Installation, Start-Up and Service Instructions

CONTENTS

SAFETY CONSIDERATIONS

Installing, starting up, and servicing air-conditioning equipment can be hazardous due to system pressures, electrical components, and equipment location (roofs, elevated structures, etc.).

Only trained, qualified installers and service mechanics should install, start-up, and service this equipment (Fig. 1).

Untrained personnel can perform basic maintenance functions such as cleaning coils. All other operations should be performed by trained service personnel.

When working on the equipment, observe precautions in the literature and on tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloth and fire extinguisher nearby when brazing. Use care in handling, rigging and setting bulky equipment.

ELECTRIC SHOCK HAZARD

Separate power sources (main and control power circuits) are used for these units. Be sure **both** main and control power circuits are disconnected before servicing.

INSTALLATION

Step 1 — Complete Pre-Installation Checks

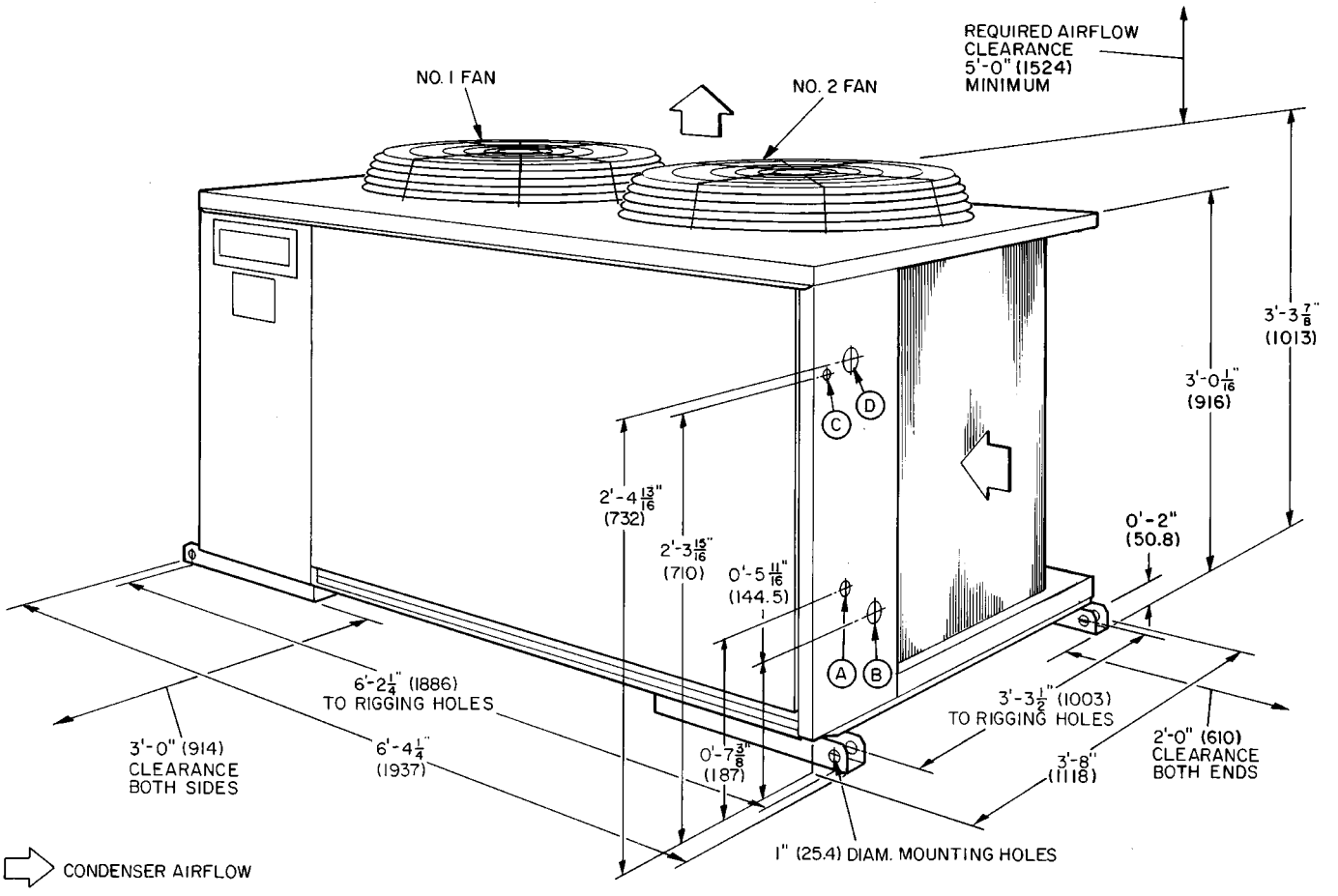
UNCRATE UNIT — Remove unit packaging except for the top skid assembly, which should be left in place until after the unit is rigged into its final location.

INSPECT SHIPMENT — File claim with shipping company if shipment is damaged or incomplete.

CONSIDER SYSTEM REQUIREMENTS

- Consult local building codes and National Electrical Code (NEC, U.S.A.) for special installation requirements.
- Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 1. See Fig. 2 for unit component locations.
- Locate unit so that outdoor coil (condenser) airflow is unrestricted on all sides and above.
- Unit may be mounted on a level pad directly on the base channels or mounted on raised pads at support points. See Table 1A-1D for unit operating weights. See Table 2 for weight distribution based on recommended support points.

  NOTE: If vibration isolators are required for a particular installation, use the data in Table 2 to make the proper selection.



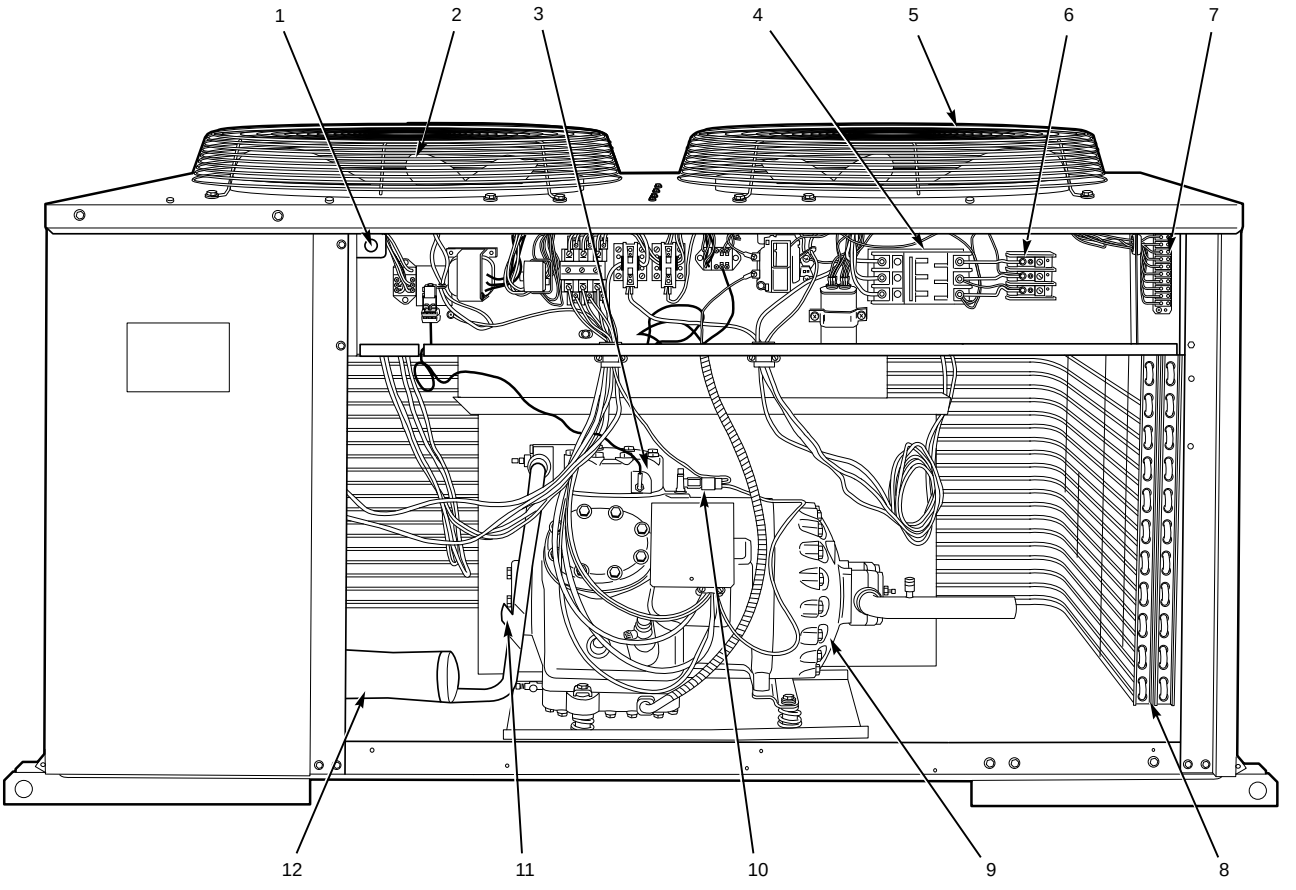
LEGEND

A — 1¼-in. (32) diameter knockout for ⅝-in. (16) ODM liquid line connection
B — 1¾-in. (44.5) diameter knockout for suction line connections of 1⅛ in. (28.6) (38AE012), 1⅜ in. (35) (38AE014,016), 1⅝ in. (41) (38AKS024)
C — ⅞-in. (22.2) diameter knockout for control power
D — 2-in. (50.8) diameter knockout for unit power

NOTES:
1. SERVICE AREAS — Allow 3 ft (914) on both sides and 2 ft (610) on both ends of unit for servicing.
2. Dimensions in ( ) are in millimeters.

