

# 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.

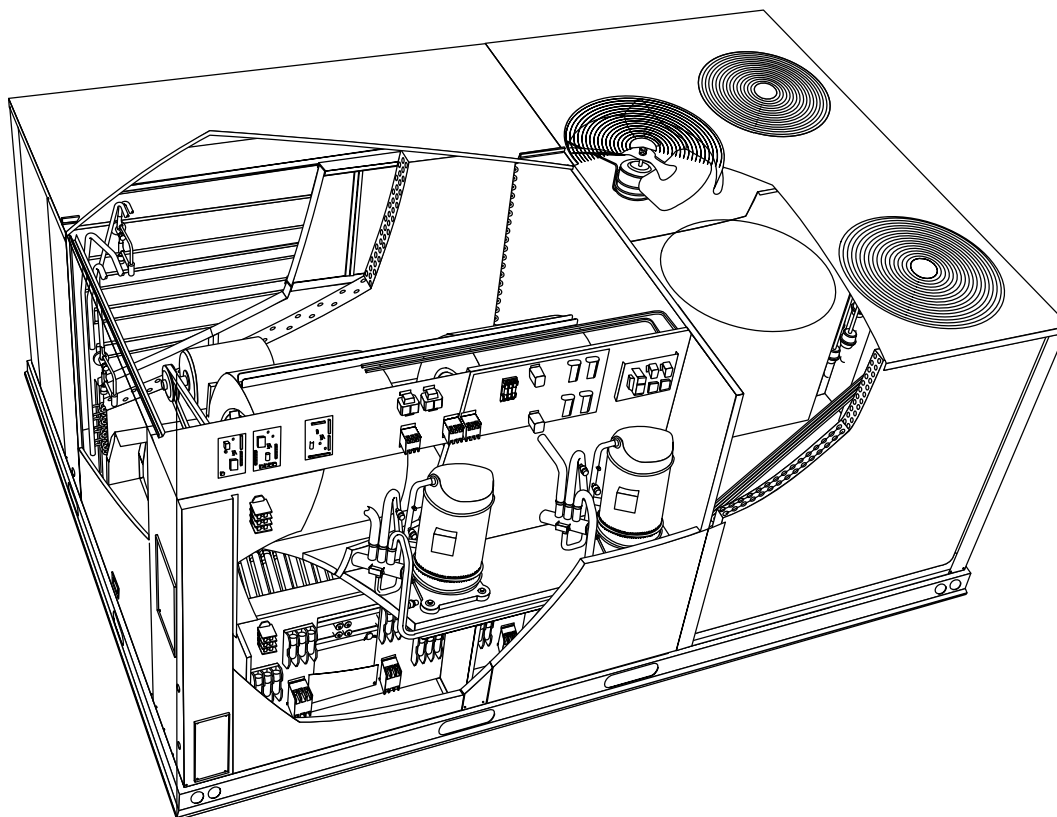
## THA180 (15-TON) THA240 (20-TON)

HEAT PUMP UNITS  
505,144M  
10/2006  
Supersedes 12/2005

**RETAIN THESE INSTRUCTIONS  
FOR FUTURE REFERENCE**

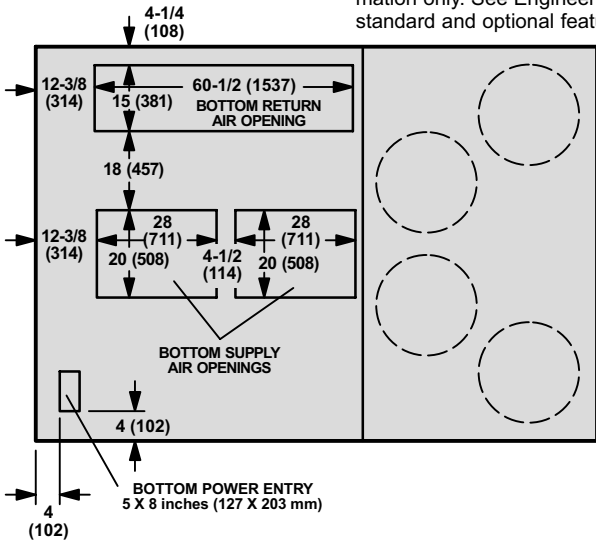
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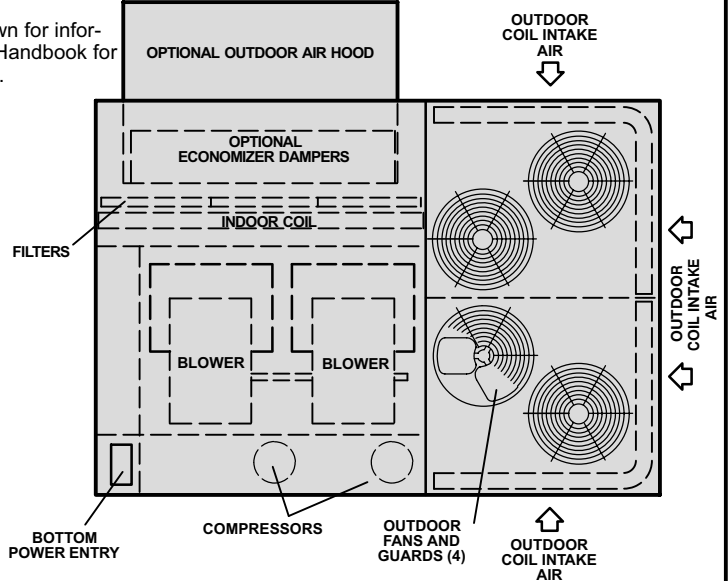


# THA180 & 240 Dimensions

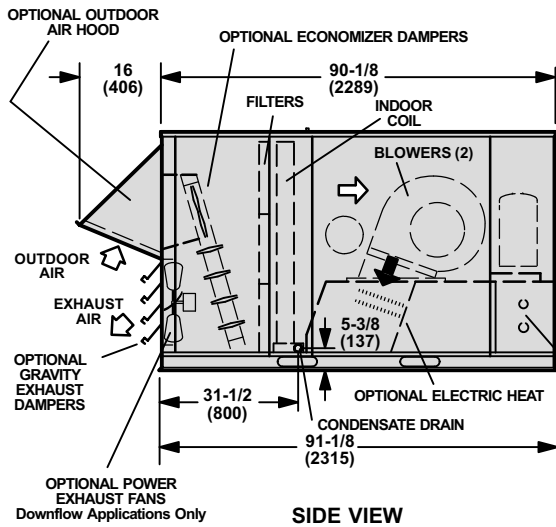
Note: Optional equipment shown for information only. See Engineering Handbook for standard and optional features.



