

INSTALLATION INSTRUCTIONS

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer, service agency or the gas supplier

⚠ CAUTION

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

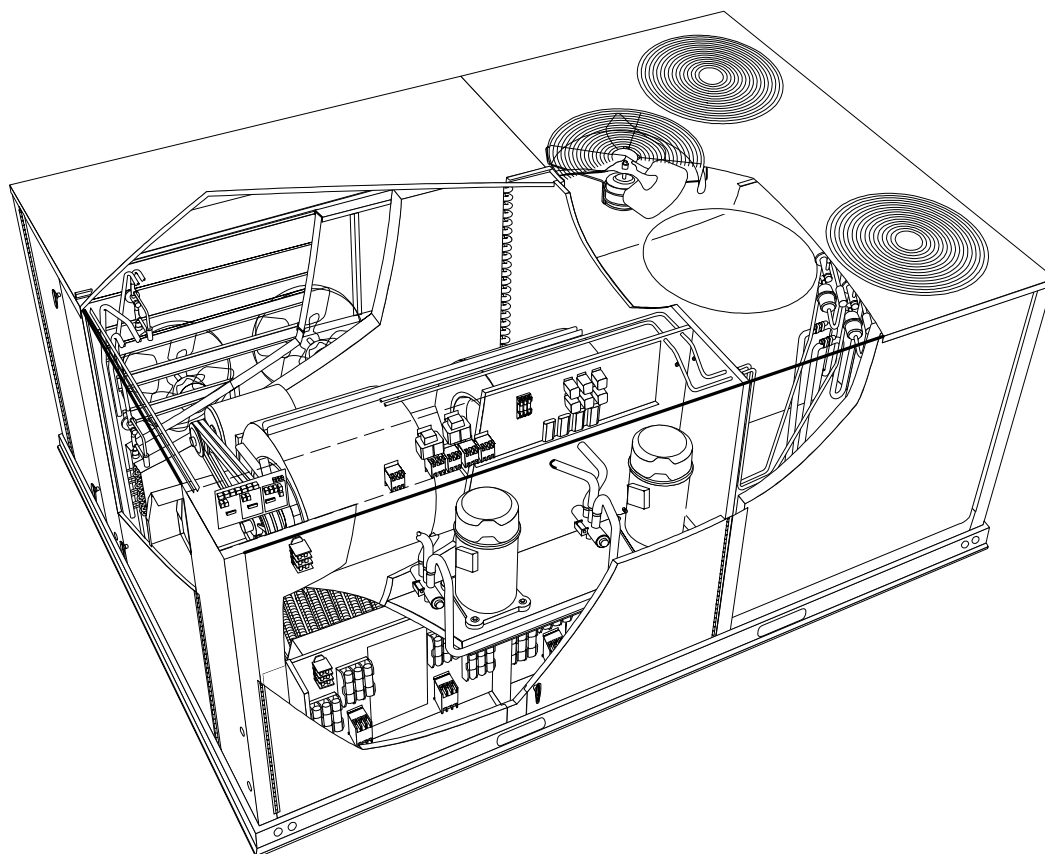
LHA180H (15-TON) LHA240H (20-TON)

HEAT PUMP UNITS
504,436M
6/2001
Supersedes 503,943M

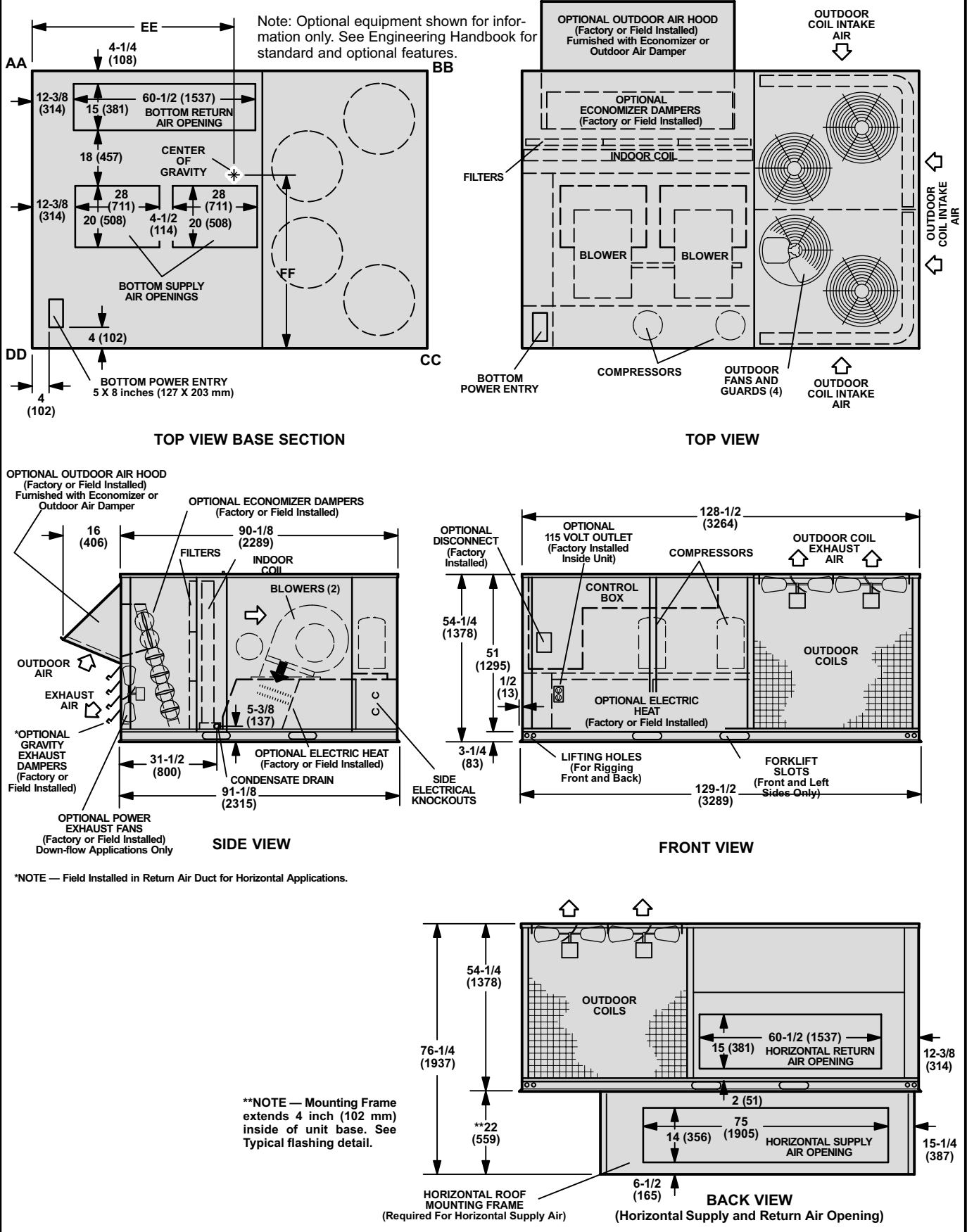
**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**

