

**IOM 20**  
**INSTALLATION**  
**OPERATION AND**  
**MAINTENANCE**  
**INFORMATION**



**CENTRAL STATION**  
**AIR HANDLERS**

**MODELS LHN, LHH, LHS, LHL, LVL,**  
**MHS, MHL, MVL**

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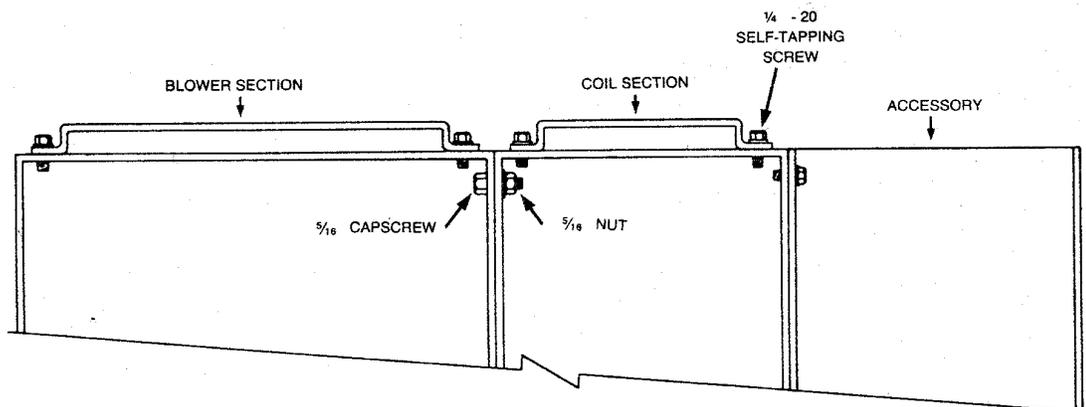
## GENERAL

1. All equipment listed on the bill of lading but not received, along with any equipment damaged in transit, should be reported to the carrier immediately and a claim filed.
2. Special care must be taken when handling the blower section. Rough handling may cause the fan shaft to be bent.

