

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

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 or service agency.

SW 036 (3 TON)

SW 060 (5 TON)

SW 120 (10 TON)

SW 240 (20 TON)

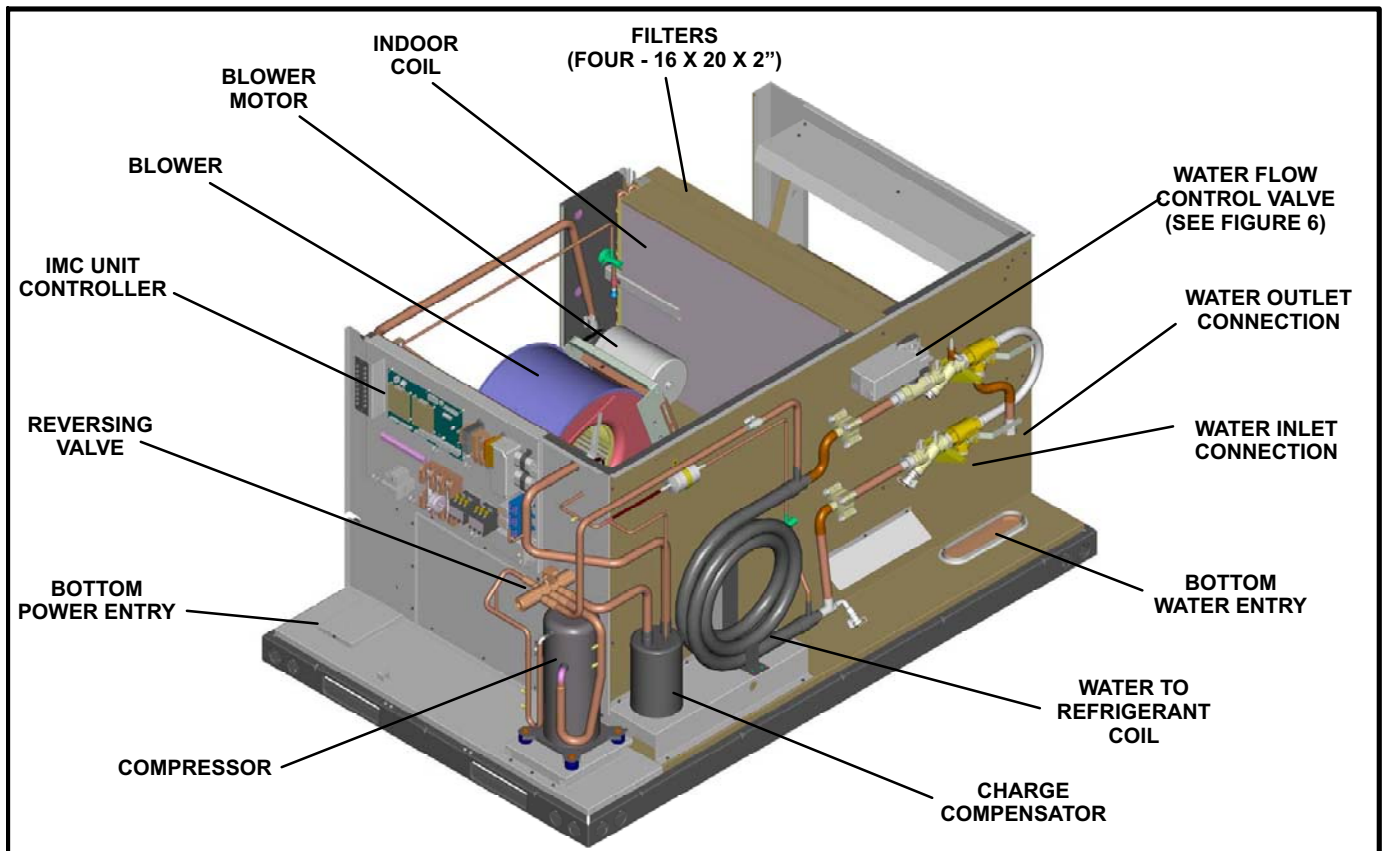
WATER SOURCE HEAT PUMP UNITS

506671-01
12/2011
Supersedes 1/2011

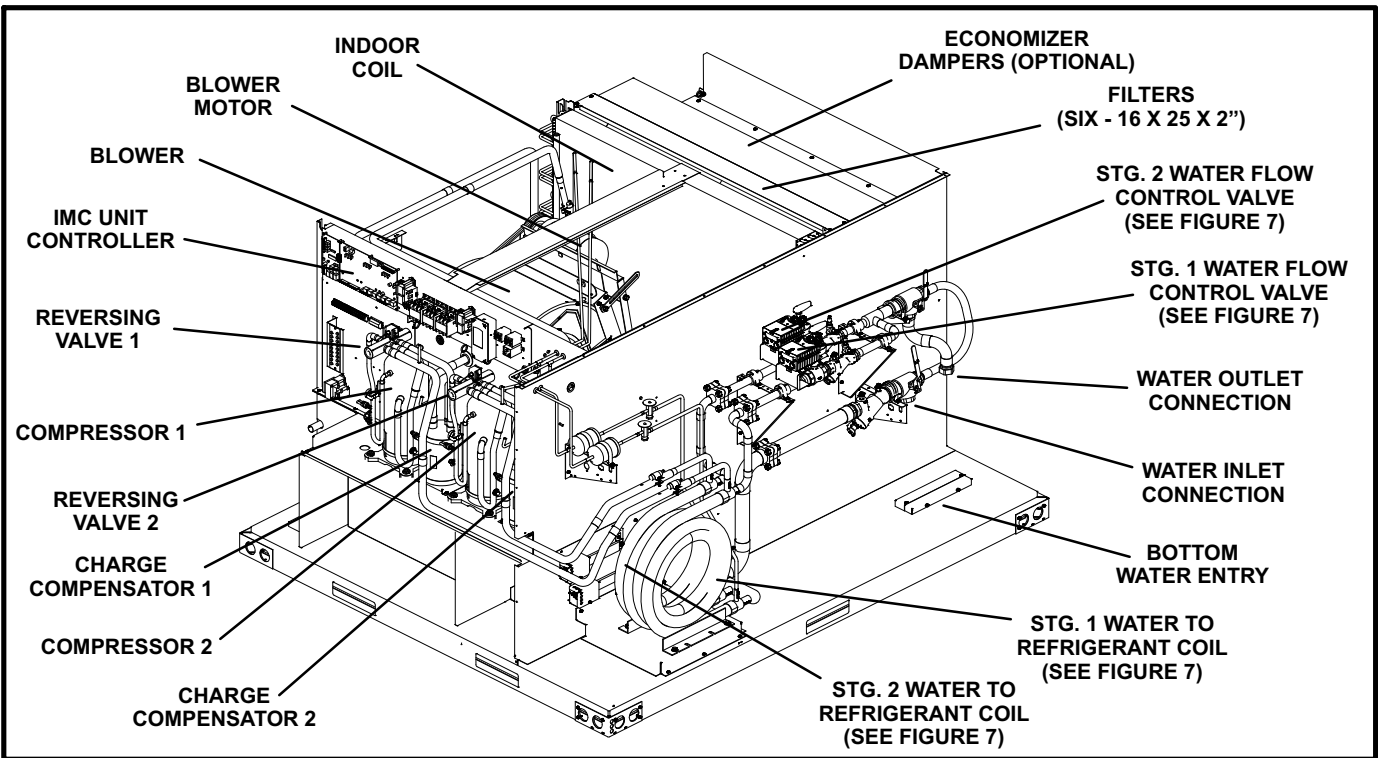
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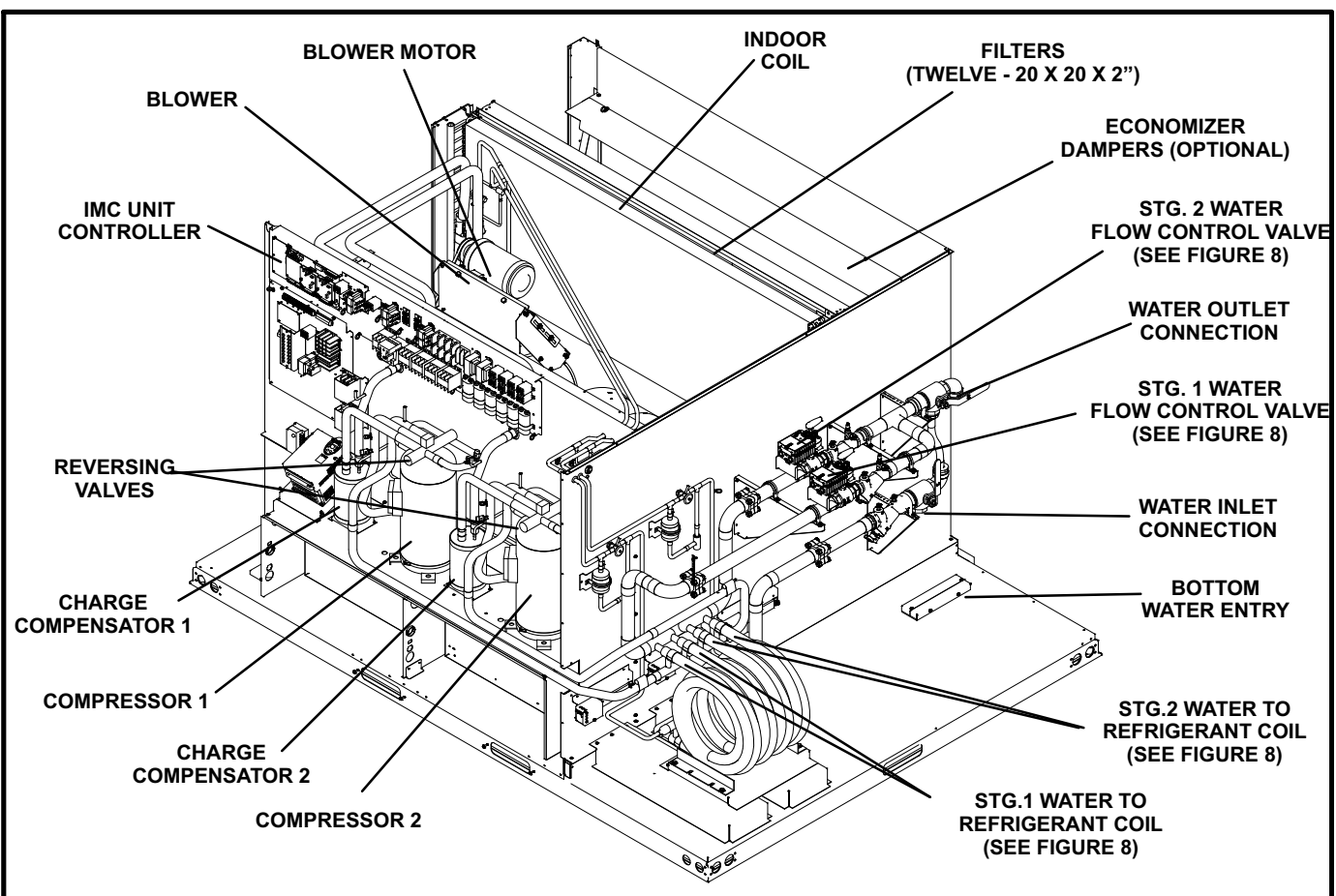
SW 036 & 060 Parts Arrangement