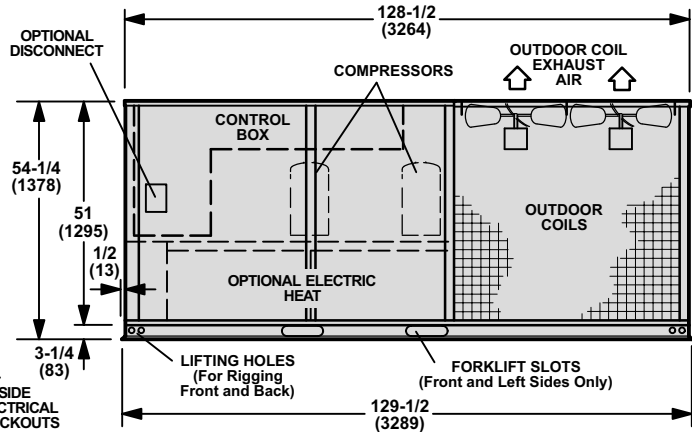
TOP VIEW BASE SECTION



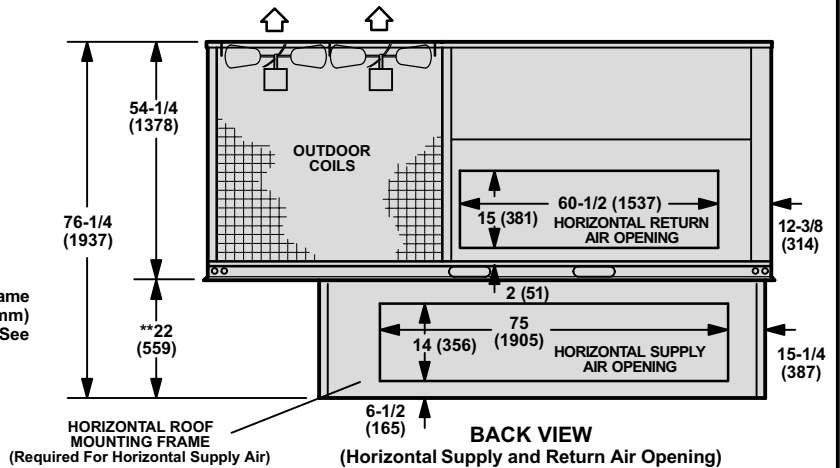
TOP VIEW



SIDE VIEW



FRONT VIEW

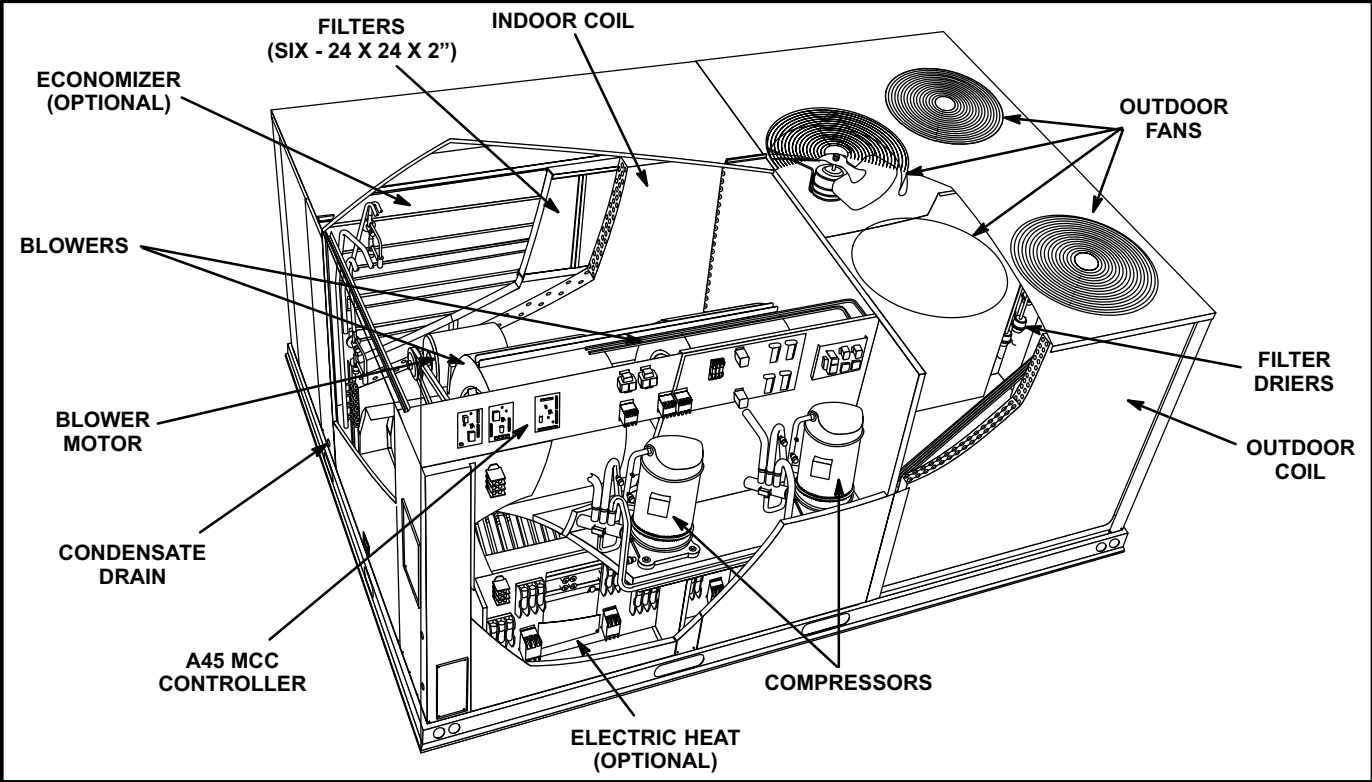


BACK VIEW

(Horizontal Supply and Return Air Opening)

\*\*NOTE — Mounting Frame extends 4 inch (102 mm) inside of unit base. See Typical flashing detail.

# THA180 & 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.

Availability of units and options varies by brand.

## Requirements

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

Installation of THA 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

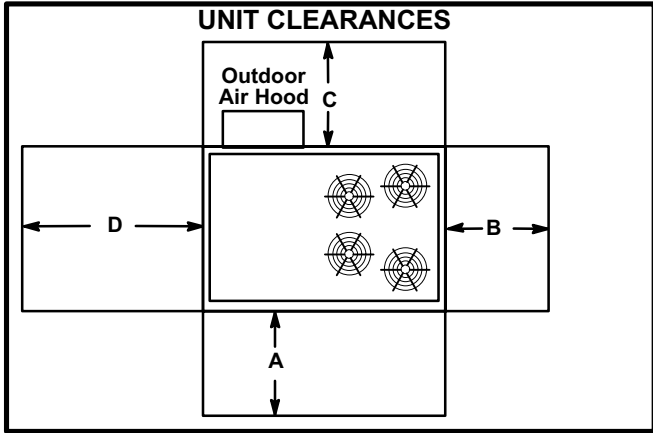


FIGURE 1

<sup>1</sup> Unit Clearance	A in.(mm)	B in.(mm)	C in.(mm)	D in.(mm)	Top Clearance
Service Clearance	45 (1143)	36 (914)	36 (914)	66 (1676)	Unobstructed
Minimum Operation Clearance	45 (1143)	36 (914)	36 (914)	41 (1041)	Unobstructed

Note - Entire perimeter of unit base requires support when elevated above mounting surface.

<sup>1</sup> **Service Clearance** - Required for removal of serviceable parts.  
**Minimum Operation Clearance** - Required clearance for proper unit operation.

## ⚠ 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.

The THA unit is ETL/CSA 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 ETL/CSA 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.

Use of this unit as a construction heater or air conditioner is not recommended during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

If this unit has been used for heating or cooling of buildings or structures under construction, the following conditions must be met or the warranty will be void:

- A room thermostat must control the unit. The use of fixed jumpers that will provide continuous heating or cooling is not allowed.
- A pre-filter must be installed at the entry to the return air duct.
- The return air duct must be provided and sealed to the unit.
- Return air temperature range between 55°F (13°C) and 80°F (27°C) must be maintained.
- Air filters must be replaced and pre-filter must be removed upon construction completion.
- The unit components, duct system, air filters and evaporator coil must be thoroughly cleaned following final construction clean-up.
- The unit operating conditions (including airflow, cooling operation, and heating operation) must be verified according to these installation instructions.

## ⚠ 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 LARMF18/36

- 1- The LARMF18/36 roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The LARMF18/36 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 THA unit; supply and return plenums must be installed before setting the unit.
- 4- Trim and discard any pieces of exposed insulation which extend past the edges of the roof mounting frame.

##### Installer's Roof Mounting Frame

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

- 1- The THA 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 THA 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 THA unit on a combustible surface for downflow discharge applications, the LARMF18/36 roof mounting frame is required.*

## B-Horizontal Discharge Applications

- 1- Units installed in horizontal airflow applications must use an LARMFH18/36 horizontal roof mounting frame. The supply air duct connects to the horizontal supply air opening on the LARMFH18/36. 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 THA 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.)

### Condensate Drains

Remove cap and 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.

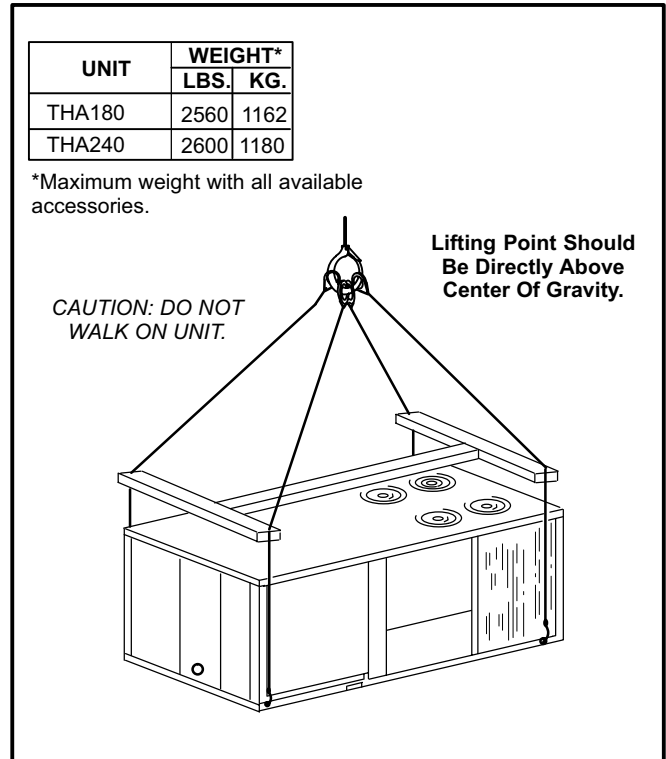


FIGURE 2

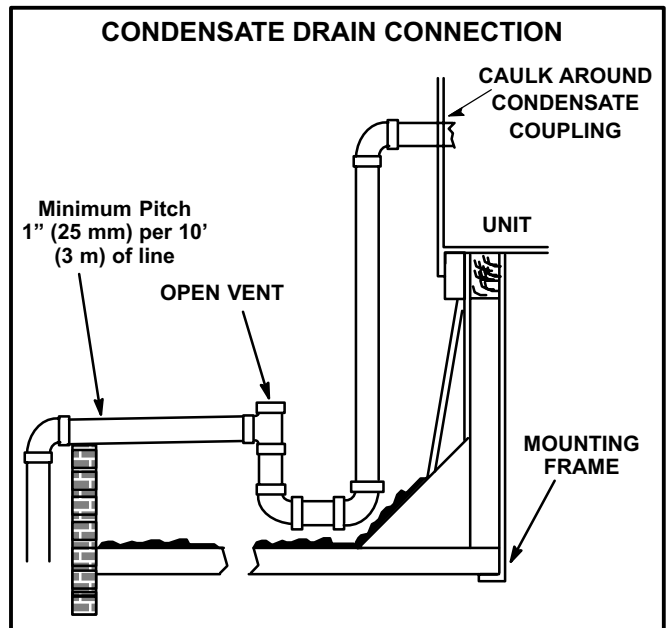


FIGURE 3

## Electrical Connections

### ⚠ 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.

#### POWER SUPPLY

Do not apply power or close disconnect switch until installation is complete. Refer to start-up directions.

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 all 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 L1, L2, and L3 on TB2 in control area. Route power to TB15 on units equipped with electric heat. Secure power wiring with wire ties provided in control box. See unit wiring diagram.

#### 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-Control Wiring

- 1- Route thermostat cable or wires from subbase to unit MCC (A45) board in control box (refer to unit dimensions to locate bottom and side power entry).

*IMPORTANT - Unless field thermostat wires are rated for maximum unit voltage, they must be routed away from line voltage wiring. Use wire ties located to the left of the MCC board (A45) to secure thermostat cable.*

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.
- 3- Connect thermostat wiring to TB1 terminal on MCC (A45) control board as shown in figure 4 for electro-mechanical and electronic thermostats. If using other temperature control devices or energy management systems see instructions and wiring diagram provided by manufacturer.

*IMPORTANT-Terminal connections at the subbase and TB1 must be made securely. Loose control wire connections may allow unit to operate but not with proper response to room demand.*

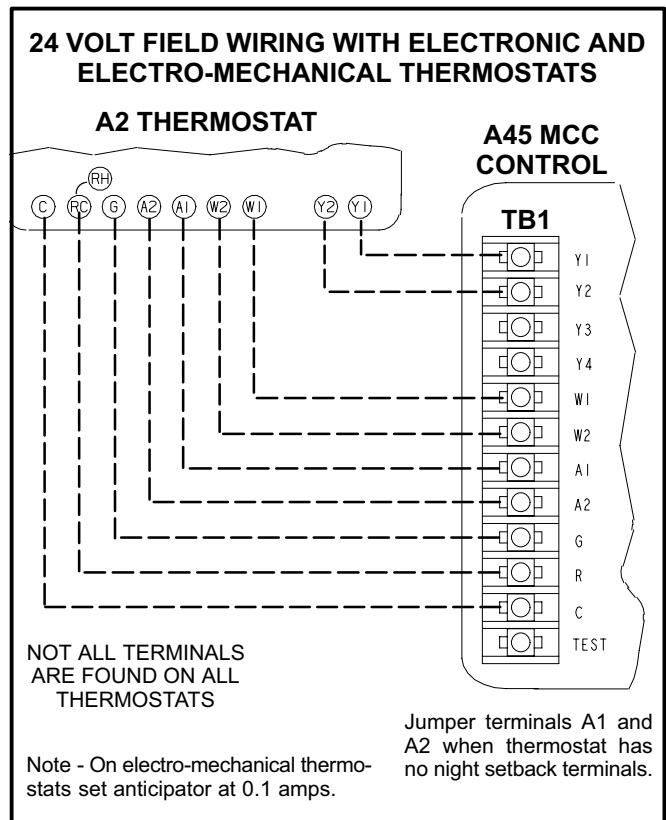


FIGURE 4

## Unit Power-Up

### A-General

- 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-MCC (A45) Control Board

- 1- Make sure there is no heating, cooling, or blower demand from thermostat. Apply power to unit.
- 2- Locate green heartbeat LED on MCC board. See figure 5. LED should flash slowly to indicate normal operation. Refer to table 1 if the heartbeat LED is not flashing normally.

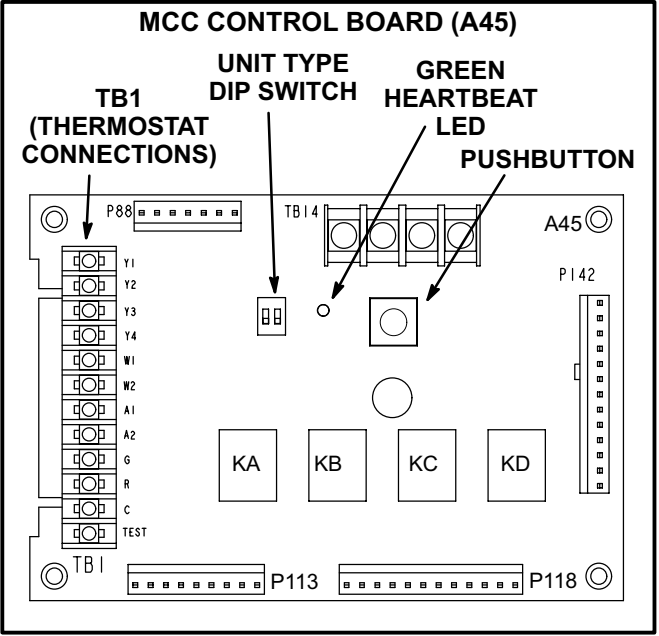


FIGURE 5

TABLE 1  
MCC HEARTBEAT LED STATUS

LED Status	Indicates	Action
Off	No power to board.	Check field wiring. If problem persists refer to service manual.
On	Processor error.	Press MCC pushbutton and hold for three seconds to re-set processor.*
Flashing Slowly	Normal.	None.
Flashing Rapidly	Invalid unit DIP switch selected.	Make sure switches are set correctly. Refer to figure 6.
Flashing Rapidly	Simultaneous heat and cool demands.	Check thermostat and wiring.

\*Press pushbutton and immediately release to override the 4-minute compressor minimum run time.

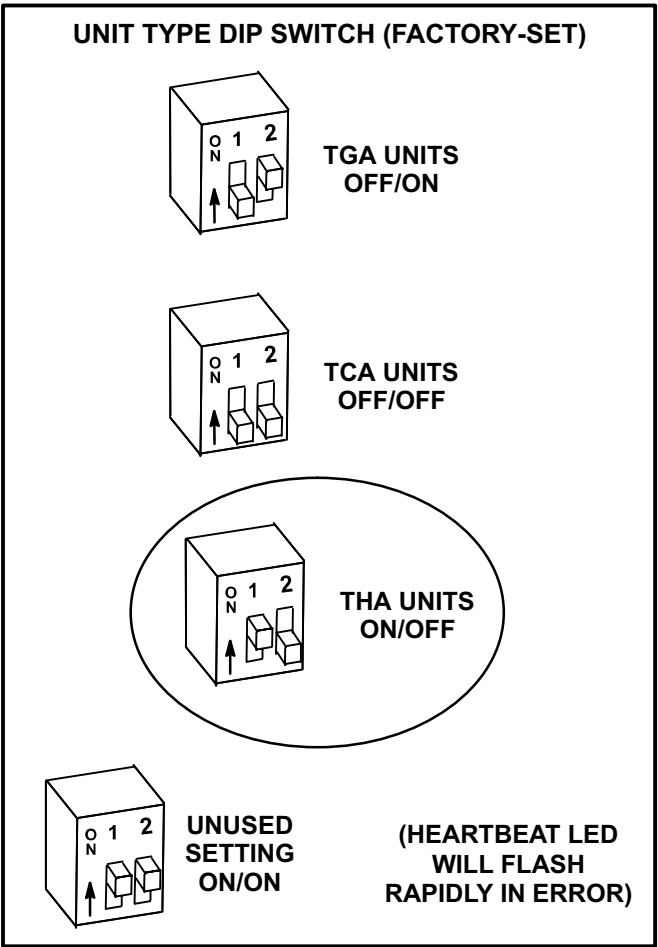


FIGURE 6

## Blower Operation And Adjustments

### A-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 TB2 or TB15 (on units equipped with electric heat). 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.

### B-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- 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.

### C-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 7.

- 1- Remove the clamp which secures the blower wiring to the blower motor base.
- 2- Remove and retain screws on either side of sliding base. Pull base toward outside of unit. When pulling the base out further than 12" (305mm), disconnect wiring to K3 blower contactor T1, T2, and T3. Pull wiring toward blower to allow enough slack to slide the base out further.

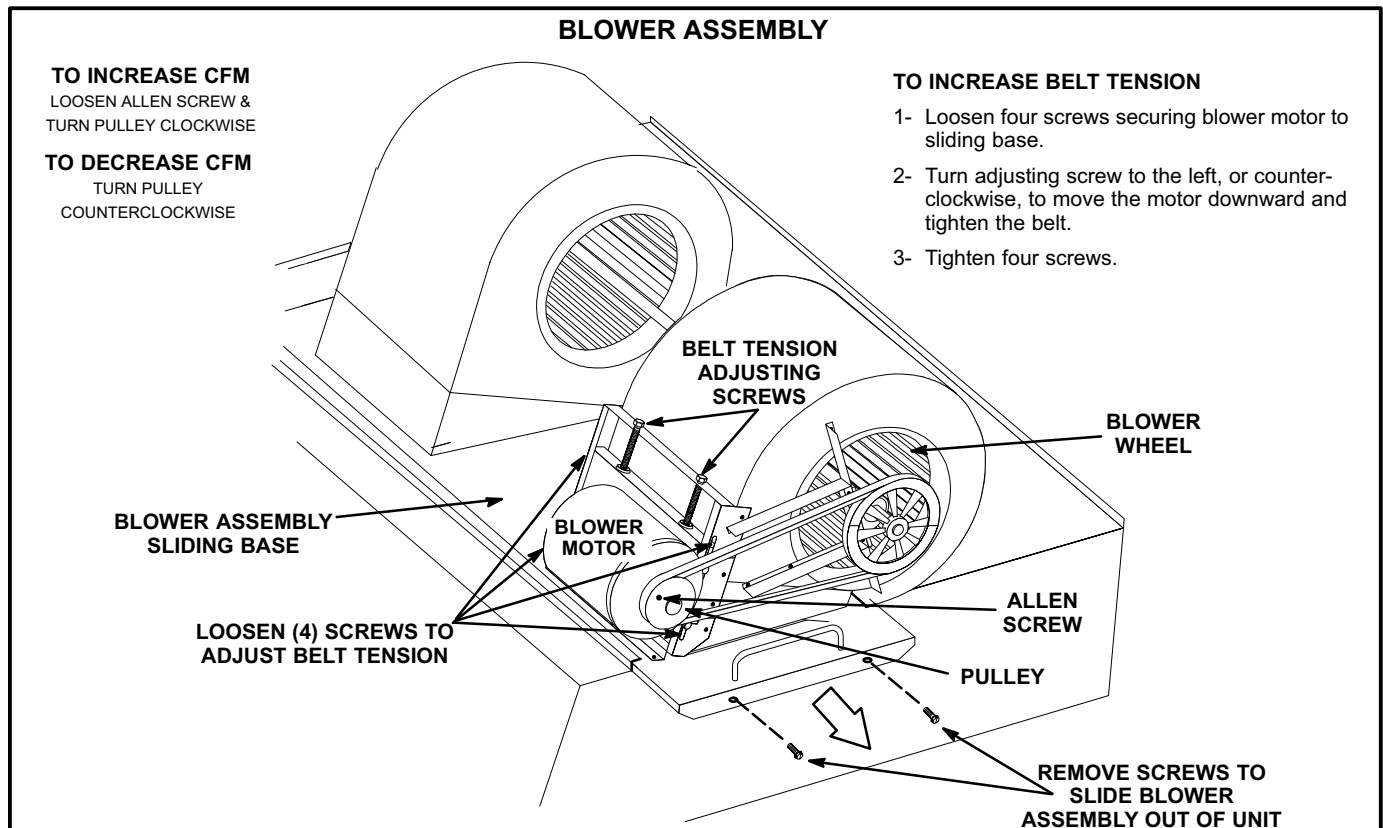


FIGURE 7



- 3- Slide base back into original position when finished servicing. Replace the clamp and blower wiring in the previous location on the blower motor base. Reconnect wiring to K3 if it was disconnected.
- 4- Replace retained screws on either side of the sliding base.
- 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.

#### D-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. Measure the indoor blower shaft RPM.
- 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 7. Tighten Allen screw after adjustment. Do not exceed minimum and maximum number of pulley turns as shown in table 2.

**TABLE 2  
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT**

Belt	Minimum Turns Open	Maximum Turns Open
A Section	No minimum	5
B Section	1*	6

\*No minimum number of turns open when B belt is used on pulleys 6" O.D. or larger.

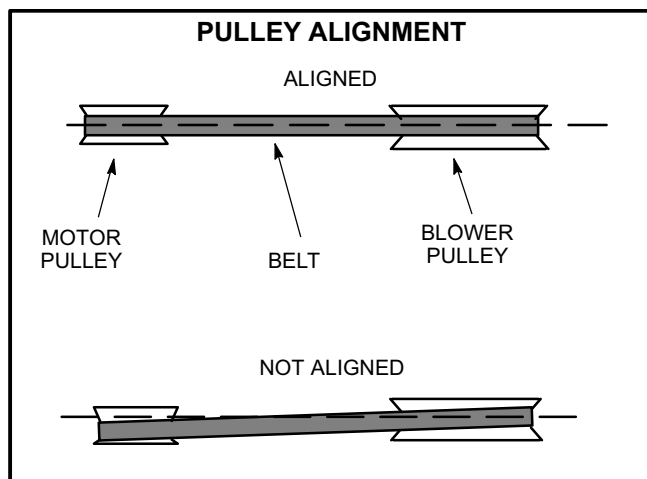
#### E-Blower Belt Adjustment

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 8.

- 1- Loosen four screws securing blower motor to sliding base. See figure 7.
- 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.

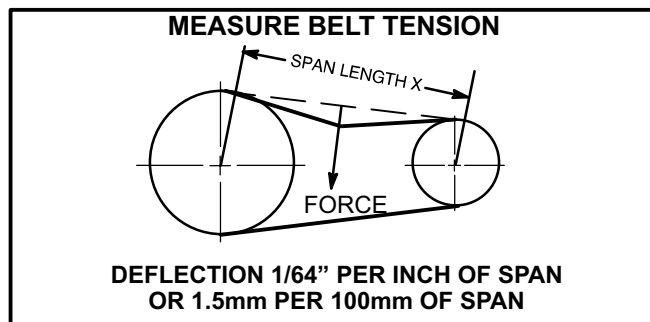


**FIGURE 8**

#### F-Check Belt Tension

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

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



**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.

#### G-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 3  
180, 240 BASE UNIT BLOWER PERFORMANCE**

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)	
	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)	RPM BHP (kW)
4500 (2125)	<b>405 0.55</b> (0.41)	<b>510 0.80</b> (0.60)	<b>605 1.10</b> (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)	<b>410 0.60</b> (0.45)	<b>515 0.85</b> (0.63)	<b>610 1.20</b> (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)	<b>415 0.65</b> (0.48)	<b>520 0.95</b> (0.71)	<b>615 1.25</b> (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)	<b>1190 4.85</b> (3.62)	
5250 (2475)	<b>420 0.70</b> (0.52)	<b>525 1.00</b> (0.75)	<b>620 1.35</b> (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)	<b>1195 5.10</b> (3.80)	
5500 (2595)	<b>425 0.75</b> (0.56)	<b>530 1.10</b> (0.82)	<b>625 1.45</b> (1.08)	705 1.85 (1.38)	775 2.20 (1.64)	845 2.60 (1.94)	905 2.95 (2.20)	960 3.35 (2.50)	1010 3.70 (2.76)	1065 4.15 (3.10)	1110 4.55 (3.39)	1155 4.95 (3.69)	<b>1200 5.35</b> (3.99)	
5750 (2715)	<b>430 0.80</b> (0.60)	<b>535 1.15</b> (0.86)	<b>630 1.55</b> (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)	<b>430 0.85</b> (0.63)	<b>540 1.25</b> (0.93)	<b>635 1.65</b> (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)	<b>435 0.95</b> (0.71)	<b>545 1.35</b> (1.01)	<b>640 1.80</b> (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)	<b>445 1.05</b> (0.78)	<b>550 1.45</b> (1.08)	<b>640 1.85</b> (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)	<b>450 1.10</b> (0.82)	<b>555 1.55</b> (1.16)	<b>645 2.00</b> (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)	<b>455 1.20</b> (0.90)	<b>560 1.65</b> (1.23)	<b>650 2.10</b> (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)	<b>460 1.25</b> (0.93)	<b>565 1.75</b> (1.31)	<b>655 2.25</b> (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)	<b>465 1.35</b> (1.01)	<b>570 1.85</b> (1.38)	<b>660 2.35</b> (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)	<b>1190 7.00</b> (5.22)	----	
7750 (3655)	<b>470 1.45</b> (1.08)	<b>575 2.00</b> (1.49)	<b>665 2.50</b> (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)	<b>1190 7.25</b> (5.41)	----	
8000 (3775)	<b>480 1.60</b> (1.19)	<b>585 2.15</b> (1.60)	<b>675 2.70</b> (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)	<b>1195 7.55</b> (5.63)	----	
8250 (3895)	<b>485 1.70</b> (1.27)	<b>590 2.25</b> (1.68)	<b>680 2.85</b> (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)	<b>1200 7.85</b> (5.86)	----	
8500 (4010)	<b>490 1.80</b> (1.34)	<b>595 2.40</b> (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)	<b>500 1.90</b> (1.42)	<b>600 2.50</b> (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)	<b>505 2.05</b> (1.53)	<b>610 2.70</b> (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)	<b>515 2.20</b> (1.64)	<b>615 2.85</b> (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)	<b>525 2.35</b> (1.75)	<b>620 3.00</b> (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)	<b>530 2.50</b> (1.87)	<b>630 3.20</b> (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)	<b>540 2.65</b> (1.98)	<b>635 3.35</b> (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 4 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

**TABLE 4  
OPTIONS ACCESSORY AIR RESISTANCE**

Air Volume		Total Resistance — inches water gauge (Pa)				
		Wet Indoor Coil		Electric Heat	Economizer	Horizontal Roof Mounting Frame
cfm	L/s	THA180	THA240			
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 5  
DRIVE KIT SPECIFICATIONS**

Blower Motor Outputs				RPM Range							
Nominal hp	Maximum hp	Nominal kW	Maximum kW	Drive A	Drive 1	Drive 2	Drive 3	Drive 4	Drive 6	Drive 7	Drive 9
3	3.45	2.2	2.6	535-725	710-965	----	----	----	----	----	----
5	5.75	3.7	4.3	----	----	685-865	850-1045	945-1185	----	----	----
7.5	8.63	5.6	6.4	----	----	----	----	----	1045-1285	850-1045	685-865
10	11.5	7.5	8.6	----	----	----	----	----	1045-1285	----	----

\*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 manufacturer 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 6  
MANUFACTURER'S NUMBERS**

Drive No.	H.P.	DRIVE COMPONENTS									
		RPM		ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
		Min	Max	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
A	3	535	725	1VP40x7/8	79J0301	BK95X1-7/16	80K1601	BX59	59A5001	N/A	N/A
1	3	710	965	1VP40x7/8	79J0301	BK72x1-7/16	100244-13	BX56	100245-11	N/A	N/A
2	5	685	865	1VP50x1-1/8	P-8-1977	BK100x1-7/16	39L1301	BX62	57A7701	N/A	N/A
3	5	850	1045	1VP65x1-1/8	100239-03	BK110H	100788-06	BX66	97J5901	H-1-7/16	49M6201
4	5	945	1185	1VP60x1-1/8	41C1301	BK90H	100788-04	BX72	57A7701	H-1-7/16	49M6201
6	7.5	1045	1285	1VP65x1-3/8	78M7101	BK90H	100788-04	BX64	97J5801	H-1-7/16	49M6201
6	10	1045	1285	1VP65x1-3/8	78M7101	1B5V86	78M8301	5VX760	100245-21	B-1-7/16	100246-01
7	7.5	850	1045	1VP65x1-3/8	78M7101	BK110H	100788-06	BX66	97J5901	H-1-7/16	49M6201
9	7.5	685	865	1VP60x1-3/8	78L5501	AK114x1-7/16	100244-01	AX68	100245-06	H-1-7/16	49M6201

## Cooling Start-Up

### A-Start-Up

- 1- Remove coil covers before starting unit.
- 2- 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 and outdoor fans 1 & 2. An increased cooling demand (Y2) will initiate compressor 2 and outdoor fans 3 & 4. 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 and outdoor fans 1 & 2.

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

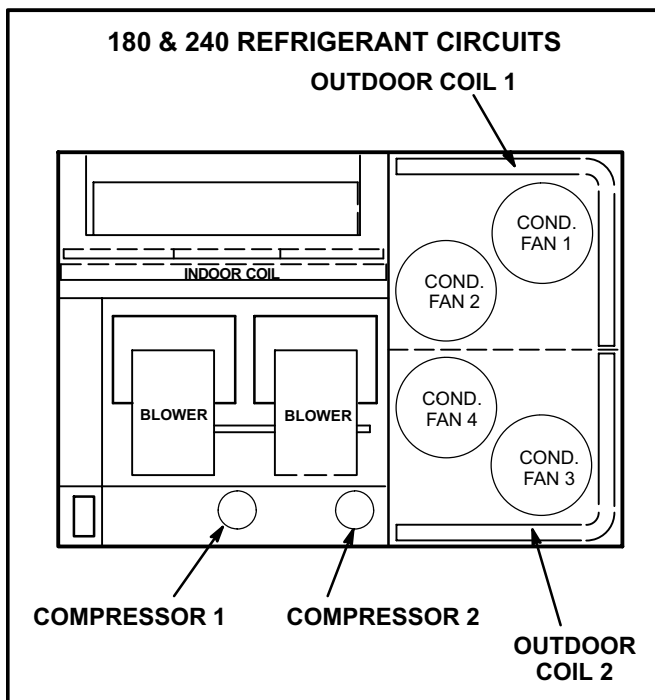


FIGURE 10

### B-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 7 or 8 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 7  
THA180 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 8  
THA240 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

**C-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 9. 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 7 or 8. The approach method is not valid for grossly over or undercharged systems.

**TABLE 9  
APPROACH TEMPERATURES**

Unit	Liquid Temp. Minus Ambient Temp.	
	1st Stage	2nd Stage
180	10°F ± 1 (5.5°C ± 0.5)	10°F ± 1 (5.5°C ± 0.5)
240	11°F ± 1 (6.1°C ± 0.5)	11°F ± 1 (6.1°C ± 0.5)

**D-Compressor Controls**

1- High Pressure Switches (S4, S7)  
Compressor circuits are protected by a high pressure switch which cuts out at 410 psig ± 10 psig (2825 kPa ± 70 kPa).

2- 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).

3- Defrost Switches (S6, S9)  
Defrost switches close to initiate defrost when liquid line temperature falls to 35°F (1.7°C). The defrost switch is located on the liquid line between the outdoor expansion valve and the distributor

4- Defrost Termination Switches (S46, S104)  
Defrost pressure switches open to terminate defrost when suction (discharge pressure during cooling and defrost) pressure reaches 275 psig (1096 kPa).

5- Defrost Controls (CMC1, CMC2)  
Defrost is liquid line temperature initiated and operates for 14 minutes unless terminated by suction line pressure drop.

When the liquid line temperature drops below 35°F, the defrost switch closes and signals the **defrost control** that a defrost cycle is needed. If the defrost switch is still closed after 60 minutes (default), a defrost cycle begins and operates for 14 minutes. The defrost pressure switch can terminate the defrost cycle before the 14 minutes elapses if suction pressure reaches 275 ± 10 psi.

Electric heat is energized during defrost to maintain discharge air temperature.

## Defrost Control Board

The defrost thermostat, defrost pressure switch and the defrost control work together to ensure that the heat pump outdoor coil does not ice excessively during the heating mode.

### Compressor Accumulated Run-Time Interval

The defrost control will not energize a defrost cycle unless the unit has been operating in heating mode for an accumulated 60 minutes (default). The run time interval can be changed by moving the jumper on the CMC board timing pins. See figure 11.

The defrost interval can be adjusted to 30, 60, or 90 minutes. The defrost timing jumper is factory-installed to provide a 60-minute defrost interval. If the timing selector jumper is not in place, the control defaults to a 90-minute defrost interval.

*Note - When adjusting timing pins, set both CMC1 and CMC2 defrost controls to the same defrost interval.*

### Defrost Test Option

A TEST option is provided for troubleshooting. The TEST mode may be started any time the unit is in the heating mode and the defrost thermostat is closed or jumpered. If

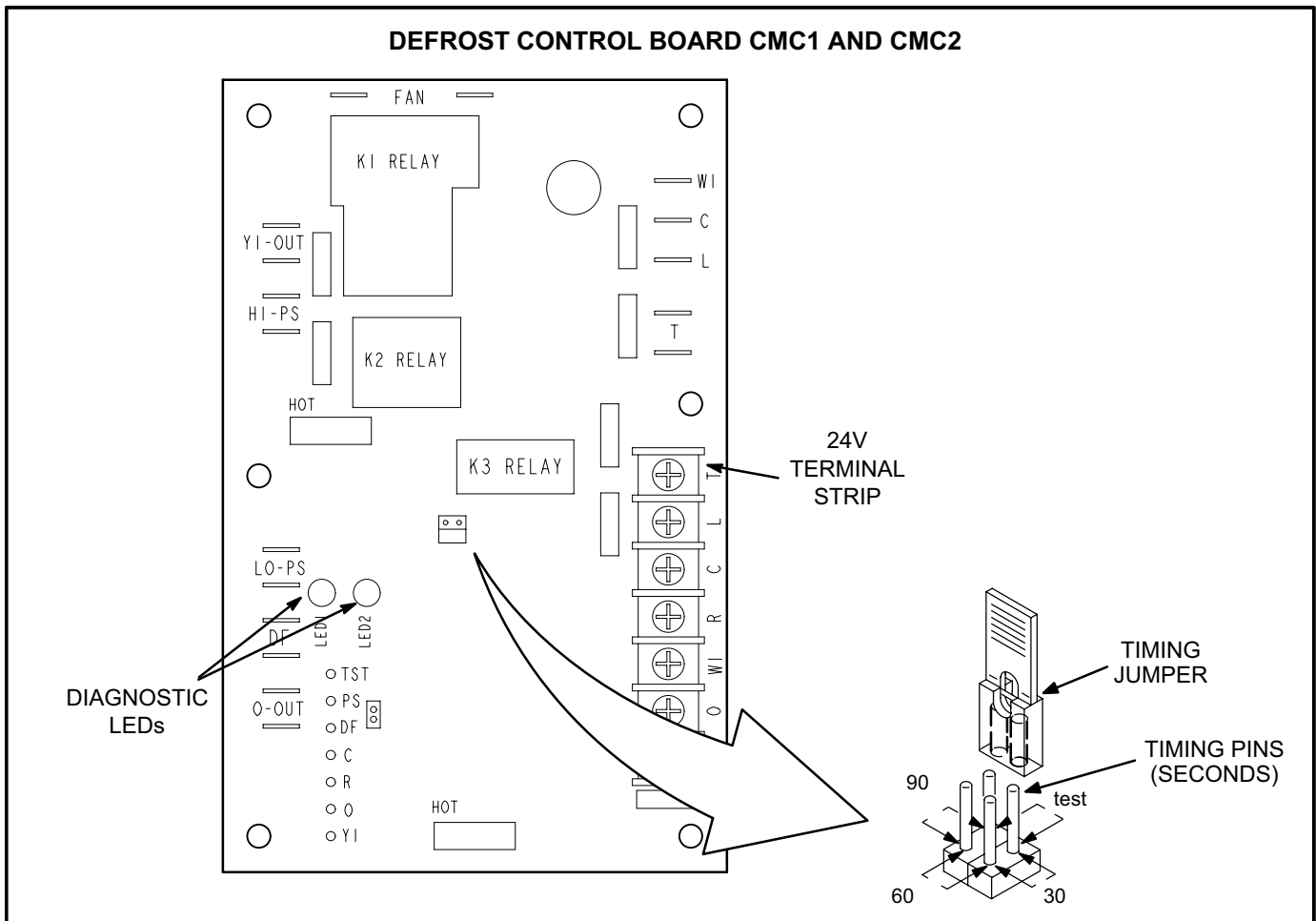
the timing jumper is in the TEST position at power-up, the defrost control will ignore the test pins. When the jumper is placed across the TEST pins for two seconds, the control will enter the defrost mode. If the jumper is removed before an additional 5-second period has elapsed (7 seconds total), the unit will remain in defrost mode until the defrost pressure switch opens or 14 minutes have passed. If the jumper is not removed until after the additional 5-second period has elapsed, the defrost will terminate and the test option will not function again until the jumper is removed and re-applied.

### Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a sequence according to the condition.

**TABLE 10**

Defrost Control Board Diagnostic LED		
Indicates	LED 1	LED 2
Normal operation / power to board	Synchronized Flash with LED 2	Synchronized Flash with LED 1
Board failure / no power	Off	Off
Board failure	On	On
Pressure switch open	Flash	On



## 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.

*THA Units With Optional Electric Heat -*

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

## Service

### ⚠ 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 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 12.

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

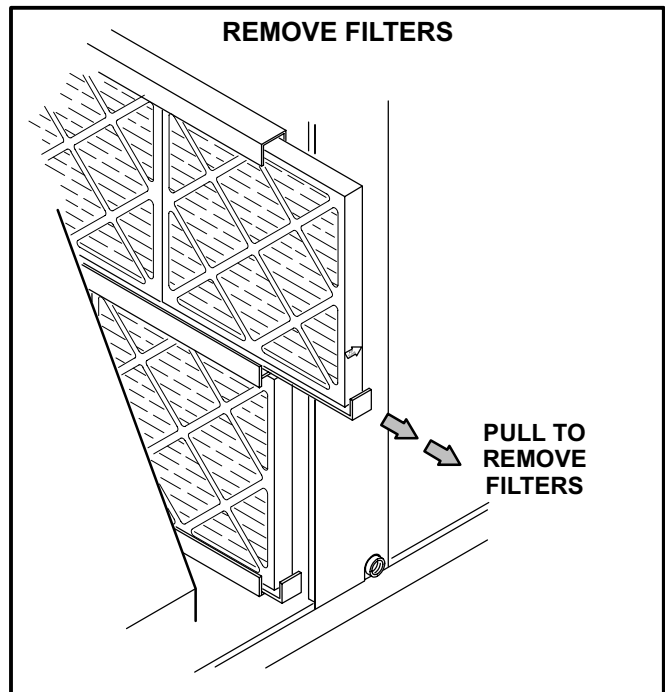


FIGURE 12

### C-Indoor Coil

Inspect and clean coil at beginning of each cooling and heating 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.

### 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.