Technical Publications
Litho U.S.A.

INSTALLATION INSTRUCTIONS

TGA/TCA180 (15 Ton)
TGA/TCA210 (17.5 Ton)
TGA/TCA240 (20 Ton)
TGA/TCA300S (25 Ton)

GAS AND COOLING PACKAGED UNITS
505,143M
10/2006
Supersedes 12/2005

⚠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

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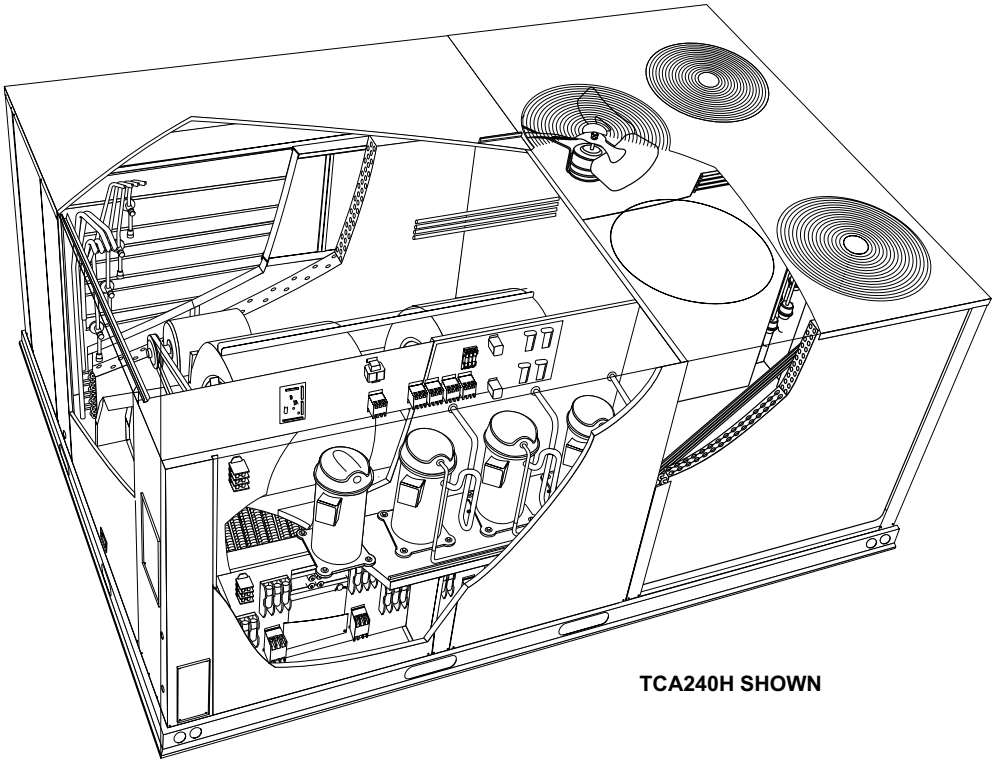
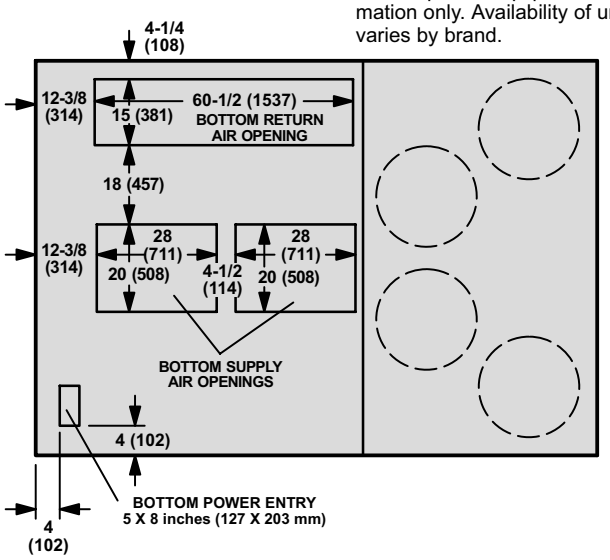
RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE



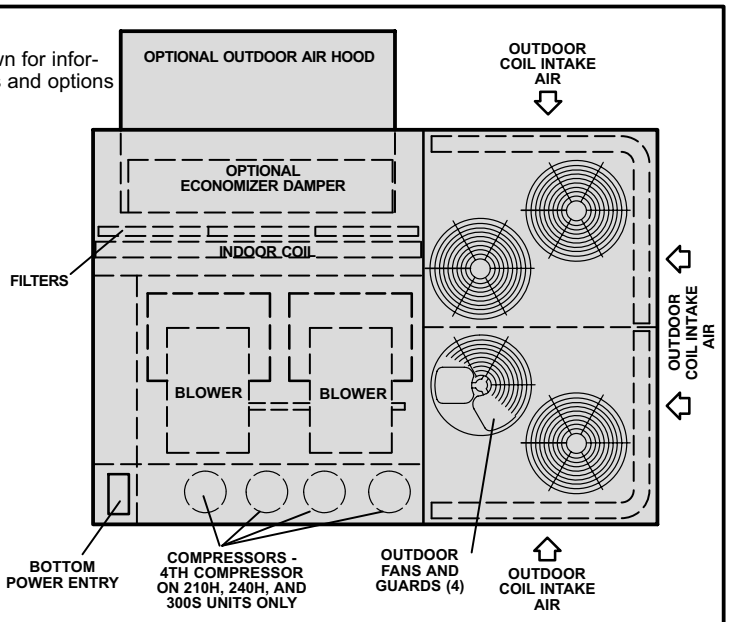
TCA240H SHOWN

TGA/TCA180, 210, 240, 300S DIMENSIONS - Electric heat section shown

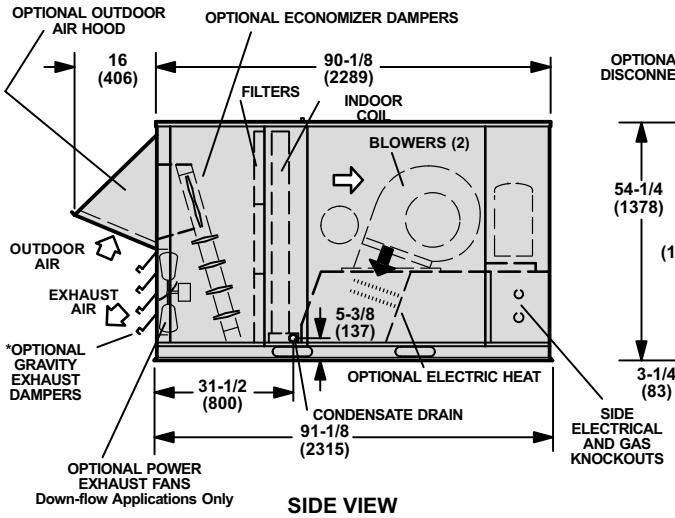
Note: Optional equipment shown for information only. Availability of units and options varies by brand.