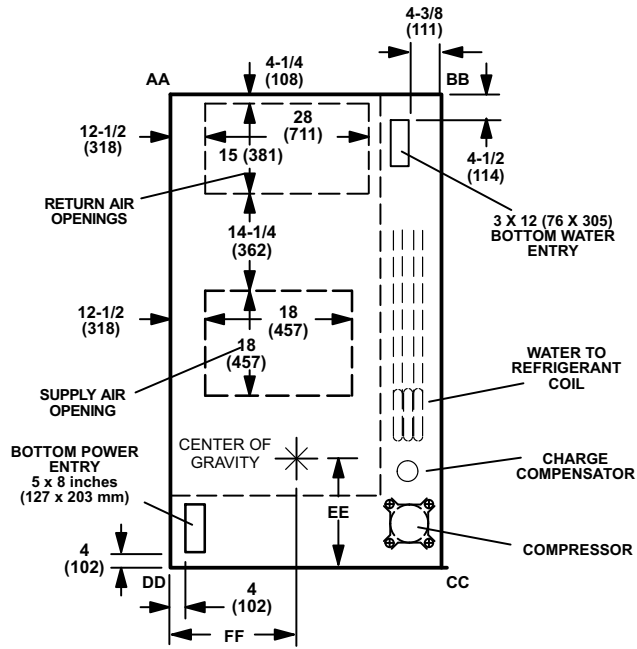
SW 120 Parts Arrangement



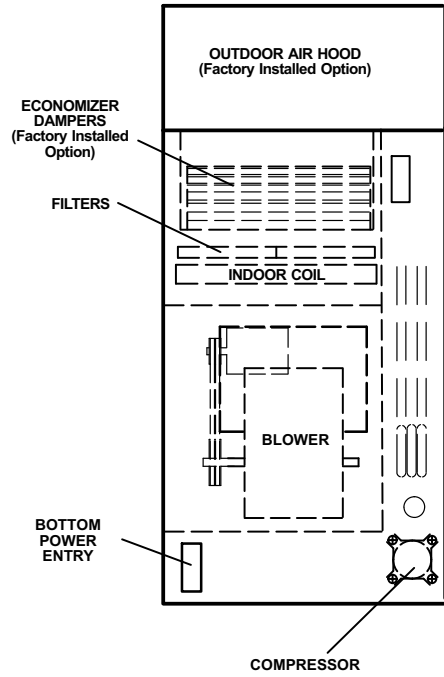
SW 240 Parts Arrangement



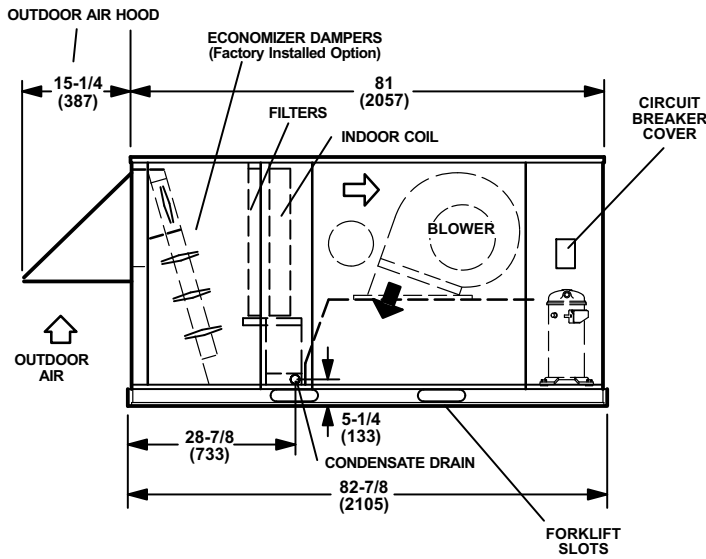
SW 036 & 060 Dimensions



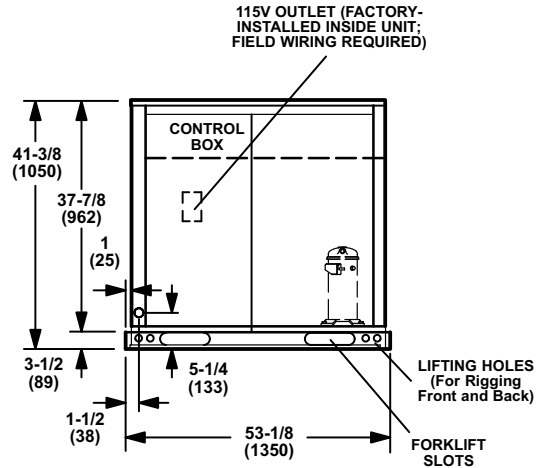
TOP VIEW BASE SECTION



TOP VIEW



SIDE VIEW

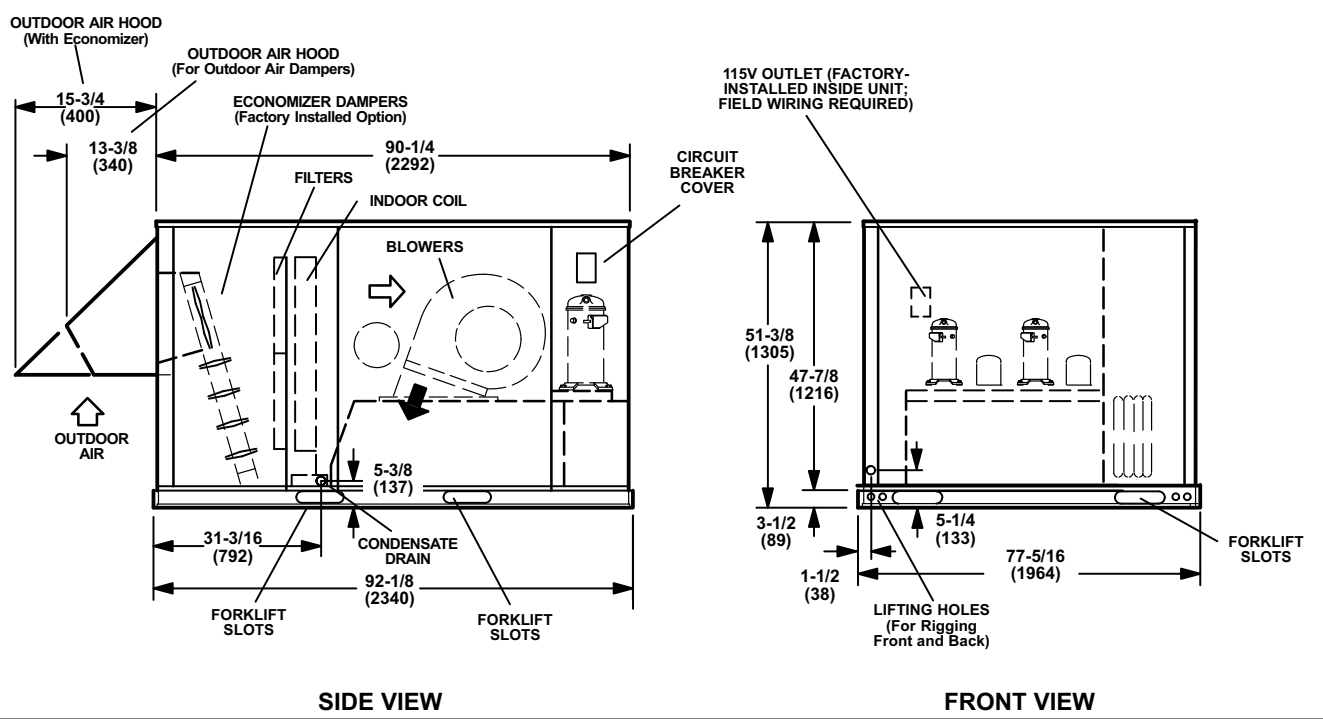
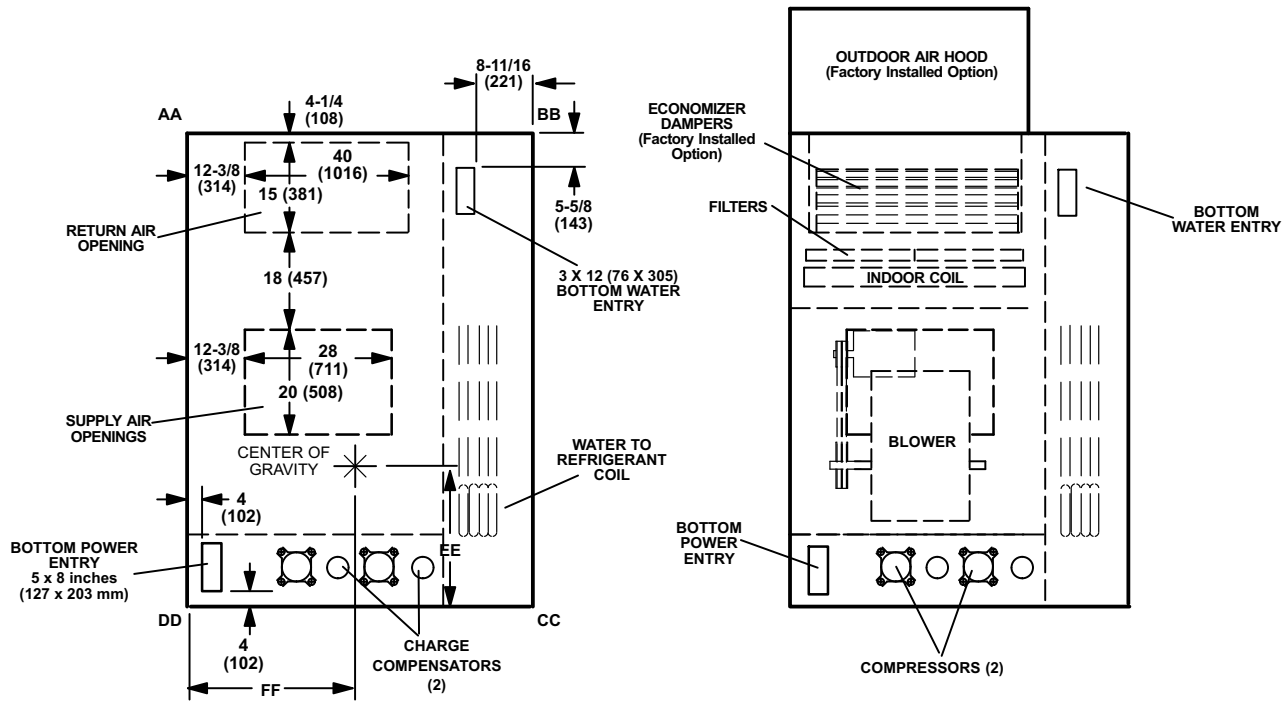


FRONT VIEW

Unit	Corner Weight - lbs. (kg)				Center of Gravity - in. (mm)	
	AA	BB	CC	DD	EE	FF
036	239 (108)	249 (113)	265 (120)	253 (115)	39-3/4 (1010)	28-3/4 (730)
060	244 (110)	255 (115)	272 (123)	259 (117)	39-3/4 (1010)	28-3/4 (730)

Weight with all options installed.

SW 120 Dimensions

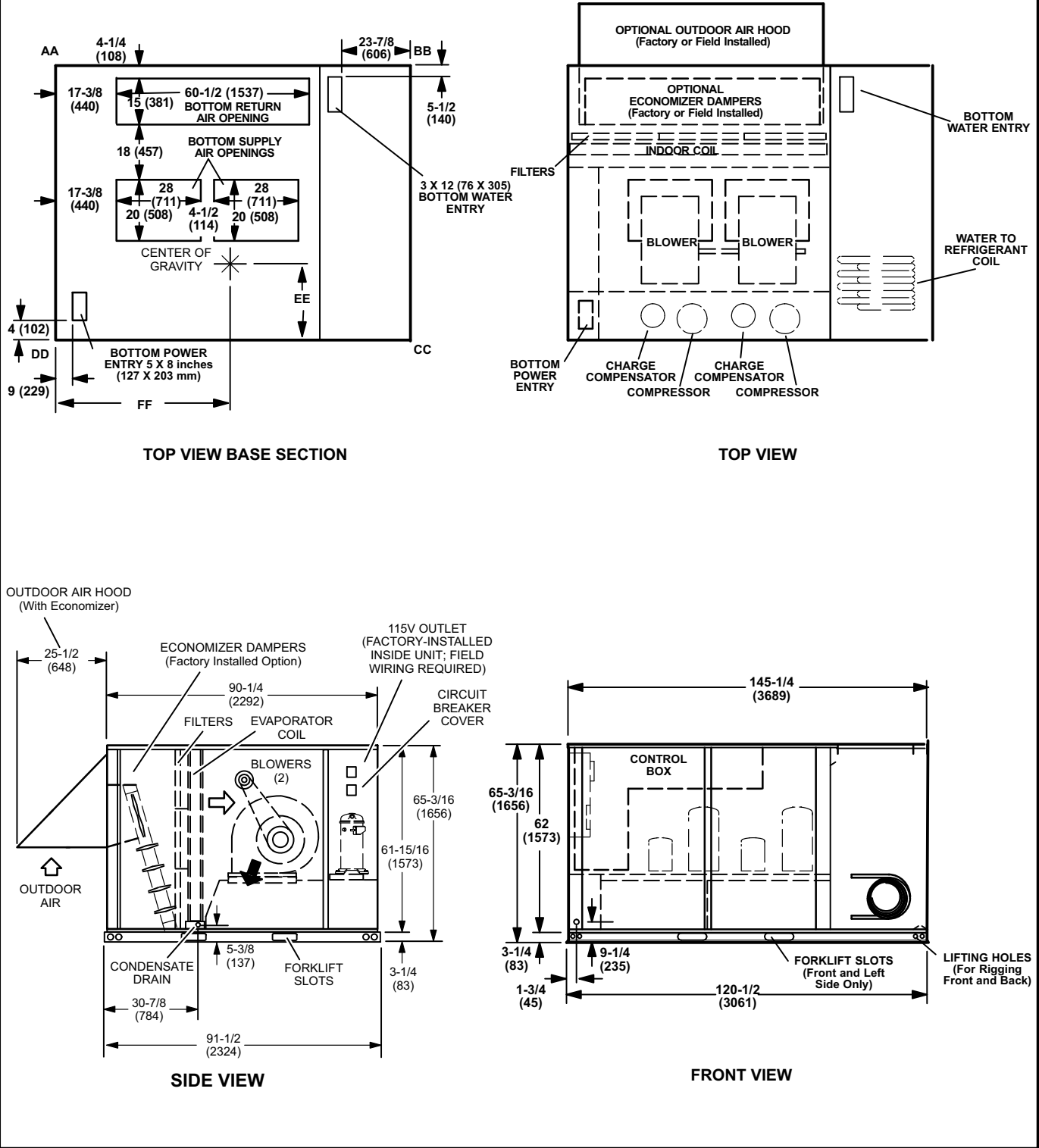


Corner Weight - lbs. (kg)				Center of Gravity - in. (mm)	
AA	BB	CC	DD	EE	FF
416 (189)	417 (189)	474 (215)	473 (215)	41 (1041)	38-3/4 (984)

Weight with all options installed.

SW 240 Dimensions

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



Corner Weight - lbs. (kg)				Center of Gravity - in. (mm)	
AA	BB	CC	DD	EE	FF
684 (310)	684 (310)	750 (340)	750 (340)	40 (1016)	60 (1524)

Weight with all options installed.

Shipping and Packing List

Package 1 of 1 contains:

1- Assembled unit

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

General

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

Requirements

The unit is ETL certified for outdoor installations only at the clearances to combustible materials listed on unit nameplate and in figures 1 and 2.

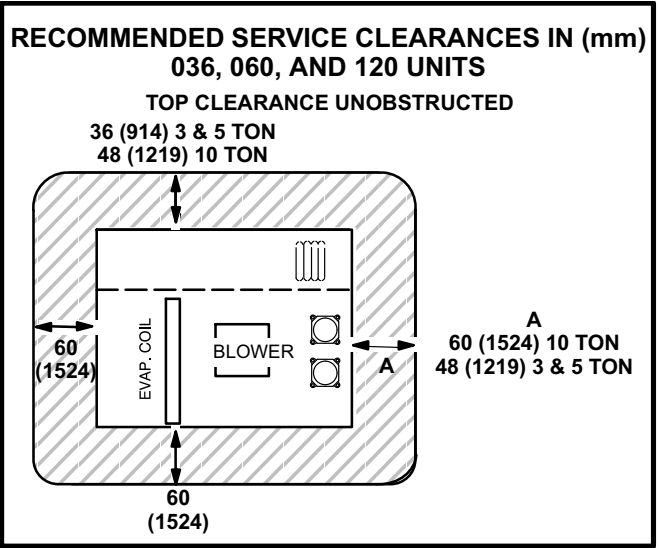


FIGURE 1

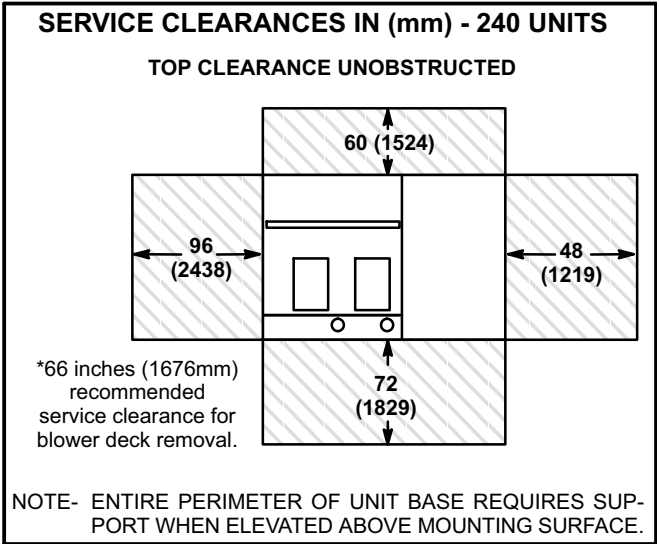


FIGURE 2

CAUTION

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

Installation of 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
 1 Batterymarch Park
 PO Box 9101
 Quincy, MA 02269-9101

The unit is ETL 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 figures 1 and 2.

Installation of ETL 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.

⚠ WARNING



Electric shock hazard and danger of explosion. Can cause injury, death or product or property damage. Turn off electrical power to unit before performing any maintenance or servicing operations on the unit.

⚠ 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.

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

Downflow Discharge Application

Roof Mounting with S1 / S6 / S7CURB

- 1- The S1 / S6 / S7CURB roof mounting frame must be installed, flashed and sealed in accordance with the instructions provided with the frame.
- 2- The S1 / S6 / S7CURB roof mounting frame should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Duct must be attached to the roof mounting frame and not to the unit; supply and return plenums must be installed before setting the unit.

Installer's Roof Mounting Frame

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

- 1- The base is fully enclosed and insulated, so an enclosed frame is not required.
- 2- The frames or supports must be constructed with non-combustible materials and should be square and level to 1/16" per linear foot (5mm per linear meter) in any direction.
- 3- Frame or supports must be high enough to prevent any form of moisture from entering unit. Recommended minimum frame height is 14" (356mm).
- 4- Duct must be attached to the roof mounting frame and not to the unit. Supply and return plenums must be installed before setting the unit.

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

NOTE-When installing a unit on a combustible surface for downflow discharge applications, an S1 / S6 / S7CURB roof mounting frame is required.

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 3.

- 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.
036, 060	1030	467
120	1752	795
240	2720	1256

IMPORTANT - ALL PANELS MUST BE IN PLACE FOR RIGGING.

LIFTING POINT SHOULD BE DIRECTLY ABOVE CENTER OF GRAVITY

CAUTION - Do not walk on unit.

FIGURE 3

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 4. Always route condensate line to a drain; condensate can damage roofing material. The condensate line must be vented. Check local codes concerning condensate disposal. Refer to dimensions in the front of this manual for condensate drain location.

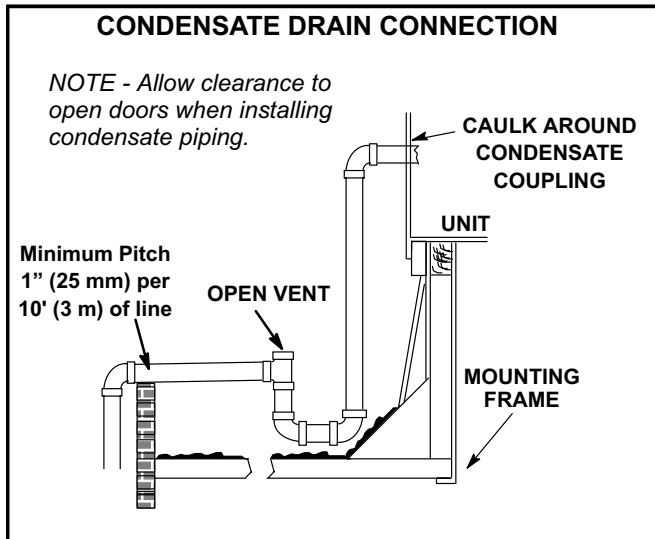


FIGURE 4

Water Supply Connections

Supply and return water connections are to be made with black iron pipe suitable for use in water systems. Lines must enter the unit through the opening in the base. Field-provided dielectric unions and flexible steel braided hose should be installed between the black iron pipe and the supply and return water connections. See dimensions in the front of this manual.

- 1- Remove two-piece cover and install black iron pipes through openings in base. Extend pipes 3-6in. (76-152mm) above the opening. Use the following diameter black iron pipe with NPT male threads:

036 - 1" diameter
060 - 1-1/4" diameter
120 - 1-1/2" diameter
240 - 2" diameter

- 2- Install the field-provided dielectric unions and flexible steel braided hoses between the black iron pipe and unit water in/out connections.
- 3- Apply a thread sealing compound to threaded connections. Use only thread sealing compounds compatible with water systems. Make sure hoses are not kinked; this may indicate incorrect black iron pipe height.
- 4- Cut half-round openings in the cover to fit around the black iron pipe. See figure 5. Secure two-piece cover to flanges and apply mastic sealant around openings.

IMPORTANT - Make sure flexible steel hoses are not kinked. Kinked hoses may increase pressure drop and reduce system performance.

Verify air vents are closed and that three-way water inlet/outlet valves are in bypass position before pressure testing the building system with air to avoid a false-positive leak check. See figure 6, 7, or 8. Do not pressurize the hose kits with more than 300 psi.

