

**FILE COPY  
DO NOT USE**

**installation  
operation  
and  
service  
instructions**

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**CHP16-953 & 1353 Units**

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**HEAT PUMP UNITS**  
502,074M  
2/93  
Supersedes 4/89

**RETAIN THESE INSTRUCTIONS  
FOR FUTURE REFERENCE**



**FOR YOUR SAFETY**

**Do not store or use gas or other  
flammable vapors and liquids in  
the vicinity of this or any other  
appliance.**

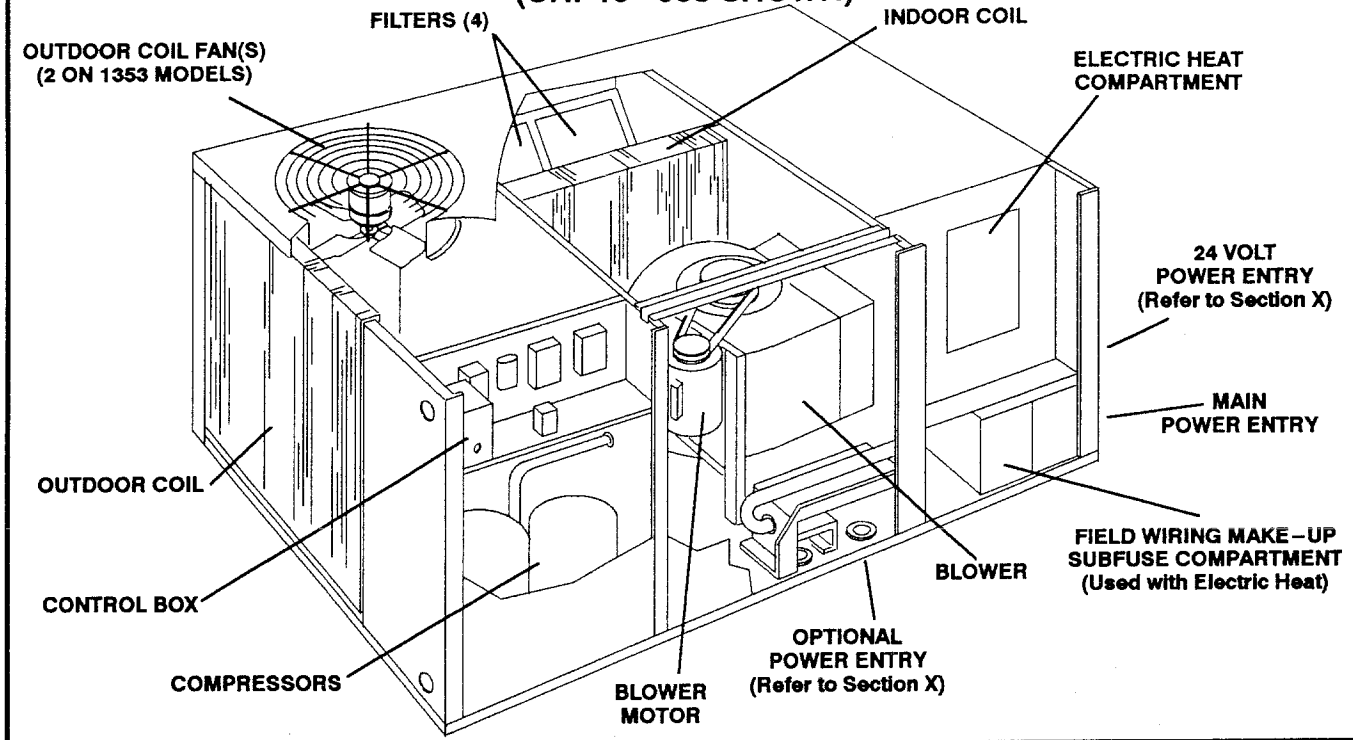
**Technical  
Literature**

Litho U.S.A

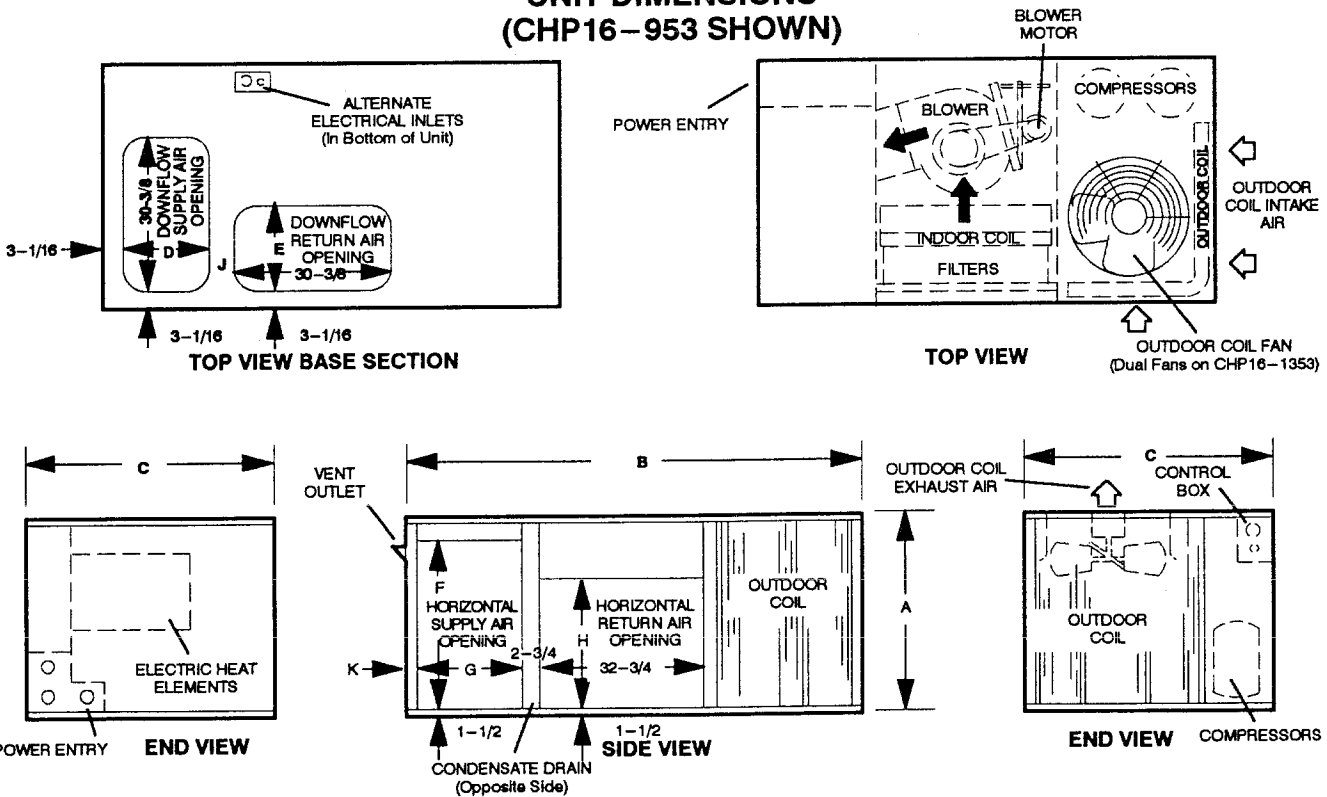
***LENNOX*** Industries Inc.

Dallas, Texas

## PARTS ARRANGEMENT (CHP16-953 SHOWN)



## UNIT DIMENSIONS (CHP16-953 SHOWN)



Model No.	A	B	C	D	E	F	G	H	J	K
CHP16-953	39	88-1/2	48	16-1/2	16-1/2	32-1/8	19-7/16	24-1/8	5-5/8	1-5/8
CHP16-1353	46	94	60	24	24	39-1/8	25-1/4	31-5/8	4-7/16	2

## I—SHIPPING AND PACKING LIST

### Package 1 of 1 contains:

1—Assembled unit

## II—SHIPPING DAMAGE

Check unit for shipping damage. The receiving party should contact the last carrier immediately if any shipping damage is found.

## III—GENERAL

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

## IV—REQUIREMENTS

The CHP16 unit is U.L. design—certified for outdoor installations only at the clearances to combustible materials listed on the unit nameplate and in figure 1. Installation of Lennox 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.

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

National Fire Protection Association  
470 Atlantic Avenue  
Boston, MA 02210

The CHP16 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.

## ! 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.**

Lennox Industries Inc.  
P.O. Box 799900  
Dallas, TX 75379—9900

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.

