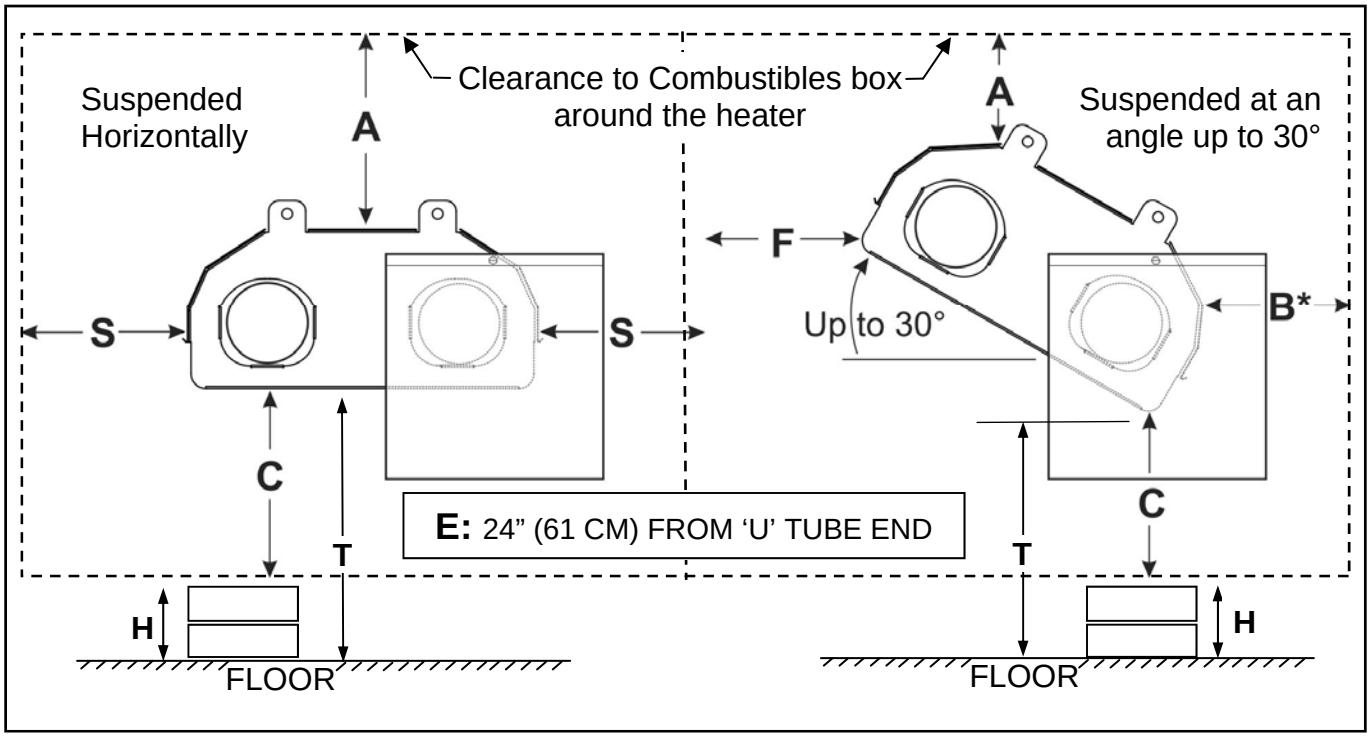
TABLE 1 MINIMUM CLEARANCES TO COMBUSTIBLE SURFACES OR MATERIALS*

MODELS	SUSPENDED HORIZONTALLY			SUSPENDED AT AN ANGLE UP TO 30 DEGREES				
P40-R	**A:** TOP inches (cm)	**C:** BELOW inches (cm)	**S:** SIDES inches (cm)	**A:** TOP inches (cm)	**C:** BELOW inches (cm)	**F:** FRONT inches (cm)	**B:** BACK **AT 30°** inches (cm)	**B:** BACK **< 30°** inches (cm)
	5 (12.7)	**53** (135)	**24** (61)	**5** (12.7)	**53** (135)	**36** (91.5)	**12** (30.5)	**24** (61)
	E: 'U' **END** of heater : **24"** (61 cm) *(horizontal or angled)*							

*The clearance to combustible materials represents the minimum distance that must be maintained between the heater and a nearby surface. **The stated clearance to combustibles represents a surface temperature of 117F° (65C°) above room temperature.**

It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, some coatings and laminated finishes, etc.

FIGURE 2 MINIMUM CLEARANCES TO COMBUSTIBLES* END VIEW - *See Table 1 above*



Calculate Maximum Stack Height '**H**': (Enter value '**H**' on the peel and stick label supplied)

- 53 inches (135 cm) is the required minimum clearance below the heater ('**C**')
- 'T' is measured on site = distance from the bottom of the heater hanger to the floor
- **H** = T- 53 inches (135 cm): Do not stack or store higher than '**H**' under the heater
- Do not place or store materials or shelving within the Clearance to Combustibles Box represented by the dotted lines in Figure 2 above

WARNING **For your convenience a "peel and stick" sign is provided with this heater. Sign must be posted** either adjacent to the IR heating system thermostat or in the absence of such thermostat, in a conspicuous place specifying the required clearances from the heater to the combustibles.

Use a permanent marker to record the required clearance dimensions on the sign.

'**H**' is a value calculated at site: (**H** = **T** - **C**) *Refer to Figure 1 and Table 1 above*

- Measure the on site distance between bottom of the heater and the floor = '**T**' inches (cm).
- The minimum clearance to combustibles below this heater '**C**' is **53 inches (1135 cm)**
- Subtract '**C**' 53 inches (135 cm) from '**T**' (Height above floor) to get value '**H**'.
- Enter the calculated value '**H'** on the sign

Enter the values as required for the other dimensions:

'**S**' = 24" (61 cm)

'**F**'= 36" (91.5 cm)

'**B**' = 12" (30.5 cm) at 30°

Or '**B**' = 24" if mount angle less than 30°

POST THIS SIGN ADJACENT TO THE HEATER THERMOSTAT OR IN A PROMINENT LOCATION.

VENT CLEARANCE: Clearance from single wall 'C' vent pipe inside the building is determined by local or national installation codes, but must not be less than 6 inches (15 cm).

Clearance from the vent terminal outside the structure are indicated in Section 11 Flue Venting and Figures 9 to 12, pages 19 to 23 for details and requirements for venting.

1. APPLICATION

Model P40-R has been design certified to ANSI Z21.86 / CSA 2.32 Vented Gas-Fired Space Heating Appliances (Vented Overhead Heater).

Model P40-R may be installed for heating of an indoor residential garage, workshop, or greenhouse. This heater can also be installed in light commercial/industrial locations.

This heater must **not be installed in any dwelling area** of a residence, nor in a basement, mobile home, or recreational vehicle.

This heater is not for installation in a Class 1 or Class 2 explosive environment. If the application is in question, consult with local authorities having jurisdiction (Fire Marshall, inspection department, insurance underwriter, or other authority having jurisdiction).

- **Due to high temperatures, the appliance should be located out of traffic and away from furniture and draperies.**
- **Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns or clothing ignition**
- **Young children should be carefully supervised when they are in the same room as the appliance**
- **Clothing or other flammable material should not be placed on or near the appliance**
- **Any safety screen or guard removed to service an appliance must be replaced prior to operating the appliance**
- **Installation and repair should be done by a qualified service person. The appliance should be inspected before use and at least annually by a qualified service person. More frequent cleaning may be required due to excessive dust or contaminants from activities in the area of the appliance. It is imperative that control compartments, burners and air passageways of the appliance be kept clean.**

It is beyond the scope of these instructions to consider all conditions that may be encountered. Installation must conform with local building codes or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 in the U.S.A. or the Natural Gas and Propane Installation Code, CSA B149.1 in Canada. The latest edition Electrical Code ANSI/NFPA N0 70 in the U.S.A. and PART 1 CSA C22.1 in Canada must also be observed.

Installation of this heater must conform to all heating installation procedures in this manual including suspension, maintenance of clearance to combustibles, connection to the gas and electrical supplies, and ventilation.

Revisions to codes and/or standards, may require revision to equipment and installation procedures. In case of discrepancy, the latest codes, standards, and installation manual will take priority over prior releases.

2. LABOR REQUIRMENTS

Two persons are required to safely install this equipment. SHARP EDGES - Wear gloves and other required safety protection.

3. INSTALLATION IN COMMERCIAL AIRCRAFT HANGARS

Low intensity radiant tube heaters are suitable for use in aircraft hangars when installed in accordance with the latest edition of the Standard for *Aircraft Hangars*, ANSI/NFPA No 409 in the USA, or the Canadian *Natural Gas and Propane Installation Code*, B149.1.

A. A minimum clearance of 10 ft (3 m) above either the highest fuel storage compartment or the highest engine enclosure of the highest aircraft which may occupy the hangar. The clearance to the bottom of the heater shall be measured from the upper surface of either the fuel storage compartment or the engine enclosure, whichever is higher from the floor.

B. A minimum clearance of 8 ft (2.4 m) must be maintained from the bottom of the heater to the floor in other sections of the aircraft hangar, such as offices and shops, which communicate with areas for servicing or storage. Refer to Table 1 for proper mounting clearances to combustibles.

C. Heaters must be located so as to be protected from damage by aircraft and other objects, such as cranes and movable scaffolding.

D. Heaters must be located so as to be accessible for servicing and adjustment.

4. INSTALLATION IN COMMERCIAL GARAGES AND PARKING STRUCTURES

Low Intensity Heaters are suitable for use in commercial garages when installed in accordance with the latest edition of the Standard for *Parking Structures*, ANSI/NFPA 88A, or the Standard for *Repair Garages*, ANSI/NFPA No. 88B, or the Canadian *Natural Gas and Propane Installation Code*, B149.1.

WARNING An overhead heater shall be located high enough to maintain the minimum distance to combustibles, as shown on the heater rating plate, from the heater to any vehicles parked below the heater.

Overhead heaters shall be installed at least 8 ft (2.4 m) above the floor in commercial garages and parking structures.

5. INSTALLATIONS OTHER THAN SPACE HEATING

Use for process or other applications that are not space heating will void the heater certification and product warranty. Process application requires field inspection and/or certification by local authorities having jurisdiction.

6. PRE INSTALLATION SURVEY

Carefully survey the area to be heated. It is recommended that a full heating design including heat loss calculation be conducted on the structure or area to be heated. Heater sizing, quantity, and placement must consider available mounting height, sources of greatest heat loss.

The certified clearances to combustibles must always be maintained with respect to stored material, moveable objects (vehicles, lifts, overhead doors, etc), sprinkler system heads, furniture and draperies, and other obstructions at the site. Consideration must also be given to vent placement and the allowable length of vent . *(see section 11, page 19)*

Installation must conform with all local, state, provincial and national code requirements including the current latest edition ANSI Z223.1 (NFPA 54) in the U.S.A. and B149.1 installation code in Canada, for gas burning appliances and equipment. The latest edition Electrical Code ANSI/ NFPA N0 70 in the U.S.A. and PART 1 CSA C22.1 in Canada must also be observed.

The heating system must have gas piping of the correct diameter, length, and arrangement to provide adequate fuel supply and function properly. A dimensioned layout drawing is advised.

7. MOUNTING CLEARANCES

This heater must be mounted with at least the minimum clearances between the heater and combustibles as shown in FIG-1, TABLE 1, Pages 8 & 9. **It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures are protected to prevent degradation. Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, some coatings and laminated finishes, etc**.

Ensure adequate clearance around the air intake at the burner to allow sufficient combustion air supply to the heater.

Proximity of lights, sprinkler heads, overhead doors, storage areas, gas and electrical lines, parked vehicles, cranes and any other possible obstruction or hazard must be evaluated.

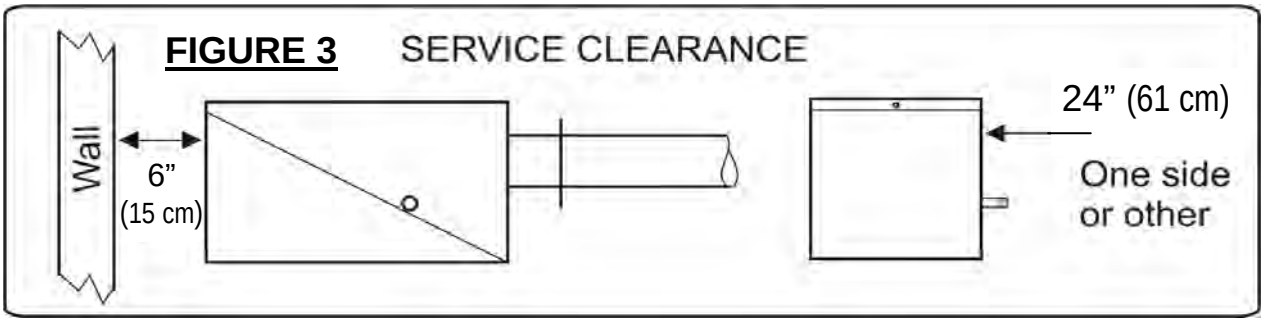
Place the heater so as not to cause a hazard to a wall, floor, shelving, curtains, furniture, or door when open, or impede the free movement of people.

It is recommended that Protective Guard JS-0502-UR-GK be installed on any heater mounted with less than 8 feet from floor to bottom of heater (See Accessories - Page 41).

8. SERVICE CLEARANCE: The lower 'jaw' of the burner cabinet swings down to provide convenient service access to burner components. Provide a minimum clearance from any wall or obstruction of 6 inches (15 cm) to the access end of the burner housing, and a minimum of 24 inches (61 cm) to any ONE side to allow burner service. (see Figure 2 below)

The minimum clearances to combustibles must always be maintained.

FIGURE 3 SERVICE CLEARANCE



9. SUGGESTED GUIDELINES FOR HEATER PLACEMENT* - SPACE HEATING APPLICATIONS

MODEL	GUIDELINE * MOUNTING HEIGHT **ft** (m)	MAXIMUM BETWEEN HEATERS **ft** (m)	DISTANCE – HEATER LONG AXIS PARALLEL TO WALL	
			HORIZONTAL **ft** (m)	ANGLE MOUNTED
P40-R	**8 – 18** (2.4 - 5.5)	**20** (6)	**5 – 12** (5 - 8)	MINIMUM: COMBUSTIBLE CLEARANCE BEHIND (refer to Table 1)

* SUGGESTED GUIDELINE MOUNTING HEIGHTS are typical to provide optimum comfort in general space heating applications. Variance from these typical heights can occur in some applications:

- Higher mounting height due to structure or application requirements
- For 'area' or 'spot' heat, or in areas with greater infiltration rates (near overhead doors, etc) where more intense heat is needed to provide better comfort then lower mounting heights are recommended (minimum 8 ft [2.4 m] mounting height)
- It is recommended that Protective Guard JS-0502-UR-GK be installed on any heater mounted with less than 8 feet from floor to bottom of heater (See Accessories - Page 41)

IMPORTANT: Single or multiple heater placement must be such that continuous operation of heaters will not cause combustible material or materials in storage to reach a temperature in excess of ambient (room) temperature plus 117F° (65C°).

It is the installer's responsibility to ensure that building materials with a low heat tolerance which may degrade at lower temperatures than the clearance temperature are protected to prevent degradation.

Examples of low heat tolerance materials include vinyl siding, fabrics, some plastics, filmy materials, etc.

Refer to "Clearance to Combustibles" information on pages 7 to 10, and Figure 1 and Table 1, and listed on the heater rating plate (on burner housing).