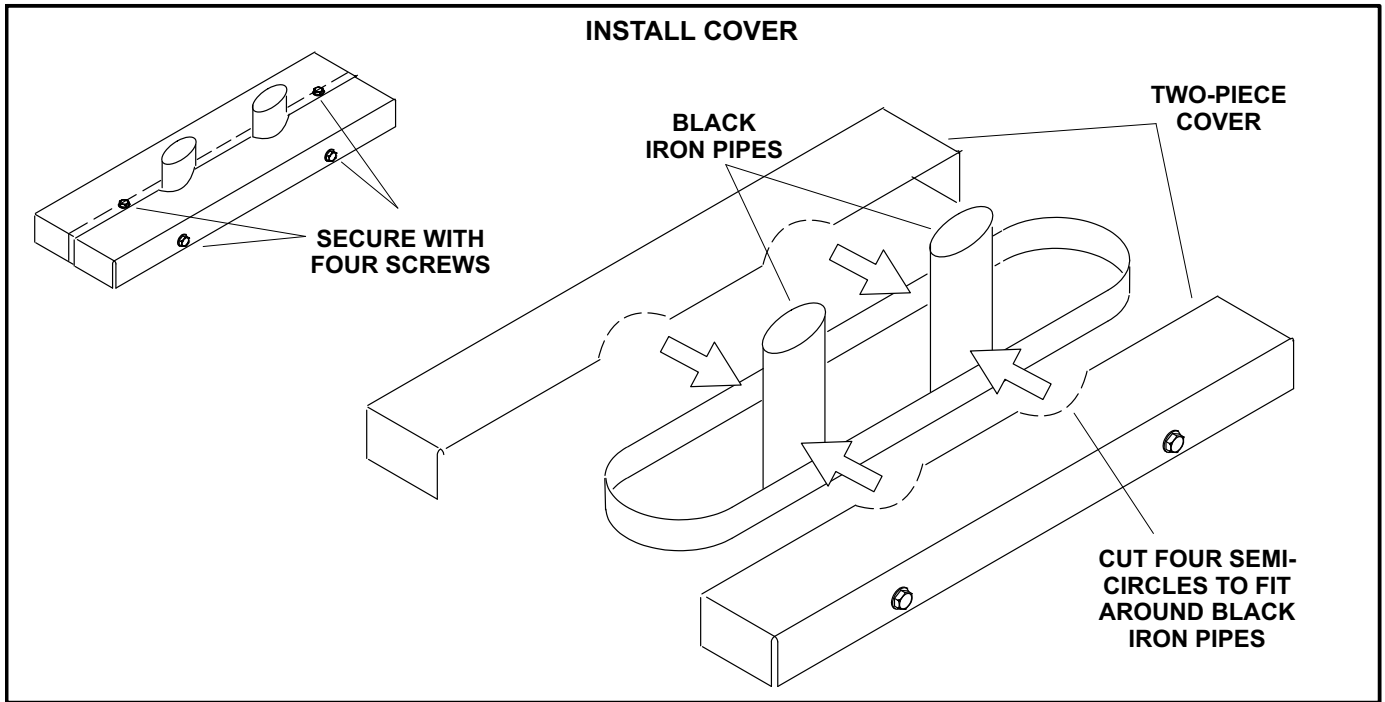


FIGURE 5

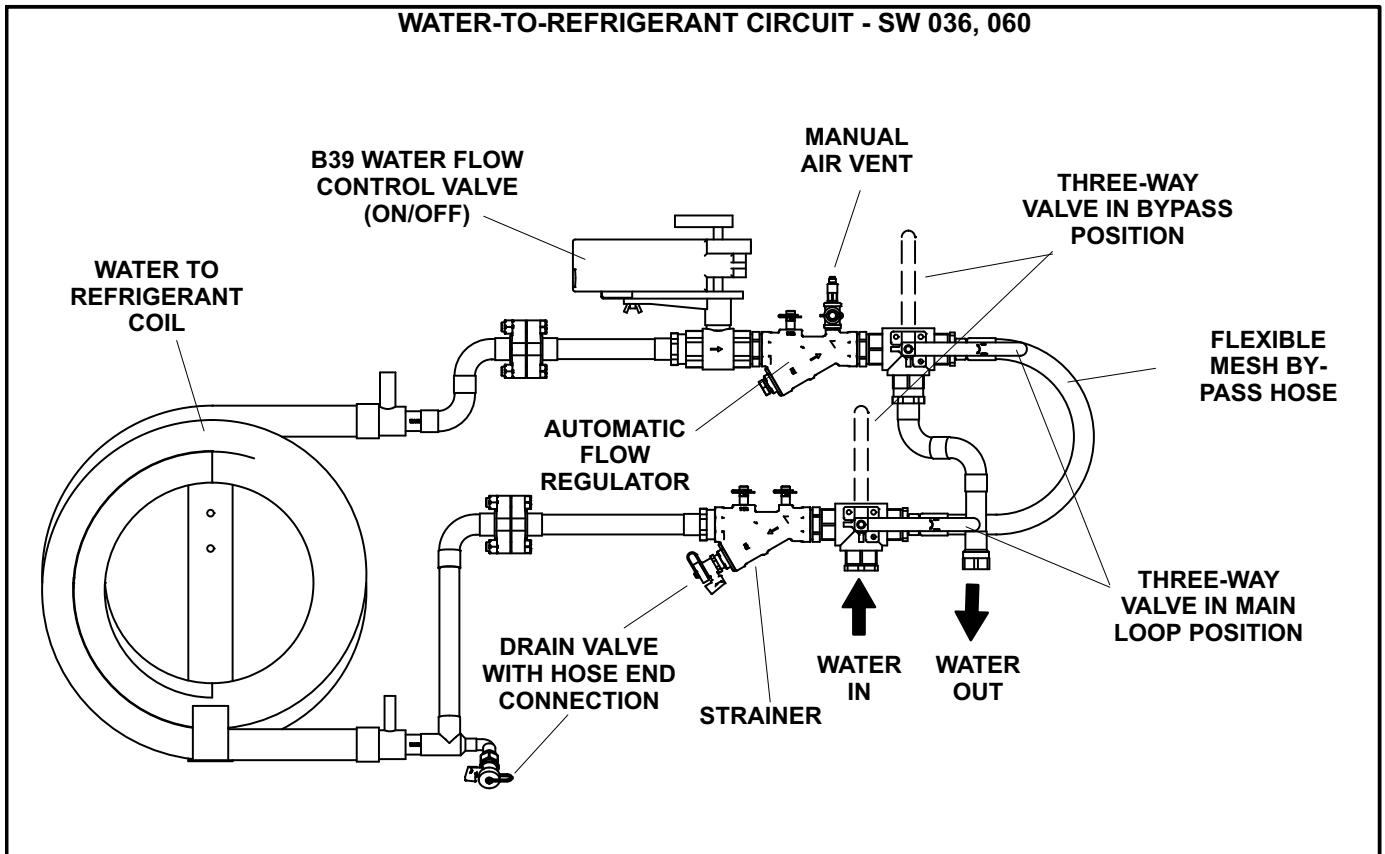


FIGURE 6

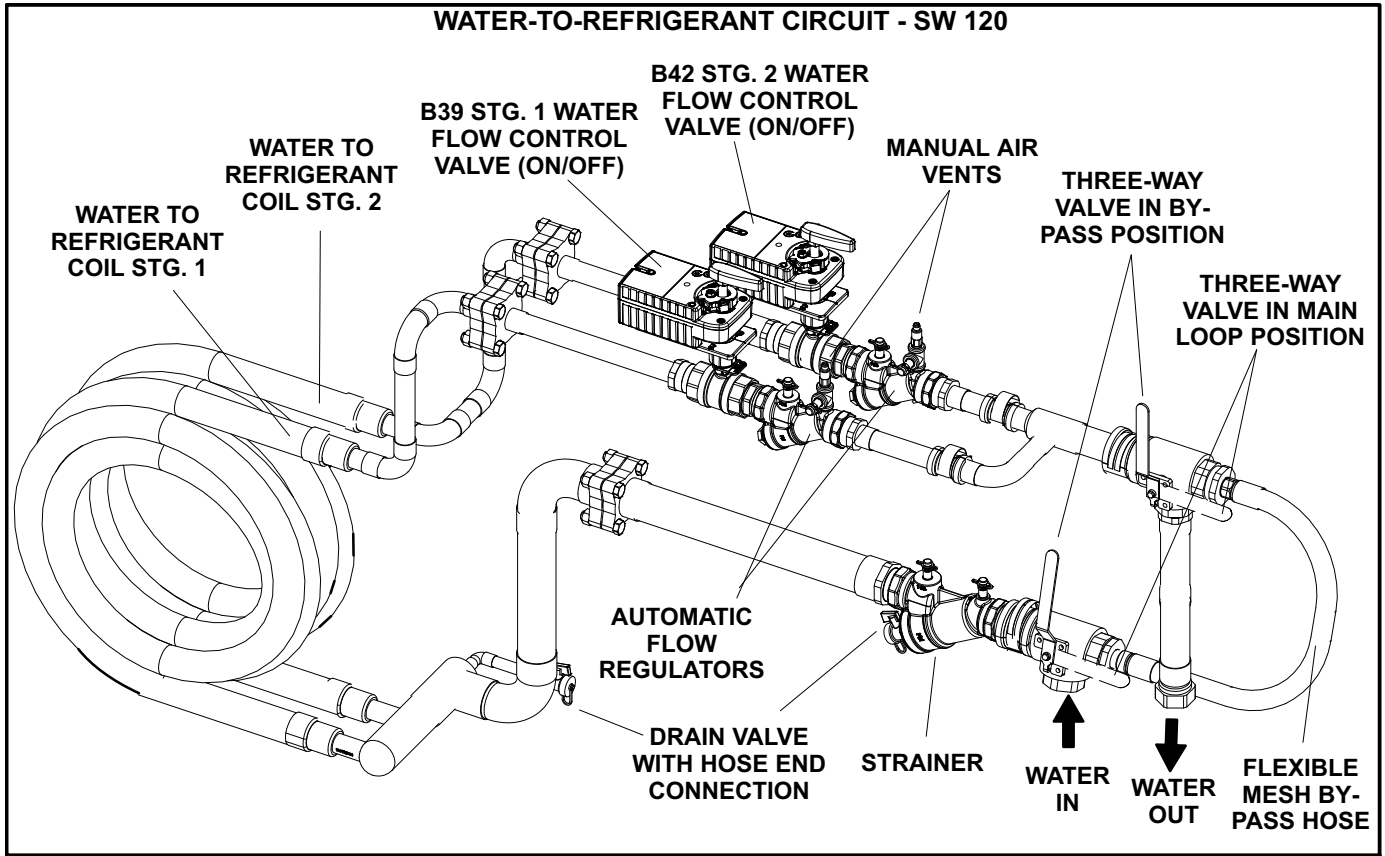


FIGURE 7

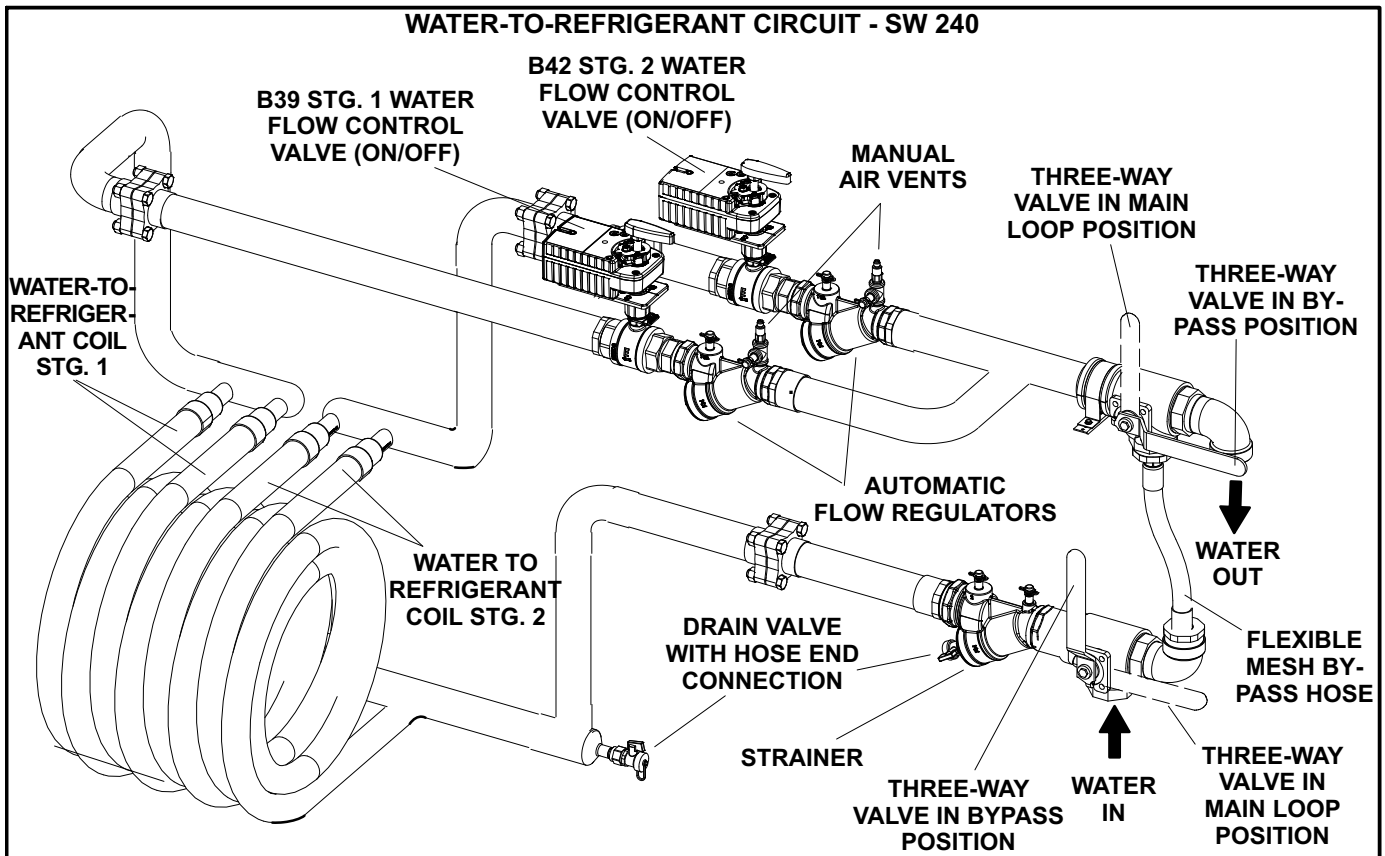


FIGURE 8

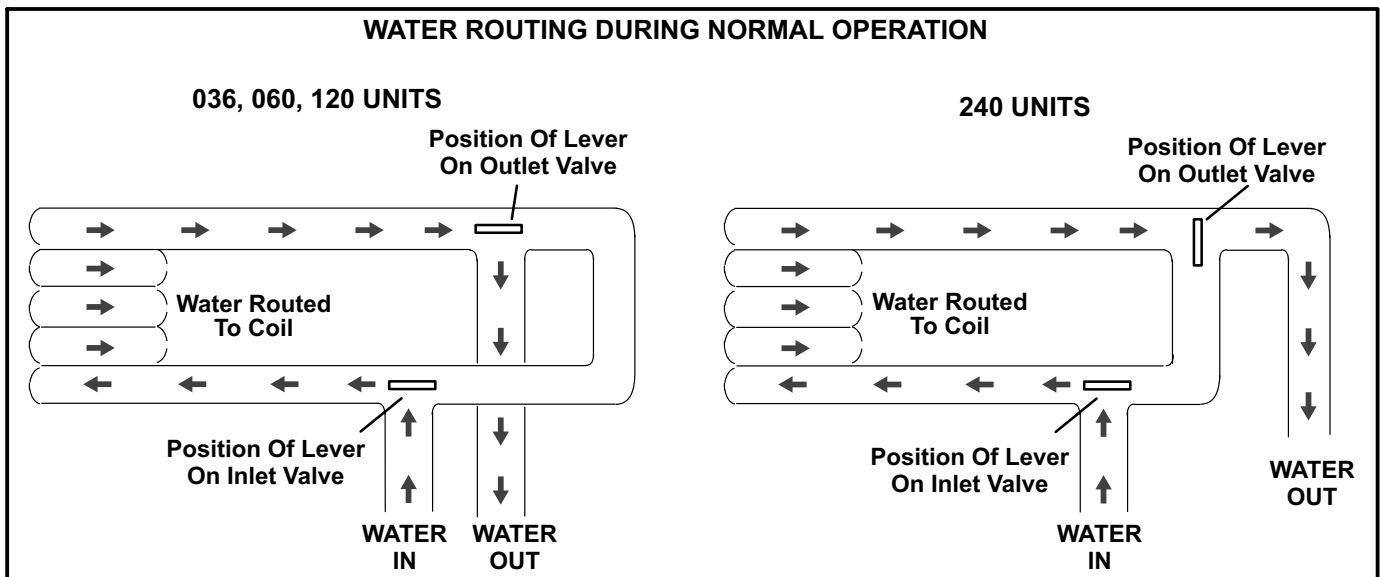
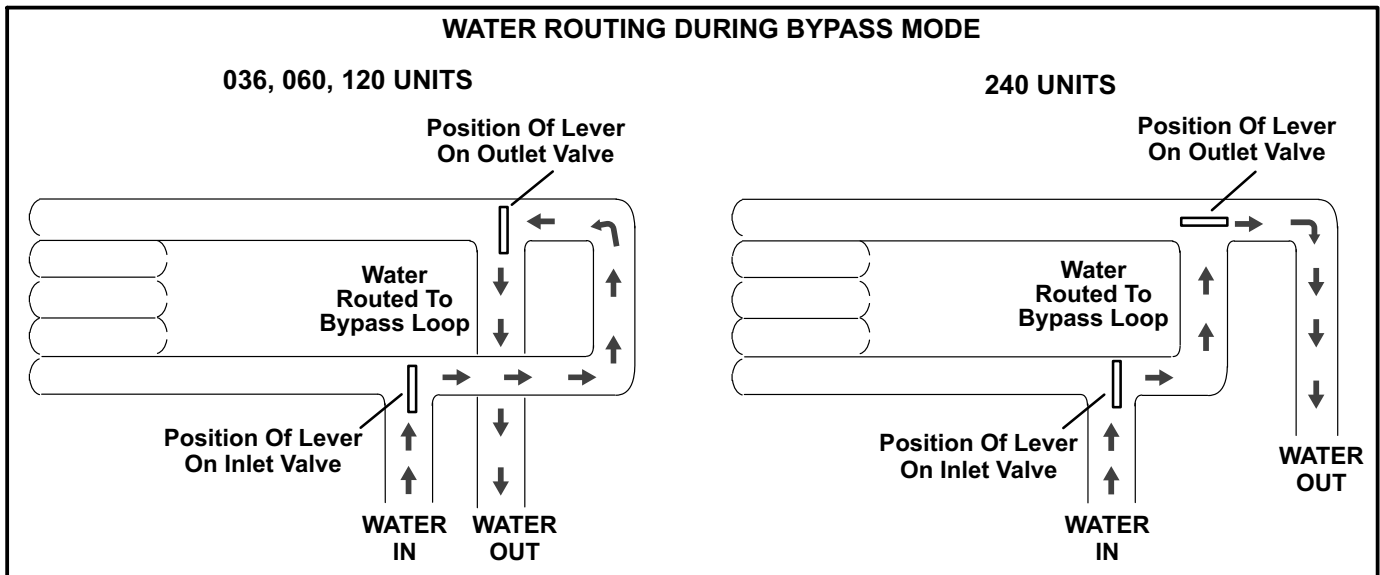
Water Bypass Loop

The water bypass loop is used to flush the water system without routing water through the rooftop unit components. Units are shipped with three-way water in/out valves in the bypass position. Refer to figure 9 for water flow path. This prevents dirt and debris buildup in the strainers and other components. Before placing unit in service, bleed air from water lines (next section).