Certified dimension drawings are available on request.

Fig. 1 — Dimensions (ft-in.)



LEGEND

1 — Low-Voltage Fuse
2 — No. 1 Fan
3 — High-Pressure Switch
4 — Circuit Breakers
5 — No. 2 Fan
6 — Terminal Block 1 (Unit Power)
7 — Terminal Block 2 (Control Power)
8 — Wraparound Coil
9 — Compressor
10 — Low-Pressure Switch
11 — Hot Gas Bypass Piping Stub (⅜-in. ODM)
12 — Muffler

Fig. 2 — Component Locations (Typical — 38AE Shown)

Table 1A — Physical Data (English, 60 Hz)

UNIT	38AE012	38AE014	38AE016	38AKS024
OPERATING WEIGHT (lb)	732	779	789	900
REFRIGERANT*	R-22			
COMPRESSOR	Reciprocating, Semi-Hermetic			
Speed (Rpm)	1750			
No. Cylinders	6	6	6	4
Model No.	06DD824	06DD328	06DD537	06E4250
Oil (pt)	10	10	10	15.5
Crankcase Heater Watts	125	125	125	180
Unloader Setting (psig)				
Load	70 ± 1			
Unload	60 ± 2			
OUTDOOR-AIR FANS	Axial Flow, Direct Drive			
No. ...Rpm	2...1075			
Diameter (in.)	24	24	24	26
Motor Hp	½			
Nominal Total Airflow (Cfm)	8800	8800	8800	11,000
OUTDOOR COIL				
Face Area (sq ft)	29.2			
Storage Capacity (lb)†	27.2	40.3	39.8	39.8
CONTROLS				
Pressurestat Settings (psig)				
High Cutout	395 ± 10			
Cut-in	295 ± 10			
Low Cutout	29 ± 4			
Cut-in.	60 +15, –0			
FUSIBLE PLUG (F)	200			
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			

Unit is factory supplied with holding charge only.
†Storage capacity is measured at liquid saturated temperatures of 125 F for 38AE012, 123 F for 38AE014, and 130 F for 38AE016 and 38AKS024.

Table 1B — Physical Data (SI, 60 Hz)

UNIT	38AE012	38AE014	38AE016	38AKS024
OPERATING WEIGHT (kg)	333	354	359	408
REFRIGERANT*	R-22			
COMPRESSOR	Reciprocating, Semi-Hermetic			
Speed (r/s)	29.2			
No. Cylinders	6	6	6	4
Model No.	06DD824	06DD328	06DD537	06E4250
Oil (L)	4.73	4.73	4.73	7.33
Crankcase Heater Watts	125	125	125	180
Unloader Setting (kPa)				
Load	483 ± 6.9			
Unload	414 + 103, –0			
OUTDOOR-AIR FANS	Axial Flow, Direct Drive			
No. ...r/s	2...17.9			
Diameter (mm)	610	610	610	661
Motor Hp	½			
Nominal Total Airflow (L/s)	4153	4153	4153	5566
OUTDOOR COIL				
Face Area (sq m)	2.71			
Storage Capacity (kg)†	12.4	18.3	18.1	18.1
CONTROLS				
Pressurestat Settings (kPa)				
High Cutout	2724 ± 68.9			
Cut-in	2034 ± 68.9			
Low Cutout	200 ± 27.6			
Cut-in	414 + 103, –0			
FUSIBLE PLUG (C)	93.3			
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			

*Unit is factory supplied with holding charge only.
†Storage capacity is measured at liquid saturated temperatures of 51.7 C for 38AE012, 50.6 C for 38AE014, and 54.4 C for 38AE016 and 38AKS024.

Table 1C — Physical Data (English, 50 Hz)

UNIT	38AE012	38AE014	38AE016	38AKS024
OPERATING WEIGHT (lb)	732	779	789	900
REFRIGERANT*	R-22			
COMPRESSOR	Reciprocating, Semi-Hermetic			
Speed (Rpm)	1460			
No. Cylinders	6	6	6	4
Model No.	06DD824	06DD328	06DD537	06E4250
Oil (pt)	10	10	10	15.5
Crankcase Heater Watts	125	125	125	180
Unloader Setting (psig)				
Load	70 ± 1			
Unload	60 ± 2			
OUTDOOR-AIR FANS	Axial Flow, Direct Drive			
No. ...Rpm	2...900			
Diameter (in.)	24	24	24	26
Motor Hp	½			
Nominal Total Airflow (Cfm)	7368	7368	7368	9210
OUTDOOR COIL				
Face Area (sq ft)	29.2			
Storage Capacity (lb)†	27.2	40.3	39.8	39.8
CONTROLS				
Pressurestat Settings (psig)				
High Cutout	395 ± 10			
Cut-in	295 ± 10			
Low Cutout	29 ± 4			
Cut-in	60 + 15, –0			
FUSIBLE PLUG (F)	200			
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			

*Unit is factory supplied with holding charge only.
†Storage capacity is measured at liquid saturated temperatures of 125 F for 38AE012, 123 F for 38AE014, and 130 F for 38AE016 and 38AKS024.

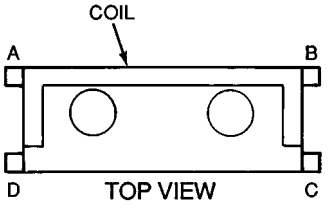
Table 1D — Physical Data (SI, 50 Hz)

UNIT	38AE012	38AE014	38AE016	38AKS024
OPERATING WEIGHT (kg)	333	354	359	408
REFRIGERANT*	R-22			
COMPRESSOR	Reciprocating, Semi-Hermetic			
Speed (r/s)	24.3			
No. Cylinders	6	6	6	4
Model No.	06DD824	06DD328	06DD537	06E4250
Oil (L)	4.73	4.73	4.73	7.33
Crankcase Heater Watts	125	125	125	180
Unloader Setting (kPa)				
Load	483 ± 6.9			
Unload	414 + 103, –0			
OUTDOOR-AIR FANS	Axial Flow, Direct Drive			
No. ...r/s	2...15.0			
Diameter (mm)	610	610	610	661
Motor Hp	½			
Nominal Total Airflow (L/s)	3728	3728	3728	4660
OUTDOOR COIL				
Face Area (sq m)	2.71			
Storage Capacity (kg)†	12.4	18.3	18.1	18.1
CONTROLS				
Pressurestat Settings (kPa)				
High Cutout	2724 ± 68.9			
Cut-in	2034 ± 68.9			
Low Cutout	200 ± 27.6			
Cut-in	414 + 103, –0			
FUSIBLE PLUG (C)	93.3			
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			

*Unit is factory supplied with holding charge only.
†Storage capacity is measured at liquid saturated temperatures of 51.7 C for 38AE012, 50.6 C for 38AE014, and 54.4 C for 38AE016 and 38AKS024.

Table 2 — Weight Distribution

UNIT	WEIGHT — lb (kg)				
	Total Operating	Support Point			
		A	B	C	D
38AE012	732 (333)	142 (65)	138 (63)	225 (102)	227(103)
38AE014	779 (354)	143 (65)	140 (64)	247 (112)	249 (113)
38AE016	789 (359)	143 (65)	143 (65)	250 (114)	253 (115)
38AKS024	900 (408)	178 (81)	168 (76)	269 (122)	285 (129)



Step 2 — Rig and Mount the Unit

⚠ CAUTION

Be sure unit panels are securely in place prior to rigging.

RIGGING — These units are designed for overhead rigging only. For this purpose, the transverse base channels extend beyond the sides of the unit, with holes provided in the end plates to attach cables or hooks. Rig with top skid packaging assembly in place to prevent unit damage by the rigging cable. As further protection for the coil faces, plywood sheets can be placed against the sides of the unit, behind the cables. Run the cables to a central suspension point so that the angle from the horizontal is not less than 45 degrees. Raise and set the unit down carefully.

If it is necessary to roll the unit into position, mount the unit on longitudinal rails, using a minimum of 3 rollers. Apply force to the rails, not the unit. If the unit is to be skidded into position, place it on a large pad and drag it by the pad. Do not apply any force to the unit.

Raise from above to lift unit from the rails or pad when unit is in final position.