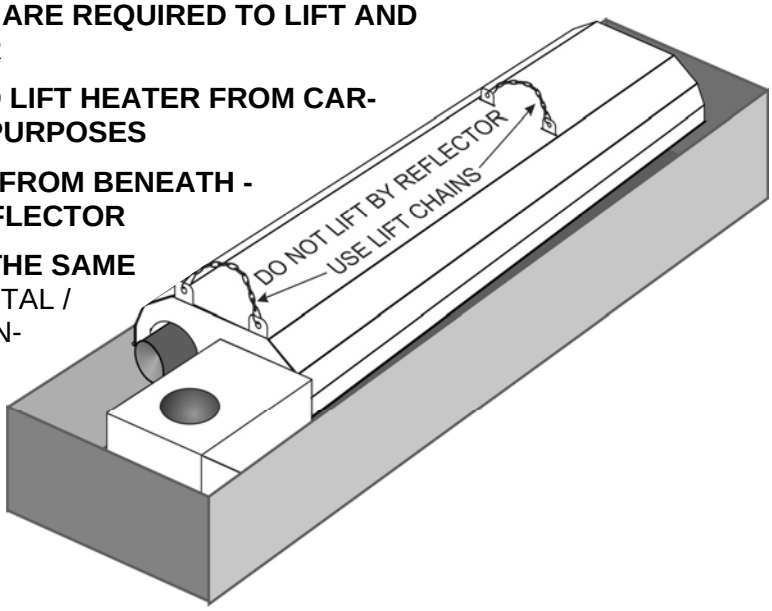
10. HEATER INSTALLATION

Inadequate or improper suspension of the tube heater can result in collapse of the system, property damage, and personal injury or death. Suspend the heater from a structural member that can adequately support the weight of the heater. Always maintain the required minimum clearances to combustible materials and vehicles (see pages 7 to 10).

It is the installer's responsibility to ensure that the hardware and structural supports from which the heater is suspended are sound and of adequate strength to support the weight [86 lb (39 kg)] and expansion forces of the heater.

USE CARE & CAUTION WHEN LIFTING HEATER FROM CARTON

1. **DO NOT LIFT THE HEATER BY THE REFLECTOR**
2. **AT LEAST 2 PERSONS ARE REQUIRED TO LIFT AND INSTALL THIS HEATER**
3. **CHAINS ARE PROVIDED TO LIFT HEATER FROM CARTON AND FOR HANDLING PURPOSES**
4. **WHEN HANDLING HEATER FROM BENEATH - HANDLE BY TUBE NOT REFLECTOR**
5. **LIFT BOTH ENDS FROM CARTON AT THE SAME TIME** TO KEEP THE HEATER HORIZONTAL / LEVEL ALONG ITS LENGTH WHILE HANDLING AND INSTALLING
6. LIFT SAFELY - LIFT WITH YOUR LEGS AND KEEP BACK STRAIGHT - DO NOT BEND OR TWIST.
7. BEWARE - SHARP EDGES! WEAR PROTECTIVE GLOVES AND CLOTHING WHEN HANDLING



IMPORTANT: **FIRST READ: Review the information on pages 4 to 10 and ensure that installation adheres to the instructions in this manual, and all national and local codes.**

Refer to pages that follow for illustrations and dimensions that assist in installation.

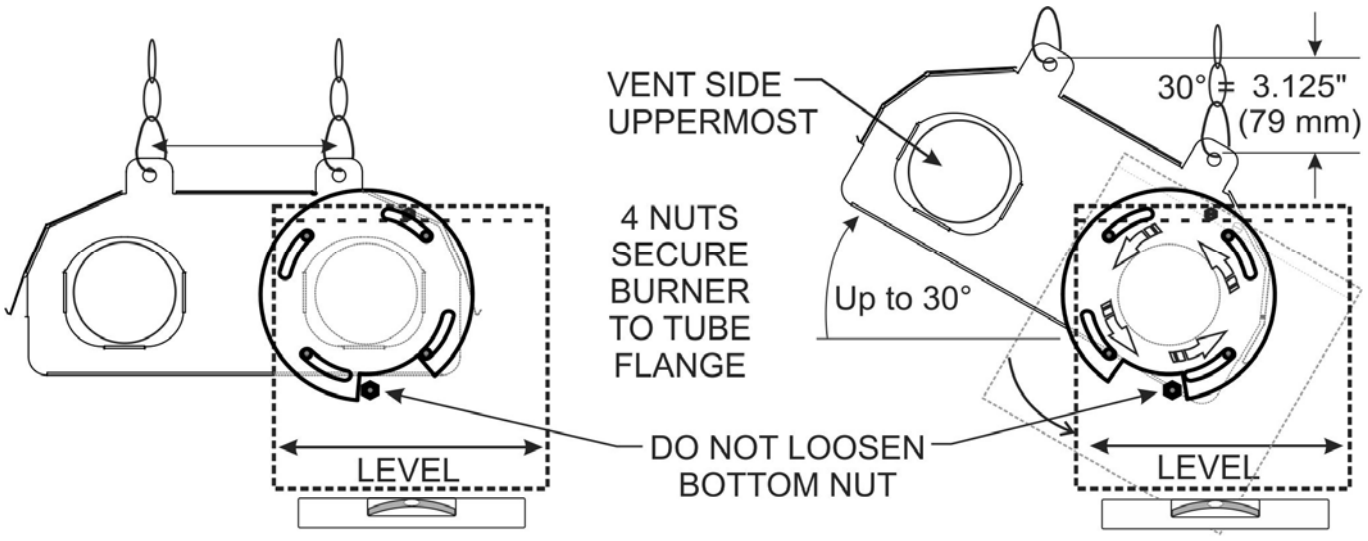
1. Survey the available structural support, considering the system configuration and heat requirements of the area to establish the optimum heater location.
2. The heater can be mounted with the tube/reflector in a horizontal position, or at 30°. Locating a heater directly under joists or beams, and/or installing supplemental support such as angle iron can ensure the integrity of the installation.
3. Hardware with a minimum 100 lb. (30 kg) work load must be used at each heater suspension point. A #2 Lion Chain or equivalent is typically used to suspend the heater.
   b) If rigid hardware such as 3/8" threaded rod is used for suspension, swing joints or other means must be provided to allow for system expansion - approximately ½ inch
4. The heater must be supported at all four mounting tabs on the hangers that are located 72 inches (183 cm) apart .

5. Install the structural fastening hardware and any suspension hardware (chain, etc) prior to removing heater from the carton. Ensure that the support hardware system is firmly fastened to a structural member(s) of sufficient strength and integrity to support the weight of the heater.
6. The heater comes fully assembled from the factory. For locations where there is constrained access for installation, removal of the burner assembly may assist in the installation of the tube/reflector assembly. Disconnect the spark wire from the igniter and remove the four nuts that fasten the burner to the tube flange. Re-install the burner after the tube system is installed. If the tube/reflector system is to be oriented up to a 30° mounting angle (see below), the burner must be adjusted to a horizontal operating position.

Up to 30° Angle Mounting:

7. The tube/reflector system can be oriented on the short axis from horizontal to an angle up to 30 degrees. When angle mounted the vent side of tube must always be higher than the burner side. The tube/reflector system must be level along its length
8. When the tube/reflector is suspended at an angle up to 30°, the burner mounting flange has a slot pattern that allows adjustment (rotation) of the burner to a horizontal position for proper operation (see Figure 4 below, and Figure 6 next page).
   - Install the tube/reflector system as above, with tube/reflector assembly angled up to 30°
   - Loosen the 4 nuts (2 or 3 turns) until burner studs can rotate in the flange slots
   - Ensure that the gasket between burner and flange rotates with the burner
   - Tighten the 4 nuts to secure the burner in the horizontal position
9. For seismic and high wind restraint see Sections 10-A & 10-B, page 18.

FIGURE 4 HEATER SUSPENSION: HORIZONTAL TO 30° ANGLE



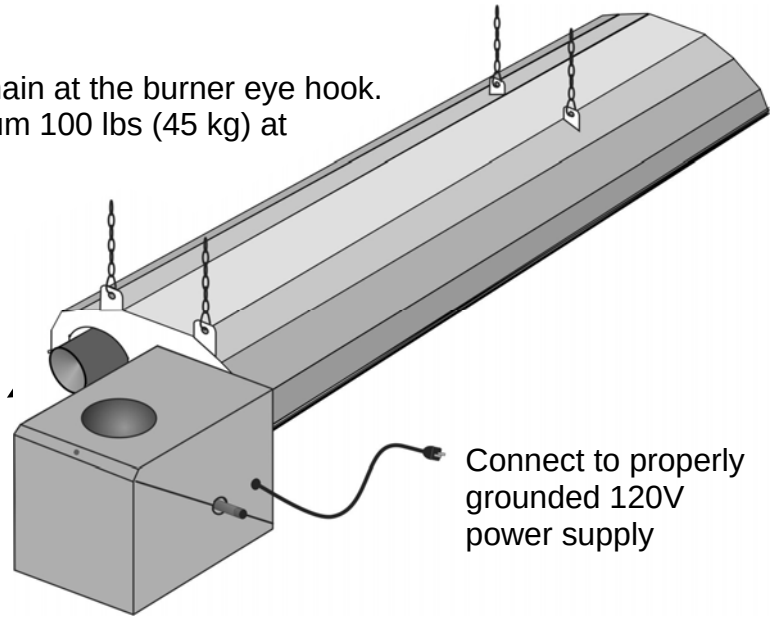
HORIZONTAL SUSPENSION:
BURNER ORIENTATION
HORIZONTAL (LEVEL)
(PACKAGED FROM FACTORY)

FOR UP TO 30° SUSPENSION: ADJUST BURNER ORIENTATION TO LEVEL
- LOOSEN 4 NUTS
- ROTATE BURNER TO HORIZONTAL
- TIGHTEN 4 NUTS TO SECURE

FIGURE 5 TYPICAL SUSPENSION

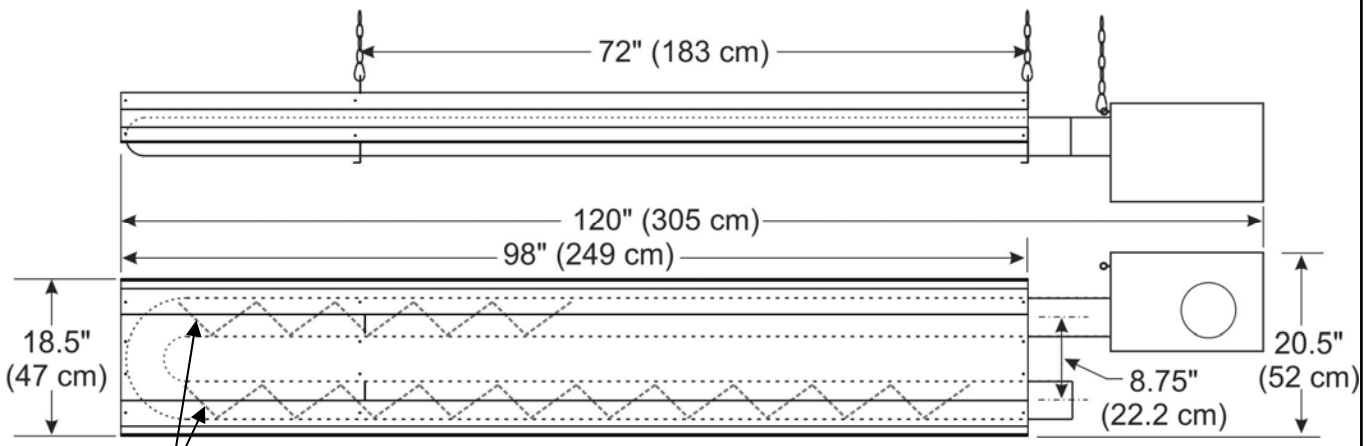
Use all four suspension points *plus* a chain at the burner eye hook. Hardware capable of supporting minimum 100 lbs (45 kg) at each suspension point.
For seismic and high wind restraint see Sections 10-A & 10-B.

SERVICE ACCESS: ALLOW A MINIMUM OF 6 INCHES (15 cm) FROM THE ACCESS END OF THE BURNER AND A MINIMUM OF 24 INCHES (60 cm) FROM EITHER SIDE OF THE BURNER TO A WALL OR ANY OBSTRUCTION THAT WOULD RESTRICT OR LIMIT ACCESS TO THE BURNER *(SEE SECTIONS 6 & 7 - PRE-INSTALLATION SURVEY AND MOUNTING CLEARANCES)*

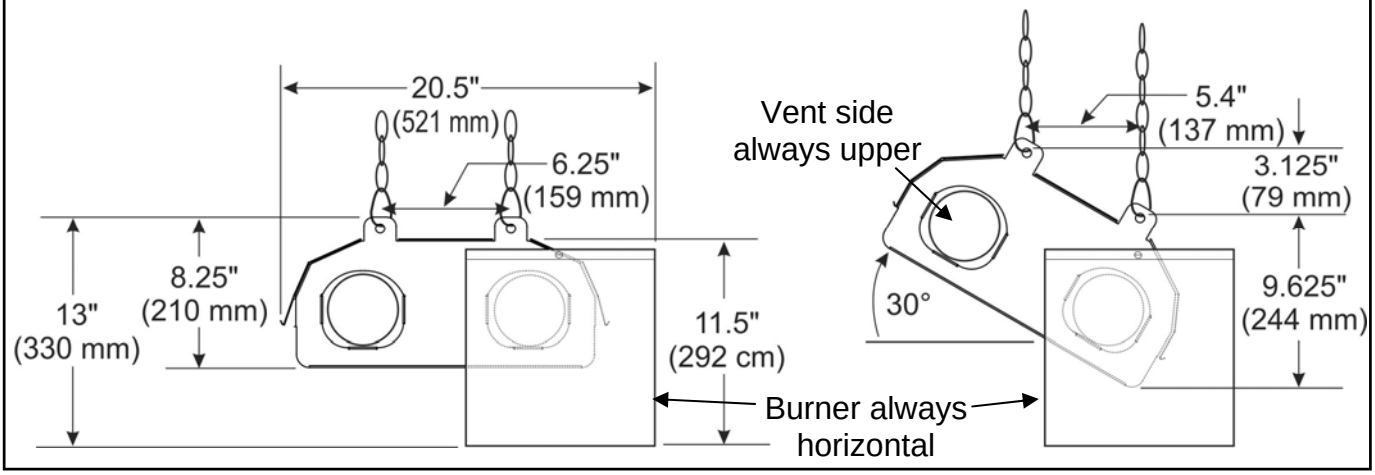


For 30° angle mount: Install the tube system; Loosen 4 nuts holding burner to tube flange; rotate burner to horizontal orientation; re-tighten 4 nuts. *(see full instructions previous page)*

FIGURE 6 HEATER DIMENSIONS & SUSPENSION ANGLE OPTIONS



Turbulators (factory installed in tube): Burner side tube: 36” (91 cm)
Vent side tube: 90” (229 cm)



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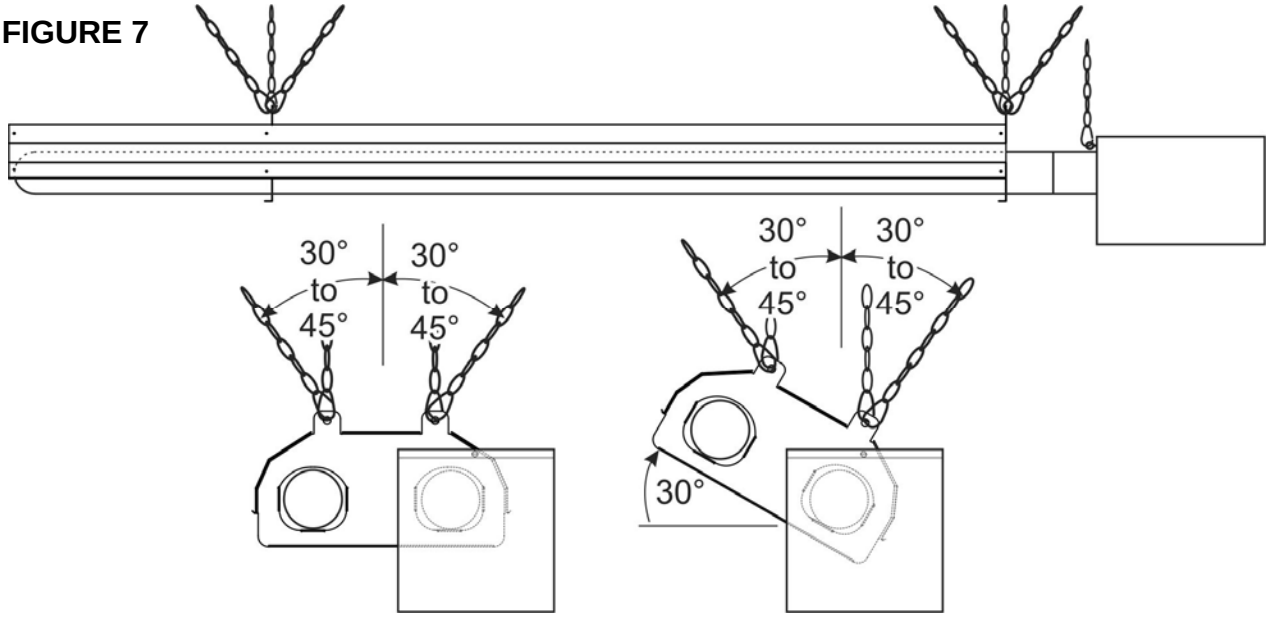
RD: AUG 2013
RL: 1D

10-A SEISMIC RESTRAINT - LATERAL AND LONGITUDINAL PLANES

FIGURE 7



In areas prone to earthquake, or as specified on a project, install lateral and longitudinal seismic restraints as indicated in Figure 11. If the heater location can be impacted by wind (near overhead doors, aircraft hangars, etc) refer to High Wind Restraint section **10-B** below.