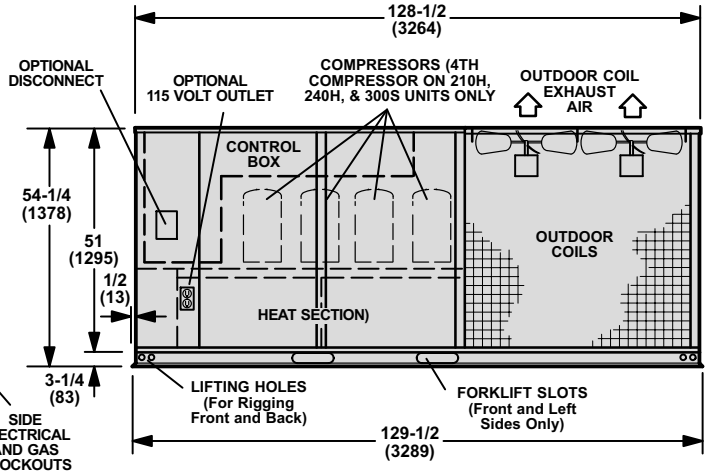
TOP VIEW BASE SECTION



TOP VIEW

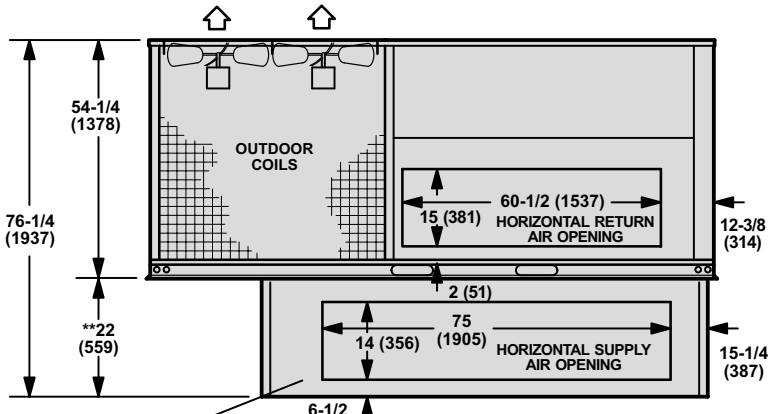


SIDE VIEW



FRONT VIEW

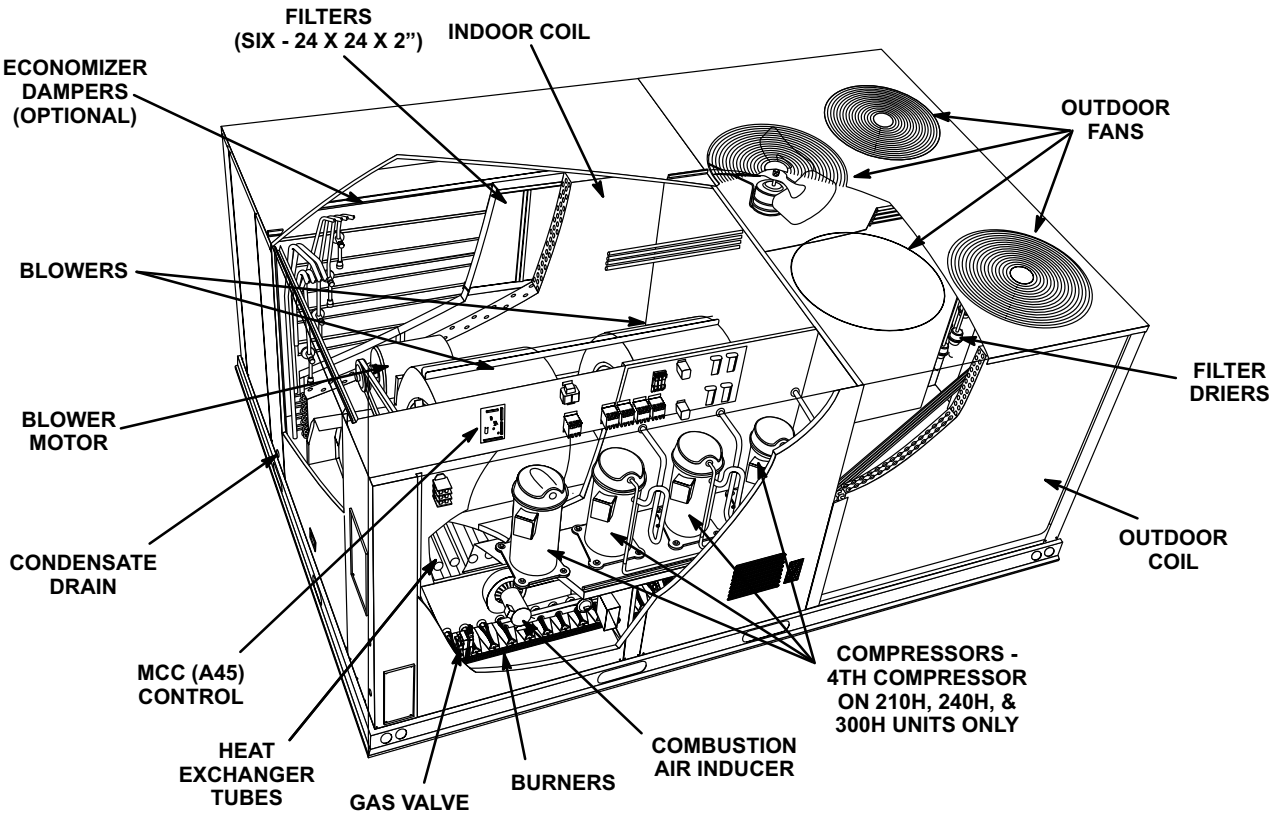
*NOTE — Field Installed in Return Air Duct for Horizontal Applications.



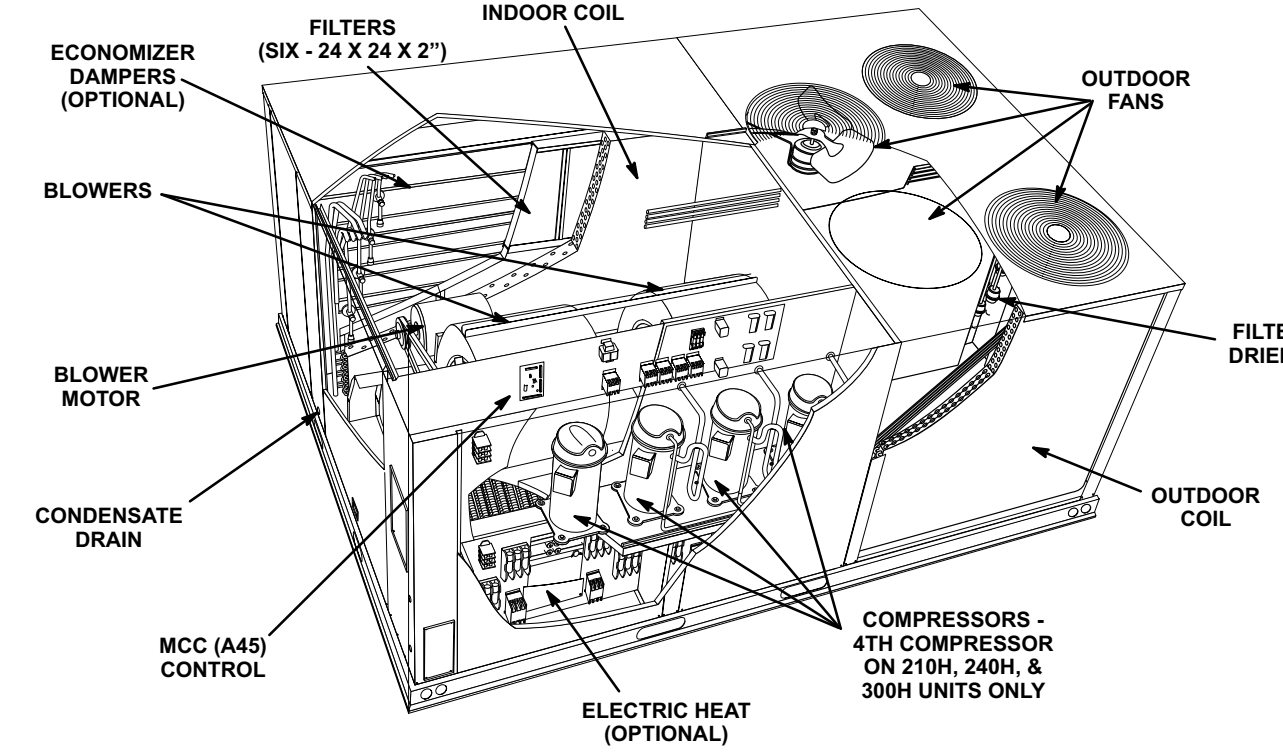
**NOTE — Mounting Frame extends 4 inch (102 mm) inside of unit base. See Typical flashing detail.

BACK VIEW
(Horizontal Supply and Return Air Opening)

TGA180, 210, 240, 300S PARTS ARRANGEMENT



TCA180, 210, 240, 300S PARTS ARRANGEMENT



⚠CAUTION

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

Shipping and Packing List

Package 1 of 1 contains:

1- Assembled unit

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

General

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

The TGA gas/electric packaged rooftop unit is available in three Btuh heating inputs. The TCA cooling packaged rooftop unit is the same basic design as the TGA unit except for the heating section. TGA and TCA units have identical refrigerant circuits with respective 15, 17-1/2, 20, and 25 ton cooling capacities.

Availability of units and options varies by brand.

Requirements

See figure 1 for unit clearances.

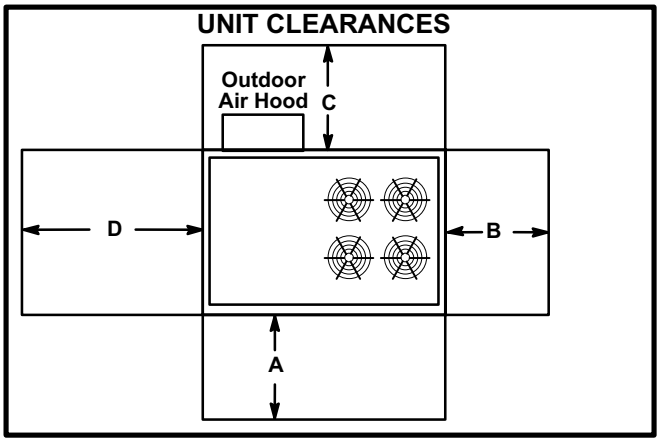


FIGURE 1

[1]Unit Clearance	A in.(mm)	B in.(mm)	C in.(mm)	D in.(mm)	Top Clearance
Service Clearance	60 (1524)	36 (914)	36 (914)	66 (1676)	Unob-structed
Clearance to Combustibles	36 (914)	1 (25)	1 (25)	1 (25)	Unob-structed
Minimum Opera-tion Clearance	45 (1143)	36 (914)	36 (914)	41 (1041)	Unob-structed

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

[1] **Service Clearance** - Required for removal of serviceable parts.
Clearance to Combustibles - Required clearance to combustible material (gas units).
Minimum Operation Clearance - Required clearance for proper unit operation.

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:

- The vent hood must be installed per these installation instructions.
- 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-filters must be removed upon construction completion.
- The input rate and temperature rise must be set per the unit rating plate.
- The heat exchanger, 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, ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

⚠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.

⚠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

In downflow discharge installations, install the unit on a non-combustible surface only. Unit may be installed on combustible surfaces when used in horizontal discharge applications or in downflow discharge applications when installed on an LARMF18/36 roof mounting frame.

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

A-Downflow Discharge Application

Roof Mounting with LARMF18/36

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

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

3- Duct must be attached to the roof mounting frame and not to the unit; supply and return plenums must be installed before setting the unit.

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 unit depending upon different roof structures. Items to keep in mind when using the building frame or supports are:

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

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

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

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

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

NOTE-When installing a unit on a combustible surface for downflow discharge applications, a LARMF roof mounting frame is required.

B-Horizontal Discharge Applications

1- Units installed in horizontal airflow applications must use an LARMF horizontal roof mounting frame. The supply air duct connects to the LARMF horizontal supply air opening. The return air duct connected to the unit horizontal return air opening. Refer to unit dimensions.

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

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

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

Duct Connection

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

⚠CAUTION

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

Rigging Unit For Lifting

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

1- Detach wooden base protection before rigging.

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

3- All panels must be in place for rigging.

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

RIGGING

UNIT	*WEIGHT	
	LBS.	KG.
TGA	2660	1207
TCA	2525	1145

CAUTION - Do not walk on unit.

*Maximum weight with all accessories.

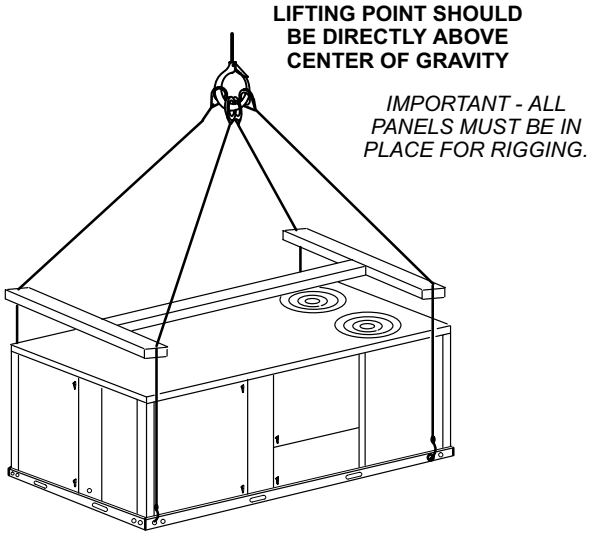


FIGURE 2

Condensate Drains

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

CONDENSATE DRAIN CONNECTION

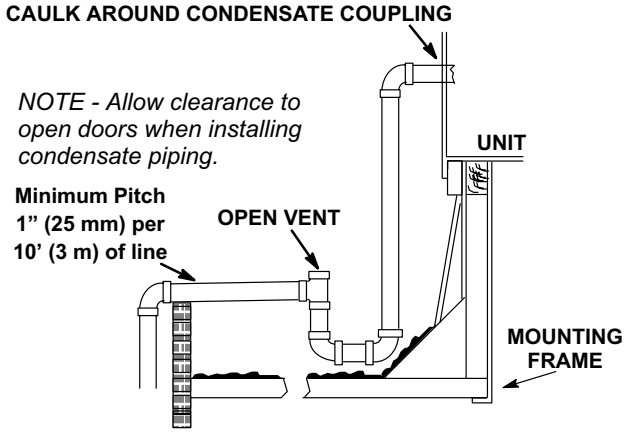


FIGURE 3

Connect Gas Piping (Gas Units)

Before connecting piping, check with gas company or authorities having jurisdiction for local code requirements. When installing gas supply piping, length of run from gas meter must be considered in determining pipe size for 0.5” w.c. (.12kPa) maximum pressure drop. Do not use supply pipe smaller than unit gas connection. For natural gas units, operating pressure at the unit gas connection must be a minimum of 4.7” w.c. (1.19kPa) and a maximum of 10.5” (2.60kPa) w.c. For LP/propane gas units, operating pressure at the unit gas connection must be a minimum of 10.8” w.c. (2.69kPa) and a maximum of 13.5” w.c. (3.36kPa).