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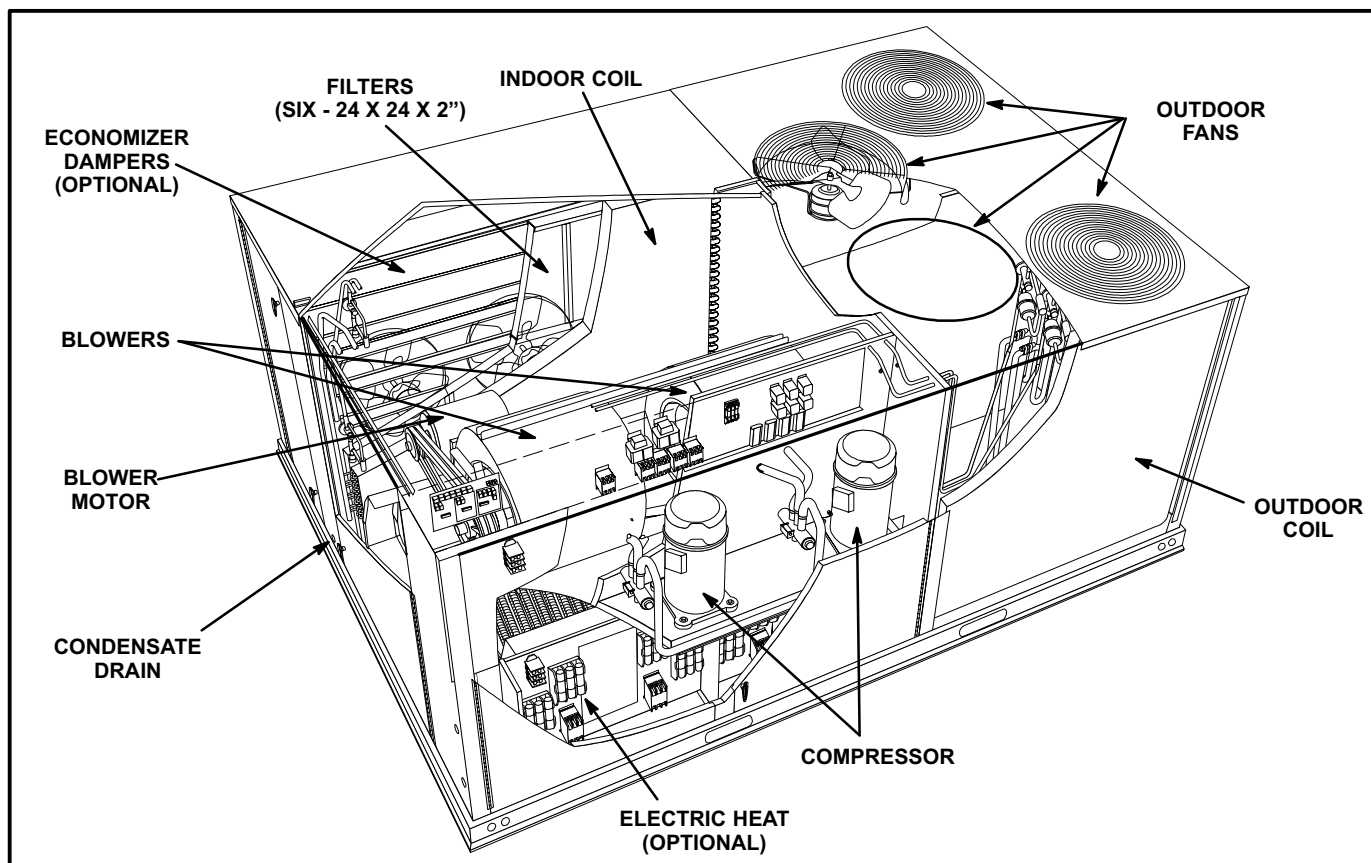
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LHA180 & 240 Dimensions



LHA180 & 240 Parts Arrangement



Shipping and Packing List

Package 1 of 1 contains:

- 1- Assembled unit

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.

Requirements

The LHA unit is ETL certified for outdoor installations only at the clearances to combustibles listed on unit nameplate and in figure 1.

Installation of LHA heat pumps must conform with standards in National Fire Protection Association (NFPA) "Standard for Installation of Air Conditioning and Ventilating Systems NFPA No. 90A," "Standard for

Installation of Residence Type Warm Air Heating and Air conditioning Systems NFPA No. 90B," local municipal building codes and manufacturer's installation instructions.

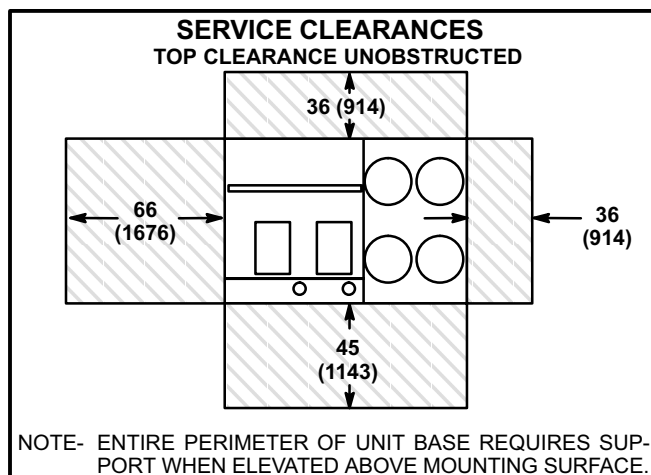


FIGURE 1

The National Electric Code (ANSI/NFPA No. 70-1984) is available from:

National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210

The LHA unit is Canadian Gas Association (C.G.A.) certified as a heat pump with cooling and with or without auxiliary electric heat for non-residential use only at the clearances to combustible materials as listed on the unit nameplate and in figure 1.

Installation of C.G.A. certified units must conform with current standard C273.5 "Installation Requirements for Heat Pumps" and applicable local codes. Authorities having jurisdiction should be consulted before installation.

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.

Unit Support

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

A-Downflow Discharge Application

Roof Mounting with LARMF18/24

- 1- The LARMF18/24 roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The LARMF18/24 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 LHA 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 LHA unit, depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

- 1- The LHA 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 LHA 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 an LHA unit on a combustible surface for downflow discharge applications, the LARMF18/24 roof mounting frame is required.

B-Horizontal Discharge Applications

- 1- Units installed in horizontal airflow applications must use an LARMFH18/24 horizontal roof mounting frame. The supply air duct connects to the horizontal supply air opening on the LARMFH18/24. The return air duct connects to the unit horizontal return air opening. Refer to unit dimensions.
- 2- Specified installation clearances must be maintained when installing LHA units. Refer to figure 1.
- 3- Top of support slab should be at least 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 weatherproofed 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

- 1- Detach wooden base protection before rigging.
- 2- Connect rigging to the unit base using both holes in each corner. See figure 2.
- 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 top of unit.)

UNIT	WEIGHT*	
	LBS.	KG.
LHA180	2560	1162
LHA240	2600	1180

*Maximum weight with all available factory-installed accessories.

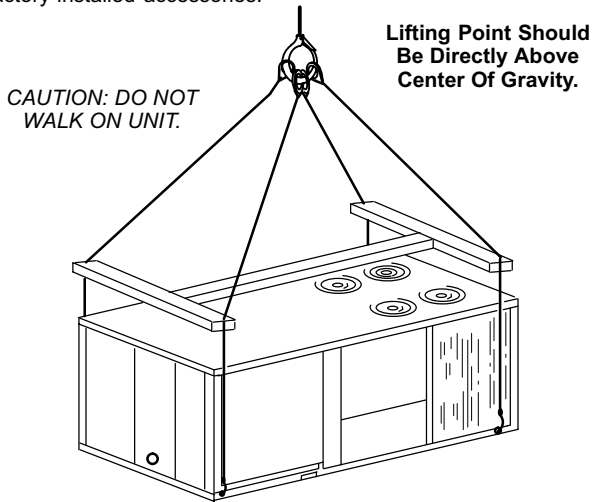


FIGURE 2

Condensate Drains

Make drain connection to the 1" N.P.T. drain nipple 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.

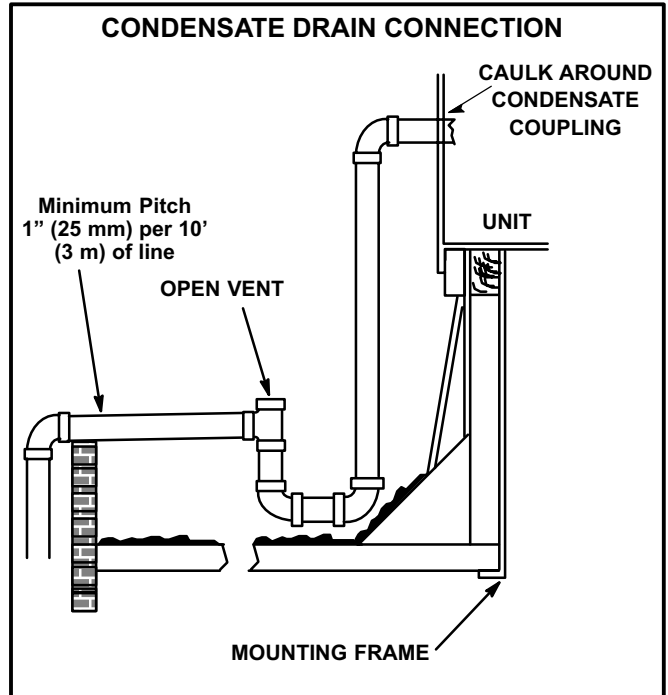


FIGURE 3

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 A56 EM1 economizer board is positioned on the A55 M1 main control board in the unit control box. See the Integrated Modular Control Guide provided with this unit 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 hoods and install as follows:

- 1- Remove screws securing side flanges of top hood to unit. See figure 4.
- 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 4.
- 3- Align two holes on intake hood side panel with two holes on bottom (longer) filter bracket. See figure 5. Secure both sides of bottom filter bracket to hood sides with sheet metal screws.
- 4- Secure intake hood sides to unit.
- 5- Position hood stiffener underneath hood top and align screw holes with hood top screw holes. Secure with sheet metal screws.