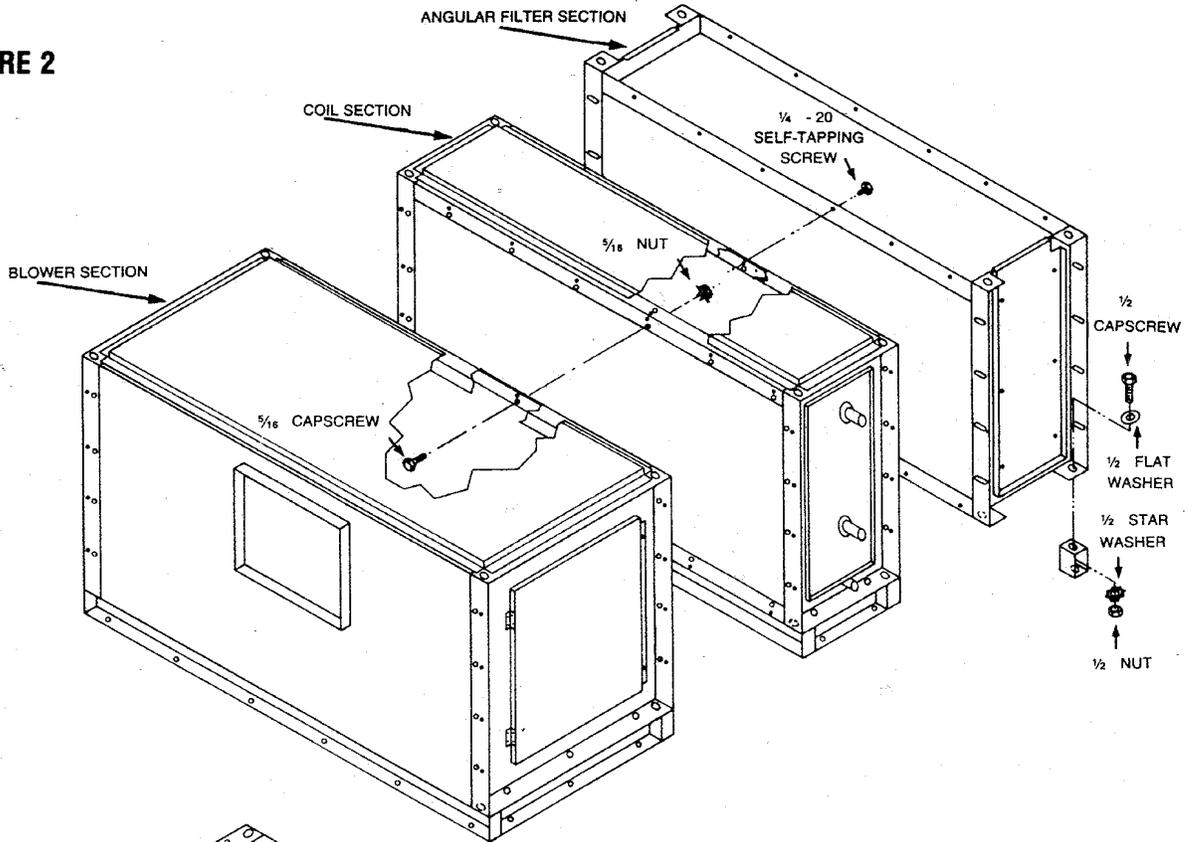
## ASSEMBLY OF SECTIONS

1. Figures 1-3 show typical assembly methods. The blower and coil sections on unit sizes 103 through 121 are shipped factory assembled. EXCEPTION: Units requiring an electric heat section in the reheat position may require field assembly depending on unit size. Unit sizes 125 and larger may have to be field assembled depending on unit arrangement and number and type of accessories.
2. Assembly hardware and accessory mounting feet are shipped in a cloth bag attached to the drive end bearing support.
3. Unit sections will be joined in the following manner:
  - A. A coil section is attached to the blower section using capscrews and nuts.
  - B. An electric heat section in the reheat position is attached to the blower and coil sections using capscrews and nuts.
  - C. Any accessory or slide-in coil section is attached to the blower or coil sections using self-tapping screws.
  - D. Any accessory is attached to another accessory or slide-in coil section using capscrews and nuts.