When making piping connections a drip leg should be installed on vertical pipe runs to serve as a trap for sediment or condensate. A 1/8” N.P.T. plugged tap is located on gas valve for test gauge connection. Refer to Heating Start-Up section for tap location. Install a ground joint union between the gas control manifold and the main manual shut-off valve.

See figure 4 for gas supply piping entering outside the unit. A kit is required when gas supply piping enters through the bottom of the unit.

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

OUTSIDE OF UNIT GAS PIPE CONNECTION

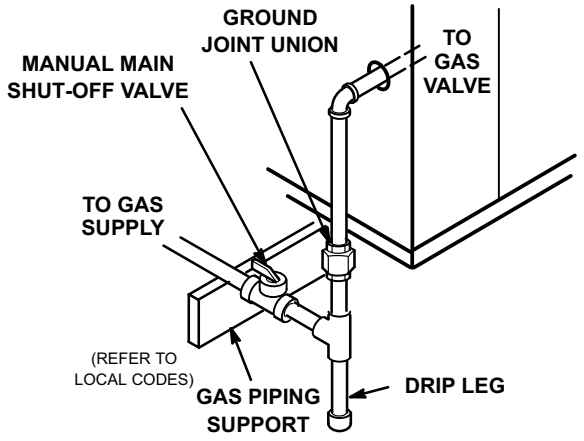


FIGURE 4

Pressure Test Gas Piping (Gas Units)

When pressure testing gas lines, the gas valve must be disconnected and isolated. Gas valves can be damaged if subjected to more than 0.5 psig (3.48kPa). See figure 5.

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

After all connections have been made, check all piping connections for gas leaks. Also check existing unit gas connections up to the gas valve; loosening may occur during installation. Use a leak detection solution or other preferred means. Do not use matches candles or other sources of ignition to check for gas leaks.

⚠CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or othe sources of ignition to check for gas leaks.

⚠WARNING

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

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

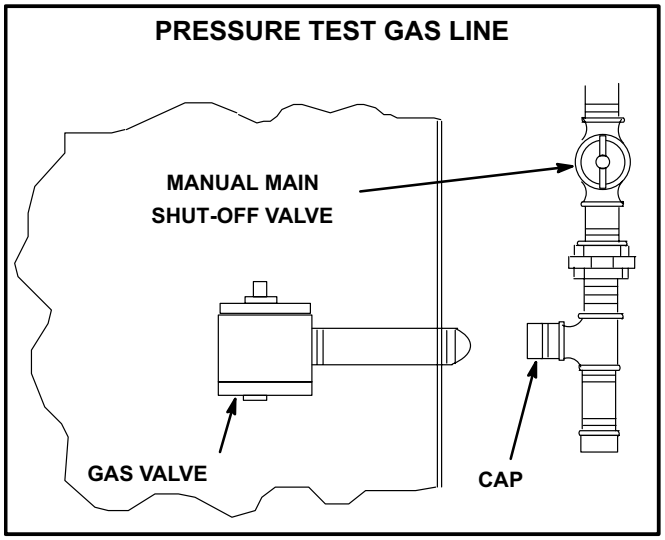


FIGURE 5

High Altitude Derate

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

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

TABLE 1

Altitude - ft. (m)*	Gas Manifold Pressure in. w.g. (kPa)	
	Natural	LP (Propane)
2001 - 3000 (610 - 915)	3.6 (0.90)	10.2 (2.54)
3001 - 4000 (915 - 1220)	3.5 (0.87)	9.9 (2.46)
4001 - 5000 (1220 - 1525)	3.4 (0.85)	9.6 (2.39)
5001 - 6000 (1525 - 1830)	3.3 (0.82)	9.4 (2.34)
6001 - 7000 (1830 - 2135)	3.2 (0.80)	9.1 (2.26)
7001 - 8000 (2135 - 2440)	3.1 (0.77)	8.8 (2.19)

*Contact Technical Support for altitudes higher than 8000 ft. (2400m).

Electrical Connections

Refer to inside of access panels for wiring diagrams.

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.

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 to 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 and parts arrangement for location of MCC board).

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.

Use18 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 6 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.

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.

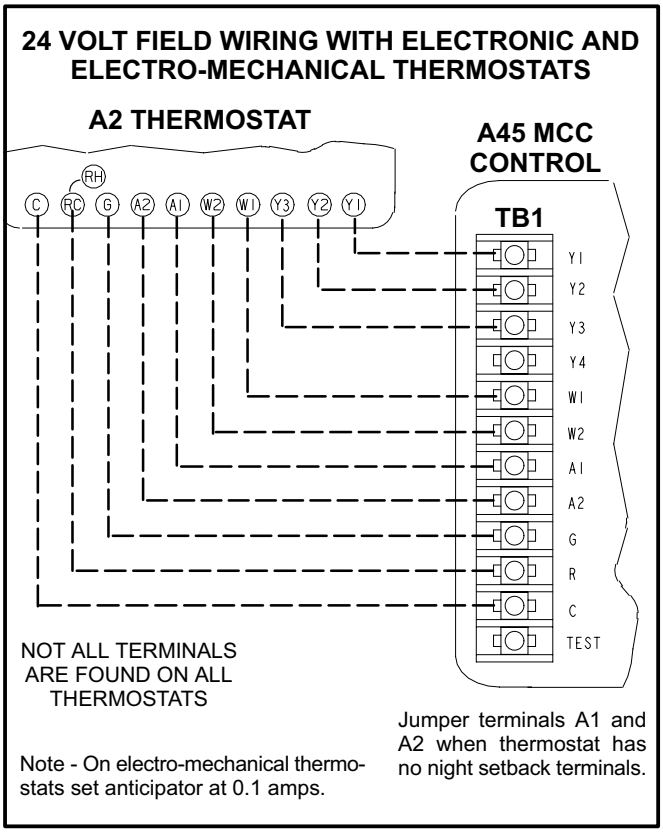


FIGURE 6

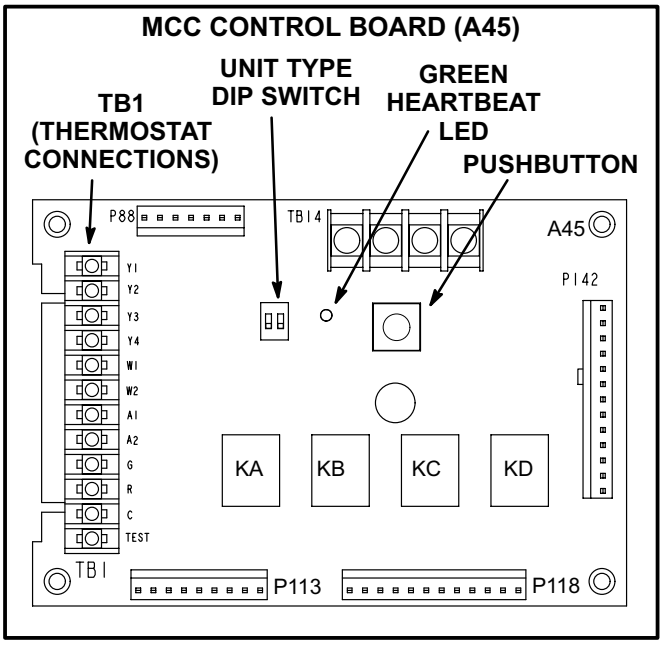


FIGURE 7

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 7. LED should flash slowly to indicate normal operation. Refer to table 2 if the heartbeat LED is not flashing normally.

TABLE 2
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 8.
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.

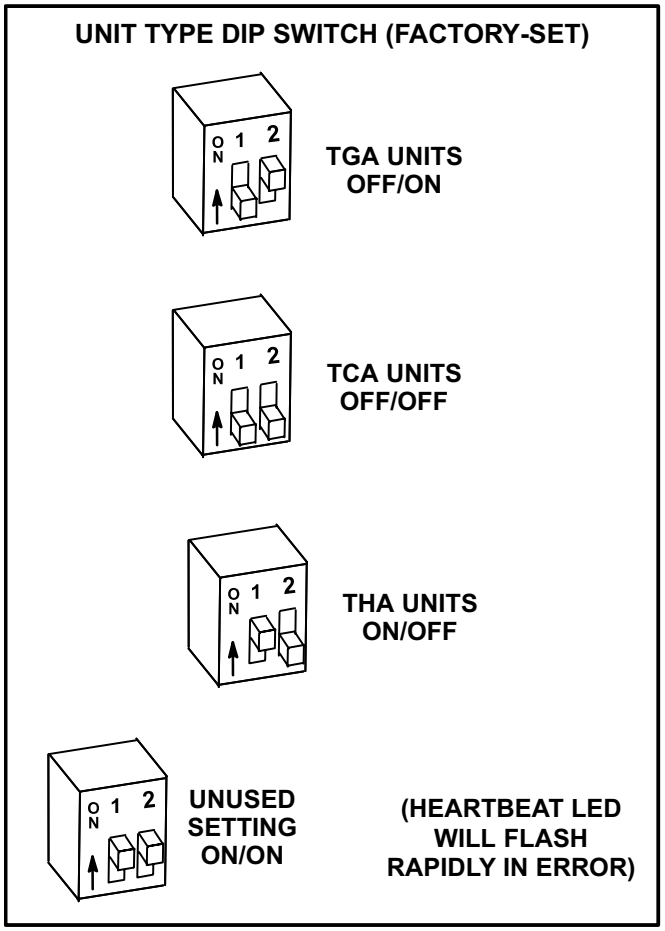


FIGURE 8

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 on TG/TC units and TB15 on TC 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- Blower operation is manually set at the thermostat subbase fan switch. With fan switch in **ON** position, blowers will operate continuously.

2- With fan switch in **AUTO** position, the blowers will cycle with heating or cooling demand. Blowers and entire unit will be off when 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 9.

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.