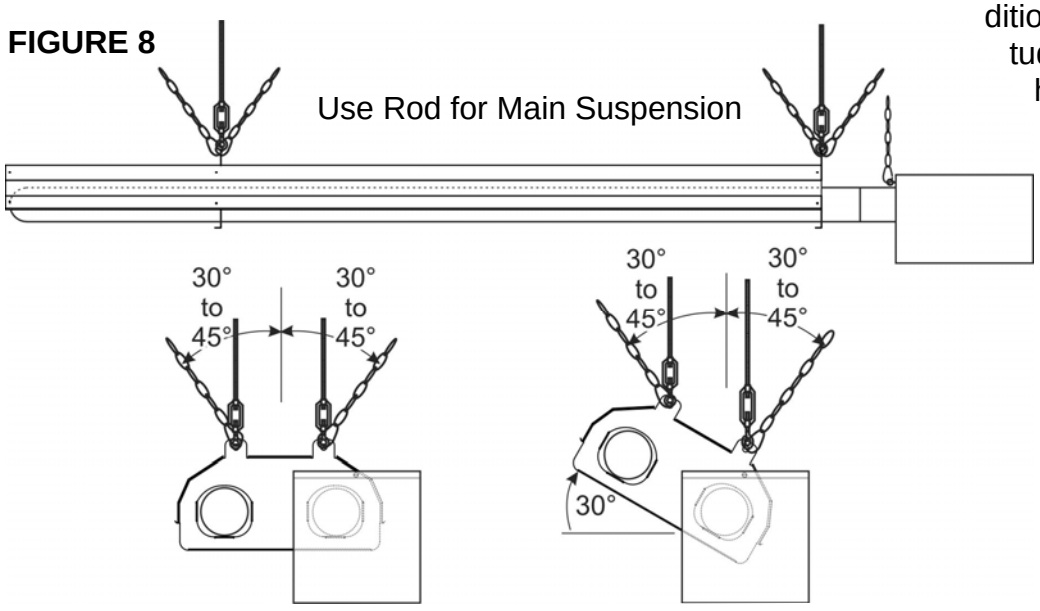
These instructions indicate attachment of suspension and restraint hardware to the heater. The attachment of suspension hardware to the structure will be as required by site structural conditions, installation codes, and/or local engineering specifications. Other types or systems of restraint that are specified by local or national codes, or by project engineering design specifications may be used .

Schwank / InfraSave offers optional items: #2 Lion Chain 115 lb work load x 200 ft roll (PN: JL-0800-XX); and Safety Snap Hooks (PN: JL-0800-SH = pkg 24; JL-0800-SH-B = pkg 100).
All other required seismic mounting hardware is field supplied by the installer.

10-B HIGH WIND RESTRAINT - LONGITUDINAL, LATERAL, AND VERTICAL PLANES

In areas with wind conditions that can impact the heater (outdoor, aircraft hangers, etc): in addition to lateral and longitudinal restraint the heater must be restrained from vertical movement.

FIGURE 8



Suspend the heater using 3/8” threaded rod with 3” adjustment turnbuckle at each hanger location to restrain up-and-down movement.

Install angled chains for lateral and longitudinal restraint.

WARNING

11. FLUE VENTING

Inadequate venting of a heater may result in asphyxiation, carbon monoxide poisoning, injury or death. This heater must be connected to a vent to remove products of combustion from the space. Seal all vent connections with high temperature sealant. Venting must be in accordance with all local, state, provincial, and national codes (ANSI Z223.1/NFPA 54 in USA; B149.1 in Canada) and as indicated below in this manual.

THIS HEATER MUST BE VENTED DIRECTLY TO THE OUTSIDE. THE SYSTEM MUST NOT BE OPERATED WITHIN A NEGATIVE AIR CONDITION. ENSURE ADEQUATE AIR SUPPLY TO THE SPACE TO ENSURE THERE IS NO NEGATIVE AIR CONDITION (NEGATIVE PRESSURE IN THE SPACE BEING HEATED).

THIS GAS APPLIANCE MUST NOT BE CONNECTED TO A CHIMNEY FLUE SERVING A SEPARATE SOLID-FUEL BURNING APPLIANCE.

GENERAL FLUE VENTING REQUIREMENTS

It is the sole responsibility of the installer to adhere to all current local codes and/or ANSI Z223.1 / CSA.B149.1 latest editions for all venting requirements, and practices.

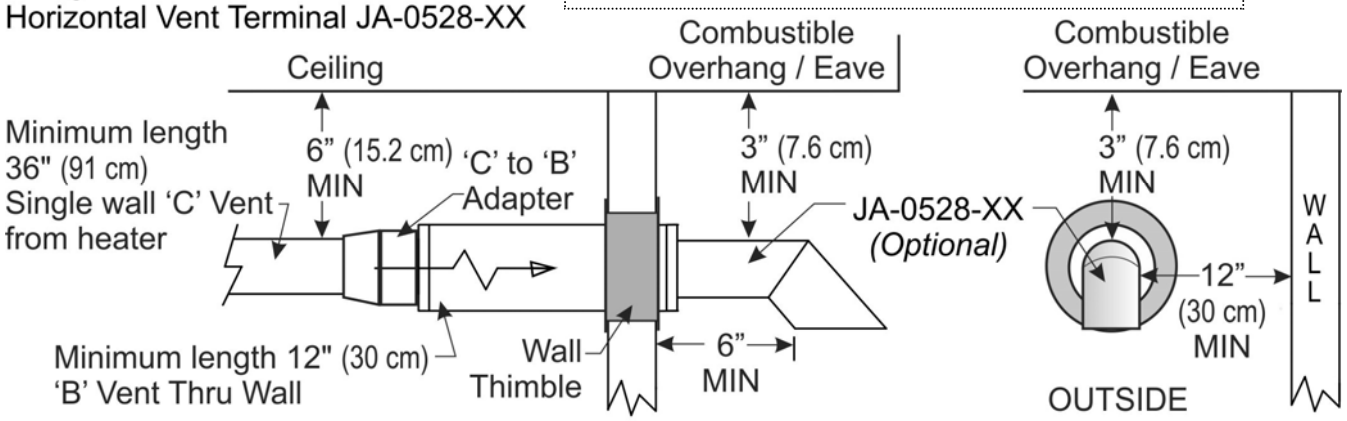
It is a normal condition that during heat-up and cool-down a tube heater will expand and contract. *Allowances for heater expansion must be made in the venting*. Improper installation can result in property damage, injury or death.

- This heater has a positive vent pressure
- A vent termination cap is supplied with the heater for use with horizontal side wall vent
- All vent pipe and adapters must be listed and will be supplied locally by others
- Vent pipe must be minimum 26 gauge single wall type “C” vent pipe of 4” (10 cm) diameter except that portion of vent passing through the wall or roof shall be 4” type “B” vent
- A minimum 12 inch (30 cm) length of minimum 26 gauge single walled 4” (10 cm) diameter “C” vent pipe is to be installed on the swaged end of the tube before any vent elbow is fitted.
- Seal all vent connections with high temperature sealant. Vent connections must be secured with three (3) #8 sheet metal screws uniformly spaced around the circumference of the vent pipe.
- When the vent pipe passes through a cold or unheated area where the ambient temperature is likely to produce condensation of the flue gases, the vent pipe will be insulated with a suitable material as approved and specified by the insulation manufacturer to withstand temperature up to 460°F (238°C).
- The vent system must **always** be adequately supported to prevent sagging.
- Refer to next pages for minimum and maximum vent length requirements:
    - Horizontal side wall vent: Pages 20 - 21
    - Vertical roof vent: Page 23

FIGURE 9 - Horizontal Vent - ALL vent pipe and adapters are field supplied

Through Combustible Wall
Using Schwank/InfraSave
Horizontal Vent Terminal JA-0528-XX

A wall thimble is not required through a non-combustible wall. Seal pipe penetration.



Through Combustible Wall
Using "High Wind" Vent Terminal

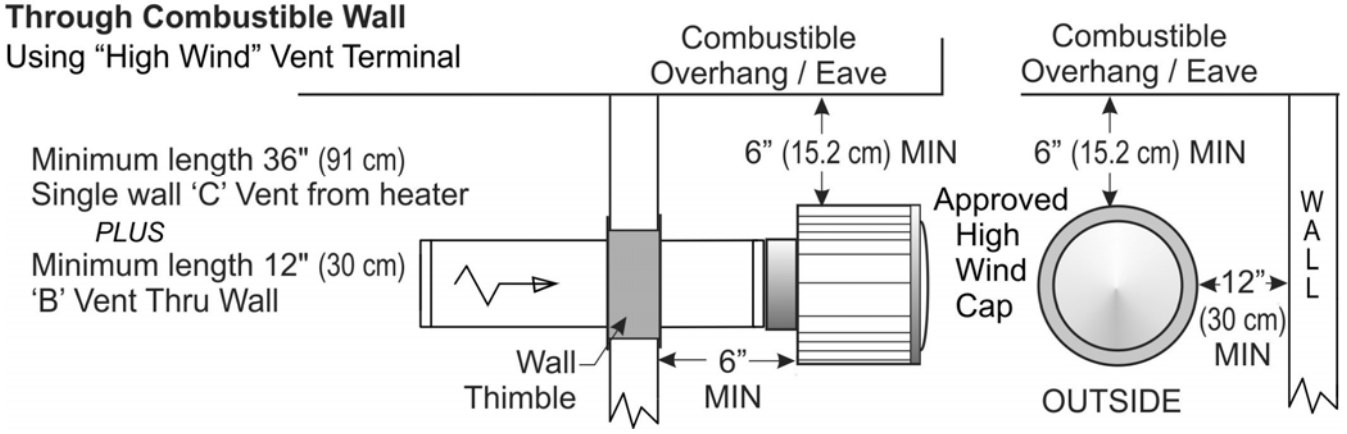
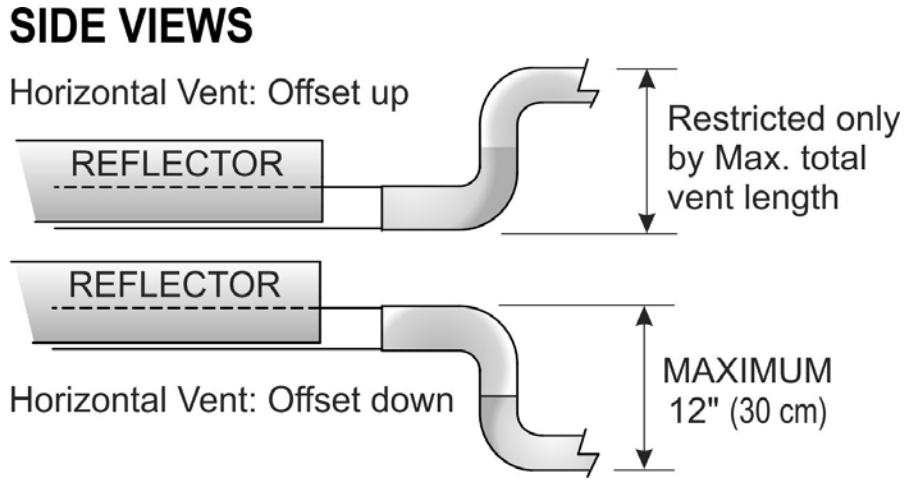


FIGURE 10 - Horizontal Vent Offset



Allow free expansion and contraction of the system, and free flow of vent gas.

All Vent Pipe & Adapters Field Supplied

continued ……..

HORIZONTAL VENT THROUGH A SIDE WALL: (*Vertical vent through roof is on page 23)*

- Refer to General Venting Requirements on page 19
- Minimum length of a horizontal side-wall vent:
  - Regardless if a 90° elbow is installed, a Minimum linear 36 inch (3 ft; 91 cm) single wall 'C' vent *plus* minimum 12 inch (30.5 cm) double wall 'B' vent through wall
  - Total minimum linear vent length of 48 inches (4 ft; 122 cm)
- Maximum length of a horizontal side-wall vent:
  - Total Maximum vent length is 15 ft (4.6 m)
  - Each 90° or 45° elbow is equivalent to 5 ft
  - A minimum 12 inch (30.5 cm) double wall 'B' vent must be used through the wall
- The flue vent system must slope downwards approximately 1/4" per foot (63 mm / 300 mm) toward the vent terminal, from the termination of the tube - radiant tube must be level.
- A maximum of two elbows (90° or 45°; each = equivalent 5 ft) can be installed in a horizontal vent
- For side wall venting use either Schwank/InfraSave 4" (10 cm) horizontal vent terminal (Part Number: JA-0528-XX - available as an option) or an approved 4" (10 cm) "High Wind" vent termination cap (see clearance information previous page and next page)
- Install the termination cap a minimum of 6 inches (15 cm) from the outside wall to the inside edge of terminal opening to minimize back pressure caused by turbulent wind conditions (See Fig. 9 above). This also ensures flue gases are directed away from the structure to help protect building materials from degradation by the exhausted flue gases.
- The vent must be installed to prevent blockage by snow, undue wind pressure on the termination, and to protect building materials from degradation by flue gases.