- 6- Secure the longer top filter bracket to top of hood as shown in figures 4 and 5. Install two filters.
- 7- Slide third filter into bottom filter bracket and hold in place at the top of the opening with the shorter filter bracket. Align holes on hood with bracket holes and secure filter bracket with sheet metal screws.

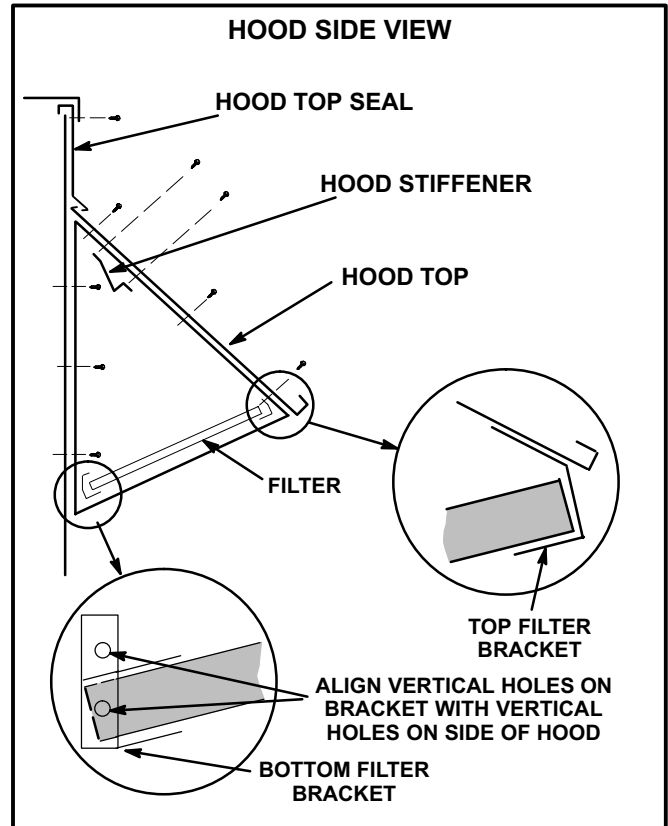


FIGURE 4

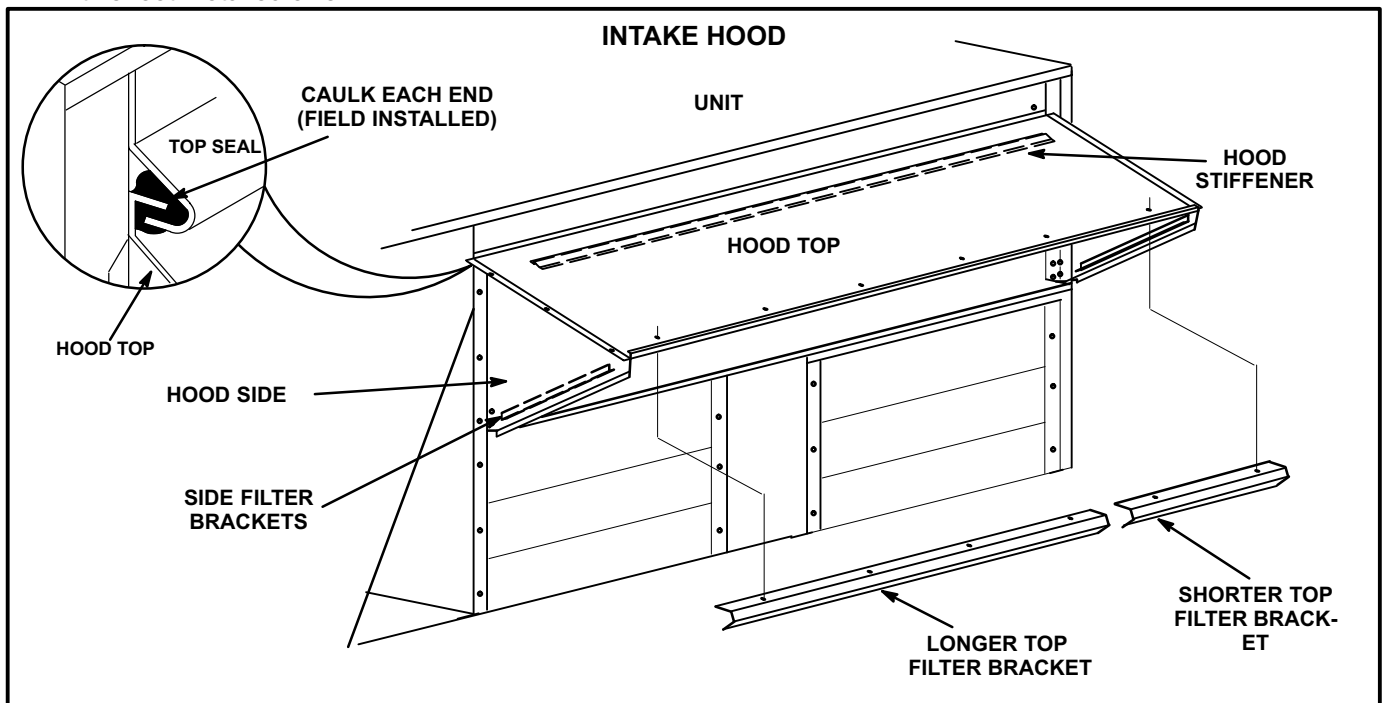


FIGURE 5

Electrical Connections

POWER SUPPLY

Do not apply power or close disconnect switch until installation is complete. Refer to start-up directions. Refer closely to unit wiring diagram. Figure 7 shows a typical LHA180H & 240H wiring diagram.

Refer to unit nameplate for minimum circuit ampacity and maximum fuse size.

- 1- 230,460,575 volt units are factory wired. For 208V supply, disconnect the orange wire (230V) at control power transformer(s). Reconnect the red wire (208V). Tape the exposed end of the 230V orange wire.
- 2- Route power through the bottom power entry area and connect to line side of unit disconnect. If unit does not contain optional controls package, connect power wiring to TB13. See unit wiring diagram.
- 3- *Units With Optional 120v GFCI Outlet-*
Route and connect separate 120v wiring to GFCI outlets which do not have factory-installed wiring.

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 (1524 mm) 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-Control Wiring

- 1- 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.

- 2- Install thermostat assembly in accordance with instructions provided with thermostat. See figure 6 for field wiring electronic and electro-mechanical thermostats. If using other temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.

IMPORTANT-Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may allow unit to operate but not with proper response to room demand.