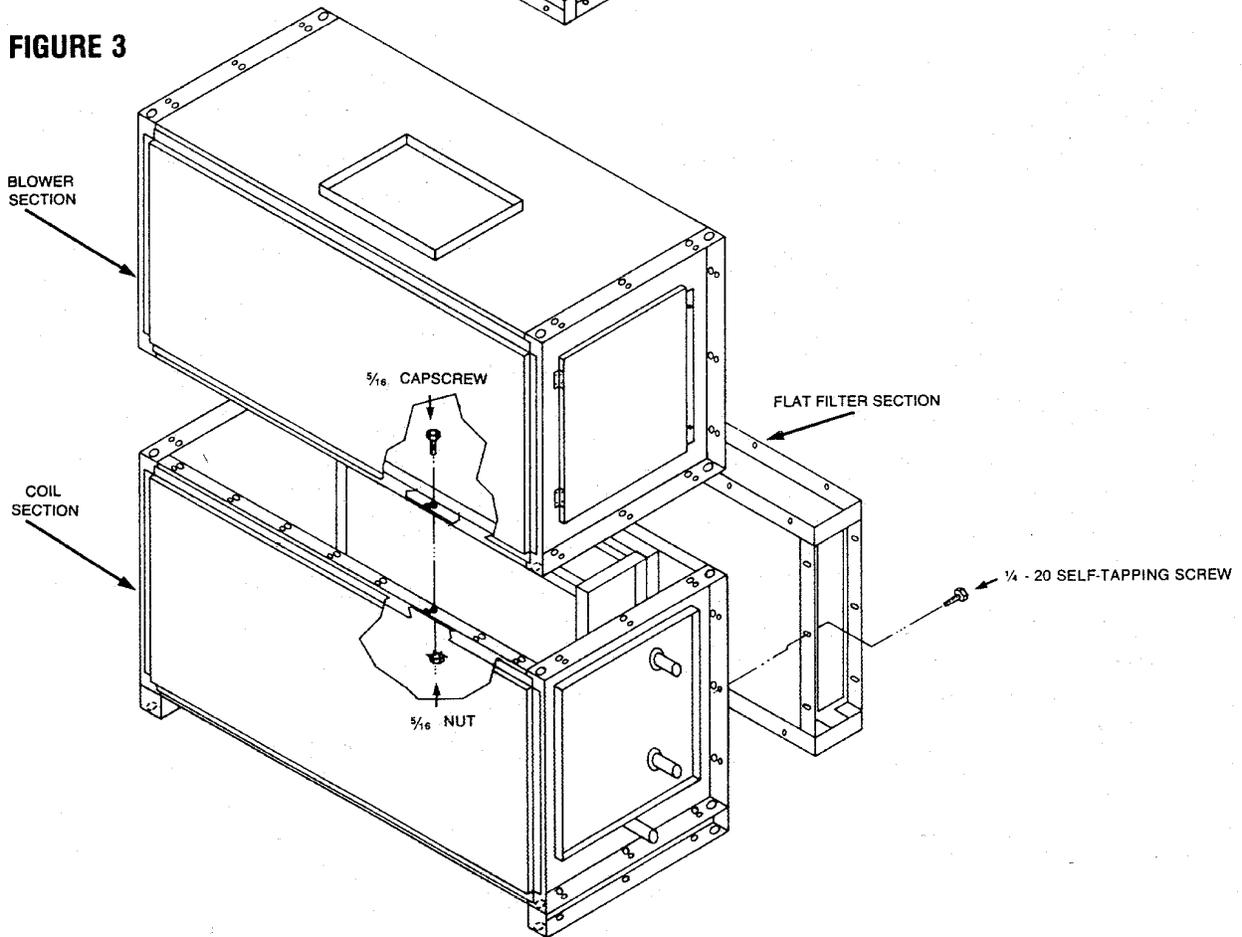
FIGURE 1



**FIGURE 2**



**FIGURE 3**



# INSTALLATION

## Location

Adequate space must be allowed around the unit to perform routine maintenance and repairs. Consideration should be given to filter removal, coil cleaning and/or removal, motor, belt and sheave (CFM) adjustment, lubrication and shaft replacement.

## Mounting

1. A flexible duct connection must be placed between the duct work and the unit to reduce noise transmission.
2. All accessories (except the flat filter section and the internal face and bypass) are shipped with mounting feet to be field installed. (See Figure 2 on page 3). Mount the feet on the accessory before mounting the unit on isolators. The mounting feet, along with mounting hardware, are shipped taped to the drive end bearing support.
3. Factory furnished floor spring isolators have a projecting stud which should be inserted into the hole provided in the base rail and mounting feet.

Factory furnished floor rubber-in-shear isolators must have a bolt and washer (provided by others) installed through the base into the isolator.

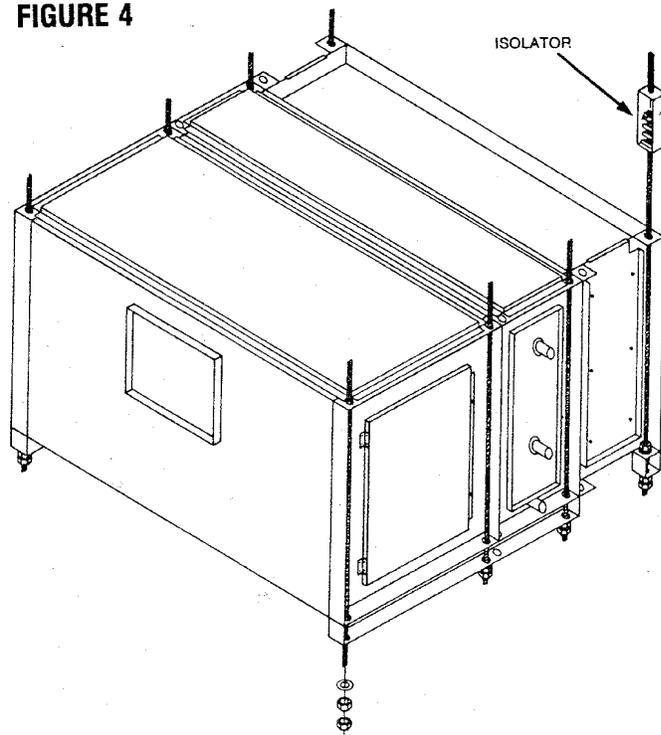
Ceiling spring and rubber-in-shear isolators are installed by using threaded rod. Mounting holes that will accommodate up to a  $\frac{5}{8}$ " threaded rod are provided in the base rail and cabinet flanges of each section (See Figure 4).

NOTE: Mounting units without vibration isolators is not recommended. However, units mounted in this manner should be supported by the mounting rails (mounting feet for accessories) only.

## Isolator Location

1. Horizontal Units
  - A. The blower section will always have four isolators (one at each corner).
  - B. The coil section, and each accessory section (except flat filter and face and bypass sections), will have two isolators—one at each corner of the air inlet side.

