



Concepcion-Carrier
Air conditioning
Company
Philippines

38AKS016 - 044 AIR-COOLED CONDENSING UNITS - 60 Hz

INSTALLATION, OPERATING MANUAL & SERVICE INSTRUCTIONS

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38AKS016/024



38AKS028/034 (044 - 3 Fans)

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 to Fig. 4).

Untrained personnel can perform basic maintenance functions such as cleaning coils. Trained service personnel should perform all other operations.

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.

	<p>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.</p>
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INSTALLATION

Step 1 – Complete Pre-Installation Checks

UNCRATE UNIT – Remove plastic cover, 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

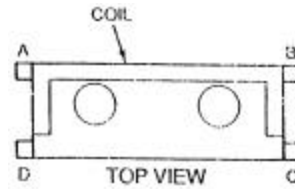
- Consult local building codes and National Electrical Code (NEC) for special installation requirements.
- Allow sufficient space for airflow clearance, wiring, refrigerant piping, and servicing unit. See Fig. 1 to Fig. 3 for unit component locations.
- Locate unit so that outdoor coil (condenser) airflow 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 Tables 2A-2B for unit operating weights. See Table 1 for weight distribution based on recommended support points.

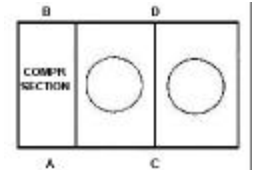
NOTE: If vibration isolators are required for a particular installation, use the data in Table 1 to make the proper selection.

Table 1 - Weight Distribution

UNIT 38AKS	WEIGHT - lb (kg)				
	Total Operating	Support Point			
		A	B	C	D
016	789 (359)	143 (65)	143 (65)	250 (114)	253 (115)
024	900 (408)	178 (81)	168 (76)	269 (122)	285 (129)
028	1650 (748)	418 (190)	626 (284)	242 (110)	364 (165)
034	1803 (818)	459 (208)	673 (305)	272 (124)	399 (181)
044	2347 (1105)	864 (392)	1077 (488)	221 (100)	275 (125)



38AKS016 and 024



38AKS028 and 034

CAUTION

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

Step 2 – Rig and Mount the Unit

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 position point so that the angle from the horizontal is not less than 45 degrees. Raise and set the unit down carefully.