IMPORTANT - Make sure the three-way valves are completely open (see figure 10). If the valves are not fully open the amount of water entering the water-to-refrigerant coil may be reduced. Reduced water supply to the coil could severely limit unit cooling performance. Reduced water flow could also cause the water to freeze. Coils damaged due to freezing water are not covered under warranty.

Bleed Air From Water Lines

- 1- Turn off all power to unit before bleeding lines.
- 2- Turn the three-way water inlet valve to main loop position. If running water is not heard circulating, make sure the main system pump is running.
- 3- Slowly open the manual air vent bleed port(s). When the venting stops, close the air vent and turn the three-way water outlet valve to main loop position. The water will now be routed as shown in figure 10.
- 4- Measure the differential pressure across the automatic flow regulator using a PT gauge set. See figure 11. A minimum differential of 2.0 PSI is required for proper flow.



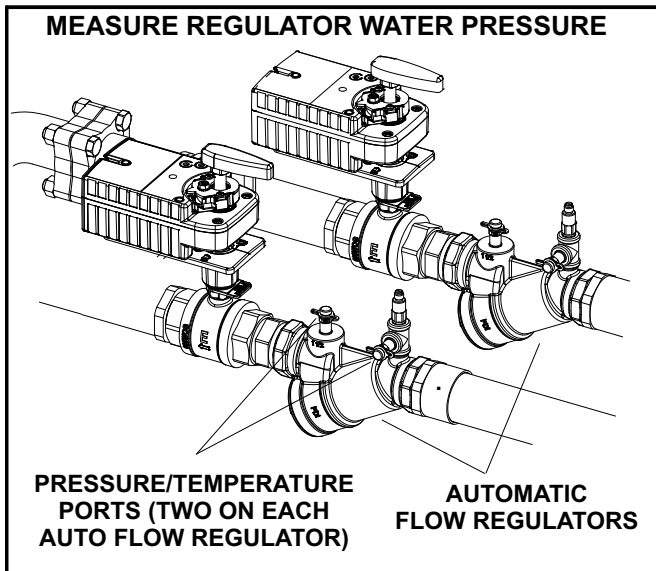


FIGURE 11

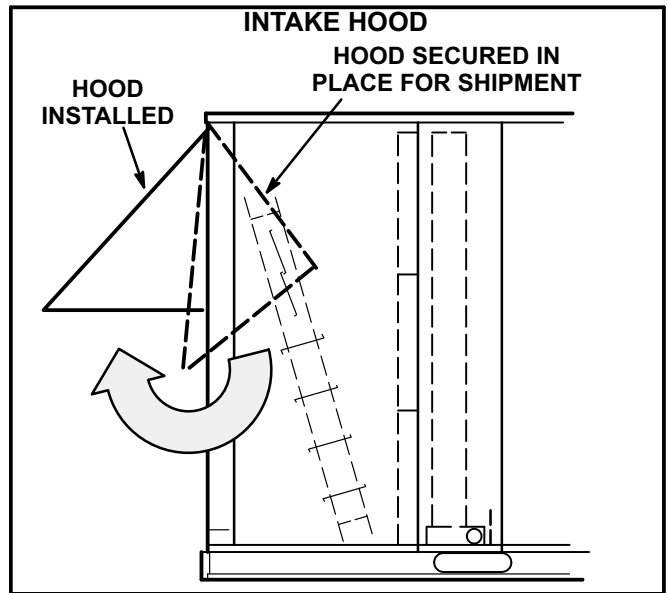


FIGURE 12

Factory-Installed Economizer

A-Economizer

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

Factory-Installed Intake Hood

036 & 060 Units

Intake hood is shipped folded down over the horizontal supply air opening. Secure hood into place as follows:

- 1- Remove shipping screws securing sides of hood to unit.
- 2- Pivot hood as shown in figure 12 and secure sides of hood to unit mullions with two sheet metal screws on each side.

120 & 240 Units

Outdoor air hood is shipped folded down over the horizontal supply air opening. Install hood as follows:

- 1- Remove left side from hood top panel.
- 2- Remove and retain screws securing hood to unit.
- 3- Lift (rotate) the bottom of the hood top panel and attach left side to hood top panel. See figure 12.
- 4- Secure sides of hood to unit mullions with retained screws.
- 5- Caulk hinge opening on each end of air hood.
- 6- *240 Units Only* - Remove two support brackets from hood top panel flange. See figure 13. Install as shown in figure 14.

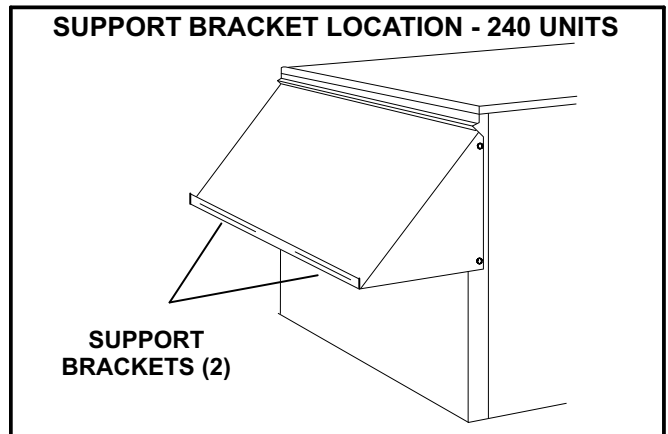


FIGURE 13

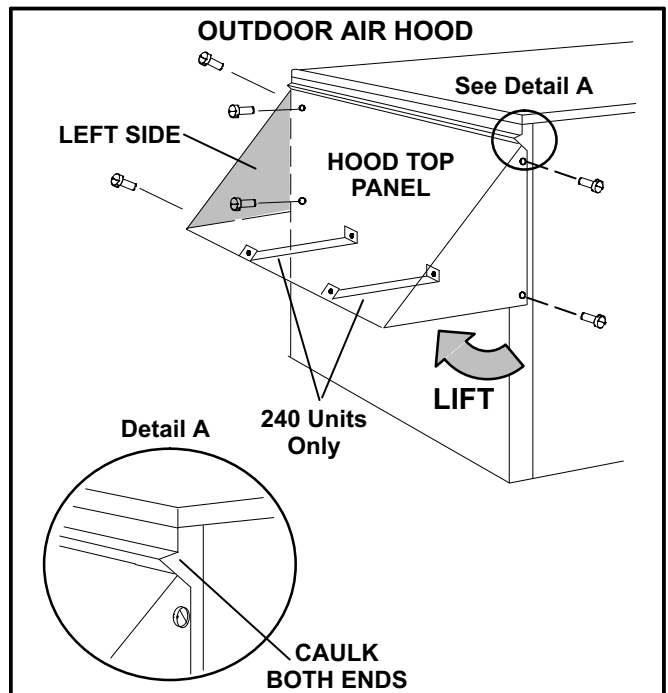


FIGURE 14

240 Units With Hood Filter Option

Outdoor air hood is shipped folded down over the horizontal supply air opening. The intake hood filters and support brackets are shipped unassembled in the blower compartment. Install as follows:

- 1- Remove left side from hood top panel.
- 2- Remove and retain screws securing hood to unit.
- 3- Lift (rotate) the bottom of the hood top panel and attach left side to hood top panel. See figure 12.
- 4- Secure sides of hood to unit mullions with retained screws.
- 5- Caulk hinge opening on each end of air hood.
- 6- Install back filter bracket on unit division panel as shown in figure 16.
- 7- Secure side seals to the hood sides as shown in figure 17.
- 8- Install longer front filter bracket on hood top as shown in figures 15 and 16. Insert four filters.
- 9- Slide fifth filter into back filter bracket and hold in place at the top of the opening with the shorter front bracket. Align holes on hood with bracket holes and secure filter bracket with sheet metal screws.

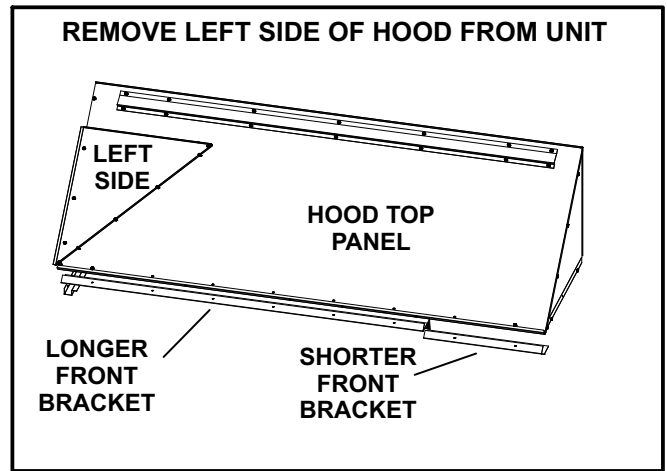


FIGURE 15

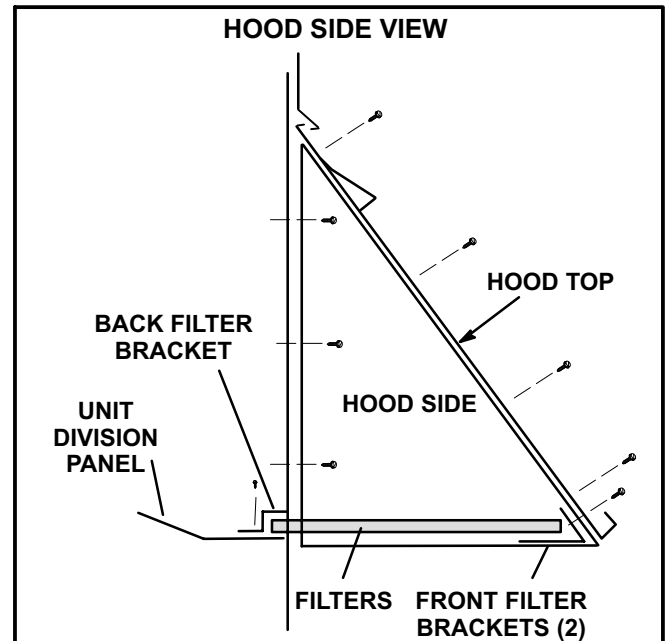


FIGURE 16

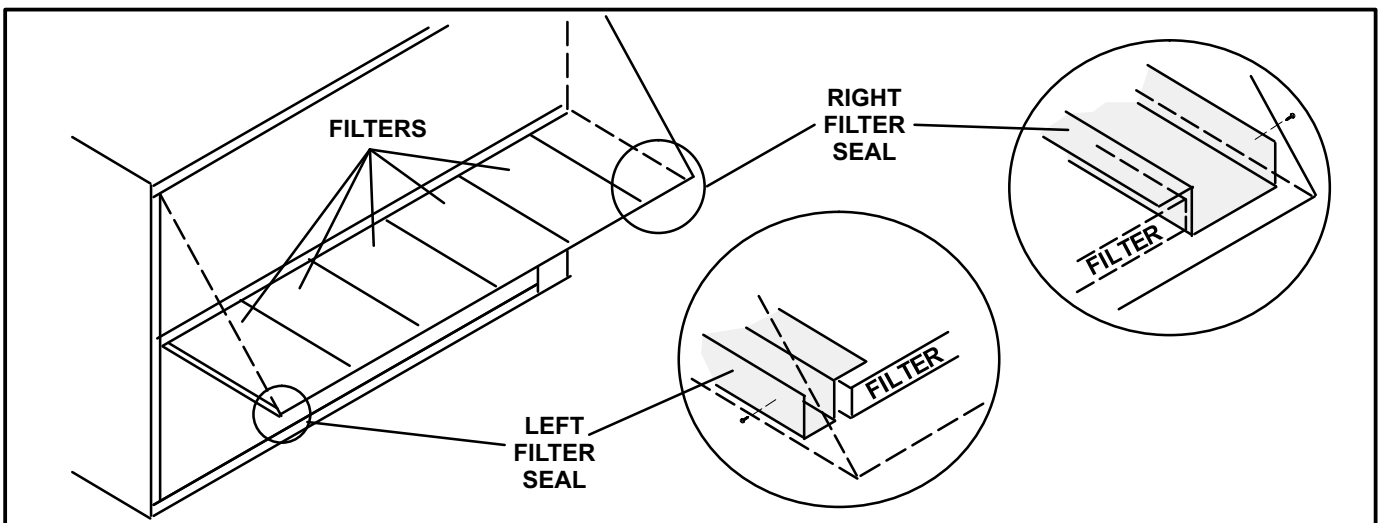


FIGURE 17

Electrical Connections

POWER SUPPLY

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

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

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

CONTROL WIRING

A-Thermostat Location

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

Locate thermostat approximately 5 feet (1524mm) above the floor in an area with good air circulation at average temperature. Avoid locating the room thermostat where it might be affected by:

- drafts or dead spots behind doors and in corners
- hot or cold air from ducts
- radiant heat from sun or appliances
- concealed pipes and chimneys

B-Wire Routing

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

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

C-Wiring Connections

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

The IMC will operate the unit from a thermostat, zone sensor, zoning system or the FS1-1 (A138) controller based on the System Mode selected in ECTO 6.01. The default System Mode (option 0) is the thermostat mode.

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

The IMC will operate two stages of heating and cooling based on thermostat demands. Install thermostat assembly in accordance with instructions provided with thermostat. See figure 18 for field wiring and wiring diagrams on unit.

IMPORTANT-Terminal connections at the wall plate or subbase must be made securely. Loose control wire connections may result in intermittent operation.

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

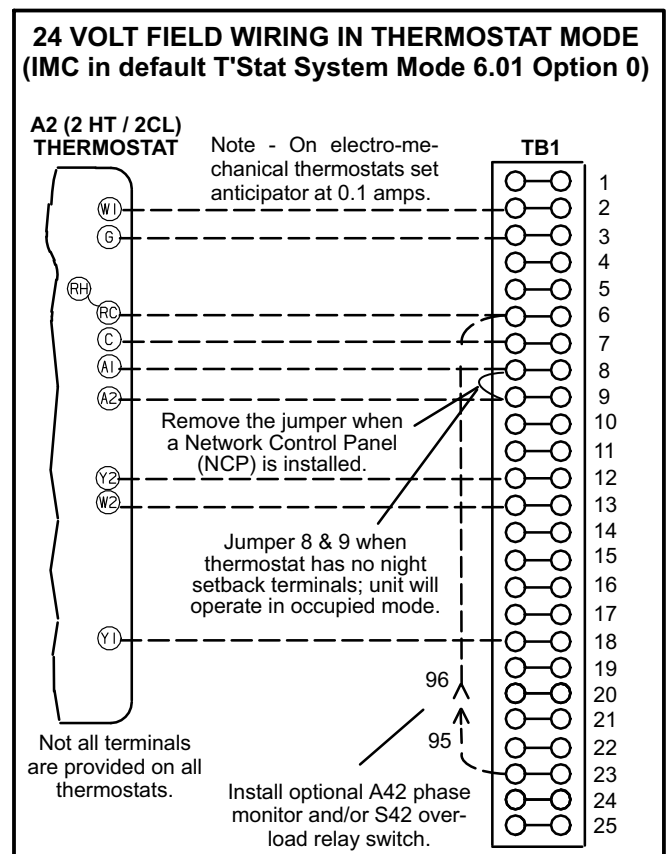


FIGURE 18

2- **Zone Sensor Mode ECTO 6.01 Option 1, 2, or 3-**

The IMC will operate up to four stages of heating and cooling based on the IMC internal setpoints and the temperature from the A2 zone sensor. An optional Network Control Panel (NCP) can also be used to provide setpoints. A thermostat or return air sensor

can be used as a back-up mode. Refer to the IMC manual provided with each unit to change ECTO options. See figure 19 for field wiring.