FIGURE 4



## 2. Vertical Units

A. In vertical unit arrangements, the blower section is mounted on top of the coil section. The blower/coil section assembly will always have four isolators (one at each corner).

B. Accessories will be the same as in 1-B above.

3. An isolator location sheet showing isolator selection and location is included in the literature packet taped to the blower housing on the drive side of the unit.

## Motor and Drive

1. The motor and drive are located inside the blower section on all units.
2. Flexible electrical conduit should be used at the motor to allow the motor to be adjusted three inches in each direction to allow for belt tensioning.
3. The motor sheave is factory set at the midpoint of its adjustment. The fan RPM may be increased by adjusting the motor sheave closed or decreased by adjusting the motor sheave open.

# COIL APPLICATION RECOMMENDATIONS

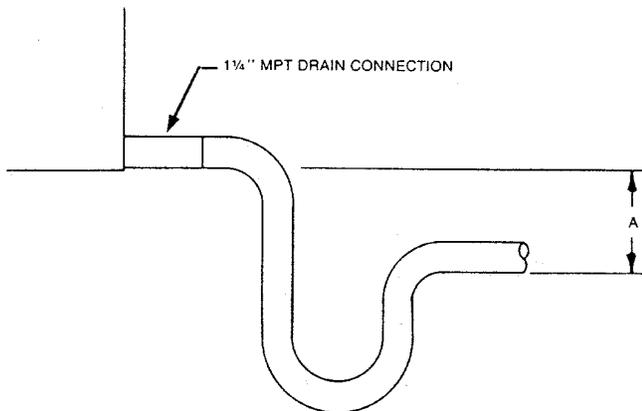
## General

1. Support all piping independently of the coil.
2. All coil connections extend through the unit side panel.
3. All connections adjacent to heating coils should have swing joints or flexible fittings to absorb expansion and contraction strains.
4. Install all piping in accordance with local codes and accepted industry standards.

## Condensate Drain

1. The drain pan has a 1¼" steel MPT connection on each side. Cap off the side that is not used.
2. Install a drain line trap as shown in Figure 5. Dimension A must be twice the negative static pressure for the unit to drain properly. Failure to install a trap and incorrect trapping can cause the drain pan to overflow.

FIGURE 5



## DX Coils

1. The expansion valve (by others) should be externally equalized. Locate the expansion valve bulb on a horizontal section of the suction line just below the valve. Make sure the surfaces of the suction line and bulb are clean and make good contact to insure accurate superheat control.
2. Suction lines should be sloped toward the compressor to allow good oil return.
3. Suction risers of more than 5 feet should be trapped at the bottom.
4. Evacuate the system to remove moisture and non-condensables. Leak test all connections before charging the system.

## Water Coils

1. Cooling and heating coils
  - A. Supply and return connections are steel MPT.
  - B. Use a back-up wrench when making coil connections to prevent damage to the coil. Excessive stress could break the weld joint at the header.
  - C. Coils are provided with ¾" steel MPT vent and drain connections.
  - D. All controls should be sized and selected based on the control manufacturer's recommendations.
2. Heating coils only
  - A. Water flow should not be modulated on heating coils subject to freezing temperatures.

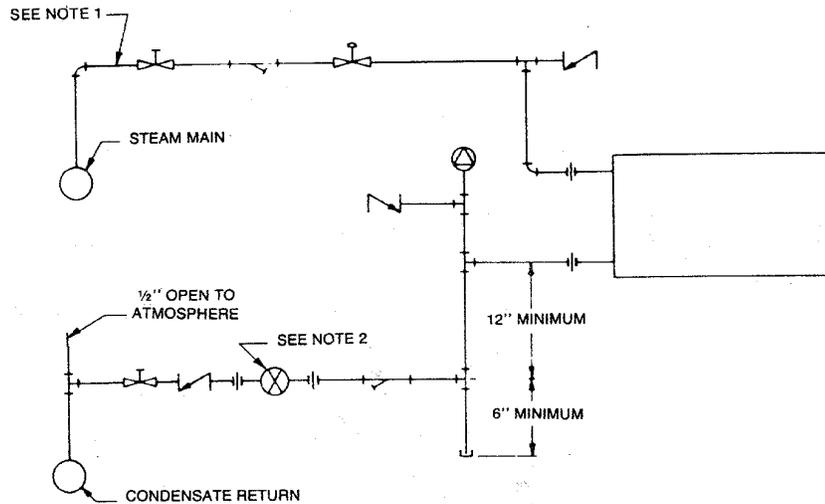
## Steam Coils (See Figures 6 and 7)