COMPRESSOR MOUNTING — As shipped, the compressor is held tightly in place by self-locking bolts. **Before starting unit, loosen self-locking bolts until the snubber washer can be moved sideways with finger pressure. Do not remove shipping bolts. See Fig. 3.**

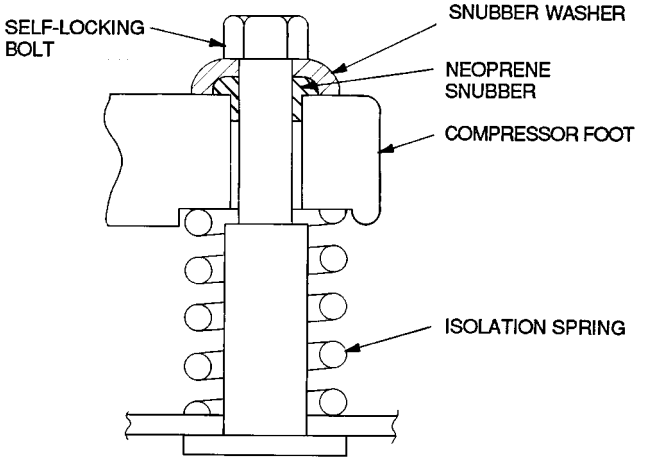


Fig. 3 — Compressor Mounting

Step 3 — Complete Refrigerant Piping Connections

IMPORTANT: A refrigerant receiver is not provided with the unit. Do not install a receiver.

SIZE REFRIGERANT LINES — Consider the length of piping required between outdoor unit and indoor unit (evaporator), the amount of liquid lift, and compressor oil return. See Tables 3, 4A, and 4B and also refer to Part 3 of Carrier System Design Manual for design details and line sizing. Refer to indoor installation instructions for additional information.

Table 3 — Liquid Line Data

UNIT	MAXIMUM ALLOWABLE LIQUID LIFT ft (m)		LIQUID LINE		
	60 Hz	50 Hz	Maximum Allowable Pressure Drop psig (kPa)	Maximum Allowable Temp. Loss F (C)	Filter Drier and Sight Glass Flare Conn.* in. (mm)
38AE012	52 (15.8)		7 (48.3)	2 (1.1)	5/8
38AE014	67 (20.4)				
38AE016	82 (25)				
38AKS024	87 (26.5)	86 (26)			

*Inlet and outlet.

NOTE: Data shown is for units operating at 45 F (7.2 C) saturated suction and 95 F (35 C) entering air.

Table 4A — Refrigerant Piping Sizes — 60 Hz

UNIT	LENGTH OF INTERCONNECTING PIPING — FT (M)									
	0-15 (0-4.6)		15-25 (4.6-7.6)		25-50 (7.6-15.2)		50-75 (15.2-22.9)		75-100 (22.9-30.5)	
	Line Size — in. OD									
	L	S	L	S	L	S	L	S	L	S
38AE012	1/2	1 1/8	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8
38AE014	1/2	1 1/8	1/2	1 3/8	5/8	1 3/8	5/8	1 5/8	7/8	1 5/8
38AE016	1/2	1 3/8	5/8	1 3/8	5/8	1 5/8	7/8	1 5/8	7/8	2 1/8
38AKS024	5/8	1 5/8	5/8	1 5/8	7/8	1 5/8	7/8	2 1/8	7/8	2 1/8

LEGEND

L — Liquid
S — Suction

Close coupled.

NOTES:
1. Pipe sizes are based on a 2 F (1.1 C) loss for liquid lines and a 1.5 F (0.8 C) loss for suction lines.
2. Pipe sizes are based on an equivalent length equal to the maximum length of interconnecting piping plus 50% for fittings. A more accurate estimate may result in smaller sizes.

Table 4B — Refrigerant Piping Sizes — 50 Hz

UNIT	LENGTH OF INTERCONNECTING PIPING — FT (M)									
	0-15 (0-4.6)		15-25 (4.6-7.6)		25-50 (7.6-15.2)		50-75 (15.2-22.9)		75-100 (22.9-30.5)	
	Line Size — in. OD									
	L	S	L	S	L	S	L	S	L	S
38AE012	1/2	1 1/8	1/2	1 1/8	5/8	1 1/8	5/8	1 3/8	5/8	1 3/8
38AE014	1/2	1 1/8	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 3/8
38AE016	1/2	1 3/8	5/8	1 3/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8
38AKS024	5/8	1 5/8	5/8	1 5/8	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8

LEGEND

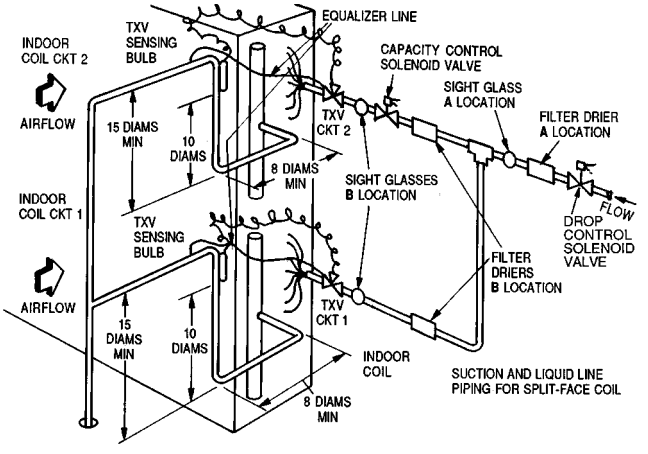
L — Liquid
S — Suction

Close coupled.

NOTES:
1. Pipe sizes are based on a 2 F (1.1 C) loss for liquid lines and a 1.5 F (0.8 C) loss for suction lines.
2. Pipe sizes are based on an equivalent length equal to the maximum length of interconnecting piping plus 50% for fittings. A more accurate estimate may result in smaller sizes.

INSTALL FILTER DRIER(S) AND MOISTURE INDICATOR(S) — Every unit should have a filter drier and liquid-moisture indicator (sight glass). In some applications, depending on space and convenience requirements, it may be desirable to install 2 filter driers and sight glasses. One filter drier and sight glass may be installed at A locations in Fig. 4. Or, 2 filter driers and sight glasses may be installed at B locations.

Select the filter drier for maximum unit capacity and minimum pressure drop. Complete the refrigerant piping from indoor unit to outdoor unit before opening the liquid and suction lines at the outdoor unit.



TXV — Thermal Expansion Valve

Fig. 4 — Location of Sight Glass(es) and Filter Drier(s)

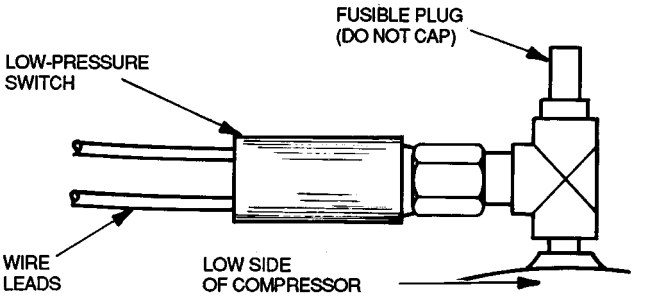
INSTALL LIQUID LINE SOLENOID VALVE — SOLENOID DROP — It is recommended that a solenoid valve be placed in the main liquid line (see Fig. 4) between condensing unit (38AE/AKS) and fan coil (40RR, 40RE). (A liquid line solenoid valve is required when the liquid line length exceeds 100 ft [30.5 m] or when the condensing unit is connected to the chiller barrel in a built-up chiller system.) This valve prevents refrigerant migration (which causes oil dilution) to the compressor during the off cycle at low outdoor ambient temperatures. The solenoid should be wired in parallel with the compressor contactor coil. This means of electrical control is referred to as solenoid *drop* control.

INSTALL LIQUID LINE SOLENOID VALVE (OPTIONAL) — CAPACITY CONTROL — If 2-step cooling is desired, place a solenoid valve in the location shown in Fig. 4.

MAKE PIPING CONNECTIONS — Do not remove run-around loop from suction and liquid line stubs in the compressor compartment until piping connections are ready to be made. Pass nitrogen or other inert gas through piping while brazing to prevent formation of copper oxide.

Install field-supplied thermostatic expansion valve(s) in indoor section. If 2 thermostatic expansion valves are installed for 2-step cooling, install field-supplied liquid line solenoid valve ahead of the second expansion valve.

PROVIDE SAFETY RELIEF — A fusible plug is located on the compressor crankcase or in the liquid line (Fig. 5). Do not cap this plug. If local code requires additional safety devices, install them as directed.



NOTE: 38AKS024 has a fusible plug in the liquid line.

Fig. 5 — Location of Fusible Plug (38AE)

Step 4 — Install Accessories — Field install accessories such as winter start control or low-ambient control before proceeding with wiring. Refer to the instructions shipped with the accessory.

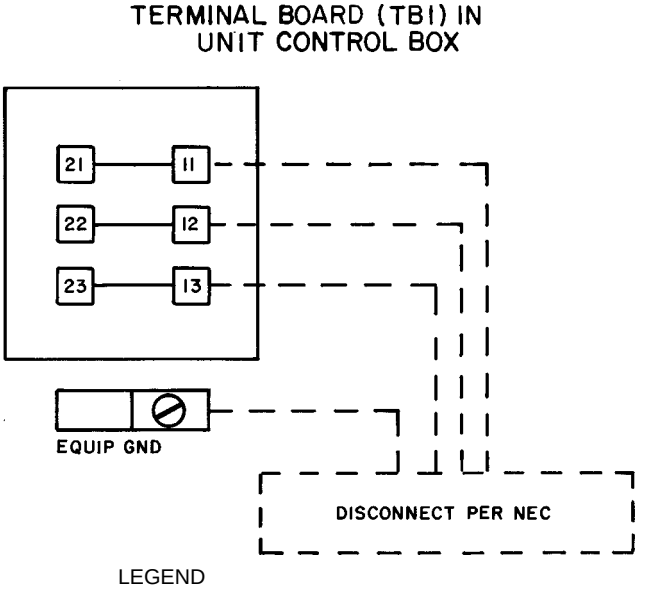
Step 5 — Complete Electrical Connections

POWER WIRING — Unit is factory wired for voltage shown on nameplate. Provide adequate fused disconnect switch within sight from unit and readily accessible from unit, but out of the reach of children. Lock switch open (off) to prevent power from being turned on while unit is being serviced. Disconnect switch, fuses, and field wiring must comply with national and local code requirements. See Tables 5A and 5B.