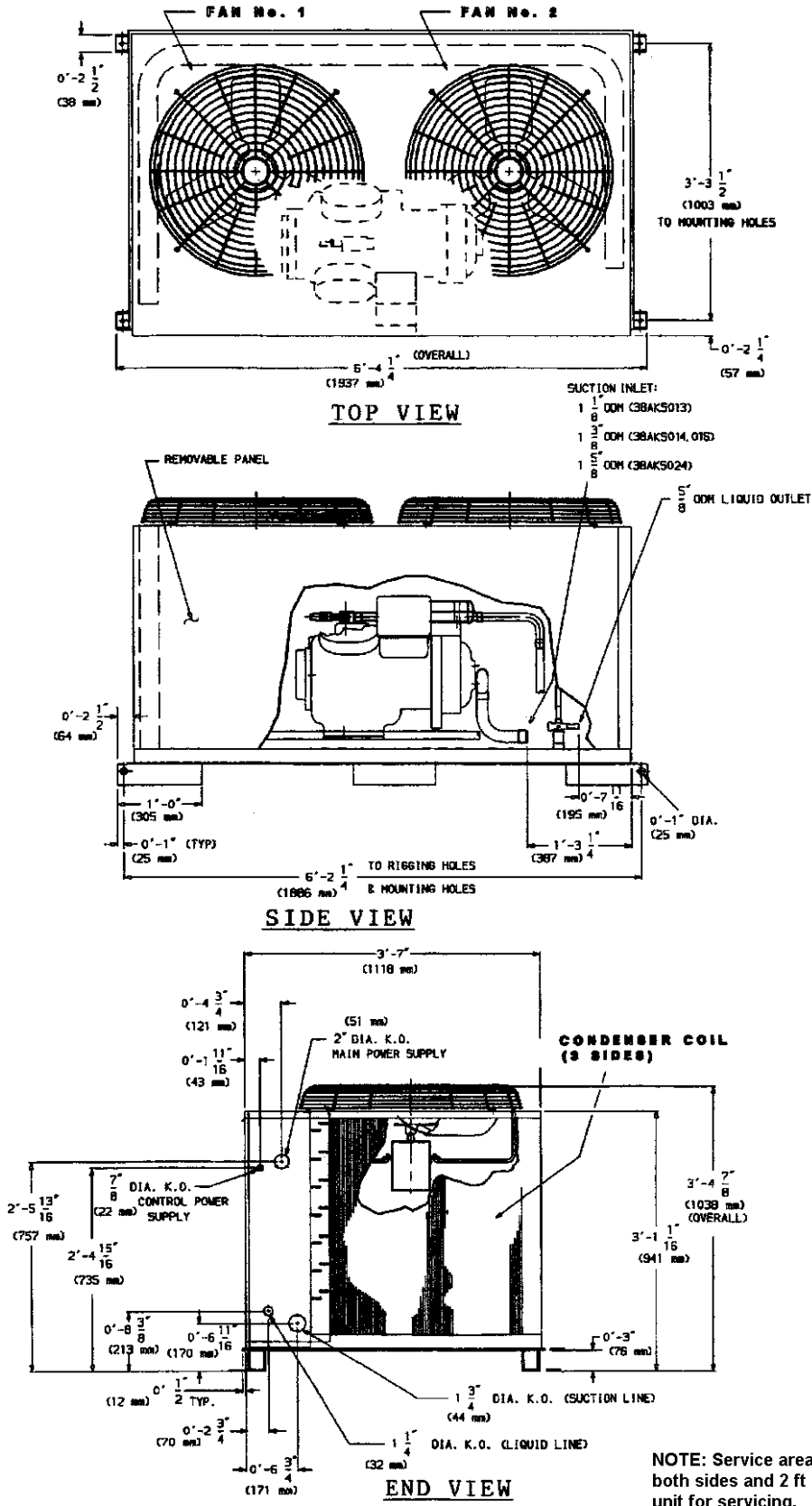


Fig. 1 - Dimensions

38AKS028, 034

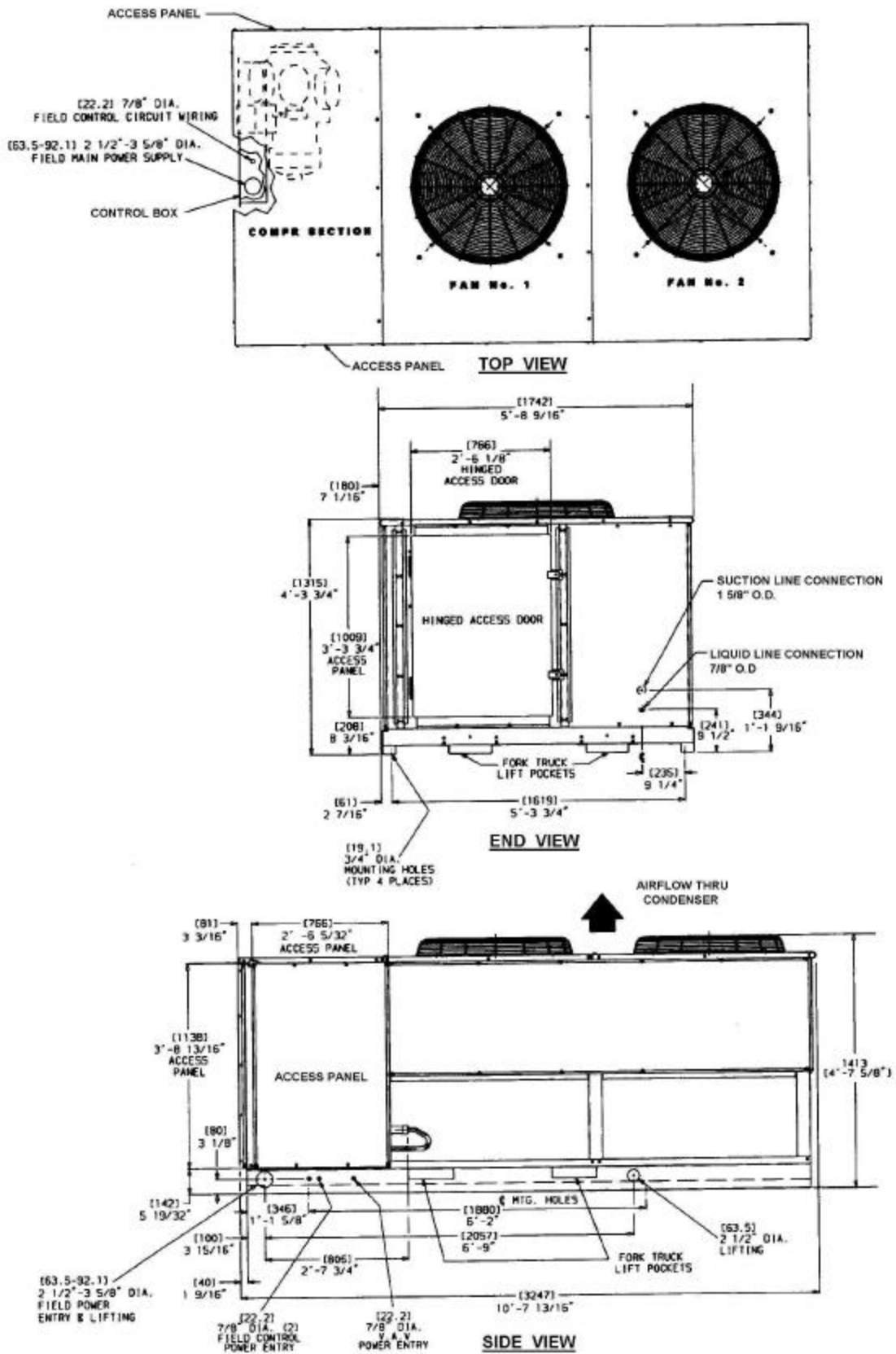
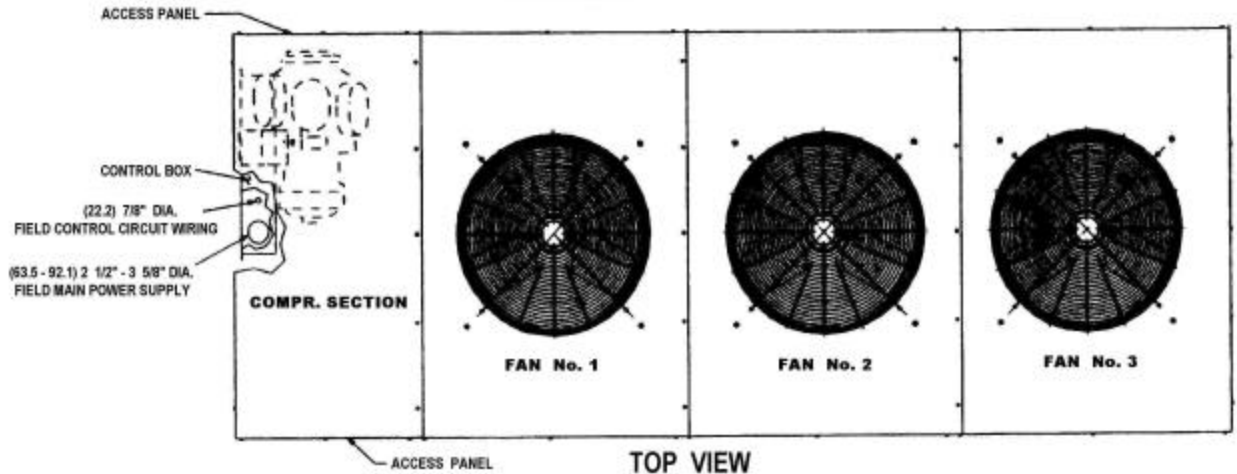


Fig. 2 - Dimensions (38AKS028/034)

38AKS044



NOTES:

1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
2. There must be minimum 8 ft [2440 mm] clear air space above unit.
3. The approximate operating weight of the unit is:

UNIT	WEIGHT (lb)	WEIGHT (kg)
38AKS		
044	2437	1106

APPROX. OPER. WT (lb) AT LIFTING HOLES*

UNIT	1	2	3	4	TOTAL
38AKS					
044	864	1077	221	275	2437

*Standard copper tube aluminum-fin coil.

