INSTALLATION INSTRUCTIONS
FOR COMBINATION HEATING AND COOLING ROOFTOP UNITS EQUIPPED WITH INTERMITTENT IGNITION
RRKA 3-5 TON (3 PHASE MODELS ONLY)

RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

WARNING
IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

WARNING
THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

WARNING
PROPOSITION 65: THIS FURNACE CONTAINS FIBERGLASS INSULATION. RESPIRABLE PARTICLES OF FIBERGLASS ARE KNOWN TO THE STATE OF CALIFORNIA AND TO THE COMMONWEALTH OF MASSACHUSETTS TO CAUSE CANCER. EXHAUST GAS FROM THIS FURNACE CONTAINS CHEMICALS, INCLUDING CARBON MONOXIDE, KNOWN TO THE STATE OF CALIFORNIA AND TO THE COMMONWEALTH OF MASSACHUSETTS TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

WARNING
— Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.
— 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.
  • Do not return to your home until authorized by the gas supplier or fire department.
— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
  • U.L. recognized fuel gas and CO (carbon monoxide) detectors are recommended in all applications, and their installation should be in accordance with the manufacturer’s recommendations and/or local laws, rules, regulations, or customs
— Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.
SAFETY INFORMATION

⚠️ WARNING ⚠️
USE ONLY WITH TYPE OF GAS APPROVED FOR THIS UNIT. REFER TO THE UNIT RATING PLATE.

⚠️ WARNING ⚠️
INSTALL THIS UNIT ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE UNIT SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

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⚠️ WARNING ⚠️
INSTALL This UNIT MAY BE USED TO HEAT THE BUILDING OR STRUCTURE DURING CONSTRUCTION IF THE FOLLOWING INSTALLATION REQUIREMENTS ARE MET. INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:
• PROPER VENT INSTALLATION;
• FURNACE OPERATING UNDER THERMOSTATIC CONTROL;
• RETURN AIR DUCT SEALED TO THE FURNACE;
• AIR FILTERS IN PLACE;
• SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;
• MEANS OF PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;
• RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND
• INSTALLATION OF EXHAUST AND COMBUSTION AIR INFET HOODS COMPLETED;
• CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS.
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Installation Instructions are updated on a regular basis. This is done as product changes occur or if new information becomes available. In this publication, an arrow () denotes changes from the previous edition or additional new material.

WARNING

THE MANUFACTURER’S WARRANTY DOES NOT COVER ANY DAMAGE OR DEFECT TO THE AIR CONDITIONER CAUSED BY THE ATTACHMENT OR USE OF ANY COMPONENTS, ACCESSORIES OR DEVICES (OTHER THAN THOSE AUTHORIZED BY THE MANUFACTURER) INTO, ONTO OR IN CONJUNCTION WITH THE AIR CONDITIONER. YOU SHOULD BE AWARE THAT THE USE OF UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES MAY ADVERSELY AFFECT THE OPERATION OF THE AIR CONDITIONER AND MAY ALSO ENDANGER LIFE AND PROPERTY. THE MANUFACTURER DISCLAIMS ANY RESPONSIBILITY FOR SUCH LOSS OR INJURY RESULTING FROM THE USE OF SUCH UNAUTHORIZED COMPONENTS, ACCESSORIES OR DEVICES.

This booklet contains the installation and operating instructions for your combination gas heating/electric cooling unit. There are some precautions that should be taken to derive maximum satisfaction from it. Improper installation can result in unsatisfactory operation or dangerous conditions.

Read this booklet and any instructions packaged with separate equipment required to make up the system prior to installation. Give this booklet to the owner and explain its provisions. The owner should retain this booklet for future reference.

CHECKING PRODUCT RECEIVED

Upon receiving the unit, inspect it for any damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. IMPORTANT: Check the unit model number, heating size, electrical characteristics, and accessories to determine if they are correct.

I. SPECIFICATIONS

A. GENERAL

The Combination Gas Heating/Electric Cooling Rooftop is available in 40, 60, 80 and 100 BTU/Hr. heating inputs and cooling capacities of 3, 3½, 4 and 5 nominal tons of cooling. Units are convertible from end supply and return to bottom supply and return by relocation of supply and return air access panels. See cover installation detail.

The units are weatherized for mounting outside of the building.

WARNING

UNITS ARE NOT DESIGN CERTIFIED TO BE INSTALLED INSIDE THE STRUCTURE. DOING SO CAN CAUSE INADEQUATE UNIT PERFORMANCE AS WELL AS PROPERTY DAMAGE AND CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

The following information is for three phase units which are not covered under the DOE certification program.

1. The energy consumption of the ignition system used with this unit is 9 watts.

2. The efficiency rating of this unit is a product thermal efficiency rating determined under continuous operating conditions independent of any installed system.

B. MAJOR COMPONENTS

The unit includes a hermetically-sealed refrigerating system (consisting of a compressor, condenser coil, evaporator coil with capillary tube assembly), a circulation air blower, a condenser fan, a heat exchanger assembly, gas burner and control assembly, combustion air motor and fan, and all necessary internal electrical wiring. The cooling system of these units is factory-evacuated, charged and performance tested. Refrigerant amount and type are indicated on rating plate.
<table>
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<th>NOMINAL COOLING CAPACITY (TONS)</th>
<th>EFFICIENCY (SEER)</th>
<th>PHASE HERTZ VOLTS</th>
<th>COMPR. RLA</th>
<th>COMPR. LRA</th>
<th>FAN MOTOR FLA</th>
<th>BUR MOTOR FLA</th>
<th>MINIMUM CIRCUIT AMPACITY</th>
<th>FUSE OR HACR CIRCUIT BREAKER</th>
<th>DRIVE TYPE</th>
<th>RECOMMENDED FILTER</th>
<th>OUTDOOR COIL</th>
<th>R22 OZ.</th>
<th>NET WT. LBS. (KG)</th>
<th>SHIP WT. LBS. (KG)</th>
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<tr>
<td>3.0</td>
<td>10</td>
<td>3-60-208/230</td>
<td>12.5/12.5</td>
<td>88</td>
<td>1.3</td>
<td>2.4</td>
<td>20/20</td>
<td>25/25</td>
<td>30/30</td>
<td>DIR</td>
<td>24'' X 24'' X 1''</td>
<td>10.5</td>
<td>62 (1758)</td>
<td>426 (193.2)</td>
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<tr>
<td>3.5</td>
<td>10</td>
<td>3-60-208/230</td>
<td>12.5/12.5</td>
<td>88</td>
<td>1.3</td>
<td>2.4</td>
<td>20/20</td>
<td>25/25</td>
<td>30/30</td>
<td>DIR</td>
<td>24'' X 24'' X 1''</td>
<td>12.8</td>
<td>74 (2098)</td>
<td>437 (198.2)</td>
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<tr>
<td>4.0</td>
<td>10</td>
<td>3-60-208/230</td>
<td>14.8/14.8</td>
<td>115</td>
<td>1.7</td>
<td>4.4</td>
<td>25/25</td>
<td>30/30</td>
<td>35/35</td>
<td>DIR</td>
<td>24'' X 24'' X 1''</td>
<td>12.8</td>
<td>78 (2211)</td>
<td>462 (209.6)</td>
</tr>
<tr>
<td>5.0</td>
<td>10</td>
<td>3-60-208/230</td>
<td>18.6/18.6</td>
<td>128</td>
<td>1.7</td>
<td>4.4</td>
<td>30/30</td>
<td>35/35</td>
<td>45/45</td>
<td>DIR</td>
<td>24'' X 30'' X 1''</td>
<td>12.8</td>
<td>83 (237.7)</td>
<td>523 (237.7)</td>
</tr>
</tbody>
</table>

*WEIGHT VARIES DEPENDING ON HEATING INPUT. MAXIMUM POSSIBLE WEIGHT SHOWN.*
Unit Dimensions
FOR CLEARANCES
SEE PAGE 9, FIGURE 12.