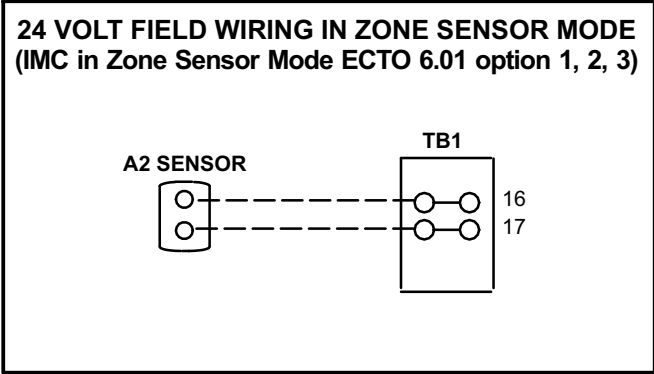


FIGURE 19

Blower Operation and Adjustments

⚠️ IMPORTANT

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

A-Blower Operation

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

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

In zone sensor applications the blower will cycle with demand (default). For continuous blower operation change ECTO 6.17 to option 1. Refer to the IMC manual.

B-Blower Access

- 1- Remove screws on either side of blower assembly sliding base. See figure 20, 21, or 22.
- 2- Pull base toward outside of unit.

C-Determining Unit CFM (with wet coil)

- 1- Run blower with 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 tables 2 through 5, use static pressure and RPM readings to determine unit CFM.
- 4- *Constant Air Volume (CAV) Supply Air Blowers* - 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 20, 21, or 22. Do not exceed minimum and maximum number of pulley turns as shown in table 1.

TABLE 1
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.

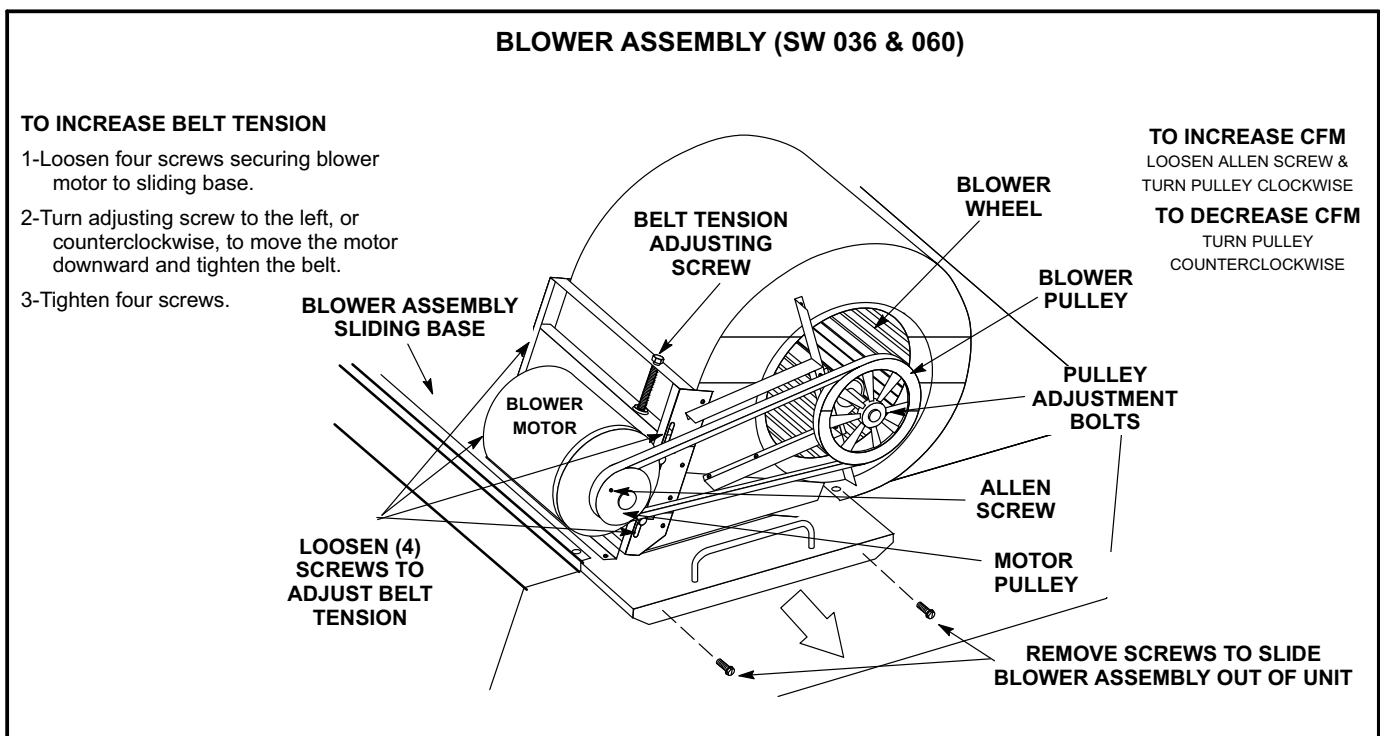


FIGURE 20

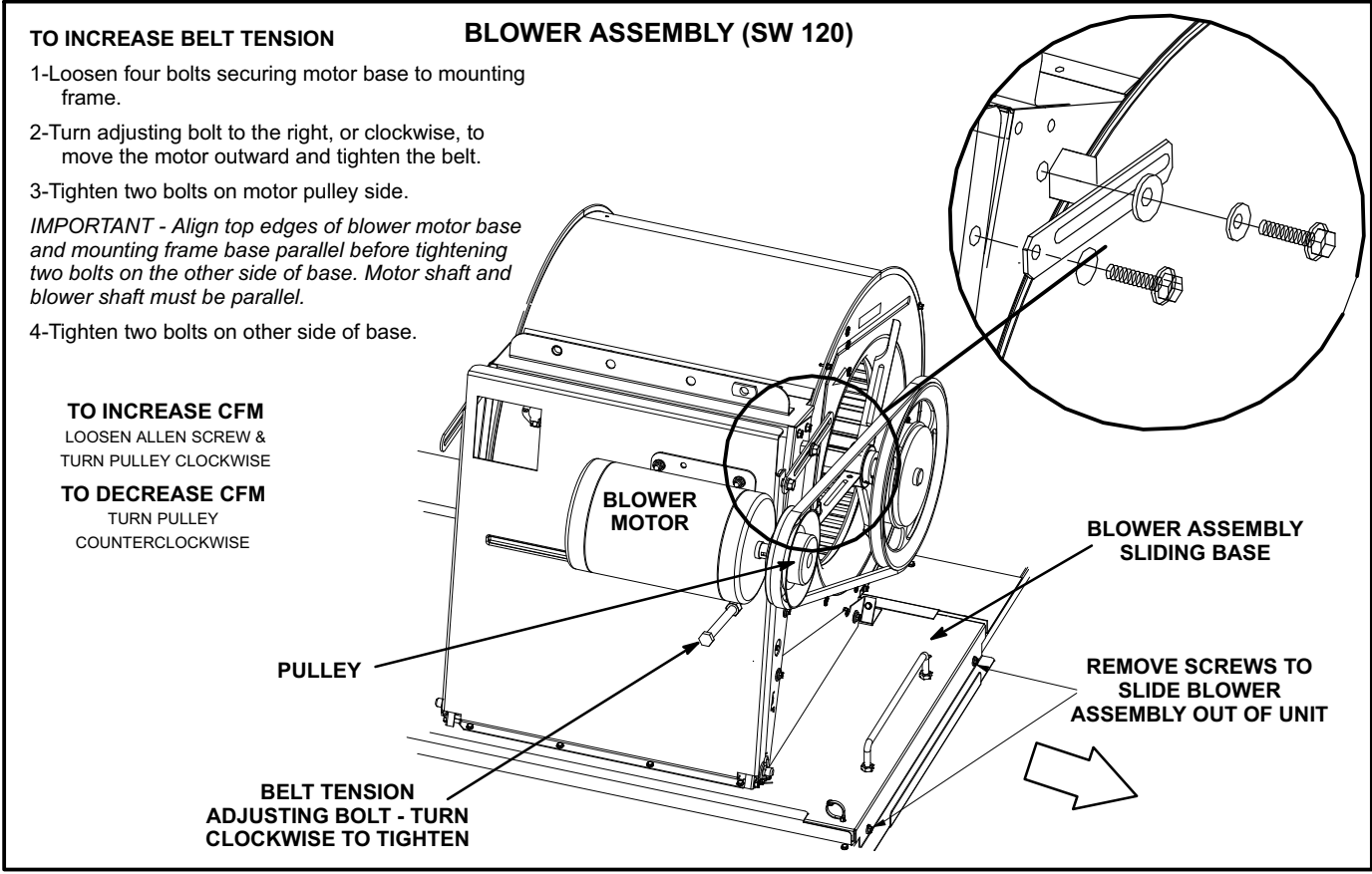


FIGURE 21

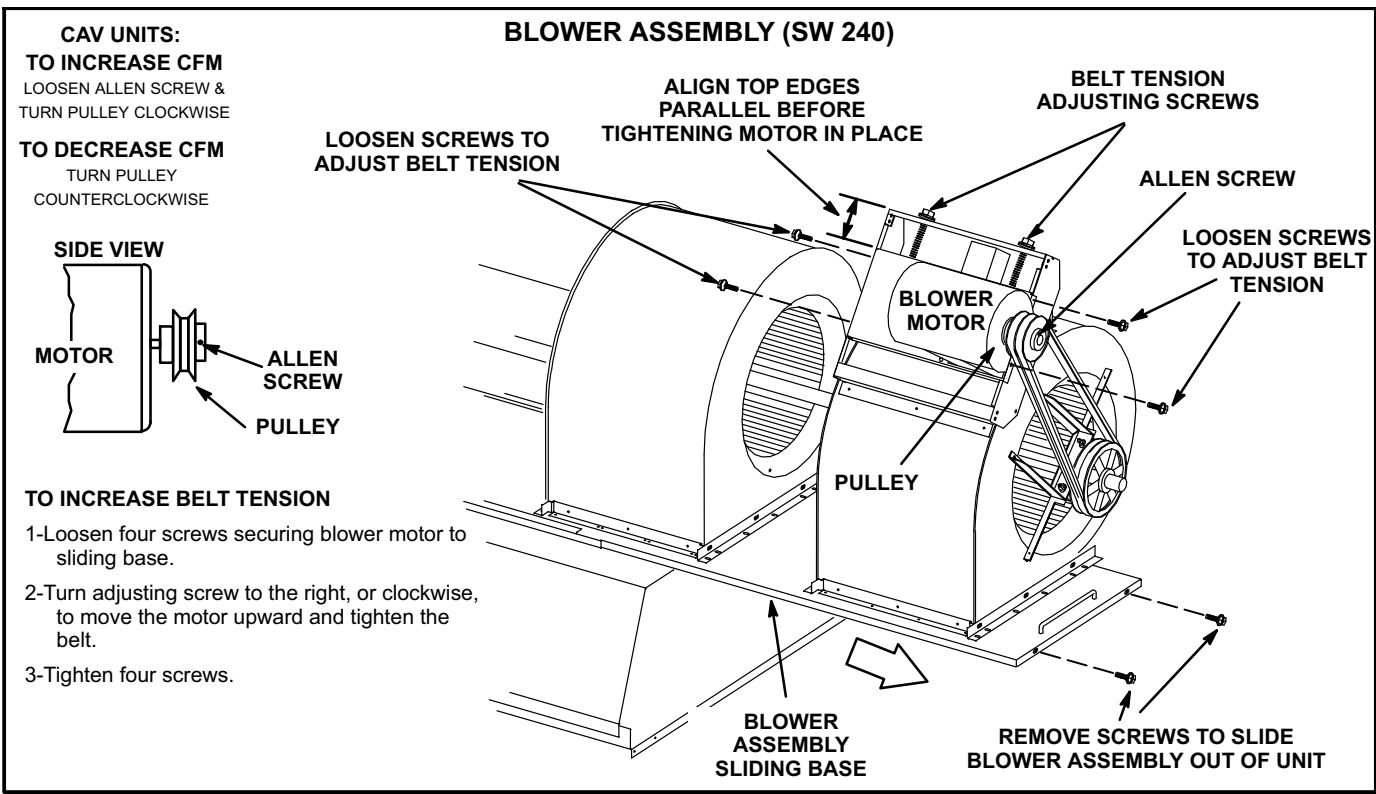


FIGURE 22

D-Blower Belt Adjustment

Maximum life and wear can be obtained from belts only if proper pulley alignment and belt tension are maintained. Tension new belts after a 24-48 hour period of operation. This will allow belt to stretch and seat grooves. Make sure blower and motor pulley are aligned as shown in figure 23.

Adjust belt tension as shown in figure 20, 21, or 22.

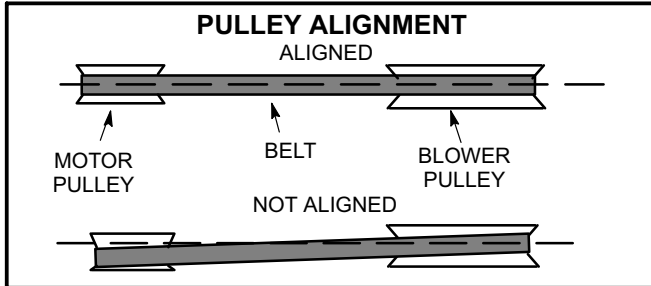


FIGURE 23

E-Check Belt Tension

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

- 1- Measure span length X. See figure 24.
- 2- Apply perpendicular force to center of span (X) with enough pressure to deflect belt 1/64" for every inch of span length or 0.4mm per 25.4mm of span length.

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

Example: Deflection distance of a 1016mm span would be 16mm.

- 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.

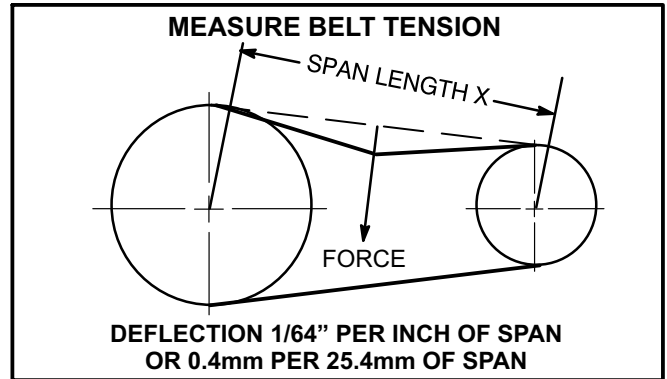


FIGURE 24

F-Field-Furnished Blower Drives

Use tables 2 through 5 to determine BHP and RPM required. Reference table 6 to determine the CAV drive numbers and table 7 through 9 to determine the CAV manufacturer's model number.

**TABLE 2
SW 036 BLOWER PERFORMANCE**

NOTE - Blower Table Includes Resistance For Base Unit With Wet Indoor Coil And Air Filters In Place.