1. Supply and return connections are steel MPT.
2. Steam coils are pitched 1/8" per foot toward the return connection end of the coil.
3. Use a back-up wrench when making coil connections to prevent damage to the coil. Excessive stress could break the weld joint at the header.
4. Pitch steam piping in the direction of steam flow and condensate piping in the direction of condensate flow.
5. Insulate both steam and condensate piping.
6. Drip legs must be provided in the steam mains to remove condensate. DO NOT drip steam mains through the coil.
7. Return piping must remain the same size as the return connection until through the dirt pocket.
8. Traps must be selected and sized according to the manufacturer's recommendations.
9. Traps must be located a minimum of 12" below the coil outlet.
10. The face area of unit sizes 136, 141, and 150 is split into 2 coils (upper and lower). Each coil must be trapped separately.
11. Controls must be selected and sized according to the manufacturer's recommendations.
12. When the entering air is 35°F or below, the following is necessary:
  - A. A minimum of 5 PSIG steam pressure must be maintained at all times.

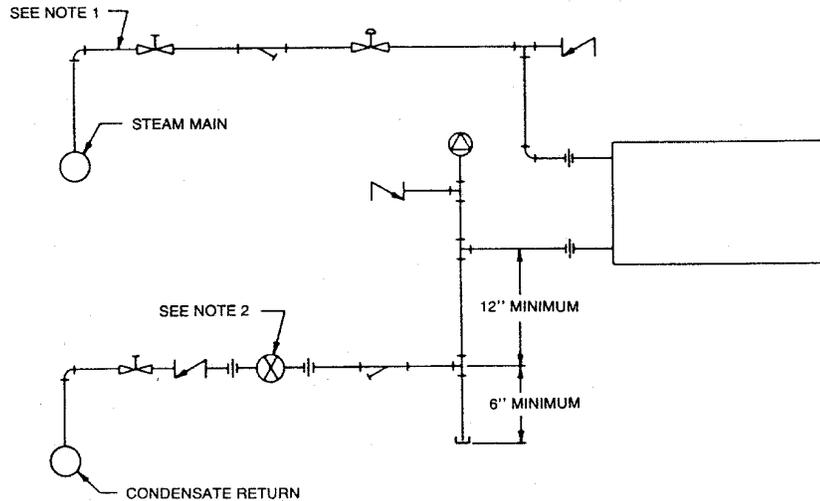
- B. Face and bypass dampers should be used in lieu of modulating controls.
- C. Steam should be fed into the coil for 10 to 15 minutes before admitting outdoor air.
- D. Provision must be made to close off outdoor air in the event sufficient steam

- is not available.
- E. Return air and outdoor air must be thoroughly mixed before entering the coil. Temperature sensing controls must be positioned to sense true mixed air temperatures.

**FIGURE 6**  
LOW PRESSURE (0 TO 15 PSIG)



**FIGURE 7**  
MEDIUM PRESSURE (15 TO 55 PSIG)  
AND HIGH PRESSURE (55 TO 100 PSIG)



**LEGEND**

- |   |                           |
|---|---------------------------|
| — 90° ELBOW                                   | — TEE                     |
| — UNION                                       | — STRAINER                |
| — AUTOMATIC OR CONTINUOUS AIR VENT            | — STEAM TRAP (SEE NOTE 2) |
| — 15° SWING CHECK VALVE                       | — GATE VALVE              |
| — VACUUM BREAKER (1/2" 15° SWING CHECK VALVE) | — CONTROL VALVE           |
| — DIRT POCKET                                 |                           |

**NOTES**

1. Long branch lines should be dripped before entering the coils.
2. For low pressure systems, a combination float and thermostatic trap is recommended. A float or bucket trap is recommended for medium or high pressure systems.

## FREEZE PROTECTION METHODS FOR COILS

Coils subjected to freezing temperatures cannot be adequately protected by simply draining the coil. Low tubes in each circuit will remain filled with water and burst upon freezing.