FIGURE 1
BOTTOM VIEW

FIGURE 2
CABINET DIMENSIONS 1.5-4 TONS
Unit Dimensions (continued)

**FIGURE 3**
CABINET DIMENSIONS

**FIGURE 4**
ACCESS LOCATIONS
II. INSTALLATION

A. GENERAL

1. INSTALLATION — Install this unit in accordance with The American National Standard Z223.1-latest edition booklet entitled “National Fuel Gas Code,” and the requirements or codes of the local utility or other authority having jurisdiction.


These publications are available from:
National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

2. PRE-INSTALLATION CHECK-POINTS — Before attempting any installation, carefully consider the following points:
- Structural strength of supporting members
- (Rooftop Installation)
- Clearances and provision for servicing
- Power supply and wiring
- Gas supply and piping
- Air duct connections
- Drain facilities and connections
- Location for minimum noise and vibration

LOCATION CONSIDERATIONS

The metal parts of this unit may be subject to rust or deterioration in adverse environmental conditions. This oxidation could shorten the equipment’s useful life. Salt spray, fog or mist in seacoast areas, sulphur or chlorine from lawn watering systems, and various chemical contaminants from industries such as paper mills and petroleum refineries are especially corrosive.

If the unit is to be installed in an area where contaminants are likely to be a problem, give special attention to the equipment location and exposure.

B. OUTSIDE INSTALLATION

WARNING

DISCONNECT ALL POWER TO UNIT BEFORE STARTING MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

REGULAR MAINTENANCE WILL REDUCE THE BUILDUP OF CONTAMINANTS AND HELP TO PROTECT THE UNIT’S FINISH.

1. Frequent washing of the cabinet, fan blade and coil with fresh water will remove most of the salt or other contaminants that build up on the unit.

2. Regular cleaning and waxing of the cabinet with a good automobile polish will provide some protection.

3. Use a good liquid cleaner several times a year to remove matter that will not wash off with water.

Several different types of protective coatings are offered in some areas. These coating may provide some benefit, but the effectiveness of such coating materials cannot be verified by the equipment manufacturer.

The best protection is frequent cleaning, maintenance and minimal exposure to contaminants.

FIGURE 5
OUTSIDE SLAB INSTALLATION. CLOSET DISTRIBUTION SYSTEM. SLAB FLOOR CONSTRUCTION

IMPORTANT: PITCH UNIT TOWARD DRAIN TO ALLOW FOR PROPER WATER DRAINAGE.

SLAB FLOOR

FILTER GRILLE

BRANCH CIRCUIT DISCONNECT

THERMOSTAT WIRE CONDUIT

POWER SUPPLY CONDUIT

UNION

GAS SHUT-OFF VALVE

SERVICE ACCESS PANELS, DO NOT BLOCK ACCESS.
PROPERTY DAMAGE, INSTALLATION INSIDE CAN ALSO CAUSE RECIRCULATION OF FLUE PRODUCTS INTO THE CONDITIONED SPACE RESULTING IN PERSONAL INJURY OR DEATH.

(Typical outdoor slab installation is shown in Figure 5.)

1. Select a location where external water drainage cannot collect around unit.
2. Provide a slab sufficiently high enough above grade to prevent surface water from entering the unit. Where snowfall is anticipated, mount the unit above the anticipated maximum snow depth for your area. The slab should be isolated from the foundation wall.
3. Pitch the slab approximately 1/2" so that the unit will be pitched toward the drain. See Figure 6.
4. The location of the unit should be such as to provide proper access for inspection and servicing as shown in Figure 12.
5. Locate unit where operating sounds will not disturb owner or neighbors.
6. Locate unit so roof runoff water does not pour directly on the unit. Provide gutter or other shielding at roof level. Do not locate unit in an area where excessive snow drifting may occur or accumulate.
7. Where snowfall is anticipated, the height of the unit above the ground level must be considered. Mount unit high enough to be above average area snowfall and to allow combustion air to enter the combustion air inlet.

C. ATTACHING EXHAUST AND COMBUSTION AIR INLET HOODS

IMPORTANT: Do not operate this unit without the exhaust and combustion air inlet hood properly installed. These hoods are shipped in a carton in the return air compartment inside the unit and must be attached when the unit is installed. See Figure 6.

To attach exhaust and combustion air inlet hoods:
1. Remove 3 screws securing filter access panel and remove filter access panel. For location of filter access panel, see Figure 4.
2. Remove both exhaust and combustion air inlet hoods from their carton, located inside the return air compartment.
3. Attach filter access panel.
4. Attach the combustion air inlet hood and the exhaust hood each with 4 screws as shown in Figure 7. Screws are in parts bag shipped in the burner compartment.
5. Vent the unit using the flue exhaust hood, as supplied from the factory, without alteration or addition. The only exception is with factory approved additions. Consult your local utility or other authority having jurisdiction for accepted venting techniques.

D. COVER PANEL INSTALLATION/CONVERSION PROCEDURE

1. HORIZONTAL TO DOWNFLOW
   a. Remove screws and covers from the supply and return bottom sections. NOTE: Rotate the supply cover 90° and remove.
   b. Install gasket (supplied with parts bag) around perimeter of cover on the insulated side. See Figure 9.
   c. Secure covers to the side of the unit using existing screws and those supplied in the parts bag.
2. DOWNFLOW TO HORIZONTAL
   a. Remove screws and covers from the outside of the supply and return sections.
   b. Install gasket (supplied with parts bag) around perimeter of cover as illustrated in Figure 8.
   c. Install covers in the unit bottom with the insulated side up. NOTE: Supply cover must be inserted through supply opening with narrow side toward unit. Once cover is through opening, rotate 90° and slip back flange of cover under tab at the back of bottom duct opening. See Figure 11.
   d. Secure supply cover to base of unit with 2 screws, engaging prepunched holes in raised duct opening flange.
   e. Secure return covers to base of unit with screws engaging prepunched holes in raised duct opening flange.
FIGURE 8
COVER GASKET DETAIL FOR UNITS SHIPPED FOR DOWNFLOW APPLICATION BEING CONVERTED TO SIDE DISCHARGE

SUPPLY/RETURN AIR COVER
TAPE AROUND FLANGE

FIGURE 9
COVER GASKET DETAIL FOR UNITS SHIPPED FOR SIDE DISCHARGE APPLICATION BEING CONVERTED TO DOWNFLOW

SUPPLY/RETURN AIR COVER
TAPE AROUND FLANGE

FIGURE 10
DUCT COVER INSTALLATION SIDE MOUNTING

RETURN DUCT COVER (ATTACH WITH 6 SCREWS)
SUPPLY DUCT COVER (ATTACH WITH 6 SCREWS)
**E. CLEARANCES**

The following minimum clearances must be observed for proper unit performance and serviceability. See Figure 12.

1. Provide 48" minimum clearance at front of the unit. Provide 24" minimum clearance on right side of unit. If economizer is used, a 24" minimum clearance is required on left side of unit. (See Figure 12.) If no economizer is required, then a 12" clearance is required on left side of unit.