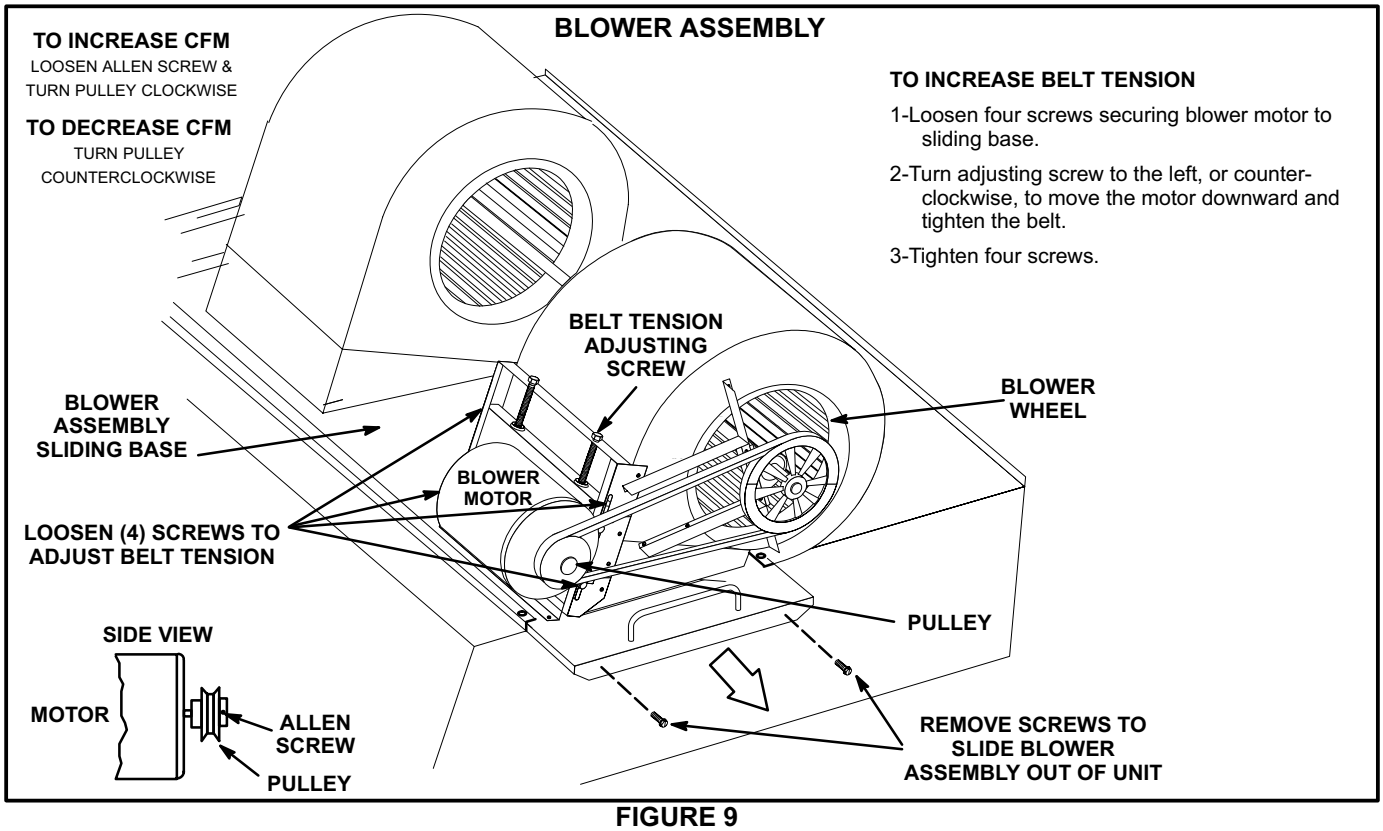


FIGURE 9

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.

D-Determining Unit CFM

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

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

3- Referring to table 4, use static pressure and RPM readings to determine unit CFM. Use table 5 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 RPM. Turn counterclockwise to decrease RPM. See figure 9. Tighten Allen screw after adjusting. Do not exceed minimum and maximum number of pulley turns as shown in table 3.

TABLE 3
MINIMUM AND MAXIMUM PULLEY ADJUSTMENT

Belt	Min. Turns Open	Max. 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 10.

1- Loosen four bolts securing motor base to mounting frame. See figure 9.

2- *To increase belt tension -*
Turn adjusting bolt to the left, or counterclockwise, to move the motor outward and tighten the belt. This increases the distance between the blower motor shaft and the blower housing shaft.

To loosen belt tension -
Turn the adjusting bolt to the right, or clockwise to loosen belt tension.

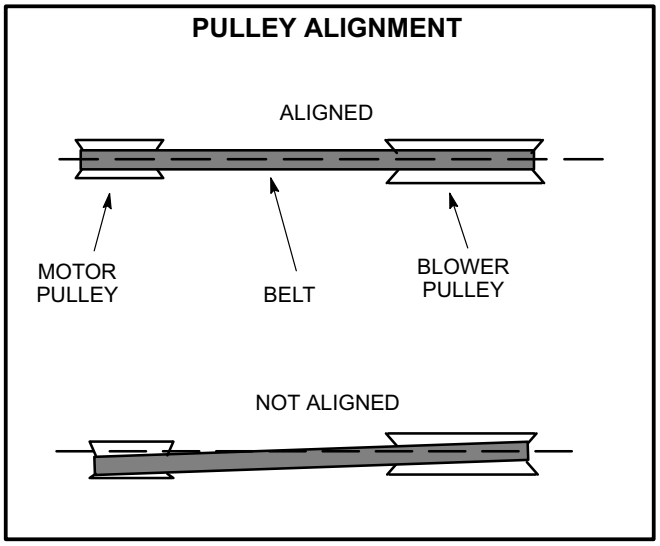


FIGURE 10

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.

F-Check Belt Tension

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

1- Measure span length X. See figure 11.

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.

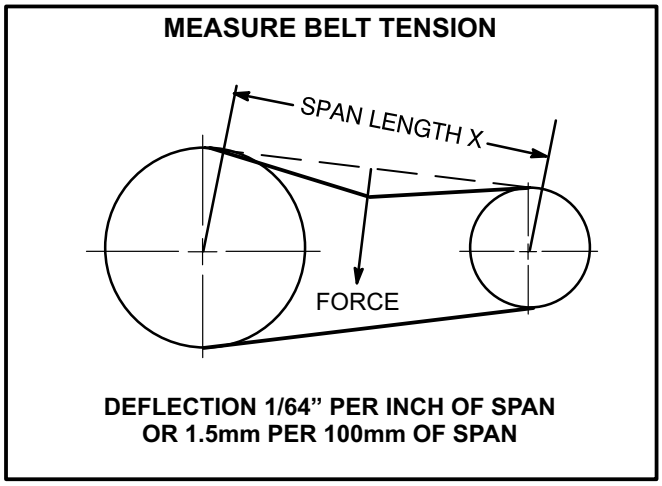


FIGURE 11

G-Field-Furnished Blower Drives

For field-furnished blower drives, use tables 4 and 5 to determine BHP and RPM required. Reference table 6 to determine the drive number and table 7 to determine the manufacturer's model number.

TABLE 4
180, 210, 240, 300S BASE UNIT BLOWER PERFORMANCE

BLOWER TABLE INCLUDES RESISTANCE FOR <u>BASE UNIT ONLY</u> WITH DRY INDOOR COIL & AIR FILTERS IN PLACE.
FOR ALL UNITS ADD:
1 - Wet indoor coil air resistance of selected unit. 2 - Any factory installed options air resistance (heat section, economizer, etc.)
3 - Any field installed accessories air resistance (duct resistance, diffuser, etc.) Then determine from blower table blower motor output and drive required. See table 5 for wet coil and option/accessory air resistance data.
MINIMUM AIR VOLUME REQUIRED FOR USE WITH OPTIONAL ELECTRIC HEAT
●-All TC units require 6000 cfm (2830 L/s) minimum air with electric heat.