Route power wires through opening in unit end panel to connection in unit control box as shown on unit label diagram and in Fig. 6. Unit must be grounded.

Affix crankcase heater warning sticker to unit disconnect switch.

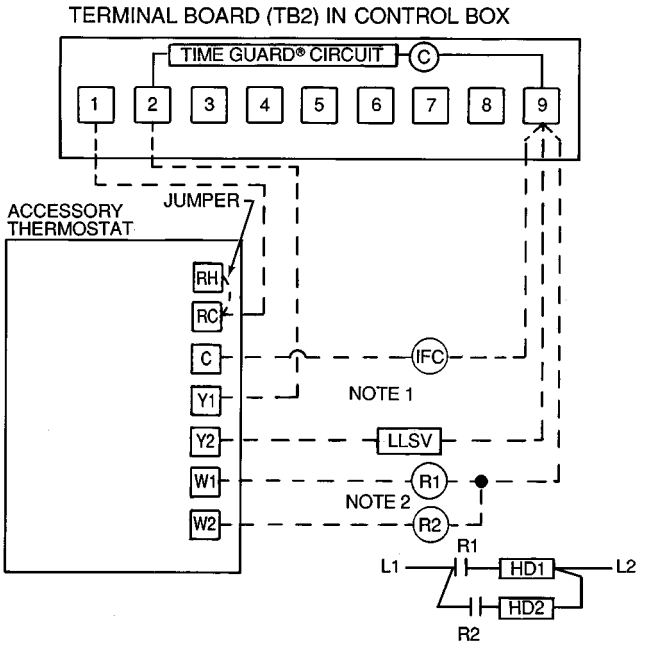
CONTROL CIRCUIT WIRING — Control voltage is 24 v. See Fig. 7 and unit label diagram for field-supplied wiring details. Route control wires through opening in unit end panel to connection in unit control box.



LEGEND

EQUIP GND — Equipment Ground
NEC — National Electrical Code
——— Factory Wiring
- - - - Field Wiring

Fig. 6 — Main Power Supply Wiring



LEGEND

C	— Compressor Contactor	**R**	— Relay
HD	— Heating Device	———	Factory Wiring
IFC	— Indoor-Fan Contactor	- - -	Field Wiring
LLSV	— Liquid Line Solenoid Valve		

NOTES:
1. Combination LLSV plus IFC va should not exceed 30 va.
2. Do not exceed 5 va (24 vac) per coil.
3. If va values shown in Notes 1 and 2 must be exceeded, use accessory relay transformer package 38AE900001.

Fig. 7 — Remote Thermostat Wiring

Table 5A — Electrical Data (3 Ph/60 Hz)

UNIT	UNIT							COMPR		FAN MOTORS (Single Phase)			
	Model	Volts			MCA	ICF	MOCP (Fuse)	RLA	LRA	Total Fans	FLA (ea) Fan No.		kW
		Nameplate	Supplied*								1	2	
			Min	Max									
38AE012	501	208-230	187	253	62.5	178	100	43.6	170	2	4.3	3.7	1.41
	201	380	342	418	35.0	101	50	24.0	93		4.3	3.7	
	601	460	414	528	29.1	81	40	20.0	77		2.3	1.9	
	101	575	518	660	22.8	67	35	15.7	62		1.8	1.8	
38AE014	501	208-230	187	253	69.3	199	100	49.3	191	2	4.3	3.7	1.41
	201	380	342	418	38.0	112	60	26.5	104		4.3	3.7	
	601	460	414	528	31.7	84	50	22.1	80		2.3	1.9	
	101	575	518	660	25.6	73	40	17.9	69		1.8	1.8	
38AE016	501	208-230	187	253	87.5	274	125	63.6	266	2	4.3	3.7	1.41
	201	380	342	418	49.3	153	80	36.0	145		4.3	3.7	
	601	460	414	528	40.7	124	60	29.3	120		2.3	1.9	
	101	575	518	660	33.0	100	50	23.8	96		1.8	1.8	
38AKS024	501	208-230	187	254	93.4	353	150	67.9	345	2	4.3	3.7	1.41
	201	380	342	418	49.7	199	80	34.6	191		4.3	3.7	
	601	460	414	508	48.1	177	80	34.7	173		2.3	1.9	
	101	575	518	632	40.1	124	60	28.8	120		1.8	1.8	

Table 5B — Electrical Data (3 Ph/50 Hz)

UNIT	UNIT							COMPR		FAN MOTORS 230 v (Single Phase)			
	Model	Volts			MCA	ICF	MOCP (Fuse)	RLA	LRA	Total Fans	FLA (ea) Fan No.		kW
		Nameplate	Supplied*								1	2	
			Min	Max									
38AE012	803	230	198	264	47.5	134	75	32.9	128	2	2.9	3.5	1.20
	903	400	342	457	31.4	80	50	20.0	74				
38AE014	803	230	198	264	51.0	149	75	35.7	143	2	2.9	3.5	1.20
	903	400	342	457	34.0	89	50	22.1	83				
38AE016	803	230	198	264	66.9	206	100	47.9	200	2	2.9	3.5	1.20
	903	400	342	457	43.0	121	60	29.3	115				
38AKS024	803	230	198	254	91.8	213	150	67.9	207	2	2.9	3.5	1.20
	303	346	311	380	51.5	121	80	33.3	115				
	903	400	342	440	50.2	179	80	34.6	173				

LEGEND

FLA — Full Load Amps (Fan Motors)
ICF — Maximum Instantaneous Current Flow during start-up (LRA of compressor plus total FLA of fan motors)
kW — Total Fan Motor Input (kilowatts)
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps per NEC (U.S.A.), Section 430-24
MOCP — Maximum Overcurrent Protection (amps)
RLA — Rated Load Amps (Compressor)

*Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed limits.

NOTES:
1. The MCA and MOCP values are calculated in accordance with the National Electrical Code (NEC) article 440 (U.S.A. standard).
2. Motor RLA and LRA values are established in accordance with Underwriters' Laboratories (UL) Standard 1995 (U.S.A. standard).

PRE-START-UP

Evacuate and Dehydrate the entire refrigerant system by either of the methods described in Carrier Standard Service Techniques Manual, Chapter 1.

Leak Test the entire refrigerant system by the pressure method described in Carrier Standard Service Techniques Manual, Chapter 1. Use R-22 at approximately 25 psig (172.4 kPa) backed up with an inert gas to a total pressure not to exceed 245 psig (1689 kPa).

Turn on Crankcase Heaters *for 24 hours before starting the unit to be sure all the refrigerant is out of the oil.* To energize the crankcase heaters, proceed as follows.

1. Set the space thermostat set point above the space temperature so there is no demand for cooling.
2. Close the field disconnect.
3. Turn the fan circuit breaker on. Leave the compressor circuit breakers off. The crankcase heaters are now energized.

Add Preliminary Charge to the refrigerant system accordingly to Carrier Standard Service Techniques Manual, Chapter 1. By the liquid charging method and charging by weight procedure, charge the units with approximately the amounts of R-22 refrigerant shown in Table 6.

Table 6 — Charging Data (R-22)

UNIT	REFRIGERANT CHARGE - lb (kg)		CONDENSING TEMP DURING CHARGING - F (C)
	Required Charge Above Clear Sight Glass	Outdoor Unit Total Charge (Approx)	
38AE012	3.0 (1.4)	22 (10)	125 (51.7)
38AE014	4.8 (2.2)	23 (10.5)	123 (50.6)
38AE016	3.4 (1.5)	23 (10.5)	130 (54.4)
38AKS024	3.4 (1.5)	28 (12.7)	131 (54.8)

Before Starting Unit ensure the following:

1. Compressor oil level must be at least within sight in the compressor sight glass. Add oil if necessary (see Tables 1A-1D and Oil Charge section).
2. Compressor holddown bolts must be snug, but not tight. Refer to Compressor Mounting section and tag on compressor foot.
3. All internal wiring connections must be tight; all barriers and covers must be in place.
4. Electrical power source must agree with unit nameplate rating.
5. All service valves must be open.
6. Crankcase heater must be firmly locked into the compressor crankcase.

