ATTENTION: READ THIS MANUAL AND ALL LABELS ATTACHED TO THE UNIT CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THESE UNITS! CHECK UNIT DATA PLATE FOR TYPE OF GAS AND ELECTRICAL SPECIFICATIONS AND MAKE CERTAIN THAT THESE AGREE WITH THOSE AT POINT OF INSTALLATION. RECORD THE UNIT MODEL AND SERIAL No.(s) IN THE SPACE PROVIDED. RETAIN FOR FUTURE REFERENCE.

Model No. ___________________________ Serial No. ___________________________

FOR YOUR SAFETY
The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

FOR YOUR SAFETY
If you smell gas:
1. Open windows.
2. Don’t touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

⚠️ WARNING ⚠️ Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

APPROVED FOR USE IN CALIFORNIA

⚠️ WARNING ⚠️ Install, operate and maintain unit in accordance with manufacturer’s instructions to avoid exposure to fuel substances or substances from incomplete combustion which can cause death or serious illness. The state of California has determined that these substances may cause cancer, birth defects, or other reproductive harm.

Installer Please Note: This equipment has been test fired and inspected. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer’s responsibility to inspect and correct any problems that may be found.

RECEIVING INSTRUCTIONS
Inspect shipment immediately when received to determine if any damage has occurred to the unit during shipment. After the unit has been uncrated, check for any visible damage to the unit. If any damage is found, the consignee should sign the bill of lading indicating such damage and immediately file claim for damage with the transportation company.

MESTEK, INC.
260 NORTH ELM ST., WESTFIELD, MA 01085
TEL: (413) 568-9571 FAX: (413) 562-8437
www.mestek.com
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NOTICE: It is the equipment owner’s responsibility to provide any scaffolding or other apparatus required to perform emergency service or annual/periodic maintenance to this equipment.

DESCRIPTION

The Power Vented gas unit heater is a factory assembled, power vented, low static pressure type propeller fan heater designed to be suspended within the space to be heated. THESE HEATERS ARE NOT TO BE CONNECTED TO DUCTWORK. The designs are certified by ETL as providing a minimum of 80% thermal efficiency, and approved for use in California. Do not alter these units in any way. If you have any questions after reading this manual, contact the manufacturer.

Figure 1 - Power Vented Separated Combustion Propeller Unit Heaters

The following terms are used throughout this manual, in addition to ETL requirements, to bring attention to the presence of potential hazards or to important information concerning the product:

⚠️ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

⚠️ CAUTION Indicates an imminently hazardous situation which, if not avoided, may result in minor injury or property damage.

⚠️ WARNING Indicates an imminently hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

NOTICE: Used to notify of special instructions on installation, operation or maintenance which are important to equipment but not related to personal injury hazards.
GENERAL SAFETY INFORMATION

**WARNING** Failure to comply with the General Safety Information may result in extensive property damage, severe personal injury or death.

**WARNING** This product must be installed by a licensed plumber or gas fitter when installed within the Commonwealth of Massachusetts.

Installation must be made in accordance with local codes, or in absence of local codes with the latest edition of ANSI Standard Z223.1 (N.F.P.A. No.54) National Fuel Gas Code. All of the ANSI and NFPA Standards referred to in these installation instructions are those that were applicable at the time the design of this appliance was certified. The ANSI Standards are available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY, 10036 or www.ansi.org. The NFPA Standards are available from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269. These unit heaters are designed for use in airplane hangars when installed in accordance with ANSI/NFPA No. 409 and in public garages when installed in accordance with NFPA No. 88A and NFPA No. 88B.

If installed in Canada, the installation must conform with local building codes, or in absence of local building codes, with CSA-B149.1 “Installation Codes for Natural Gas Burning Appliances and Equipment” or CSA-B149.2 “Installation Codes for Propane Gas Burning Appliances and Equipment”. These Unit Heaters have been designed and certified to comply with CSA 2.6. Also see sections on installation in AIRCRAFT HANGARS and PUBLIC GARAGES.

**WARNING** Do not alter the unit heater in any way or damage to the unit and/or severe personal injury or death may occur!

**WARNING** Disconnect all power and gas supplies before installing or servicing the heater. If the power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power. Failure to do so could result in fatal electric shock, or severe personal injury.

**CAUTION** Ensure that all power sources conform to the requirements of the unit heater or damage to the unit will result!

Follow installation instructions CAREFULLY to avoid creating unsafe conditions. All wiring should be done and checked by a qualified electrician, using copper wire only. All external wiring must conform to applicable local codes and to the latest edition of the National Electrical Code ANSI/NFPA No. 70. All gas connections should be made and leak-tested by a suitably qualified individual, per instructions in this manual. Also follow procedures listed on the “Gas Equipment Start-Up Sheet” located in this manual.

Use only the fuel for which the heater is designed (see rating plate). Using LP gas in a heater that requires natural gas, or vice versa, will create the risk of gas leaks, carbon monoxide poisoning and explosion.

**WARNING** Do not attempt to convert the heater for use with a fuel other than the one intended. Such conversion is dangerous, as it will create the risks listed previously.

Make certain that the power source conforms to the electrical requirements of the heater.

**WARNING** Do not depend upon a thermostat or other switch as sole means of disconnecting power when installing or servicing heater. Always disconnect power at main circuit breaker as described above. Failure to do so could result in fatal electric shock.

Special attention must be given to any grounding information pertaining to this heater. To prevent the risk of electrocution, the heater must be securely and adequately grounded. This should be accomplished by connecting a grounded conductor between the service panel and the heater. To ensure a proper ground, the grounding means must be tested by a qualified electrician.

Do not insert fingers or foreign objects into the heater or its air moving device. Do not block or tamper with the heater in any manner while in operation or just after it has been turned off, as some parts may be hot enough to cause injury.

This heater is intended for general heating applications ONLY. It must NOT be used in potentially dangerous locations such as flammable, explosive, chemical-laden or wet atmospheres.

Do not attach ductwork to this product or use it as a makeup air heater. Such usage voids the warranty and will create unsafe operation.

In cases in which property damage may result from malfunction of the heater, a backup system or a temperature sensitive alarm should be used.

**CAUTION** The open end of piping systems being purged shall not discharge into areas where there are sources of ignition or into confined spaces UNLESS precautions are taken as follows: (1) By ventilation of the space, (2) control of purging rate, (3) elimination of all hazardous conditions. All precautions must be taken to perform this operation in a safe manner.

<table>
<thead>
<tr>
<th>Conversion</th>
<th>SI Unit Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 gallon = 3.785 L</td>
<td>1 foot = 0.305 m</td>
</tr>
<tr>
<td>1 pound = 0.453 kg</td>
<td>1 inch water column = 0.249 kPa</td>
</tr>
<tr>
<td>1000 Btu/Cu. Ft. = 37.5 MJ/m³</td>
<td>1 inch = 25.4 mm</td>
</tr>
<tr>
<td>1000 Btu per hour = 0.293 kW</td>
<td>1 foot = 0.305 m</td>
</tr>
<tr>
<td>1 liter/second = CFM x 0.472</td>
<td>1 psig = 6.894 kPa</td>
</tr>
<tr>
<td>1 meter/second = FPM ÷ 196.8</td>
<td>1 pound = 0.453 kg</td>
</tr>
</tbody>
</table>

Unless otherwise specified, the following conversions may be used for calculating SI unit measurements:

- Metric units to English units:
  - 1 gallon = 3.785 L
  - 1 pound = 0.453 kg
- English units to Metric units:
  - 1 foot = 0.305 m
  - 1 meter/second = FPM ÷ 196.8
  - 1 inch = 25.4 mm
  - 1 pound = 0.453 kg
  - 1 liter/second = CFM x 0.472
  - 1 meter/second = FPM ÷ 196.8

- Temperature:
  - 1°F = 0.556°C
  - 1°C = 1.8°F
Table 1 – Performance and Specification Data – Separated Combustion Propeller Unit heater