Air Volume cfm (L/s)	TOTAL STATIC PRESSURE — Inches Water Gauge (Pa)																					
	.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)
4000 (1890)	545	0.85 (0.63)	635	1.10 (0.82)	715	1.40 (1.04)	785	1.70 (1.27)	850	2.00 (1.49)	910	2.30 (1.72)	965	2.60 (1.94)	1020	2.90 (2.16)	1070	3.25 (2.42)	1115	3.55 (2.65)	1160	3.85 (2.87)	1205	4.15 (3.10)
4250 (2005)	555	0.90 (0.67)	645	1.25 (0.93)	725	1.55 (1.16)	795	1.85 (1.38)	855	2.15 (1.60)	915	2.45 (1.83)	970	2.80 (2.09)	1025	3.10 (2.31)	1075	3.45 (2.57)	1120	3.75 (2.80)	1165	4.10 (3.06)	1210	4.45 (3.32)
4500 (2125)	565	1.00 (0.75)	655	1.35 (1.01)	730	1.65 (1.23)	800	2.00 (1.49)	865	2.35 (1.75)	925	2.65 (1.98)	980	3.00 (2.24)	1030	3.30 (2.46)	1080	3.65 (2.72)	1130	4.05 (3.02)	1175	4.35 (3.25)	1215	4.70 (3.51)
4750 (2240)	575	1.10 (0.82)	660	1.45 (1.08)	740	1.80 (1.34)	810	2.15 (1.60)	870	2.50 (1.87)	930	2.85 (2.13)	985	3.20 (2.39)	1040	3.55 (2.65)	1085	3.90 (2.91)	1135	4.25 (3.17)	1180	4.65 (3.47)	1225	5.00 (3.73)
5000 (2360)	585	1.25 (0.93)	670	1.60 (1.19)	750	1.95 (1.45)	815	2.30 (1.72)	880	2.70 (2.01)	940	3.05 (2.28)	995	3.40 (2.54)	1045	3.80 (2.83)	1095	4.15 (3.10)	1140	4.50 (3.36)	1185	4.90 (3.66)	1230	5.30 (3.95)
5250 (2475)	595	1.35 (1.01)	680	1.70 (1.27)	755	2.10 (1.57)	825	2.50 (1.87)	890	2.90 (2.16)	945	3.25 (2.42)	1000	3.65 (2.72)	1050	4.00 (2.98)	1100	4.40 (3.28)	1150	4.80 (3.58)	1195	5.20 (3.88)	1235	5.60 (4.18)
5500 (2595)	605	1.45 (1.08)	690	1.85 (1.38)	765	2.25 (1.68)	835	2.65 (1.98)	895	3.05 (2.28)	955	3.45 (2.57)	1010	3.85 (2.87)	1060	4.25 (3.17)	1110	4.70 (3.51)	1155	5.10 (3.80)	1200	5.50 (4.10)	1240	5.90 (4.40)
5750 (2715)	615	1.60 (1.19)	700	2.00 (1.49)	775	2.45 (1.83)	840	2.85 (2.13)	905	3.25 (2.42)	960	3.65 (2.72)	1015	4.10 (3.06)	1065	4.50 (3.36)	1115	4.95 (3.69)	1160	5.35 (3.99)	1205	5.80 (4.33)	1250	6.25 (4.66)
6000 (2830)	630	1.75 (1.31)	710	2.15 (1.60)	785	2.60 (1.94)	850	3.05 (2.28)	910	3.45 (2.57)	970	3.90 (2.91)	1025	4.35 (3.25)	1075	4.80 (3.58)	1120	5.20 (3.88)	1170	5.65 (4.21)	1215	6.10 (4.55)	1255	6.55 (4.89)
6250 (2950)	640	1.90 (1.42)	720	2.35 (1.75)	795	2.80 (2.09)	860	3.25 (2.42)	920	3.70 (2.76)	975	4.15 (3.10)	1030	4.60 (3.43)	1080	5.05 (3.77)	1130	5.50 (4.10)	1175	5.95 (4.44)	1220	6.45 (4.81)	1265	6.90 (5.15)
6500 (3065)	650	2.05 (1.53)	730	2.50 (1.87)	805	3.00 (2.24)	870	3.45 (2.57)	930	3.95 (2.95)	985	4.40 (3.28)	1040	4.85 (3.62)	1090	5.35 (3.99)	1140	5.85 (4.36)	1185	6.30 (4.70)	1225	6.75 (5.04)	1270	7.25 (5.41)
6750 (3185)	665	2.20 (1.64)	745	2.70 (2.01)	815	3.20 (2.39)	880	3.70 (2.76)	940	4.20 (3.13)	995	4.65 (3.47)	1045	5.10 (3.80)	1095	5.60 (4.18)	1145	6.10 (4.55)	1190	6.60 (4.92)	1235	7.10 (5.30)	1275	7.60 (5.67)
7000 (3305)	675	2.35 (1.75)	755	2.90 (2.16)	825	3.40 (2.54)	890	3.95 (2.95)	950	4.45 (3.32)	1005	4.95 (3.69)	1055	5.40 (4.03)	1105	5.95 (4.44)	1155	6.45 (4.81)	1200	6.95 (5.18)	1240	7.45 (5.56)	1285	8.00 (5.97)
7250 (3420)	690	2.60 (1.94)	765	3.10 (2.31)	835	3.65 (2.72)	900	4.15 (3.10)	955	4.65 (3.47)	1015	5.25 (3.92)	1065	5.75 (4.29)	1115	6.25 (4.66)	1160	6.75 (5.04)	1205	7.30 (5.45)	1250	7.85 (5.86)	1290	8.35 (6.23)
7500 (3540)	700	2.75 (2.05)	775	3.30 (2.46)	845	3.85 (2.87)	910	4.45 (3.32)	965	4.95 (3.69)	1020	5.50 (4.10)	1075	6.05 (4.51)	1125	6.60 (4.92)	1170	7.15 (5.33)	1215	7.65 (5.71)	1260	8.25 (6.15)	1300	8.75 (6.53)
7750 (3655)	715	3.00 (2.24)	790	3.55 (2.65)	855	4.10 (3.06)	920	4.70 (3.51)	975	5.25 (3.92)	1030	5.80 (4.33)	1080	6.35 (4.74)	1130	6.90 (5.15)	1180	7.50 (5.60)	1225	8.05 (6.01)	1265	8.60 (6.42)	1305	9.15 (6.83)
8000 (3775)	725	3.20 (2.39)	800	3.80 (2.83)	865	4.35 (3.25)	930	4.95 (3.69)	985	5.50 (4.10)	1040	6.10 (4.55)	1090	6.70 (5.00)	1140	7.25 (5.41)	1185	7.85 (5.86)	1230	8.40 (6.27)	1275	9.00 (6.71)	1315	9.60 (7.16)
8250 (3895)	740	3.40 (2.54)	810	4.00 (2.98)	880	4.65 (3.47)	940	5.25 (3.92)	995	5.85 (4.36)	1050	6.45 (4.81)	1100	7.05 (5.26)	1150	7.65 (5.71)	1195	8.25 (6.15)	1240	8.85 (6.60)	1280	9.40 (7.01)	1325	10.05 (7.50)
8500 (4010)	750	3.65 (2.72)	825	4.30 (3.21)	890	4.90 (3.66)	950	5.55 (4.14)	1005	6.15 (4.59)	1060	6.80 (5.07)	1110	7.40 (5.52)	1160	8.05 (6.01)	1205	8.65 (6.45)	1250	9.25 (6.90)	1290	9.85 (7.35)	1330	10.45 (7.80)
8750 (4130)	765	3.90 (2.91)	835	4.55 (3.39)	900	5.20 (3.88)	960	5.85 (4.36)	1015	6.45 (4.81)	1070	7.15 (5.33)	1120	7.75 (5.78)	1165	8.35 (6.23)	1215	9.05 (6.75)	1255	9.65 (7.20)	1300	10.30 (7.68)	1340	10.90 (8.13)
9000 (4245)	780	4.20 (3.13)	850	4.85 (3.62)	910	5.50 (4.10)	970	6.15 (4.59)	1025	6.80 (5.07)	1080	7.50 (5.60)	1130	8.15 (6.08)	1175	8.75 (6.53)	1220	9.40 (7.01)	1265	10.10 (7.53)	1310	10.80 (8.06)	1350	11.40 (8.50)
9250 (4365)	790	4.45 (3.32)	860	5.15 (3.84)	925	5.85 (4.36)	985	6.55 (4.89)	1040	7.20 (5.37)	1090	7.85 (5.86)	1140	8.55 (6.38)	1185	9.20 (6.86)	1230	9.85 (7.35)	1275	10.55 (7.87)	1315	11.20 (8.36)	----	
9500 (4485)	805	4.75 (3.54)	875	5.45 (4.07)	935	6.15 (4.59)	995	6.90 (5.15)	1050	7.60 (5.67)	1100	8.25 (6.15)	1150	8.95 (6.68)	1195	9.60 (7.16)	1240	10.30 (7.68)	1285	11.05 (8.24)	----		----	
9750 (4600)	820	5.05 (3.77)	885	5.75 (4.29)	950	6.55 (4.89)	1005	7.20 (5.37)	1060	7.95 (5.93)	1110	8.65 (6.45)	1160	9.40 (7.01)	1205	10.05 (7.50)	1250	10.80 (8.06)	1295	11.50 (8.58)	----		----	
10000 (4720)	835	5.40 (4.03)	900	6.15 (4.59)	960	6.85 (5.11)	1015	7.60 (5.67)	1070	8.35 (6.23)	1120	9.05 (6.75)	1170	9.80 (7.31)	1215	10.50 (7.83)	1260	11.25 (8.39)	----		----		----	
10250 (4835)	845	5.65 (4.21)	910	6.45 (4.81)	970	7.20 (5.37)	1030	8.00 (5.97)	1080	8.75 (6.53)	1135	9.55 (7.12)	1180	10.25 (7.65)	1225	11.00 (8.21)	----		----		----		----	
10500 (4955)	860	6.00 (4.48)	925	6.85 (5.11)	985	7.65 (5.71)	1040	8.40 (6.27)	1095	9.20 (6.86)	1145	10.00 (7.46)	1190	10.70 (7.98)	1235	11.45 (8.54)	----		----		----		----	
10750 (5075)	875	6.40 (4.77)	940	7.25 (5.41)	1000	8.05 (6.01)	1055	8.85 (6.60)	1105	9.65 (7.20)	1155	10.45 (7.80)	1200	11.20 (8.36)	----		----		----		----		----	
11000 (5190)	890	6.80 (5.07)	950	7.60 (5.67)	1010	8.45 (6.30)	1065	9.30 (6.94)	1115	10.05 (7.50)	1165	10.90 (8.13)	----		----		----		----		----		----	

TABLE 5
OPTION / ACCESSORY AIR RESISTANCE

Air Volume		Total Resistance - inches water gauge (Pa)								
		Wet Indoor Coil		Gas Heat Exchanger (TG Models)			Electric Heat (TC Models)	Econo-mizer	LARMFH18/24 Horizontal Roof Mounting Frame	LARMFH30/36 Horizontal Roof Mounting Frame (for 300S Only)
cfm	L/s	180 210S 240S (3 row)	210H, 240H, 300S (4 row)	Standard Heat	Medium Heat	High Heat				
4000	1890	.02 (5)	.04 (10)	.01 (2)	.02 (5)	.02 (5)	- - - -	- - - -	.06 (15)	- - - -
4250	2005	.02 (5)	.04 (10)	.01 (2)	.02 (5)	.03 (7)	- - - -	- - - -	.07 (17)	- - - -
4500	2125	.02 (5)	.05 (12)	.01 (2)	.03 (7)	.04 (10)	- - - -	- - - -	.07 (17)	.02 (5)
4750	2240	.02 (5)	.05 (12)	.02 (5)	.04 (10)	.05 (12)	- - - -	- - - -	.08 (20)	.03 (7)
5000	2360	.02 (5)	.05 (12)	.02 (5)	.04 (10)	.06 (15)	- - - -	- - - -	.08 (20)	.03 (7)
5250	2475	.02 (5)	.06 (15)	.02 (5)	.05 (12)	.07 (17)	- - - -	- - - -	.09 (22)	.04 (10)
5500	2595	.02 (5)	.07 (17)	.02 (5)	.06 (15)	.08 (20)	- - - -	- - - -	.10 (25)	.04 (10)
5750	2715	.07 (7)	.07 (17)	.02 (5)	.06 (15)	.09 (22)	- - - -	- - - -	.11 (27)	.05 (12)
6000	2830	.03 (7)	.08 (20)	.02 (5)	.07 (17)	.11 (27)	.01 (2)	- - - -	.11 (27)	.06 (15)
6250	2950	.03 (7)	.08 (20)	.02 (5)	.08 (20)	.12 (30)	.01 (2)	.01 (2)	.12 (30)	.07 (17)
6500	3065	.03 (7)	.09 (22)	.03 (7)	.10 (25)	.14 (35)	.01 (2)	.02 (5)	.13 (32)	.08 (20)
6750	3185	.04 (10)	.10 (25)	.03 (7)	.10 (25)	.15 (37)	.01 (2)	.03 (7)	.14 (35)	.08 (20)
7000	3305	.04 (10)	.10 (25)	.04 (10)	.11 (27)	.16 (40)	.01 (2)	.04 (10)	.15 (37)	.09 (22)
7250	3420	.04 (10)	.11 (27)	.04 (10)	.12 (30)	.18 (45)	.01 (2)	.05 (12)	.16 (40)	.10 (25)
7500	3540	.05 (12)	.12 (30)	.04 (10)	.13 (32)	.19 (47)	.01 (2)	.06 (15)	.17 (42)	.11 (27)
7750	3655	.05 (12)	.12 (30)	.04 (10)	.14 (35)	.21 (52)	.01 (2)	.07 (17)	.18 (45)	.12 (30)
8000	3775	.05 (12)	.13 (32)	.05 (12)	.16 (40)	.23 (57)	.02 (5)	.09 (22)	.19 (47)	.13 (32)
8250	3895	.06 (15)	.14 (35)	.06 (15)	.18 (45)	.26 (65)	.02 (5)	.10 (25)	.20 (50)	.14 (35)
8500	4010	.06 (15)	.15 (37)	.07 (17)	.19 (47)	.27 (67)	.02 (5)	.11 (27)	.21 (52)	.15 (37)
8750	4130	.06 (15)	.16 (40)	.07 (17)	.20 (50)	.29 (72)	.03 (7)	.12 (30)	.22 (55)	.16 (40)
9000	4245	.07 (17)	.16 (40)	.08 (20)	.22 (55)	.31 (77)	.04 (10)	.14 (35)	.24 (60)	.17 (42)
9250	4365	.07 (17)	.17 (42)	.09 (22)	.23 (57)	.33 (82)	.04 (10)	.16 (40)	.25 (62)	.18 (45)
9500	4485	.08 (20)	.18 (45)	.10 (25)	.24 (60)	.34 (85)	.05 (12)	.16 (40)	.26 (65)	.19 (47)
9750	4600	.08 (20)	.19 (47)	.11 (27)	.27 (67)	.37 (92)	.06 (15)	.18 (45)	.27 (67)	.20 (50)
10,000	4720	.08 (20)	.20 (50)	.12 (30)	.28 (69)	.39 (97)	.06 (15)	.19 (47)	.29 (72)	.21 (52)
10,250	4840	.09 (22)	.21 (52)	.13 (32)	.30 (75)	.41 (102)	.07 (17)	.21 (52)	.30 (75)	.23 (57)
10,500	4955	.09 (22)	.22 (55)	.14 (35)	.32 (80)	.44 (109)	.09 (22)	.22 (55)	.31 (77)	.24 (60)
10,750	5075	.10 (25)	.23 (57)	.16 (40)	.34 (85)	.46 (114)	.09 (22)	.24 (60)	.33 (82)	.26 (65)
11,000	5190	.11 (27)	.24 (60)	.18 (45)	.37 (92)	.49 (122)	.11 (27)	.25 (62)	.34 (85)	.27 (67)