START-UP

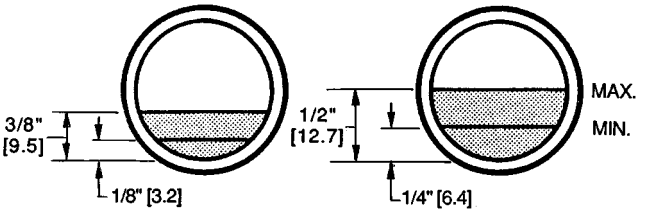
To Start Unit — *Set thermostat set point below the space temperature.* After starting unit, there is a delay of at least 3 seconds before compressor starts.

Oil Charge (see Tables 1A-1D) —Allow unit to run for about 20 minutes. Stop unit and check compressor oil level at sight glass. Add oil if necessary to bring oil to the correct level shown in Fig. 8. *Use only Carrier-approved compressor oil.* Approved oils are:

Witco Chemical Corp. . . . . Suniso 3GS
Texaco, Inc. WF32
Petroleum Specialties Co. . . . . Cryol 150

Do not reuse drained oil or use any oil that has been exposed to atmosphere. Procedures for adding or removing oil are given in Carrier Standard Service Techniques Manual, Chapter 1, Refrigerants.

If oil is added, run unit for additional 10 minutes. Stop unit and check oil level. If level is still low, add oil *only after* determining that piping system is designed for proper oil return and that the system is not leaking oil.



38AKS024 (06E COMPRESSOR) 38AE012,014,016 (06D COMPRESSOR)

Fig. 8 — Operating Oil Levels

Refrigerant Charge — Actual start-up should be done only under supervision of a qualified refrigeration mechanic. Refer to charging charts.

See Fig. 9-11 for the particular unit being charged. Measure pressure at the liquid line service valve, being sure a Schrader depressor is used if required. Also, measure liquid line temperature as close to the liquid service valve as possible. Add or reduce charge until the pressure and temperature conditions of the charging charge curve are met. If liquid pressure and temperature point falls above curve, add charge. If liquid pressure and temperature point falls below curve, reduce the charge until the conditions match the curve.

⚠ CAUTION

Never charge liquid into the low-pressure side of system. Do not overcharge. During charging or removal of refrigerant, be sure indoor fan system is operating.