<table>
<thead>
<tr>
<th>Capacity (MBH)</th>
<th>100</th>
<th>125</th>
<th>150</th>
<th>175</th>
<th>200</th>
<th>225</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>400</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PERFORMANCE DATA‡</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input BTU/Hr (kW)</td>
<td>(29.3)</td>
<td>(36.6)</td>
<td>(43.9)</td>
<td>(51.2)</td>
<td>(58.6)</td>
<td>(65.9)</td>
<td>(73.2)</td>
<td>(87.8)</td>
<td>(102.5)</td>
<td>(117.1)</td>
</tr>
<tr>
<td>Output BTU/Hr (kW)</td>
<td>(24.4)</td>
<td>(30.1)</td>
<td>(35.8)</td>
<td>(41.5)</td>
<td>(47.2)</td>
<td>(53.0)</td>
<td>(58.8)</td>
<td>(73.2)</td>
<td>(87.8)</td>
<td>(102.5)</td>
</tr>
<tr>
<td>Thermal Efficiency (%)</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Free Air Delivery CFM (cu. m/s)</td>
<td>1,480</td>
<td>1,650</td>
<td>2200</td>
<td>2,530</td>
<td>2,640</td>
<td>2,700</td>
<td>3,100</td>
<td>4,400</td>
<td>5,000</td>
<td>5,300</td>
</tr>
<tr>
<td>Air Temperature Rise °F (°C)</td>
<td>50</td>
<td>56</td>
<td>50</td>
<td>51</td>
<td>56</td>
<td>61</td>
<td>60</td>
<td>50</td>
<td>52</td>
<td>56</td>
</tr>
<tr>
<td>Outlet Velocity FPM (m/s)</td>
<td>775</td>
<td>910</td>
<td>1045</td>
<td>1070</td>
<td>1000</td>
<td>950</td>
<td>980</td>
<td>1100</td>
<td>1150</td>
<td>1050</td>
</tr>
<tr>
<td>Full Load Amps at 115V (ODP)</td>
<td>4.5</td>
<td>6.1</td>
<td>6.6</td>
<td>7.7</td>
<td>7.7</td>
<td>7.7</td>
<td>7.7</td>
<td>9.4</td>
<td>11.6</td>
<td>11.8</td>
</tr>
</tbody>
</table>

**DIMENSIONAL DATA (inches (mm))**

| **A** Height to Top of Unit | 31-1/4 | 31-1/4 | 36-1/4 | 36-1/4 | 36-1/4 | 36-1/4 | 36-1/4 | 36-1/4 | 36-1/4 | 36-1/4 |
| **C** Discharge Opening Width | 14-3/4 | 17-1/2 | 17-1/2 | 20-1/4 | 23 | 25-3/4 | 28-1/2 | 34 | 39-1/2 | 45 |
| **F** to Centerline of Flue | 5-7/8 | 7-1/4 | 7-1/4 | 8-5/8 | 10 | 11-1/4 | 12-3/4 | 15-1/2 | 18-1/4 | 21 |
| **G** Flue Diameter Inches** (Diameter mm) | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 6 |
| **H** Fan Diameter-Inches | 14 | 16 | 16 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| **I** Gas Inlet-Natural Gas-Inches | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| **J** Gas Inlet-LP Gas-Inches | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 | 1/2 |
| Approx. Shipping Wt. lb (kg) | 200 | 228 | 256 | 284 | 312 | 340 | 368 | 432 | 488 | 545 |

**LEGEND:** SP = SHADED POLE  PSC = PERMANENT SPLIT CAPACITOR  ODP = OPEN DRIP PROOF

For installations in Canada, any reference to deration at altitudes in excess of 2,000 ft (610m) are to be ignored. At altitudes of 2,000 ft. to 4,500 ft. (610 to 1372m), the unit must be derated to 90% of the normal altitude rating, and be so marked in accordance with the ETL certification.

Figure 1A

- **DIMENSIONS:** 3-3/8 STANDARD UNITS
- **DIMENSIONS IN PARENTHESES (XXX) MILLIMETERS**

‡ Ratings shown are for unit installations at elevations between 0 and 2,000 ft (0 to 610m). For unit installations in U.S.A. above 2,000 ft (610m), the unit input must be derated 4% for each 1,000 ft (305m) above sea level; refer to local codes, or in absence of local codes, refer to the latest edition of the National Fuel Gas Code, ANSI Standard 223.2 (N.F.P.A. No. 54).

For installations in Canada, any reference to deration at altitudes in excess of 2,000 ft (610m) are to be ignored. At altitudes of 2,000 ft. to 4,500 ft. (610 to 1372m), the unit must be derated to 90% of the normal altitude rating, and be so marked in accordance with the ETL certification.

**LEGEND:** SP = SHADED POLE  PSC = PERMANENT SPLIT CAPACITOR  ODP = OPEN DRIP PROOF

Figure 1A

- **DIMENSIONS:** 3-3/8 STANDARD UNITS
- **DIMENSIONS IN PARENTHESES (XXX) MILLIMETERS**
INSTALLATION

**WARNING** Do not install unit heaters in corrosive or flammable atmospheres! Premature failure of, or severe damage to the unit will result!

**WARNING** Avoid locations where extreme drafts can affect burner operation. Unit heaters must not be installed in locations where air for combustion would contain chlorinated, halogenated or acidic vapors. If located in such an environment, premature failure of the unit will occur!

Since the unit is equipped with an automatic gas ignition system, the unit heater must be installed such that the gas ignition control system is not directly exposed to water spray, rain or dripping water.

NOTICE: Location of unit heaters is related directly to the selection of sizes (refer to Figure 2). Basic rules are as follows:

**Figure 2 - Heater Location**

**MOUNTING HEIGHT:** Unit Heaters must be installed at a minimum of 8 feet (2.4m) above the floor, measured to the bottom of the unit. At heights above 8 feet (2.4m), less efficient air distribution will result. Occasionally unit heaters must be mounted at heights of 12 to 16 feet (3.66 to 4.88m) in order to clear obstacles. When this is the case, it is advisable to use centrifugal blower unit heaters. If the unit heater to be mounted below 8 feet (2.4m) above the floor, the unit heater must be equipped with an OSHA approved fan guard.

**AIRCRAFT HANGARS:** Unit Heaters must be installed in aircraft hangars and public garages as follows: In aircraft hangars, unit heaters must be at least 10 feet (3.0m) above the upper surface of wings or engine enclosures of the highest aircraft to be stored in the hangar and 8 feet (2.4m) above the floor in shops, offices and other sections of the hangar where aircraft are not stored or housed. Refer to current ANSI/NFPA No. 409, Aircraft Hangars. In Canada, installation is suitable in aircraft hangars when acceptable to the enforcing authorities.

**PUBLIC GARAGES:** In repair garages, unit heaters must be at least 8 feet (2.4m) above the floor. Refer to the latest edition of NFPA No. 88B, Repair Garages.

In parking structures, unit heaters must be installed so that the burner flames are located a minimum of 18 inches (457mm) above the floor or protected by a partition not less than 18 inches (457mm) high. However, any unit heater mounted in a parking structure less than 8 feet (2.4m) above the floor must be equipped with an OSHA approved fan guard. Refer to the latest edition of NFPA 88A, Parking Structures.

In Canada, installation must be in accordance to the latest edition of CSA-B149 “Installation Codes for Gas Burning Appliances and Equipment.”

**AIR DISTRIBUTION:** Direct air towards areas of maximum heat loss. When multiple heaters are involved, circulation of air around the perimeter is recommended where heated air flows along exposed walls. Satisfactory results can also be obtained where multiple heaters are located toward the center of the area with heated air directed toward the outside walls. Be careful to avoid all obstacles and obstructions which could impede the warm air distribution patterns. Heat throw distances are presented in Table 2, and Figure 2A.

**Figure 2A - Heat Throw Distances**

<table>
<thead>
<tr>
<th>&quot;H&quot;</th>
<th>100,000</th>
<th>125,000</th>
<th>150,000</th>
<th>175,000</th>
<th>200,000</th>
<th>225,000</th>
<th>250,000</th>
<th>300,000</th>
<th>350,000</th>
<th>400,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>(m)</td>
<td>(29.3)</td>
<td>(36.6)</td>
<td>(43.9)</td>
<td>(51.2)</td>
<td>(58.6)</td>
<td>(65.9)</td>
<td>(73.2)</td>
<td>(87.8)</td>
<td>(102.5)</td>
<td>(117.1)</td>
</tr>
<tr>
<td>8</td>
<td>60</td>
<td>65</td>
<td>70</td>
<td>75</td>
<td>80</td>
<td>85</td>
<td>90</td>
<td>105</td>
<td>110</td>
<td>120</td>
</tr>
<tr>
<td>(2.4)</td>
<td>(18.3)</td>
<td>(19.8)</td>
<td>(21.3)</td>
<td>(22.9)</td>
<td>(24.4)</td>
<td>(25.9)</td>
<td>(27.4)</td>
<td>(32.0)</td>
<td>(33.5)</td>
<td>(36.6)</td>
</tr>
<tr>
<td>10</td>
<td>54</td>
<td>56</td>
<td>60</td>
<td>64</td>
<td>68</td>
<td>72</td>
<td>78</td>
<td>80</td>
<td>90</td>
<td>95</td>
</tr>
<tr>
<td>(3.0)</td>
<td>(16.5)</td>
<td>(17.1)</td>
<td>(18.3)</td>
<td>(19.5)</td>
<td>(20.7)</td>
<td>(21.9)</td>
<td>(23.8)</td>
<td>(27.4)</td>
<td>(29.0)</td>
<td>(30.5)</td>
</tr>
<tr>
<td>12</td>
<td>44</td>
<td>46</td>
<td>49</td>
<td>57</td>
<td>61</td>
<td>65</td>
<td>68</td>
<td>80</td>
<td>84</td>
<td>90</td>
</tr>
<tr>
<td>(3.7)</td>
<td>(13.4)</td>
<td>(14.0)</td>
<td>(20.7)</td>
<td>(17.4)</td>
<td>(18.6)</td>
<td>(19.8)</td>
<td>(20.7)</td>
<td>(24.4)</td>
<td>(25.6)</td>
<td>(27.4)</td>
</tr>
<tr>
<td>15</td>
<td>NR</td>
<td>NR</td>
<td>45</td>
<td>49</td>
<td>52</td>
<td>56</td>
<td>60</td>
<td>70</td>
<td>74</td>
<td>80</td>
</tr>
<tr>
<td>(4.6)</td>
<td>(22.6)</td>
<td>(14.9)</td>
<td>(15.8)</td>
<td>(17.1)</td>
<td>(18.3)</td>
<td>(21.3)</td>
<td>(22.6)</td>
<td>(24.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>46</td>
<td>50</td>
<td>54</td>
<td>63</td>
<td>66</td>
<td>70</td>
</tr>
<tr>
<td>(6.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(14.0)</td>
<td>(15.2)</td>
<td>(16.5)</td>
<td>(19.2)</td>
<td>(20.1)</td>
<td>(21.3)</td>
</tr>
</tbody>
</table>