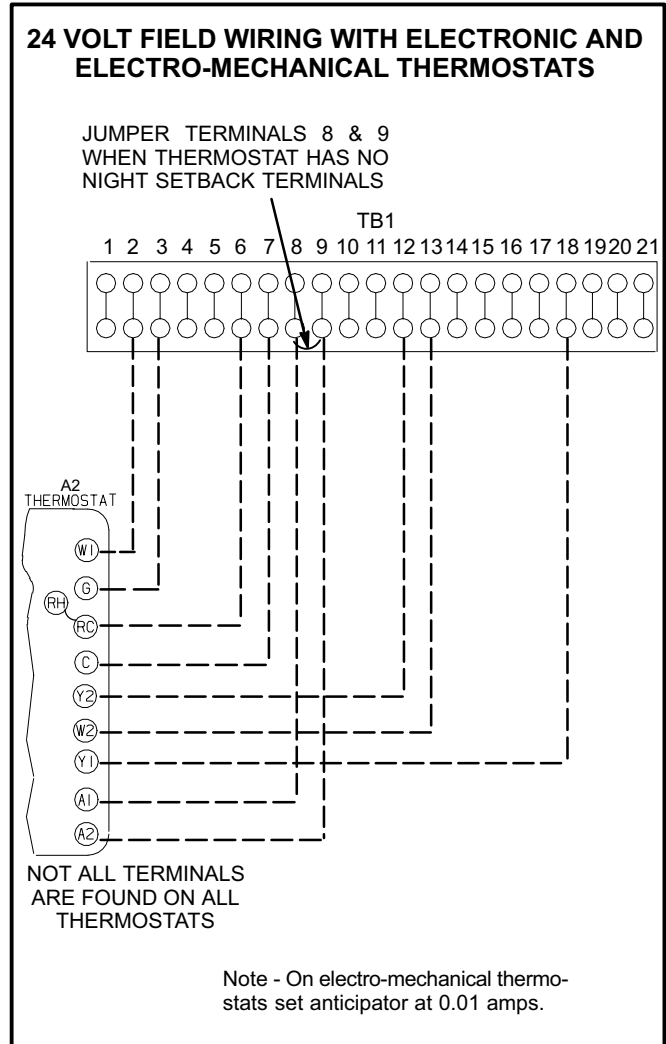
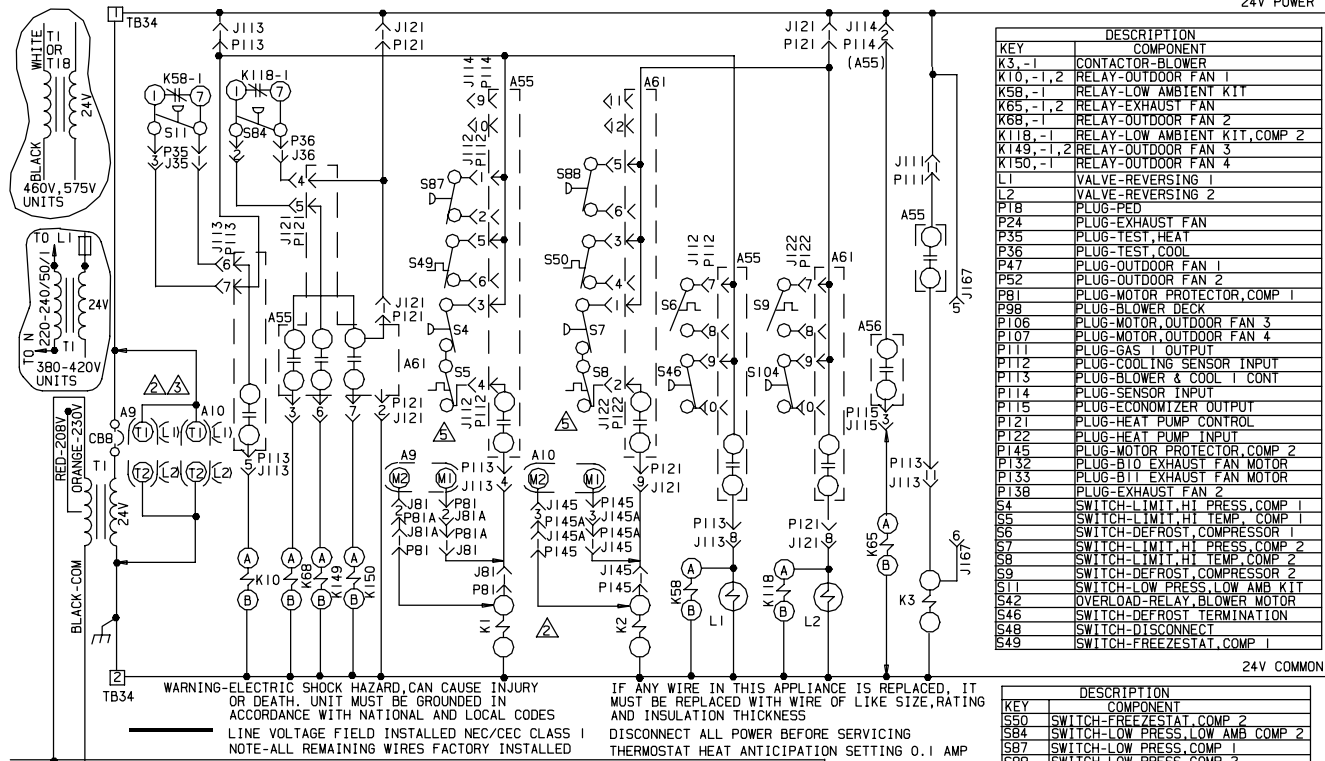


FIGURE 6

TYPICAL LHA180 & 240 UNIT WIRING SCHEMATIC

24V POWER

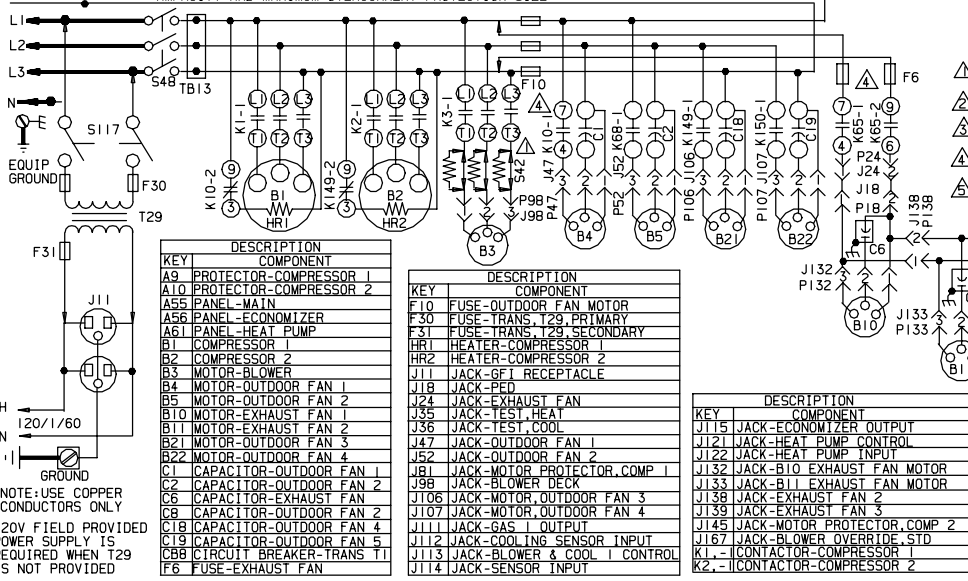


KEY	DESCRIPTION	COMPONENT
K3,-1	CONTACTOR-BLOWER	
K10,-1,2	RELAY-OUTDOOR FAN 1	
K58,-1	RELAY-LOW AMBIENT KIT	
K65,-1,2	RELAY-EXHAUST FAN	
K68,-1	RELAY-OUTDOOR FAN 2	
K118,-1	RELAY-LOW AMBIENT KIT, COMP 2	
K149,-1,2	RELAY-OUTDOOR FAN 3	
K150,-1	RELAY-OUTDOOR FAN 4	
L1	VALVE-REVERSING 1	
L2	VALVE-REVERSING 2	
P18	PLUG-PED	
P24	PLUG-EXHAUST FAN	
P35	PLUG-TEST, HEAT	
P36	PLUG-TEST, COOL	
P47	PLUG-OUTDOOR FAN 1	
P52	PLUG-OUTDOOR FAN 2	
P81	PLUG-MOTOR PROTECTOR, COMP 1	
P88	PLUG-BLOWER DECK	
P106	PLUG-MOTOR, OUTDOOR FAN 3	
P107	PLUG-MOTOR, OUTDOOR FAN 4	
P111	PLUG-GAS I OUTPUT	
P112	PLUG-COOLING SENSOR INPUT	
P113	PLUG-BLOWER & COOL I CONT	
P114	PLUG-SENSOR INPUT	
P115	PLUG-ECONOMIZER OUTPUT	
P121	PLUG-HEAT PUMP CONTROL	
P122	PLUG-HEAT PUMP INPUT	
P145	PLUG-MOTOR PROTECTOR, COMP 2	
P132	PLUG-B10 EXHAUST FAN MOTOR	
P133	PLUG-B11 EXHAUST FAN MOTOR	
P138	PLUG-EXHAUST FAN 2	
S4	SWITCH-I UNIT, HI PRESS, COMP 1	
S5	SWITCH-I UNIT, HI TEMP, COMP 1	
S6	SWITCH-DEFROST, COMPRESSOR 1	
S7	SWITCH-I UNIT, HI PRESS, COMP 2	
S8	SWITCH-I UNIT, HI TEMP, COMP 2	
S9	SWITCH-DEFROST, COMPRESSOR 2	
S11	SWITCH-LOW PRESS, LOW AMB KIT	
S42	OVERLOAD-RELAY, BLOWER MOTOR	
S46	SWITCH-DEFROST TERMINATION	
S48	SWITCH-DISCONNECT	
S49	SWITCH-FREEZE/STAT, COMP 1	

24V COMMON

KEY	DESCRIPTION	COMPONENT
S50	SWITCH-FREEZE/STAT, COMP 2	
S84	SWITCH-LOW PRESS, LOW AMB COMP 2	
S87	SWITCH-LOW PRESS, COMP 1	
S88	SWITCH-LOW PRESS, COMP 2	
S104	SWITCH-DEFROST PRESS, COMP 2	
S117	SWITCH-DEFI	
T1	TRANSFORMER-CONTROL	
T18	TRANSFORMER-CONTACTOR	
T29	TRANSFORMER-GEI	
TB13	TERMINAL STRIP-POWER DISTRIB	
TB34	TERMINAL STRIP-24VAC POWER	

S42 USED ON "M" VOLTAGE UNITS AND UNITS WITH HIGH EFFICIENCY MOTORS
A9, A10, J81 AND P81 ARE USED ON -J VOLTAGE UNITS ONLY
MOTOR PROTECTORS MAY HAVE S1, S2, L1 & L2 OR S, S1, T1 & T2 TERMINALS
F6 AND F10 FUSES ARE USED ON Y VOLTAGE UNITS ONLY
S5 AND S8 USED ON -2 UNITS WITH COPELAND COMPRESSORS



KEY	DESCRIPTION	COMPONENT
A9	PROTECTOR-COMPRESSOR 1	
A10	PROTECTOR-COMPRESSOR 2	
A55	PANEL-MAIN	
A56	PANEL-ECONOMIZER	
A61	PANEL-HEAT PUMP	
B1	COMPRESSOR 1	
B2	COMPRESSOR 2	
B3	MOTOR-BLOWER	
B4	MOTOR-OUTDOOR FAN 1	
B5	MOTOR-OUTDOOR FAN 2	
B10	MOTOR-EXHAUST FAN 1	
B11	MOTOR-EXHAUST FAN 2	
B21	MOTOR-OUTDOOR FAN 3	
B22	MOTOR-OUTDOOR FAN 4	
C1	CAPACITOR-OUTDOOR FAN 1	
C2	CAPACITOR-OUTDOOR FAN 2	
C6	CAPACITOR-EXHAUST FAN	
C8	CAPACITOR-OUTDOOR FAN 2	
C18	CAPACITOR-OUTDOOR FAN 4	
C19	CAPACITOR-OUTDOOR FAN 5	
C89	CIRCUIT BREAKER-TRANS T1	
F6	FUSE-EXHAUST FAN	

KEY	DESCRIPTION	COMPONENT
F10	FUSE-OUTDOOR FAN MOTOR	
F30	FUSE-TRANS, T29, PRIMARY	
F31	FUSE-TRANS, T29, SECONDARY	
HR1	HEATER-COMPRESSOR 1	
HR2	HEATER-COMPRESSOR 2	
J11	JACK-GEI RECEPTACLE	
J18	JACK-PED	
J24	JACK-EXHAUST FAN	
J35	JACK-TEST, HEAT	
J36	JACK-TEST, COOL	
J47	JACK-OUTDOOR FAN 1	
J52	JACK-OUTDOOR FAN 2	
J81	JACK-MOTOR PROTECTOR, COMP 1	
J98	JACK-BLOWER DECK	
J106	JACK-MOTOR, OUTDOOR FAN 3	
J107	JACK-MOTOR, OUTDOOR FAN 4	
J111	JACK-GAS I OUTPUT	
J112	JACK-COOLING SENSOR INPUT	
J113	JACK-BLOWER & COOL I CONTROL	
J114	JACK-SENSOR INPUT	

KEY	DESCRIPTION	COMPONENT
J115	JACK-ECONOMIZER OUTPUT	
J121	JACK-HEAT PUMP CONTROL	
J122	JACK-HEAT PUMP INPUT	
J132	JACK-B10 EXHAUST FAN MOTOR	
J133	JACK-B11 EXHAUST FAN MOTOR	
J138	JACK-EXHAUST FAN 2	
J139	JACK-EXHAUST FAN 3	
J145	JACK-MOTOR PROTECTOR, COMP 2	
J167	JACK-BLOWER OVERRIDE, STD	
K1,-1	CONTACTOR-COMPRESSOR 1	
K2,-1	CONTACTOR-COMPRESSOR 2	

WIRING DIAGRAM 5/01

HEAT PUMPS-PACKAGED

LHA-180, 240-1, 2-G, J, M, Y

HEAT PUMP SECTION B15

Supersedes Form No. 533, 141W
New Form No. 533, 745W

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FIGURE 7

Blower Operation And Adjustments

A-Blower Operation

- 1- Set thermostat or temperature control device fan switch to **AUTO** or **ON**. With fan switch in **ON** position, blower will operate continuously. With fan switch in **AUTO** position, the blower will cycle with demand.
- 2- Blower and entire unit will be off when thermostat or temperature control device system switch is in **OFF** position.

B-Blower Access

The blower assembly is secured to a sliding base which allows the entire assembly to be pulled out of the unit. See figure 8.

- 1- Disconnect blower motor jack J98 from blower motor plug P98.
- 2- Remove screws on either side of sliding base. Pull base toward outside of unit.

C-Determining Unit CFM

- 1- The following measurements must be made with a dry indoor coil and with air filters in place. Run blower without a cooling demand.
- 2- With all access panels in place, measure static pressure external to unit (from supply to return).
- 3- Measure the indoor blower shaft RPM.

- 4- Referring to table 1, use static pressure and RPM readings to determine unit CFM. Use table 2 when installing units with any of the optional accessories listed.
- 5- 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 8.

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.

- 1- Loosen four screws securing blower motor to sliding base. See figure 8.
- 2- *To increase belt tension -*
Turn belt tension adjusting screw to the left, or counterclockwise, to tighten the belt. This increases the distance between the blower motor and the blower housing.
- To loosen belt tension -*
Turn the adjusting screw to the right, or clockwise to loosen belt tension.
- 3- Tighten four screws securing blower motor to sliding base once adjustments have been made.

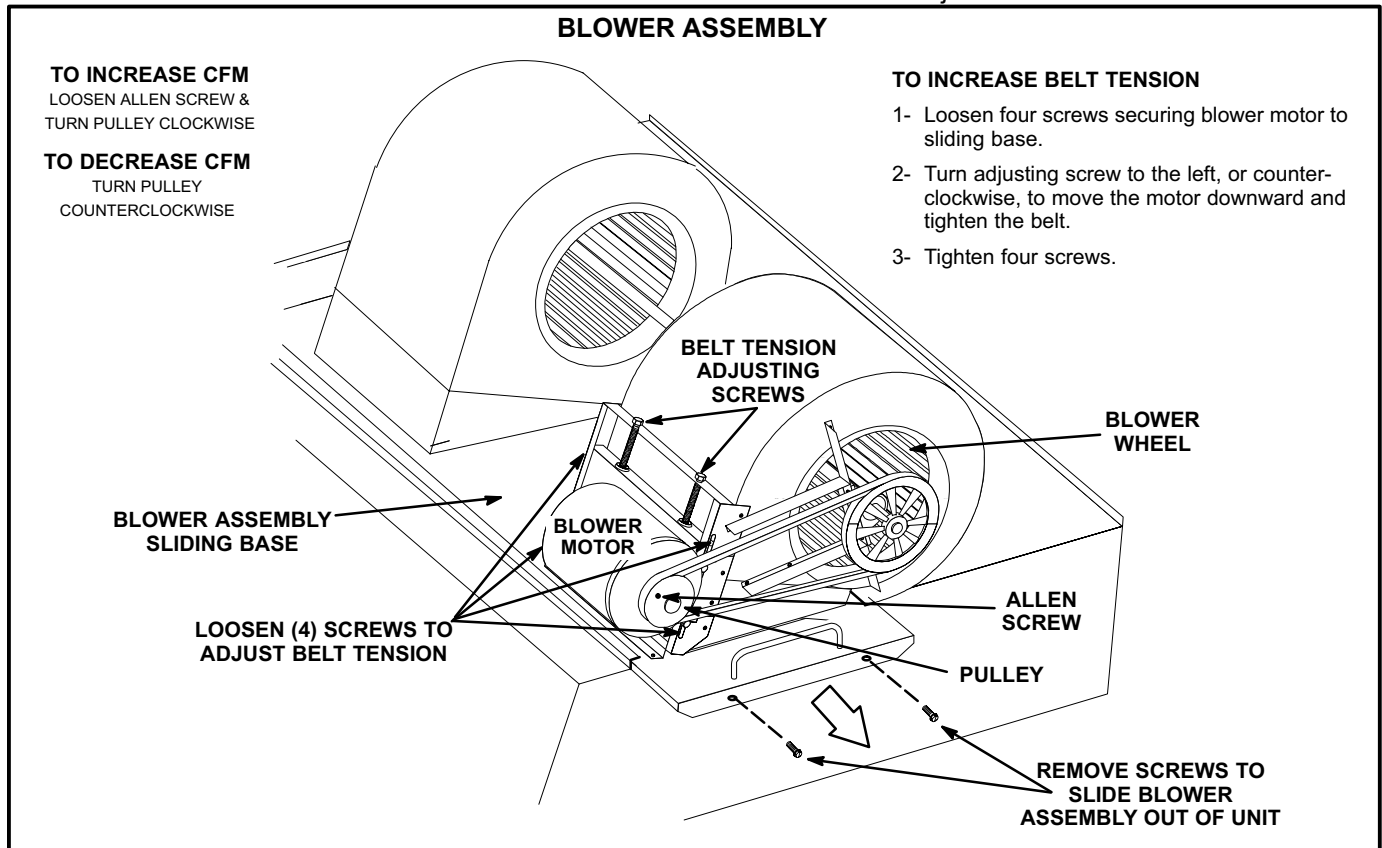


FIGURE 8

E-Check Belt Tension

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

- 1- Measure span length X. See figure 9.
- 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.

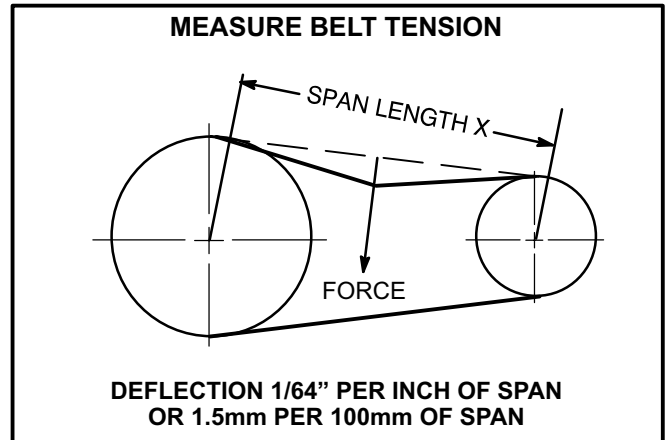


FIGURE 9

TABLE 1
FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE

Air Volume cfm (L/s)	TOTAL STATIC PRESSURE — Inches Water Gauge (Pa)													
	.20 (50)	.40 (100)	.60 (150)	.80 (200)	1.00 (250)	1.20 (300)	1.40 (350)	1.60 (400)	1.80 (450)	2.00 (495)	2.20 (545)	2.40 (595)	2.60 (645)	
	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)	RPMBHP (kW)
4500 (2125)	405 (0.55) (0.41)	510 (0.80) (0.60)	605 (1.10) (0.82)	690 (1.40) (1.04)	760 (1.70) (1.27)	825 (2.05) (1.53)	885 (2.35) (1.75)	945 (2.70) (2.01)	995 (3.00) (2.24)	1045 (3.35) (2.50)	1095 (3.70) (2.76)	1140 (4.05) (3.02)	1185 (4.45) (3.32)	
4750 (2240)	410 (0.60) (0.45)	515 (0.85) (0.63)	610 (1.20) (0.90)	695 (1.50) (1.12)	765 (1.85) (1.38)	830 (2.15) (1.60)	890 (2.50) (1.87)	950 (2.85) (2.13)	1000 (3.20) (2.39)	1050 (3.55) (2.65)	1100 (3.90) (2.91)	1145 (4.30) (3.21)	1185 (4.60) (3.43)	
5000 (2360)	415 (0.65) (0.48)	520 (0.95) (0.71)	615 (1.25) (0.93)	695 (1.60) (1.19)	770 (1.95) (1.45)	835 (2.30) (1.72)	895 (2.65) (1.98)	950 (3.00) (2.24)	1005 (3.40) (2.54)	1055 (3.75) (2.80)	1100 (4.10) (3.06)	1145 (4.45) (3.32)	1190 4.85 (3.62)	
5250 (2475)	420 (0.70) (0.52)	525 (1.00) (0.75)	620 (1.35) (1.01)	700 (1.70) (1.27)	775 (2.10) (1.57)	840 (2.45) (1.83)	900 (2.80) (2.09)	955 (3.15) (2.35)	1010 (3.55) (2.65)	1060 (3.95) (2.95)	1105 (4.30) (3.21)	1150 (4.70) (3.51)	1195 5.10 (3.80)	
5500 (2595)	425 (0.75) (0.56)	530 (1.10) (0.82)	625 (1.45) (1.08)	705 (1.85) (1.38)	775 (2.20) (1.64)	845 (2.60) (1.94)	905 (2.95) (2.20)	960 (3.30) (2.50)	1010 (3.70) (2.76)	1065 (4.15) (3.10)	1110 (4.55) (3.39)	1155 (4.95) (3.69)	1200 5.35 (3.99)	
5750 (2715)	430 (0.80) (0.60)	535 (1.15) (0.86)	630 (1.55) (1.16)	710 (1.95) (1.45)	780 (2.35) (1.75)	845 (2.70) (2.01)	905 (3.10) (2.31)	965 (3.55) (2.65)	1015 (3.90) (2.91)	1065 (4.35) (3.25)	1115 (4.75) (3.54)	1160 (5.15) (3.84)	----	
6000 (2830)	430 (0.85) (0.63)	540 (1.25) (0.93)	635 (1.65) (1.23)	715 (2.05) (1.53)	785 (2.45) (1.83)	850 (2.85) (2.13)	910 (3.30) (2.46)	965 (3.70) (2.76)	1020 (4.10) (3.06)	1070 (4.55) (3.39)	1120 (5.00) (3.73)	1165 (5.40) (4.03)	----	
6250 (2950)	435 (0.95) (0.71)	545 (1.35) (1.01)	640 (1.80) (1.34)	720 (2.20) (1.64)	790 (2.60) (1.94)	855 (3.05) (2.28)	915 (3.45) (2.57)	970 (3.90) (2.91)	1025 (4.35) (3.25)	1075 (4.75) (3.54)	1120 (5.20) (3.88)	1165 (5.65) (4.21)	----	
6500 (3065)	445 (1.05) (0.78)	550 (1.45) (1.08)	640 (1.85) (1.38)	725 (2.35) (1.75)	795 (2.75) (2.05)	860 (3.20) (2.39)	920 (3.65) (2.72)	975 (4.10) (3.06)	1030 (4.55) (3.39)	1080 (5.00) (3.73)	1125 (5.45) (4.07)	1170 (5.90) (4.40)	----	
6750 (3185)	450 (1.10) (0.82)	555 (1.55) (1.16)	645 (1.95) (1.49)	725 (2.45) (1.83)	800 (2.90) (2.16)	865 (3.40) (2.54)	925 (3.85) (2.87)	980 (4.30) (3.21)	1035 (4.75) (3.54)	1085 (5.25) (3.92)	1130 (5.70) (4.25)	1175 (6.15) (4.59)	----	
7000 (3305)	455 (1.20) (0.90)	560 (1.65) (1.23)	650 (2.10) (1.57)	730 (2.60) (1.94)	805 (3.10) (2.31)	870 (3.55) (2.65)	930 (4.05) (3.02)	985 (4.50) (3.36)	1035 (4.95) (3.69)	1085 (5.45) (4.07)	1135 (5.95) (4.44)	1180 (6.45) (4.81)	----	
7250 (3420)	460 (1.25) (0.93)	565 (1.75) (1.31)	655 (2.25) (1.68)	735 (2.75) (2.05)	810 (3.25) (2.42)	875 (3.75) (2.80)	935 (4.25) (3.17)	990 (4.70) (3.51)	1040 (5.20) (3.88)	1090 (5.70) (4.25)	1140 (6.20) (4.63)	1185 (6.70) (5.00)	----	
7500 (3540)	465 (1.35) (1.01)	570 (1.85) (1.38)	660 (2.35) (1.75)	740 (2.90) (2.16)	815 (3.40) (2.54)	880 (3.95) (2.95)	935 (4.40) (3.28)	995 (4.95) (3.69)	1045 (5.45) (4.07)	1095 (5.95) (4.44)	1140 (6.45) (4.81)	1190 7.00 (5.22)	----	
7750 (3655)	470 (1.45) (1.08)	575 (2.00) (1.49)	665 (2.50) (1.87)	745 (3.05) (2.28)	820 (3.60) (2.69)	880 (4.10) (3.06)	940 (4.60) (3.43)	995 (5.15) (3.84)	1050 (5.70) (4.25)	1100 (6.20) (4.63)	1145 (6.70) (5.00)	1190 7.25 (5.41)	----	
8000 (3775)	480 (1.60) (1.19)	585 (2.15) (1.60)	675 (2.70) (2.01)	750 (3.20) (2.39)	820 (3.75) (2.80)	885 (4.30) (3.21)	945 (4.85) (3.62)	1000 (5.35) (3.99)	1055 (5.95) (4.44)	1105 (6.50) (4.85)	1150 (7.00) (5.22)	1195 7.55 (5.63)	----	
8250 (3895)	485 (1.70) (1.27)	590 (2.25) (1.68)	680 (2.85) (2.13)	755 (3.35) (2.50)	825 (3.95) (2.95)	890 (4.50) (3.36)	950 (5.05) (3.77)	1005 (5.60) (4.18)	1060 (6.20) (4.63)	1110 (6.75) (5.04)	1155 (7.30) (5.45)	1200 7.85 (5.86)	----	
8500 (4010)	490 (1.80) (1.34)	595 (2.40) (1.79)	685 (3.00) (2.24)	760 (3.55) (2.65)	830 (4.10) (3.06)	895 (4.70) (3.51)	955 (5.30) (3.95)	1010 (5.85) (4.36)	1065 (6.45) (4.81)	1110 (7.00) (5.22)	1160 (7.60) (5.67)	----	----	
8750 (4130)	500 (1.90) (1.42)	600 (2.50) (1.87)	690 (3.15) (2.35)	765 (3.75) (2.80)	835 (4.30) (3.21)	900 (4.95) (3.69)	960 (5.55) (4.14)	1015 (6.10) (4.55)	1065 (6.70) (5.00)	1115 (7.30) (5.45)	1165 (7.90) (5.89)	----	----	
9000 (4245)	505 (2.05) (1.53)	610 (2.70) (2.01)	695 (3.30) (2.46)	770 (3.90) (2.91)	840 (4.55) (3.39)	905 (5.15) (3.84)	965 (5.75) (4.29)	1020 (6.40) (4.77)	1070 (6.95) (5.18)	1120 (7.60) (5.67)	1170 (8.25) (6.15)	----	----	
9250 (4365)	515 (2.20) (1.64)	615 (2.85) (2.13)	700 (3.50) (2.61)	775 (4.10) (3.06)	845 (4.75) (3.54)	910 (5.40) (4.03)	970 (6.00) (4.48)	1025 (6.65) (4.96)	1075 (7.25) (5.41)	1125 (7.90) (5.89)	1170 (8.50) (6.34)	----	----	
9500 (4485)	525 (2.35) (1.75)	620 (3.00) (2.24)	705 (3.65) (2.72)	785 (4.35) (3.25)	850 (4.95) (3.69)	915 (5.60) (4.18)	975 (6.30) (4.70)	1030 (6.90) (5.15)	1080 (7.55) (5.63)	1130 (8.20) (6.12)	----	----	----	
9750 (4600)	530 (2.50) (1.87)	630 (3.20) (2.39)	715 (3.85) (2.87)	790 (4.55) (3.39)	855 (5.20) (3.88)	920 (5.85) (4.36)	980 (6.55) (4.89)	1035 (7.20) (5.37)	1085 (7.85) (5.86)	1135 (8.50) (6.34)	----	----	----	
10,000 (4720)	540 (2.65) (1.98)	635 (3.35) (2.50)	720 (4.05) (3.02)	795 (4.75) (3.54)	860 (5.40) (4.03)	925 (6.10) (4.55)	985 (6.80) (5.07)	1035 (7.45) (5.56)	1090 (8.15) (6.08)	----	----	----	----	

NOTES — **BLOWER PERFORMANCE TABLE INCLUDES INTERNAL RESISTANCE FOR BASE UNIT ONLY.** All data is measured with dry indoor coil and air filters in place

BASE UNIT WITH OPTIONS/ACCESSORIES:

TOTAL STATIC PRESSURE = TOTAL ADDED INTERNAL STATIC PRESSURE + TOTAL ADDED EXTERNAL STATIC PRESSURE
TO DETERMINE TOTAL ADDED INTERNAL STATIC PRESSURE: For design air volume, determine total air resistance for

- 1) wet indoor coil of selected unit, plus
- 2) all selected factory installed options (heat section, economizer, etc.) and field installed accessories (horizontal roof frame, diffuser, etc.). See table 5 for wet coil and option/accessory air resistance data.

NOTE — BOLD ITALICS INDICATES FIELD FURNISHED DRIVE. 1200 RPM maximum blower speed.

⊕ NOTE — In Canada, nominal motor output is also maximum usable motor output. Maximum usable motor horsepower: 3hp=3.45, 5hp=5.75, 7.5hp=8.62

F-Field-Furnished Blower Drives

For field-furnished blower drives, use tables 1 and 2 to determine BHP and RPM required. Reference table 3 to

determine the drive number and table 4 to determine the manufacturer's model number.

**TABLE 2
FACTORY INSTALLED OPTIONS/FIELD INSTALLED ACCESSORY AIR RESISTANCE**

Air Volume		Total Resistance — inches water gauge (Pa)				
		Wet Indoor Coil		Electric Heat	Economizer	Horizontal Roof Mounting Frame
cfm	L/s	LHA180	LHA240			
4500	2125	.04 (10)	.06 (15)	.01 (2)	.05 (12)	.07 (170)
4750	2240	.04 (10)	.06 (15)	.01 (2)	.05 (12)	.08 (20)
5000	2360	.04 (10)	.07 (17)	.01 (2)	.06 (15)	.08 (20)
5250	2475	.05 (12)	.07 (17)	.02 (5)	.06 (15)	.09 (22)
5500	2595	.05 (12)	.08 (20)	.02 (5)	.06 (15)	.10 (25)
5750	2715	.05 (12)	.08 (20)	.02 (5)	.07 (17)	.11 (27)
6000	2830	.06 (15)	.09 (22)	.02 (5)	.07 (17)	.11 (27)
6250	2950	.06 (15)	.10 (25)	.02 (5)	.08 (20)	.12 (30)
6500	3065	.06 (15)	.10 (25)	.03 (7)	.08 (20)	.13 (32)
6750	3185	.07 (17)	.11 (27)	.03 (7)	.08 (20)	.14 (35)
7000	3305	.07 (17)	.12 (30)	.03 (7)	.09 (22)	.15 (37)
7250	3420	.08 (20)	.12 (30)	.03 (7)	.09 (22)	.16 (40)
7500	3540	.08 (20)	.13 (32)	.03 (7)	.10 (25)	.17 (42)
7750	3655	.08 (20)	.13 (32)	.04 (10)	.10 (25)	.18 (45)
8000	3775	.09 (22)	.14 (35)	.04 (10)	.11 (27)	.19 (47)
8250	3895	.09 (22)	.15 (37)	.04 (10)	.11 (27)	.20 (50)
8500	4010	.10 (25)	.16 (40)	.04 (10)	.12 (30)	.21 (52)
8750	4130	.10 (25)	.16 (40)	.05 (12)	.12 (30)	.22 (55)
9000	4245	.11 (27)	.17 (42)	.05 (12)	.13 (32)	.24 (60)
9250	4365	.11 (27)	.18 (45)	.05 (12)	.14 (35)	.25 (62)
9500	4485	.12 (30)	.18 (45)	.05 (12)	.14 (35)	.26 (65)
9750	4600	.12 (30)	.19 (47)	.06 (15)	.15 (37)	.27 (67)
10,000	4720	.12 (30)	.20 (50)	.06 (15)	.16 (40)	.29 (72)

**TABLE 3
FACTORY INSTALLED DRIVE KIT SPECIFICATIONS**

Motor Outputs				RPM Range								
Nominal hp	Maximum hp	Nominal kW	Maximum kW	Drive A	Drive 1	Drive 2	Drive 3	Drive 4	Drive 5	Drive 6	Drive 7	Drive 8
3 Std Eff	3.45	2.2	2.6	535-725	685-865	----	----	----	----	----	----	----
3 High Eff	3.45	2.2	2.6	----	----	685-865	----	----	----	----	----	----
5	5.75	3.7	4.3	----	----	685-865	850-1045	945-1185	----	----	----	----
7.5	8.63	5.6	6.4	----	----	----	----	----	945-1185	1045 - 1285	850-1045	----
10	11.5	7.5	8.6	----	----	----	----	----	----	1045 - 1285	----	1135 - 1365

NOTE - Using total air volume and system static pressure requirements determine from blower performance tables rpm and motor output required. Maximum usable output of motors furnished by Lennox are shown. 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 4
MANUFACTURER'S NUMBERS**

DRIVE NO.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS (2 REQUIRED)	
	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.	BROWNING NO.	OEM PART NO.
A	1VP40x7/8	79J0301	1BK95x1-7/16	80K1601	BX59	59A5001
1	1VP50x7/8	P-8-2187	BK100x1-7/16	39L1301	BX62	57A7701
2	1VP50x1-1/8	P-8-1977	BK100x1-7/16	39L1301	BX62	57A7701
3	2VP65x1-1/8	97J6001	2BK110Hx1-7/16	P-8-2725	BX66	97J5901
4	2VP60x1-1/8	P-8-9161	2BK90Hx1-7/16	49K3201	BX62	57A7701
5	2VP60x1-3/8	97J5701	2BK90Hx1-7/16	49K3201	BX63	97J5501
6	2VP65x1-3/8	97J5601	2BK90Hx1-7/16	49K3201	BX64	97J5801
7	2VP65x1-3/8	97J5601	2BK110Hx1-7/16	P-8-2725	BX66	97J5901
8	2VP62x1-3/8	73K3901	2BK80Hx1-7/16	58K2101	BX62	57A7701

NOTE - All fixed sheaves with a letter suffix "H" require a split-taper bushing (OEM 53A1201).

Cooling Start-Up

IMPORTANT-Crankcase heaters 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.

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- Set thermostat or temperature control device fan switch to **AUTO** or **ON**. Set thermostat or temperature control device to initiate a first-stage cooling demand.

A first-stage (Y1) cooling demand will energize compressor 1. An increased cooling demand (Y2) will initiate compressor 2.

Units With Optional Economizer -

The optional economizer will start on a first stage (Y1) cooling demand when outdoor air enthalpy is suitable. An increased cooling demand (Y2) will also energize compressor 1 (default).

- 2- Refrigerant circuits are factory charged with HCFC-22 refrigerant. See unit rating plate for correct amount of charge.
- 3- Units contain two refrigerant circuits or systems. See figure 10.

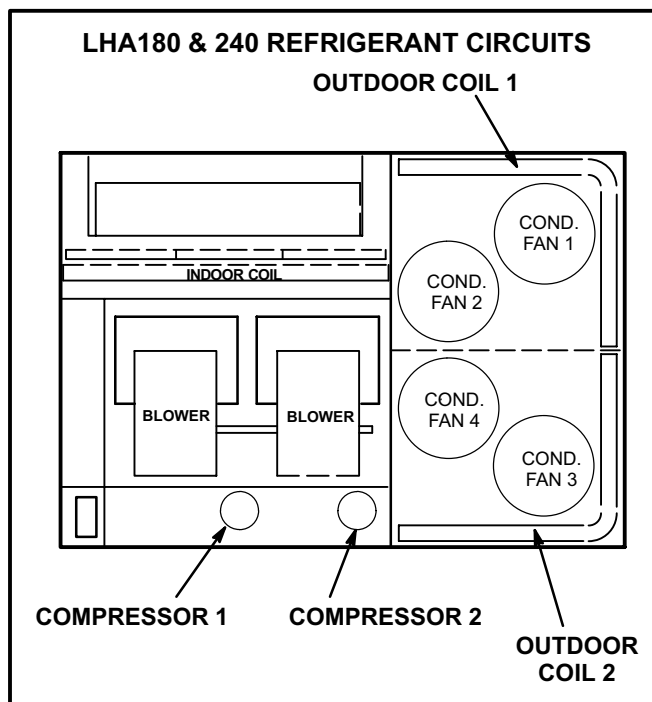


FIGURE 10

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-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:

- 1- Attach gauge manifolds and operate unit in cooling mode until system stabilizes (approximately five minutes). Make sure all 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 table 5 or 6 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 5
LHA180 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	155	70	158	71
75°F	182	71	187	73
85°F	212	71	216	74
95°F	242	72	247	75
105°F	270	72	278	76
115°F	300	73	309	78

**TABLE 6
LHA240 NORMAL OPERATING PRESSURES**

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2	
	Dis. +10 psig	Suct. +5 psig	Dis. +10 psig	Suc. +5 psig
65°F	168	73	168	74
75°F	194	74	195	76
85°F	224	75	228	77
95°F	255	76	260	79
105°F	287	76	292	80
115°F	319	77	322	82

E-Charge Verification - Approach Method

- 8- Using the same thermometer, compare liquid temperature to outdoor ambient temperature.
Approach Temperature = Liquid temperature minus ambient temperature.
- 9- Approach temperature should match values in table 7. An approach temperature greater than value shown indicates an undercharge. An approach temperature less than value shown indicates an overcharge.
- 10- Do not use the approach method if system pressures do not match pressures in table 5 or 6. The approach method is not valid for grossly over or undercharged systems.

**TABLE 7
APPROACH TEMPERATURES**

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
LHA180H	10°F ± 1 (5.5°C ± 0.5)	10°F ± 1 (5.5°C ± 0.5)
LHA240H	11°F ± 1 (6.1°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)

F-Compressor Controls

- 1- High Pressure Switch (S4, S7)
The compressor circuit is protected by a high pressure switch which cuts out at 450 psig \pm 10 psig (3103 kPa \pm 70 kPa) and automatically resets at 300 psig \pm 20psig (2069kPa \pm 138kPa).
- 2- Low Pressure Switches (S87, S88)
The compressor circuits are protected by loss of charge switches. Switches cut out at 25 psig (172 kPa) and automatically reset at 55 psig (379 kPa).
- 3- Crankcase Heaters (HR1, HR2)
The compressors contain a belly band compressor oil heater 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 Switches (S11, S84)
Switches maintain adequate discharge pressure in each circuit by de-energizing outdoor fan when liquid pressure falls below 150 psig. Switches close to energize condenser fans when pressure rises to 275 psig (1896kPa).

During ambient conditions above 55°F (13°C), outdoor fans 1 and 2 cycle with a Y1 cooling demand; outdoor fans 3 and 4 cycle with a Y2 cooling demand.

The A61 HP1 controller de-energizes outdoor fans 2 and 4 when outdoor temperature drops below 55°F (13C).

The A61 HP1 controller cycles outdoor fan 1 via S11 pressure switch and K10 outdoor fan relay. The A55 M1 main controller cycles outdoor fan 3 via S84 pressure switch and K149 outdoor fan relay.
- 5- Low Ambient Relay (K58, K118)
During heating operation, relays prevent S11 and S84 fan cycling.
- 6- Freezestats (S49, S50)
Switches de-energize compressors when indoor coil temperature falls below 29°F (-2°C) to prevent coil freeze-up. Switches reset when indoor coil temperature reaches 58°F (15°C).
- 7- Discharge Temperature Switches (S5, S8)
Switches are wired in series with S4 and S7 high pressure switches. Switches open at 240°F (116°C) and close at 190°F(88°C).

Heating Start-Up

- 1- Set thermostat or temperature control device to initiate a first-stage heating demand.

A first-stage heating demand (W1) will energize compressors 1 and 2. All four outdoor fans are energized with a W1 demand.

LHA Units With Optional Electric Heat -

An increased heating demand (W2) will energize electric heat.

Service

⚠ 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 below, or contact your supervisor.

**P.O. Box 799900
Dallas, TX 75379-9900**

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

A-Lubrication

All motors are lubricated at the factory. No further lubrication is required.

Blower shaft bearings are prelubricated. For extended bearing life, relubricate at least once every two years with a lithium base grease, such as Alvania 3 (Shell Oil), Chevron BRB2 (Standard Oil) or Regal AFB2 (Texas Oil). Use a hand grease gun for relubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

B-Filters

Units are equipped with six 24 X 24 X 2" filters. Filters should be checked 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 11.

NOTE-Filters must be U.L.C. certified or equivalent for use in Canada.

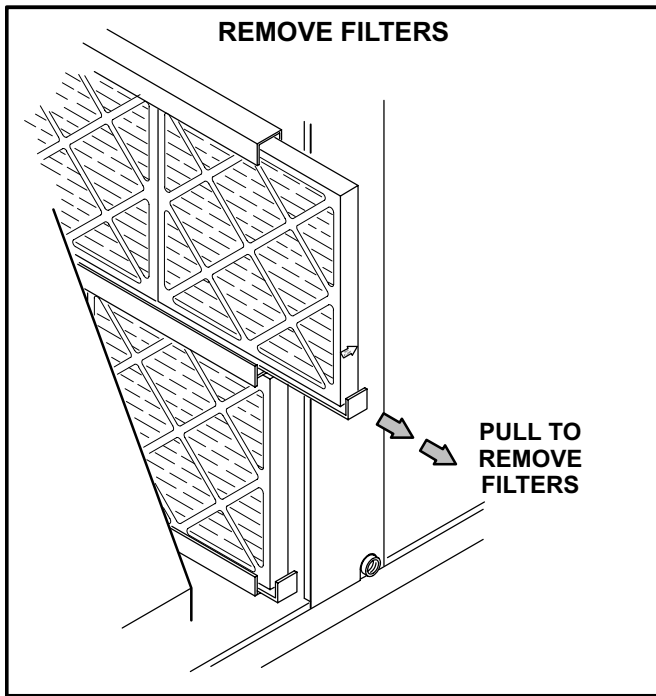


FIGURE 11

C-Indoor Coil

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

D-Outdoor Coil

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

E-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.