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge											
		0.10		0.20		0.30		0.40		0.50		0.60	
900	5	507	0.32	577	0.35	650	0.37	728	0.39	802	0.41	867	0.44
1000		525	0.34	593	0.37	665	0.39	740	0.41	813	0.43	876	0.46
1100		543	0.36	611	0.39	682	0.41	754	0.43	825	0.45	887	0.49
1200		562	0.38	630	0.41	700	0.43	770	0.45	839	0.48	899	0.52
1300		583	0.40	651	0.43	720	0.45	788	0.47	854	0.51	912	0.55
1400		606	0.43	674	0.45	740	0.47	806	0.51	871	0.55	926	0.59
1500		630	0.45	697	0.48	762	0.50	826	0.54	888	0.59	941	0.63
1600		657	0.48	722	0.51	784	0.54	847	0.58	906	0.63	957	0.67
1700		685	0.52	748	0.55	808	0.58	869	0.62	925	0.68	974	0.72
1800		714	0.56	773	0.58	831	0.62	891	0.67	944	0.73	992	0.78
1900		743	0.60	799	0.63	855	0.67	913	0.73	965	0.79	1012	0.83
2000	1	771	0.64	824	0.67	880	0.72	936	0.79	986	0.85	1034	0.90
2100		798	0.68	849	0.72	905	0.79	960	0.86	1009	0.92	1057	0.96
2200		823	0.73	875	0.79	932	0.86	986	0.93	1034	0.98	1081	1.02
2300		849	0.79	903	0.86	961	0.94	1012	1.01	1060	1.06	1107	1.09
2400		876	0.86	934	0.94	991	1.03	1049	1.09	1086	1.13	1132	1.16
2500		907	0.94	968	1.04	1022	1.12	1069	1.16	1113	1.20	1159	1.23

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge											
		0.70		0.80		0.90		1.0		1.10		1.20	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1	919	0.46	968	0.48	1018	0.51	---	---	---	---	---	---
1000		928	0.49	976	0.51	1027	0.54	1082	0.57	1138	0.60	---	---
1100		938	0.52	985	0.54	1037	0.57	1093	0.60	1149	0.64	1207	0.67
1200		949	0.55	996	0.57	1049	0.60	1105	0.64	1162	0.67	1220	0.71
1300		960	0.58	1008	0.61	1061	0.64	1117	0.68	1175	0.71	1233	0.75
1400		974	0.62	1022	0.65	1075	0.68	1132	0.72	1189	0.75	1248	0.79
1500		988	0.67	1037	0.70	1092	0.73	1149	0.77	1206	0.80	1265	0.84
1600		1004	0.71	1054	0.75	1110	0.78	1168	0.82	1226	0.86	1285	0.89
1700		1021	0.76	1073	0.80	1130	0.84	1189	0.88	1248	0.92	1307	0.96
1800		1041	0.82	1094	0.86	1151	0.90	1211	0.94	1270	0.98	1329	1.02
1900		1062	0.87	1115	0.91	1172	0.95	1232	1.00	1291	1.04	1351	1.08
2000	Field Furnished	1084	0.93	1137	0.97	1194	1.01	1252	1.05	1312	1.09	1371	1.13
2100		1107	1.00	1160	1.03	1216	1.07	1274	1.11	1333	1.15	1393	1.19
2200		1131	1.06	1183	1.09	1239	1.13	1296	1.17	1355	1.21	1414	1.25
2300		1155	1.12	1207	1.16	1262	1.19	1319	1.23	1377	1.27	1436	1.30
2400		1181	1.19	1232	1.22	1286	1.25	1343	1.29	1400	1.32	1459	1.36
2500		1207	1.26	1257	1.29	1311	1.32	1366	1.35	1423	1.38	1481	1.42

NOTE - *italics* - field furnished.

**TABLE 3
SW 060 BLOWER PERFORMANCE**

NOTE - Blower Table Includes Resistance For Base Unit With Wet Indoor Coil And Air Filters In Place.

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge											
		0.10		0.20		0.30		0.40		0.50		0.60	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	Field Furnished	507	0.32	577	0.35	650	0.37	728	0.39	802	0.41	867	0.44
1000		525	0.34	593	0.37	665	0.39	740	0.41	813	0.43	876	0.46
1100		543	0.36	611	0.39	682	0.41	754	0.43	825	0.45	887	0.49
1200		562	0.38	630	0.41	700	0.43	770	0.45	839	0.48	899	0.52
1300		583	0.40	651	0.43	720	0.45	788	0.47	854	0.51	912	0.55
1400		606	0.43	674	0.45	740	0.47	806	0.51	871	0.55	926	0.59
1500		630	0.45	697	0.48	762	0.50	826	0.54	888	0.59	941	0.63
1600		657	0.48	722	0.51	784	0.54	847	0.58	906	0.63	957	0.67
1700		685	0.52	748	0.55	808	0.58	869	0.62	925	0.68	974	0.72
1800		714	0.56	773	0.58	831	0.62	891	0.67	944	0.73	992	0.78
1900		743	0.60	799	0.63	855	0.67	913	0.73	965	0.79	1012	0.83
2000	1	771	0.64	824	0.67	880	0.72	936	0.79	986	0.85	1034	0.90
2100		798	0.68	849	0.72	905	0.79	960	0.86	1009	0.92	1057	0.96
2200		823	0.73	875	0.79	932	0.86	986	0.93	1034	0.98	1081	1.02
2300		849	0.79	903	0.86	961	0.94	1012	1.01	1060	1.06	1107	1.09
2400		876	0.86	934	0.94	991	1.03	1040	1.09	1086	1.13	1132	1.16
2500		907	0.94	968	1.04	1022	1.12	1069	1.16	1113	1.20	1159	1.23

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge											
		0.70		0.80		0.90		1.0		1.10		1.20	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
900	1	919	0.46	968	0.48	1018	0.51	---	---	---	---	---	---
1000		928	0.49	976	0.51	1027	0.54	1082	0.57	1138	0.60	---	---
1100		938	0.52	985	0.54	1037	0.57	1093	0.60	1149	0.64	1207	0.67
1200		949	0.55	996	0.57	1049	0.60	1105	0.64	1162	0.67	1220	0.71
1300		960	0.58	1008	0.61	1061	0.64	1117	0.68	1175	0.71	1233	0.75
1400		974	0.62	1022	0.65	1075	0.68	1132	0.72	1189	0.75	1248	0.79
1500		988	0.67	1037	0.70	1092	0.73	1149	0.77	1206	0.80	1265	0.84
1600		1004	0.71	1054	0.75	1110	0.78	1168	0.82	1226	0.86	1285	0.89
1700		1021	0.76	1073	0.80	1130	0.84	1189	0.88	1248	0.92	1307	0.96
1800		1041	0.82	1094	0.86	1151	0.90	1211	0.94	1270	0.98	1329	1.02
1900		1062	0.87	1115	0.91	1172	0.95	1232	1.00	1291	1.04	1351	1.08
2000	Field Furnished	1084	0.93	1137	0.97	1194	1.01	1252	1.05	1312	1.09	1371	1.13
2100		1107	1.00	1160	1.03	1216	1.07	1274	1.11	1333	1.15	1393	1.19
2200		1131	1.06	1183	1.09	1239	1.13	1296	1.17	1355	1.21	1414	1.25
2300		1155	1.12	1207	1.16	1262	1.19	1319	1.23	1377	1.27	1436	1.30
2400		1181	1.19	1232	1.22	1286	1.25	1343	1.29	1400	1.32	1459	1.36
2500		1207	1.26	1257	1.29	1311	1.32	1366	1.35	1423	1.38	1481	1.42

NOTE - *italics* - field furnished.

**TABLE 4
SW 120 BLOWER PERFORMANCE**

NOTE - Blower Table Includes Resistance For Base Unit With Wet Indoor Coil And Air Filters In Place.

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge													
		0.10		0.20		0.30		0.40		0.50		0.60		0.70	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
3000	Field Furnished	538	0.67	567	0.79	597	0.93	627	1.06	658	1.18	689	1.30	720	1.41
3200		554	0.79	583	0.92	612	1.05	643	1.18	673	1.31	704	1.42	735	1.53
3400		570	0.92	599	1.05	629	1.18	659	1.31	690	1.44	721	1.55	752	1.66
3600		588	1.06	616	1.19	646	1.32	677	1.45	708	1.58	739	1.69	769	1.80
3800		606	1.21	635	1.34	665	1.48	696	1.61	727	1.73	758	1.85	788	1.95
4000		626	1.37	655	1.50	685	1.64	716	1.77	747	1.90	778	2.01	808	2.10
4200		647	1.54	676	1.68	707	1.82	738	1.95	769	2.07	799	2.18	828	2.27
4400		1	669	1.72	699	1.87	730	2.01	761	2.14	791	2.25	820	2.35	849
4600	693		1.92	724	2.07	755	2.21	785	2.34	814	2.45	842	2.54	871	2.62
4800	718		2.14	749	2.29	780	2.43	809	2.54	837	2.64	865	2.73	893	2.81

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge													
		0.80		0.90		1.00		1.10		1.20		1.20			
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP		
3000	1	751	1.50	782	1.58	815	1.67	849	1.76	884	1.87	922	1.99		
3200		766	1.62	797	1.71	830	1.79	863	1.89	899	2.00	936	2.12		
3400		782	1.75	814	1.84	846	1.93	879	2.03	914	2.13	951	2.25		
3600		800	1.89	831	1.98	863	2.07	896	2.17	931	2.28	967	2.39		
3800		818	2.04	849	2.13	881	2.22	913	2.32	948	2.42	983	2.53		
4000		837	2.20	868	2.28	899	2.38	932	2.47	965	2.57	1000	2.68		
4200		857	2.36	887	2.45	918	2.54	950	2.63	983	2.73	1018	2.84		
4400		878	2.53	908	2.61	938	2.70	969	2.79	1002	2.89	1036	2.99		
4600		899	2.71	928	2.79	958	2.87	989	2.96	1021	3.06	1054	3.16		
4800		*	920	2.88	949	2.96	979	3.04	1009	3.13	1041	3.22	1073	3.32	

*NOTE - *italics* - field furnished.

**TABLE 5
SW 240 BLOWER PERFORMANCE**

NOTE - Blower Table Includes Resistance For Base Unit With Wet Indoor Coil And Air Filters In Place.

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge													
		0.10		0.20		0.30		0.40		0.50		0.60		0.70	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	Field Fur- nished	372	1.04	422	1.29	463	1.54	502	1.73	539	1.95	571	2.17	604	2.35
6200		381	1.08	429	1.36	470	1.62	508	1.82	544	2.05	576	2.28	609	2.46
6400		390	1.14	437	1.44	477	1.71	515	1.92	550	2.16	582	2.39	614	2.57
6600		399	1.20	444	1.53	484	1.80	521	2.02	556	2.28	587	2.51	620	2.68
6800		408	1.27	452	1.62	491	1.89	528	2.13	562	2.40	593	2.63	625	2.80
7000		417	1.35	460	1.71	498	1.99	535	2.24	568	2.52	599	2.74	631	2.91
7200		426	1.45	467	1.82	505	2.10	541	2.36	574	2.65	606	2.86	638	3.02
7400		435	1.55	475	1.93	513	2.22	548	2.49	580	2.77	612	2.98	644	3.14
7600		444	1.67	483	2.05	520	2.34	555	2.62	587	2.90	618	3.10	650	3.26
7800		452	1.80	491	2.18	528	2.47	562	2.75	594	3.02	625	3.22	657	3.38
8000		461	1.93	500	2.31	536	2.61	570	2.89	601	3.15	632	3.35	664	3.51
8200		470	2.08	508	2.45	544	2.75	577	3.03	608	3.29	639	3.47	671	3.63
8400		479	2.23	516	2.60	552	2.90	585	3.18	615	3.42	646	3.60	678	3.76
8600		488	2.39	525	2.76	560	3.05	592	3.33	623	3.56	653	3.74	685	3.89
8800		498	2.56	533	2.91	568	3.21	600	3.48	630	3.70	661	3.87	692	4.02
9000		507	2.73	542	3.08	576	3.37	608	3.63	638	3.85	668	4.01	699	4.16
9200		516	2.91	551	3.25	584	3.53	616	3.78	645	3.99	676	4.15	707	4.29
9400	2	526	3.09	560	3.42	593	3.69	623	3.94	653	4.13	683	4.28	714	4.43
9600		535	3.27	569	3.59	601	3.86	631	4.10	661	4.28	691	4.42	721	4.56

TABLE CONTINUED ON NEXT PAGE

TABLE CONTINUED FROM PREVIOUS PAGE

NOTE - Blower Table Includes Resistance For Base Unit Wet Indoor Coil And Air Filters In Place.

Air Volume cfm	Drive No.	EXTERNAL STATIC PRESSURE - Inches Water Gauge											
		0.80		0.90		1.00		1.10		1.20		1.20	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
6000	2	636	2.53	670	2.72	706	2.91	743	3.11	779	3.30	816	3.50
6200		641	2.64	676	2.82	712	3.02	749	3.22	785	3.42	822	3.62
6400		647	2.74	682	2.93	718	3.14	755	3.34	792	3.54	828	3.75
6600		653	2.85	688	3.04	725	3.25	762	3.46	798	3.67	835	3.87
6800		659	2.96	694	3.15	731	3.37	768	3.58	805	3.80	842	4.01
7000		665	3.08	700	3.27	737	3.48	775	3.70	812	3.92	848	4.14
7200		671	3.19	707	3.39	744	3.60	781	3.83	818	4.05	855	4.27
7400		677	3.31	713	3.50	750	3.72	788	3.94	825	4.17	861	4.39
7600		684	3.43	719	3.62	756	3.84	794	4.06	831	4.29	868	4.51
7800		Field Fur- nished	690	3.55	726	3.74	763	3.96	800	4.18	837	4.40	874
8000	697		3.67	732	3.87	769	4.08	806	4.30	843	4.52	880	4.74
8200	704		3.80	739	3.99	775	4.20	812	4.42	849	4.64	886	4.86
8400	711		3.93	746	4.11	782	4.32	819	4.54	855	4.76	892	4.98
8600	718		4.06	752	4.24	788	4.44	825	4.66	862	4.88	898	5.10
8800	725		4.19	759	4.37	795	4.57	831	4.78	868	5.00	904	5.21
9000	732		4.32	766	4.50	802	4.69	838	4.90	874	5.12	911	5.33
9200	739		4.45	773	4.63	808	4.82	844	5.03	881	5.24	917	5.46
9400	746		4.58	780	4.76	815	4.95	851	5.15	887	5.36	923	5.58
9600	753		4.72	787	4.89	822	5.08	858	5.28	894	5.49	930	5.70

NOTE - *italics* - field furnished.

**TABLE 6
CAV FACTORY INSTALLED DRIVE KIT
SPECIFICATIONS**

Unit	Motor		RPM Range		
	hp	kw	Drive 1	Drive 2	Drive 5
036	1.5	1.1	765/1075	NA	564/847
060	1.5	1.1	765/1075	NA	NA
120	3	2.2	660/900	NA	NA
240	5	3.7	NA	520/685	NA

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
SW 036 & 060 CAV MANUFACTURER'S NUMBERS**

Drive No.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	1VP40 X 7/8	79J0301	AK61 X 1	100244-20	AX44	12L2601
5	1VP34 X 7/8	31K6901	AK64 X 1	12L2501	AX44	12L2601

**TABLE 8
SW 120 CAV MANUFACTURER'S NUMBERS**

Drive No.	DRIVE COMPONENTS					
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
1	1VP40 X 7/8	79J0301	BK77 X 1	49K4001	BX57	78L5301

**TABLE 9
SW 240 CAV MANUFACTURER'S NUMBERS**

Drive No.	DRIVE COMPONENTS							
	ADJUSTABLE SHEAVE		FIXED SHEAVE		BELTS		SPLIT BUSHING	
	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.	Supplier No.	OEM Part No.
2	1VP44 X 1-1/8	100239-07	BK110H	100788-06	BX68	88K3401	H-1-7/16	49M6201

Cooling Start-Up

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

A-Preliminary Checks

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

B-Start-Up

- 1- Initiate first and second cooling demand according to instructions provided with thermostat.
- 2- *036 & 060 Units-*
First-stage thermostat demand will energize compressor 1. 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.

The water flow control valve is energized open when compressor 1 starts. Water is allowed to flow through the water-to-refrigerant coil.

120 & 240 Units-
First-stage thermostat demand will energize compressor 1. Second-stage thermostat demand will

energize compressor 2. On units with an economizer, when outdoor air is acceptable, a first-stage demand will energize the economizer; a second-stage demand will energize compressor 1.

The B39 stage 1 water flow control valve opens when compressor 1 starts. B42 stage 2 flow control valve opens when compressor 2 starts. When flow control valves open, water flows to the appropriate section of the water-to-refrigerant coil.

- 3- 120 and 240 units contain two refrigerant circuits and two stages of cooling. See figure 25.
- 4- Each refrigerant circuit is separately charged with R410A refrigerant. See unit nameplate for correct amount of charge.
- 5- See the following figures for refrigerant circuit routing:

3, 5, & 10 Ton Units	Cooling Mode	Figure 26
20 Ton Units	Cooling Mode	Figure 27
3, 5, & 10 Ton Units	Heating Mode	Figure 28
20 Ton Units	Heating Mode	Figure 29
- 6- Refer to Cooling Operation and Adjustment section for proper method to check refrigerant charge.