NR = Not recommended  H = Distance from floor to bottom of the unit.
Unit heaters should not be installed to maintain low temperatures and/or freeze protection of buildings. A minimum of 50°F (10°C) thermostat setting must be maintained. If unit heaters are operated to maintain lower than 50°F (10°C), hot flue gases are cooled inside the heat exchanger to a point where water vapor (a flue gas by-product) condenses onto the heat exchanger walls. The result is a mildly corrosive acid that prematurely corrodes the aluminized heat exchanger and can actually drip water down from the unit heater onto floor surface. Additional unit heaters should be installed if a minimum 50°F (10°C) thermostat setting cannot be maintained.

NOTICE: Unit heater sizing should be based on heat loss calculations where the unit heater output equals or exceeds heat loss. Heater output is approximately 80% of input BTU/HR rating.

CLEARANCES: Each Gas Unit Heater shall be located with respect to building construction and other equipment so as to permit access to the Unit Heater. Clearance between walls and the vertical sides of the Unit Heater shall be no less than 18 inches (457mm). A minimum clearance of 6 inches (152mm) must be maintained between the top of the Unit Heater and the ceiling. The bottom of the Unit Heater must be no less than 12 inches (305 mm) from any combustible. However, in order to ensure access to the burner compartment, a minimum distance of 25 inches (635mm) is required. The distance between the flue collector and any combustible must be no less than 6 inches (152mm). Also see COMBUSTION AIR and EXHAUST VENTING sections.

NOTICE: Increasing the clearance distances may be necessary if there is a possibility of distortion or discoloration of adjacent materials.

WARNING Make certain that the lifting methods used to lift the heater and the method of suspension used in the field installation of the heater are capable of uniformly supporting the weight of the heater at all times. Failure to heed this warning may result in property damage or personal injury!
GAS SUPPLY PIPING

**WARNING** To avoid equipment damage or possible personal injury, do not connect gas piping to this unit until a supply line pressure/leak test has been completed. Connecting the unit before completing the pressure/leak test may damage the unit gas valve and result in a fire hazard.

**WARNING** Do not rely on a shut off valve to isolate the unit while conducting gas pressure/leak tests. These valves may not be completely shut off, exposing the unit gas valve to excessive pressure and damage.

### PIPE SIZING

To provide adequate gas pressure at the gas unit heater, size the gas piping as follows:

1. Find the cu ft/hr by using the following formula:
   \[ \text{Cu ft/hr} = \frac{\text{Input Btu/Hr.}}{1000} \]

2. Refer to Table 3. Match length of pipe in feet with appropriate “Gas Input - Cu Ft/Hr” figure. This figure can then be matched to the pipe size at the left of the table.

Example: It is determined that a 67 foot (20.4m) run of gas pipe is required to connect a 200 MBTU gas unit heater to a 1,000 Btu/cu. ft (0.29 kW) natural gas supply.

\[
\begin{align*}
200,000 \text{ Btu/hr} & = 200 \text{ Cu ft/hr} \\
r & = 1,000 \text{ Btu/cu ft} \\
\text{Using Table 3, a 1 inch pipe is needed.}
\end{align*}
\]

**NOTICE:** See General Safety Information section for English/SI (metric) unit conversion factors.

### Table 3 - Gas Pipe Size

<table>
<thead>
<tr>
<th>Nominal Pipe Size</th>
<th>Length of Pipe, Feet (meters)</th>
<th>Iron Pipe Dia. Inches</th>
<th>Iron Internal Diameter Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>175</td>
<td>97</td>
<td>82</td>
</tr>
<tr>
<td></td>
<td>(4.96)</td>
<td>(2.75)</td>
<td>(2.32)</td>
</tr>
<tr>
<td>3/4</td>
<td>360</td>
<td>200</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td>(10.2)</td>
<td>(7.08)</td>
<td>(5.66)</td>
</tr>
<tr>
<td>1</td>
<td>680</td>
<td>375</td>
<td>320</td>
</tr>
<tr>
<td></td>
<td>(19.3)</td>
<td>(13.2)</td>
<td>(10.6)</td>
</tr>
<tr>
<td>1-1/4</td>
<td>1400</td>
<td>770</td>
<td>660</td>
</tr>
<tr>
<td></td>
<td>(39.6)</td>
<td>(26.9)</td>
<td>(21.8)</td>
</tr>
<tr>
<td>1-1/2</td>
<td>2100</td>
<td>1180</td>
<td>990</td>
</tr>
<tr>
<td></td>
<td>(59.5)</td>
<td>(41.3)</td>
<td>(33.4)</td>
</tr>
<tr>
<td>2</td>
<td>3950</td>
<td>2200</td>
<td>1900</td>
</tr>
<tr>
<td></td>
<td>(112)</td>
<td>(77.9)</td>
<td>(62.3)</td>
</tr>
<tr>
<td>2-1/2</td>
<td>6300</td>
<td>3500</td>
<td>3000</td>
</tr>
<tr>
<td></td>
<td>(178)</td>
<td>(123)</td>
<td>(99.7)</td>
</tr>
<tr>
<td>3</td>
<td>11000</td>
<td>6250</td>
<td>5300</td>
</tr>
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<td></td>
<td>(311)</td>
<td>(218)</td>
<td>(177)</td>
</tr>
<tr>
<td>4</td>
<td>23000</td>
<td>10800</td>
<td>9700</td>
</tr>
<tr>
<td></td>
<td>(651)</td>
<td>(447)</td>
<td>(362)</td>
</tr>
</tbody>
</table>

Maximum Capacity of Pipe in Cubic Feet of Gas per Hour (Cubic Meters per Hour) for Gas Pressures of 0.5 psig (3.5 kPa) or Less, and a Pressure Drop of 0.5 Inch Water Column (124.4 Pa) (Based on a 0.60 Specific Gravity Gas)

1. Determine the required Cu. Ft. / Hr. by dividing the rated heater input by 1000. For SI / Metric measurements: Convert unit Btu./ Hr. to kilowatts. Multiply the units input (kW) by 0.0965 to determine Cubic Meters / Hour.  2. FOR NATURAL GAS: Select the pipe size directly from the table.  3. FOR PROPANE GAS: Multiply the Cu. Ft. / Hr. value by 0.633; then use the table.  4. Refer to the metric conversion factors listed in General Safety section for more SI unit measurements/conversions.

Before any connection is made to an existing line supplying other gas appliances, contact the local gas company to make certain that the existing line is of adequate size to handle the combined load.
PIPE INSTALLATION

1. Install the gas piping in accordance with applicable local codes.

2. Check gas supply pressure. Each unit heater must be connected to a manifold pressure and a gas supply capable of supplying its full rated capacity (see Table 4). A field LP tank regulator must be used to limit the supply pressure to maximum of 14 inch WC (3.5 kPa). All piping should be sized in accordance with the latest edition of ANSI Standard Z223.1, National Fuel Gas Code; in Canada, according to CSA B149. See Tables 1 and 3 for correct gas supply piping size. If gas pressure is excessive on natural gas applications, install a pressure regulating valve in the line upstream from the main shutoff valve.

3. Adequately support the piping to prevent strain on the gas manifold and controls.

4. To prevent the mixing of moisture with gas, run the take-off piping from the top, or side, of the main.

5. Separated combustion unit heaters optional two-stage units, and hydraulic modulating units are supplied with a combination valve which includes:
   - (a) Manual “A” valve
   - (b) Manual “B” valve
   - (c) Solenoid valve
   - (d) Pilot safety
   - (e) Pressure regulator

   Pipe directly into the combination valve (see Figure 4).