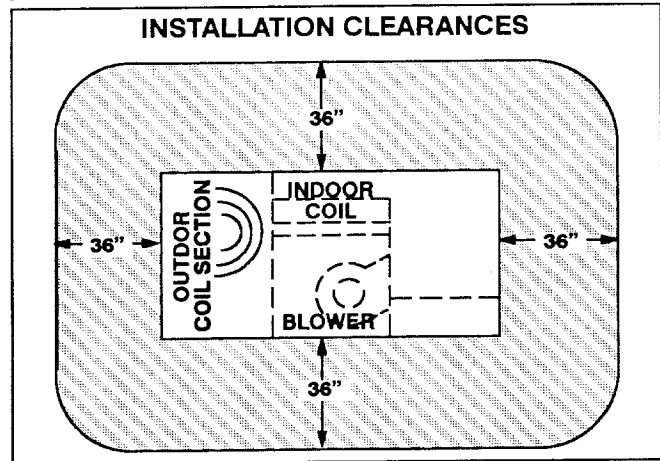


FIGURE 1

## ! 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.**

## V—UNIT SUPPORT

### A—Roof Mounting with Lennox RMF16 Frame — Downflow Discharge Application

- 1—The RMF16 roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2—The RMF16 roof mounting frame should be square and level to 1/16" per linear foot in any direction.
- 3—Duct must be attached to the roof mounting frame and not to the CHP16 unit. Supply and return air plenums must be installed before setting the unit.

### B—Roof Mounting with Installer's Frame — Downflow Discharge Application

*NOTE — When CHP16 is installed on a combustible surface for downflow applications, the Lennox RMF16 roof mounting frame is required.*

Many types of frames can be used to install the CHP16 unit, depending upon different roof structures. Keep in mind the following items when using building frames or supports:

- 1—The CHP16 unit base is fully enclosed and insulated, so an enclosed frame is not required.
- 2—Frames or supports must be constructed with non—combustible materials and should be square and level to 1/16" per linear foot in any direction.

- 3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended frame height is 14 inches.
- 4- Defrost condensate must be removed and should not be allowed to accumulate around unit.

**C-Horizontal Discharge Applications**

- 1- Specified installation clearances must be maintained when installing CHP16 units.
- 2- Top of support slab should be at least four inches above the finished grade and located so no run-off water from higher ground can collect around the unit.
- 3- Horizontal discharge kit LB-55756BA is used with CHP16-953 units; kit LB-55756BB is used with CHP16-1353 units.
- 4- Horizontal discharge units installed on the roof require support along all four sides of the unit base. Supports must be constructed of steel or suitably treated wood materials.

**VI-DUCT CONNECTION**

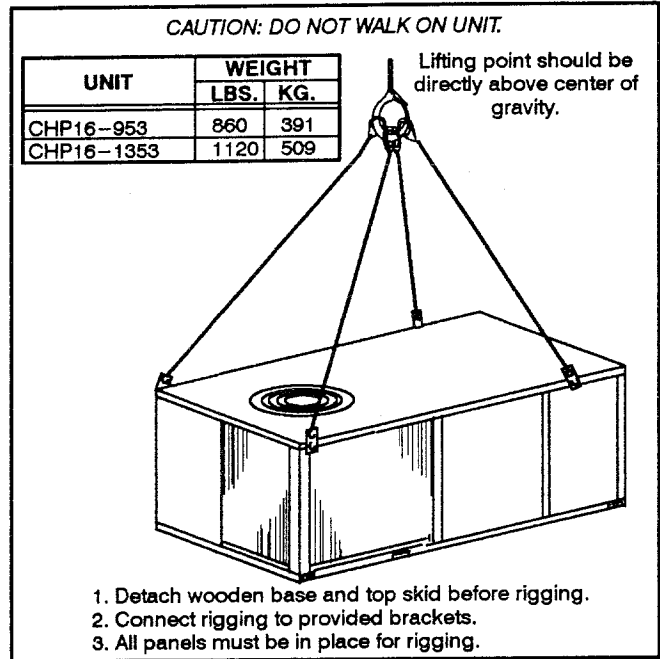
- 1- When Lennox RMF16 mounting frame is used, the duct must be attached to the roof mounting frame. The duct must not be secured to the unit. Refer to RMF16 installations instructions.
- 2- Secure duct to CHP16 flanges with screws if Lennox RMF16 is not used. Unit supply and return air opening dimensions are shown on page 1.
- 3- 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.