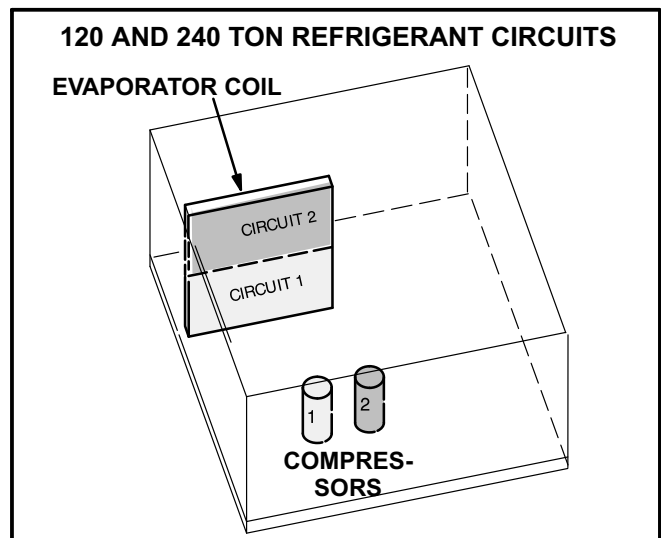


FIGURE 25

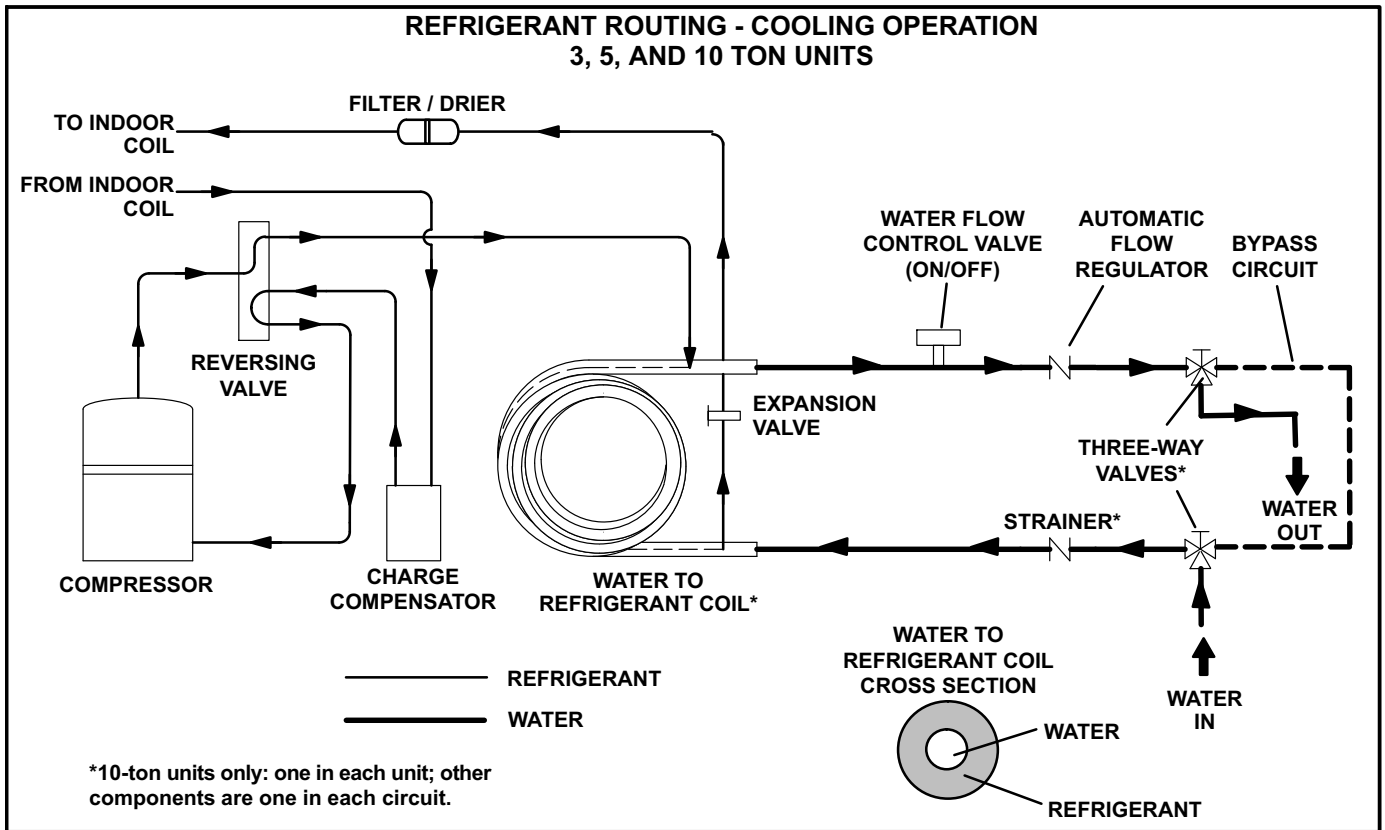


FIGURE 26

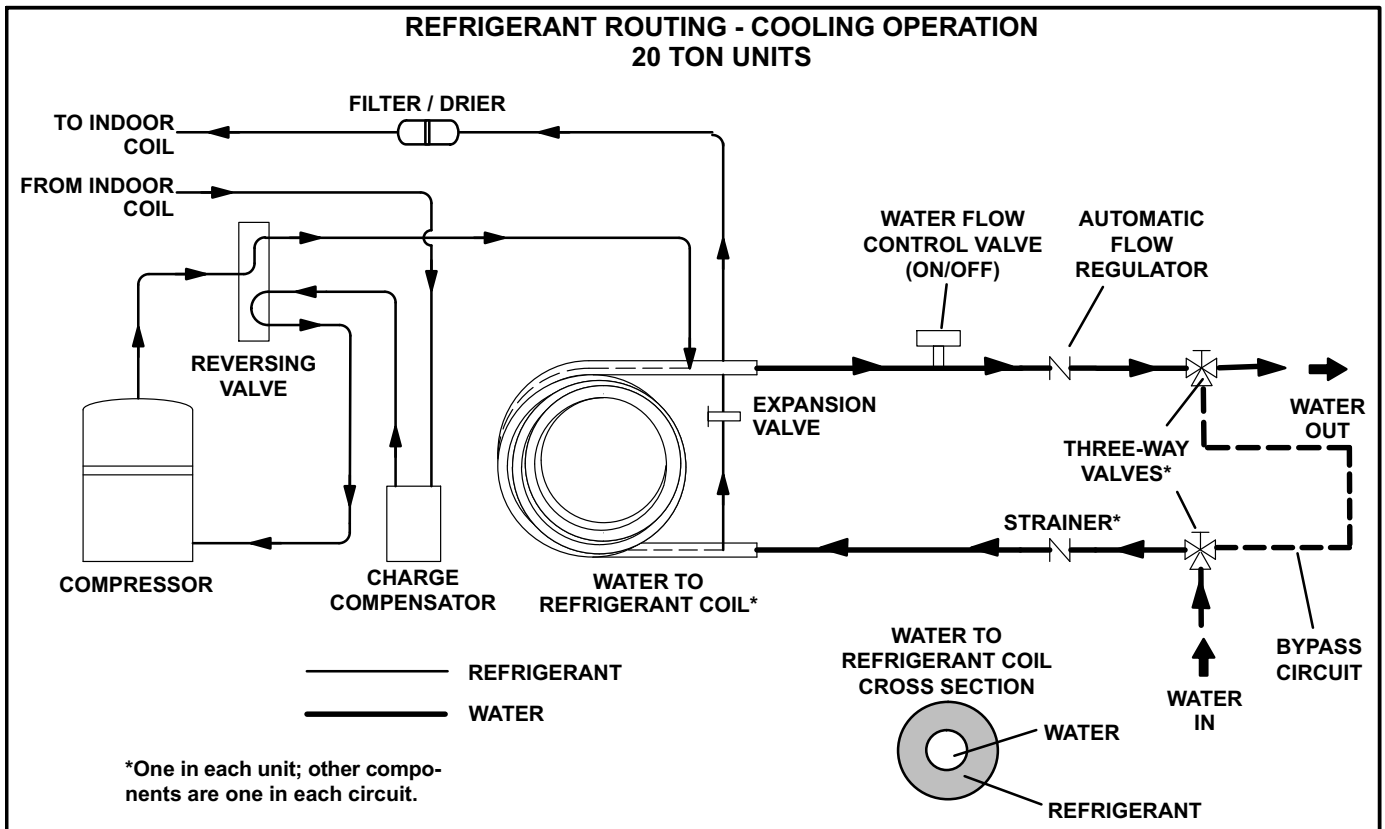


FIGURE 27

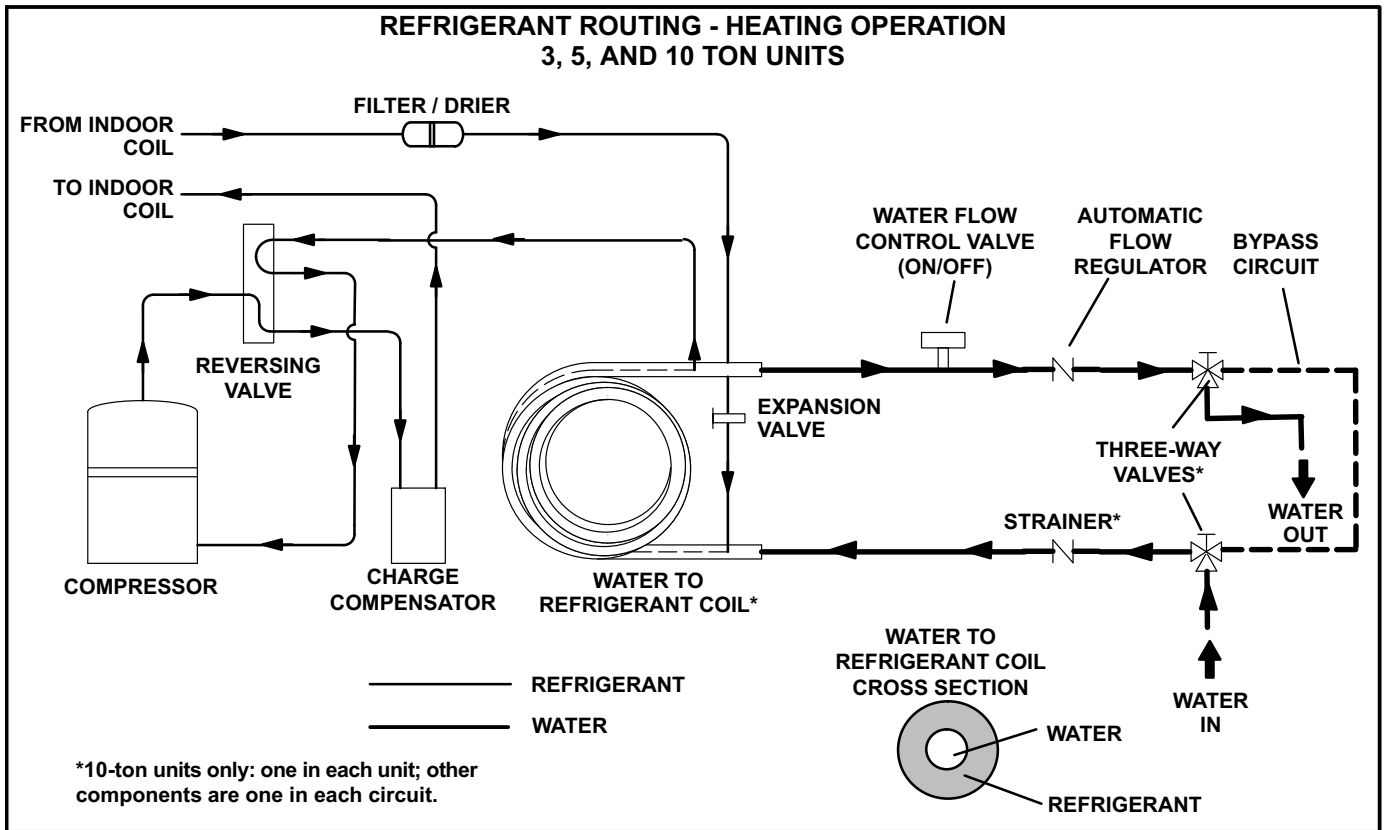


FIGURE 28

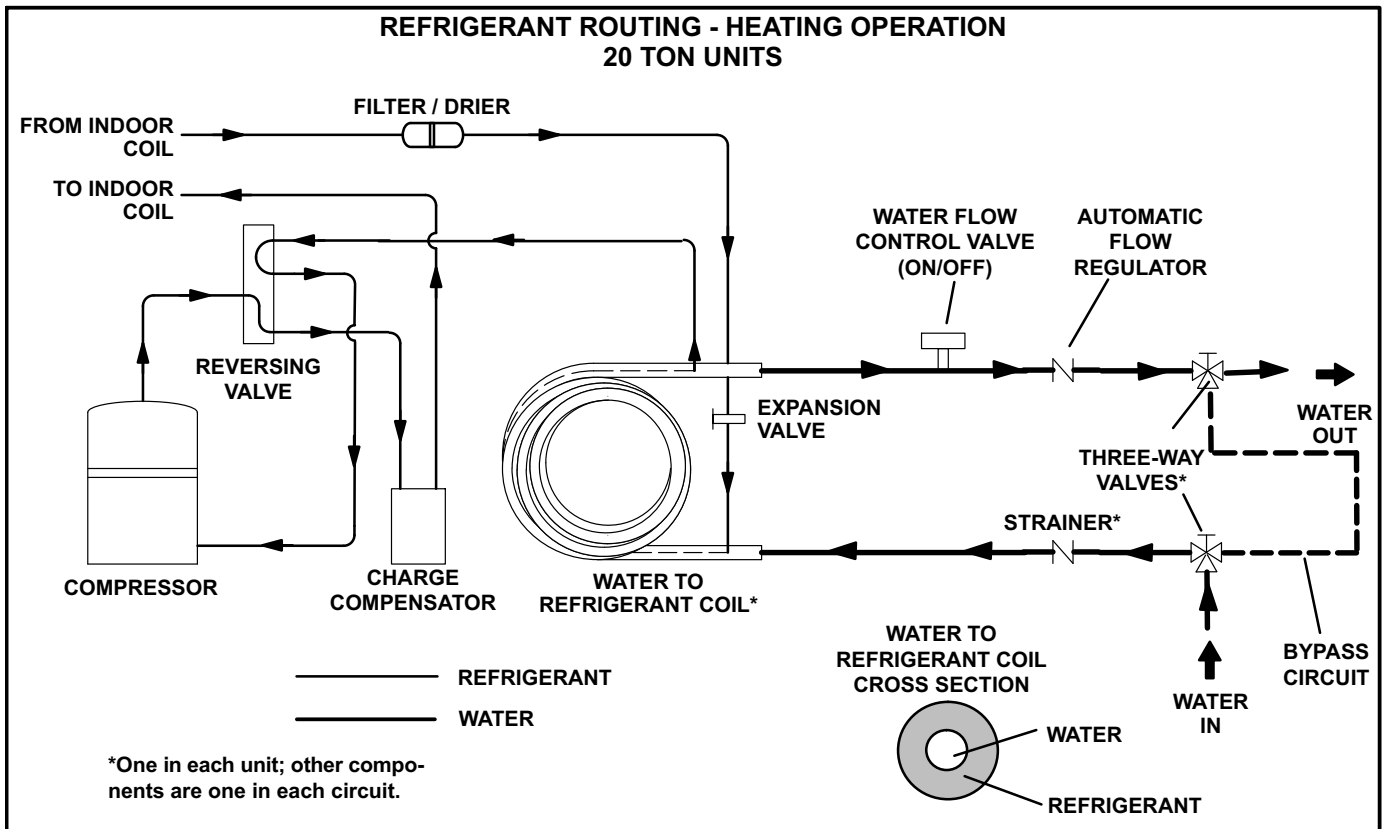


FIGURE 29

C-Three Phase Scroll Compressor Voltage Phasing

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

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

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

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

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

D-R410A Refrigerant

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

R410A refrigerant is stored in a pink cylinder.

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

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

E-Refrigerant Charge and Check

WARNING-Do not exceed nameplate charge under any condition.

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

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

- 1- Attach gauge manifolds and operate unit at full CFM 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 entering water temperature at the strainer. See figure 33.
- 4- Apply the water temperature to appropriate table 10 through 17 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- Operate the unit in heating mode until system stabilizes (approximately five minutes).
- 8- Apply the water temperature to appropriate table 10 through 17 to determine normal operating pressures. Use steps 5 and 6 to adjust refrigerant.

**TABLE 10
SW 036 COOLING OPERATING PRESSURES**

Entering Water Temp	Discharge ±10 psig	Suction ± 5 psig
59°F	245	140
77°F	312	144
86°F	339	148

**TABLE 11
SW 036 HEATING OPERATING PRESSURES**

Entering Water Temp	Discharge ±10 psig	Suction ± 5 psig
32°F	291	77
50°F	321	106
68°F	352	137

**TABLE 12
SW 060 COOLING OPERATING PRESSURES**

Entering Water Temp	Discharge ±10 psig	Suction ± 5 psig
59°F	260	135
77°F	328	140
86°F	357	144

**TABLE 13
SW 060 HEATING OPERATING PRESSURES**

Entering Water Temp	Discharge ±10 psig	Suction ± 5 psig
32°F	312	75
50°F	342	103
68°F	377	139

**TABLE 14
SW 120 COOLING OPERATING PRESSURES**

Entering Water Temp	CIRCUIT 1		CIRCUIT 2	
	Dis ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig
59°F	245	136	254	136
77°F	322	134	322	137
86°F	365	135	364	138

**TABLE 15
SW 120 HEATING OPERATING PRESSURES**

Entering Water Temp	CIRCUIT 1		CIRCUIT 2	
	Dis ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig
32°F	300	75	285	74
50°F	332	105	313	103
68°F	360	134	337	130

**TABLE 16
SW 240 COOLING OPERATING PRESSURES**

Entering Water Temp	CIRCUIT 1		CIRCUIT 2	
	Dis ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig
59°F	231	127	250	131
77°F	312	132	306	140
86°F	353	135	346	142

**TABLE 17
SW 240 HEATING OPERATING PRESSURES**

Entering Water Temp	CIRCUIT 1		CIRCUIT 2	
	Dis ±10 psig	Suc ±5 psig	Dis ±10 psig	Suc ±5 psig
32°F	282	70	271	68
50°F	335	97	324	96
68°F	355	123	342	122

F-Compressor Controls

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

1- High Pressure Switch (S4, S7)

The compressor circuit is protected by a high pressure switch which opens at 640 psig ± 10 psig (4413 kPa ± 70 kPa) and automatically resets at 475 psig ± 20 psig (3275kPa ± 138 kPa).