6. A 1/8 inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the appliance.

7. Provide a drip leg in the gas piping near the gas unit heater. A ground joint union and a manual gas shutoff valve should be installed ahead of the unit heater controls to permit servicing. The manual main shutoff valve must be located external to the jacket. See Figure 4.

8. Make certain that all connections have been adequately doped and tightened.

   **CAUTION** Do not overtighten the inlet gas piping into the valve. This may cause stresses that would crack the valve!

NOTICE: Use pipe joint sealant resistant to the action of liquefied petroleum gases regardless of gas conducted.

**WARNING** Check all pipe joints for leakage using a soap solution or other approved method. Never use an open flame or severe personal injury or death may occur.

---

**Figure 4 - Pipe Installation, Standard Controls**

---

**WARNING** Never use an open flame to detect gas leaks. Explosive conditions may exist which would result in personal injury or death.

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 psig (3.5 kPa).

The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 psig (3.5 kPa).

---

**Table 4 - Gas Piping Requirements**

<table>
<thead>
<tr>
<th>SINGLE STAGE GAS PIPING REQUIREMENTS*</th>
<th>GAS TYPE</th>
<th>NATURAL GAS</th>
<th>PROPANE (LP) GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manifold Pressure</strong></td>
<td>3.5 inch WC (0.9 kPa)</td>
<td>10.0 inch WC (2.5 kPa)</td>
<td></td>
</tr>
<tr>
<td><strong>Supply Inlet Pressure</strong></td>
<td>14.0 inch WC Max (3.5 kPa)</td>
<td>14.0 inch WC Max (3.5 kPa)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5.0 inch WC Min (1.2 kPa)</td>
<td>11.0 inch WC Min (2.7 kPa)</td>
<td></td>
</tr>
</tbody>
</table>

*For single stage application only at normal altitudes.

<table>
<thead>
<tr>
<th>TWO STAGE GAS PIPING REQUIREMENTS**</th>
<th>GAS TYPE</th>
<th>NATURAL GAS</th>
<th>PROPANE (LP) GAS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply Inlet Pressure</strong></td>
<td>6.5 inch WC Min (1.6 kPa)</td>
<td>11.5 inch WC Min (2.9 kPa)</td>
<td></td>
</tr>
</tbody>
</table>

**For two stage applications only at normal altitudes.
**WARNING**

HAZARDOUS VOLTAGE!

disconnect ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING. Failure to disconnect power before servicing can cause severe personal injury or death.

Standard units are shipped for use on 115 volt, 60 hertz single phase electric power. The motor nameplate and electrical rating on the transformer should be checked before energizing the unit heater electrical system. All external wiring must conform to the latest edition of ANSI/NFPA No. 70, National Electrical Code and applicable local codes; in Canada, to the Canadian Electrical Code, Part 1 CSA Standard C22.1.

**CAUTION** Do not use any tools (i.e. screwdriver, pliers, etc.) across the terminals to check for power. Use a voltmeter.

It is recommended that the electrical power supply to each unit heater be provided by a separate, fused and permanently live electrical circuit. A disconnect switch of suitable electrical rating for each unit heater should be located as close to the gas valve and controls as possible. Each unit heater must be electrically grounded in accordance with the latest edition of National Electric Code, ANSI/NFPA No. 70 or CSA Standard C22.1. Sample wiring connections are depicted in Figures 5, 6, 7, 8 & 9.

The transformer supplied with this unit heater is internally fused. Any overload or short circuit will ruin the transformer.

**THERMOSTAT WIRING AND LOCATION**

**NOTICE:** The thermostat must be mounted on a vertical vibration-free surface free from air currents and in accordance with the furnished instructions.

Mount the thermostat approximately 5 feet (1.5 m) above the floor in an area where it will be exposed to a free circulation of average temperature air. Always refer to the thermostat instructions as well as our unit wiring diagram and wire accordingly. Avoid mounting the thermostat in the following locations:
1. Cold areas - Outside walls or areas where drafts may affect the operation of the control.
2. Hot areas - Areas where the sun’s rays, radiation, or warm air currents may affect control operation.
3. Dead areas - Areas where air cannot circulate freely, such as behind doors or in corners.

**THERMOSTAT HEAT ANTICIPATOR ADJUSTMENTS:**

The initial heat anticipator setpoint should equal the thermostat's current amperage draw when the unit is firing. This setpoint should be measured for the best results. Use the recommended ranges as a guide. If further information is needed, consult your thermostat manufacturer's instructions.

**Recommended Heat Anticipator Setting Ranges:**

<table>
<thead>
<tr>
<th>Gas Ignition Type</th>
<th>25 ft. (7.6m) T'stat Wiring</th>
<th>50 ft. (15.2m) T'stat Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>For Power Vented Units: Intermittent (Spark)</td>
<td>0.85 to 0.90 A</td>
<td>0.90 to 1.1 A Max. Setting on T'stat</td>
</tr>
</tbody>
</table>

**FAN TIME DELAY CONTROL**

Leads from time delay controls are factory wired to the junction box. The fan control is a time delay relay (approximately 45 seconds ON, 65 seconds OFF). The fan control is rated at 17 amps.

**NOTICE:** The start-up fan delay must not exceed 90 seconds from a cold start.

**NOTICE:** For all wiring connections, refer to the wiring diagram that your unit is equipped with (either affixed to the side jacket or enclosed in your unit’s installation instruction envelope). Should any original wire supplied with the heater have to be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C.

Should any high limit switch wires have to be replaced, they must be replaced with wiring material having a temperature rating of 200°C minimum.
NOTICE: Combustion and exhaust venting instructions below describe two-pipe venting. If venting concentrically, a Concentric Vent Kit is required and instructions included in the kit should be followed.

**COMBUSTION AIR VENTING AND PIPING**

**WARNING** Never operate unit heaters without combustion air and flue gas piping in place or severe personal injury or death may occur!

**WARNING** CARBON MONOXIDE! Your venting system must not be blocked by any snow, snow drifts, or any foreign matter. Inspect your venting system to ensure adequate ventilation exists at all times! Failure to heed these warnings could result in Carbon Monoxide Poisoning (symptoms include grogginess, lethargy, inappropriate tiredness, or flu-like symptoms).

1. The combustion air system installation must be in accordance with the current National Fuel Gas Code-NFPA 54 or ANSI Z223.1 National Fuel Gas Code. In Canada, installation must be in accordance with CSA-B149.1 “Installation Code for Natural Gas Burning Appliances and Equipment” and CSA-B149.2 “Installation Code for Propane Burning Appliances and Equipment”.

2. A Breidert Type L or Fields inlet cap, furnished by the customer, must be installed at the termination point of the combustion air system, Figures 10 & 11.

**NOTICE:** The top of the inlet cap is to be no less than 12 inches (305mm) from the top of the vent cap, see Figures 10 & 11.

3. Each unit heater MUST have its own combustion air system. It MUST NOT be connected to other air intake systems.

4. Use single wall pipe constructed of 26-gauge galvanized steel or a material of equivalent durability and corrosion resistance for the combustion air system.

**WARNING** Never use pipe of a diameter other than that specified in Table 1, page 4! Never use PVC, ABS or any other non-metallic pipe for venting! To do so may result in serious damage to the unit and or severe personal injury or death!

5. Long runs of single wall combustion air piping passing through an unheated space may require insulating if condensation becomes noticeable.

6. The combustion air system must be installed to prevent collection of condensate. Pitch horizontal pipes downward 1/4 inch per foot (21mm/m) toward the inlet cap to facilitate drainage. Vertical combustion air pipes should be piped as depicted in Figure 10.

7. The equivalent length of the vent system must not be less than 5 feet and must not exceed 50 feet (15.2m). Equivalent length equals the total length of straight pipe plus 10 feet (4.6m) for each 90° elbow and 5 feet (1.5m) for each 45° elbow.

**NOTICE:** For optimum performance keep the combustion air system as straight as possible.

8. Each slip joint must be secured with at least three corrosion resistant screws. Two full turns of 3M #425 Aluminum Foil Tape or its equivalent must then be used to seal each joint. General Electric RTV-108, Dow-Corning RTV-732 or an equivalent may be used instead of the tape.

9. For horizontal combustion air systems longer than 5 feet (1.5m), the system must be supported from overhead building structures at 3 foot (1m) intervals.

**EXHAUST VENTING**

**WARNING** Never operate unit heaters without combustion air and flue gas piping in place or severe personal injury or death may occur!