**IX-ELECTRIC HEAT OPTION**

Electric elements provide second-stage heat for the CHP16 unit. Elements are stepped automatically by time delays. See instructions provided with electric heat unit for detailed information

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

- 1- 230/460/575 volt units are factory-wired. For 208V power supply, disconnect orange wire (230V) at the control power transformer. Reconnect red wire (208V). Tape exposed end of 230V orange wire.



**FIGURE 2**

**⚠ CAUTION**

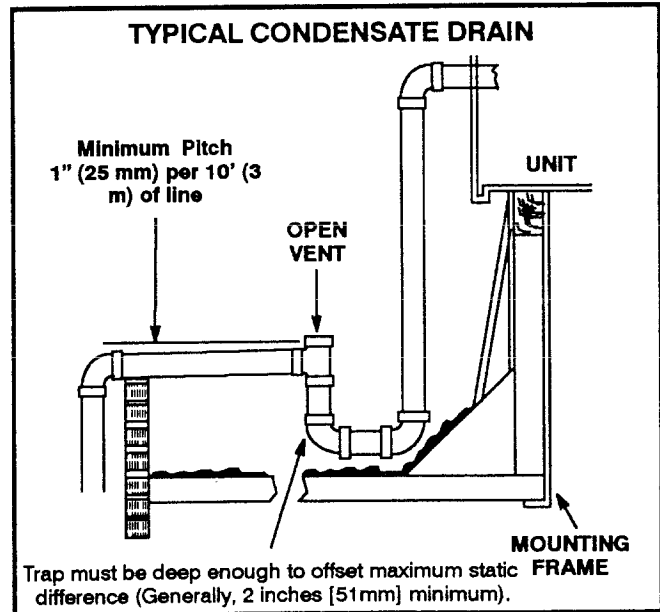
**In downflow applications, do not drill or punch holes in base of unit. Leaking in roof may occur if unit base is punctured.**

**VII-RIGGING UNIT FOR LIFTING**

Rig unit for lifting by attaching four wires to factory-installed brackets as shown in figure 2.

**VIII-CONDENSATE DRAINS**

Make drain connection to the 3/4" 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. Condensate may sometimes be drained onto roof or grade; however, a tee should be fitted to the trap to direct condensate downward. Condensate line must be vented. Check local codes concerning condensate disposal. Refer to page 1 for condensate drain location.



**FIGURE 3**

- 2- Unit is provided with 7/8" diameter power entry knockouts on side and bottom of the unit as marked. The hole should be enlarged by punching or cutting to size required. Bottom power entry must not be used without optional power entry enclosure (LB-55757CA).
- 3- Remove unit electrical knockouts.
- 4- Install adequate disconnect switch external to unit in accordance with local or national codes as applicable.

**XI-ELECTRICAL CONNECTIONS-CONTROL WIRING**  
**A-Room Thermostat Location**

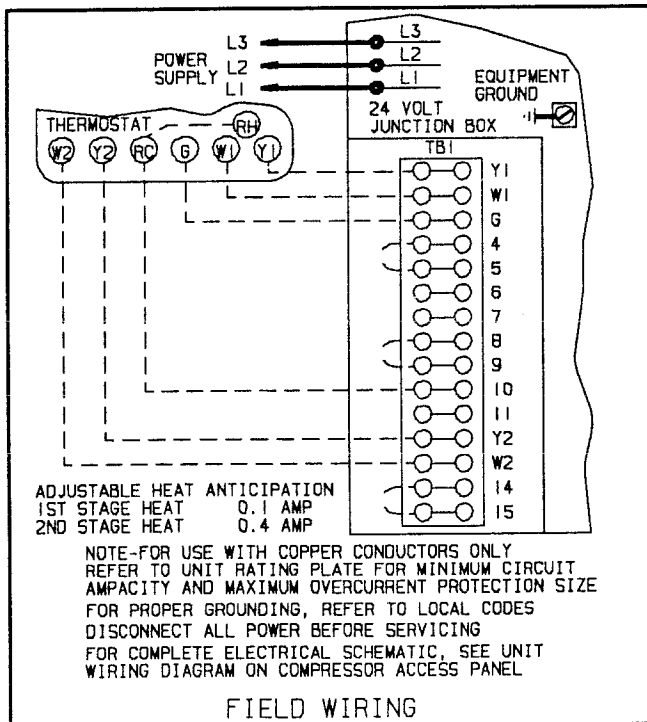
Room thermostat mounts on any non-conductive, flat, vertical surface.