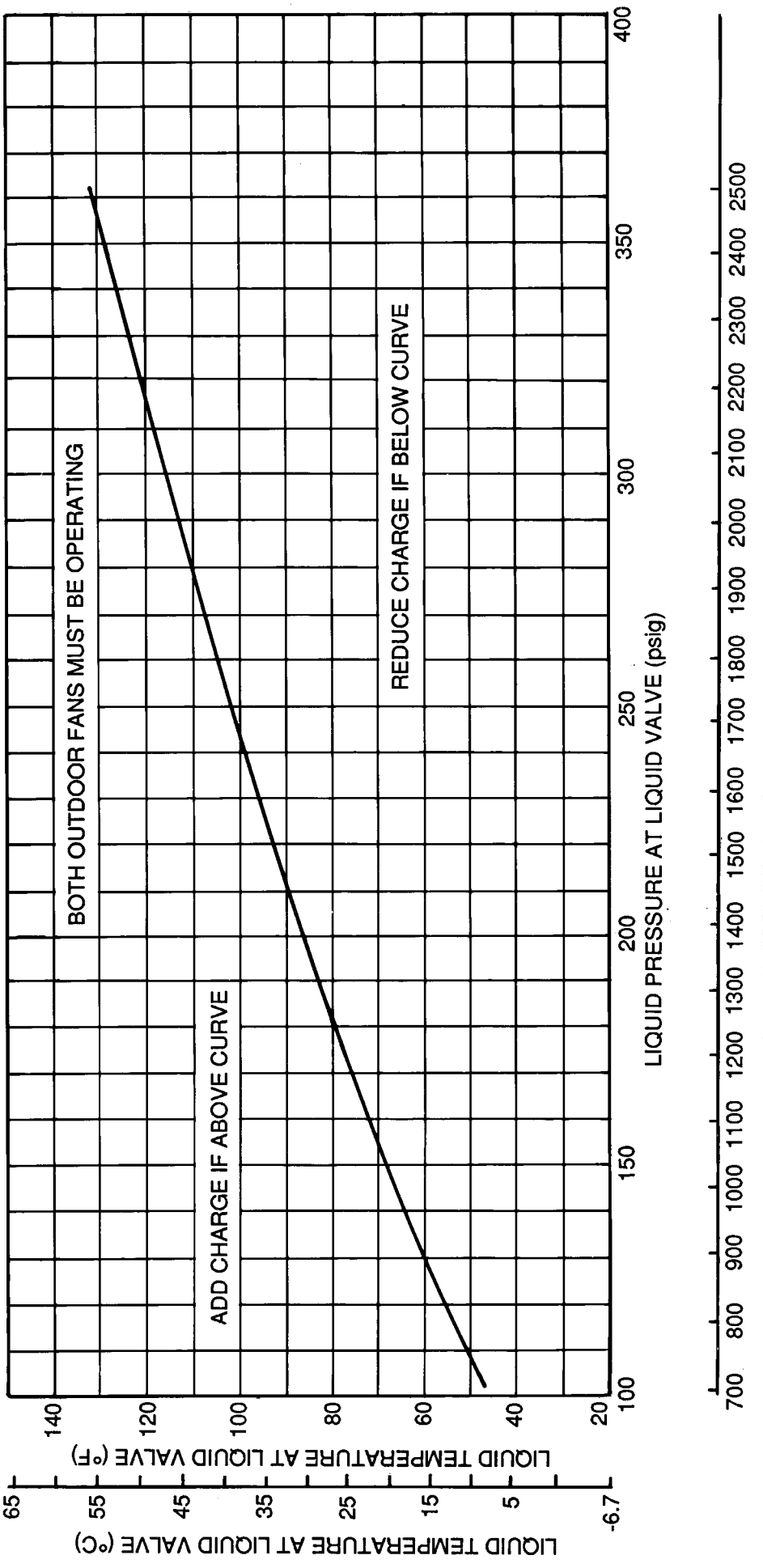


Fig. 9 — 38AE012 and 38AKS024 Charging Chart

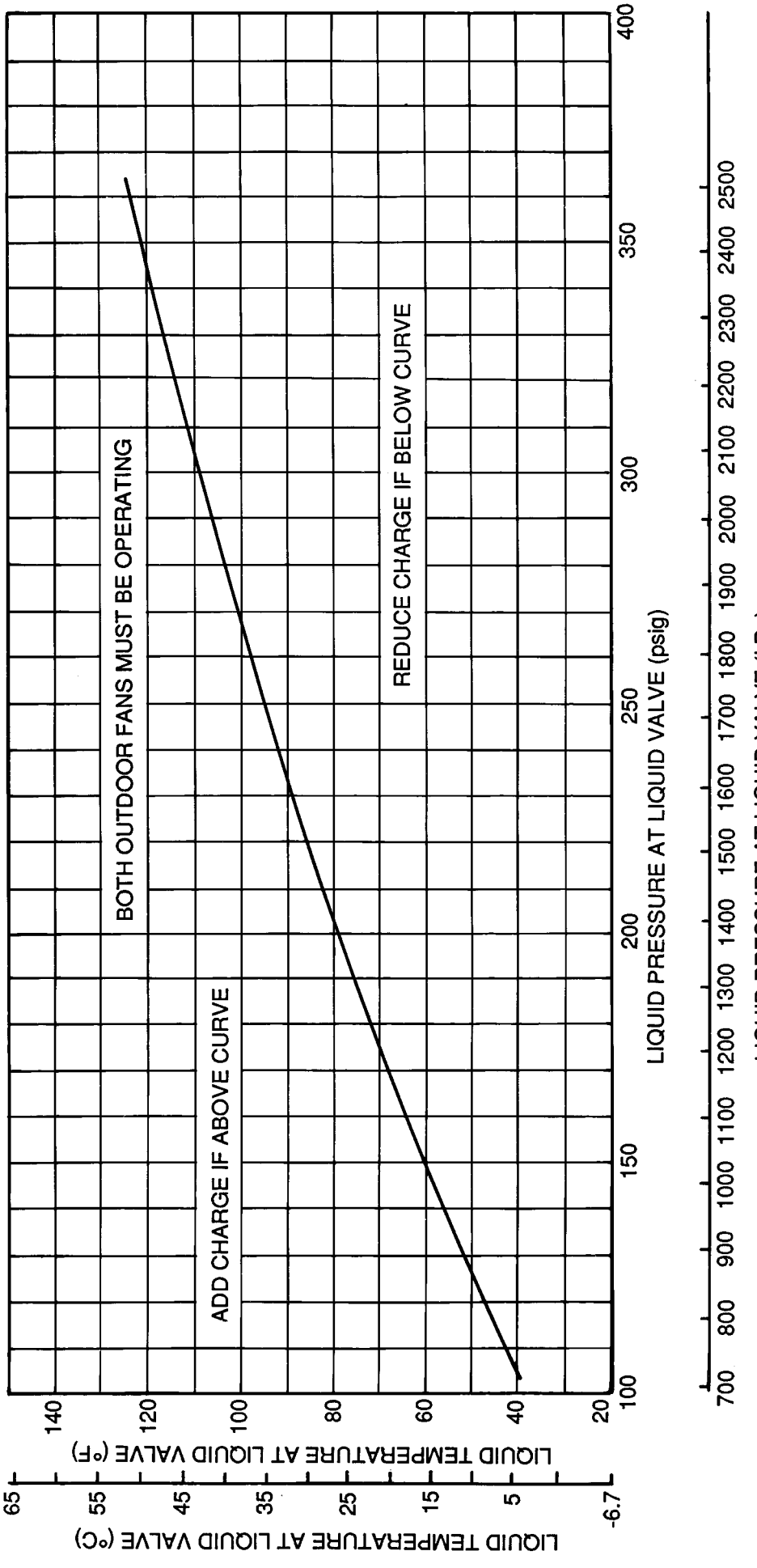


Fig. 10 — 38AE014 Charging Chart

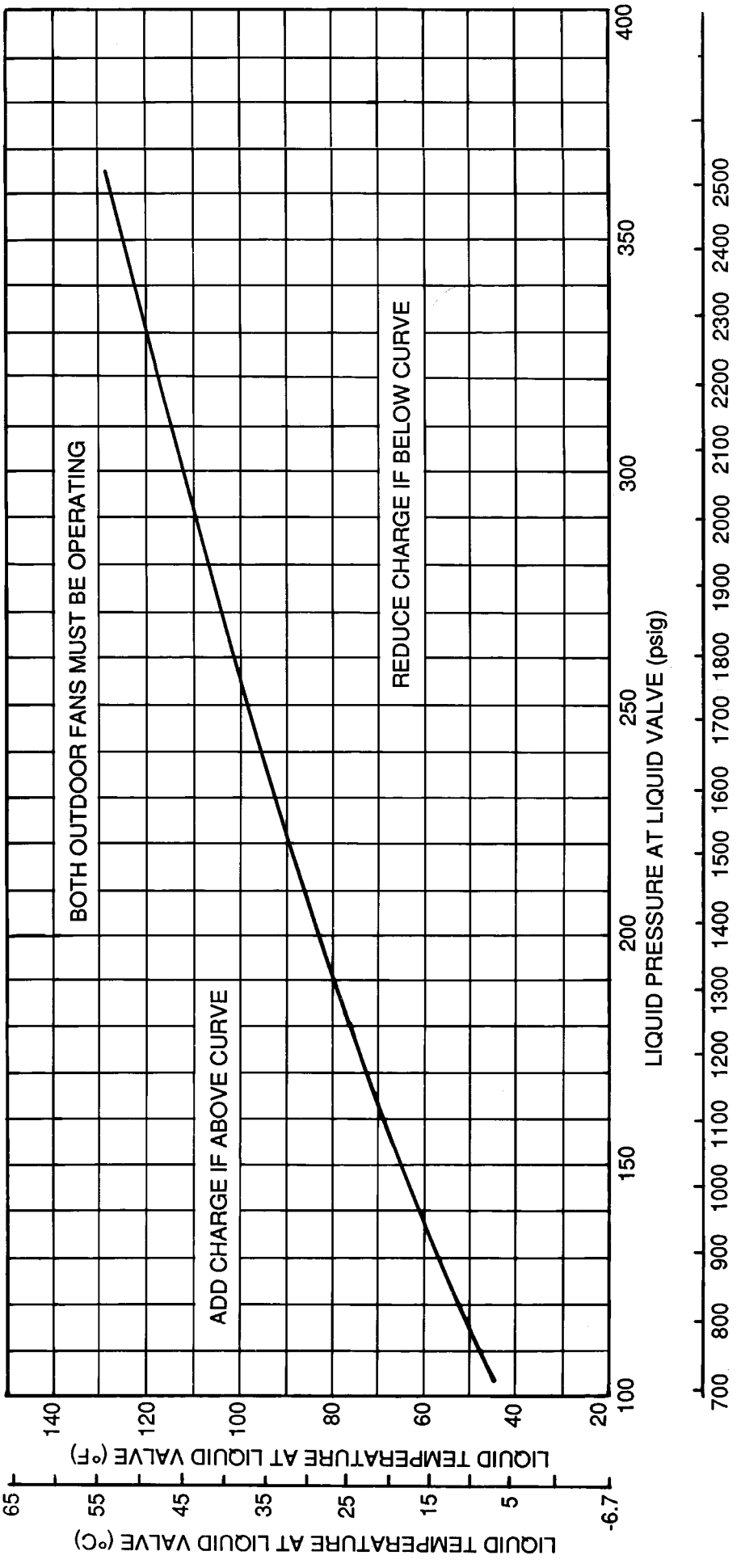


Fig. 11 — 38AE016 Charging Chart

Check Operation — Verify operation of all safety controls. Replace all service panels. *Be sure that control panel cover is closed tightly.*

OPERATING SEQUENCE

Cooling — When the first stage (TC1) of the cooling thermostat closes, the timer starts. After approximately 3 seconds, the timer activates the compressor and fan motor no. 1 contactor. When the liquid pressure builds to approximately 257 psig (1772 kPa), fan motor no. 2 is energized.

On demand for additional cooling capacity, the second stage (TC2) of the cooling thermostat closes, energizing a field-supplied liquid line solenoid (LLS) valve, which opens. This increases the suction pressure, causing the compressor to operate at higher capacity.

When fan switch is set at AUTO, the indoor-air fan cycles with the compressor. When the switch is set at CONT, the indoor-air fan runs continuously.

At shutdown, the Time Guard® II timer prevents the compressor from restarting for approximately 5 minutes.

When installed, a field-supplied solenoid valve (wired in parallel with the compressor contactor coil), shuts off the liquid line to prevent refrigerant migration back to the compressor during the off cycle.

Heating — The heating thermostat (TH) energizes a field-supplied relay which operates heating controls and energizes the indoor-fan relay. When the fan switch is set at AUTO, the indoor-air fan cycles with the heating control. The indoor-air fan runs continuously when the fan switch is set at CONT.

Fan Cycling — Head pressure control is accomplished by cycling the fans. The no. 2 fan responds to liquid line pressure, cycling on at approximately 257 psig (1772 kPa) and off at approximately 126 psig (869 kPa).

Winter Start Control (If Installed) — When the compressor starts, the control's bypass timer contacts close for 150 seconds, thereby bypassing the low-pressure switch during start-up. After 150 seconds, the bypass timer contacts open and the low-pressure switch is restored to the safety circuit.

SERVICE

Capacity Control — A suction pressure-actuated unloader controls 2 cylinders and provides capacity control. Unloaders are factory set (see Tables 1A-1D), but can be field adjusted as described in the 2 following sections.

CONTROL SET POINT (cylinder load point) is adjustable from 0 to 85 psig (586 kPa). To adjust, turn control set point adjustment nut (Fig. 12) clockwise to its bottom stop. In this position, set point is 85 psig (586 kPa). Next, turn adjustment counterclockwise to desired control set point. Every full turn counterclockwise decreases set point by 7.5 psig (51.7 kPa).

PRESSURE DIFFERENTIAL (difference between cylinder load and unload points) is adjustable from 6 to 22 psig (41.4 to 152 kPa). To adjust, turn pressure differential adjustment screw (Fig. 12) counterclockwise to its back stop position. In this position, differential is 6 psig (41.4 kPa). Next, turn adjustment clockwise to desired pressure differential setting. Every full turn clockwise increases differential by 1.5 psig (10.3 kPa).

Head Pressure Control — *Fan cycling* is a standard feature. The no. 2 fan cycles in response to changes in liquid pressure. The switch cycles the fan off at 126 ± 4 psig (869 ± 28 kPa) as pressure decreases, and cycles it back on at 257 (+5, −0) psig (1772 [+103, −0] kPa).

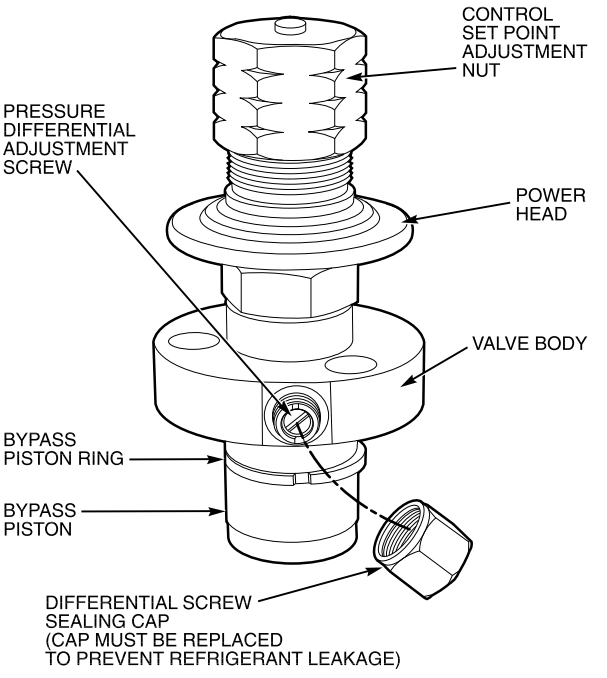


Fig. 12 — Compressor Capacity Control Unloader

Time Guard II Circuit — Prevents short-cycling by providing a delay of approximately 5 minutes before restarting compressor after shutdown from safety device action.

On start-up, the Time Guard II timer causes a delay of approximately 3 seconds after thermostat closes.

On compressor shutdown, the timer recycles for approximately 5 minutes. During this time, the compressor cannot restart.