1. Vent system installation must be in accordance with the current National Fuel Gas Code-NFPA 54 or ANSI Z223.1 National Fuel Gas Code. In Canada, installation must be in accordance with CSA-B149.1 “Installation Code for Natural Gas Burning Appliances and Equipment” and CSA-B149.2 “Installation Code for Propane Burning Appliances and Equipment”.

2. A Breidert Type L or Fields vent cap, furnished by the customer, must be installed at the termination point of the vent system, Figures 10 & 11.

3. Each unit heater MUST have its own vent system. It MUST NOT be connected to other vent systems or to a chimney.

4. Use single wall pipe constructed of 26 GA galvanized steel or a material of equivalent durability and corrosion resistance for the vent system. For installations in Canada, use corrosion resistant and gas-tight, listed vent pipe conforming with local building codes, or in the absence of local building codes, with current CSA-B149.1, Installation Codes for Natural Gas Burning Appliances and Equipment or CSA-B149.2, Installation Codes for Propane Gas Burning Appliances and Equipment.
**WARNING** Never use pipe of a diameter other than that specified in Table 1, page 4! Never use PVC, ABS or any other non-metallic pipe for venting! To do so may result in serious damage to the unit and or severe personal injury or death!

5. Any run of single wall vent pipe passing through an unheated space must be insulated with an insulation suitable to 550°F (288°C).

6. The vent system must be installed to prevent collection of condensate. Pitch horizontal pipes downward 1/4 inch per foot (21mm/m) toward the vent cap to facilitate drainage. Vertical vent pipes should be piped as depicted in Figure 10.

7. The equivalent length of the vent system must not be less than 5 feet (1.5m) and must not exceed 50 feet (15.2m). Equivalent length equals the total length of straight pipe plus 10 feet (4.6m) for each 90° elbow and 5 feet (1.5m) for each 45° elbow.

8. Each slip joint must be secured with at least three corrosion resistant screws. Two full turns of 3M #425 Aluminum Foil tape or its equivalent must then be used to seal each joint. General Electric RTV-108, Dow-Corning RTV-732 or an equivalent may be used instead of the tape.

9. For horizontal vent systems longer than 5 feet (1.5m), the system must be supported from overhead building structures at 3 foot (1m) intervals.

10. The exhaust vent system must remain at a minimum distance of 6 inches (152mm) from all combustible materials. Any part of the vent system that passes through a combustible material must be properly insulated.

**NOTICE:** Increasing the clearance distances may be necessary if there is a possibility of distortion or discoloration of adjacent materials.

For a VERTICAL vent pipe section that passes through a floor or roof, an opening 4 inches (102mm) greater in diameter is required. The opening must be insulated and flashed in accordance with applicable installation codes.

A HORIZONTAL section of an exhaust vent system that passes through a combustible wall must be constructed and insulated as shown in Figure 11A.

11. The top of a VERTICALLY VENTED exhaust system must extend at least 3 feet (1m) above the roof surface that it passes through. The point of termination for a HORIZONTALLY VENTED exhaust system must be at least 12 inches (305mm) from the exterior of the wall that it passes through. Refer to Table 5 and Figures 10A and 11A for additional vent termination clearance requirements.

### Table 5

<table>
<thead>
<tr>
<th>Structure/Object</th>
<th>Minimum Clearance for Termination Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vent Systems</strong></td>
<td><strong>Termination Clearance Requirements</strong></td>
</tr>
<tr>
<td>USA</td>
<td>CANADA</td>
</tr>
<tr>
<td>Door, window, or gravity vent inlet; combustion air inlet for other appliances</td>
<td>9 inch for 10,000 to 50,000 BTU/Hr input; 12 inch for input exceeding 50,000 BTU/Hr.</td>
</tr>
<tr>
<td>Forced air inlet within 10 feet</td>
<td>3 feet above</td>
</tr>
<tr>
<td>Adjoining Building or parapet</td>
<td>6 feet</td>
</tr>
<tr>
<td>Adjacent public walkways</td>
<td>7 feet above grade</td>
</tr>
<tr>
<td>Electric, gas meters &amp; regulators</td>
<td>4 feet horizontal</td>
</tr>
<tr>
<td>Above grade level</td>
<td>1 foot</td>
</tr>
</tbody>
</table>
* Size according to expected snow depth.

** If excessive condensation develops, a drip leg with a condensate drain may be required. Insulating the pipes may eliminate the problem.
Figure 10A - Horizontal Intake/Vent Locations

Figure 11 - Vertical Vent Installation

Figure 11A - Horizontal Vent Installation
OPERATION

**CAUTION** Never operate the unit beyond the specified limits or severe damage to and or premature failure of the unit will result!

EXPLANATION OF CONTROLS (see Figure 12)

1. Each Separated Combustion Unit Heater comes equipped with a power vent system that consists of a power venter motor and blower, pressure switch and sealed flue collector.

**CAUTION** The addition of external draft hoods or power venters is not permitted. Addition of such devices may cause severe unit malfunction or failure!

2. The power venter motor is energized by the room thermostat when a demand for heat is sensed. The pressure switch measures the pressure differential between the air inlet and exhaust vent systems. If the differential is correct the indirect spark ignition system is energized.

**WARNING** Under no conditions is the unit to be fired if the power venter is not operable or severe personal injury or death may occur!

3. The indirect spark ignition system consists of an ignition module, a dual combination valve, and a spark-ignited pilot burner. When the pressure switch is closed, the pilot valve opens as a spark is generated to light the pilot. When the flame is sensed by the flame sensing circuit the spark ceases and the main gas valve is opened to supply gas to the main burners. Once the thermostat has been satisfied, the vent system and gas valve are simultaneously deenergized stopping all gas flow to the unit.

4. The limit switch interrupts the flow of electric current to the main gas valve if the unit heater becomes overheated.

5. The fan switch delays the operation of the fan for 60 to 90 seconds once the thermostat is closed and continues fan operation for 60 to 90 seconds after the thermostat opens.

**NOTICE:** The start-up fan delay must not exceed 90 seconds from a cold start.

6. The wall thermostat, supplied optionally, is a temperature sensitive switch that operates the vent and ignition systems to control the temperature of the space being heated.

**NOTICE:** The thermostat must be mounted on a vertical, vibration-free surface free from air currents and in accordance with the furnished instructions.

INITIAL LIGHTING

1. Open the manual gas valve, in the gas supply line to the unit heater. Loosen the union in the gas supply line to purge it of air. Tighten the union and check for leaks.

**WARNING** Check all pipe joints for leakage using a soap solution or other approved method. Never use an open flame or severe personal injury or death may occur.

2. Turn on the electrical power. The unit heater should now be under the control of the thermostat. Set the thermostat to its highest setting, the power venter motor should start and burner ignition occur. Allow the unit heater to operate until the fan starts then set the thermostat to its lowest setting. The burners and power venter motor should stop operating immediately while the fan continues to operate until the fan time delay times out, shutting it off. Reset the thermostat to the desired operational setting.

CHECKING UNIT HEATER RATE

**CAUTION** Never overfire the unit heater, as this may cause unsatisfactory operation or shorten the life of the heater.

Gas appliances are rated based on sea level operation with no adjustment required at elevations up to 2000 feet. At elevations above 2000 feet, input ratings should be reduced by 4 percent for each 1000 feet above sea level. Check the input rate as follows:

1. Turn off all other gas appliances that utilize the same gas meter as the unit heater.
2. Let the unit heater run for 15 minutes.
3. Using the gas meter, clock the time that it takes to burn 1 cubic foot of gas.
4. Insert the time, in seconds, into the formula below.

$$\text{RATE in} = \frac{\text{HEATING VALUE(BTU/FT}^3\text{)}(3600\text{S/HR})}{\text{Time (s/ft}^3\text{)}}$$

**EXAMPLE:** If: heating value = 1000 BTU/ft³
time/ft³ = 18 s/ft³

$$\text{RATE in} = \frac{(1000 \text{ BTU/ft}^3)(3600 \text{ s/hr})}{18 \text{ s/ft}^3}$$

$$\text{RATE in} = 200,000 \text{ BTU/hr}$$
Figure 12 - Burner Components/Unit Controls
Intermittent Pilot Ignition

BURNER DRAWER COMMON PARTS:
1. MAIN BURNERS
2. BURNER MANIFOLD
3. AIR SHUTTERS
4. BURNER SPRINGS
5. MAIN BURNER ORIFICE
6. TRANSFORMER
7. PILOT TUBING

CONTROLS (REFER TO UNIT WIRING DIAGRAM):
8A. MAIN GAS VALVE (HONEYWELL)
8B. MAIN GAS VALVE (WHITE-RODGERS)
9. HONEYWELL IGNITOR
10. HONEYWELL PILOT BURNER
12. FAN TIME DELAY SWITCH
13. HI LIMIT (LOCATED ON REAR HEADER PLATE OF HEAT EXCHANGER)
Table 6 - Main Burner Orifice Schedule*