Locate thermostat approximately 5 feet (1.5m) above the floor in an area with good air circulation at average temperature. Avoid locating the thermostat where it might be affected by:

- Drafts or dead spots behind doors or 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 knock-out provided in unit. Plastic bushing is shipped loose in field make-up compartment and must be installed in 24 volt control wiring knockout if conduit is not used. See figure 4 and wiring diagram on unit. For thermostat wire runs up to 50 feet (15m), use 18-gauge wire; and for 60 to 90 feet (18 to 27m) runs, use 16-gauge wire.



**FIGURE 4**

- 2- Install thermostat assembly in accordance with instructions provided with thermostat

**IMPORTANT** – Terminal connections at wall plate or subbase must be made securely. Loose control wire connections may allow unit to operate; however, improper response to room demand may result.

**START-UP / OPERATION / ADJUSTMENT**

**NOTE** – CHP16-1353 units are equipped with wooden shipping blocks beneath each compressor. These blocks should be removed prior to start-up.

**I-COOLING START-UP**

**IMPORTANT** – Crankcase heaters must be energized 24 hours before attempting to start compressors. Set thermostat levers so there is no demand in order to prevent compressors from cycling. Apply power to unit.

**A-Preliminary Checks**

- 1- Make sure unit is installed in accordance with 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 unit cabinet or against other refrigerant lines.
- 4- Check voltage at disconnect switch. If voltage is not within the range listed on nameplate, consult power company and have voltage condition corrected before starting unit.
- 5- Make sure filters are in place before start-up. Failure to do so could result in improper operation or damage to unit.

**B-Start-Up**

- 1- Set fan switch to AUTO or ON and move system selection switch to cool. Adjust thermostat setting below room temperature to bring on both compressors. Compressors will start and cycle on demand from thermostat.
- 2- Each refrigerant circuit is separately charged with R-22 refrigerant. See unit rating plate for correct amount of charge.
- 3- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

**II-HEATING START-UP**

- 1- Move thermostat heat setting above room temperature.
- 2- On a heating demand, the reversing valve is set for heating operation. Heat pump provides two stages of compressor operation. The initial heating demand energizes both compressor 1 and compressor 2. An additional heating demand will energize supplemental electric heat (if used).

### III – BLOWER OPERATION AND ADJUSTMENTS

#### A – Blower Operation

Blower operation is manually set at the thermostat subbase fan switch. With fan switch in ON position, blowers will operate continuously. With fan switch in AUTO position, blowers will cycle with demand. Blowers and entire unit will be off when system switch is in OFF position.

#### B – Determining Unit CFM

- 1– The following measurements must be made with a dry indoor coil. Run blower without a cooling demand. Air filters must be in place when measurements are taken.
- 2– Measure static pressure external to unit (from supply to return).
- 3– Measure indoor blower motor RPM.
- 4– Use static pressure and RPM reading to determine unit CFM from the following tables.
- 5– The CFM can be adjusted at the motor pulley. See figure 5. Loosen screw and turn adjustable sheave clockwise to increase CFM. Turn counter-clockwise to decrease CFM.

#### C – Blower Belt Adjustment

*NOTE – Remove shipping screw from top of motor mounting plate.*

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Initially, tension new belt after a 24 to 48 hour period of operation. This will allow belt to stretch and seat in the grooves. To increase belt tension, loosen two locking bolts and pull motor mounting plate. Tighten bolts so motor mounting plate is in vertical position. See figure 5.