Refer to Fig. 13 and to label diagram on unit.

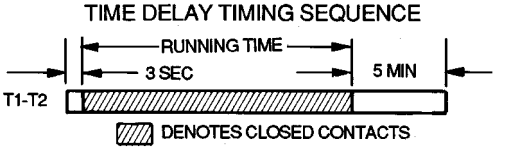


Fig. 13 — Timer Sequence Chart

Winter-Start Control (If Required) — Install Accessory Package 38AE900021.

Crankcase Heater — The heater prevents refrigerant migration and compressor oil dilution during shutdown whenever compressor is not operating. It is wired into the control circuit, and cycles with the compressor; the heater is off when compressor is running, and on when compressor is off.

Both compressor service valves must be closed whenever the crankcase heater is deenergized for more than 6 hours. The crankcase heater is operable as long as the control circuit is energized.

Outdoor Fans — Each fan is supported by a formed-wire mount bolted to the fan deck and covered with a wire guard. The exposed end of the motor shaft is covered with a rubber boot. In case a fan motor must be repaired or replaced, be sure the rubber boot is put back on when the fan is reinstalled and be sure the fan guard is in place before starting the unit. Figure 14 shows the proper position of the mounted fan. Fan motors have permanently lubricated bearings.

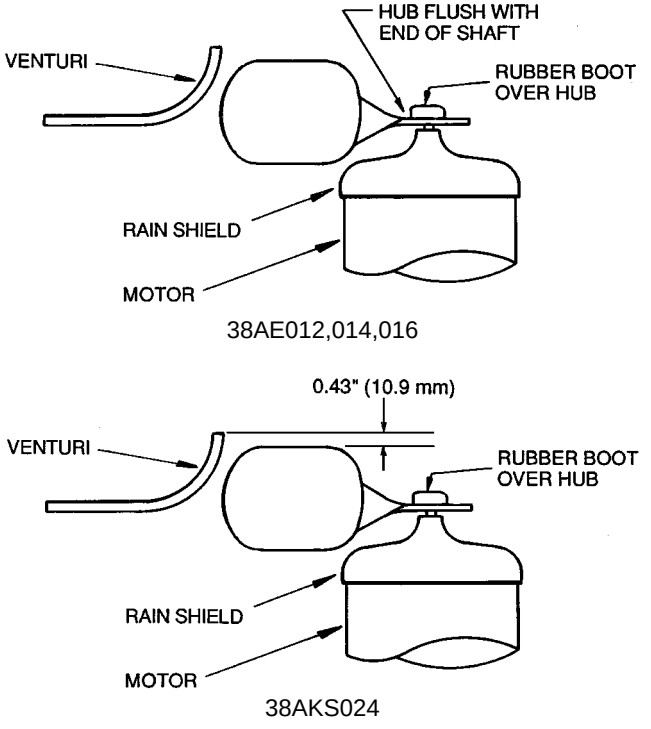


Fig. 14 — Outdoor Fan

Lubrication

FAN MOTORS have sealed bearings. No provisions are made for lubrication.

COMPRESSOR has its own oil supply. Loss of oil due to a leak in the system should be the only reason for adding oil after the system has been in operation. See Oil Charge section.

Cleaning Coils — The coils can be cleaned with a vacuum cleaner, washed out with water, blown out with low-pressure compressed air, or brushed *(do not use wire brush)*. Fan motors are drip-proof but not waterproof.

Clean outdoor coil annually or as required by location or outdoor air conditions. Inspect coil monthly, and clean as required. Fins are not continuous through coil sections; dirt and debris may pass through first section, become trapped between the 2 rows of fins (38AE012) or 3 rows of fins (38AE014,016, 38AKS024) and restrict outdoor airflow. Use a flashlight to determine if dirt or debris has collected between coil sections. Clean coil as follows:

1. Turn off unit power.
2. Remove screws holding rear corner posts and top cover in place. Pivot top cover up 12 to 18 in. (305 to 457 mm) and support with a rigid support. See Fig. 15.
3. Remove clips securing tube sheets together at the return bend end of the coil. Carefully spread the ends of the coil rows apart by moving the outer sections. See Fig. 16.
4. Using a water hose, or other suitable equipment, flush down between the sections of coil to remove dirt and debris.
5. Clean the remaining surfaces in the normal manner.
6. Reposition outer coil sections.
7. Reinstall clips which secure tube sheets.
8. Replace top cover and rear corner posts.

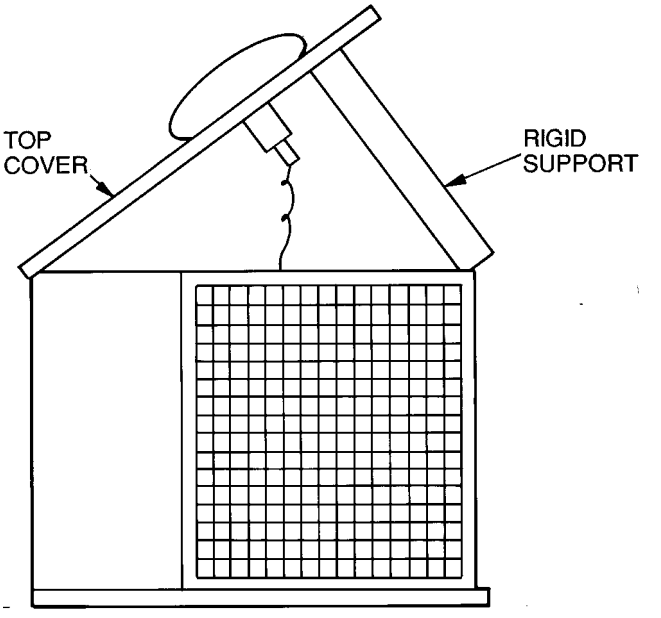


Fig. 15 — Pivot and Support Top Cover

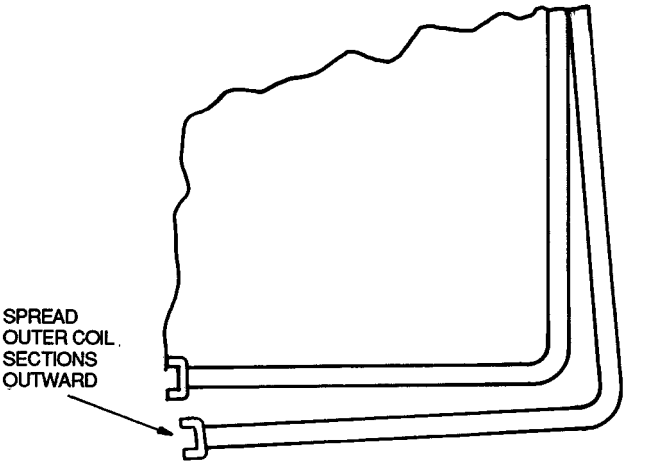


Fig. 16 — Coil Cleaning (Typical)

TROUBLESHOOTING

PROBLEM	SOLUTION
COMPRESSOR DOES NOT RUN	
Contactor Open	
1. Power off.	1. Restore power.
2. Fuses blown in field power circuit.	2. After finding cause and correcting, replace with correct size fuse.
3. No control power.	3. Check secondary fuse(s); replace with correct type and size. Replace transformer if primary windings receiving power.
4. Thermostat circuit open.	4. Check thermostat setting.
5. Time Guard® II device not operating.	5. Check Time Guard II devices.
6. Compressor circuit breaker tripped.	6. Check for excessive compressor current draw. Reset breaker; replace if defective.
7. Safety device lock-out circuit active.	7. Reset lock-out circuit at thermostat or circuit breaker.
8. Low-pressure switch open.	8. Check for refrigerant undercharge, obstruction of indoor airflow, or whether compressor suction shutoff valve is fully open. Make sure liquid line solenoid valve(s) is open.
9. High-pressure switch open.	9. Check for refrigerant overcharge, obstruction of outdoor airflow, air in system, or whether compressor discharge valve is fully open. Be sure outdoor fans are operating correctly.
10. Compressor overtemperature switch open.	10. Check for open condition. Allow for reset. Replace if defective.
11. Loose electrical connections.	11. Tighten all connections.
12. Compressor stuck.	12. See compressor service literature.
Contactor Closed	
1. Compressor leads loose.	1. Check connections.
2. Motor windings open.	2. See compressor service literature.
3. Single phasing.	3. Check for blown fuse. Check for loose connection at compressor terminal.
COMPRESSOR STOPS ON HIGH-PRESSURE SWITCH	
Outdoor Fan On	
1. High-pressure switch faulty.	1. Replace switch.
2. Reversed fan rotation.	2. Confirm rotation, correct if necessary.
3. Airflow restricted.	3. Remove obstruction.
4. Air recirculating.	4. Clear airflow area.
5. Noncondensables in system.	5. Purge and recharge as required.
6. Refrigerant overcharge.	6. Purge as required.
7. Line voltage incorrect.	7. Consult power company.
8. Refrigerant system restrictions.	8. Check or replace filter drier, expansion valve, etc. Check that compressor discharge service valve is fully open.
Outdoor Fan Off	
1. Fan slips on shaft.	1. Tighten fan hub setscrews.
2. Motor not running.	2. Check power and capacitor.
3. Motor bearings stuck.	3. Replace bearings.
4. Motor overload open.	4. Check overload rating. Check for fan blade obstruction.
5. Motor burned out.	5. Replace motor.
COMPRESSOR CYCLES ON LOW-PRESSURE SWITCH	
Indoor-Air Fan Running	
1. Compressor suction service valve partially closed.	1. Open valve fully.
2. Liquid line solenoid valve(s) fails to open.	2. Check liquid line solenoid valve(s) for proper operation. Replace if necessary.
3. Filter drier plugged.	3. Replace filter drier.
4. Expansion valve power head defective.	4. Replace power head.
5. Low refrigerant charge.	5. Add charge. Check low-pressure switch setting.