2. Provide 60" minimum clearance between top of unit and maximum 3 foot overhang.

3. Unit is design certified for 2" minimum clearance between supply duct and a combustible structure for the first 3 feet of duct. 0" clearance is allowed after 3 feet.
G. ROOFTOP INSTALLATION

1. Before locating the unit on the roof, make sure that the roof structure is adequate to support the weight involved. (See electrical and physical tables in this book for weight of unit.) **THIS IS VERY IMPORTANT AND THE INSTALLER'S RESPONSIBILITY.**

2. For rigging and roofcurb details, see Figures 17, 18 and 19.

3. The location of the unit on the roof should be such as to provide proper access for inspection and servicing.

**IMPORTANT:** If unit will not be put into service immediately, block off supply and return air openings to prevent excessive condensation.

H. DUCTING

The installing contractor should fabricate ductwork in accordance with local codes. Use industry manuals as a guide when sizing and designing the duct system. Contact Air Conditioning Contractors of America, 1513 16th St. N.W., Washington, D.C. 20036.

---

**WARNING**

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT **RETURN DUCTWORK TO ANY OTHER HEAT PRODUCING DEVICE SUCH AS FIREPLACE INSERT, STOVE, ETC.** UNAUTHORIZED USE OF SUCH DEVICES MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.
Place the unit as close to the conditioned space as possible allowing clearances as indicated. Run ducts as directly as possible to supply and return outlets. Use of non-flammable weatherproof flexible connectors on both supply and return connections at unit to reduce noise transmission is recommended.

On ductwork exposed to outside temperature and humidity, use a minimum of 2” of insulation and a vapor barrier. Distribution system in attic, furred space or crawl space should be insulated with at least 2’ of insulation. ¼” to 1” thick insulation is usually sufficient for ductwork inside the air conditioned space.

Provide balancing dampers for each branch duct in the supply system. Properly support ductwork from the structure.

IMPORTANT: In the event that the return air ducts must be run through an "unconfined" space containing other fuel burning equipment, it is imperative that the user/homeowner must be informed against future changes in construction which might change this to a "confined space." Also, caution the user/homeowner against any future installation of additional equipment (such as power ventilators, clothes dryers, etc., within the existing unconfined and/or confined space which might create a negative pressure within the vicinity of other solid, liquid, or gas fueled appliances.

RETURN AIR

WARNING

NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPEd.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

I. FILTERS

The installer must install field supplied filters in the return air duct. A field installed filter grille is recommended for easy and convenient access to the filters for periodic inspection and cleaning. Filters must have adequate face area for the rated air quantity of the unit. See air delivery tables for recommended filter size. A field installed internal filter kit RXRY-B01 is available.
**FIGURE 18**
ROOFCURB

- INSULATION PANELS
- RETURN PLENUM
- SUPPLY PLENUM
- DUCT FLANGE (NOT TO EXCEED 1"

- NAILING STRIP
- CAULK ALL JOINTS WATERTIGHT

**FIGURE 19**
ROOFCURB

- GASKET
- TIE DOWN SCREW *
- ROOFCURB
- **DUCT**
- ROOF FLASHING *
- INSULATION *
- ROOFING *
- CANT STRIP *
- ROOF DECK *

**FIGURE 20**
DUCTWORK COVER INSTALLATION DETAIL

- INSULATED DUCTWORK INSIDE DUCTWORK COVER
- RECOMMENDED SHEET METAL DUCTWORK COVER CAULKED WATERTIGHT

**FIGURE 21**
RESIDENTIAL ROOFTOP DUCTWORK INSTALLATION DETAIL.

- CAULK ALL JOINTS WATERTIGHT
- 90° FLANGE ON DUCT
- RETURN AIR DUCT
- SUPPLY AIR DUCT

*BY CONTRACTOR

**FOR INSTALLATION OF DUCT AS SHOWN, USE RECOMMENDED DUCT SIZES FROM ROOFCURB INSTALLATION INSTRUCTIONS. FOR DUCT FLANGE ATTACHMENT TO UNIT, SEE UNIT INSTALLATION INSTRUCTIONS (FIGURE 1) FOR SIZE OF DUCT OPENINGS.**

*RECOMMENDED SHEET METAL DUCTWORK COVER CAULKED WATERTIGHT*
III. GAS SUPPLY, CONDENSATE DRAIN AND PIPING

A. GAS CONNECTION

IMPORTANT: Connect this unit only to gas supplied by a commercial utility.

1. Install gas piping in accordance with local codes and regulations of the local utility company. In the absence of local codes, the installation must conform to the specifications of the National Fuel Gas Code, ANSI Z223.1 - latest edition.

NOTE: The use of flexible gas connectors is not permitted.

NOTE: The Commonwealth of Massachusetts requires the gas shut-off valve to be a T-handle gas cock.

2. Connect the gas line to the gas pipe inlet opening provided into the 1/2" inlet valve. See Figure 5 for typical piping.

3. Size the gas line to the furnace adequate enough to prevent undue pressure drop and never less than 1/2.(

4. Install a drip leg or sediment trap in the gas supply line as close to the unit as possible.

5. Install an outside ground joint union to connect the gas supply to the control assembly at the burner tray.

6. Gas valves have been factory installed. Install a manual gas valve where local codes specify a shut-off valve outside the unit casing. (See Figure 22.)

7. Make sure piping is tight. A pipe compound resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.

8. IMPORTANT: any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

IMPORTANT: Disconnect the furnace and its individual shut-off valve from the gas supply piping during any pressure testing of that system at test pressures in excess of 1/2 psig or isolate the system from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of this gas supply system at pressures equal to or less than 1/2 PSIG.

TABLE 2
GAS PIPE CAPACITY TABLE (CU. FT./HR.)

<table>
<thead>
<tr>
<th>Nominal Iron Pipe Size, Inches</th>
<th>Equivalent Length of Pipe, Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/8</td>
<td>132 92 73 63 56 50 46 43</td>
</tr>
<tr>
<td>1/4</td>
<td>278 190 152 130 115 105 96 90</td>
</tr>
<tr>
<td>1</td>
<td>520 350 285 246 215 195 180 170</td>
</tr>
<tr>
<td>1 1/4</td>
<td>1,050 730 590 500 440 400 370 350</td>
</tr>
<tr>
<td>1 1/2</td>
<td>1,600 1,100 890 760 670 610 560 530</td>
</tr>
</tbody>
</table>

The capacities of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas) are shown in Table 2.

After determining the pipe length, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

\[
\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT³)}}
\]

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility or the L.P. gas supplier.
B. LP CONVERSION

**WARNING**

THIS UNIT IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY, PROPERTY DAMAGE OR DEATH.

Convert the valve to use liquefied petroleum (LP) gas by replacing the pressure regulator spring with the conversion kit spring. This LP kit spring allows the regulator to maintain the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit. See Figure 23.

**NOTE:** Order the correct LP conversion kit from the furnace manufacturer. See Conversion Kit Index shipped with unit for proper LP kit number. Furnace conversion to LP gas must be performed by a qualified technician.

**NOx MODELS**

When converting units equipped with NOx inserts to LP gas, the stainless steel mesh inserts in the entrance of the tubular exchangers are not required to meet SCAQMD NOx emission levels. Carefully remove these inserts before firing this furnace on LP gas. This furnace is not designed to operate on LP gas with the NOx inserts in place.

---

### TABLE 3

LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

<table>
<thead>
<tr>
<th>Nominal Iron Pipe Size, Inches</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>125</th>
<th>150</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2</td>
<td>275</td>
<td>189</td>
<td>152</td>
<td>129</td>
<td>114</td>
<td>103</td>
<td>96</td>
<td>93</td>
<td>89</td>
<td>83</td>
<td>78</td>
<td>69</td>
</tr>
<tr>
<td>3/4</td>
<td>567</td>
<td>393</td>
<td>315</td>
<td>267</td>
<td>237</td>
<td>217</td>
<td>196</td>
<td>182</td>
<td>173</td>
<td>162</td>
<td>146</td>
<td>132</td>
</tr>
<tr>
<td>1</td>
<td>1,071</td>
<td>732</td>
<td>590</td>
<td>504</td>
<td>448</td>
<td>409</td>
<td>378</td>
<td>346</td>
<td>322</td>
<td>307</td>
<td>275</td>
<td>252</td>
</tr>
<tr>
<td>1-1/4</td>
<td>2,205</td>
<td>1,496</td>
<td>1,212</td>
<td>1,039</td>
<td>913</td>
<td>834</td>
<td>771</td>
<td>724</td>
<td>677</td>
<td>630</td>
<td>567</td>
<td>511</td>
</tr>
<tr>
<td>1-1/2</td>
<td>3,307</td>
<td>2,299</td>
<td>1,858</td>
<td>1,559</td>
<td>1,417</td>
<td>1,275</td>
<td>1,181</td>
<td>1,086</td>
<td>1,023</td>
<td>976</td>
<td>866</td>
<td>787</td>
</tr>
<tr>
<td>2</td>
<td>6,221</td>
<td>4,331</td>
<td>3,465</td>
<td>2,992</td>
<td>2,646</td>
<td>2,394</td>
<td>2,205</td>
<td>2,047</td>
<td>1,921</td>
<td>1,811</td>
<td>1,606</td>
<td>1,496</td>
</tr>
</tbody>
</table>

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).

Based on a Pressure Drop of 0.5 Inch Water Column

Example (LP): Input BTU requirement of unit, 150,000

Equivalent length of pipe, 60 ft. = 3/4” IPS required.

---

Step by step instructions on removing the NOx inserts and retaining rod are included in the Conversion Kit Installation Instructions.

**C. ADJUSTING OR CHECKING FURNACE INPUT**

- **Natural Gas Line Pressure 5” - 10.5” W.C.**
- **LP Gas Line Pressure 11” - 13” W.C.**
- **Natural Gas Manifold Pressure 3.5” W.C.**
- **LP Gas Manifold Pressure - 10” W.C.**

Supply and manifold pressure taps are located on the gas valve body 1/8” N.P.T.). Use properly calibrated manometer gauge for accurate gas pressure readings.

Only small variations in the gas flow should be made by means of the pressure regulator adjustment. Furnaces functioning on LP gas must be set by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10” W.C. at the gas control valve.

To adjust the pressure regulator, remove the regulator cap and turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure. Then replace the regulator cap securely.

Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off the manual main gas valve and remove the gas manifold.

For elevations up to 2,000 feet, rating plate input ratings apply. For high altitudes (elevations over 2,000 ft.), see conversion kit index 92-21519-XX for derating and orifice spud sizes.

Check of input is important to prevent over-firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following table or formula to determine input rate.
Heating Value of Gas
(\text{BTU/Cu. Ft.}) \times 3600\text{Cu. Ft. Per Hr. Required} = \frac{\text{Time in Seconds}}{\text{(for 1 Cu. Ft.) of Gas}}

Start the furnace and measure the time required to burn one cubic foot of gas. Prior to checking the furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners. Time the meter with only the furnace in operation.

**IMPORTANT NOTE FOR ALTITUDES ABOVE 2,000 FEET (610 METERS):** The main burner orifices in your furnace and in these kits are sized for the nameplate input and intended for installations at elevations up to 2,000 feet in the USA or Canada, or for elevations of 2,000 - 4,500 feet (610 - 1,373 meters) in Canada if the unit has been derated at the factory. For elevations above 2,000 feet (610 meters) **IN THE USA ONLY** (see ANSI-Z223.1), the burner orifices must be sized to reduce the input 4% for each 1,000 feet (305 meters) above sea level.

**NOTICE:** DERATING OF THE HEATING INPUT FOR HIGH ALTITUDE IN THE FIELD IS UNLAWFUL IN CANADA (REFER TO CAN/CGA 2.17). UNITS INSTALLED IN ALTITUDES GREATER THAN 2,000 FEET (610 METERS) MUST BE SHIPPED FROM THE FACTORY OR FROM A FACTORY AUTHORIZED CONVERSION STATION WITH THE HEATING INPUT DERATED BY 10% SO AS TO OPERATE PROPERLY IN ALTITUDES FROM 2,000 - 4,500 FEET (610 - 1,373 METERS).

**D. CONDENSATE DRAIN**

The evaporator coil condensate drain ends with an threaded 3/4” nominal PVC stub. A trap is built in for proper condensate drainage and to prevent debris from being drawn into the unit. Do not connect the drain to a closed sewer line. Connection to a vented sewer line is allowed. It is recommended that a PVC cement not be used so that the drain line can be easily cleaned in the future.

**IMPORTANT:** DO NOT INSTALL AN EXTERNAL TRAP. DOING SO CAN CAUSE IMPROPER DRAINAGE OF THE CONDENSATE AND RESULT IN FLOODING WITHIN THE UNIT.
IV. WIRING

A. POWER SUPPLY

\[\text{\textbf{WARNING}}\]

TURN OFF THE MAIN ELECTRICAL POWER AT THE BRANCH CIRCUIT DISCONNECT CLOSEST TO THE UNIT BEFORE ATTEMPTING ANY WIRING. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

1. All wiring should be made in accordance with the National Electrical Code. Consult the local power company to determine the availability of sufficient power to operate the unit. Check the voltage at power supply to make sure it corresponds to the unit’s RATED VOLTAGE REQUIREMENT. Install a branch circuit disconnect near the rooftop, in accordance with the N.E.C. or local codes.

2. It is important that proper electrical power is available at the unit. Voltage should not vary more than 10% from that stamped on the unit nameplate. On three phase units, phases must be balanced within 3%.

3. For branch circuit wiring (main power supply to unit disconnect), the minimum wire size for the length of run can be determined from Table 5 using the circuit ampacity found on the unit rating plate. Use the smallest wire size allowable in Table 5 from the unit disconnect to unit. The disconnect must be in sight and readily accessible of the unit.

NOTES:

1. Wire size based on 60°C rated wire insulation and 30°C Ambient Temp. (86°F).

2. For more than 3 conductors in a raceway or cable, see the N.E.C. for derating the ampacity of each conductor.

When installed, the unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70, if an external electrical source is utilized.

IMPORTANT: THIS UNIT IS APPROVED FOR USE WITH COPPER CONDUCTORS ONLY CONNECTED TO UNIT CONTACTOR.

WARRANTY MAY BE JEOPARDIZED IF ALUMINUM WIRE IS CONNECTED TO UNIT CONTACTOR.

Special instructions apply for power wiring with aluminum conductors:
Warranty is void if connections are not made per instructions.

TABLE 5
BRANCH CIRCUIT COPPER WIRE SIZE (BASED ON 1% VOLTAGE DROP)*

<table>
<thead>
<tr>
<th>SUPPLY WIRE LENGTH-FEET</th>
<th>200</th>
<th>150</th>
<th>100</th>
<th>50</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
<td>45</td>
</tr>
</tbody>
</table>

*Taken from National Electric Code

TABLE 6
AWG Copper Wire Size | AWG Aluminum Wire Size | Connector Type and Size (or equivalent)
---------------------|------------------------|----------------------------------------
#12                  | #10                    | T & B Wire Nut PT2                     
#10                  | # 8                    | T & B Wire Nut PT3                     
# 8                  | # 6                    | Sherman Split Bolt TSP5                
# 6                  | # 4                    | Sherman Split Bolt TSP4                
# 4                  | # 2                    | Sherman Split Bolt TSP2                

Attach a length (6” or more) of recommended size copper wire to the unit contactor terminals L1 and L3 for single phase, L1, L2 and L3 for three phase.

Select the equivalent aluminum wire size from the tabulation below:
Splice copper wire pigtailed to aluminum wire with U.L. recognized connectors for copper-aluminum splices. Please exercise the following instructions very carefully to obtain a positive and lasting connection:

1. Strip insulation from aluminum conductor.

2. Coat the stripped end of the aluminum wire with the recommended inhibitor, and wire brush the aluminum surface through inhibitor. INHIBITORS: Brundy-Pentex “A”; Alcoa-No. 2EJC; T & B-KPOR Shield.

3. Clean and recoat aluminum conductor with inhibitor.

4. Make the splice using the above listed wire nuts or split bolt connectors.

5. Coat the entire connection with inhibitor and wrap with electrical insulating tape.

TABLE 6
BRANCH CIRCUIT AMPACITY

<table>
<thead>
<tr>
<th>AWG Copper Wire Size</th>
<th>AWG Aluminum Wire Size</th>
<th>Connector Type and Size (or equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#12</td>
<td>#10</td>
<td>T &amp; B Wire Nut PT2</td>
</tr>
<tr>
<td>#10</td>
<td># 8</td>
<td>T &amp; B Wire Nut PT3</td>
</tr>
<tr>
<td># 8</td>
<td># 6</td>
<td>Sherman Split Bolt TSP5</td>
</tr>
<tr>
<td># 6</td>
<td># 4</td>
<td>Sherman Split Bolt TSP4</td>
</tr>
<tr>
<td># 4</td>
<td># 2</td>
<td>Sherman Split Bolt TSP2</td>
</tr>
</tbody>
</table>
B. HOOK-UP

To wire unit, refer to the following hook-up diagram. Refer to Figure 3 for location of wiring entrances.

Wiring to be done in the field between the unit and devices not attached to the unit, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire [63°F rise (35°C)] when installed in accordance with the manufacturer’s instructions.

C. INTERNAL WIRING

IMPORTANT: Some single phase units are equipped with a single pole contactor. Caution must be exercised when servicing as only one leg of the power supply is broken with the contactor.

A diagram of the internal wiring of this unit is located under the electrical box cover. If any of the original wire as supplied with the appliance must be replaced, the wire gauge and insulation must be same as original wiring.

Transformer is factory wired for 230 volts on 208/230 volt models and must be changed for 208 volt applications. See unit wiring diagram for 208 volt wiring.

D. THERMOSTAT

The room thermostat must be compatible with the spark ignition control on the unit. Generally, all thermostats that are not of the “current robbing” type are compatible with the integrated furnace control. The low voltage wiring should be sized as shown in Table 7.

Install the room thermostat in accordance with the instruction sheet packed in the box with the thermostat. Run the thermostat lead wires inside the blower compartment and connect to low voltage terminals as shown on the wiring diagram.

Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes or ducts, lighting fixtures, radiation from fireplace, sun rays, lamps, televisions, radios or air streams from registers. Refer to instructions packed with the thermostat for “heater” selection or adjustment.

The following is a list of recommended thermostats to be used with and without an economizer:

<table>
<thead>
<tr>
<th>SINGLE STAGE COOL W/O ECONOMIZER</th>
<th>TWO STAGE COOL W/ ECONOMIZER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAPLE CHASE - MODEL #0970</td>
<td>HONEYWELL - MODEL #T7300-A1005</td>
</tr>
<tr>
<td>HONEYWELL - MODEL #T8602C</td>
<td>HONEYWELL - MODEL #T874D-1959</td>
</tr>
<tr>
<td>MAPLE CHASE - MODEL #0960</td>
<td></td>
</tr>
<tr>
<td>WHITE ROGERS - MODEL #1F91-59</td>
<td></td>
</tr>
<tr>
<td>ROBERTSHAW - MODEL #CM64A-USAJ</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE 7

<table>
<thead>
<tr>
<th>FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS</th>
<th>SOLID COPPER WIRE - AWG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Run - Feet (1)</td>
<td></td>
</tr>
<tr>
<td>Thermostat Load - Amps</td>
<td>16 14 12 10 10 10</td>
</tr>
<tr>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>50 100 150 200 250 300</td>
<td></td>
</tr>
</tbody>
</table>

(1) The total wire length is the distance from the furnace to the thermostat and back to the furnace.

**NOTE:** DO NOT USE CONTROL WIRING SMALLER THAN NO. 18 AWG.
V. FURNACE SECTION CONTROLS AND IGNITION SYSTEM

NORMAL FURNACE OPERATING SEQUENCE

This unit is equipped with an integrated direct spark ignition control.

1. The thermostat calls for heat.
2. The control board will run a self check to verify that the limit control and manual reset overtemperature control are closed and that the pressure switch is open. If so, the induced draft blower (inducer) begins a prepurge cycle.
3. The air proving negative pressure switch closes.
4. 15 seconds after the pressure switch closes, the gas valve opens and the spark is initiated for a 7 second trial for ignition.
5. Burners ignite and flame sensor proves all burners have lit.
6. The circulating air blower is energized after 30 seconds.
7. The control board enters a normal operation loop in which all safety controls are monitored continuously.
8. Thermostat is satisfied and opens.
9. The gas valve is de-energized and closes, shutting down the burner flame.
10. The control board will de-energize the inducer after a five second post purge.
11. The circulating air blower is de-energized after 90 seconds.
12. The integrated control board has a three try ignition system.
13. After a total of three trials for ignition without sensing main burner flame, the system goes into a 100% lockout mode.
14. After one hour, the ignition control repeats the prepurge and ignition cycles for 3 tries and then goes into 100% lockout mode again.
15. It continues this sequence of cycles and lockout each hour until igniton is successful or power is interrupted.
16. During the lockout mode, neither the spark ignition control or gas valve will be energized until the system is reset by turning the thermostat to the “OFF” position or interrupting the electrical power to the unit for 3 seconds or longer.

• The induced draft blower and main burner will shut off when the thermostat is satisfied.
• The circulating air blower will start and run on the heating speed if the thermostat fan switch is in the “ON” position.

The integrated furnace control is equipped with diagnostic LED. The LED is lit continuously when there is power to the control, with or without a call for heat. If the LED is not lit, there is either no power to the control or there is an internal component failure within the control, and the control should be replaced.

If the control detects the following failures, the LED will flash on for approximately 1/4 second, then off for 3/4 second for designated failure detections.
1 Flash: Failed to detect flame within the three tries for ignition.
2 Flash: Pressure switch or induced draft blower problem detected.
3 Flash: High limit or auxiliary limit open.
4 Flash: Flame sensed and gas valve not energized or flame sensed with no “W” signal.
5 Flash: Overtemperature switch open.

OPERATING INSTRUCTIONS

This appliance is equipped with a direct spark intermittent ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See operating instructions on the back of the furnace/controls access panel.

⚠️ WARNING

DO NOT ATTEMPT TO MANUALLY LIGHT THIS FURNACE WITH A MATCH OR ANY OPEN FLAME. ATTEMPTING TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

TO START THE FURNACE

1. STOP! Read the safety information on the Operating Instructions Label located on this appliance.

⚠️ WARNING

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.

2. Set the thermostat to its lowest setting.
3. Turn off all electric power to the appliance.
4. 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.
5. Remove control door/access panel.
6. Move switch to the “OFF” position.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP!
   • 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. If you don’t smell gas, go to the next step.
8. Move the switch from “OFF” position to “ON” position.
9. Replace the control door.
10. Turn on all electric power to the appliance.
11. Set the thermostat to the desired setting.
12. If the appliance will not operate, follow the instructions below on how to shut down the furnace.

⚠️ WARNING

THE SPARK IGNITOR AND IGNITION LEAD FROM THE IGNITION CONTROL ARE HIGH VOLTAGE. KEEP HANDS OR TOOLS AWAY TO PREVENT ELECTRICAL SHOCK. SHUT OFF ELECTRICAL POWER BEFORE SERVICING ANY OF THE CONTROLS. FAILURE TO ADHERE TO THIS WARNING CAN RESULT IN PERSONAL INJURY OR DEATH. The initial start-up on a new installation may require the control system to be energized for some time until any air has bled through the system and fuel gas is available at the burners.
TO SHUT DOWN FURNACE
1. Set the thermostat to the lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control door.
4. Move switch to the “OFF” position.
5. Replace control door.

**WARNING**
SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN RESULT IN AN EXPLOSION OR FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH!

**BURNERS**
Burners for these units have been designed so that field adjustment is not required. Burners are tray-mounted and accessible for easy cleaning when required.

**MANUAL RESET OVERTEMPERATURE CONTROL**
A manual reset overtemperature control is located on the burner shield. This device senses blockage in the heat exchanger or insufficient combustion air. This shuts off the main burners if excessive temperatures occur in the burner compartment.

Operation of this control indicates an abnormal condition. Therefore, the unit should be examined by a qualified installer, service agency, or the gas supplier before being placed back into operation.

**WARNING**
DO NOT JUMPER THIS DEVICE! DO NOT reset the overtemperature control without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Failure to do so can result in carbon monoxide poisoning or death. Replace this control only with the identical replacement part.

**PRESSURE SWITCH**
This furnace has a pressure switch for sensing a blocked exhaust or a failed induced draft blower. It is normally open and closes when the induced draft blower starts, indicating air flow through the combustion chamber.

**LIMIT CONTROL**
The supply air high temperature limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature. **WARNING: DO NOT JUMPER THIS DEVICE!** Replace this control only with the identical replacement part.

**WARNING**
4. Move switch to the “OFF” position.
VI. SYSTEM OPERATING INFORMATION

ADVISE THE CUSTOMER

1. Keep the air filters clean. The heating system operates better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This reduces the heating load on the system.
4. Avoid excessive use of exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles three feet from the unit and exhaust system.

7. IMPORTANT: Replace all blower doors and compartment cover after servicing the unit. Do not operate the unit without all panels and doors securely in place.
8. Do not allow snow or other debris to accumulate in the vicinity of the appliance.

FURNACE SECTION MAINTENANCE

The unit’s furnace should operate for many years without excessive scale build-up in flue passageways; however, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the exhaust system and the burners for continued safe operation, paying particular attention to deterioration from corrosion or other sources.

If during inspection the flue passageways and exhaust system are determined to require cleaning, the following procedures should be followed (by a qualified installer, service agency, or gas supplier):

1. Turn off the electrical power to the unit and set the thermostat to the lowest temperature.
2. Shut off the gas supply to the unit either at the meter or at manual valve in the supply piping.

3. Remove the furnace controls access panel and the control box cover.
4. Disconnect the gas supply piping from the gas valve.
5. Disconnect the wiring to the induced draft blower motor, gas valve, flame sensor, and flame roll-out control, and ignitor cable. Mark all wires disconnected for proper reconnection.
6. Remove the screws (4) connecting the burner tray to the heat exchanger mounting panel.
7. Remove the burner tray and the manifold assembly from the unit.
8. Remove the screws (4) connecting the induced draft blower to the collector box and screws (16) connecting the collector box to the heat exchanger mounting panel. Remove the induced draft blower and the collector box from the unit.
9. Remove the turbulators from inside the heat exchangers by inserting the blade of a screwdriver under the locking tabs. Pop the tabs out of the expanded grooves of the heat exchanger. Slide the turbulators out of the heat exchangers.
10. Direct a water hose into the outlet of the heat exchanger top. Flush the inside of each heat exchanger tube with water. Blow out each tube with air to remove excessive moisture.
11. Reassemble (steps 1 through 10 in reverse order). Be careful not to strip out the screw holes used to mount the collector box and inducer blower. Replace inducer blower gasket and collector box gasket with factory replacements if damaged.

WARNING

LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING CONTROLS. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

LUBRICATION

IMPORTANT: DO NOT attempt to lubricate the bearings on the blower motor or the induced draft blower motor. Addition of lubricants can reduce the motor life and void the warranty.

The blower motor and induced draft blower motor are prelubricated by the manufacturer and do not require further attention.

A qualified installer, service agency or the gas supplier must periodically clean the motors to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict air flow and the motor depends upon sufficient air flowing across and through it to prevent overheating.

COOLING SECTION MAINTENANCE

WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING MAINTENANCE. FAILURE TO DO SO MAY RESULT IN ELECTRICAL SHOCK OR SEVERE PERSONAL INJURY OR DEATH.
It is recommended that at the beginning of each cooling season a qualified installer or service agency inspect and clean the cooling section of this unit. The following areas should be addressed: evaporator coil, condenser coil, condenser fan motor and venturi area.

To inspect the evaporator coil:
1. Remove the filter access panel and the blower/evaporator coil access panel.

⚠️ WARNING
LABEL ALL WIRES PRIOR TO DISCONNECTION WHEN SERVICING THE UNIT. WIRING ERRORS CAN CAUSE IMPROPER AND DANGEROUS OPERATION RESULTING IN FIRE, ELECTRICAL SHOCK, PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

2. Unplug the wires from the circulating air blower and the limit control. Remove the two screws and slide the blower out of the unit sideways.
3. Shine a flashlight on the evaporator coil (both sides) and inspect for accumulation of lint, insulation, etc.
4. If coil requires cleaning, follow the steps shown below.

Cleaning Evaporator Coil
1. Remove screws from condenser fan grille assembly and lay grille over on the unit top panel.
2. Remove the controls access panel and the control box cover.
3. Disconnect the outdoor fan motor wiring from the compressor contactor and capacitor. Remove the strain relief in the bulkhead and pull the fan motor wires through. Set grille assembly to the side.
4. Remove the screws that secure the unit top to the unit. Remove the top and set the unit top to the side.
5. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
6. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.

7. Go to next section for cleaning the condenser coil.

Cleaning Condenser Coil, Drain Pan, Condensate Drain, Condenser Fan, Circulation Air Blower and Venturi
1. Remove the screws from the condenser coil protective grille and remove the grille from the unit. Ensure the filter access panel is still removed to access all of the screws securing the grille.
2. The coil should be cleaned when it is dry. If the coil is coated with dirt or lint, vacuum it with a soft brush attachment. Be careful not to bend the coil fins.
3. If the coil is coated with oil or grease, clean it with a mild detergent-and-water solution. Rinse the coil thoroughly with water. **IMPORTANT: Do not** use excessive water pressure. Excessive water pressure can bend the fins and tubing of the coil and lead to inadequate unit performance. Be careful not to splash water excessively into unit.
4. If coil requires cleaning, follow the steps shown below.

Cleaning Condenser Coil
1. Remove the screws from the condenser fan grille assembly and lay grille back on unit and replace all screws.
2. Place top panel back on unit and replace all screws.
3. Set condenser fan grille assembly on top of the unit with the fan on top and the motor wires on the venturi side. Run the fan motor wires through the bulkhead and pull wires through the hole on the bottom of the control box on the left side and into the control box. Reconnect fan motor wires per the wiring diagram attached to the back of the control box cover.
4. Replace wire strain relief in bulkhead after the slack is pulled out of the wires on the fan side. This will assure wires will not be damaged by the fan during unit operation.
5. Turn the condenser fan grille assembly over and into the recess in the unit top. Secure the grille to the unit with the four long #8 screws removed earlier.
6. Replace the circulating air blower, making sure that all wires are properly reconnected per the unit wiring diagram.
7. Replace the filter and blower/evaporator coil access panels.
8. Replace the control box cover and controls access panel.
9. Restore electrical power to the unit and check for proper operation, especially the condenser fan motor.

REPLACEMENT PARTS
Contact your local distributor for a complete parts list.

TROUBLESHOOTING
Refer to Figures 27 and 28 for determining cause of unit problems.

WIRING DIAGRAM
Figures 29 and 30 are complete wiring diagrams for the unit and its power sources.

CHARGING
See Figure 31 through 38 for proper charging information.
### Table 8. Air-Flow Performance – RRKA Models

**Indoor Airflow Performance—208 Volts**

|-----------------------------------|--------------------------|---------------------------|----------------------------------------|-------------|-------------------------------------------|-------------------------|

**Note:** On 4 ton models, switch to medium speed for cooling if external static pressure is less than 0.4" W.C. at 230 volts or less than 0.3" W.C. at 208 volts.

**WARNING:** Observe airflow operating limits if operating in area of airflow table shown in bold.

#### Down Discharge Pressure Drop (Add to External Static Pressure)

<table>
<thead>
<tr>
<th>CFM [L/s]</th>
<th>Pressure Drop—Inches W.C. [kPa]</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 [283]</td>
<td>0.00 [0.02]</td>
</tr>
<tr>
<td>800 [378]</td>
<td>0.01 [0.02]</td>
</tr>
<tr>
<td>1000 [472]</td>
<td>0.02 [0.05]</td>
</tr>
<tr>
<td>1200 [566]</td>
<td>0.03 [0.07]</td>
</tr>
<tr>
<td>1400 [661]</td>
<td>0.05 [0.12]</td>
</tr>
<tr>
<td>1600 [755]</td>
<td>0.07 [0.17]</td>
</tr>
<tr>
<td>1800 [850]</td>
<td>0.08 [0.19]</td>
</tr>
<tr>
<td>2000 [944]</td>
<td>0.09 [0.22]</td>
</tr>
</tbody>
</table>

**Minimum Recommended Filter Sizes**

<table>
<thead>
<tr>
<th>Nominal Cooling Capacity Tons [kW]</th>
<th>1.5 [5.28]</th>
<th>2.0 [7.03]</th>
<th>2.5 [8.79] – 4.0 [14.07]</th>
<th>5.0 [17.59]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Filter Size—Inches [mm]</td>
<td>16 x 20 x 1 [406 x 508 x 25]</td>
<td>20 x 20 x 1 [508 x 508 x 25]</td>
<td>24 x 24 x 1 [610 x 610 x 25]</td>
<td>24 x 30 x 1 [610 x 762 x 1]</td>
</tr>
</tbody>
</table>

[ ] Designates Metric Conversions
### INDOOR AIRFLOW PERFORMANCE—230 VOLTS

<table>
<thead>
<tr>
<th>Nominal Cooling Capacity Tons (kW)</th>
<th>Motor Speed from Factory</th>
<th>Heating Input BTU/HR [kW] &amp; # of Speeds</th>
<th>CFM (L/s) Air Delivery/RPM/Watts—230 Volts</th>
<th>External Static Pressure—Inches W.C. (kPa)</th>
<th>Side Discharge—Wet Coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.0 [10.55]</td>
<td>Med Low</td>
<td>All Inputs 40,000 [11.72]</td>
<td>Med 1411 [666] 865 [3.05] 1237 [626] 1285 [606] 1238 [584] 1183 [558] 1116 [527]</td>
<td>0.1 [.02]</td>
<td>0.2 [.05]</td>
</tr>
<tr>
<td>3.5 [12.31]</td>
<td>High Low</td>
<td>All Inputs 60,000 [17.58]</td>
<td>Med 1411 [666] 865 [3.05] 1237 [626] 1285 [606] 1238 [584] 1183 [558] 1116 [527]</td>
<td>0.1 [.02]</td>
<td>0.2 [.05]</td>
</tr>
<tr>
<td>4.0 [14.07]</td>
<td>High Low</td>
<td>All Inputs 80,000 [23.45]</td>
<td>Med 1411 [666] 865 [3.05] 1237 [626] 1285 [606] 1238 [584] 1183 [558] 1116 [527]</td>
<td>0.1 [.02]</td>
<td>0.2 [.05]</td>
</tr>
<tr>
<td>5.0 [17.59]</td>
<td>High Low</td>
<td>100,000 [29.31]</td>
<td>Med 1411 [666] 865 [3.05] 1237 [626] 1285 [606] 1238 [584] 1183 [558] 1116 [527]</td>
<td>0.1 [.02]</td>
<td>0.2 [.05]</td>
</tr>
</tbody>
</table>

### NOTE: On 4 ton models, switch to medium speed for cooling if the external static pressure is less than 0.4" W.C. at 230 volts or less than 0.3" W.C. at 208 volts.

### WARNING: Observe airflow operating limits if operating in area of airflow table shown in bold.

[ ] Designates Metric Conversions
BLOWER MOTOR SPEED TAPS

After determining necessary CFM and speed tap data from Table 8, follow the steps below to change speeds.

1. Remove the furnace/control access panel.
2. Remove the control box cover. See Figure 23 for location of the furnace control board.
3. Reference Figure 24 for the proper location of the red and black wires on the speed tap block and on the furnace control board to obtain the speed tap you have chosen.
4. After adjusting the wires accordingly, attach the control box cover, furnace control access panel and the blower access panel to the unit.

FIGURE 24
INTEGRATED FURNACE CONTROL BOARD

FIGURE 25
FACTORY SET BLOWER SPEEDS W/ELEC. HEAT

<table>
<thead>
<tr>
<th>MODEL</th>
<th>FACTORY SET BLOWER SPEED</th>
</tr>
</thead>
<tbody>
<tr>
<td>COOL</td>
<td>HEAT</td>
</tr>
<tr>
<td>3.0 TON/ALL HEATS</td>
<td>MED.</td>
</tr>
<tr>
<td>3.5 TON/ALL HEATS</td>
<td>LOW</td>
</tr>
<tr>
<td>4.0 TON/ALL HEATS</td>
<td>HIGH</td>
</tr>
<tr>
<td>5.0 TON/ALL HEATS</td>
<td>LOW</td>
</tr>
</tbody>
</table>
**FIGURE 27**

COOLING TROUBLE SHOOTING CHART

**WARNING**

DISCONNECT ALL POWER TO UNIT BEFORE SERVICING. CONTACTOR MAY BREAK ONLY ONE SIDE. FAILURE TO SHUT OFF POWER CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>POSSIBLE CAUSE</th>
<th>REMEDY</th>
</tr>
</thead>
</table>
| Unit will not run | • Power off or loose electrical connection  
• Thermostat out of calibration-set too high  
• Failed contactor  
• Blown fuses  
• Transformer defective  
• High pressure control open (if provided)  
• Interconnecting low voltage wiring damaged | • Check for correct voltage at compressor contactor in control box  
• Reset  
• Check for 24 volts at contactor coil - replace if contacts are open  
• Replace fuses  
• Check wiring-replace transformer  
• Reset-also see high head pressure remedy-The high pressure control opens at 450 PSIG  
• Replace thermostat wiring |
| Condenser fan runs, compressor doesn’t | • Run or start capacitor failed (single phase only)  
• Start relay defective - (single phase only)  
• Loose connection  
• Compressor stuck, grounded or open motor winding open internal overload.  
• Low voltage condition  
• Low voltage condition | • Replace  
• Replace  
• Check for correct voltage at compressor - check & tighten all connections  
• Wait at least 2 hours for overload to reset.  
• If still open, replace the compressor.  
• At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.  
• Add start kit components |
| Insufficient cooling | • Improperly sized unit  
• Improper airflow  
• Incorrect refrigerant charge  
• Air, non-condensibles or moisture in system  
• Incorrect voltage | • Recalculate load  
• Check - should be approximately 400 CFM per ton.  
• Charge per procedure attached to unit service panel.  
• Recover refrigerant, evacuate & recharge, add filter drier  
• At compressor terminals, voltage must be within 10% of rating plate volts when unit is operating.  
• Add start kit components |
| Compressor short cycles | • Incorrect voltage  
• Defective overload protector  
• Refrigerant undercharge | • At compressor terminals, voltage must be ± 10% of nameplate marking when unit is operating.  
• Replace - check for correct voltage  
• Add refrigerant |
| Registers sweat | • Low evaporator airflow | • Increase speed of blower or reduce restriction - replace air filter |
| High head-low vapor pressures | • Restriction in liquid line, expansion device or filter drier  
• Flow check piston size too small  
• Incorrect capillary tubes  
• TXV does not open | • Remove or replace defective component  
• Change to correct size piston  
• Change coil assembly  
• Replace TXV |
| High head-high or normal vapor pressure - Cooling mode | • Dirty condenser coil  
• Refrigerant overcharge  
• Condenser fan not running  
• Air or non-condensibles in system | • Clean coil  
• Correct system charge  
• Repair or replace  
• Recover refrigerant, evacuate & recharge |
| Low head-high vapor pressures | • Defective Compressor valves  
• Incorrect capillary tubes | • Replace compressor  
• Replace coil assembly |
| Low vapor - cool compressor - iced evaporator coil | • Low evaporator airflow  
• Operating below 65°F outdoors  
• Moisture in system | • Increase speed of blower or reduce restriction - replace air filter  
• Add Low Ambient Kit  
• Recover refrigerant - evacuate & recharge - add filter drier |
| High vapor pressure | • Excessive load  
• Defective compressor | • Recheck load calculation  
• Replace |
| Fluctuating head & vapor pressures | • TXV hunting  
• Air or non-condensibles in system | • Check TXV bulb clamp - check air distribution on coil - replace TXV  
• Recover refrigerant, evacuate & recharge |
| Gurgle or pulsing noise at expansion device or liquid line | • Air or non-condensibles in system | • Recover refrigerant, evacuate & recharge |
| Circulating air blower & inducer run continuously, compressor will not start | • Manual reset overtemperature control  
• tripped  
• Wire loose in limit circuit | • Reset or replace  
• Check wiring |
**FURNACE TROUBLESHOOTING GUIDE**

**COMBINATION HEATING AND COOLING UNITS WITH DIRECT SPARK IGNITION**

**WARNING**

**CONNECTIONS**

**HAZARDOUS VOLTAGE LEVEL**

**DISCONNECT POWER BEFORE SERVICING**

**SERVICE TECHNICIAN MUST BE A TRAINED, QUALIFIED PERSON**

---

**START**

- SET THERMOSTAT TO CALL FOR HEAT
- SET FAN SWITCH TO AUTO

---

**INDUCED DRAFT BLOWER MOTOR STARTS**

- YES
- NO

---

**15 SECOND PREPURGE**

- YES
- NO

---

**30 SECOND PREPURGE**

- YES
- NO

---

**IGNITOR SPARKS**

- YES
- NO

---

**MAIN BURNER LIGHTS**

- YES
- NO

---

**MAIN BURNER FLAME SUSTAINED**

- YES
- NO

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**REPLACE IGNITOR/CLIP ASSEMBLY**

---

**REPLACE NIPPLES PRESSURE**

---

**REPLACE NEGATIVE PRESSURE SWITCH**

---

**REPLACE EXHAUST PRESSURE SWITCH**

---

**REPLACE SENSOR**

---

**REPLACE INTEGRATED NITROGEN HADLING (IFC)**

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**REPLACE LIMIT IF UNIT IS COOL**

---

**NOTE:** THE SYSTEM WILL ATTEMPT TO LIGHT 3 TIMES WITH A 60 SECOND INTERVAL BETWEEN TRIES. IF AFTERTHE HERTH TIME THE BURNERS DO NOT LIGHT, THE SYSTEM WILL LOCK OUT. THE SYSTEM WILL ATTEMPT TO LIGHT 3 TIMES EACH HOUR UNTIL THE BURNERS LIGHT OR THE THERMOSTAT IS RESET.

---

**NOTE:** IF THE SYSTEM GOES INTO LOCKOUT, WAIT 30 SECONDS AND RESET THE SYSTEM.

---

**CHECK INLET GAS PRESSURE**

- YES
- NO

---

**CHECK 24 VOLS TO GAS VALVE**

- YES
- NO

---

**CHECK FOR GAS FLOW TO AND FROM VALVE**

- YES
- NO

---

**REPLACE VALVE**

---

---

**REPLACE LIMIT IF UNIT IS COOL**

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**REPLACE INTEGRATED FURNACE CONTROL (IFC)**

---

**CHECK FOR DIRT FILTERS**

---

**CHECK FOR RESTRICTED AIR FLOW**

---

**CHECK FOR EXHAUST INTAKE OR HEAT EXCHANGER BLOCKAGE**

---

**CLEAR BLOCKAGE AND RESET CONTROL**

---

**TROUBLESHOOTING ENDS**

---

**REPEAT PROCEDURE UNTIL TROUBLE FREE OPERATION IS OBTAINED**

---

**ILL 1651**

**5-9-95**

**PB**
INSTRUCTIONS:
1. CONNECT PRESSURE GAUGES TO SUCTION AND LIQUID PORTS AT OUTDOOR UNIT.
2. MEASURE AIR TEMPERATURE TO THE UNIT (OUTDOOR DRYBULB AMBIENT).
3. PLACE AN "X" ON THE CHART WHERE THE SUCTION AND LIQUID PRESSURE CROSS.
4. IF "X" IS BELOW OUTDOOR TEMPERATURE LINE, ADD CHARGE AND REPEAT 3.
5. IF "X" IS ABOVE OUTDOOR TEMPERATURE LINE, RECOVER CHARGE AND REPEAT 3.
SYSTEM CHARGE CHARTS

FIGURE 31
3 1/2 TON COOLING - (-)RKA

FIGURE 32
4 TON COOLING - (-)RKA

INSTRUCTIONS:
1. Connect pressure gauges to suction and liquid ports at outdoor unit.
2. Measure air temperature to the unit (outdoor drybulb ambient).
3. Place an 'X' on the chart where the suction and liquid pressure cross.
4. If 'X' is below outdoor temperature line, add charge and repeat 3.
5. If 'X' is above outdoor temperature line, recover charge and repeat 3.