Two generally accepted methods of protecting coils from freezing are:

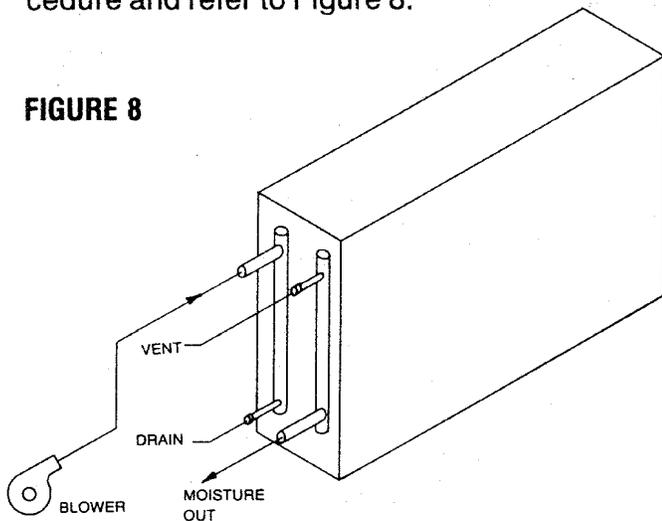
1. Using an air blower.
2. Adding an adequate antifreeze solution.

### Using an Air Blower

To use this method, a blower capable of producing 150 CFM at about 45 inches of water is required. The blower outlet will have to be field adapted to the threaded coil connection.

When blowing out a coil, use the following procedure and refer to Figure 8.

FIGURE 8



1. Turn off the water supply.
2. Remove the vent and drain caps and allow the coil to drain.
3. Replace the vent and drain caps and remove the supply and return piping from the coil connections.
4. Connect the blower outlet to the return (top) connection as shown. Care should be taken not to place excessive stress on the connection or damage to the coil may result.
5. Blow air through the coil for about 30 to 45 minutes. Tap the top or bottom of the air handler along the length of the coil area to help remove trapped water.
6. Place a mirror in front of the supply connection (bottom) to see if all the moisture is removed. Any moisture still being removed from the coil will fog the mirror.
7. Once the air appears to be moisture free, turn the blower off and allow the coil to stand about 10 minutes to permit any water

remaining on the inside tube walls to drain down.

8. Start the blower again and if any moisture is being removed repeat the procedure again.
9. Do not reconnect the supply and return piping until the coil is ready to be returned to operation.

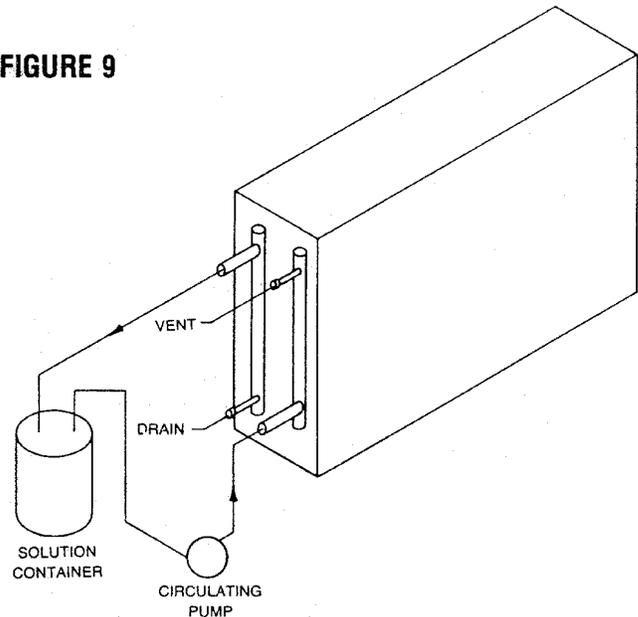
### Addition of Antifreeze Solution

A corrosion inhibited antifreeze solution should be circulated through the coil for best results. Consult the manufacturer's information about freezing points of different concentrations to determine the best solution and the lowest cost.

For best results use a circulating pump and run-around loop between the coil and the solution container.

Referring to Figure 9, use the following procedure:

FIGURE 9



1. Repeat steps 1-3 above.
2. Connect the circulating pump to the supply (bottom) connection and the return line to the return (top) connection.
3. Circulate the solution for about 20 minutes.
4. Check the solution with a hydrometer. If the freezing point is not as low as desired, add additional antifreeze to the solution container and repeat the procedure.
5. The antifreeze may be left in the coil or removed to be used on another coil.