<table>
<thead>
<tr>
<th>*</th>
<th><strong>TYPE OF GAS</strong></th>
<th><strong>NATURAL</strong></th>
<th><strong>PROPANE</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HEATING VALUE</strong></td>
<td>1075 BTU/ft³ (40.1 MJ/m³)</td>
<td>2500 BTU/ft³ (93.1 MJ/m³)</td>
<td></td>
</tr>
<tr>
<td><strong>MANIFOLD PRESSURE</strong></td>
<td>3.5 inch WC (0.87 kPa)</td>
<td>10 inch WC (2.49 kPa)</td>
<td></td>
</tr>
<tr>
<td><strong>NO. OF BURNER ORIFICES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>96</td>
<td>40</td>
</tr>
<tr>
<td>125</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>120</td>
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<td>150</td>
<td>FT³/HR ORIFICE DRILL</td>
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<td>250</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>233</td>
<td>100</td>
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<td>300</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>280</td>
<td>120</td>
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<tr>
<td>350</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>326</td>
<td>140</td>
</tr>
<tr>
<td>400</td>
<td>FT³/HR ORIFICE DRILL</td>
<td>372</td>
<td>160</td>
</tr>
</tbody>
</table>

* This schedule is for units operating at normal altitudes of 2000 feet (610m) or less. SPECIAL ORIFICES ARE REQUIRED FOR INSTALLATIONS ABOVE 2,000 FT. (610M).

When installed in Canada, any references to deration at altitudes in excess of 2000 feet (610m) are to be ignored. At altitudes of 2000 to 4500 feet (610 to 1372m), the unit heaters must be orificed to 90% of the normal altitude rating, and be so marked in accordance with the ETL certification.

**PRIMAL AIR SHUTTER ADJUSTMENT**

After the unit has been operating for at least 15 minutes, adjust the primary air flow to the burners. Turn the friction-locked, manually-rotated air shutters clockwise to close, or counterclockwise to open (see Figures 12 and 14).

For correct air adjustment, close the air shutter until yellow tips in the flame appear. Then open the air shutter to the point just beyond the position where yellow tipping disappears. Refer to Figure 13.

**NOTICE:** There may be momentary and spasmodic orange flashes in the flame. This is caused by the burning of airborne dust particles, and not to be confused with the yellow tipping, which is a stable or permanent situation when there is insufficient primary air.

**PILOT ADJUSTMENT**

1. Remove the pilot adjustment cap.
2. Adjust the pilot screw to provide a properly sized flame.
3. A proper pilot flame is a soft steady flame that envelopes 3/8 to 1/2-inch (9.5 to 12.7 mm) of the thermocouple tip.
4. Replace the pilot adjustment cap.

**MANIFOLD PRESSURE ADJUSTMENT**

If the manifold pressure requires minor adjustment, remove the cap from the pressure regulator and turn the adjustment screw clockwise to increase the pressure, or counterclockwise to decrease the pressure. The adjusted manifold pressure should not vary more than 10% from the pressures specified in Table 6.
PERIODIC SERVICE

NOTICE: The heater and vent system should be checked once a year by a qualified technician.

All Maintenance/Service information should be recorded accordingly on the Inspection Sheet provided in this manual.

⚠️ WARNING ⚠️ Open all disconnect switches and disconnect all electrical and gas supplies and secure in that position before servicing unit. Failure to do so may result in personal injury or death from electrical shock.

⚠️ WARNING ⚠️ Gas tightness of the safety shut-off valves must be checked on at least an annual basis.

To check gas tightness of the safety shut-off valves, turn off the manual valve upstream of the appliance combination control. Remove the 1/8 inch pipe plug on the inlet side of the combination control and connect a manometer to that tapping. Turn the manual valve on to apply pressure to the combination control. Note the pressure reading on the manometer, then turn the valve off. A loss of pressure indicates a leak. If a leak is detected, use a soap solution to check all threaded connections. If no leak is found, combination control is faulty and must be replaced before putting appliance back in service.

Should maintenance be required, perform the following inspection and service routine:

1. Inspect the area near the unit to be sure that there is no combustible material located within the minimum clearance requirements listed in this manual.

⚠️ WARNING ⚠️ Under no circumstances should combustible material be located within the clearances specified in this manual. Failure to provide proper clearance could result in personal injury or equipment damage from fire.

2. Turn off the manual gas valve and electrical power to the gas unit heater.

3. To clean or replace the main burners, remove the bottom panel and compress the spring by moving the burner toward the manifold. Slide the opposite end of the burner downward from the locating slot while retaining spring is still compressed. Pull the burners away from the heat.

4. With the burners removed, wire brush the inside surfaces of the heat exchanger.

5. Remove any dirt, dust, or other foreign matter from the burners using a wire brush and/or compressed air. Ensure that all parts are unobstructed. Inspect and clean pilot burner if necessary.

6. Reassemble the gas unit heater by replacing all parts in reverse order.

7. Relight the pilot (see lighting instruction plate on the unit). Complete the appropriate unit start-up procedure as given in the “Operation” section of this manual.

8. Check the burner adjustment. See the “Primary Air Shutter Adjustment” section of this manual.

9. Check all gas control valves and pipe connections for leaks.

10. Check the operation of the automatic gas valve by lowering the setting of the thermostat, stopping the operation of the gas unit heater. The gas valve should close tightly, completely extinguishing the flame on the main burners.

11. Inspect and service the motor/fan assemblies. To maintain efficient air flow, inspect and clean the fan blades and guard to prevent buildup of foreign matter.

12. Check lubrication instructions on the motor. If oiling is required, add 3 to 4 drops of electric motor oil as follows:
   (a.) Light Duty - After three years or 25,000 hours of operation.
   (b.) Average Duty - Annually after three years or 8,000 hours of operation.
   (c.) Heavy Duty - Annually after one year or at least every 1500 hours of operation.

⚠️ CAUTION ⚠️ Never over oil the motor or premature failure may occur!

13. Check and test the operational functions of all safety devices supplied with your unit.
IDENTIFICATION OF PARTS

Figure 14 - Combustion Chamber

- GAS VALVE
- MAIN BURNERS
- RETAINER SPRING
- AIR SHUTTERS
- PILOT ASSY.
- MANIFOLD

Figure 15 - Internal Furnace Assembly

- MANIFOLD & MAIN BURNERS INCLUDED IN BURNER COMPARTMENT ASSY.

Figure 16 - Separated Combustion Unit Heater

- PRESSURE SWITCH
- POWER VENT ASSY.
- POWER VENT MOTOR
- FAN MOTOR
- FAN GUARD
- AIR INLET
- GAS SUPPLY INLET
### Table 7 - Power Vented Propellers Troubleshooting Guide

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>POSSIBLE CAUSE(S)</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Flame lifting from burner ports.</td>
<td>1. Pressure regulator set too high. 2. Defective Regulator. 3. Burner orifice too large.</td>
<td>1. Reset manifold pressure. Refer to &quot;Operation&quot;. 2. Replace regulator section of combination gas valve or complete valve. 3. Check with local gas supplier for proper orifice size and replace. Refer to &quot;Operation&quot;.</td>
</tr>
<tr>
<td>B. Flame pops back.</td>
<td>1. Excessive primary air. 2. Burner orifice too small.</td>
<td>1. Close air shutter. Refer to &quot;Operation&quot;. 2. Check with local gas supplier for proper orifice size and replace. Refer to &quot;Operation&quot;.</td>
</tr>
<tr>
<td>C. Noisy flame.</td>
<td>1. Too much primary air. 2. Noisy pilot. 3. Irregular orifice causing whistle or resonance. 4. Excessive gas input.</td>
<td>1. Close air shutter. 2. Reduce pilot gas. Refer to &quot;Operation&quot;. 3. Replace orifice. 4. Reset manifold pressure. Refer to &quot;Operation&quot;; Replace regulator section of combination gas valve or complete valve; or Check with local gas supplier for proper orifice size and replace. Refer to &quot;Operation&quot;.</td>
</tr>
<tr>
<td>D. Yellow tip flame (some yellow tipping on propane gas is permissible).</td>
<td>1. Insufficient primary air. 2. Clogged main burner ports. 3. Misaligned orifices. 4. Clogged flue collector. 5. Air shutter linted. 6. Insufficient combustion air.</td>
<td>1. Open air shutters. Refer to &quot;Operation&quot;. 2. Clean main burner ports. 3. Replace manifold assembly. 4. Clean flue collector. 5. Check for dust or lint at air mixer opening and around the air shutter. 6. Clean combustion air inlet openings in bottom panel, see &quot;Installation&quot;.</td>
</tr>
<tr>
<td>H. Failure to ignite.</td>
<td>1. Main gas off. 2. Lack of power at unit. 3. Thermostat not calling for heat. 4. Defective limit switch. 5. Improper thermostat or transformer wiring at gas valve. 6. Defective gas valve.</td>
<td>1. Open all manual gas valves. 2. Replace fuse or turn on power supply. 3. Turn up thermostat. 4. Check limit switch with continuity tester. If open, replace limit switch. 5. Check wiring per diagrams. 6. Replace gas valve.</td>
</tr>
<tr>
<td>SYMPTOMS</td>
<td>POSSIBLE CAUSE(S)</td>
<td>CORRECTIVE ACTION</td>
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<tr>
<td>H. Failure to ignite.</td>
<td>7. Defective thermostat.</td>
<td>7. Check thermostat and replace if defective.</td>
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<td>8. Defective transformer.</td>
<td>8. Be sure 115 volts is supplied to the transformer primary, then check for 24 volts at secondary terminal before replacing.</td>
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<tr>
<td></td>
<td>9. Loose wiring.</td>
<td>9. Check and tighten all wiring connections per diagrams.</td>
</tr>
<tr>
<td></td>
<td>10. Defective ignition control.</td>
<td>10. Replace, if necessary. Also see W, X &amp; Y symptoms.</td>
</tr>
<tr>
<td>J. Condensation of water vapor</td>
<td>1. Improper venting.</td>
<td>1. Refer to “Installation, Venting”.</td>
</tr>
<tr>
<td>K. Burner won't turn off</td>
<td>1. Poor thermostat location.</td>
<td>1. Relocate thermostat away from drafts.</td>
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<td>2. Defective thermostat.</td>
<td>2. Replace thermostat.</td>
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<td></td>
<td>3. Improper thermostat or transformer wiring at gas valve.</td>
<td>3. Check wiring per diagrams.</td>
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<td>4. Short circuit.</td>
<td>4. Check operation at valve. Look for short (such as staples piercing thermostat wiring), and correct.</td>
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<td>5. Defective or sticking gas valve.</td>
<td>5. Replace gas valve.</td>
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<td>6. Excessive gas supply pressure.</td>
<td>6. Refer to “Operation”.</td>
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<tr>
<td>L. Rapid burner cycling.</td>
<td>1. Loose electrical connections at gas valve or thermostat.</td>
<td>1. Tighten all electrical connections.</td>
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<td>2. Excessive thermostat heat anticipator.</td>
<td>2. Adjust thermostat heat anticipator for longer cycles. Refer to “Operation”.</td>
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<td>3. Unit cycling on high limit.</td>
<td>3. Check for proper air supply across heat exchanger.</td>
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<td>4. Poor thermostat location.</td>
<td>4. Relocate thermostat. (Do not mount thermostat on unit).</td>
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<td>5. Draft on Pilot.</td>
<td>5. Eliminate drafts. Refer to Installation.</td>
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<tr>
<td></td>
<td>7. Unit cycling on high limit.</td>
<td>7. Check for proper air supply across heat exchanger.</td>
</tr>
<tr>
<td>M. Noisy.</td>
<td>1. Fan blades loose.</td>
<td>1. Replace or tighten.</td>
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<td>2. Fan blades dirty.</td>
<td>2. Clean fan wheel.</td>
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<td>4. Bearings are dry.</td>
<td>4. Oil bearings on fan motor. (Refer to label on motor).</td>
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<tr>
<td>N. Pilot will not light or will not stay lit</td>
<td>1. Main gas off.</td>
<td>1. Open all manual gas valves.</td>
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<td>2. Pilot adjustment screw turned too low on combination/automatic main gas valve.</td>
<td>2. Increase size of pilot flame. Refer to “Operation”.</td>
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<td></td>
<td>3. Air in gas line.</td>
<td>3. Purge air from gas supply.</td>
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<td>4. Incorrect lighting procedure.</td>
<td>4. Follow lighting instruction label adjacent to gas valve.</td>
</tr>
<tr>
<td></td>
<td>5. Dirt in pilot orifice.</td>
<td>5. Remove pilot orifice. Clean with compressed air or solvent. (Do not ream).</td>
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<tr>
<td></td>
<td>6. Extremely high or low gas pressure.</td>
<td>6. Refer to “Operation”.</td>
</tr>
<tr>
<td></td>
<td>7. Defective thermocouple.</td>
<td>7. Check thermocouple connection, and replace if defective.</td>
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<td></td>
<td>8. Drafts around unit.</td>
<td>8. Eliminate drafts. Refer to “Installation”.</td>
</tr>
<tr>
<td></td>
<td>10. No spark (faulty wiring).</td>
<td>10. Inspect and correct ignition system wiring. See symptoms W, X, &amp; Y.</td>
</tr>
</tbody>
</table>
### Power Vented Propellers Troubleshooting Guide

<table>
<thead>
<tr>
<th>SYMPTOMS</th>
<th>POSSIBLE CAUSE(S)</th>
<th>CORRECTIVE ACTION</th>
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</thead>
<tbody>
<tr>
<td>O. Fan will not run.</td>
<td>1. Loose wiring.  2. Defective motor overload protector or defective motor.  3. Defective fan switch.</td>
<td>1. Check and tighten all wiring connections per diagrams. Thermostat wires tagged “W” and “G” must be connected together (unless special thermostats are used; if so, see thermostat wiring diagram). See electrical connections.  2. Replace motor.  3. Check for 24V across “H” terminals on fan time delay switch. If 24V is present, jumper terminals numbered 2 and 4. If motor runs, the fan switch is defective and must be replaced. If 24V is not present, check wiring per diagrams.</td>
</tr>
<tr>
<td>P. Fan motor turns on and off while burner is operating.</td>
<td>1. Fan switch heater element improperly wired.  2. Defective fan switch.  3. Motor overload protector cycling on and off.  4. Motor not properly oiled.</td>
<td>1. Be sure fan switch heater terminals are connected per diagrams.  2. Replace fan switch.  3. Check motor amps against motor name plate rating, check voltage, replace fan motor if defective.  4. Refer to label on motor.</td>
</tr>
<tr>
<td>Q. Fan motor will not stop.</td>
<td>1. Improperly wired fan control.  2. Main burners not lighting while thermostat calls for heat.  3. Defective fan switch.</td>
<td>1. Check all wiring.  2. Refer to H or N symptoms.  3. Replace fan switch.</td>
</tr>
<tr>
<td>R. Not enough heat.</td>
<td>1. Incorrect gas input.  2. Heater undersized.  3. Thermostat malfunction.  4. Heater cycling on limit control.</td>
<td>1. Refer to “Operation”.  2. This is especially true when the heated space is enlarged. Have the heat loss calculated and compare to the heater output (80% of input). Your gas supplier or installer can furnish this information. If heater is undersized, add additional heaters.  3. Replace thermostat.  4. There should be NO ducts attached to the front of this heater. Check air movement through heat exchanger. Check voltage to fan motor. Clean fan blade and heat exchanger and oil fan motor.</td>
</tr>
<tr>
<td>T. Too much heat.</td>
<td>1. Thermostat malfunction.  2. Heater runs continuously.</td>
<td>1. Replace thermostat.  2. Check wiring per diagrams; Check operation at valve. Look for short (such as staples piercing thermostat wiring), and correct; Replace gas valve; Refer to “Operation”.</td>
</tr>
<tr>
<td>U. Cold air is delivered on start up.</td>
<td>1. Fan switch heater element improperly wired.</td>
<td>1. Be sure fan switch heater terminals are connected per diagrams.</td>
</tr>
<tr>
<td>V. Cold air is delivered during heater operation.</td>
<td>1. Incorrect manifold pressure or input.  2. Voltage to unit too high.  3. Air through put too high.</td>
<td>1. Refer to “Operation”.  2. Check motor voltage with fan running. Should be 115 volts AC.  3. Refer to “Operation”.</td>
</tr>
<tr>
<td>SYMPTOMS</td>
<td>POSSIBLE CAUSE(S)</td>
<td>CORRECTIVE ACTION</td>
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</tbody>
</table>
| X.       | Spark present but pilot does not light. | 1. Loose S8600 connections.  
2. Improper gas pressure.  
3. Is spark in pilot gas stream?  
4. No pilot gas — do not use match to test - presence of gas is easily detected by the odor. | 1. Check all connections, term. PV feeds 24V to pilot valve.  
2. Check pressure — pressure that is either too high or too low may cause a problem.  
3. Spark should arc from electrode.  
4. Check pilot line for kinks. Ensure there are no drafts. |
| Y.       | Pilot lights — Main valve does not energize. | 1. Loose S8600 connections.  
2. Cracked or broken sensor ceramic.  
3. Check sensor/spark lead for continuity.  
2. Replace pilot assembly.  
3. Replace if needed.  
4. If present, replace main valve; if not, replace S8600 igniter. |
| Z.       | Hi-Limit switch tripping. | 1. Vertical run of flue is too short.  
2. Unit is overfiring.  
3. Air flow too low.  
4. Defective switch. | 1. Lengthen vertical run of flue pipe (see venting).  
2. Burner orifice may be too large: verify/replace if req’d.  
3. Increase air flow; check fan size. Check for proper voltage.  
4. Replace. |
| AA.      | Noisy power venter. | 1. Power venter wheel loose.  
2. Power venter wheel dirty.  
3. Power venter wheel rubbing housing.  
4. Bearings are dry. | 1. Replace or tighten.  
2. Clean power venter wheel.  
3. Realign power venter wheel.  
4. Oil bearings on power venter motor. (Refer to label on motor). |
| BB.      | Power venter will not run. | 1. Loose wiring.  
2. Defective motor overload protector or defective motor.  
3. Defective power venter relay. | 1. Check and tighten all wiring connections per diagrams. Thermostat wires tagged "W" and "G" must be connected together (unless special thermostats are used; if so, see thermostat wiring diagram). See electrical connections.  
2. Replace motor.  
3. Check for 24V across 1 and 3 terminals on fan relay. If 24V is present, jumper terminals numbered 2 and 4. If motor runs, the relay is defective and must be replaced. If 24V is not present, check wiring per diagrams. |
| CC.      | Power venter motor turns on and off while burner is operating. | 1. Fan relay heater element improperly wired.  
2. Defective venter relay switch.  
3. Motor overload protector cycling on and off.  
4. Motor not properly oiled. | 1. Be sure venter relay heater terminals are connected per diagrams.  
2. Replace venter relay.  
3. Check motor amps against motor name plate rating, check voltage, replace power venter motor if defective.  
4. Refer to label on motor. |
| DD.      | Power Venter motor will not stop. | 1. Improperly wired venter relay.  
2. Main burners not lighting while thermostat calls for heat.  
2. Refer to H & N symptoms.  
3. Replace venter relay. |
NOTES:

*1) For item No. 6, use counter-clockwise rotation.

2) DO NOT OVERTIGHTEN CELCON NUT! HAND TIGHTEN ONLY! DO NOT USE TOOLS!
   Approximate 1/3 turn maximum or 8 inch pounds is sufficient from the point where the tube does not slip in or out.

3) Flue Sizes:
   100/175 units: 4 inch dia. flue outlet Reducer required – To be supplied by installer.
   200/250 units: 5 inch dia. flue outlet (no adapter required).
   300/400 units: 6 inch dia. flue outlet Increser required – To be supplied by manufacturer.
HOW TO ORDER REPLACEMENT PARTS

Please send the following information to your local representative; if further assistance is needed, contact the manufacturer's customer service department.

- Model number
- Serial Number (if any)
- Part description and Number as shown in the Replacement Parts Catalog.

LIMITED WARRANTY

SEPARATED COMBUSTION PROPELLER UNIT HEATERS

1. The “Manufacturer” warrants to the original owner at original installation site that the above model Gas-Fired Heater ("the Product") will be free from defects in material or workmanship for one (1) year from the date of shipment from the factory, or one and one-half (1½) years from the date of manufacture, whichever occurs first. The Manufacturer further warrants that the complete heat exchanger, draft hood/ flue collector assembly, and burners will be free from defects in material or workmanship for a period of one (1) year from date of manufacture. If upon examination by the Manufacturer the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

2. This limited warranty does not apply:
   (a) if the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, has not been installed, maintained or operated in accordance with the furnished written instructions, or has been altered or modified in any way by any unauthorized person.
   (b) to any expenses, including labor or material, incurred during removal or reinstallation of the Product.
   (c) to any damage due to corrosion by chemicals, including halogenated hydrocarbons, precipitated in the air.
   (d) to any workmanship of the installer of the Product.

3. This limited warranty is conditional upon:
   (a) advising the installing contractor, who will in turn notify the distributor or manufacturer.
   (b) shipment to the Manufacturer of that part of the Product thought to be defective. Goods can only be returned with prior written approval of the Manufacturer. All returns must be freight prepaid.
   (c) determination in the reasonable opinion of the Manufacturer that there exists a defect in material or workmanship.

4. Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

5. THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY. IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES THE ORIGINAL OWNER OF THE PRODUCT SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

In the interest of product improvement, we reserve the right to make changes without notice.
## SEPARATED COMBUSTION PROPELLER
### UNIT NUMBER DESCRIPTION

<table>
<thead>
<tr>
<th>Digit</th>
<th>UT</th>
<th>CA</th>
<th>FT</th>
<th>FM</th>
<th>GT</th>
<th>IC</th>
<th>AL</th>
<th>GC</th>
<th>SV</th>
<th>MT</th>
<th>MS</th>
<th>AS</th>
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<tbody>
<tr>
<td>Digit #1, 2 - Unit Type [UT]</td>
<td>P3 - Separated Combustion Propeller</td>
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<td>Digit #3, 4, 5 - Capacity [CA]</td>
<td>100 - 100,000 BTU/HR</td>
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<td>Digit #6 - Furnace Type [FT]</td>
<td>B - Left Side Access</td>
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<tr>
<td>Digit #7 - Heat Exchanger Construction Material [FM]</td>
<td>1 - Aluminized Steel</td>
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<td>2 - 409 Stainless Steel</td>
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<td>3 - 321 Stainless Steel</td>
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<td>Digit #8 - Gas Type [GT]</td>
<td>N - Natural Gas</td>
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<td>P - Propane Gas (LP)</td>
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<td>K - Natural Gas w/100% Shutoff</td>
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<td>Digit #9 - Ignition Control [IC]</td>
<td>2 - Spark Ignition</td>
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<td>A - 0-1,999 ft.</td>
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<td>B - 2,000-2,999 ft.</td>
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<td>C - 3,000-3,999 ft.</td>
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<td>D - 4,000-4,999 ft.</td>
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<td>F - 5,000-5,999 ft.</td>
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<td>G - 6,000-6,999 ft.</td>
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<td>H - 7,000-7,999 ft.</td>
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<td>Digit #11 - Gas Control [GC]</td>
<td>A - Single Stage</td>
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<td>B - Two Stage</td>
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<td>H - Electronic Modulation w/Room Sensing</td>
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<td>Digit #12 - Supply Voltage [SV]</td>
<td>1 - 115/160</td>
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<td>2 - 208/1/60</td>
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<td>4 - 208/3/60</td>
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Note: Supply Voltages [SV] 2-7 include field mounted step down transformer.
NOTES:
GAS EQUIPMENT
START-UP

Customer ___________________________ Job Name & Number ___________________________

PRE-INSPECTION INFORMATION
With power and gas off.

Type of Equip: Unit Heater Duct Furnace Indoor Rooftop

Serial Number ___________________________ Model Number ___________________________

Name Plate Voltage: ___________________ Name Plate Amperage: _____________________

Type of Gas: Natural LP Tank Capacity _______ lbs. Rating: _______ BTU @ _____ °F

__________ kg __________ kw @ _____ °C

☐ Are all panels, doors, vent caps in place?

☐ Has the unit suffered any external damage? Damage ________________________________

☐ Does the gas piping and electric wiring appear to be installed in a professional manner?

☐ Has the gas and electric been inspected by the local authority having jurisdiction?

☐ Is the gas supply properly sized for the equipment?

☐ Were the installation instructions followed when the equipment was installed?

☐ Have all field installed controls been installed?

☐ Do you understand all the controls on this equipment? If not, contact your wholesaler or rep.

(Do NOT START this equipment unless you fully understand the controls.)

GENERAL
With power and gas off.

☐ Make certain all packing has been removed.

☐ Tighten all electrical terminals and connections.

☐ Check damper linkages for tightness.

☐ Check all fans & blowers for free movement.

☐ Check all controls for proper settings.

☐ Check all set screws on blowers and bearings.

☐ Check belt tightness.

BLOWER
With power on and gas off.

☐ Check voltage L1 _____ L2 _____ L3 _____

☐ Check rotation of main blower.

☐ Check motor amps L1 _____ L2 _____ L3 _____

☐ Blower RPM _______________

☐ Check air filters. (Record quantity & size.)

GAS HEATING
With power and gas on.

☐ Inlet gas pressure. ______ in. W.C. or _____ kPa

☐ Pilot & main burner ignition.

☐ Manifold gas pressure. ______ in. W.C. or _____ kPa

☐ Cycle firestat and/or freezestat.

☐ Check electronic modulation. Set at: _______________

☐ Cycle and check all other controls not listed.

☐ Check operation of remote panel.

☐ Entering air temp. ______ °F or _____ °C

☐ Discharge air temp. (high fire) ______ °F. or _____ °C

☐ External static pressure _________ in. W.C.

☐ Cycle by thermostat or operating control.

Remarks: ______________________________

_____________________________________

_____________________________________