TABLE 6
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	910-965	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
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	- - - -	685-865

*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 7
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

The thermostat specified for use on this unit has three cooling outputs.

A-Operation

1- Remove coil covers before starting unit.

2- Initiate first and second stage cooling demands according to instructions provided with thermostat.

3- First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will energize compressor 2. Third-stage thermostat demand will energize compressor 3 (and 4 on 4-compressor units only). 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.

4- *180S & H, 210S, 240S,-*
Units contain three refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuit 1 makes up stage 1 cooling. Evaporator and condenser coil refrigerant circuit 2 makes up stage 2 cooling. Evaporator and condenser coil refrigerant circuit 3 makes up stage 3 cooling. See figure 12.

210H, 240H, 300S -
Units contain four refrigerant circuits or systems. Evaporator and condenser coil refrigerant circuit 1 makes up stage 1 cooling. Evaporator and condenser refrigerant circuit 2 makes up stage 2 cooling. Evaporator and condenser refrigerant circuit 3 and 4 makes up stage 3 cooling. See figure 13.

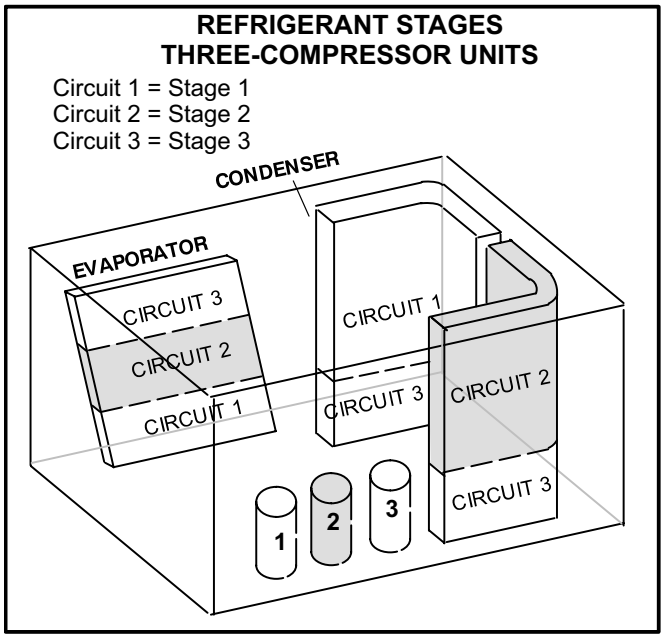


FIGURE 12

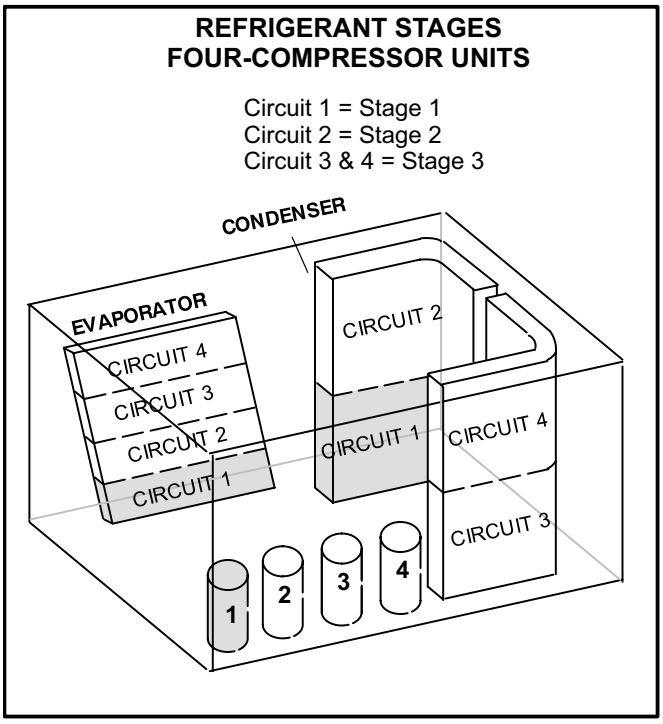


FIGURE 13

5- *180S & H, 210S, 240S,-*
First-stage thermostat demand will energize condenser fans 1 and 2. Second-stage thermostat demand will energize condenser fans 3 and 4. Fans will continue to operate with additional thermostat demands.

210H, 240H, 300S -
First-stage thermostat demand will energize condenser fans 1 and 2. See figure 14. Third-stage thermostat demand will energize condenser fans 3 and 4.

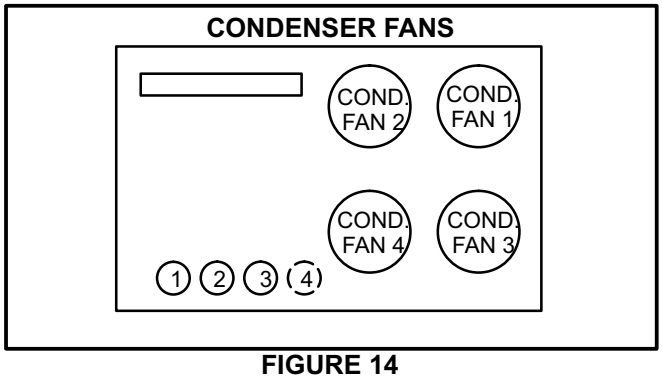


FIGURE 14

6- Each refrigerant circuit is separately charged with HCFC22 refrigerant. See unit rating plate for correct amount of charge.

7- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

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 outdoor air dampers are closed.

2- Check each system separately with all stages operating.

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

4- Apply the outdoor temperature to tables 8 through 14 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 8
TGA/TCA180S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	172	75	178	78	181	78
75°F	199	77	205	80	210	80
85°F	228	79	237	82	242	81
95°F	258	80	271	83	274	82
105°F	293	82	309	84	312	84
115°F	331	83	348	85	350	85

TABLE 9
TGA/TCA180H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	158	72	159	74	158	74
75°F	183	76	186	79	184	78
85°F	210	78	214	81	211	79
95°F	239	79	245	83	241	81
105°F	270	81	278	84	273	82
115°F	304	82	313	86	306	84

TABLE 10
TCA/TGA210S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	188	66	191	67	194	71
75°F	213	69	217	70	220	73
85°F	242	71	247	74	252	74
95°F	275	73	281	76	286	76
105°F	308	75	315	77	321	77
115°F	347	77	355	79	361	79

TABLE 11
TCA/TGA210H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	170	77	173	80	172	80	168	80
75°F	197	78	198	81	197	81	193	81
85°F	223	79	225	82	225	82	221	82
95°F	255	81	255	83	257	83	252	83
105°F	289	83	287	84	293	85	287	85
115°F	329	85	323	86	333	87	327	87

TABLE 12
TCA/TGA240S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	185	69	182	73	183	72
75°F	212	71	209	75	210	74
85°F	236	72	233	75	234	75
95°F	267	73	265	76	264	75
105°F	297	74	301	77	300	76
115°F	335	76	340	78	338	78

TABLE 13
TCA/TGA240H NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	179	75	181	79	174	79	176	79
75°F	207	76	208	81	203	79	204	80
85°F	239	78	238	82	233	80	234	81
95°F	272	80	270	83	266	83	266	83
105°F	307	83	303	84	301	84	300	85
115°F	351	85	342	85	343	86	342	86

TABLE 14
TCA/TGA300S NORMAL OPERATING PRESSURES

Outdoor Coil Entering Air Temp	CIRCUIT 1		CIRCUIT 2		CIRCUIT 3		CIRCUIT 4	
	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc. ±5 psig	Dis. ±10 psig	Suc ±5 psig	Dis. ±10 psig	Suc. ±5 psig
65°F	185	69	183	70	186	72	179	71
75°F	213	72	210	74	215	76	207	75
85°F	247	75	241	77	249	78	240	78
95°F	280	77	271	78	281	80	271	79
105°F	320	79	309	79	317	81	307	80
115°F	361	81	346	80	358	82	345	82

C-Charge Verification - Approach Method

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

Approach Temperature = Liquid temperature minus ambient temperature.

2- Approach temperatures should match values in table 15. An approach temperature greater than this value indicates an undercharge. An approach temperature less than this value indicates an overcharge.

3- Do not use the approach method if system pressures do not match pressures in tables 8 through 14. The approach method is not valid for grossly over or undercharged systems.

TABLE 15
APPROACH TEMPERATURES

Unit	Liquid Temp. Minus Ambient Temp.			
	1st Stage	2nd Stage	3rd Stage	4th Stage
180S 210S 240S 180H	7°F ± 1 (3.9°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	NA
210H	9°F ± 1 (5°C ± 0.5)	7°F ± 1 (3.9°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)	8°F ± 1 (4.4°C ± 0.5)
240H	10°F ± 1 (5.6°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	9°F ± 1 (5°C ± 0.5)	10°F ± 1 (5.6°C ± 0.5)
300S	14°F ± 1 (7.8°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)	12°F ± 1 (6.7°C ± 0.5)

D-Compressor Controls

Most compressor controls are integrated in the A45 MCC control or are field-installed options. See unit wiring diagram to determine which controls are used on each unit. Optional controls are identified on wiring diagrams by arrows at junction points.

1- Freezestats (S49, S50, S53, S95)
Switches de-energize compressors when evaporator coil temperature falls below 29°F (-2°C) to prevent evaporator freeze-up. Switches reset when evaporator coil temperature reaches 58°F (15°C).

2- Optional High Pressure Switches (S4, S7, S28, S96)
Switches open to de-energize appropriate compressor at 450 psig ± 10 psig (3100kPa ± 70kPa). Switch must be manually reset.

Gas Heat Start-Up (Gas Units)

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠WARNING

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

⚠WARNING

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

⚠WARNING

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

⚠WARNING

SMOKE POTENTIAL

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

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

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

⚠WARNING

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

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

A-Placing Unit In Operation

⚠WARNING

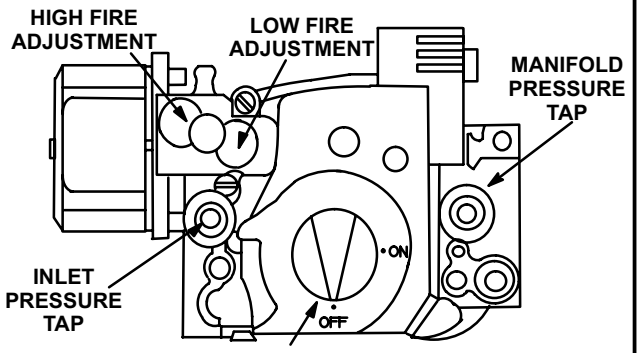
Danger of explosion and fire. Can cause injury or product or property damage. You must follow these instructions exactly.

Gas Valve Operation Honeywell VR8205Q/VR8305Q (figure 15) and White Rodgers 36C (figure 16)

1- Set thermostat to lowest setting.

2- Turn off all electrical power to appliance.

HONEYWELL VR8205Q/VR8305Q SERIES GAS VALVE



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

FIGURE 15

WHITE RODGERS 36C76 GAS VALVE

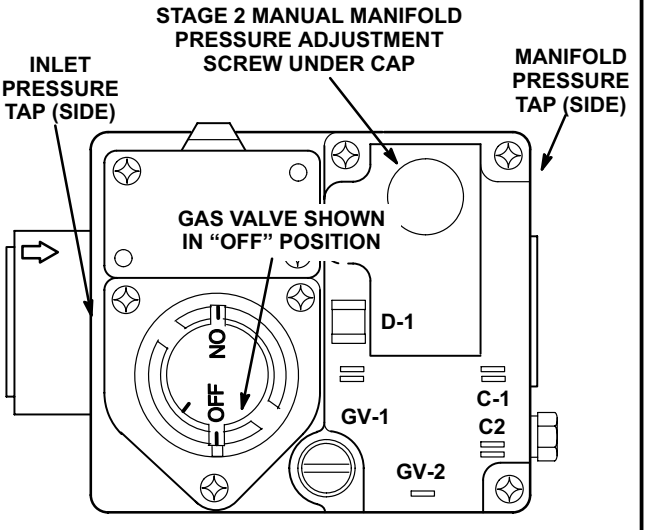


FIGURE 16

3- This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.

4- Open or remove the heat section access panel.

5- Turn the knob on the gas valve clockwise ↷ to **"OFF"**. Depress knob slightly. Do not force.

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

7- Turn the knob on the gas valve counterclockwise ↶ to **"ON"**. Do not force.

8- Close or replace the heat section access panel.

9- Turn on all electrical power to appliance.

10- Set thermostat to desired setting.

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

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

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

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

Turning Off Gas to Unit

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

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

3- Open or remove the heat section access panel.

4- Turn the knob on the gas valve clockwise ↷ to **"OFF"**. Depress knob slightly. Do not force.

5- Close or replace the heat section access panel.

⚠WARNING

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

Heating Operation and Adjustments

(Gas Units)

First Stage Heat:

1- The thermostat initiates W1 heating demand.

2- 24VAC is routed from TB1 on control module A45 to ignition control A3 through P88. A3 proves N.C. primary limit S10 and N.C. rollout switch S47.

3- Combustion air inducer blower B6 is energized.

4- After the combustion air inducer B6 has reached full speed, the combustion air proving switch S18 contacts close.

5- After a 30 second delay A3 energizes the ignitor and LO terminal (low fire) of gas valve GV1.

Second Stage Heat:

6 With first stage heat operating, an additional heating demand from the thermostat initiates W2.

7- A second stage heating demand is received by A45 control module. The second stage heat signal passes from A45 to A3.

8- A3 energizes HI terminal (high fire) of gas valve GV1.

End of Second Stage Heat:

9- Heating demand is satisfied. Terminal W2 (high fire) is de-energized.

10- Terminal HI of GV1 is de-energized by A3 control module.

End of First Stage Heat:

11- Heating demand is satisfied. Terminal W1 (low fire) is de-energized.

12- Ignition A3 is de-energized by control module A45 in turn de-energizing terminal LO of GV1.

Optional Low Ambient Kit:
(CSA -50°C Low Ambient Kit)

13- Line voltage (or transformer T20 in 460V and 575V only) is routed through the low ambient kit fuses F20 and N.C. low ambient kit thermostats S60 and S61,to energize low ambient kit heater HR6.

B-Ignition Control Diagnostic LED's

TABLE 16
IGNITION CONTROL HEARTBEAT LED STATUS

LED Flashes	Indicates
Slow	Normal operation. No call for heat.
Fast	Normal operation. Call for heat.
Steady Off	Internal control fault OR no power to control OR Gas Valve Relay Fault.
Steady On	Control internal failure.
2	Lockout. Failed to detect or sustain flame.
3	Prove switch open or closed or rollout switch open.
4	Limit switch is open and/or limit has opened three times.
5	Flame sensed but gas valve solenoid not energized.

C-Limit Controls

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

D-Heating Adjustment

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

The following manifold pressures are listed on the gas valve.

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

Electric Heat Start-Up (TCA Unit)

Electric heat will stage on and cycle with thermostat demand. Number of stages of electric heat will vary depending on electric heat assembly. See electric heat wiring diagram on unit for sequence of operation.

Service

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

⚠CAUTION

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

⚠WARNING

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

A-Filters

Units are equipped with 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 17.

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

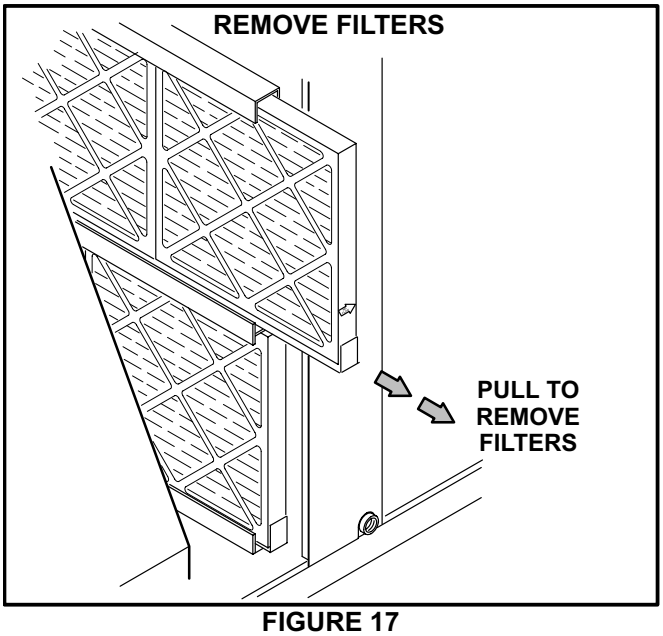


FIGURE 17

B-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 lubrication. Add only enough grease to purge through the bearings so that a bead of grease appears at the seal lip contacts.

C-Burners (Gas Units)

Periodically examine burner flames for proper appearance during the heating season. Before each heating season examine the burners for any deposits or blockage which may have occurred.

Clean burners as follows:

1- Turn off both electrical power and gas supply to unit.

2- Remove burner compartment access panel.

3- Remove two screws securing burners to burner support and lift the burners from the orifices. See figure 18. Clean as necessary.

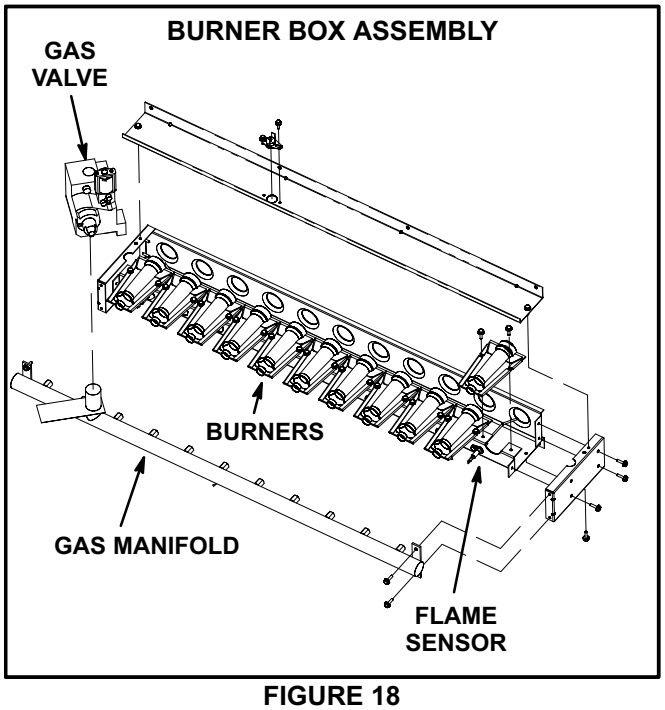


FIGURE 18

4- Locate the ignitor under the left burners. Check ignitor spark gap with appropriately sized twist drills or feeler gauges. See figure 19.

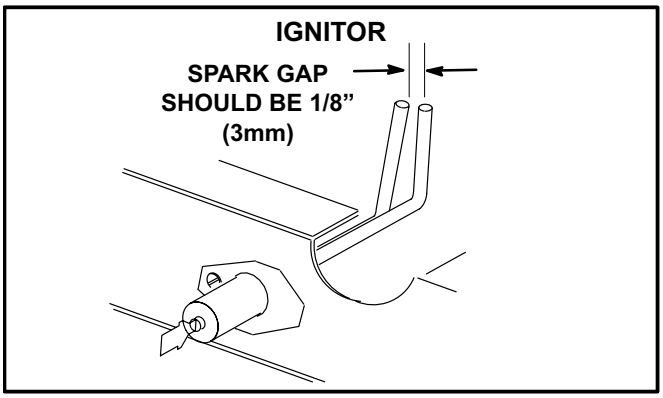


FIGURE 19

5- Check the alignment of the ignitor and the sensor as shown in figure 20 and table 17.

6- Replace burners and screws securing burner.

TABLE 17
IGNITOR AND SENSOR POSITION

Dimension	Unit Btuh Input	Length - in. (mm)	
		Ignitor	Sensor
A	260K	7-3/4 (197)	11 (279)
B	360K	5 (127)	5-1/2 (140)
C	480K	2-1/4 (57)	2-3/4 (70)

⚠WARNING

Danger of explosion. Can cause injury or death. Do not overtighten main burner mounting screws. Snug tighten only.

7- Replace access panel.

8- Restore electrical power and gas supply. Follow lighting instructions attached to unit and use inspection port in access panel to check flame.

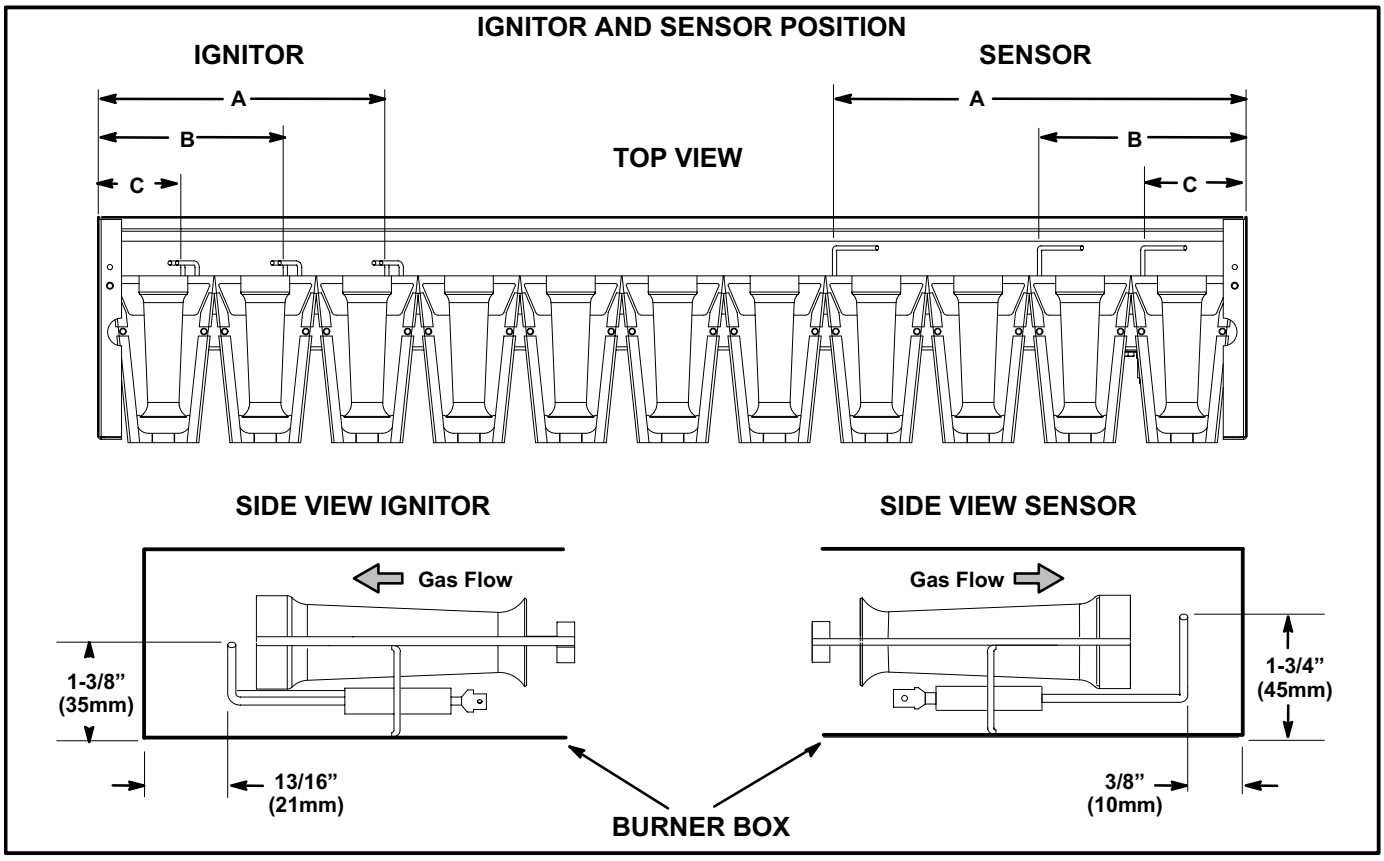

IGNITOR AND SENSOR POSITION
IGNITOR
SENSOR
A
B
C
TOP VIEW
SIDE VIEW IGNITOR
SIDE VIEW SENSOR
Gas Flow
Gas Flow
1-3/8"
(35mm)
13/16"
(21mm)
3/8"
(10mm)
1-3/4"
(45mm)
BURNER BOX

FIGURE 20

D-Combustion Air Inducer (Gas Units)

A combustion air proving switch checks combustion air inducer operation before allowing power to the gas controller. Gas controller will not operate if inducer is obstructed.

Under normal operating conditions, the combustion air inducer wheel should be checked and cleaned prior to the heating season. However, it should be examined periodically during the heating season to establish an ideal cleaning schedule. With power supply disconnected, the condition of the inducer wheel can be determined by looking through the vent opening.

Clean combustion air inducer as follows:

1- Shut off power supply and gas to unit.

2- Disconnect pressure switch air tubing from combustion air inducer port.

3- Remove and retain screws securing combustion air inducer to flue box. Remove and retain two screws from bracket supporting vent connector. See figure 21.

4- Clean inducer wheel blades with a small brush and wipe off any dust from housing. Clean accumulated dust from front of flue box cover.

5- Return combustion air inducer motor and vent connector to original location and secure with retained screws. It is recommended that the combustion air inducer gasket be replaced during reassembly.

6- Clean combustion air inlet louvers on heat access panel using a small brush.

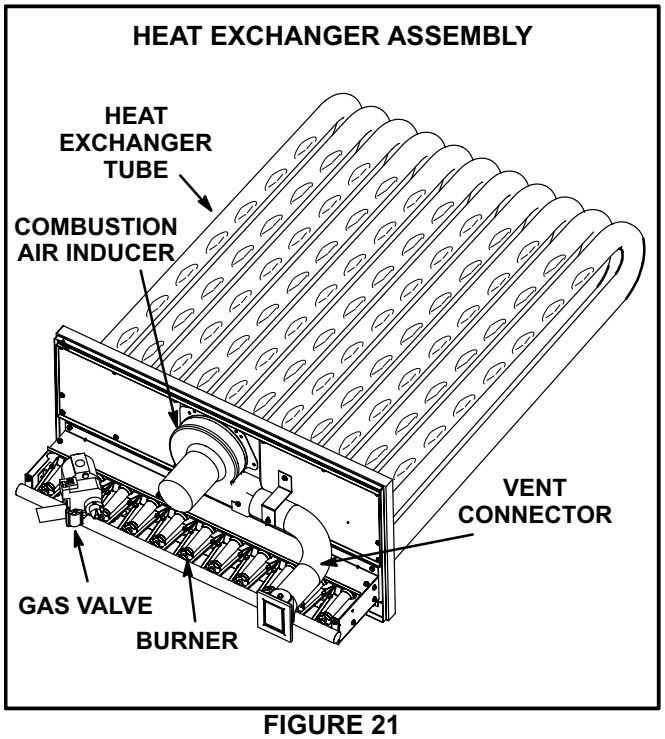


FIGURE 21

E-Flue Passageway and Flue Box (Gas Units)

1- Remove combustion air inducer assembly as described in section D.

2- Remove flue box cover. Clean with a wire brush as required.

3- Clean tubes with a wire brush.

4- Reassemble the unit. The flue box cover gasket and combustion air inducer gasket should also be replaced during reassembly.

F-Evaporator Coil

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

G-Condenser Coil

Clean condenser coil annually with detergent or commercial coil cleaner and inspect monthly during the cooling season.

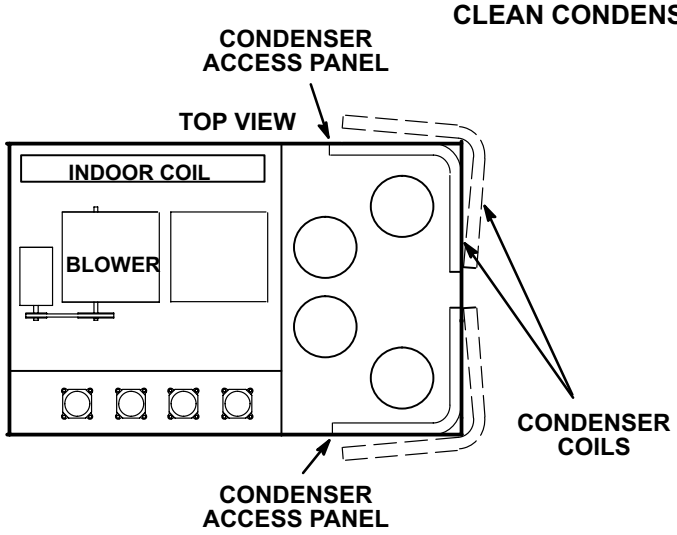
Condenser coils are made of two formed slabs. Dirt and debris may become trapped between the slabs. To clean between slabs, carefully separate coil slabs and wash them thoroughly. See figure 22. Flush coils with water following cleaning.

Note - Remove all screws and gaskets prior to cleaning procedure and replace upon completion.

H-Supply Air Blower Wheel

Annually inspect supply air blower wheel for accumulated dirt or dust. Turn off power before attempting to remove access panel or to clean blower wheel.

CLEAN CONDENSER COIL



1- Remove unit top panel and both condenser access panels.

2- Remove screws securing coil end plates to mullions.

3- Remove clips connecting coils slabs and separate slabs 3-4” (76-102mm).

4- Clean coils with detergent or commercial coil cleaner.

5- Rinse thoroughly with water and reassemble.

FIGURE 22