Clearances Required for Horizontal Side Wall Vent :

- Refer to Figure 9 above, and in particular to Figure 11 and Table 3 next page for specific requirements of codes in the USA and Canada
- Any values not listed in Table 3 shall be in accordance with local installation codes and the requirements of the gas supplier

Footnotes for Table 3 (next page)

1 *Installations in Canada in accordance with current CSA B149.1, Natural Gas and Propane installation Code*

2 *Installations in the USA in accordance with the current ANSI Z223.1 / NFPA 54, National Fuel Gas Code*

† *A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings*

‡ *Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor*

** *Clearance in accordance with local installation codes and the requirements of the gas supplier*.

FIGURE 11: LOCATION OF HORIZONTAL (SIDE WALL) VENT TERMINAL

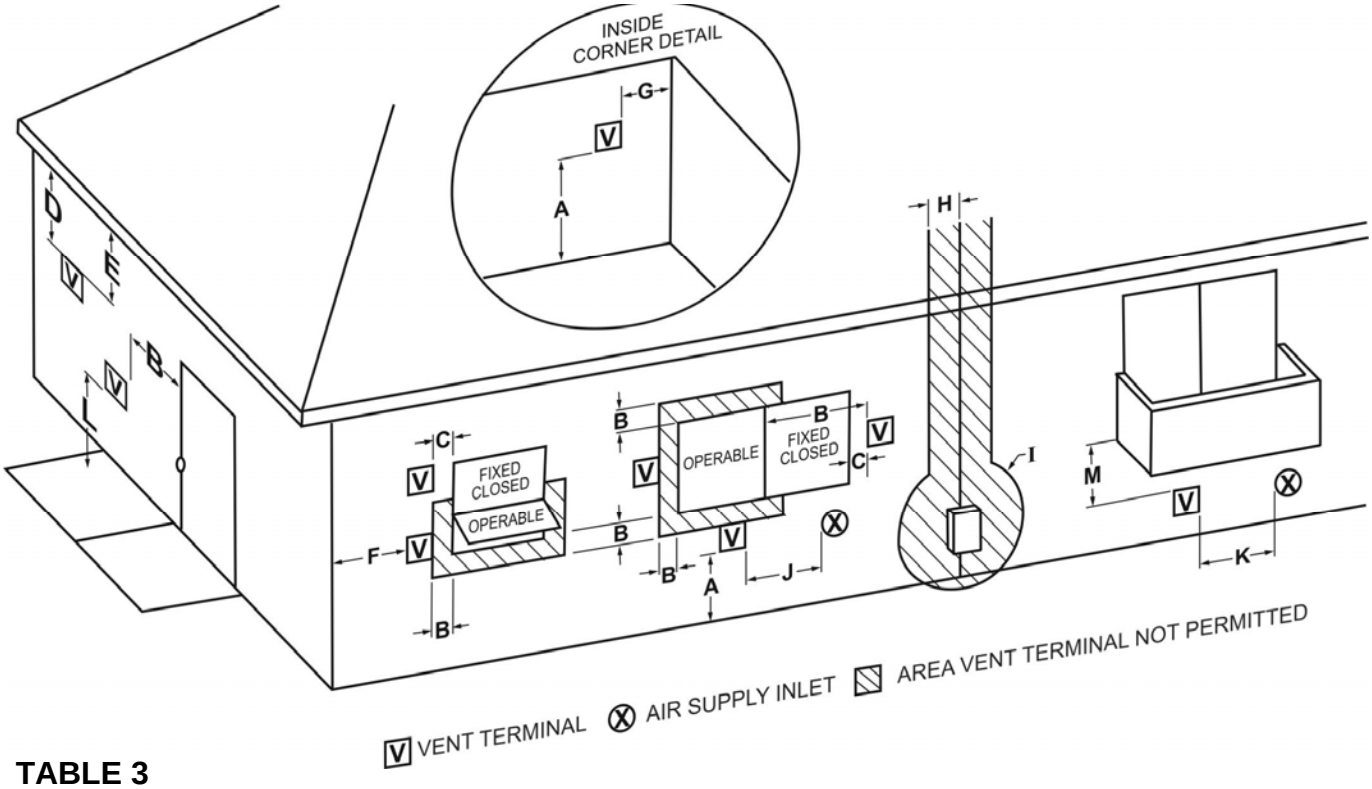


TABLE 3

	Clearance required:	Canada[1]	USA[2]
A	Above grade, veranda, porch, deck, balcony	12” (30 cm)	12” (30 cm)
B	To a window or door that may be opened	12” (30 cm)	9” (23 cm)
C	To a permanently closed window	**	**
D	Below a ventilated soffit within 2 ft horizontal from center of terminal	12” (30 cm)	9” (23 cm)
E	Below an unventilated soffit	3” (7.6 cm)	3” (7.6 cm)
F	To an outside corner	12” (30 cm)	12” (30 cm)
G	To an inside corner	12” (30 cm)	12” (30 cm)
H	To each side of centerline extended above a meter/regulator assembly	3 ft (91 cm) within 15 ft (4.5 m) height above meter/regulator	**
I	To a service regulator vent outlet	3 ft (91 cm)	**
J	To non-mechanical air supply inlet or combustion air inlet to other appliance	12” (30 cm)	9” (23 cm)
K	To mechanical air supply inlet	6 ft (1.83 m)	3 ft (91 cm) above if within 10 ft (3 m) horizontally
L	Above sidewalk or paved drive on public property	7 ft (2.13 m) †	**
M	Under veranda, porch, deck, balcony	12” (30 cm) ‡	**

See Table footnotes previous page

VERTICAL VENT THROUGH THE ROOF: *(Horizontal vent through side wall is on pages 20 - 21)*

It is the sole responsibility of the installer to adhere to all current local codes and/or ANSI Z223.1 / CSA.B149.1 latest editions for all venting requirements, and practices.

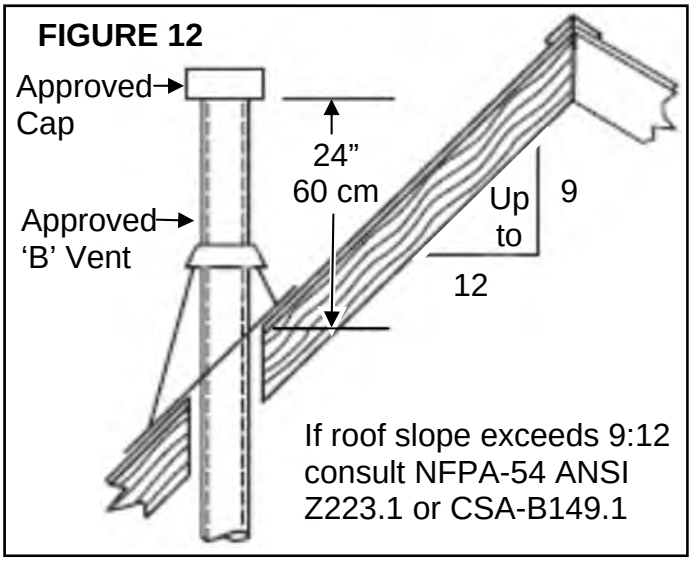
- Refer to General Venting Requirements on page 19

- Any horizontal portion of vent must be minimum 26 gauge single wall type "C" vent pipe of 4" (10 cm) diameter (seal all connections); vertical portion of vent can be 4" type "B" vent

- When the vent pipe passes through a cold or unheated area where the ambient temperature is likely to result in condensation of the flue gases, the vent pipe will be type 'B' vent or insulated with a suitable material as approved and specified by the insulation manufacturer to withstand temperature up to 460°F (238°C).

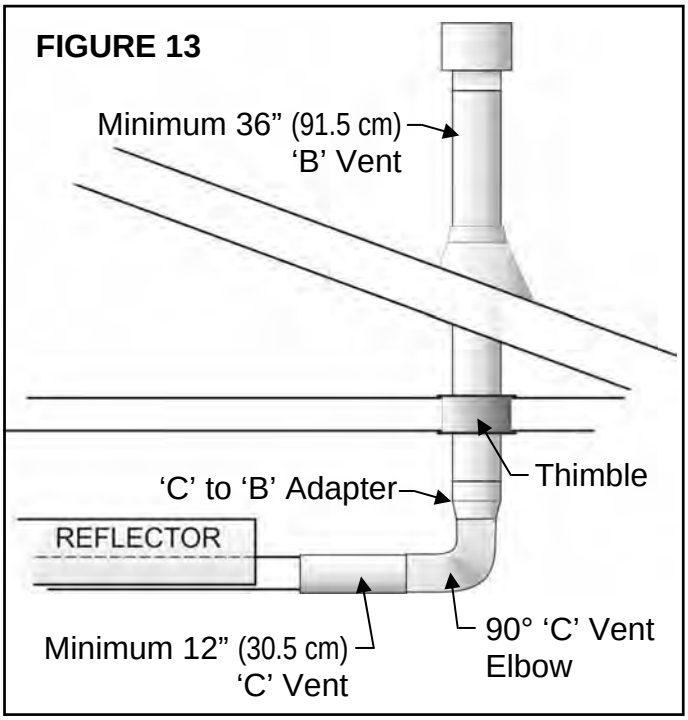
- Use an approved 'B-vent' termination cap as supplied by the manufacturer of the listed 'B-vent'.

FIGURE 12



- Minimum length of a vertical roof vent:
  - Minimum 12 inch (1 ft; 30.5 cm) single wall 'C' vent
  - *Plus* one 90° "C" vent elbow
  - *Plus* minimum 36 inch (3 ft; 91.4 cm) double wall 'B' vent
  - Total minimum linear vent length of 48 inches (4 ft; 122 cm) *plus* one 90° 'C' elbow

FIGURE 13



- Maximum length of a vertical roof vent:
  - Above minimum requirements must be met
  - A maximum of one 90° elbow (equivalent 5 ft) *plus* two 45° elbows (each equivalent to 2.5 ft) can be installed in a vertical vent system
  - Refer to local and national codes for maximum allowable venting

12 COMBUSTION AIR REQUIREMENTS

Outside combustion air must not be ducted directly to this appliance.

Do not install a filter at the combustion air inlet.

Make provision to ensure adequate combustion and ventilation air in the space:

- **USA:** In accordance with Section 9.3 ANSI Z223.1 / NFPA-54 for a fan-assisted appliance.
- **Canada:** In accordance with CSA B149.1: 4 in^2 (2,600 mm^2) required free area of air-supply opening [acceptable round opening of approximate 2.25 in (57 mm) diameter].

Ensure adequate clearance around the air intake (at top of burner cabinet) to allow sufficient combustion air supply to the heater. Keep the area around the air intake free and clear of debris or other material.

Regularly check that the bird-screened air inlet on top of blower is not clogged with dust or fibrous material. Clean away any foreign matter build-up regularly.

13. GAS SUPPLY - GAS CONNECTION

CAUTION: All gas supply piping and appliance connection must be in accordance with local and national codes, *ANSI Z223.1 (NFPA 54)* in the USA, and the *CSA B149.1 Natural Gas and Propane Installation Code* in Canada. Model P40-R is an appliance approved as a Vented Overhead Heater under ANSI Z21.86 / CSA 2.32 Vented Gas-Fired Space Heating Appliances.

TEST FOR LEAKS: All gas piping and connections must be tested for leaks after the installation is completed.

Apply soap suds solution to all connections and joints and if bubbles appear, leaks have been detected and must be corrected.

DO NOT USE A MATCH OR OPEN FLAME OF ANY KIND TO TEST FOR LEAKS. NEVER OPERATE THE HEATER WITH LEAKING CONNECTIONS.

Provide a 1/8 in (3.2 mm) NPT plugged tapping, accessible for test gauge connection, immediately upstream of the gas supply connection to the heater.
The gas supply should be checked first with heater turned “OFF” followed by another check with heater turned “ON”.

This appliance and its main gas valve must be disconnected from the gas supply piping system during any pressure testing of the gas supply piping system at test pressure in excess of 1/2 psi (3.5 kPa).

This appliance must be isolated from the piping system by closing the equipment shut off valve (field supplied) during any pressure testing of the gas piping system at test pressure equal to or less than 1/2 psi (3.5 kPa).

13. GAS SUPPLY - GAS CONNECTION *… continued*

Provide a 1/8 in (3.2 mm) NPT plugged tapping, accessible for test gauge connection, immediately upstream of the gas supply connection to the heater.
The gas supply should be checked first with heater turned "OFF" followed by another check with heater turned "ON".

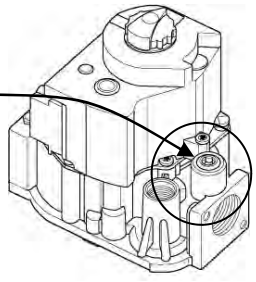
This appliance and its main gas valve must be disconnected from the gas supply piping system during any pressure testing of the gas supply piping system at test pressure in excess of 1/2 psi (3.5 kPa).

This appliance must be isolated from the piping system by closing the equipment shut off valve (field supplied) during any pressure testing of the gas piping system at test pressure equal to or less than 1/2 psi (3.5 kPa).

IMPORTANT: Minimum supply line pressure at the inlet to the heater regulator must not be lower than 5.0 inches of water column pressure for natural gas, and not be lower than 10.0 inches of water column pressure for LPG. The supply gas pressure must be checked with all heaters in operation.

Installation of a gas line (trap) "drip leg" is required at the inlet connection tee following the pipe drop to the heater. Failure to provide a "drip leg" could result in condensation and foreign matter passing into the gas valve. Failure to install a "drip leg" in the gas line can cause property damage, injury or death and will void the heater warranty.

TABLE 4 GAS TYPE	LINE PRESSURE INCHES WATER COLUMN		MANIFOLD PRESSURE (tap at gas valve outlet) INCHES WATER COLUMN
	MINIMUM	MAXIMUM	
Natural Gas	5.0	14.0	3.5
LP Gas	11.0	14.0	10.0

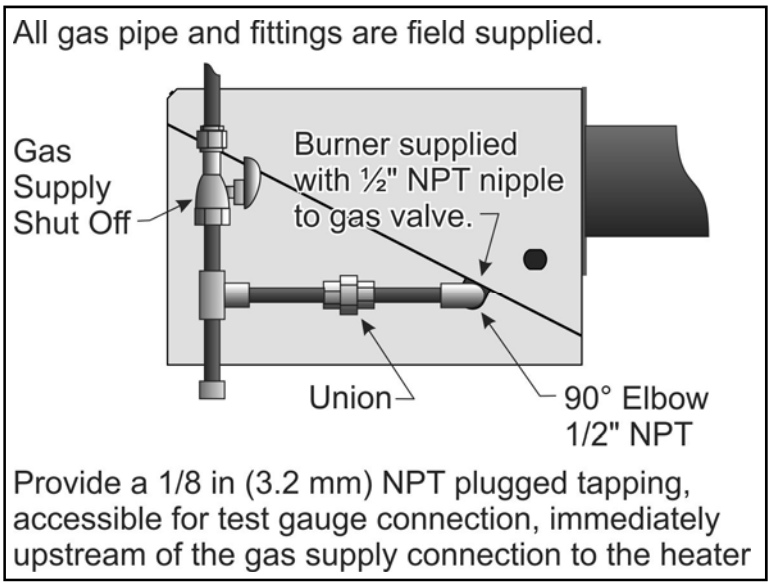


NOTE: Access to the manifold pressure test port is located on the top of the valve. A 3/16" Allen Key is required. A **manometer** should be used to check the manifold pressure. Gauges which measure in ounces or PSI are not accurate enough to measure or set the pressure.

GAS CONNECTION

Connection between the gas supply piping and the appliance must be in accordance with local and national codes, *ANSI Z223.1 (NFPA 54)* in the USA, and the *CSA B149.1 Natural Gas and Propane Installation Code* in Canada.

The P40-R is approved as a Vented Overhead Heater and may be rigid piped to the building gas supply (*also see Flexible Gas Connection Option, next page*).



WHEN USING A FLEXIBLE GAS CONNECTION TO THE APPLIANCE:
ORIENTATION OF FLEXIBLE GAS CONNECTOR

Where allowed by local code, the installer may optionally use a flexible gas connector. Refer and adhere to local code requirements and NFPA 54 Section 9.6 (in the USA), and B149.1 Sections 4.1, 4.2, 4.3, and 6.21 (6.21.3(b)) in Canada.

A flexible gas connector must be installed in the orientation shown in Figure 14 below as required by national installation codes. This orientation protects the flexible gas connector from damage due to movement during heater expansion. Failure to install the gas connector in the proper orientation can result in a hazardous condition, property damage, personal injury or death.

It is the responsibility of the installer to ensure correct installation and gas connection.

FIGURE 14

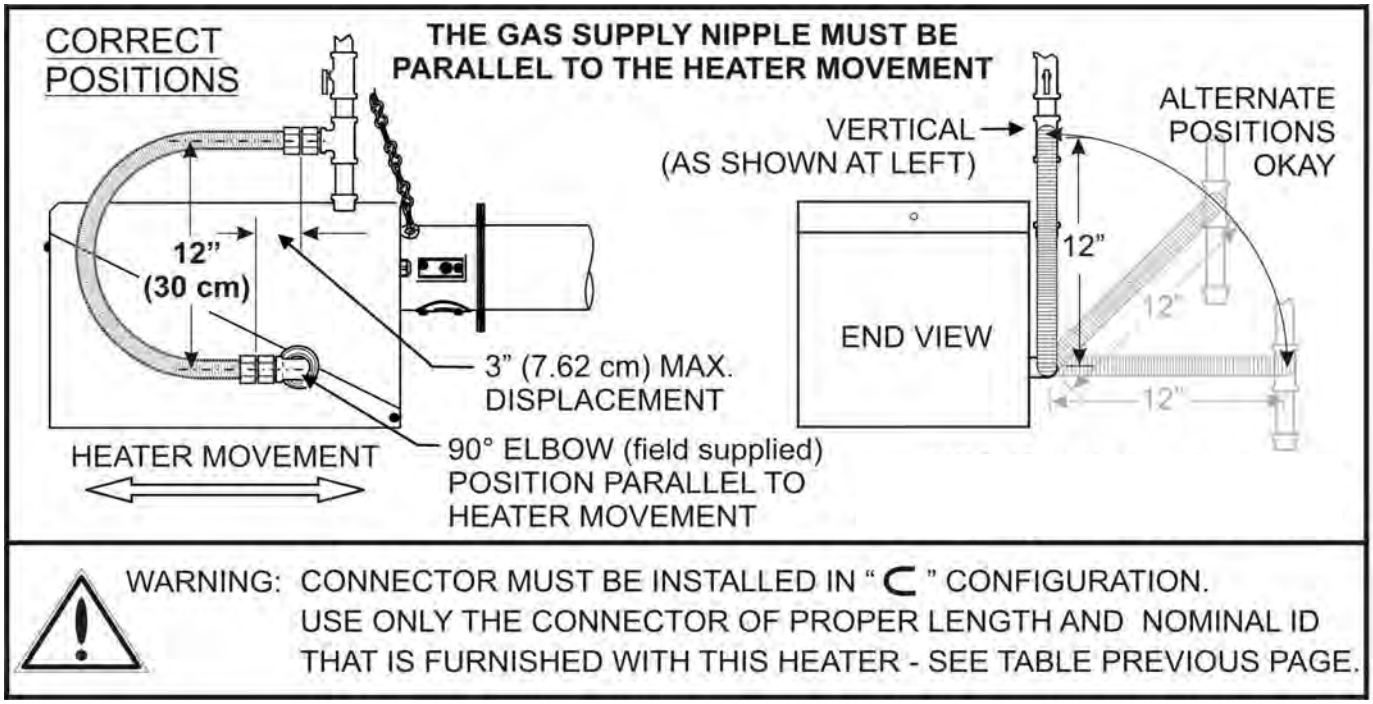
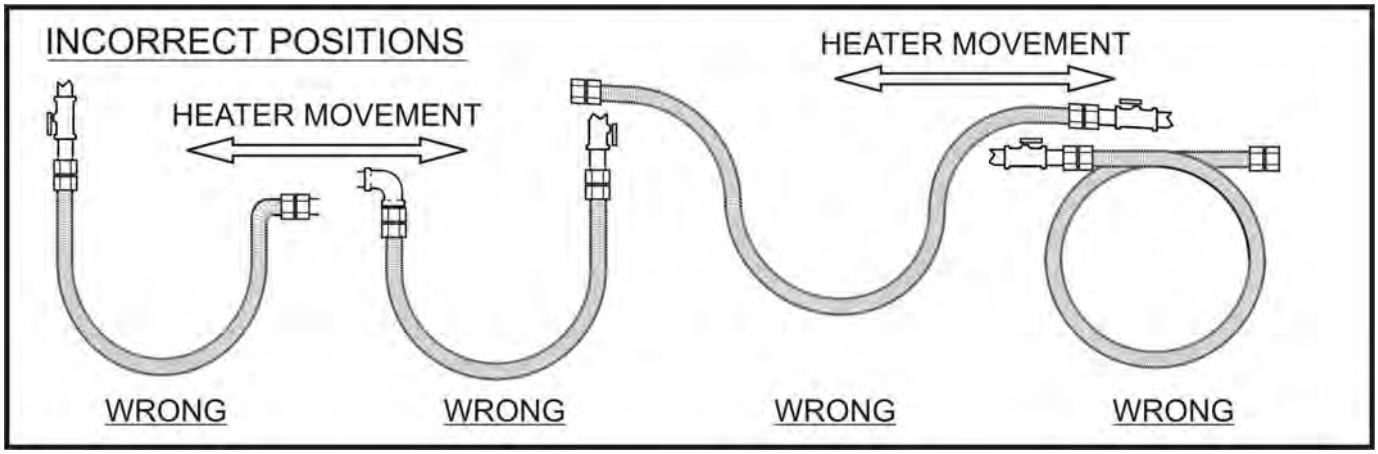


FIGURE 15



14. GAS CONVERSION

WARNING: Gas conversion must only be performed by a trained gas service technician.

Do not convert heater to alternate gas without using the proper kit listed below. Property damage, injury or death could result.

Standard production of this model heater is for use with natural gas. Field conversion between Natural Gas and Propane Gas can be accomplished using field conversion kits available from you local Schwank or InfraSave supplier:

- Part number: JS-0555-XB - Natural Gas to Propane Gas Conversion Kit P40-R
- Part number: JS-0555-XA - Propane Gas to Natural Gas Conversion Kit P40-R

15. ELECTRICAL AND THERMOSTAT WIRING (WIRING DIAGRAMS PAGE 29 & 30)

The heater must be electrically grounded in accordance with the National Electrical Code. ANSI / NFPA 70 or current Canadian Electrical code CSA C22.1.

Appliance and control wiring must be in accordance with all applicable local codes. The total load of all heaters must be considered in determining the required contact rating of the controlling thermostat or switch. Each tube heater requires 120V, 60 HZ electrical power sized for 145VA. The heater includes a 24V/120V relay switch and can be controlled by a 24V Thermostat, a TruTemp Thermostat, a line voltage Thermostat or by an “ON/OFF” switch. Maximum power flow for internal 24V burner components is 21VA.

A maximum night set-back of 9°F (5°C) is recommended for optimum economy and comfort. To maintain satisfactory comfort levels do not turn off the heating system over night/weekends.

16. HIGH ALTITUDE INSTALLATIONS - *also refer to chart in Section 26*

When installed above the altitude stipulated below for the USA or Canada, the input must be de-rated by 4% for each 1000 ft above the altitude listed . **If your local utility supplies gas with a de-rated heat content, no orifice change is required in the heater** . If the gas supply is not de-rated, the orifice must be changed according to the chart in Section 26. Check with your local utility regarding the gas supply and the de-rating of this appliance. Maintain gas supply pressures indicated in Table 4, page 25.

USA: The factory installed orifice for this appliance is approved for altitudes zero to 2000 feet above sea level. When installed above 2000 feet, **refer to Section 26**.

Canada: The factory installed orifice for this appliance is approved for altitudes zero to 4500 feet above sea level. When installed above 4500 feet, **refer to Section 26**.

17. LIGHTING INSTRUCTIONS

Refer to the lighting instructions label on the outside of the burner housing. If the unit locks out on safety, main power to the unit must be manually interrupted for a 30 second reset period before the heater can be restarted.

NOTE: ***On initial installation, the unit may lock out on safety owing to the length of time required to bleed air from the gas piping system.***

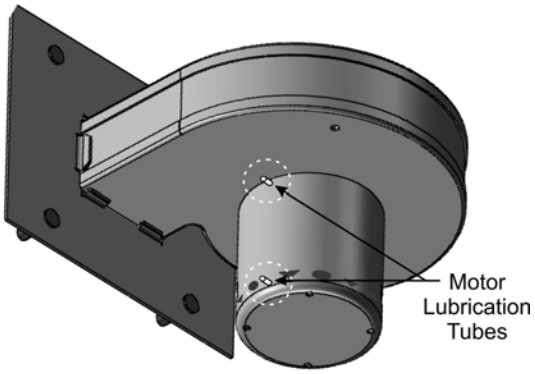
18. RECOMMENDED MAINTENANCE

Improper adjustment, alteration, service or maintenance can cause property damage, injury or death. This heater must be installed and serviced only by a trained gas service technician.

At least annually inspect the entire heater system, venting, and gas supply connections prior to the heating season. Replace worn parts and repair deficiencies.

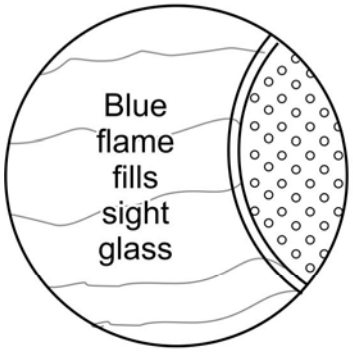
1. Periodically check the inlet air opening and the blower squirrel cage vanes, cleaning off any lint or foreign matter. It is important that the flow of combustion and ventilation air must not be obstructed.

2. Annually, prior to the heating season, lubricate the blower motor assembly by introducing several drops of oil to the top and bottom oil tubes located on the left hand side of the motor.

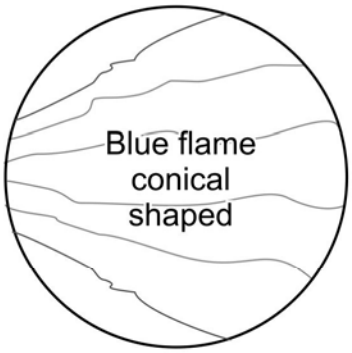


3. Periodically inspect the vent and vent termination to ensure no debris is blocking the vent, and that the integrity and construction of the vent piping is sound and no leakage is occurring.

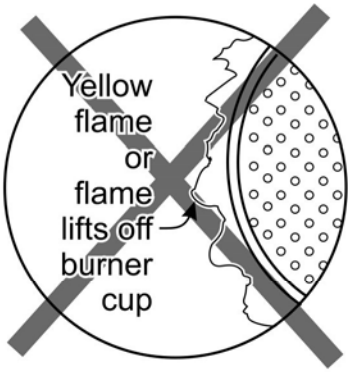
4. Visually inspect the burner flame periodically to ensure proper performance. The flame is visible through the sight glass assembly located on the bottom surface of the tube just downstream of the burner. The flame should be substantially blue - the occasional yellow fleck is normal. The flame should originate tight back to the burner cup face, and become cone shaped as it travels away from the burner cup. If the flame becomes yellow/orange, or if the flame is lifting away from the burner cup face, the burner requires cleaning or repair that must be conducted by a qualified gas service technician.



Correct Operation:
Blue flame fills sight glass, tight back to burner cup



Correct Operation:
Blue flame becomes cone shaped travelling away from burner cup



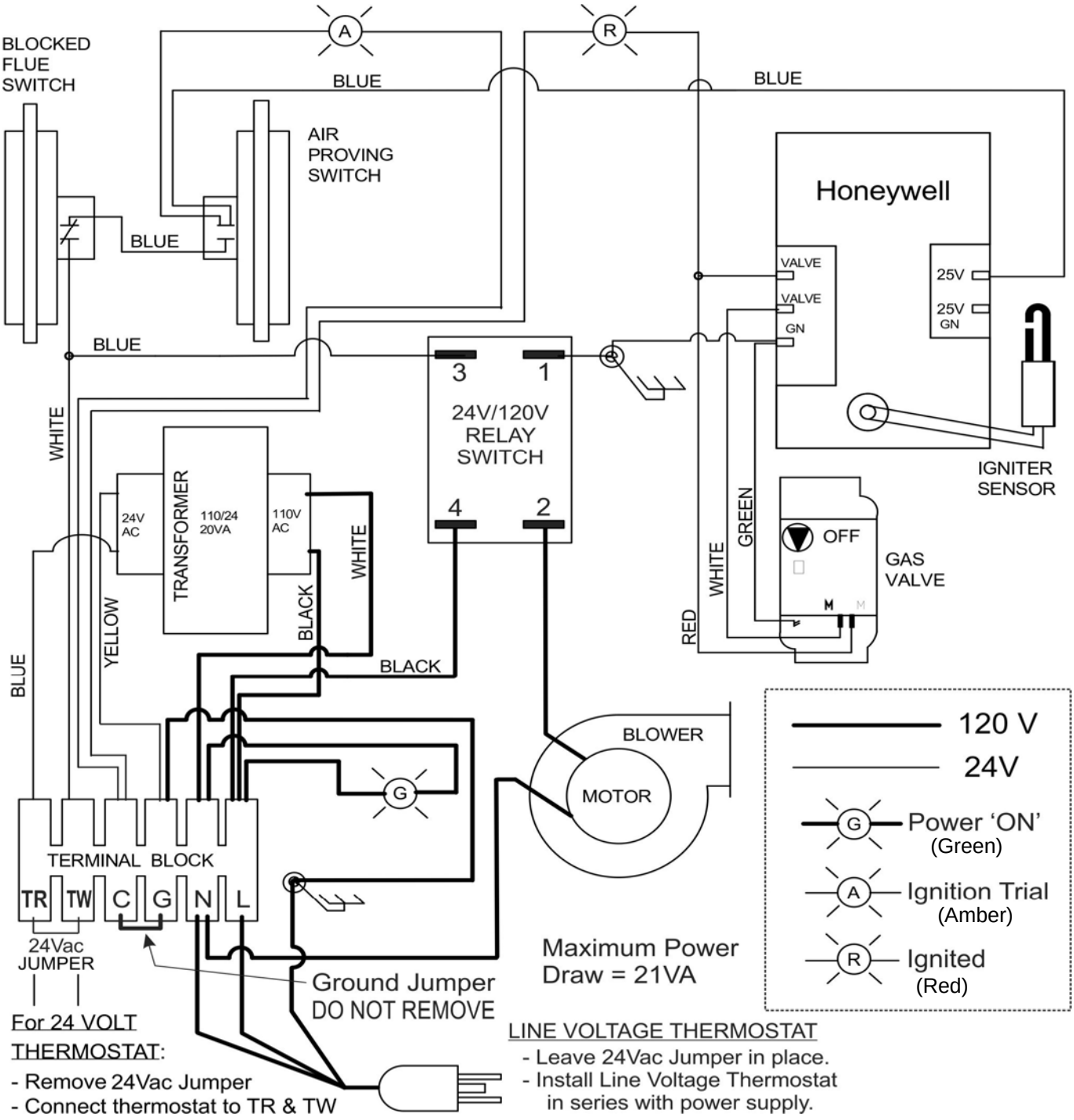
Incorrect Operation:
Yellow/orange flame or blue flame lifts away from burner cup.
Call service technician.

5. On an on-going basis, ensure that the area around the heater is kept clear and free from combustible materials, gasoline and other flammable liquids and vapors.

6. CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

7. Verify proper operation after servicing.

19. MODELS P40-R WIRING DIAGRAM: 24V OR 120 VOLT THERMOSTAT SINGLE HEATER PER THERMOSTAT

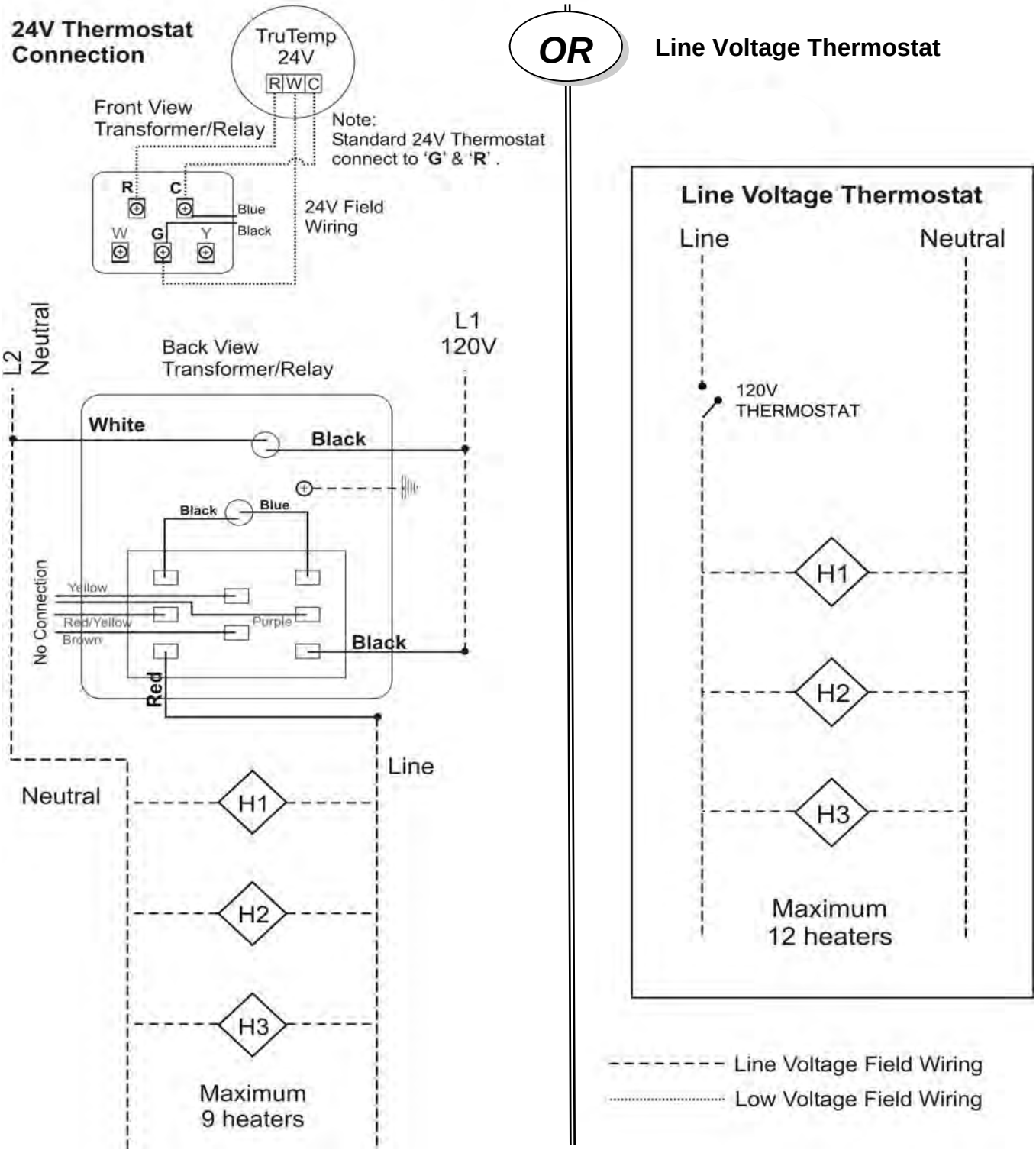


Each tube heater requires 120V, 60 HZ electrical power sized for 145VA. The heater includes a 24V/120V relay switch . Maximum power draw for internal 24V burner components is 21VA.

The heater must be electrically grounded in accordance with the National Electrical Code. ANSI / NFPA 70 or current Canadian Electrical code CSA C22.1.

A maximum night set-back of 9°F (5°C) is recommended for optimum economy and comfort. To maintain satisfactory comfort levels do not turn off the heating system over night/weekends.

19-A. MULTIPLE TUBE HEATERS per THERMOSTAT



Each tube heater requires 120V, 60 HZ electrical power sized for 145VA. Maximum power flow for internal 24V burner components is 21VA. ***See previous page for internal wiring.***

The heater must be electrically grounded in accordance with the National Electrical Code. ANSI / NFPA 70 or current Canadian Electrical code CSA C22.1.

A maximum night set-back of 9°F (5°C) is recommended for optimum economy and comfort. To maintain satisfactory comfort levels do not turn off the heating system over night/weekends.

20. MODEL P40-R SEQUENCE OF OPERATION

The S87 ignition control module is powered by a 24v transformer and activated when the thermostat calls for heat. On every call for heat the S87J will delay start-up to provide a 30 second system pre-purge. When the S87 is activated by a thermostat or call for heat an internal transformer provides power to the electronic generator circuit for Spark Ignition and the safety lockout timing begins. At the same time, the S87 opens the gas controls main valve allowing gas to flow to the main Burner.

The S87 Control Module performs the following basic functions:

- Provides a 30 second system pre-purge
- Supplies power to the electronic pulse-generator circuit for the Spark Igniter (30,000 volts open circuit).
- Allows 21 seconds for Ignition trial (TFI) before system safety lockout occurs.
- Senses the Burner flame for safe lighting
- Shuts off the spark after the Burner is lit.

Burner with direct spark ignition, sequence is as follows :

1a. **Line Voltage Thermostat:** Upon a call for heat by the line voltage Thermostat or "ON/OFF" switch, the Blower and the 120/24 volt Transformer are powered simultaneously with 115 volts.

1b. **24 Volt Thermostat:** The 120 volt supply to heater will power the 120v/24v Transformer and the 120V side of the Blower switching relay simultaneously. A call for heat by the 24 volt Thermostat energizes the 24 volt control circuit and the 24v/120 volt relay powering the Blower.

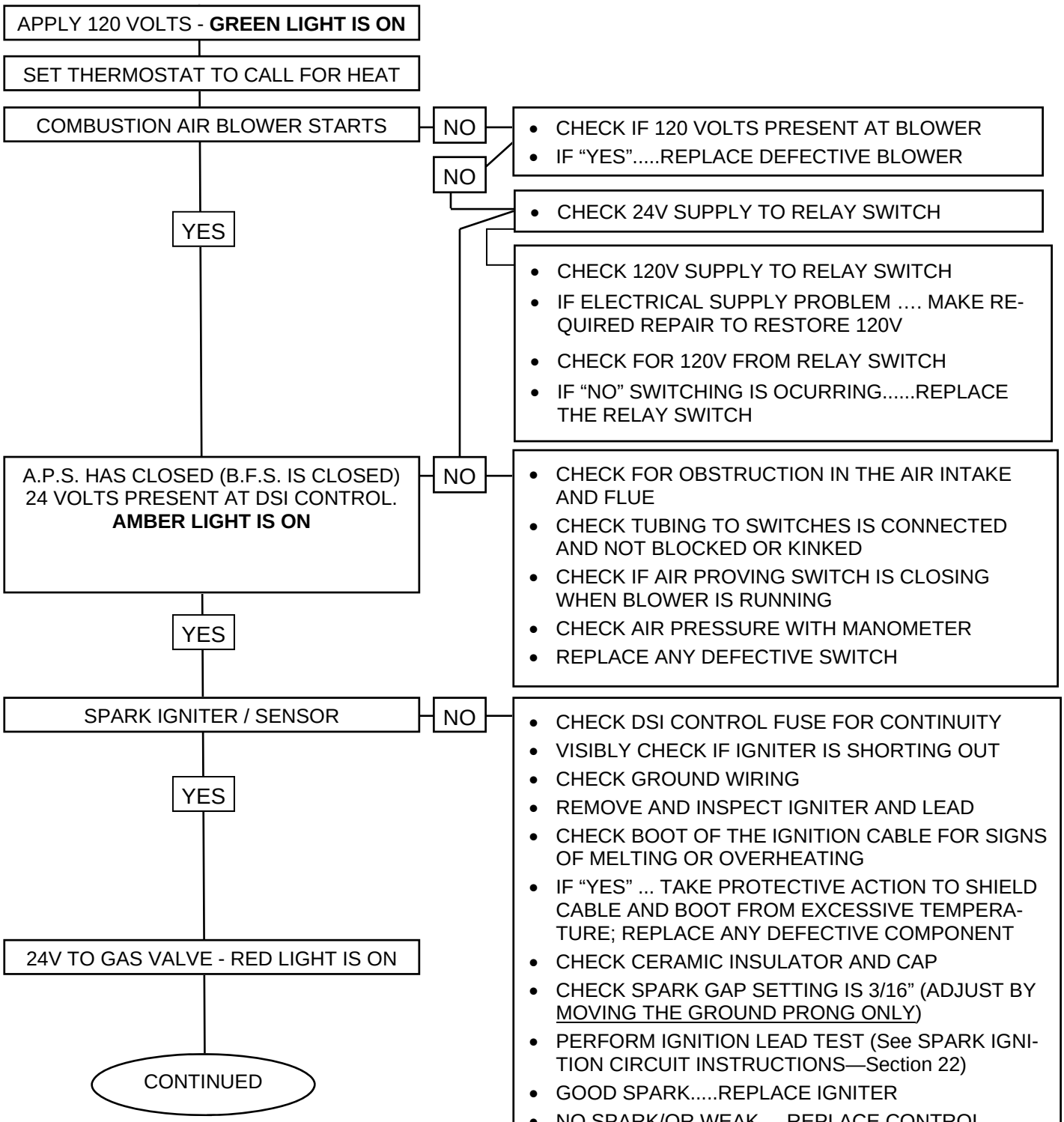
2. The 24 volt control circuit powers the DSI control in series through the normally open Air Pressure Switch (APS) and the normally closed Blocked Flue Switch (BFS).
3. The Blower creates a positive pressure and closes a normally open contact inside the Air Proving Switch (APS).
4. 24 volts supplied to the DSI control initiates the 30 second pre-purge cycle.
5. After completing the 30 second pre-purge cycle the DSI control generates high voltage to the Spark Igniter, and 24 volts to energize the Gas Valve.
6. The Burner will light and establish a steady flame.
7. Once the flame sensor determines there is a steady flame established, with a minimum flame signal of 1.5 µA the spark igniter is then de-energized.
8. In the event ignition does not occur, the safety circuit will function to interrupt gas flow after approximately 21 seconds and lock the system out. No further gas will flow until the power has been manually interrupted for a period of 30 seconds. This will reset the ignition module and the operating sequence will restart at step #1
9. If the blower does not run, the blower air pressure switch (normally open contact) does not close and power is not supplied to the ignition control.

21. TROUBLESHOOTING GUIDE

WARNING

Improper adjustment, alteration, service or maintenance can cause property damage, injury or death. This heater must be installed and serviced only by a trained gas service technician

SEQUENCE OF EVENTS



MAIN BURNER LIGHTS

NO

- CHECK FOR STRONG SPARK AT IGNITER.....
  - (SEE PREVIOUS PAGE).
- CHECK FOR 24 VAC ACROSS GAS VALVE.
- CHECK OUTPUT VOLTAGE FROM CONTROL TERMINALS TO GAS VALVE.....IF NO VOLTAGE REPLACE CONTROL.
- CHECK ELECTRICAL WIRING, AND VOLTAGE BETWEEN IGNITION CONTROL AND GAS VALVE.
- IF OK, REPLACE GAS VALVE.

YES

SPARK STOPS WHEN BURNER LIGHTS

NO

CONTROL IS NOT SENSING FLAME WITHIN THE 21 SECOND TFI AND IS STILL TRYING TO LIGHT

- CHECK CONTINUITY OF SENSOR CABLE AND GROUND WIRE
- CHECK BURNER FLAME IS COVERING SENSOR.
- CHECK FLAME SIGNAL IN SERIES WITH THE GROUND AND MODULE FOR 1.5UA MINIMUM.
- IF SIGNAL IS LOWER CHANGE IGNITER.
- IF CHECKS ARE OK.....REPLACE CONTROL.

YES

SYSTEM RUNS UNTIL CALL FOR HEAT ENDS

NO

NOTE: IF IGNITION CONTROLS GOES INTO A LOCKOUT, INTERRUPT POWER AND RESTART.

- CHECK CONTINUITY OF SENSOR CABLE AND GROUND WIRE AS A POOR GROUND COULD RESULT IN ERRATIC BEHAVIOUR AND NUISANCE SHUTDOWNS EVEN THOUGH OPERATION IS NORMAL AT THE TIME OF CHECKOUT.
- CHECK FOR EXCESSIVE HEAT AT SENSOR INSULATOR AS TEMPERATURES ABOVE 1000°F(538°C) CAUSES SHORT TO GROUND.
- CHECK FLAME SIGNAL IN SERIES WITH THE GROUND AND MODULE FOR A MINIMUM 1.5UA.
- IF SIGNAL IS LOWER CHANGE IGNITER.
- IF CHECKS ARE OK.....REPLACE CONTROL.

YES

CALL FOR HEAT ENDS:
SYSTEM SHUTS OFF

NO

- CHECK TEMPERATURE CONTROLLER.
- CHECK FOR FAULTY WIRING, REMOVE GAS VALVE LEAD AT CONTROL ,
- IF VALVE CLOSES, RECHECK THE TEMPERATURE CONTROLLER AND WIRING.
- IF VALVE STAYS OPEN....REPLACE GAS VALVE

YES

TROUBLESHOOTING ENDS
SEE S87J DSI CHECK

22. SPARK IGNITION CIRCUIT

The step-up transformer in the ignition control provides spark ignition at 30,000 volts (open circuit). To check the spark ignition circuit, proceed as follows.

- Shut off gas supply to the gas control
- Disconnect the ignition cable at the ignition control stud terminal to isolate the circuit from the Spark Igniter or Igniter / Sensor
- Prepare a short jumper lead, using heavily insulated wire such as ignition cable

CAUTION

In the next step, DO NOT allow fingers to touch either the stripped end of the jumper or the stud terminal. This is a very high voltage circuit and electrical shock, personal injury, or death can result.

- Perform this test immediately upon energizing the system before the Ignition Control goes into safety lockout and interrupts the spark circuit. Touch one end of the jumper firmly to the ignition control GND terminal. (DO NOT remove the existing ground lead.) Slowly move the other end of the jumper wire toward the stud terminal on the Ignition Control to establish a spark.
- Pull the wire away from the stud and note the length of gap at which spark discontinues.
- A spark length of 1/8 in. (3 mm) or more indicates satisfactory voltage output. If no arc can be established, or the maximum spark is less than 1/8 in. (3 mm), and power to the Ignition Control input terminals was proved, replace the Ignition Control.

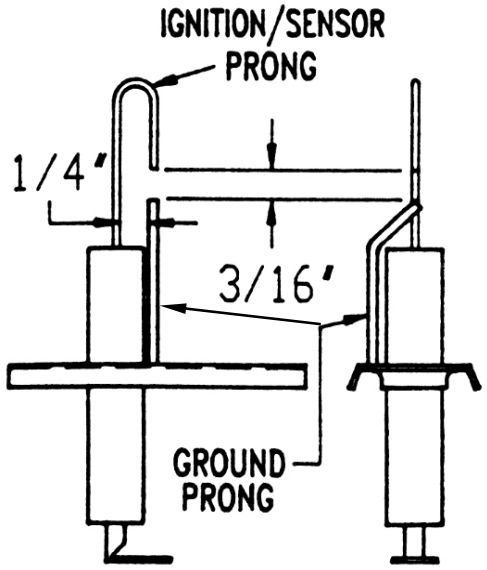
TURN OFF THE POWER AND RECONNECT THE IGNITION WIRE TO THE IGNITION CONTROL STUD. DISCONNECT THE IGNITION WIRE FROM THE IGNITER AND REPEAT THE STEPS ABOVE BY GROUNDING THE WIRE OUT TO THE TUBE BODY THIS TIME. TURN ON THE POWER AND PULL THE WIRE AWAY FROM THE TUBE AND NOTE THE LENGTH OF GAP AT WHICH THE SPARK DISCONTINUES. IF THERE IS NO SPARK OR WEAK SPARK REPLACE THE IGNITION WIRE.

SPARK IGNITER SET UP

Use the following diagram to check the Igniter gap. If the gap is incorrect all adjustments should be made with the **GROUND PRONG/PIN ONLY! DO NOT BEND THE IGNITER PRONG!!!!**

USE THE BLACK BARS BELOW AS A GUIDE FOR ADJUSTMENT. USE THE BARS THAT COINCIDE WITH THE FORMAT & SIZE OF THIS PUBLICATION .

IF this manual is in "booklet" format (8.5" x 11" folded in half) use these bars →



OR

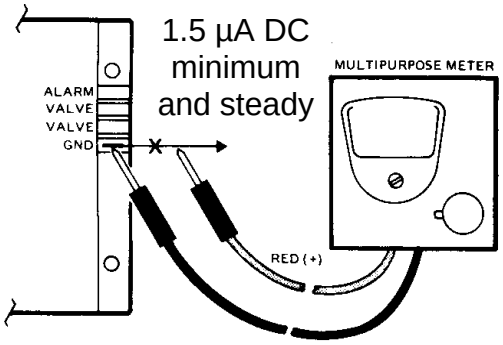
IF this manual is 8.5" x 11" "full page" format use these bars →

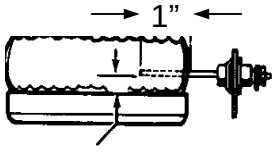
23. FLAME SENSING CIRCUIT MODEL P40-R - HONEYWELL S87 DSI

The output of the flame sensing circuit cannot be checked directly on the S87 body. Check the flame sensing circuit directly by checking the flame sensing current from the sensor to the S87 as follows.

1. Connect a meter (dc microammeter scale) in series with the flame signal ground wire as shown below. Using the Honeywell W136A Test Meter or equivalent. Disconnect the ground wire from the S87. Connect the red (positive) meter lead to the free end of the ground wire. Connect the black (negative) meter lead to the quick-connect ground terminal on the S87.
2. Restart the system and read the meter. The flame sensor current must be at least 1.5 uA and steady. If the reading is less than 1.5µA or unsteady, see LOW OR UNSTEADY FLAME CURRENT section, below.

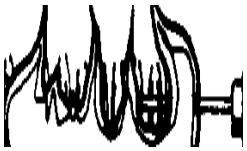
   If a flame is present at sensor and a reading of zero uA is obtained, check for a secondary ground connection to the 24V (GND) terminal. If secondary connection exists, temporarily remove connection and measure flame current.





1/4” to 1/2”

A good rectifying flame is achieved with approx 1” of sensor in a strong blue flame, positioned 1/4” to 1/2” away from flame source surface.



A lazy or weak flame is not a good rectifying flame.
Check gas pressure and gas orifice for insects, and spider webs.

LOW/ UNSTEADY FLAME CURRENT

If the current to the S87 flame circuit is less than 1.5 µA or is unsteady, check the burner flame, flame sensor location and electrical connections as follows.

Electrical Connections and Shorts

Connections at the flame sensor must be clean and secure. If wiring needs replacement, use moisture resistant #18 wire rated for continuous duty up to 221^0 F [105^0 C].

Flame Sensor

The flame signal is best when about 1 in. [25 mm] of flame rod is immersed in the burner flame. A bent flame rod, bent mounting bracket or cracked ceramic insulator will affect flame signal.
Replace flame sensor if necessary.

Burner Flame

The flame sensor must be constantly immersed in flame. Check burner flame condition as shown opposite. Observe burner rating plate for the correct gas pressure, and check with a manometer. If gas pressure is correct check line and orifice for obstructions.

24. START-UP / COMMISSIONING SHEET

THIS EQUIPMENT HAS BEEN FACTORY FIRED AND TESTED PRIOR TO SHIPMENT. HOWEVER, THIS APPLIANCE IS NOT "PLUG & PLAY". IT REQUIRES COMMISSIONING AND FIELD ADJUSTMENT / SPECIFICATIONS CONFIRMATION TO ENSURE SAFE AND EFFICIENT OPERATION.

COMMISSIONING REPORT
AS PER I&O MANUAL AND LOCAL CODES

CONTRACTOR NAME: .....DATE.....

ADDRESS:.....

.....

CITY:.....

PHONE:.....

CELL: .....

JOB SITE.....CITY.....

HEATER MODEL NUMBER:.....
Located on burner rating plate

HEATER SERIAL NUMBER: .....
Located on burner rating plate

TO ENSURE THAT SITE CONDITIONS ARE COMPATIBLE WITH THE HEATER'S PERFORMANCE AND TO ALLEVIATE NUISANCE CALL-BACKS, THE FOLLOWING START-UP NEEDS TO BE COMPLETED BY THE QUALIFIED GAS INSTALLER.

A TECHNICIAN CALLING FOR TECHNICAL SUPPORT MUST PROVIDE THE INFORMATION FROM THE COMPLETED COMMISSIONING REPORT ON THE NEXT PAGE

FAX COMPLETED REPORT TO TECHNICAL SERVICES:
FAX 1-866-361-0523,
VOICE 1-877-446-3727

WARNING

START UP 'SMOKE'

During start up, material coatings used in the production process of tubes and reflectors will "burn off" and create smoke during the first hour of operation. This is temporary and normal.

Please ensure that there is sufficient ventilation to adequately clear the smoke from the space.

Notify site and safety personnel to ensure that alarm systems are not unduly activated.

QUALIFIED INSTALLER TO COMPLETE THIS TUBE HEATER COMMISSIONING REPORT

TYPE OF GAS:	NG ☐	LP ☐
DOES BUILDING HAVE A NEGATIVE CONDITION:	YES ☐	NO ☐
IF THIS IS A HIGH ALTITUDE AREA WHAT IS THE ALTITUDE ABOVE SEA LEVEL	_____ Ft	
DOES APPLICATION REQUIRE FRESH AIR TO BURNER	YES ☐	NO ☐
IS HEATER EXPOSED TO CHEMICAL OR CORROSIVE ATMOSPHERE:	YES ☐	NO ☐
ARE ACTUAL MINIMUM CLEARANCES AS PER TABLE 3	YES ☐	NO ☐
CAN HEATER BE AFFECTED BY OVERHEAD CRANES / VIBRATION	YES ☐	NO ☐
ARE GAS SUPPLY LINES ADEQUATELY SIZED FOR SYSTEM	YES ☐	NO ☐
GAS LINES AND BRANCHES HAVE BEEN PURGED OF AIR:	YES ☐	NO ☐
THIS HEATER FIRED WITHOUT ANY MALFUNCTION:	YES ☐	NO ☐
INLET GAS SUPPLY PRESSURE WITH HEATER OPERATING :	_____	WC"
GAS VALVE OUTLET (Manifold) PRESSURE WITH HEATER OPERATING:	_____	WC"
WHAT IS THE LINE VOLTAGE READING AT THE HEATER	_____	VOLTS
WHAT IS THE VOLTAGE READING AT THE IGNITION MODULE	_____	VOLTS
WHAT IS THE FLAME SIGNAL STRENGTH IN uA FROM SENSOR:	_____	uA (microamps)
IS HEATER CONTROLLED BY A THERMOSTAT	YES ☐	NO ☐
IS THE THERMOSTAT STRATEGICALY LOCATED	YES ☐	NO ☐
WHAT IS TOTAL LENGTH OF INSTALLED THERMOSTAT WIRE	_____	FEET
WHAT IS THE GAUGE OF THE THERMOSTAT WIRE	_____	GAUGE
WHAT IS THE HEATER TUBE LENGTH (10ft per Tube section)	_____	FEET
WHAT IS THE TOTAL LENGTH OF THE VENT (add 10ft for each bend)	_____	FEET
WHAT LENGTH IS COMBUSTION AIR INTAKE (add 10ft for each bend)	_____	FEET
IF REQUIRED....WHAT IS THE LENGTH OF THE TURBULATOR(S)	_____	FEET
IF INSTALLED....IS TURBULATOR AT FLUE END OF SYSTEM	YES ☐	NO ☐
"MAXIMUM STACKING HEIGHT" SIGN(S) - POSTED AT THERMOSTAT(S)	☐	

THIS HEATER MUST BE ELECTRICALLY GOUNDED

FAX COMPLETED REPORT TO TECHNICAL SERVICES: FAX 1-866-361-0523, VOICE 1-877-446-3727

25. DIMENSIONS AND WEIGHT

Assembled System:

- Weight: 96 pounds (44 kg)
- Dimensions: 119.5” L x 20” W x 12” H (3035 mm x 508 mm x 305 mm)

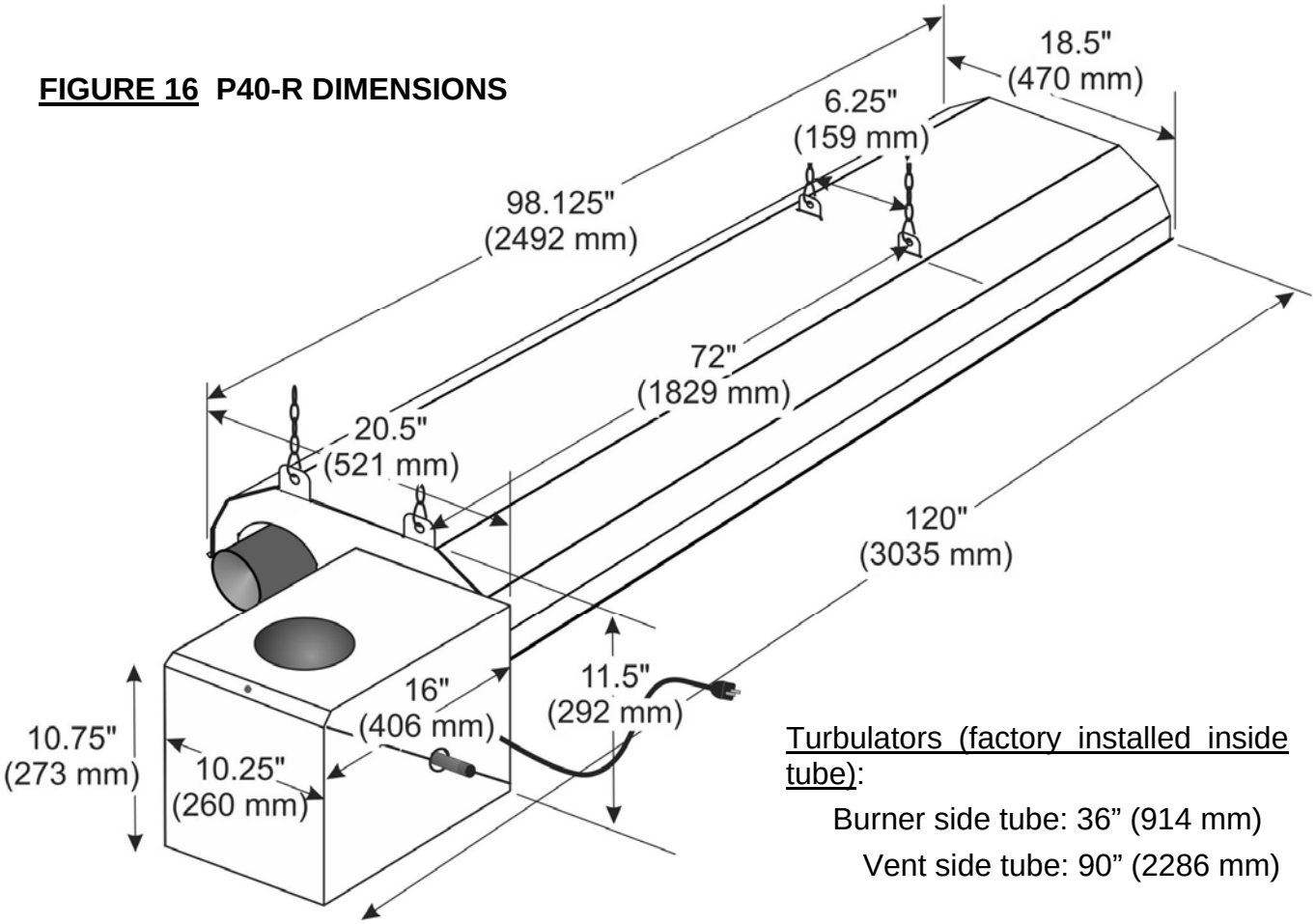
Burner:

- Weight: 26 pounds (11.8 kg)
- Dimensions: 16” L x 10.25” W x 10.75” H (406 mm x 260 mm x 273 mm)

Tube Reflector System:

- Weight: 60 pounds (27 kg)
- Dimensions: 103.5” L x 16.5” W x 7.5” H (2629 mm x 420 mm x 190 mm)

FIGURE 16 P40-R DIMENSIONS



Turbulators (factory installed inside tube):

Burner side tube: 36” (914 mm)

Vent side tube: 90” (2286 mm)

26. HIGH ALTITUDE INSTALLATION

When this appliance is installed above the altitude stipulated below, the input must be de-rated by 4% for each 1000 ft . **If your local utility supplies gas with a de-rated heat content, no orifice change is required in the heater** . Check with your local utility regarding de-rating.

USA: The factory installed orifice for this appliance is approved for altitudes zero to 2000 feet above sea level. Above 2000 feet, refer to table below.

Canada: The factory installed orifice for this appliance is approved for altitudes zero to 4500 feet above sea level. When installed above 4500 feet, refer to the table below

ORIFICE CHART - ALTITUDE CONVERSION

MODEL NO	FOR USE AT ALTITUDES ABOVE (FEET) Gas Orifice Drill Size / Part #							
	Supplied	USA Only			USA & CANADA*			
	0	2000	3000	4000	5000	6000	7000	8000
P40U / P40U-I NG	31 DMS JS-0731-DM	3 mm JS-0730-MM	32DMS JS-0732-DM	32DMS JS-0732-DM	33DMS JS-0733-DM	34DMS JS-0734-DM	7/64 JS-0731-IN	36DMS JS-0736-DM
P40U / P40U-I LPG*	49 DMS JS-0749-DM	50 DMS JS-0750-DM	50 DMS JS-0750-DM	50 DMS JS-0750-DM	51 DMS JS-0751-DM	51 DMS JS-0751-DM	51 DMS JS-0751-DM	52 DMS JS-0752-DM

* Field Conversion Kit required to convert between fuel gas types:

- Part number: JS-0555-XB P40U - Natural Gas to Propane Gas Conversion Kit
- Part number: JS-0555-XA P40U - Propane Gas to Natural Gas Conversion Kit

27. OPTIONAL ACCESSORIES

Flue Vent Terminal

4" wall horizontal — JA-0528-XX

6" wall horizontal — JA-0529-XX

Clearance Sign - Metal 18" x 6" — JL-0798-CS

- Required in some jurisdictions:
  - Vehicle service garages
  - 3/4" high red lettering on white background

#2 Lion Chain (115 lb work load) **- 200 ft roll** — JL-0800-XX

Safety Snap Hooks - 2" - pkg of 25 — JL-0800-SH

- pkg of 100 — JL-0800-SH-B

TruTemp Infrared Setback Thermostat

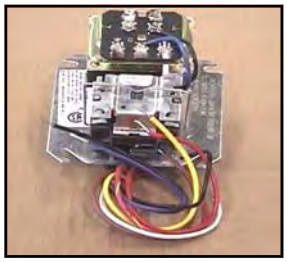
True comfort control for radiant heating systems - senses and averages ambient and radiant temperatures.
Occupancy sensor with auto set-back of 9°F (5°C).
Do not use in wet or corrosive environments

JM-0150-XX

24 Volt Option: Control Center

Use when Multiple Tube Heaters are controlled by a single 24V Thermostat or TruTemp
(for field mounting)

JM-0303 –KT



Check local codes for compliance:

Stainless Steel Flexible Gas Connector 1/2" x 24" — JL-0771-XX

JS-0502-UR-GK PROTECTIVE GUARD SCREEN OPTION

– Recommended for heater mounted with less than 8 feet [2.4 m] between floor and bottom of heater

Two sections make up the protective guard assembly that installs on the underside of the P40-R heater. Near the bottom edge at each side of the reflector are two sets of three holes. Each set of holes has one round hole at the center of the reflector, the other two holes are elongated and positioned between the center and the ends of the reflector. The pins that extend from each side of the two guard sections are inserted into these sets of holes.

Fig. 1

Fig. 2

Step 1: On ONE SIDE of the reflector, remove the bottom screws (Qty 3) that fasten the reflector to the end and center hanger brackets, Fig. 1. Retain screws for re-attachment of reflector .

Step 2: On the side of the reflector that remains securely fastened to the hangers, insert a pin located at the end of the Protective Guard into one of the 1/8" round holes located at the center of the reflector, Fig. 2

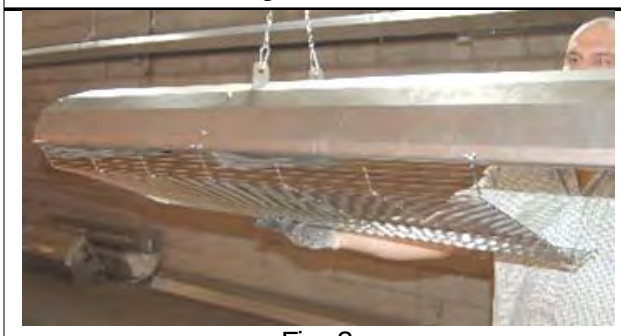


Fig. 3

Fig. 4

STEP 3: Continue installing pins into the reflector until all three pins on one side of the heater are inserted, Fig 3.

STEP 4: Swing the guard up to the opposite side of the reflector that was loosened from the hangers, Fig.4.

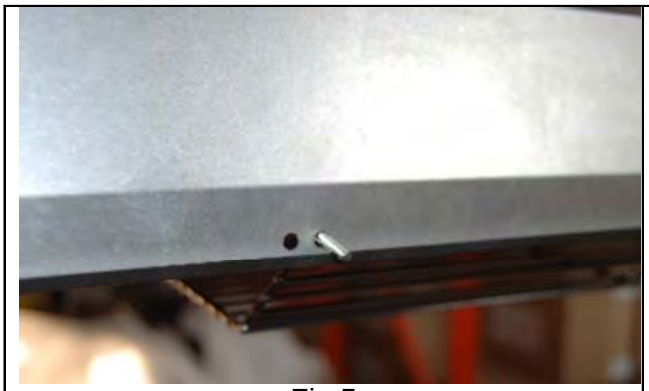


Fig.5

Fig. 6

STEP 4: On the second side of the reflector, first Insert a guard pin into the center hole, Fig 5. Insert remaining guard pins in the reflector holes, Fig 6.

Step 5: Repeat the process with the second guard section.

Fig. 7

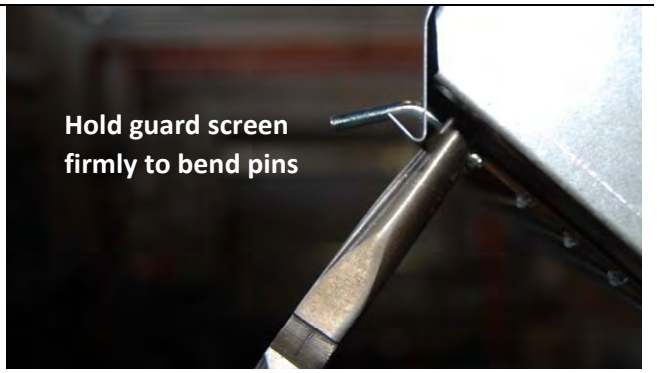


Fig. 8

Step 6: Re-install the screws at the bottom edge of the reflector into the three hangers, Fig. 7.

Fig. 9

Fig. 10 (Center)

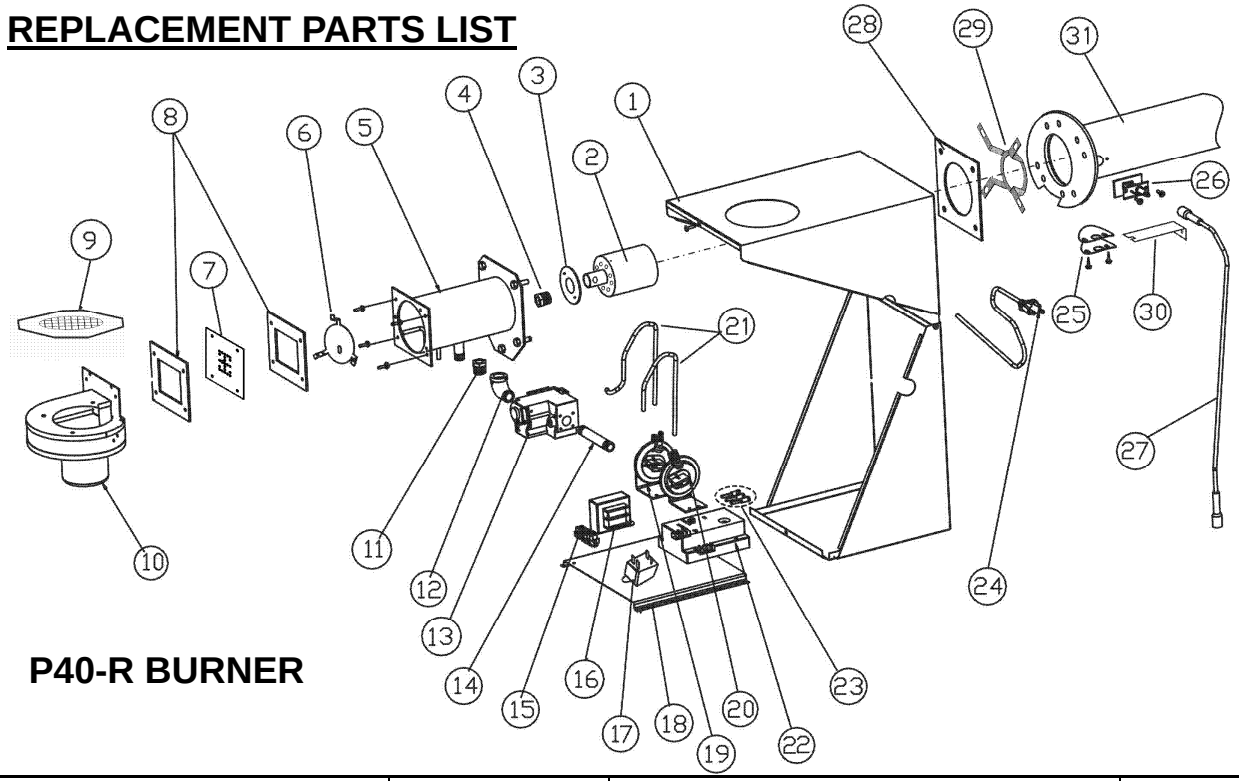
Fig. 11 (End)

Notes:

1) *To bend the pins, use needle nose pliers to hold the guard screen securely, Fig.8 and another set of pliers to bend the pin sideways, Fig.9.*
2) *DO NOT bend the pins downwards, it can damage the edge of the reflector.*

STEP 7: To secure the guard in place bend the <u>end</u> pins of <u>each</u> guard section sideways and towards each other, Fig. 10 & 11. The center pin does not require bending.

28. REPLACEMENT PARTS LIST

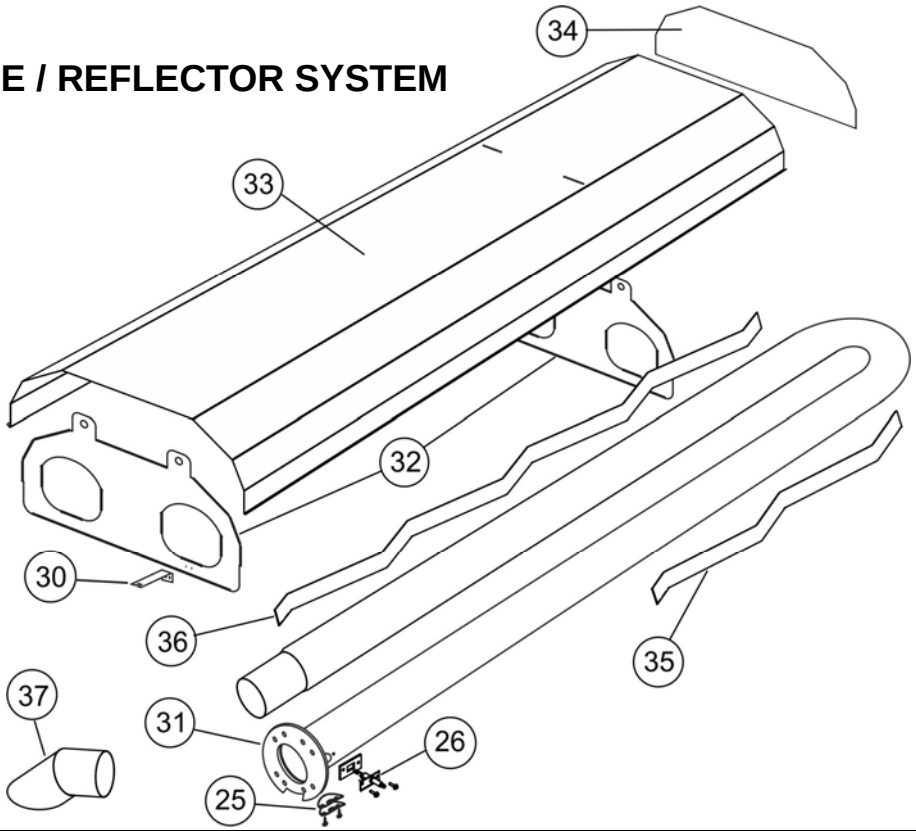


P40-R BURNER

#	PART DESCRIPTION	PART #	PART DESCRIPTION PRIMARY	SUPPLEMENT
1	**BURNER HOUSING: Schwank P40U**	JS-0582-XX	Burner housing coated gray	P40R
2	**BURNER CUP**	JS-0512-UL	Burner Cup 40,000	40 NG & LP
3	**AIR RESTRICTOR RING**	JS-0592-RA-R	Burner Cup air restrictor ring - 2 Holes	40 NG & LP
4	**MAIN BURNER ORIFICE NG**	JS-0731-DM	Gas orifice low intensity HR 31 DMS	40,000 NG
	MAIN BURNER ORIFICE LPG	JS-0749-DM	Gas orifice low intensity HR 49 DMS	40,000 LP
5	**BURNER CHAMBER**	JS-0504-XX	Burner Chamber	All
6	**AIR RESTRICTOR**	JS-0592-RF	Burner air restrictor P40-R	40 NG & LP
7	**EQUALIZER PLATE NG**	JS-0593-EP-R	Outlet equalizer plate 40,000 - 13 Holes	40 NG & LP
8	**BLOWER GASKET**	JS-0578-XX	Blower gasket - Outlet	Each
9	**AIR INTAKE SCREENED RESTRICTOR**	JS-0595-UR	Air Intake Restrictor - 1-1/4” Hole	40 NG & LP
10	**BLOWER**	JS-0579-AA	Blower Assembly Tube Burner	
11	**MANIFOLD BUSHING**	JM-0589-XX	Manifold bushing	
12	**90 DEGREE ELBOW FITTING 1/2"**	JS-0588-XX	Street elbow fitting 90 deg	
13	**GAS VALVE - NG**	JL-0701-AA	Gas Valve comb 3.5" WC 24VAC VR8 NG	40,000 NG
	GAS VALVE - LPG	JL-0703-AA	Gas Valve comb 10" WC 24VAC VR8 LP	40,000 LPG
14	**4" NIPPLE**	JS-0590-XX	Nipple 4"	
15	**TERMINAL BLOCK**	JM-0455-DD	Terminal block - Electrical Connections	
16	**STEP DOWN TRANSFORMER**	JA-0775-XX	Transformer 120/24V, 20VA	
17	**24V/120V RELAY SWITCH**	JS-0568-CC	24V/120V Relay Switch	
18	**COMPONENT PLATE**	JS-0581-SE	Component mounting plate SE	
19	**COMBUSTION AIR PROVING SWITCH**	JS-0576-UG	Air Proving Switch 1.00" WC	
20	**BLOCKED FLUE PROVING SWITCH**	JS-0577-RR	Blocked Flue Switch 0.46" WC	
21	**PRESSURE SWITCH TUBING**	JS-0572-SE	Tubing set 2 x 20" PVC SE	
22	**IGNITION CONTROL**	JA-0568-XX	Control DSI 24VAC S87J-1034	*Also see kit next page*

#	PART DESCRIPTION	PART #	PART DESCRIPTION PRIMARY
22A	**Ignition Replacement Kit**	JA-0568-KT	DSI S87J + CABLE + IGNITER KIT (22 + 26 + 27)
	WIRING KIT (not shown)	JW-SUXX-HX	Low Voltage Wiring Kit w/ Harness
23	**INDICATOR LAMPS**	JW-0519-AM	Indicator light amber
		JW-0519-GR	Indicator light green
		JW-0519-RE	Indicator light red
24	**ELECTRICAL CORD**	JB-0567-XX	Cord - electrical 6'
25	**SIGHT GLASS ASSEMBLY**	JS-0536-XX	Sight glass assembly - tube heater
26	**IGNITER KIT**	JA-0571-KT	Spark Igniter & Gasket Kit
27	**IGNITION CABLE FOR** HONEYWELL S87J	JS-0518-XX	Wire hi voltage (24")
28	**FLANGE GASKET**	JS-0591-XX	Flange Adapter Gasket
29	**FLAME RECTIFIER**	JS-0592-RR	Flame Rectifier

P40-R TUBE / REFLECTOR SYSTEM



25	**SIGHT GLASS ASSEMBLY**	JS-0536-XX	Sight glass assembly - tube heater	
26	**IGNITER KIT**	JA-0571-KT	Spark Igniter & Gasket Kit	
30	**TUBE FASTENING BRACKET**	JS-0502-UV	Positions tube in hanger / reflector system	
31	**PREFORMED U-TUBE**	JA-0501-UT	Preformed U-Tube: 17 ft tube length	
32	**P40-R HANGER**	JS-0506-UH	P40-R System Hanger	
33	**P40-R REFLECTOR**	JS-0502-UR	Reflector for P40-R	
34	**REFLECTOR END PLATE**	JS-0502-UT	Reflector End Plate	
35	**P40-R TURBULATOR 36"**	JS-0533-US	36" Turbulator In Burner Side Tube	
36	**P40-R TURBULATOR 90"**	JS-0533-UT	90" Turbulator In Vent Side Tube	
37	**OPTIONAL VENT CAP**	JA-0528-XX	Horizontal side wall 4" vent terminal	Optional Item

Contact your local Schwank or InfraSave distributor for replacement parts.

Schwank
INNOVATIVE HEATING SOLUTIONS

LIMITED WARRANTY CERTIFICATE

infrasave
radiant heaters

FOR GAS-FIRED OVERHEAD VENTED ROOM HEATER : P40-R & P40R-I SERIES

The Manufacturer warrants that this product is free from defects in material or workmanship under normal use and service subject to the terms of this document.

THREE YEAR WARRANTY

Subject to the conditions and limitations stated herein, during the term of this limited warranty, the manufacturer will supply any component part (at their option a new or repaired component part) of the heater as defined below, excluding any labor, which the Manufacturer's examination determines to be defective in workmanship or material for a period of three years (3 years) from the date of installation, unless otherwise specified below. This warranty applies to the heater's original owner, and subsequent transferees and only if the unit is installed and operated in accordance with the printed instructions accompanying the unit and in compliance with all applicable installation codes and good trade practices. Warranty of replacement parts is limited to a period of one year (1 year).

WHAT IS NOT COVERED

The Manufacturer shall not be responsible for any expenses, including service, labor, diagnosis, analysis, material or transportation charges incurred during removal or reinstallation of this product, or any of its components or parts. All labor or service charges shall be paid by the owner. This warranty does not cover heating products improperly installed, misused, exposed to or damaged by negligence, accident, corrosive or contaminating atmosphere, water, excessive thermal shock, impact, abrasion, normal wear due to use, alteration or operation contrary to the owner's manual or if the serial number has been altered, defaced or removed. This warranty shall not apply if the input to the heating product exceeds by more than 2% of the rated input on the rating plate. The Manufacturer shall not be liable for any default or delay in performance by its warranty caused by any contingency beyond its control, including war, government restrictions, or restraints, strikes, fire, flood, acts of God, or short or reduced supply of raw materials or products.

WARRANTY PROCEDURE

To establish the installation date for any purpose under this Limited Warranty, you must retain the original records that can establish the installation date of your unit. If you do not provide such documents, the start date of the term of this Limited Warranty will be based upon the date of unit manufacture, plus thirty (30) days. Failure to maintain the equipment through regular annual service maintenance by a qualified service technician shall void the warranty.

LIMITATIONS AND EXCLUSIONS

This document contains all warranties made by the Manufacturer and may not be varied, altered or extended by any person. There are no promises, or agreements extending from the Manufacture other than the statements contained herein. THIS WARRANTY IS IN LIEU OF ALL WARRANTIES EXPRESSED OR IMPLIED, TO THE EXTENT AUTHORIZED BY THE LAWS OF THE JURISDICTION, INCLUDING SPECIFICALLY THE WARRANTIES OR MERCHANTIBILITY OF FITNESS FOR A PARTICULAR PURPOSE.

It is understood and agreed that the Manufacturer's obligation hereunder is limited to repairing or replacing parts determined to be defective as stated above. In no event shall the Manufacturer be responsible for any alleged personal injuries or other special, incidental or consequential damages. As to property damages, contract, tort or other claim the Manufacturer's responsibility shall not exceed the purchase priced paid for the product.

All replacement parts will be warranted for the unused portion of the warranty coverage period remaining on the applicable unit.

Some Authorities do not allow certain warranty exclusions or limitations on duration of warranty or the exclusions or limitations of incidental or consequential damages. In such cases, the above limitations or exclusions may not apply to you and are not intended to do so where prohibited by law. This warranty gives you specific legal rights. You may also have other rights which vary by jurisdiction.

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