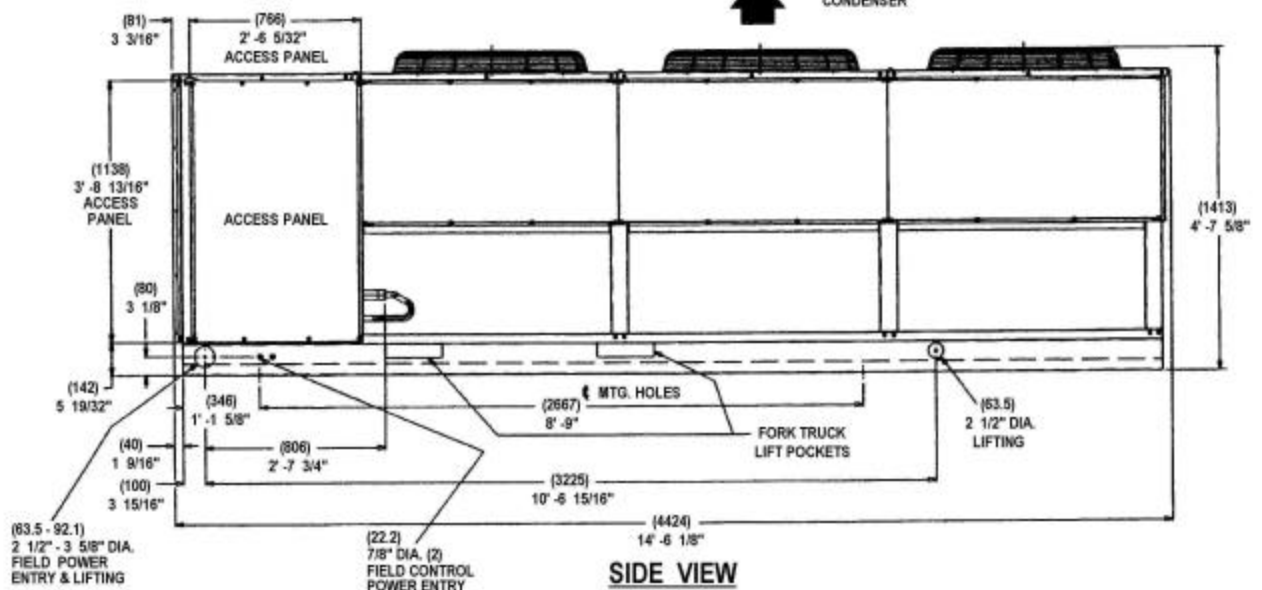
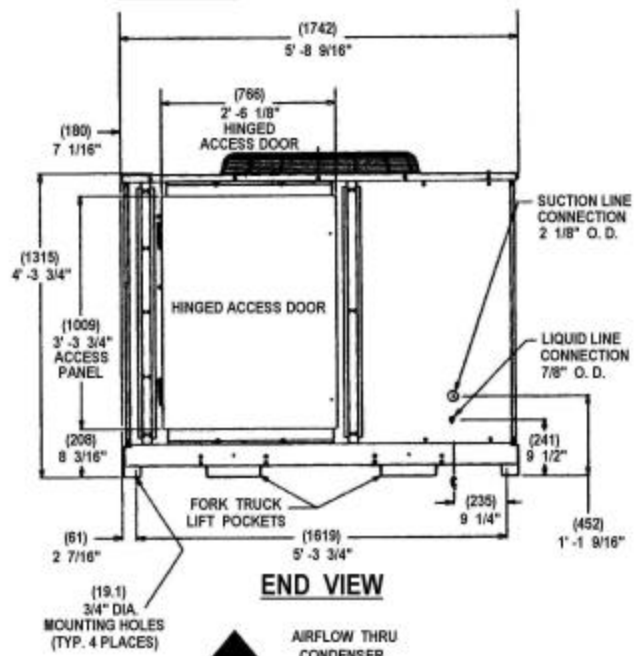
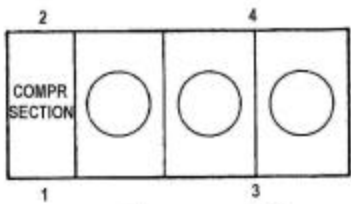


Fig. 3 - Dimensions (38AKS044)

Table 2A - Physical Data (English, 60 Hz)

UNIT 38AKS	016	024
NOMINAL CAPACITY (tons)	15	20
OPERATING WEIGHT (lb)	789	900
REFRIGERANT*	R-22	
Operating Charge, Typical (lb)**	23	28
COMPRESSOR	Reciprocating, Semi-Hermetic	
Speed (Rpm)	1750	
No. Cylinders	6	4
Model No.	06DD537	06E-50
Oil (pt)	8	14
Crankcase Heater Watts	125	
Unloader Setting (psig)		
Load	70+/-1	
Unload	60+/-2	
OUTDOOR-AIR FANS	Axial Flow, Direct Drive	
No. ...Rpm	2 ...900	
Diameter (in.)	26	
Motor Hp	1/2	
Nominal Total Airflow (Cfm)	9210	
OUTDOOR COIL		
Face Area (sq ft)	29.2	
Storage Capacity (lb)^	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	1 3/8	1 5/8
Liquid	5/8	

*Unit is factory supplied with holding charge only.

**With 25 ft of interconnecting piping. Operating charge is approximate for maximum system capacity.

^Storage capacity is measured at liquid saturated temperatures of 130 F for 38AKS016 and 024.

Table 2B - Physical Data (English, 60 Hz)

UNIT 38AKS	028	034	044
NOMINAL CAPACITY (tons)	25	30	40
OPERATING WEIGHTS (lb)	1650	1803	2437
COMPRESSOR	Reciprocating, Semi-Hermetic		
Model	06E-265	06E-275	06E-299
Oil (pt)	19		19
No. Cylinders (ea)...Speed (rpm)	6... 1750		
Capacity Steps	100%, 66%		
Unloader Setting (psig)			
No. 1 Load	76		
Unload	58		
REFRIGERANT	R-22		
Operating Charge, Typical (lb)	30.5	43.5	65
CONDENSER FANS	Propeller Type - Direct Drive		
Quantity...Diameter (in.)	2...30		3...30
Nominal Airflow (cfm)	15,700		23,700
Speed (rpm)	1140		
Power Consumption (Watts, each)	1492		
CONDENSER COIL	Enhanced Copper Tubes, Lanced Aluminum Fins		
Rows...Fins/in.	3... 17		
Total Face Area (sq ft)	39.2		58.4
Coil Storage Cap. (lb) - 80% Full at 125 F	56.6		84.4
ELECTRIC CONTROLS	Time Guard Device		
HIGH PRESSURE SWITCH (psig)			
Cutout	364 +/-7		
Cut-in	200 +/-20		
LOW PRESSURE SWITCH (psig)			
Cutout	29 +/-3		
Cut-in	44 +/-5		
OIL PRESSURE SWITCH (psig)			
Close on Rise	7.0		
Open on Fall	5.0		
PRESSURE RELIEF	Fusible Plug		
PIPING CONNECTIONS			
Suction - in. OD	1 5/8		
Liquid - in. OD	7/8		
Hot Gas Stub - in. OD	5/8		

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 the finger pressure. Do not remove shipping bolts. See Fig. 4.**

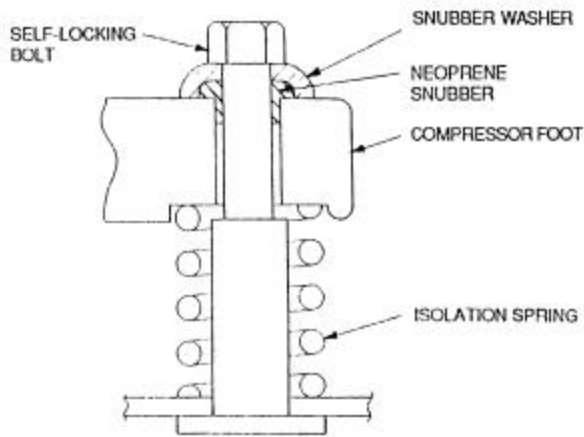


Fig. 4 – Compressor Mounting

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 3A-4B for design details and line sizing. Refer to indoor unit installation instructions for additional information.

NOTE: Use the piping data in Tables 3A-4B as a general guide only.

Hot gas bypass, if used, should be introduced before the evaporator.

Note that refrigerant suction piping should be insulated.

Table 3A - Liquid Line Data

UNIT 38AKS	MAXIMUM ALLOWABLE LIQUID LIFT ft (m)	LIQUID LINE		
		Maximum Allowable Pressure Drop psig (kPa)	Maximum Allowable Temp. Loss F (C)	Filter Drier and Sight Glass Flare Conn. * in. (mm)
016	82 (25)	7 (48.3)	2 (1.1)	5/8
024	87 (26.5)	7 (48.3)	2 (1.1)	5/8

*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 3B - Maximum
Liquid Lift (028/034/044)**

UNIT 38AKS	FT
028	76
034	67
044	76

Table 4A - Refrigerant Piping Sizes

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)									
	0-15 (0-4.5)		15-25 (4.5-7.5)		25-50 (7.5-15)		50-75 (15-23)		75-100 (23-30)	
	Line Size (in. OD)									
	L	S	L	S	L	S	L	S	L	S
016	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
024	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:

- 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.
- 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.
- Line size conversion to mm:

<u>in.</u>	<u>mm.</u>
1/2	12.7
5/8	15.9
7/8	22.2
1 1/8	28.6
1 3/8	34.9
1 5/8	41.3
2 1/8	54

Table 4B - Refrigerant Piping Sizes
SINGLE SUCTION RISERS

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT									
	16-25		26-50		51-75		76-100		101-200	
	L	S	L	S	L	S	L	S	L	S
028	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8
034	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 5/8
044	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 5/8

LEGEND

L - Liquid Line
S - Suction Line

NOTE: Liquid and suction line sizes are OD (in.)

INSTALL FILTER DRIER(S), MOISTURE INDICATOR(S) AND SOLENOID VALVE(S) – The illustrations below are the standard piping connections.

Complete the refrigerant piping from indoor unit to outdoor unit before opening the liquid and suction lines at the outdoor unit.

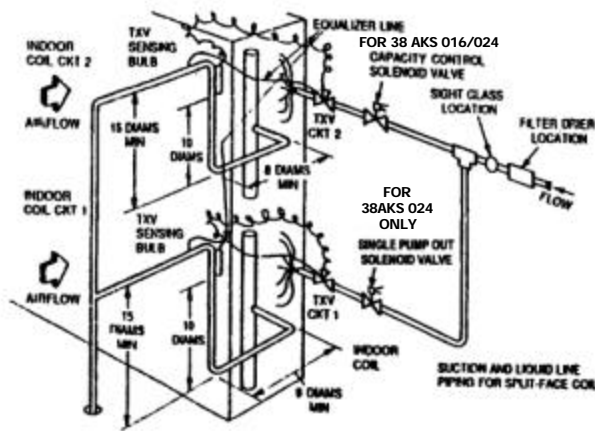


Fig. 5– Location of Sight Glass, Filter Drier and Solenoid Valve(s) for 38 AKS 016/024

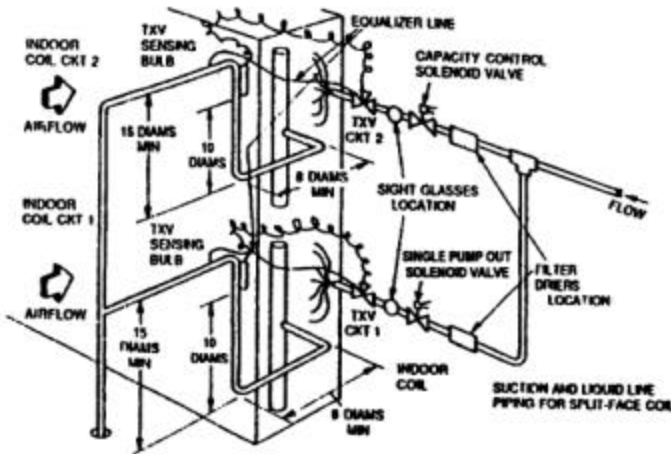


Fig. 6 – Location of Sight Glasses, Filter Driers and Solenoid Valves for 38AKS 028/034/044

INSTALL LIQUID LINE SOLENOID VALVE – CAPACITY CONTROL - For 2-step cooling , place a solenoid valve in the location shown in Fig. 5 and Fig. 6 , upper circuit (ckt. 2). Circuit (ckt.) 2 shall be controlled by Thermostat 2 (T2).

MAKE PIPING CONNECTIONS – Do not remove runaround 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.

WARNING

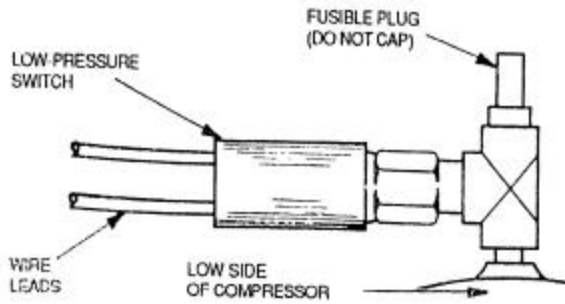
Recover holding charge prior to removal of runaround piping loop (R-22).

1. Open service valves:
 - a. Discharge service valve on compressor.
 - b. Suction service valve on compressor.
 - c. Liquid line valve.
2. Remove ¼ in. flare cap from liquid valve Schrader port.
3. Attach refrigerant recovery device and recover holding charge.
4. Remove runaround loop.
5. Install the field-supplied filter drier(s), liquid moisture indicator(s) and solenoid valve(s) in the piping based on the given illustrations.

PROVIDE SAFETY RELIEF – A fusible plug is located on the compressor crankcase or in the liquid line (Fig.7). Do not cap this plug.

Step 4 – 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.



NOTE: 38AKS024, 034 & 044 has a fusible plug in the liquid line.

Fig. 7 – Location of Fusible Plug (38AKS)

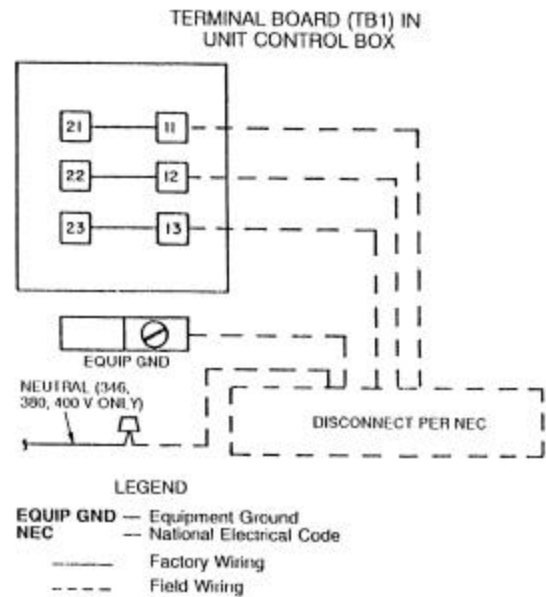


Fig. 8 – Main power Supply Wiring

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

UNIT 38AKS	UNIT							COMPR		FAN MOTORS (Single Phase)			
	Model	Volts		MCA	ICF	MOCP C.B.	RLA	LRA	Total Fans	FLA(ea) Fan No.		HP	
		Nameplate	Supplied*							1	2		
016	501	208-230	187	253	87.5	274	125	63.6	266	2	3.6		1/2
	601	460	414	528	40.7	124	60	29.3	120		1.8		
024	501	208-230	187	253	93.4	353	150	67.9	345	2	3.6		1/2
	601	460	414	528	48.1	177	80	34.7	173		1.8		

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)
- CB - Circuit Breaker (Amps)

*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).

Table 5B - Electrical Data (3 Ph/60 Hz)

UNIT 38AKS	UNIT			COMPRESSOR		FAN MOTORS		POWER SUPPLY				
	Nominal Voltage	Voltage Range*		FLA	RLA	LRA	Qty	FLA (ea)	MCA	ICF	MOCP (C.B.)	
		Min	Max									
028	208-230	187	254	102.2	89.8	446	2	5.5	124.6	452.2	200	
	460	414	508	49.8	43.6	223		2.75	60.7	226.1	100	
034	208-230	187	254	118.4	106.5	506		5.5	145.5	512.2	250	
	460	414	508	56.2	50	253		2.75	68.7	256.1	110	
044	208-230	187	254	165.6	147.5	690		3	5.5	203	702.4	350
	460	414	508	74.7	65.4	345			2.75	91	351.2	150

LEGEND

- FLA - Full Load Amps
- ICF - Maximum Instantaneous Current Flow during starting.
(The point in the starting sequence where the sum of the LRA for the starting compressor, plus the total RLA for all running compressors, plus the total FLA for all running motors is maximum).
- LRA - Locked Rotor Amps
- MCA - Minimum Circuit Amps

- MOCP - Maximum Overcurrent Protection
- OFM - Outdoor (Condenser) Fan Motor
- RLA - Rated Load Amps
- C.B. - Circuit Breaker (Amps)

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

Route power wires through opening in unit end panel to connection in unit control box as shown on unit label diagram and in Fig. 8. Unit must be grounded.

Affix crankcase heater warning sticker to unit disconnect switch. See accessories with unit.

If unit has field-installed accessories, be sure all are properly installed and correctly wired. If used, airflow switch must be properly installed.

PRE-START-UP

IMPORTANT: Before beginning Pre-Start-up or Start-up, review Start-Up Checklist at the back of this book. The Checklist assures proper start-up of a unit and provides a record of unit condition, application requirements, system information, and operation at initial start-up.

CAUTION

Do not attempt to start the condensing unit, even momentarily, until the following steps have been completed. Compressor damage may result.

System Check

1. Check all air handler(s) and other equipment auxiliary components. Consult the manufacturer's instructions regarding any other equipment connected to the condensing unit.
2. Backseat (open) compressor suction and discharge valves. Now close valves one turn to allow refrigerant pressure to reach test gages.
3. Open liquid line service valve.
4. Check tightness of all electrical connections.
5. Compressor oil level should be visible in sight glass. See Fig. 9. Adjust the oil level as required. Refer to Preliminary Oil Charge section. No oil should be removed unless the crankcase heater has been energized for at least 24 hours.
6. Be sure unit is properly leak checked, dehydrated, and charged. See Preliminary Charge.
7. Electrical power source must agree with nameplate rating.
8. *Crankcase heater must be firmly locked into compressor crankcase. Be sure crankcase is warm (heater must be on for 24 hours before starting compressor).*
9. Be sure compressor floats freely on the mounting springs and that snubber washers can be moved with finger pressure. See Compressor Mounting, page 9, and Fig. 5 for loosening compressor bolts.

Leak Test and Dehydration – Leak test the entire refrigerant system using soap bubbles and/or an electronic leak detector.

Turn On Crankcase Heater – Turn on crankcase heater for 24 hours before starting the unit to be sure all the refrigerant is out of the oil. To energize the crankcase heater, 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 heater is now energized

Preliminary Charge – Charge each system with R-22 by the liquid charging method (through liquid service valve) on the high side when the system has not yet been started. Charge according to the values in the Charging Chart, Fig. 10 to 14 via the suction service valve when the system has started.

START-UP

Compressor crankcase heater must be on 24 hours before start-up. After the heater has been on for 24 hours, the unit can be started. However, if start-up is done immediately after charging, the 24 hours wait is NOT necessary.

Preliminary Checks

1. Ensure that compressor service valves are back seated.
2. Verify that each compressor floats freely on its mounting springs, snug fit on washer.
3. Check that electric power supply agrees with the unit nameplate data.
4. Verify that compressor crankcase heater is securely in place.
5. Check that compressor crankcase heater has been on at least 24 hours.
6. Note that compressor oil level is visible in the sight glass.
7. Recheck for leaks using same procedure as previously outlined in Pre-Start-Up section, Leak Test and Dehydration.
8. If any leaks are detected, evacuate, repair and dehydrate as previously outlined in Pre-Start-Up

section, Leak Test and Dehydration.

9. All internal wiring connections must be re-tightened, and all barriers and covers must be in place.

Preliminary Oil Charge – Compressor is factory charged with oil (see Tables 2A-2B). When oil is checked at start-up, it may be necessary to add or remove oil to bring it to the proper level. One recommended oil level adjustment method follows:

ADD OIL – Close suction service valve and pump down crankcase to 2 psig (14 kPag). (Low-pressure switch must be jumpered). Wait a few minutes and repeat until pressure remains steady at 2 psig (14 kPag). Remove oil fill plug above the oil level sight glass, add oil through plug hole, and replace plug. Run compressor for 20 minutes and check oil level. See Fig. 9.

NOTE: Use only Carrier approved compressor oil. Approved sources are:

Totaline.	150 SUS
Texas, Inc.	Capella WF-32
Witco Chemical Co.	Suniso 3GS

Do not use oil that has been drained out, or oil that has been exposed to atmosphere, due to moisture content.

REMOVE OIL – Pump down compressor to 2 psig (14 kPag). Loosen the ¼ in. (6.4 mm) pipe plug at the compressor base and allow the oil to seep out past the threads of the plug.

NOTE: The crankcase will be slightly pressurized. Do not remove the plug, or the entire oil charge will be lost.

Small amounts of oil can be removed through the oil pump discharge connection while the compressor is running.

Start Unit – The field disconnect is closed, the fan circuit breaker is closed, and the space thermostat is set above ambient so that there is no demand for cooling. Only the crankcase heater will be energized.

Next, close the compressor circuit breaker and then reset space thermostat below ambient so that a call for cooling is ensured. If compressor does not start, set thermostat lower.

NOTE: Do not use circuit breaker to start and stop the compressor except in an emergency.

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.

Adjust Refrigerant Charge

NOTE: Actual start-up and all refrigerant charge modifications should be done only under supervision of a qualified refrigerant mechanic.

With all fans operating, adjust the refrigerant charge.

Measure pressure at the liquid line service valve, being sure Schrader depressor is used if required. Also, measure liquid line temperature as close to the liquid service valve as possible. Add charge until the pressure and temperature conditions of the charging chart curve are met. If liquid pressure and temperature point fall above curve, add charge. If liquid pressure and temperature point fall below curve, reduce the charge until the conditions match the curve. (± 3 °F allowable range)

If the sight glass is cloudy, check refrigerant charge again. *Ensure all fans are operating*. Also ensure maximum allowable liquid lift has not been exceeded. If charge per chart and if the sight glass is still cloudy, check for a plugged filter drier or a partially closed solenoid valve. Replace or repair, as needed.

Check Compressor Oil Level – After adjusting the refrigerant charge, allow the compressor to run fully loaded for 20 minutes. Running oil level should be within view of the crankcase sight glass. Stop the compressor at the field power supply disconnect and check the crankcase oil level. Add oil only if necessary to bring the oil into view in the sight glass. If oil is added, run the compressor for an additional 10 minutes; then stop and check oil level. If the level remains low, check the piping system for proper design for oil return; also, check the system for leaks.

If the initial check shows too much oil (too high in the sight glass) remove oil to proper level. See Preliminary Oil Charge, for proper procedure for adding and removing oil. See Fig. 9.

When the above checks are complete, repeat the procedure with the unit operating at minimum load conditions.

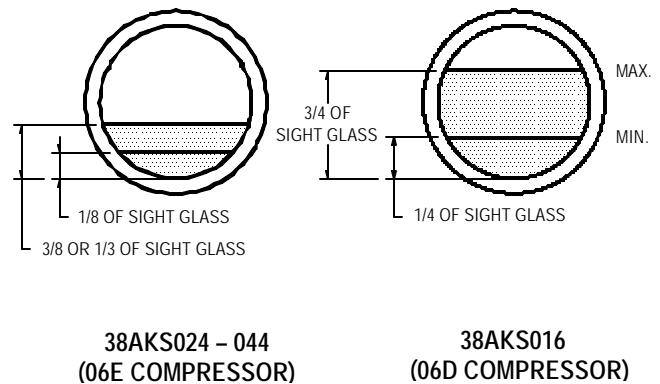


Fig. 9 – Operating Oil Levels

Final Checks – Ensure all safety controls are operating, control panel covers are on, and the service panels are in place.

OPERATING SEQUENCE

Cooling - When the first stage (TC1) of the cooling thermostat closes, timer starts. After 3 minutes, the timer expires, energizing the compressor.

On demand for additional cooling capacity, the second stage (TC2) of the cooling thermostat closes, energizing field supplied liquid line solenoid (LLS) valve, which opens.

At shutdown, the Time Guard timer prevents the compressor from re-starting for approximately 3 minutes.

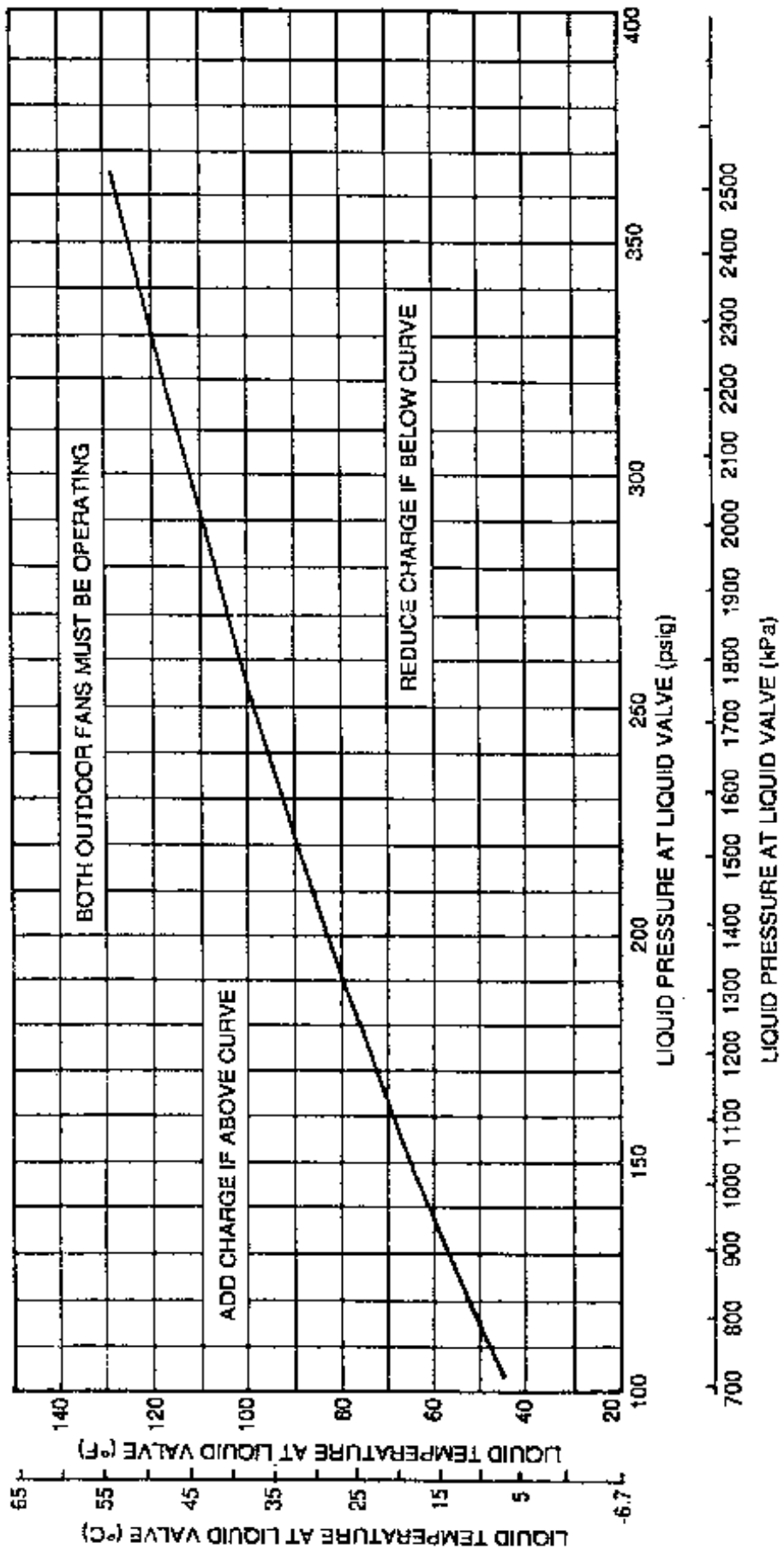


FIG. 10 - 38AKS016 CHARGING CHART

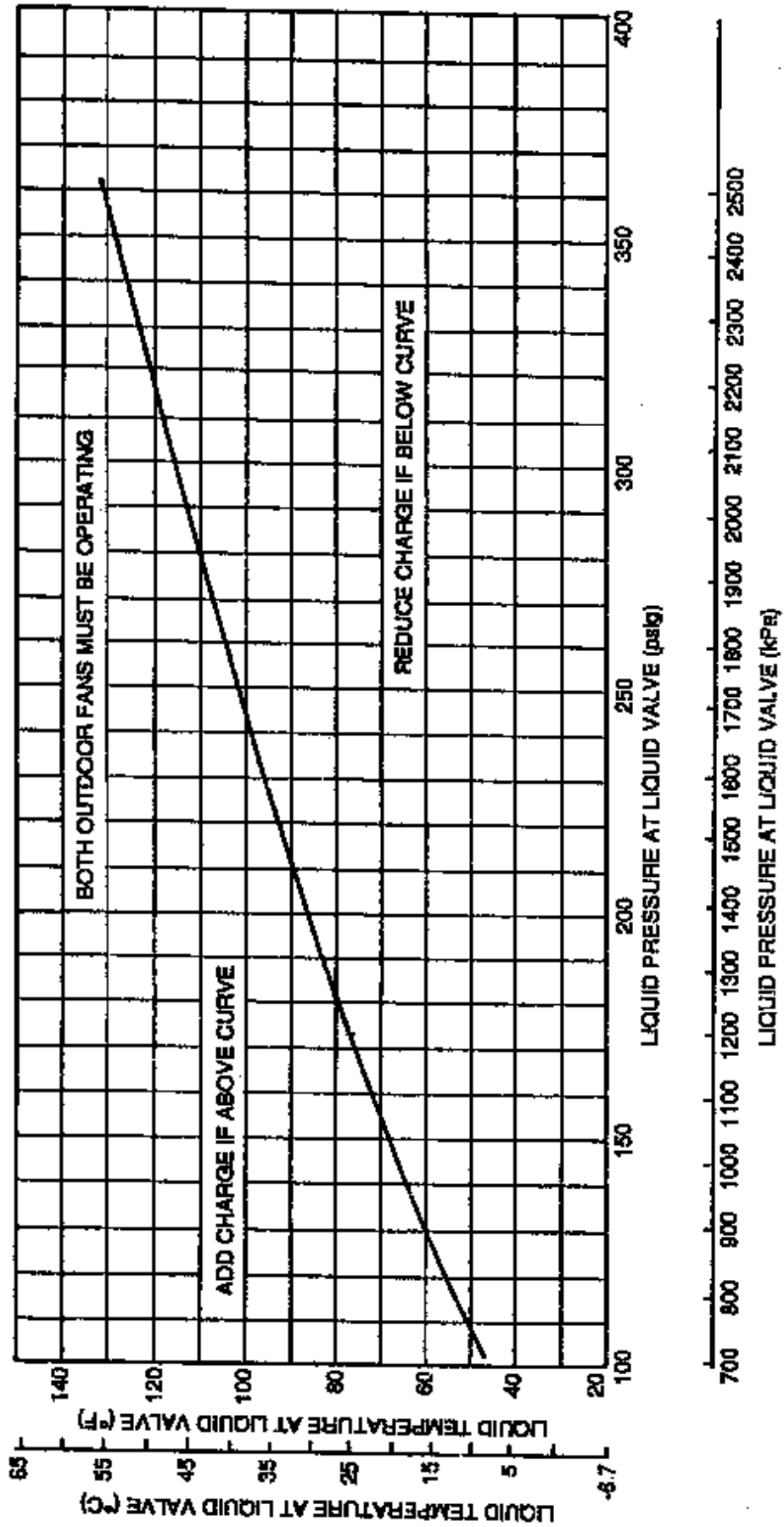


FIG. 11 - 38AKS024 CHARGING CHART