## OPERATION

### General Safety Information

**WARNING: Make sure the power supply to the fan is turned off and locked before entering the fan section.**

1. Be sure the motor is wired to match the available voltage.
2. The motor and the unit cabinet must be connected to the building electrical ground.
3. All motors and drives are internally mounted and do not require fan guards. **DO NOT** open access doors while the fan is still running. Personal injury or motor overloading may result.
4. To determine the fan RPM without entering the fan section while the fan is running, use the following procedure:
  - A. Turn off and lock the power supply to the fan.
  - B. Measure the outside diameter of the belt where it passes around each sheave.
  - C. Using the following formula, the fan RPM may be calculated as follows:

$$\text{Fan RPM} = 1750 \times \frac{\text{Measured Motor Sheave Diameter}}{\text{Measured Fan Sheave Diameter}}$$

### System Check and Start-Up

**WARNING: Make sure the power supply to the fan is turned off and locked before entering the fan section.**

1. Check the setscrews and capscrews in the fan and motor sheave, bearings and blower wheel for tightness.
2. Check belt(s) for proper tensioning.
3. Check fan and motor sheaves for proper alignment.

4. Check fan wheel to be sure it is centered between the inlet funnels.
5. Rotate the fan shaft by hand to be sure it turns freely.
6. Turn the power supply to the fan on momentarily to check for correct fan rotation.
7. Check the motor amp draw against the nameplate rating.
8. Leak test all heat transfer system connections.

**NOTE:** After the first 48 hours of operation re-check the belt(s) for proper tension. Also, re-check the setscrew tightness on the fan, bearings and sheaves.

### Operating Limits

1. The maximum air temperature over the motor must not exceed 150°F.
2. The maximum wheel RPM for each unit size is listed in Table 1 below.

**TABLE 1**

UNIT SIZE	MAXIMUM RPM	UNIT SIZE	MAXIMUM RPM
103	1800	121	1200
106	1300	125	1000
108	1400	131	1000
110	1400	136	840
112	1350	141	840
114	1350	150	700
117	1200	—	—

## MAINTENANCE

### General

**WARNING: Make sure the power supply to the fan is turned off and locked before entering the fan section.**

1. Check filters every three months. Clean or replace if necessary.
2. Check belt(s) every three months for tensioning or excessive wear. If re-tensioning or replacement is necessary, be sure sheaves remain aligned.
3. Check bearing and fan setscrews for tightness every six months.

### Motor Lubrication

All motors are factory lubricated and do not need to be greased when the unit is installed. Some small frame ball bearing motors are permanently lubricated and never need to be greased. The grease in larger frame motors should be renewed periodically. Follow the detailed instructions included in the installation instruction packet.

Use Chevron SR1-2 lubricating grease or any other equivalent high quality grease.

### Fan Bearings

Fan bearings are factory lubricated and do not need to be greased when the unit is installed. Fan bearings have extended lube lines that exit the unit on the drive side.

For best results the bearings should be lubricated while in operation. The bearings may be lubricated using the following procedure:

1. Disconnect and lock power to the fan.
2. Open each access door and wipe excess grease from bearing seals.
3. Close access doors, unlock power and turn fan on.
4. Slowly pump a small amount of grease into each bearing.
5. Disconnect power to the fan and check each bearing to see if a small bead has formed around the seal. If not, repeat the procedure.

NOTE: Do not open the access doors while the fan is in operation. Increased air volume

may overload the motors. For lubrication, a high quality lithium base grease conforming to NLGI grade #2 is recommended.

Use Table 2 below as a guide to greasing intervals.

TABLE 2

CONDITIONS			GREASING INTERVAL
SPEED	TEMPERATURE	CLEANLINESS	
100 RPM	Up to 120°F	Clean	6 to 12 Months
500 RPM	Up to 150°F	Clean	2 to 6 Months
1000 RPM	Up to 210°F	Clean	2 Weeks to 2 Months
1500 RPM	Over 210°F	Clean	Weekly
Any Speed	Up to 150°F	Dirty	1 Week to 1 Month
Any Speed	Over 150°F	Dirty	Daily to 2 Weeks
Any Speed	Any Temp.	Very Dirty	Daily to 1 Week
Any Speed	Any Temp.	Extreme Conditions	Daily to 1 Week

## FIELD COIL REPLACEMENT

**Side Removal—LHS, LHL, LVL, MHS, MHL, MVL.** Should coil replacement become necessary, the coil may be removed as follows:

1. Disconnect heat transfer system pipe work.
2. Remove coil section end panels (both are removable to allow easy access).
3. Remove the clips that hold the coil to the coil channel support.
4. Remove the bolts that hold the coil to the coil section frame.
5. The coil may now be removed by sliding it out the end of the coil section.

NOTE: If there's more than one coil in the coil section, the above procedures apply to any coil.