TROUBLESHOOTING (cont)

PROBLEM	SOLUTION
COMPRESSOR CYCLES ON LOW-PRESSURE SWITCH (cont)	
Airflow Restricted	
1. Coil iced up.	1. Check refrigerant charge.
2. Coil dirty.	2. Clean coil fins.
3. Air filters dirty.	3. Clean or replace filters.
4. Dampers closed.	4. Check damper operation and position.
Indoor-Air Fan Stopped	
1. Electrical connections loose.	1. Tighten all connections.
2. Fan relay defective.	2. Replace relay.
3. Motor overload open.	3. Power supply.
4. Motor defective.	4. Replace motor.
5. Fan belt broken or slipping.	5. Replace or tighten belt.
COMPRESSOR RUNNING BUT COOLING INSUFFICIENT	
Suction Pressure Low	
1. Refrigerant charge low.	1. Add refrigerant.
2. Head pressure low.	2. Check refrigerant charge. Check outdoor-air fan thermostat settings.
3. Air filters dirty.	3. Clean or replace filters.
4. Expansion valve power head defective.	4. Replace power head.
5. Indoor coil partially iced.	5. Check low-pressure setting.
6. Indoor airflow restricted.	6. Remove obstruction.
Suction Pressure High	
1. Unloaders not functioning.	1. Check unloader adjustments. Check unloader setting.
2. Compressor valve defective.	2. See compressor service literature.
3. Heat load excessive.	3. Check for open doors or windows in vicinity of fan coil.
UNIT OPERATES TOO LONG OR CONTINUOUSLY	
1. Low refrigerant charge.	1. Add refrigerant.
2. Control contacts fused.	2. Replace control.
3. Air in system.	3. Purge and evacuate system.
4. Partially plugged expansion valve or filter drier.	4. Clean or replace.
SYSTEM IS NOISY	
1. Piping vibration.	1. Support piping as required.
2. Compressor noisy.	2. Check valve plates for valve noise. Replace compressor if bearings are worn.
COMPRESSOR LOSES OIL	
1. Leak in system.	1. Repair leak.
2. Crankcase heaters not energized during shutdown.	2. Check wiring and relays. Check heater and replace if defective.
3. Improper interconnecting piping design.	3. Check piping for oil return. Replace if necessary.
FROSTED SUCTION LINE	
Expansion valve admitting excess refrigerant.	Adjust expansion valve.
HOT LIQUID LINE	
1. Shortage of refrigerant due to leak.	1. Repair leak and recharge.
2. Expansion valve opens too wide.	2. Adjust expansion valve.
FROSTED LIQUID LINE	
1. Restricted filter drier.	1. Remove restriction or replace.
2. Liquid line solenoid valve partially closed.	2. Replace valve.
COMPRESSOR WILL NOT UNLOAD	
1. Defective unloader.	1. Replace unloader.
2. Defective capacity control solenoid valve (if used).	2. Replace valve.
3. Miswired capacity control liquid line solenoid (if used).	3. Rewire correctly.
4. Weak, broken, or wrong valve body spring.	4. Replace spring.
COMPRESSOR WILL NOT LOAD	
1. Miswired capacity control liquid line solenoid (if used).	1. Rewire correctly.
2. Defective capacity control solenoid valve (if used).	2. Replace valve.
3. Plugged strainer (high side).	3. Clean or replace strainer.
4. Stuck or damaged unloader piston or piston ring(s).	4. Clean or replace the necessary parts.

PACKAGED SERVICE TRAINING

Our packaged service training programs provide an excellent way to increase your knowledge of the equipment discussed in this manual. Product programs cover:

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

A large selection of product, theory, and skills programs is available. All programs include a video cassette and/or slides and a companion booklet. Use these for self teaching or to conduct full training sessions.

For a free Service Training Material Catalog (STM), call 1-800-962-9212. Ordering instructions are included.

START-UP CHECKLIST

A. Preliminary Information

OUTDOOR: MODEL NO. _____ SERIAL NO. _____

INDOOR: AIR HANDLER MANUFACTURER _____

MODEL NO. _____ SERIAL NO. _____

ADDITIONAL ACCESSORIES _____

B. Pre-Start-Up

OUTDOOR UNIT

IS THERE ANY SHIPPING DAMAGE? _____ (Y/N) _____

IF SO, WHERE: _____

_____

WILL THIS DAMAGE PREVENT UNIT START-UP? (Y/N) _____

CHECK POWER SUPPLY. DOES IT AGREE WITH UNIT? (Y/N) _____

HAS THE GROUND WIRE BEEN CONNECTED? (Y/N) _____

HAS THE CIRCUIT PROTECTION BEEN SIZED AND INSTALLED PROPERLY? (Y/N) _____

ARE THE POWER WIRES TO THE UNIT SIZED AND INSTALLED PROPERLY? (Y/N) _____

HAVE COMPRESSOR HOLDDOWN BOLTS BEEN LOOSENED (Snubber washers are snug, but not tight)? (Y/N) _____

CONTROLS

ARE THERMOSTAT AND INDOOR FAN CONTROL WIRING CONNECTIONS MADE AND CHECKED? (Y/N) _____

ARE ALL WIRING TERMINALS (including main power supply) TIGHT? (Y/N) _____

HAS CRANKCASE HEATER BEEN ENERGIZED FOR 24 HOURS? (Y/N) _____

INDOOR UNIT

HAS WATER BEEN PLACED IN DRAIN PAN TO CONFIRM PROPER DRAINAGE? (Y/N) _____

ARE PROPER AIR FILTERS IN PLACE? (Y/N) _____

HAVE FAN AND MOTOR PULLEYS BEEN CHECKED FOR PROPER ALIGNMENT? (Y/N) _____

DO THE FAN BELTS HAVE PROPER TENSION? (Y/N) _____

HAS CORRECT FAN ROTATION BEEN CONFIRMED? (Y/N) _____

PIPING

ARE LIQUID LINE SOLENOID VALVES LOCATED AT THE EVAPORATOR COILS AS REQUIRED? (Y/N) _____

HAVE LEAK CHECKS BEEN MADE AT COMPRESSOR, CONDENSER, EVAPORATOR(S), TXVs (Thermostatic Expansion Valves), SOLENOID VALVES, FILTER DRIERS, AND FUSIBLE PLUGS WITH A LEAK DETECTOR? (Y/N) _____

LOCATE, REPAIR, AND REPORT ANY LEAKS. _____

HAVE ALL COMPRESSOR SERVICE VALVES BEEN FULLY OPENED (BACKSEATED)? (Y/N) _____

HAVE LIQUID LINE SERVICE VALVES BEEN OPENED? (Y/N) _____

IS THE OIL LEVEL IN EACH COMPRESSOR CRANKCASE VISIBLE IN THE COMPRESSOR SIGHT GLASSES? (Y/N) _____

CHECK VOLTAGE IMBALANCE

LINE-TO-LINE VOLTS: AB _____ V AC _____ V BC_____ V

(AB + AC + BC)/3 = AVERAGE VOLTAGE = _____ V

MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____ V

VOLTAGE IMBALANCE = 100 X (MAX DEVIATION)/(AVERAGE VOLTAGE) = _____ %

IF OVER 2% VOLTAGE IMBALANCE, DO NOT ATTEMPT TO START SYSTEM!
CALL LOCAL POWER COMPANY FOR ASSISTANCE.

CUT ALONG DOTTED LINE

C. Start-Up

CHECK EVAPORATOR FAN SPEED AND RECORD. _____

CHECK CONDENSER FAN SPEED AND RECORD. _____

AFTER AT LEAST 10 MINUTES RUNNING TIME, RECORD THE FOLLOWING MEASUREMENTS:

OIL PRESSURE	_____
SUCTION PRESSURE	_____
SUCTION LINE TEMP	_____
DISCHARGE PRESSURE	_____
DISCHARGE LINE TEMP	_____
ENTERING CONDENSER AIR TEMP	_____
LEAVING CONDENSER AIR TEMP	_____
EVAP ENTERING-AIR DB (dry bulb) TEMP	_____
EVAP ENTERING AIR WB (wet bulb) TEMP	_____
EVAP LEAVING AIR DB TEMP	_____
EVAP LEAVING AIR WB TEMP	_____

COMPRESSOR AMPS (L1/L2/L3) _____ / _____ / _____

CHECK THE COMPRESSOR OIL LEVEL SIGHT GLASSES; ARE THE SIGHT GLASSES SHOWING OIL LEVEL IN VIEW? (Y/N) _____

NOTES: