INSTALLATION INSTRUCTIONS

LGC090S, LCC090S (7.5 Ton)
LGA090H, LCA090H (7.5 Ton)
LGA102H, LCA102H (8.5 Ton)
LGC102S, LCC102S (8.5 Ton)
LGA120H, LCA120H (10 Ton)
LGC120S, LCC120S (10 Ton)
LGC150S, LCC150S (12.5 Ton)

L SERIES PACKAGED UNITS
504,990M
12/2004
Supersedes 504,980M

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RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE
*Reheat coils are factory-installed in Humiditrol units only.

NOTE /C0266 Field Installed in Return Air Duct for Horizontal Applications.

*OPTIONAL OUTDOOR AIR HOOD (Factory or Field Installed)

*OPTIONAL OUTDOOR AIR DAMPERS (Manual or Automatic) (Factory or Field Installed)

OPTIONAL 115 VOLT OUTLET (Factory Installed)

OPTIONAL DISCONNECT / CIRCUIT BREAKER (Factory or Field Installed)

OPTIONAL ECONOMIZER DAMPERS (Factory or Field Installed)

OPTIONAL POWER EXHAUST FANS (Factory or Field Installed)

Optional with Economizer or Outdoor Air Damper
**CAUTION**

Danger of sharp metallic edges. Can cause injury. Take care when servicing unit to avoid accidental contact with sharp edges.

**Shipping and Packing List**

Package 1 of 1 contains:

1- Assembled unit

**IMPORTANT - Humiditrol® units require a specific field-provided and installed humidity sensor.**

Check unit for shipping damage. Receiving party should contact last carrier immediately if shipping damage is found.

**General**

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.

The LGA/LGC090, 102, 120, & 150 gas/electric packaged rooftop unit is available in 130,000 Btuh or 235,000 Btuh heating inputs. The LCA/LCC090, 102, 120 & 150 cooling packaged rooftop unit is the same basic design as the LGA/LGC unit except for the heating section. Optional electric heat is factory- or field-installed in LCA/LCC units. LGA/LGC and LCA/LCC units have identical refrigerant circuits with respective 7-1/2, 8-1/2, 10, and 12-1/2 ton cooling capacities.

In addition to standard heating and cooling, Humiditrol® units provide a dehumidifying mode of operation. Refer to Reheat Operation section.

The LGC/LCC120S unit is available using R410A, an ozone-friendly HFC refrigerant. Refer to the Cooling Start-Up section for precautions when installing unit.

**Requirements**

**NOTE -** These units must not be used as a “construction heater” at any time during any phase of construction. Very low return air temperatures, harmful vapors, and misplacement of the filters will damage the unit and its efficiency.

**IMPORTANT**

The Clean Air Act of 1990 bans the intentional venting of refrigerant (CFC’s and HCFC’s) as of July 1, 1992. Approved methods of recovery, recycling or reclaiming must be followed. Fines and/or incarceration may be levied for non-compliance.

**WARNING**

Electric shock hazard and danger of explosion. Can cause injury, death or product or property damage. Turn off gas and electrical power to unit before performing any maintenance or servicing operations on the unit. Follow lighting instructions attached to unit when putting unit back into operation and after service or maintenance.

See figure 1 for unit clearances.

**SERVICE CLEARANCES**

**TOP CLEARANCE UNOBSTRUCTED**

See figure 1 for unit clearances.

**FIGURE 1**

**Unit Support**

In downflow discharge installations, install the unit on a non-combustible surface only. Unit may be installed on combustible surfaces when used in horizontal discharge applications or in downflow discharge applications when installed on an LARMF10/15 roof mounting frame.

**NOTE -** Securely fasten roof frame to roof per local codes.

**A-Downflow Discharge Application**

**Roof Mounting with LARMF10/15**

1- The LARMF roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.

2- The LARMF roof mounting frame should be square and level to 1/16” per linear foot (5mm per linear meter) in any direction.

3- Duct must be attached to the roof mounting frame and not to the unit; supply and return plenums must be installed before setting the unit.
Installer's Roof Mounting Frame

Many types of roof frames can be used to install the unit depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

1- The base is fully enclosed and insulated, so an enclosed frame is not required.

2- The frames or supports must be constructed with non-combustible materials and should be square and level to 1/16” per linear foot (5mm per linear meter) in any direction.

3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum frame height is 14” (356mm).

4- Duct must be attached to the roof mounting frame and not to the unit. Supply and return plenums must be installed before setting the unit.

5- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

NOTE—When installing a unit on a combustible surface for downflow discharge applications, an LARMF10/15 roof mounting frame is required.

B-Horizontal Discharge Applications

1- Units installed in horizontal airflow applications must use a horizontal conversion kit (56K53).

2- Specified installation clearances must be maintained when installing units. Refer to figure 1.

3- Top of support slab should be approximately 4” (102mm) above the finished grade and located so no run-off water from higher ground can collect around the unit.

4- Units require support along all four sides of unit base. Supports must be constructed of steel or suitably treated wood materials.

Duct Connection

All exterior ducts, joints and openings in roof or building walls must be insulated and weather-proofed with flashing and sealing compounds in accordance with applicable codes. Any duct passing through an unconditioned space must be insulated.

CAUTION

In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.

Rigging Unit For Lifting

Rig unit for lifting by attaching four cables to holes in unit base rail. See figure 2.

1- Detach wooden base protection before rigging.

2- Connect rigging to the unit base using both holes in each corner.

3- All panels must be in place for rigging.

4- Place field-provided H-style pick in place just above top edge of unit. Frame must be of adequate strength and length. (H-style pick prevents damage to unit.)

Condensate Drains

Remove cap and make drain connection to the 1” N.P.T. drain coupling provided on unit. A trap must be installed between drain connection and an open vent for proper condensate removal. See figure 3. It is sometimes acceptable to drain condensate onto the roof or grade; however, a tee should be fitted to the trap to direct condensate downward. The condensate line must be vented. Check local codes concerning condensate disposal. Refer to pages 1 and 2 for condensate drain location.
**Connect Gas Piping (Gas Units)**

Before connecting piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5" w.c. (1.2kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. For natural gas units, operating pressure at the unit gas connection must be a minimum of 4.7" w.c. (1.17kPa) and a maximum of 10.5" (2.60kPa) w.c. For LP/propane gas units, operating pressure at the unit gas connection must be a minimum of 11" w.c. (2.74kPa) and a maximum of 13.5" w.c. (3.36kPa).

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8" N.P.T. plugged tap is located on gas valve for test gauge connection. Refer to Heating Start-Up section for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve. See figure 4 for gas supply piping entering outside the unit. Figure 5 shows complete bottom gas entry piping.

Compounds used on threaded joints of gas piping shall be resistant to the action of liquified petroleum gases.

**Pressure Test Gas Piping (Gas Units)**

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 6.

*NOTE*-Codes may require that manual main shut-off valve and union (furnished by installer) be installed in gas line external to unit. Union must be of the ground joint type.

After all connections have been made, check all piping connections for gas leaks. Also check existing piping connections up to the gas valve; loosening may occur during installation. Use a leak detection solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.
Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

**WARNING**

Danger of explosion. Can cause injury or product or property damage. Do not use matches, candles, flame or other sources of ignition to check for leaks.

**NOTE** - In case emergency shut down is required, turn off the main manual shut-off valve and disconnect main power to unit. These devices should be properly labeled by the installer.

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### Factory-Installed Options

**A-Economizer**

The A56 EM1 economizer board controls economizer operation and provides potentiometers to control minimum damper position and enthalpy control adjustments. The economizer board is positioned on the A55 M1 main control board in the unit control box. See the Integrated Modular Control Guide for economizer operation and adjustments.

**B-Intake Hood**

The intake hood top panel is secured to the unit. The intake hood sides, filters, and three support brackets are shipped unassembled in the blower compartment. Assemble hood and install as follows:

1. Remove screws securing side flanges of top hood to unit. See figure 7.
2. Pivot top hood open and secure sides of intake hood to top of hood using three sheet metal screws on each side. See figure 7.
3. Align two holes on intake hood side panel with two holes on bottom filter bracket. See figure 8. Secure both sides of bottom filter bracket to hood sides with sheet metal screws.
4. Secure intake hood sides to unit.

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### High Altitude Derate

Units may be installed at altitudes up to 2000 feet (610 m) above sea level without any modification. At altitudes above 2000 feet (610 m), units must be derated to match the gas manifold pressures shown in table 1.

**NOTE** - This is the only permissible derate for these units.

**TABLE 1**

<table>
<thead>
<tr>
<th>Altitude - ft. (m)</th>
<th>Natural Gas Manifold Pressure in. w.g. (kPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 - 3000 (610 - 915)</td>
<td>3.6 (0.90)</td>
</tr>
<tr>
<td>3001 - 4000 (915 - 1220)</td>
<td>3.5 (0.87)</td>
</tr>
<tr>
<td>4001 - 5000 (1220 - 1525)</td>
<td>3.4 (0.85)</td>
</tr>
<tr>
<td>5001 - 6000 (1525 - 1830)</td>
<td>3.3 (0.82)</td>
</tr>
<tr>
<td>6001 - 7000 (1830 - 2135)</td>
<td>3.2 (0.80)</td>
</tr>
<tr>
<td>7001 - 8000 (2135 - 2440)</td>
<td>3.1 (0.77)</td>
</tr>
</tbody>
</table>

*Contact Technical Support for altitudes higher than 8000 ft. (2400m).*
5- Slide two filters into bottom filter bracket. Position filler piece between filters with one end in bottom filter bracket.

6- Install top filter bracket as shown in figure 8. Secure with screws provided.

3- Connect separate 120v wiring to optional GFCI outlet pigtails.

**CONTROL WIRING**

**A-Thermostat Location**

Room thermostat mounts vertically on a standard 2" x 4" handy box or on any non-conductive flat surface.

Locate thermostat approximately 5 feet (1524mm) above the floor in an area with good air circulation at average temperature. Avoid locating the room thermostat where it might be affected by:
- drafts or dead spots behind doors and in corners
- hot or cold air from ducts
- radiant heat from sun or appliances
- concealed pipes and chimneys

**B-Wire Routing**

Route thermostat cable or wires from subbase through knockout provided in unit. Use 18 AWG wire for all applications using remotely installed electro-mechanical and electronic thermostats.

On Humiditrol Units, route wires from RH sensor or remote switch through knockout provided in unit. For sensor installations, use 22AWG stranded, two twisted pairs, individually shielded, 100% aluminum shield with drain wire and Teflon jacket.

**IMPORTANT** - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring.

**C-Wire Connections**

This unit is equipped with a series of integrated modular control (IMC) boards which control unit function. Refer to the IMC manual provided with each unit.

The IMC will operate the unit from a thermostat or zone sensor based on the System Mode selected in ECTO 6.01. The default System Mode (option 0) is the thermostat mode.

1- **Default** Thermostat Mode ECTO 6.01 Option 0 -

The IMC will operate two stages of heating and cooling based on thermostat demands. Install thermostat assembly in accordance with instructions provided with thermostat. See figure 9 for field wiring and refer to wiring diagrams on unit.

**IMPORTANT**-Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may result in intermittent operation.
24 VOLT FIELD WIRING IN THERMOSTAT MODE
(IMC in default T'Stat System Mode 6.01 Option 0)

A2 (2 HT / 2CL) THERMOSTAT

Not all terminals are provided on all thermostats.

Jumper 8 & 9 when thermostat has no night setback terminals; unit will operate in occupied mode.

Note - On electro-mechanical thermostats set anticipator at 0.1 amps.

Remove the jumper when a Network Control Panel (NCP) is installed.

TB1

FIGURE 9

2- Zone Sensor Mode ECTO 6.01 Option 1, 2, or 3-
The IMC will operate heating and cooling based on the IMC internal setpoints and the temperature from the A2 zone sensor. An optional Network Control Panel (NCP) can also be used to provide setpoints. A thermostat or return air sensor can be used as a back-up mode. Refer to the IMC manual provided with each unit to change ECTO options. See figure 10 for field wiring.

D-Humiditrol® Units Only -
Install humidity sensor in accordance with instructions provided with sensor. A DDC input may be used to initiate dehumidification instead of a sensor. Make wiring connections as shown in figure 9 for Thermostat Mode and figure 10 for Zone Sensor Mode. In addition, connect either a zone sensor or a dehumidification input as shown in figure 11.

Note - Install sensor and make communication wiring connections as shown in literature provided with sensor.

FIGURE 11

24 VOLT FIELD WIRING HUMIDITROL UNITS

Connect EITHER an A91 sensor or a remote digital input to TB1

Connect shield drain to unit TB1-7 - not RH sensor.

One wire of the two pairs is not connected.

FIGURE 10

24 VOLT FIELD WIRING IN ZONE SENSOR MODE
(IMC in Zone Sensor Mode ECTO 6.01 option 1, 2, 3)
Blower Operation and Adjustments

IMPORTANT
Three phase scroll compressors must be phased sequentially for correct compressor and blower rotation. Follow “COOLING START-UP” section of installation instructions to ensure proper compressor and blower operation.

A-Blower Operation
Initiate blower demand at thermostat according to instructions provided with thermostat. Unit will cycle on thermostat demand. The following steps apply to applications using a typical electro-mechanical thermostat.

1- Blower operation is manually set at the thermostat subbase fan switch. With fan switch in ON position, blowers will operate continuously.

2- With fan switch in AUTO position, the blowers will cycle with demand. Blowes and entire unit will be off when system switch is in OFF position.

B-Blower Access
1- Disconnect jack/plug connector to blower motor. Also disconnect jack/plug connector heating limit switches on gas units.

2- Remove screws on either side of blower assembly sliding base. See figure 12.

3- Pull base toward outside of unit.

C-Determining Unit CFM
1- The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. Measure the indoor blower shaft RPM. Air filters must be in place when measurements are taken.

2- With all access panels in place, measure static pressure external to unit (from supply to return).

3- Referring to table 3, use static pressure and RPM readings to determine unit CFM. Use table 4 when installing units with any of the optional accessories listed.

4- The blower RPM can be adjusted at the motor pulley. Loosen Allen screw and turn adjustable pulley clockwise to increase CFM. Turn counterclockwise to decrease CFM. See figure 12. Do not exceed minimum and maximum number of pulley turns as shown in table 2.

D-Blower Belt Adjustment
Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned as shown in figure 13.

1- Loosen four bolts securing motor base to mounting frame. See figure 12.

<table>
<thead>
<tr>
<th>Belt</th>
<th>Minimum Turns Open</th>
<th>Maximum Turns Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Section</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>B Section</td>
<td>1*</td>
<td>6</td>
</tr>
</tbody>
</table>

*No minimum turns open when B belt is used on pulleys 6” O.D. or larger.
**TO INCREASE BELT TENSION**

1- Loosen four bolts securing motor base to mounting frame.
2- Turn adjusting bolt to the right, or clockwise, to move the motor outward and tighten the belt.
3- Tighten two bolts on motor pulley side.

*IMPORTANT - Align top edges of blower motor base and mounting frame base parallel before tightening two bolts on the other side of base. Motor shaft and blower shaft must be parallel.*

4- Tighten two bolts on other side of base.

**TO INCREASE CFM**

Loosen Allen screw & turn pulley clockwise

**TO DECREASE CFM**

Turn pulley counterclockwise to tighten belt

---

**E-Check Belt Tension**

Overtensioning belts shortens belt and bearing life. Check belt tension as follows:

1- Measure span length X. See figure 14.
2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 1.5mm per 100mm of span length.

Example: Deflection distance of a 40" span would be 40/64" or 5/8".

Example: Deflection distance of a 400mm span would be 6mm.

3- Measure belt deflection force. For a used belt, the deflection force should be 5 lbs. (35kPa). A new belt deflection force should be 7 lbs. (48kPa).

A force below these values indicates an undertensioned belt. A force above these values indicates an overtensioned belt.
### TABLE 3
090, 102, 120, 150 BASE UNIT BLOWER PERFORMANCE

**BLOWER TABLE INCLUDES RESISTANCE FOR BASE UNIT ONLY WITH DRY INDOOR COIL & AIR FILTERS IN PLACE. FOR ALL UNITS ADD:**

1. Wet indoor air resistance of selected unit.
2. Any factory installed options air resistance (heat section, economizer, etc.)
3. Any field installed accessories air resistance (duct resistance, diffuser, etc.)

Then determine from blower table blower motor output and drive required.

See table 4 for wet coil and option/accessory air resistance data.

**MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT**
LCA/LCC090, 102 requires 3000 cfm (1415 L/s) minimum air with electric unit.
LCA/LCC120 & LCA/LCC150 models require 4000 cfm (1890 L/s) minimum air with electric unit.

**BOLD ITALIC INDICATES FIELD FURNISHED DRIVE.**

<table>
<thead>
<tr>
<th>Volume cfm (L/s)</th>
<th>.20 (50)</th>
<th>.40 (100)</th>
<th>.60 (150)</th>
<th>.80 (200)</th>
<th>1.00 (250)</th>
<th>1.20 (300)</th>
<th>1.40 (350)</th>
<th>1.60 (400)</th>
<th>1.80 (450)</th>
<th>2.00 (495)</th>
<th>2.20 (545)</th>
<th>2.40 (595)</th>
<th>2.60 (645)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2250 (1060)</td>
<td>455 0.30</td>
<td>455 0.45</td>
<td>640 0.60</td>
<td>720 0.80</td>
<td>790 1.00</td>
<td>865 1.20</td>
<td>915 1.40</td>
<td>975 1.60</td>
<td>1030 1.85</td>
<td>1080 2.05</td>
<td>1130 2.30</td>
<td>1175 2.56</td>
<td>1220 2.80</td>
</tr>
<tr>
<td>2500 (1180)</td>
<td>475 0.40</td>
<td>575 0.55</td>
<td>660 0.70</td>
<td>735 0.90</td>
<td>805 1.10</td>
<td>870 1.30</td>
<td>930 1.50</td>
<td>985 1.75</td>
<td>1040 2.00</td>
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<td>1140 2.50</td>
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<td>1230 3.00</td>
</tr>
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<td>675 0.85</td>
<td>750 1.05</td>
<td>820 1.25</td>
<td>885 1.45</td>
<td>940 1.70</td>
<td>995 1.90</td>
<td>1050 2.20</td>
<td>1100 2.45</td>
<td>1150 2.65</td>
<td>1195 2.95</td>
<td>1240 3.25</td>
</tr>
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<td>895 1.60</td>
<td>955 1.85</td>
<td>1010 2.10</td>
<td>1060 2.35</td>
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<td>1260 3.55</td>
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<td>715 1.10</td>
<td>790 1.35</td>
<td>855 1.60</td>
<td>915 1.80</td>
<td>970 2.05</td>
<td>1025 2.35</td>
<td>1075 2.60</td>
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<td>1215 3.40</td>
<td>1260 3.67</td>
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<tr>
<td>3500 (1650)</td>
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<td>810 1.50</td>
<td>870 1.75</td>
<td>930 2.00</td>
<td>985 2.25</td>
<td>1040 2.55</td>
<td>1090 2.85</td>
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</tr>
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<td>3750 (1770)</td>
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<td>690 1.20</td>
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<td>890 1.95</td>
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<tr>
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<td>930 2.45</td>
<td>985 2.75</td>
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<td>1090 3.35</td>
<td>1135 3.65</td>
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<td>1235 4.30</td>
<td>1280 4.65</td>
<td>1320 4.95</td>
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<td>770 1.80</td>
<td>835 2.10</td>
<td>895 2.40</td>
<td>955 2.70</td>
<td>1005 3.00</td>
<td>1060 3.35</td>
<td>1105 3.65</td>
<td>1150 4.00</td>
<td>1200 4.30</td>
<td>1245 4.65</td>
<td>1290 4.95</td>
<td>1330 5.25</td>
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<td>795 2.05</td>
<td>860 2.40</td>
<td>920 2.70</td>
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<td>5000 (2360)</td>
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<td>1165 4.70</td>
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<td>1300 5.85</td>
<td>1340 6.25</td>
<td></td>
</tr>
<tr>
<td>5500 (2595)</td>
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<td>880 2.95</td>
<td>940 3.30</td>
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<td>1095 4.40</td>
<td>1145 4.80</td>
<td>1190 5.20</td>
<td>1235 5.60</td>
<td>1280 6.00</td>
<td>1320 6.40</td>
<td>1360 6.80</td>
<td></td>
</tr>
<tr>
<td>5750 (2715)</td>
<td>850 2.95</td>
<td>910 3.30</td>
<td>965 3.70</td>
<td>1020 4.05</td>
<td>1070 4.45</td>
<td>1120 4.85</td>
<td>1165 5.20</td>
<td>1210 5.60</td>
<td>1255 6.00</td>
<td>1300 6.40</td>
<td>1340 6.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6000 (2830)</td>
<td>885 3.35</td>
<td>940 3.70</td>
<td>995 4.10</td>
<td>1045 4.45</td>
<td>1095 4.85</td>
<td>1145 5.25</td>
<td>1190 5.65</td>
<td>1235 6.05</td>
<td>1280 6.45</td>
<td>1320 6.85</td>
<td>1360 7.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Static Pressure - in. w.g. (Pa)**

- MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT
  - LCA/LCC090, 102 requires 3000 cfm (1415 L/s) minimum air with electric unit.
  - LCA/LCC120 & LCA/LCC150 models require 4000 cfm (1890 L/s) minimum air with electric unit.

**BOLD ITALIC INDICATES FIELD FURNISHED DRIVE.**
F-Field-Furnished Blower Drives

For field-furnished blower drives, use tables 3 and 4 to determine BHP and RPM required. Reference table 5 to determine the drive number and table 6 to determine the manufacturer’s model number.

### TABLE 4
FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

<table>
<thead>
<tr>
<th>Air Volume</th>
<th>Wet Indoor Coil</th>
<th>Gas Heat Exchanger (Gas Units)</th>
<th>Electric Heat (Cooling Models)</th>
<th>Economizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>cfm</td>
<td>Std. Heat 130,000</td>
<td>Med Heat 180,000</td>
<td>High Heat 240,000</td>
<td>2250</td>
</tr>
<tr>
<td>L/s</td>
<td>090, 102</td>
<td>120S</td>
<td>120H</td>
<td>150S</td>
</tr>
<tr>
<td></td>
<td>120S</td>
<td>120H</td>
<td>150S</td>
<td>0.07 (17)</td>
</tr>
<tr>
<td></td>
<td>150S</td>
<td></td>
<td></td>
<td>0.16 (40)</td>
</tr>
</tbody>
</table>

### TABLE 5
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS

<table>
<thead>
<tr>
<th>Motor</th>
<th>RPM Range</th>
<th>Drive 1</th>
<th>Drive 2</th>
<th>Drive 3</th>
<th>Drive 4</th>
<th>Drive 5</th>
<th>Drive 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>hp</td>
<td>kW</td>
<td>60 Hz</td>
<td>50 Hz</td>
<td>60 Hz</td>
<td>50 Hz</td>
<td>60 Hz</td>
<td>50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>1.5</td>
<td>680-940</td>
<td>560-775</td>
<td>850-1130</td>
<td>700-930</td>
<td>917-1152</td>
<td>915-1150</td>
</tr>
<tr>
<td>3</td>
<td>Std.</td>
<td>680-940</td>
<td>560-775</td>
<td>850-1130</td>
<td>740-925</td>
<td>1105-1410</td>
<td>1110-1395</td>
</tr>
<tr>
<td>3 Hi</td>
<td>Eff</td>
<td>680-895</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
</tr>
<tr>
<td>5</td>
<td>3.7</td>
<td>680-895</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
<td>895-1120</td>
</tr>
</tbody>
</table>

In Canada, nominal motor output is also maximum usable motor output. If motors of comparable output are used, be sure to keep within the service factor limitations outlined on the motor nameplate.

### TABLE 6
MANUFACTURER’S NUMBERS

<table>
<thead>
<tr>
<th>DRIVE NO.</th>
<th>DRIVE COMPONENTS</th>
<th>ADJUSTABLE SHEAVE</th>
<th>FIXED SHEAVE</th>
<th>BELT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1VP40x7/8</td>
<td>1VP40x7/8</td>
<td>79J0301</td>
<td>79J0301</td>
</tr>
<tr>
<td>2</td>
<td>1VP44x1-1/8</td>
<td>1VP44x1-1/8</td>
<td>36C0701</td>
<td>36C0701</td>
</tr>
<tr>
<td>3</td>
<td>1VP44x7/8</td>
<td>1VP44x7/8</td>
<td>53J9601</td>
<td>53J9601</td>
</tr>
<tr>
<td>4</td>
<td>1VP60x1-1/8</td>
<td>1VP60x1-1/8</td>
<td>41C1301</td>
<td>41C1301</td>
</tr>
<tr>
<td>5</td>
<td>1VP50x7/8</td>
<td>1VP50x7/8</td>
<td>41C1301</td>
<td>41C1301</td>
</tr>
<tr>
<td>6</td>
<td>1VP60x1-1/8</td>
<td>1VP60x1-1/8</td>
<td>41C1301</td>
<td>41C1301</td>
</tr>
</tbody>
</table>

Page 12
Cooling Start-Up

IMPORTANT—The crankcase heater must be energized for 24 hours before attempting to start compressor. Set thermostat so there is no demand to prevent compressors from cycling. Apply power to unit.

**IMPORTANT**

Units contain either R22 or R410A refrigerant. Check the nameplate to determine the type of refrigerant before installation or servicing.

NOTE - These units must not be used as a “construction heater” at any time during any phase of construction. Very low return air temperatures, harmful vapors, and misplacement of the filters will damage the unit and its efficiency. Additionally, a unit which will be subject to cold temperatures when not in operation must have a vapor barrier installed to seal the duct connections. Failure to protect the unit from moisture laden air or harmful vapors (generated from the construction process and temporary combustion heating equipment) will cause corrosive condensation within the unit. Failure to properly protect the unit in this situation will cause electrical and electronic component failure and could affect the unit warranty status.

A-Preliminary Checks

1- Make sure that unit is installed in accordance with the installation instructions and applicable codes.
2- Inspect all electrical wiring, both field- and factory-installed, for loose connections. Tighten as required.
3- Check to ensure that refrigerant lines do not rub against the cabinet or against other refrigerant lines.
4- Check voltage at disconnect switch. Voltage must be within range listed on nameplate. If not, consult power company and have voltage condition corrected before starting unit.
5- Make sure filters are in place before start-up.

B-Start-Up

1- Initiate first and second stage cooling demands according to instructions provided with thermostat.
2- First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will energize compressor 2. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1.
3- Units contain two refrigerant circuits or stages. See figure 15.

![REFRIGERANT STAGES](image)

4- Each refrigerant circuit is charged with either HCFC-22 or R410A refrigerant. See unit rating plate for type of refrigerant and correct amount of charge.
5- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

C-Three Phase Scroll Compressor Voltage Phasing

Three phase scroll compressors must be phased sequentially to ensure correct compressor and blower rotation and operation. Compressor and blower are wired in phase at the factory. Power wires are color-coded as follows: line 1-red, line 2-yellow, line 3-blue.

1- Observe suction and discharge pressures and blower rotation on unit start-up.
2- Suction pressure must drop, discharge pressure must rise, and blower rotation must match rotation marking.

If pressure differential is not observed or blower rotation is not correct:

3- Disconnect all remote electrical power supplies.
4- Reverse any two field-installed wires connected to the line side of S48 disconnect or TB13 terminal strip. Do not reverse wires at blower contactor.
5- Make sure the connections are tight.

Discharge and suction pressures should operate at their normal start-up ranges.
D-R410A Refrigerant

Units charged with R410A refrigerant operate at much higher pressures than R22. The expansion valve and liquid line drier provided with the unit are approved for use with R410A. Do not replace them with components designed for use with R22.

R410A refrigerant is stored in a pink cylinder.

Manifold gauge sets used with systems charged with R410A refrigerant must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0-800 on the high side and a low side of 30” vacuum to 250 psi with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

⚠️ IMPORTANT

Mineral oils are not compatible with R410A. If oil must be added, it must be a polyol ester oil.

E-Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

This unit is factory charged and should require no further adjustment. If the system requires charge, reclaim the charge, evacuate the system, and add required nameplate charge.

NOTE - System charging is not recommended below 60°F (15°C). In temperatures below 60°F (15°C), the charge must be weighed into the system.

If weighing facilities are not available, or to check the charge, use the following procedure:

IMPORTANT - Charge unit in standard cooling mode.

1- Attach gauge manifolds and operate unit in cooling mode until system stabilizes (approximately five minutes). Make sure outdoor air dampers are closed.

2- Check each system separately with all stages operating.

3- Use a thermometer to accurately measure the outdoor ambient temperature.

4- Apply the outdoor temperature to tables 7 through 22 to determine normal operating pressures.

5- Compare the normal operating pressures to the pressures obtained from the gauges. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Correct any system problems before proceeding.

6- If discharge pressure is high, remove refrigerant from the system. If discharge pressure is low, add refrigerant to the system.
   • Add or remove charge in increments.
   • Allow the system to stabilize each time refrigerant is added or removed.

7- Use the following approach method along with the normal operating pressures to confirm readings.

<table>
<thead>
<tr>
<th>TABLE 7</th>
<th>LG/LC Series 090S R22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Coil Entering Air Temp</td>
<td>CIRCUIT 1</td>
</tr>
<tr>
<td></td>
<td>Discharge +10 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>179</td>
</tr>
<tr>
<td>75°F</td>
<td>204</td>
</tr>
<tr>
<td>85°F</td>
<td>233</td>
</tr>
<tr>
<td>95°F</td>
<td>265</td>
</tr>
<tr>
<td>105°F</td>
<td>299</td>
</tr>
<tr>
<td>115°F</td>
<td>335</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 8</th>
<th>LG/LC Series 090H R22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Coil Entering Air Temp</td>
<td>CIRCUIT 1</td>
</tr>
<tr>
<td></td>
<td>Dis. +10 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>160</td>
</tr>
<tr>
<td>75°F</td>
<td>184</td>
</tr>
<tr>
<td>85°F</td>
<td>211</td>
</tr>
<tr>
<td>95°F</td>
<td>241</td>
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<tr>
<td>105°F</td>
<td>272</td>
</tr>
<tr>
<td>115°F</td>
<td>310</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 9</th>
<th>LG/LC Series 090H R22 Humiditrol®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Coil Entering Air Temp</td>
<td>CIRCUIT 1</td>
</tr>
<tr>
<td></td>
<td>Dis. +10 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>167</td>
</tr>
<tr>
<td>75°F</td>
<td>188</td>
</tr>
<tr>
<td>85°F</td>
<td>216</td>
</tr>
<tr>
<td>95°F</td>
<td>248</td>
</tr>
<tr>
<td>105°F</td>
<td>280</td>
</tr>
<tr>
<td>115°F</td>
<td>313</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE 10</th>
<th>LG/LC Series 090H R410A Std. &amp; Humiditrol®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outdoor Coil Entering Air Temp</td>
<td>CIRCUIT 1</td>
</tr>
<tr>
<td></td>
<td>Dis. +10 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>248</td>
</tr>
<tr>
<td>75°F</td>
<td>286</td>
</tr>
<tr>
<td>85°F</td>
<td>328</td>
</tr>
<tr>
<td>95°F</td>
<td>373</td>
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<tr>
<td>105°F</td>
<td>421</td>
</tr>
<tr>
<td>115°F</td>
<td>473</td>
</tr>
</tbody>
</table>
**TABLE 11**

<table>
<thead>
<tr>
<th>Outdoor Coil Entering Air Temp</th>
<th>CIRCUIT 1</th>
<th>CIRCUIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dis. +10 psig</td>
<td>Suc. +5 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>181</td>
<td>78</td>
</tr>
<tr>
<td>75°F</td>
<td>205</td>
<td>79</td>
</tr>
<tr>
<td>85°F</td>
<td>232</td>
<td>79</td>
</tr>
<tr>
<td>95°F</td>
<td>261</td>
<td>80</td>
</tr>
<tr>
<td>105°F</td>
<td>294</td>
<td>82</td>
</tr>
<tr>
<td>115°F</td>
<td>327</td>
<td>83</td>
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</table>

**TABLE 12**

<table>
<thead>
<tr>
<th>Outdoor Coil Entering Air Temp</th>
<th>CIRCUIT 1</th>
<th>CIRCUIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dis. +10 psig</td>
<td>Suc. +5 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>155</td>
<td>78</td>
</tr>
<tr>
<td>75°F</td>
<td>185</td>
<td>79</td>
</tr>
<tr>
<td>85°F</td>
<td>216</td>
<td>80</td>
</tr>
<tr>
<td>95°F</td>
<td>247</td>
<td>81</td>
</tr>
<tr>
<td>105°F</td>
<td>277</td>
<td>82</td>
</tr>
<tr>
<td>115°F</td>
<td>308</td>
<td>83</td>
</tr>
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</table>

**TABLE 13**

<table>
<thead>
<tr>
<th>Outdoor Coil Entering Air Temp</th>
<th>CIRCUIT 1</th>
<th>CIRCUIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dis. +10 psig</td>
<td>Suc. +5 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>166</td>
<td>77</td>
</tr>
<tr>
<td>75°F</td>
<td>192</td>
<td>79</td>
</tr>
<tr>
<td>85°F</td>
<td>221</td>
<td>80</td>
</tr>
<tr>
<td>95°F</td>
<td>252</td>
<td>82</td>
</tr>
<tr>
<td>105°F</td>
<td>285</td>
<td>83</td>
</tr>
<tr>
<td>115°F</td>
<td>323</td>
<td>85</td>
</tr>
</tbody>
</table>

**TABLE 14**

<table>
<thead>
<tr>
<th>Outdoor Coil Entering Air Temp</th>
<th>CIRCUIT 1</th>
<th>CIRCUIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dis. +10 psig</td>
<td>Suc. +5 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>259</td>
<td>128</td>
</tr>
<tr>
<td>75°F</td>
<td>298</td>
<td>130</td>
</tr>
<tr>
<td>85°F</td>
<td>341</td>
<td>133</td>
</tr>
<tr>
<td>95°F</td>
<td>388</td>
<td>138</td>
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<tr>
<td>115°F</td>
<td>491</td>
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</table>

**TABLE 15**

<table>
<thead>
<tr>
<th>Outdoor Coil Entering Air Temp</th>
<th>CIRCUIT 1</th>
<th>CIRCUIT 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dis. +10 psig</td>
<td>Suc. +5 psig</td>
</tr>
<tr>
<td>65°F</td>
<td>180</td>
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<td>75°F</td>
<td>206</td>
<td>78</td>
</tr>
<tr>
<td>85°F</td>
<td>234</td>
<td>80</td>
</tr>
<tr>
<td>95°F</td>
<td>265</td>
<td>82</td>
</tr>
<tr>
<td>105°F</td>
<td>297</td>
<td>83</td>
</tr>
<tr>
<td>115°F</td>
<td>334</td>
<td>84</td>
</tr>
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</table>
**TABLE 21**

<table>
<thead>
<tr>
<th>Outdoor</th>
<th>Circuit 1</th>
<th>Circuit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering</td>
<td>10 psig</td>
<td>5 psig</td>
</tr>
<tr>
<td>Air Temp</td>
<td>65°F</td>
<td>187</td>
</tr>
<tr>
<td></td>
<td>75°F</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td>85°F</td>
<td>234</td>
</tr>
<tr>
<td></td>
<td>95°F</td>
<td>264</td>
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<tr>
<td></td>
<td>105°F</td>
<td>301</td>
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<td></td>
<td>115°F</td>
<td>344</td>
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**TABLE 22**

<table>
<thead>
<tr>
<th>Outdoor</th>
<th>Circuit 1</th>
<th>Circuit 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering</td>
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<td>5 psig</td>
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<td>65°F</td>
<td>290</td>
</tr>
<tr>
<td></td>
<td>75°F</td>
<td>330</td>
</tr>
<tr>
<td></td>
<td>85°F</td>
<td>373</td>
</tr>
<tr>
<td></td>
<td>95°F</td>
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<td></td>
<td>105°F</td>
<td>469</td>
</tr>
<tr>
<td></td>
<td>115°F</td>
<td>521</td>
</tr>
</tbody>
</table>

**G-Compressor Controls**

See unit wiring diagram to determine which controls are used on each unit.

1. **High Pressure Switch (S4, S7) R22**
   The compressor circuit is protected by a high pressure switch which opens at 450 psig + 10 psig (3103 kPa + 70 kPa) and automatically resets at 300 psig + 20 psig (2069 kPa + 138 kPa).

2. **Low Pressure Switch (S87, S88) R22**
   The compressor circuit is protected by a low pressure switch. Switch opens at 25 psig (172 kPa) and automatically resets at 55 psig (379 kPa).

3. **Crankcase Heater (HR1, HR2)**
   Compressors have belly band compressor oil heaters which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling, and apply power to unit.

4. **Low Ambient Pressure Switch (S11, S84) R22**
   Switch maintains adequate discharge pressure by de-energizing condenser fan when liquid pressure falls below 150 psig (1034 kPa). S11 is installed in stage 1 liquid line and S84 is installed in stage 2 liquid line. Switch closes to energize condenser fans when pressure rises to 275 psig (1896 kPa).

**F-Charge Verification - Approach Method**

1. Using the same thermometer, compare liquid temperature to outdoor ambient temperature.

   Approach Temperature = Liquid temperature minus ambient temperature.

2. Approach temperature should match values in table 23. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.

3. Do not use the approach method if system pressures do not match pressures in tables 7 through 22. The approach method is not valid for grossly over or undercharged systems.

**TABLE 23**

**APPROACH TEMPERATURE**

<table>
<thead>
<tr>
<th>Unit</th>
<th>Liquid Temp. Minus Ambient Temp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st Stage</td>
</tr>
<tr>
<td>090S</td>
<td>12°F ± 1 (6.7°C ± 0.5)</td>
</tr>
<tr>
<td>090H</td>
<td>7°F ± 1 (3.8°C ± 0.5)</td>
</tr>
<tr>
<td>102S</td>
<td>9°F ± 1 (5°C ± 0.5)</td>
</tr>
<tr>
<td>102H</td>
<td>9°F ± 1 (5°C ± 0.5)</td>
</tr>
<tr>
<td>120S</td>
<td>9°F ± 1 (5°C ± 0.5)</td>
</tr>
<tr>
<td>120H, 150S</td>
<td>7°F ± 1 (3.8°C ± 0.5)</td>
</tr>
<tr>
<td>090H Humiditrol</td>
<td>4°F ± 1 (2.2°C ± 0.5)</td>
</tr>
<tr>
<td>102H Humiditrol</td>
<td>5°F ± 1 (2.7°C ± 0.5)</td>
</tr>
</tbody>
</table>
falls below 240 psig ±10 (1655 kPa±69). S11 is installed in the liquid line. Switch closes to energize condenser fan when pressure rises to 450 psig ±10 (3103kPa ± 69).

Both condenser fans are energized on a Y1 cooling demand and continue to operate when Y2 demand is initiated. If BOTH switches cut out due to low pressure, ONLY stage 1 condenser fan is cycled.

The C1 (A57) controller de-energizes condenser fan 2 when outdoor temperature drops below 55°F (13°C).

5- Freezestats (S49, S50)
Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).

Gas Heat Start-Up (Gas Units)

**FOR YOUR SAFETY READ BEFORE LIGHTING**

**WARNING**

Electric shock hazard. Can cause injury or death. Do not use this unit if any part has been under water. Immediately call a qualified service technician to inspect the unit and to replace any part of the control system and any gas control which has been under water.

**WARNING**

Danger of explosion. Can cause injury or product or property damage. If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off electrical supply.

**WARNING**

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

**WARNING**

SMOKE POTENTIAL
The heat exchanger in this unit could be a source of smoke on initial firing. Take precautions with respect to building occupants and property. Vent initial supply air outside when possible.

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

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

**WARNING**

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

This unit is equipped with an automatic spark ignition system. There is no pilot. In case of a safety shutdown, move thermostat switch to OFF and return the thermostat switch to HEAT to reset ignition control.

**A-Placing Unit In Operation**

Gas Valve Operation for White Rodgers 36C (figure 16) and Honeywell VR8205Q/VR8305Q (figure 17).

1- Set thermostat to lowest setting.
2- Turn off all electrical power to appliance.
3- This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
HONEYWELL VR8205Q/VR8305Q SERIES GAS VALVE

Gas valve knob is shown in **OFF** position.

**FIGURE 17**

4- Open or remove the heat section access panel.

5- Turn the knob on the gas valve clockwise 🔄 to **“OFF”**. Depress 36C knob slightly. Do not force.

6- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP**! Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions. If you do not smell gas, go to the next step.

7- Turn the knob on the gas valve counterclockwise 🔄 to **“ON”**. Do not force.

8- Close or replace the heat section access panel.

9- Turn on all electrical power to appliance.

10- Set thermostat to desired setting.

11- The combustion air inducer will start. The burners will light within 40 seconds.

12- If the appliance does not light the first time (gas line not fully purged), it will attempt up to two more ignitions before locking out.

13- If lockout occurs, repeat steps 1 through 10.

14- If the appliance will not operate, follow the instructions “Turning Off Gas to Appliance” and call your service technician or gas supplier.

### Turning Off Gas to Unit

1- If using an electromechanical thermostat, set to the lowest setting.

2- Before performing any service, turn off all electrical power to the appliance.

3- Open or remove the heat section access panel.

4- Turn the knob on the gas valve clockwise 🔄 to **“OFF”**. Depress 36C knob slightly. Do not force.

5- Close or replace the heat section access panel.

### WARNING

Danger of explosion. Can cause injury or death. Do not attempt to light manually. Unit has a direct spark ignition system.

### Heating Operation and Adjustments

**(Gas Units)**

**A-Heating Sequence of Operation**

1- On a heating demand the combustion air inducer starts immediately.

2- Combustion air pressure switch proves inducer operation, then allows power to ignition control. Switch is factory set and requires no adjustment.

3- After a 45-second prepurge, spark ignitor energizes and gas valve solenoid opens.

4- Spark ignites gas, ignition sensor proves the flame and combustion continues.

5- If flame is not detected after first ignition trial, ignition control will repeat steps 3 and 4 two more times before locking out the gas valve.

6- For troubleshooting purposes, an ignition attempt after lock out may be re-established manually. Move thermostat to **“OFF”** and return thermostat switch to **“HEAT”** position.

**B-Limit Controls**

Limit controls are factory-set and are not adjustable. The primary limit is located on the blower deck behind the blower housing.

**C-Heating Adjustment**

Main burners are factory-set and do not require adjustment.

The following manifold pressures are listed on the gas valve.

- Natural Gas Units − Low Fire − 1.6” w.c. (not adjustable)
- Natural Gas Units − High Fire − 3.7” w.c.
- LP Gas Units − Low Fire − 5.5” w.c. (not adjustable)
- LP Gas Units − High Fire − 10.5” w.c.

### Electric Heat Start-Up (Cooling Units)

**Factory- or Field-Installed Option**

Electric heat will stage on and cycle with thermostat demand. Number of stages of electric heat will vary depending on electric heat assembly. See electric heat wiring diagram on unit for sequence of operation.
Humiditrol® Start-Up And Operation

General
Humiditrol units provide a dehumidifying mode of operation. These units contain a reheat coil adjacent to and downstream of the evaporator coil. Reheat coil solenoid valve, L14, routes hot discharge gas from the compressor to the reheat coil. Return air pulled across the evaporator coil is cooled and dehumidified; the reheat coil adds heat to supply air. See figure 18 for reheat refrigerant routing and figure 19 for standard cooling refrigerant routing.
L14 Reheat Coil Solenoid Valve

When IMC board input (P114-10) indicates room conditions require dehumidification, L14 reheat valve is energized (RH1 board P175-3) and refrigerant is routed to the reheat coil.

RH1 Humiditrol Board

The RH1 add-on board is factory-installed in all Humiditrol units. RH1 is located on the M1 board as shown in figure 20.

Reheat Setpoint

Reheat is factory-set to energize when indoor relative humidity rises above 60% (default). The reheat setpoint can be adjusted by changing ECTO 4.25. A setting of 100% will operate reheat from an energy management system digital output. The reheat setpoint can also be adjusted using an optional Network Control Panel (NCP).

Reheat will terminate when the indoor relative humidity falls 3% (57% default) or the digital output de-energizes. The reheat deadband can be adjusted 1-10% RH by changing ECTO 4.26.

A91 Humidity Sensor

Install humidity sensor in the conditioned space according to instructions provided with sensor.

Relative humidity should correspond to the sensor (A91) output voltage listed in table 24. For example: if indoor air relative humidity is 80% ± 3%, the humidity sensor output should read 8.00VDC.

Check the sensor output annually for accuracy. Keep the air intake openings on the sensor clean and free of obstructions and debris.

Read Relative Humidity At IMC

Turn MODE DIP “TEMP” “ON”. Display will alternately flash from readout to output. A single push on the pushbutton will toggle advance to different sensor readings. A double push will toggle the readout the opposite direction. Once readout “RH” is displayed alternately with the output, use table 24 to determine the percent relative humidity.

Check-Out

Test Humiditrol operation using the following procedure.

1- Make sure reheat is wired as shown in wiring section.

2- Set IMC ECTO system mode parameter 6.01 to option 0 (default local thermostat mode)

3- For RH sensors, set IMC ECTO reheat setpoint parameter 4.25 to 0% relative humidity. For digital input, set IMC ECTO reheat setpoint parameter 4.25 to 100% relative humidity.

4- Jumper the following TB1 terminals:
   8 & 9 (occupied mode)
   6 & 3 (blower demand G)
   24 & 6 (digital input applications only)

The blower, compressor 1, and compressor 2 (reheat) should be operating. L14 and L30 LED’s on the A67 board should also be ON, indicating the reheat valves are energized.

<table>
<thead>
<tr>
<th>Relative Humidity (%RH ± 3%)</th>
<th>Sensor Output (VDC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>2.00</td>
</tr>
<tr>
<td>30</td>
<td>3.00</td>
</tr>
<tr>
<td>40</td>
<td>4.00</td>
</tr>
<tr>
<td>50</td>
<td>5.00</td>
</tr>
<tr>
<td>60</td>
<td>6.00</td>
</tr>
<tr>
<td>70</td>
<td>7.00</td>
</tr>
<tr>
<td>80</td>
<td>8.00</td>
</tr>
<tr>
<td>90</td>
<td>9.00</td>
</tr>
</tbody>
</table>
5- Press the IMC pushbutton to by-pass the compressor minimum run delay.

6- For RH sensors, disconnect the jumper between TB1 terminals 8 & 9 (occupied mode). For digital input, remove the jumper between TB1-6 & 24.

Compressor 1 and 2 (reheat) should de-energize, L14 and L30 LED’s should go OFF, blower should still be energized.

8- When check-out is complete, remove all jumpers, set ECTO 4.25 back to the proper humidity setpoint, and set ECTO 6.01 to the proper setting.

Default Reheat Operation
Humiditrol unit reheat control parameter 4.24 is factory-set to option 6. Reheat will operate as shown in table 25 once three conditions are met:

1- Blower must be operating.
2- System must be in occupied mode.
3- System must NOT be operating in heating mode.

IMPORTANT - Free cooling does not operate during reheat. Free cooling will operate as shown in the IMC manual.

Reheat Control Options
Reheat control parameter 4.24 can be set to other reheat control operating conditions as follows (see IMC manual):

ECTO 4.24 option 3 -
1- Blower must be operating.
2- System must be in occupied mode.
3- System must NOT be operating in heating mode.
4- One cooling demand is required if the unit has been in heating mode, the IMC has been reset, or at initial unit start-up.

ECTO 4.24 option 5 -
3- System must NOT be operating in heating mode.
4- One cooling demand is required if the unit has been in heating mode, the IMC has been reset, or at initial unit start-up.

ECTO 4.24 option 7 -
3- System must NOT be operating in heating mode.
Once the corresponding conditions are met in each mode, reheat will operate as shown in table 25.

TABLE 25
Reheat Operation - Two Cooling Stages - Default

<table>
<thead>
<tr>
<th>T’stat and Humidity Demands</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reheat Only</td>
<td>Compressor 1 Reheat</td>
</tr>
<tr>
<td>Reheat &amp; Y1</td>
<td>Compressor 1 Reheat &amp; Compressor 2 Cooling</td>
</tr>
<tr>
<td>Reheat &amp; Y1 &amp; Y2</td>
<td>Compressor 1 Cooling &amp; Compressor 2 Cooling</td>
</tr>
</tbody>
</table>

*If there is no reheat demand and outdoor air is suitable, free cooling will operate.
**If there is no reheat demand and outdoor air is suitable, free cooling and compressor 1 will operate.

Additional Cooling Stages
Units are shipped from the factory to provide two stages of cooling. (ECTO 5.04 option 2 and 6.01 option 0). Three stages of cooling is available in zone sensor mode (ECTO 6.01 set to option 1, 2, or 3). Three stages of cooling is also available by installing a transfer relay and a three-stage thermostat; ECTO 5.04 must be set to option 3.

Service
The unit should be inspected once a year by a qualified service technician.

⚠️ CAUTION
Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠️ WARNING
Product contains fiberglass wool. Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.) Fiberglass wool may also cause respiratory, skin, and eye irritation. To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown on unit nameplate or contact your supervisor.

A- Filters
Units are equipped with four 18 X 24 X 2" filters. Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 21.

NOTE: Filters must be U.L.C. certified or equivalent for use in Canada.
B-Lubrication
All motors are lubricated at the factory. No further lubrication is required.

C-Burners (Gas Units)
Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

Clean burners as follows:
1- Turn off both electrical power and gas supply to unit.
2- Remove burner compartment access panel.
3- Remove two screws securing burners to burner support and lift the burners from the orifices. See figure 22. Clean as necessary.
4- Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 23.
5- Check the alignment of the ignitor and the sensor as shown in figure 24 and table 26.
6- Replace burners and screws securing burner.
7- Replace access panel.
8- Restore electrical power and gas supply. Follow lighting instructions attached to unit and use inspection port in access panel to check flame.

D-Combustion Air Inducer (Gas Units)
A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

### TABLE 26

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Btuh Input</th>
<th>Ignitor Length - in. (mm)</th>
<th>Sensor Length - in. (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>130K</td>
<td>7-3/4 (197)</td>
<td>11 (279)</td>
</tr>
<tr>
<td>B</td>
<td>180K</td>
<td>5 (127)</td>
<td>5-1/2 (140)</td>
</tr>
<tr>
<td>C</td>
<td>240K</td>
<td>2-1/4 (57)</td>
<td>2-3/4 (70)</td>
</tr>
</tbody>
</table>

⚠️ **WARNING**

Under normal operating conditions, the combustion air inducer wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the inducer wheel can be determined by looking through the vent opening.
Clean combustion air inducer as follows:
1- Shut off power supply and gas to unit.
2- Disconnect pressure switch air tubing from combustion air inducer port.
3- Remove and retain screws securing combustion air inducer to flue box. Remove and retain two screws from bracket supporting vent connector. See figure 25.
4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.
5- Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.
6- Clean combustion air inlet louvers on heat access panel using a small brush.

E-Flue Passageway and Flue Box (Gas Units)
1- Remove combustion air inducer assembly as described in section D.
2- Remove flue box cover. Clean with a wire brush as required.
3- Clean tubes with a wire brush.
4- Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

F-Evaporator Coil
Inspect and clean coil at beginning of each cooling season. Clean using mild detergent or commercial coil cleaner. Flush coil and condensate drain with water taking care not to get insulation, filters and return air ducts wet.

G-Condenser Coil
Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season. Access panels are provided on front and back of condenser section.

H-Supply Air Blower Wheel
Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.