2- Low Pressure Switch (S87, S88)

The compressor circuit is protected by a loss of charge switch. Switch opens at 40 psig ± 5 psig (276 ± 34 kPa) and automatically resets at 90 psig ± 5 psig (621 kPa ± 34 kPa).

3- Crankcase Heater (HR1, HR2)

Units have compressors which contain a belly band compressor oil heater which must be on 24 hours before running compressors. Energize by setting thermostat so that there is no cooling demand, to prevent compressor from cycling, and apply power to unit.

4- Freezestats (S49, S50)

Switches de-energize compressors when indoor coil temperature falls below 29°F (-2°C) to prevent indoor coil freeze-up. Switches reset when indoor coil temperature reaches 58°F (15°C).

5- Crankcase Heater Thermostat (S40, S162)

Switches de-energize crankcase heaters when discharge temperature rises above 94°F (34.4°C). Switch opens to energize crankcase heaters when discharge temperature drops below 74°F (23.2°C).

Water Circuit Operation

When the compressor is energized the water flow control valve will de-energize and spring-return open allowing water flow. When the compressor de-energizes, the valve is actuated closed, stopping the flow of water. The valve opens in 10-15 seconds and closes in 30-40 seconds. The automatic flow regulator manages the water flow to the water-to-refrigerant coil. No g.p.m. adjustment is required.

Freeze Protection

Consult with local and national governing bodies when determining the water mixture used in the water-to-refrigerant coil. Appropriate mixtures must be used to prevent personal injury, product, or property damage.

Each unit is equipped with a factory-installed S116 antifreeze controller to prevent damage to the refrigerant to water coil. See figure 30. The controller is set to initiate water compartment electric heat when compartment temperature drops to 42°F (10°F above the freezing point of water) and to circulate water if compartment temperature continues to drop to 37°F (5°F above the freezing point of water). When compartment temperature rises to 42°F water circulation is discontinued. If compartment temperature continues to rise electric heat will de-energize at 47°F. See figure 31.

Controller is located on the right side of the controls hat section above compressor(s). The controller sensor is located in the water compartment.

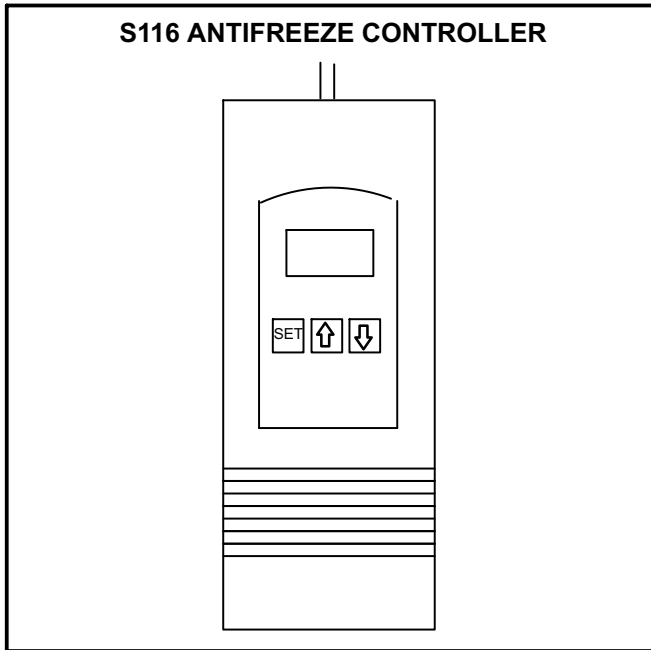


FIGURE 30

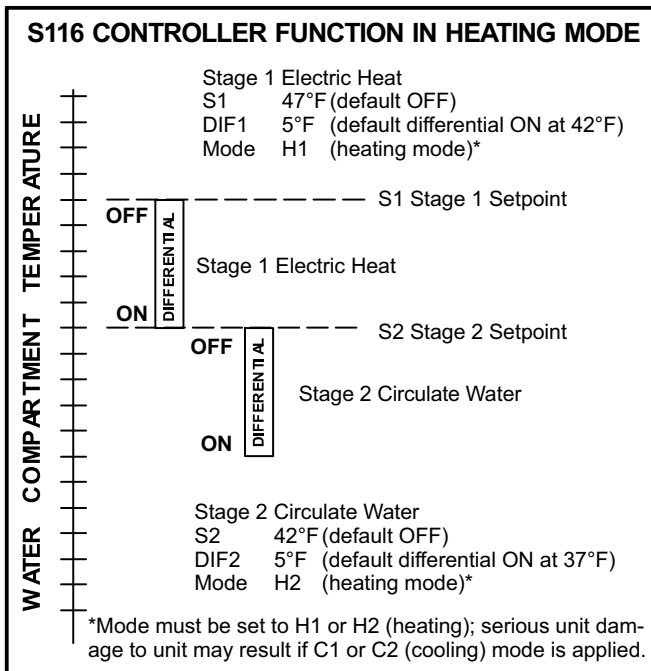


FIGURE 31

Antifreeze / Water Mixture

Controller is factory-set for 100% water mixture. When an antifreeze/water mixture is used, controller settings may be adjusted. See table 18 for antifreeze/water mixture freezing points. Antifreeze type and mixture will affect capacity and pressure drop.

**TABLE 18
 ANTIFREEZE MIXTURE FREEZING TEMPERATURES**

% By Volume	0%	10%	20%	30%	40%	50%
Propylene Glycol	32°F	26°F	18°F	7°F	-8°F	-29°F
Ethylene Glycol	32°F	23°F	14°F	2°F	-13°F	-36°F
Methanol	32°F	20°F	0°F	-15°F	-40°F	-65°F

Determining Setpoints

Set stage 1 to initiate a minimum of 10°F above the antifreeze/water mixture freezing point. Set stage 2 to initiate a minimum of 5°F above the antifreeze/water mixture freezing point.

For example, the freezing point of a 10% mixture of ethylene glycol and water is 23°F. Stage 1 initiation of electric heat should be no less than 33°F (S1 - DIF1 or 38°F - 5°F = ON at 33°F). Stage 2 initiation of water circulation should be no less than 28°F (S2 - DIF2 or 33°F - 5°F = ON at 28°F).

Important - Setting the temperature too close to the freezing temperature of the antifreeze/water mixture could result in serious unit damage.

Adjusting Setpoints

Use the controller SET and UP/DOWN arrow keys to adjust settings. See figure 30. The menus are sequential in the following order:

- Fahrenheit / Celsius
- S1 (Stage 1 temperature)
- DIF1 (Stage 1 differential)
- H1 (Stage 1 htg./clg. mode)
- S2 (Stage 2 temperature)
- DIF2 (Stage 2 differential)
- H1 (Stage 2 htg./clg. mode)

Use the UP/DOWN arrow keys to adjust the setting and the SET key to save the change and advance to the next selection. If no keys are pressed for 30 seconds the switch will save any changes and return to the main display screen.

- 1- Press the SET key once to access the Fahrenheit / Celsius mode. F should be displayed. If not, use the UP/DOWN arrow keys to toggle from C to F.
- 2- Press the SET key again to access Stage 1 Temperature. S1 will blink and the screen will display the current temperature setting (47°F). Use the UP/DOWN arrow keys to adjust the temperature.

- 3- Press the SET key again to access Stage 1 Differential. DIF1 will blink and the screen will display the current setting (5°F). Use the UP/DOWN arrow keys to change the temperature.
- 4- Press the SET key again to access Stage 1 Heating / Cooling mode. H1 should be displayed. If C1 is displayed, press the UP/DOWN arrow keys to change the setting to H1.
- 5- Press the SET key again to access Stage 2 temperature. S2 will blink and display the current temperature setting (42°F). Use the UP/DOWN arrows to change the temperature
- 6- Press the SET key again to access Stage 2 Differential. DIF2 will blink and the screen will display the current setting (5°F). Use the UP/DOWN arrow keys to change the temperature.
- 7- Press the SET key again to access Stage 2 Heating / Cooling mode. H2 should be displayed. If C2 is displayed, press the UP/DOWN arrow keys to change the setting to H2.

Water Quality Guidelines

Water Conditioning

The water-to-refrigerant coil requires varying degrees of protection depending on water quality. Water quality varies from location to location and is unique to each site. Water typically contains impurities and hardness that must be removed. The required treatment will depend on the water quality as well as the system type. If water impurities exceed the maximum allowable levels shown in table 19, the potential for serious corrosion or scaling exists.

**TABLE 19
ALLOWABLE WATER QUALITY LEVELS**

Condition		Acceptable Level
pH		7 to 9.0
Total Hardness (Calcium and Magnesium)		Should not exceed 350 ppm
Iron Oxides		Less than 1 ppm
Iron Bacteria		No level allowable
Corrosion	Ammonia, Ammonium Hydroxide	0.5 ppm maximum
	Ammonium chloride, Ammonium	0.5 ppm maximum
	Nitrate Ammonium Sulfate	0.5 ppm maximum
	Hydrogen Sulfide	No level allowable

Maintenance

Water quality should be checked periodically to maintain acceptable water quality levels. If the water-to-refrigerant coil becomes contaminated with dirt or scaling, the coil will have to be back-flushed and cleaned with chemicals that will remove the scale. This service should be performed by an experienced water treatment specialist.

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.

A-Filters

Units are equipped with the following filters:

- 036/060 Units: Four 16 X 20 X 2" (406 X 508 X 51mm)
- 120 Units - Six 16 X 25 X 2" (406 X 635 X 51mm)
- 240 Units: Twelve 20 X 20 X 2" (508 X 508 X 51mm)

Filters should be checked monthly and replaced when necessary with filters of like kind and size. Take note of air flow direction marking on filter frame when reinstalling filters. See figure 32.

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

Check and replace or clean economizer filters as needed.

B-Lubrication

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

C-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.

D-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.

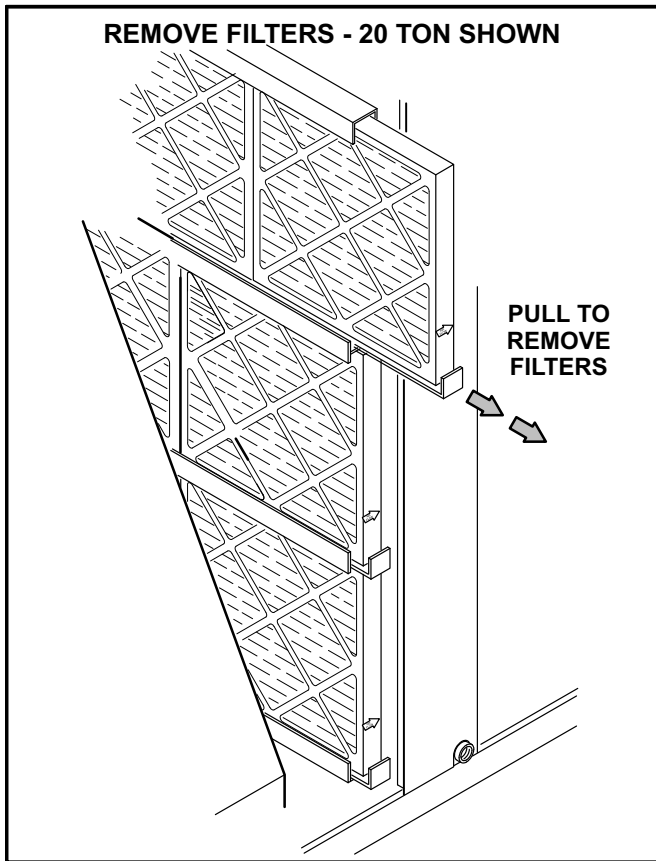


FIGURE 32

E-Strainer

Clean the strainer of debris after initial unit startup and every 6 months after unit start-up.

- 1- Route the water flow through the bypass circuit. See figure 6 for 3 and 5 ton units, figure 7 for 10 ton units

and figure 8 for 20 ton units. Turn the three-way valve levers to the bypass position as shown.

- 2- Remove the hose end cap. See figure 33.
- 3- Open the hose end drain valve and drain the fluid into an approved container. Dispose of fluid properly.

NOTE - If fluid isn't draining, open the manual air vents on the automatic flow regulators.

- 4- Unscrew the removable cap from the strainer body and remove the mesh strainer. Clean the mesh strainer and reinstall.
- 5- Replace removable cap and hose end cap. Close the hose end drain valve and manual air vents if opened.
- 6- To place the water system valves in the main loop position follow procedure in *Bleed Air From Water Lines* section.

⚠ 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**

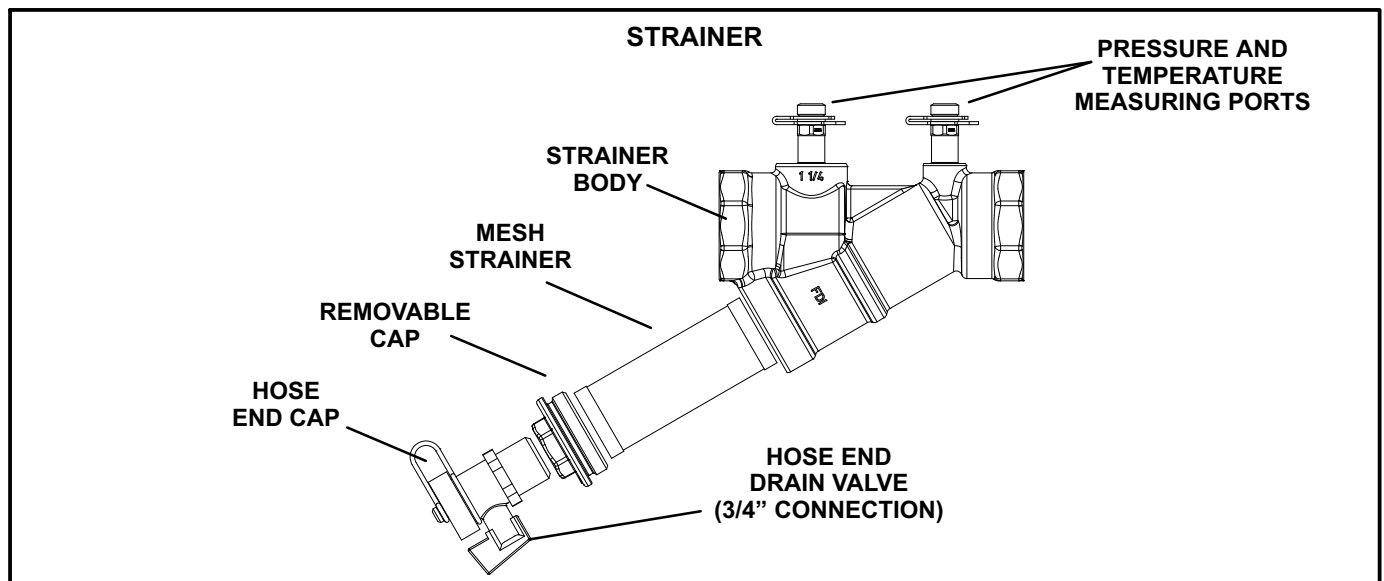


FIGURE 33

START-UP REPORT

Job Name: _____
 Store No. _____ Start-Up Date: _____
 Address: _____
 City: _____ State: _____
 Start-Up Contractor: _____
 Technician: _____
 Model No.: _____
 Serial No.: _____
 RTU No.: _____ Catalog No.: _____

Inspections and Checks			
Damage?	Yes	No	R410A <input type="checkbox"/>
If yes, reported to: _____			
Verify factory and field-installed accessories.			
Check electrical connections. Tighten if necessary.			
Supply voltage: L1-L2 _____ L1-L3 _____ L2-L3 _____			
If unit contains a 208-230/240 volt transformer:			
Check primary transformer tap <input type="checkbox"/>			
Transformer secondary voltage: _____			

Cooling Checks									
Compressor Rotation <input type="checkbox"/> Ambient Temp. _____ Return Air Temp. _____ Supply Air Temp. _____									
	Compr. Amps			Compressor Volts			Pressures		CC Heater Amps
	L1	L2	L3	L1-L2	L1-L3	L2-L3	Disch.	Suct.	L1
1									
2									

Water-To-Refrigerant Coil Checks		
Fluid type: Water and Propylene Glycol <input type="checkbox"/> Water and Ethylene Glycol <input type="checkbox"/> Water and Methanol <input type="checkbox"/> _____ %		
Stage 1 Pressure Differential	Stage 2 Pressure Differential	
Water Inlet Temperature	Water Outlet Temperature	Water Temperature Differential
Strainer cleaner installed? <input type="checkbox"/>		

Blower Checks			
Pulley/Belt Alignment <input type="checkbox"/>		Blower Rotation <input type="checkbox"/>	
Set Screws Tight <input type="checkbox"/>		Belt Tension <input type="checkbox"/>	
Nameplate Amps: _____			
Volts: _____			
Motor	Amps	Volts	
L1	_____	L1-L2	_____
L2	_____	L1-L3	_____
L3	_____	L2-L3	_____

Control Type

Accessory Checks	
Power Exhaust Amps	
1 _____ 2 _____	None <input type="checkbox"/>
Economizer Operation	
Min. Pos. <input type="checkbox"/>	Motor travel full open/close <input type="checkbox"/>

Notes: _____