### Top Removal—LHS, LHL, MHS, MHL

1. Repeat steps 1-4 above.
2. Remove the coil section top panel.
3. Slide the coil to one side to allow the opposite end of the coil to clear the frame.
4. Lift the freed end of the coil through the top

of the coil section and remove the coil.

### Front or Rear Removal—LVL, MVL

1. Repeat steps 1-4 under "Side Removal" above.
2. Remove filter section and connecting duct work, or the coil section front panel if the coil is to be removed through the front.
3. Remove the air baffles (top and bottom) on the rear of the coil section if the coil is to be removed through the rear.
4. Slide the coil to one side to allow the opposite end of the coil to clear the frame.
5. Turn the coil 90° so that the face of the coil is toward the end panel.
6. The coil may now be removed.

NOTE: Coils on LHS, LHL, MHS, MHL units may also be removed and installed through the rear of the unit if necessary by following the above procedures.

To install a new coil, reverse the above procedures.

**TABLE 3: Net Weights (approximate)**

DESCRIPTION	UNIT SIZE												
	103	106	108	110	112	114	117	121	125	131	136	141	150
<b>BLOWER AND COIL SECTIONS</b>													
LHN	187	254	338	418	456	499	603	652	1070	1163	1537	1677	2029
LHH	223	297	389	475	516	562	672	727	1149	1250	1630	1777	2137
LHS, MHS	349	446	566	693	735	796	946	1019	1357	1484	1918	2066	2444
LHL, MHL	387	501	614	782	831	900	1107	1201	1599	1773	2256	2477	2865
LVL, MVL	361	465	567	726	769	831	1022	1102	1612	1784	2235	2441	2896
<b>HEATING AND COOLING COILS (LC) — ALUMINUM FINNS *</b>													
1 ROW	22	33	42	49	56	63	74	87	107	130	177	190	218
2 ROW	29	46	62	73	84	95	115	136	164	203	261	285	333
3 ROW	41	64	85	102	118	133	162	193	228	284	360	395	464
4 ROW	52	82	110	132	153	174	210	251	294	367	461	507	598
5 ROW	62	98	132	159	185	199	244	306	357	448	557	613	726
6 ROW	72	114	155	187	217	247	301	360	420	528	653	720	854
8 ROW	93	148	201	243	283	323	394	472	539	690	847	936	1114
10 ROW	112	180	246	298	347	396	485	581	674	850	1039	1150	1370
<b>FILTER SECTIONS</b>													
FLAT	26	38	44	45	48	56	61	69	83	99	114	143	135
ANGULAR	72	95	101	119	135	146	146	158	165	214	212	242	275
HEAVY DUTY	—	—	—	119	136	148	175	180	196	229	239	266	310
<b>OTHER SECTIONS</b>													
INTERNAL FACE & BYPASS	56	72	83	105	127	149	172	200	168	226	249	274	304
MIXING BOX	145	209	265	290	325	359	374	421	475	581	653	736	829

\* To approximate weight of water filled coil, multiply coil weight by 1.35.

**TABLE 4: Motor Weights — Drip Proof — 1800 RPM**

MOTOR HP	½	¾	1	1½	2	3	5	7½	10	15	20	25	30	40	50
NEMA FRAME	56	56	143T	145T	145T	182T	184T	213T	215T	254T	256T	284T	286T	324T	326T
WEIGHT (LBS.)	18	25	29	31	36	55	69	99	114	191	231	269	300	390	440

### REPLACEMENT PARTS LIST

UNIT SIZE	PART NO.				
	MOTOR <sup>1</sup>	BLOWER WHEEL	BLOWER HOUSING	- FAN <sup>2</sup> SHAFT	BEARINGS (PILLOW BLOCK)
103	—	8221060	8221061	—	8323041
106	—	8221062	8221063	—	8323041
108	—	8221064	8221065	—	8323043
110	—	8221064	8221065	—	8323043
112	—	8221066	8221067	—	8323043
114	—	8221066	8221067	—	8323043
117	—	8221068	8221069	—	8323043
121	—	8221068	8221069	—	8323043
125	—	8221070	8221071	—	8323090
131	—	8221070	8221071	—	8323090
136	—	8221072	8221073	—	8323095
141	—	8221072	8221073	—	8323095
150	—	8221074	8221075	—	8323095

1. Specify HP, voltage, phase, frame size and RPM.
2. Specify Model No. and Serial No.

SERVICE RECORD		
DATE	MAINTENANCE PERFORMED	COMPONENTS REQUIRED