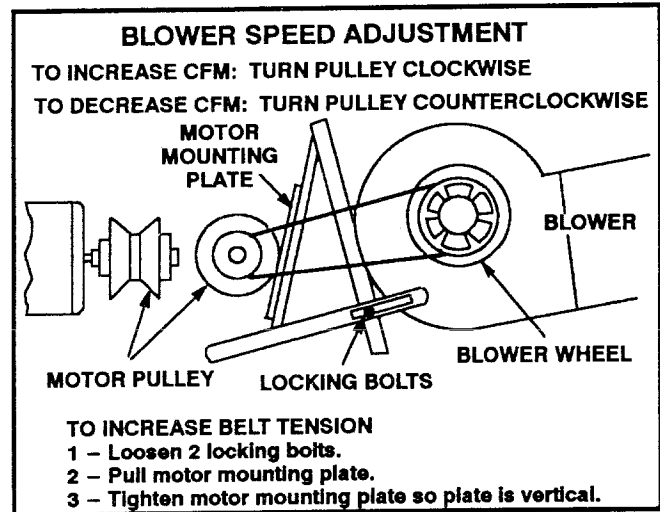


FIGURE 5

TABLE 1  
CHP16–953 BLOWER PERFORMANCE

AIR VOL. (CFM)	STATIC PRESSURE EXTERNAL TO UNIT – (INCHES WATER GAUGE)																									
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00		1.10					
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP		
2600	670	1.40	715	1.44	760	1.53	805	1.60	840	1.65	880	1.70	915	1.75	940	1.80	965	1.85	990	1.90	1020	1.95				
2800	710	1.50	755	1.58	800	1.65	840	1.71	880	1.78	910	1.83	935	1.86	960	1.93	985	1.96	1015	2.03	1040	2.10				
*3000	750	1.65	795	1.71	840	1.80	880	1.88	910	1.90	935	1.95	960	1.99	990	2.06	1015	2.11	1040	2.20	---	---	---	---		
3200	800	1.81	840	1.89	885	1.95	915	2.00	940	2.06	965	2.11	990	2.16	1020	2.21	1040	2.25	---	---	---	---	---	---		
3400	840	2.00	885	2.08	920	2.13	940	2.18	970	2.23	995	2.28	---	---	---	---	---	---	---	---	---	---	---	---		
**3600	885	2.20	920	2.28	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

\*3000 cfm minimum air @ .25 discharge static pressure with electric heat.

\*\*Maximum air 3600 cfm (935 rpm) @ .25" external static pressure.

NOTE – All cfm data is measured external to the unit with air filters in place.

TABLE 2  
CHP16–1353 BLOWER PERFORMANCE

AIR VOL. (CFM)	STATIC PRESSURE EXTERNAL TO UNIT – (INCHES WATER GAUGE)																							
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00		1.10			
	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
*3500	595	0.90	635	1.03	670	1.18	710	1.30	740	1.45	775	1.58	805	1.68	830	1.80	860	1.95	885	2.08	905	2.18	915	2.28
3600	610	0.95	645	1.10	685	1.25	720	1.38	755	1.53	785	1.65	815	1.78	840	1.90	865	2.03	890	2.18	910	2.28	935	2.45
3800	630	1.10	670	1.25	710	1.38	740	1.53	775	1.65	805	1.78	830	1.90	860	2.03	885	2.18	910	2.28	935	2.45	955	2.68
**4000	660	1.25	700	1.38	735	1.53	765	1.65	795	1.83	825	1.95	855	2.10	880	2.23	905	2.36	930	2.53	955	2.68	975	2.90
4200	690	1.48	730	1.63	760	1.75	790	1.90	820	2.03	850	2.15	875	2.30	900	2.43	925	2.60	950	2.73	975	2.90	1000	3.18
4400	725	1.68	755	1.80	785	1.93	815	2.08	845	2.23	870	2.38	895	2.50	920	2.65	950	2.83	970	2.95	1000	3.18	1020	3.40
4600	750	1.88	780	2.00	815	2.18	840	2.30	865	2.43	890	2.58	920	2.73	945	2.88	970	3.08	995	3.25	1020	3.40	---	---
4800	780	2.13	815	2.28	840	2.40	865	2.53	885	2.65	920	2.85	945	3.00	970	3.15	995	3.36	---	---	---	---	---	---
5000	815	2.40	840	2.53	865	2.65	885	2.75	920	2.95	945	3.10	970	3.30	---	---	---	---	---	---	---	---	---	---
5200	840	2.68	865	2.78	885	2.90	920	3.08	945	3.25	970	3.43	---	---	---	---	---	---	---	---	---	---	---	---

\*3500 cfm minimum @ .30 discharge static pressure with ECH16 electric heat (CHA16–1353).

\*\*4000 cfm minimum @ .30 discharge static pressure with ECH16 electric heat (CHP16–1353).

NOTE – All cfm data is measured external to the unit with air filters in place.

NOTE – Shaded area indicates 3 horsepower motor required.

#### IV-COOLING OPERATION AND ADJUSTMENT

##### A-Refrigerant Charge and Check

**WARNING** – Do not exceed nameplate charge under any condition.

This unit is factory-charged; however, check charge during start-up using approach method outlined below. The approach method compares the actual liquid temperature with the outdoor ambient. Thermometer wells have been provided to allow accurate liquid temperature measurement.

##### Charging must be done in the cooling mode.

- 1- Attach gauge manifold and insert thermometer in well pocket.

**NOTE** – Thermometer well pocket must be filled with oil for accurate reading.

- 2- Operate unit until system stabilizes (approximately 5 minutes).
- 3- Check each stage separately with both stages operating.
- 4- Compare liquid temperatures to outdoor ambient. Approach Temperature – Liquid temperature minus ambient temperature. For best results, use same thermometer to take both readings.
- 5- Approach temperature should match values given in table 3 and on charging procedure sticker on unit. Approach temperatures greater than the value given in the table indicate refrigerant undercharge. Approach temperatures less than the value given in the table indicate refrigerant overcharge.

**TABLE 3**

APPROACH TEMPERATURE	
Unit	Liq. Temp. Minus Amb. Temp.
CHP16-953	18°F ± 1° (-7.7°C ± .5°)
CHP16-1353	10°F ± 1° (-12°C ± .5°)

- 6- When checking charge at outdoor ambients below 60°F, it is necessary to raise the liquid pressure to 200 to 250 psig. To accomplish this, block the outdoor coil from top to bottom evenly from both ends, then proceed with step 4.

When unit is properly charged, system pressures should approximate those given in table 4, Normal Operating Pressures.

This table is provided to assist in determining normal operating conditions and is not to be used as a charging procedure. Due to the many differences existing between installations (i.e., indoor air volume, humidity and load) this table may be used only as a guide. Minor differences should be expected. Significant differences could indicate the malfunction of a component or an improper charge.

##### B-Charging

If system is completely void of refrigerant, the recommended and most accurate method of charging is to weight the refrigerant into the unit according to the amount shown on the unit nameplate. If weighing facilities are not available or if unit is just low on charge, use the procedure outlined in section A.

#### C-Compressor Controls

##### 1-High Pressure Switches (S4, S7)

Each compressor circuit is protected by a manually reset high pressure switch which cuts out at 410±10 psig (2825 kPa ±70).

##### 2-Loss of Charge Switches (S25, S26)

Each compressor circuit is also protected by a loss of charge switch which cuts out at 15 psig (103 kPa) and automatically resets at 25 psig (172 kPa).

##### 3-Crankcase Heaters

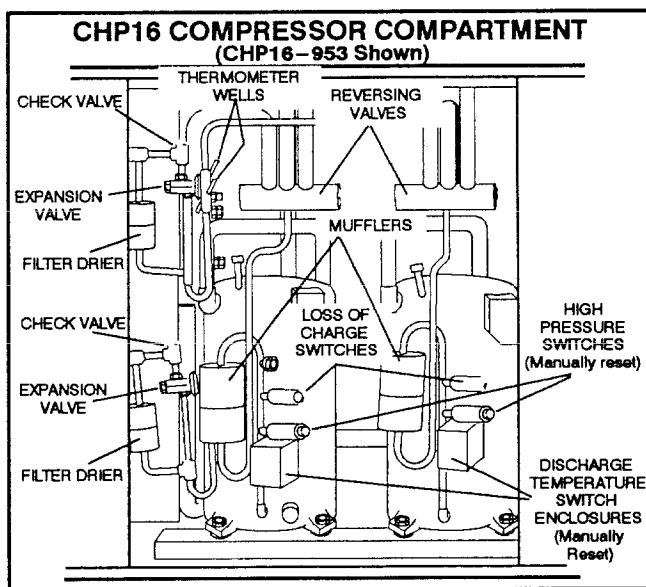
Compressors contain a compressor oil heater which must be energized 24 hours before running compressors. Energize by setting thermostat levers so there is no cooling demand to prevent compressor from cycling, and apply power to unit.

##### 4-Discharge Temperature Switches (S5, S8)

Each compressor circuit is protected by a manually reset discharge temperature switch which cuts out at 260 ± 6° F (127 ± 3 °C).

**TABLE 4**  
NORMAL OPERATING PRESSURES

MODE	OUTDOOR COIL ENTERING AIR TEMPERATURE	CHP16-953			
		1ST STAGE		2ND STAGE	
COOLING	65°F	180	68	184	68
	85°F	245	74	250	74
	95°F	276	76	280	76
	105°F	305	78	310	78
HEATING	35°F	195	40	180	38
	45°F	225	49	210	47
	55°F	240	54	220	52
	65°F	250	70	235	68
CHP16-1353					
COOLING	65°F	-	-	-	-
	85°F	220	73	222	72
	95°F	256	75	258	74
	105°F	300	78	305	77
HEATING	35°F	205	46	208	44
	45°F	228	50	228	48
	55°F	243	54	243	52
	65°F	255	65	255	64



**FIGURE 6**

## MAINTENANCE

### **! 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

### **! CAUTION**

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

#### A—Lubrication

*NOTE – Always prelubricate motors according to manufacturer's lubrication instructions on each motor. If no instructions are provided, use the following as a guide.*

- 1—Supply Air Blower Motor Bearings – Bearings are prelubricated; no further lubrication is required for 20 years of normal operation. Thereafter, clean and repack bearings with a suitable bearing grease every two years.
- 2—Blower Shaft Bearings – Bearings are prelubricated and sealed; no further lubrication is necessary.
- 3—Condenser Fan Motor Bearings – Bearings are prelubricated. For extended bearing life, lubricate each bearing through oiling ports with a few drops of a high-grade electric motor oil or SAE10 or SAE20 non-detergent motor oil every two years.

#### B—Filters

CHP16 unit is equipped with either pleated 2" throwaway-type filters or 1" permanent foam filters. Filter rack is adjustable to accommodate either 1" or 2" filters. Filters should be checked periodically and replace (or cleaned) when necessary with filters of like kind and size. DO NOT replace 1" permanent filters with 1" throwaway-type filter. Take note of air flow direction marking on filter frame when reinstalling filters. Permanent foam filters supplied with some CHP16 units can be cleaned with water and a mild detergent. They should be sprayed with Filter Handicoater when dry, prior to reinstallation. Filter Handicoater is R.P. Products coating number 418 and is available as Lennox part number P-8-5069.

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

#### 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, return air ducts, etc., wet.

#### D—Outdoor Coil

Clean outdoor coil annually with detergent or commercial coil cleaner and inspect monthly during cooling season. Outdoor coil is made of individual coil slabs. Dirt and debris may become trapped between rows. To clean between rows, carefully separate coil slabs and clean between slab sections. Refer to figure 7. Flush with water following cleaning.

*NOTE – Remove all screws and gaskets prior to cleaning procedure and replace upon completion.*

#### 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.

#### F—Replacement Parts

A complete list of replacement parts may be obtained from your local independent Lennox dealer.

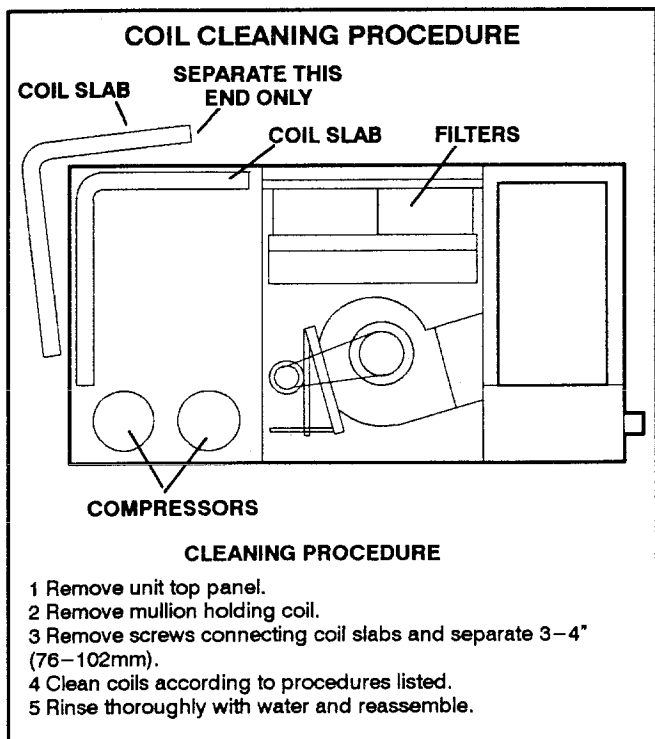


FIGURE 7