BOTH OUTDOOR FANS MUST BE OPERATING

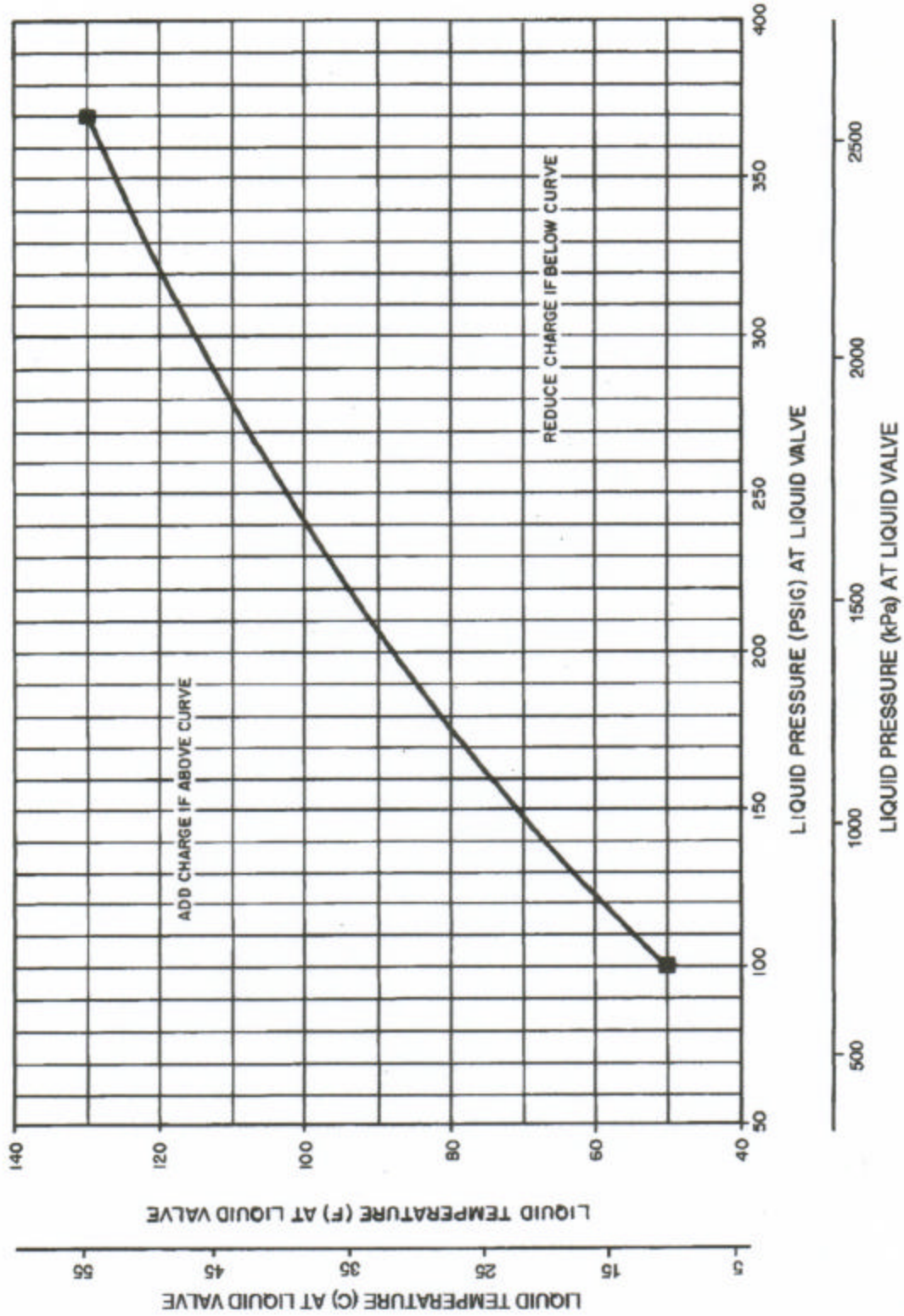


FIG. 12 - 38AKS028 CHARGING CHART

BOTH OUTDOOR FANS MUST BE OPERATING

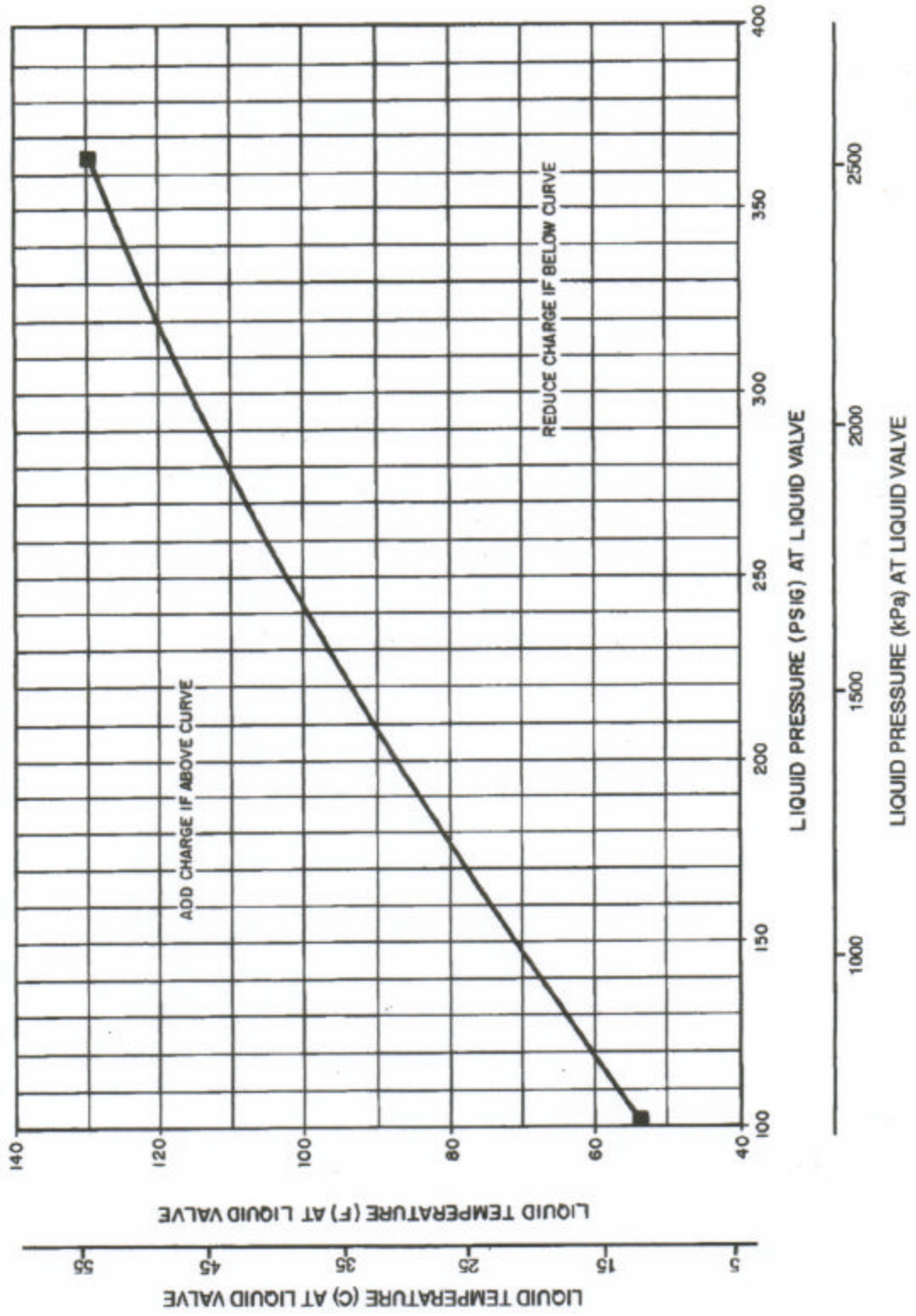
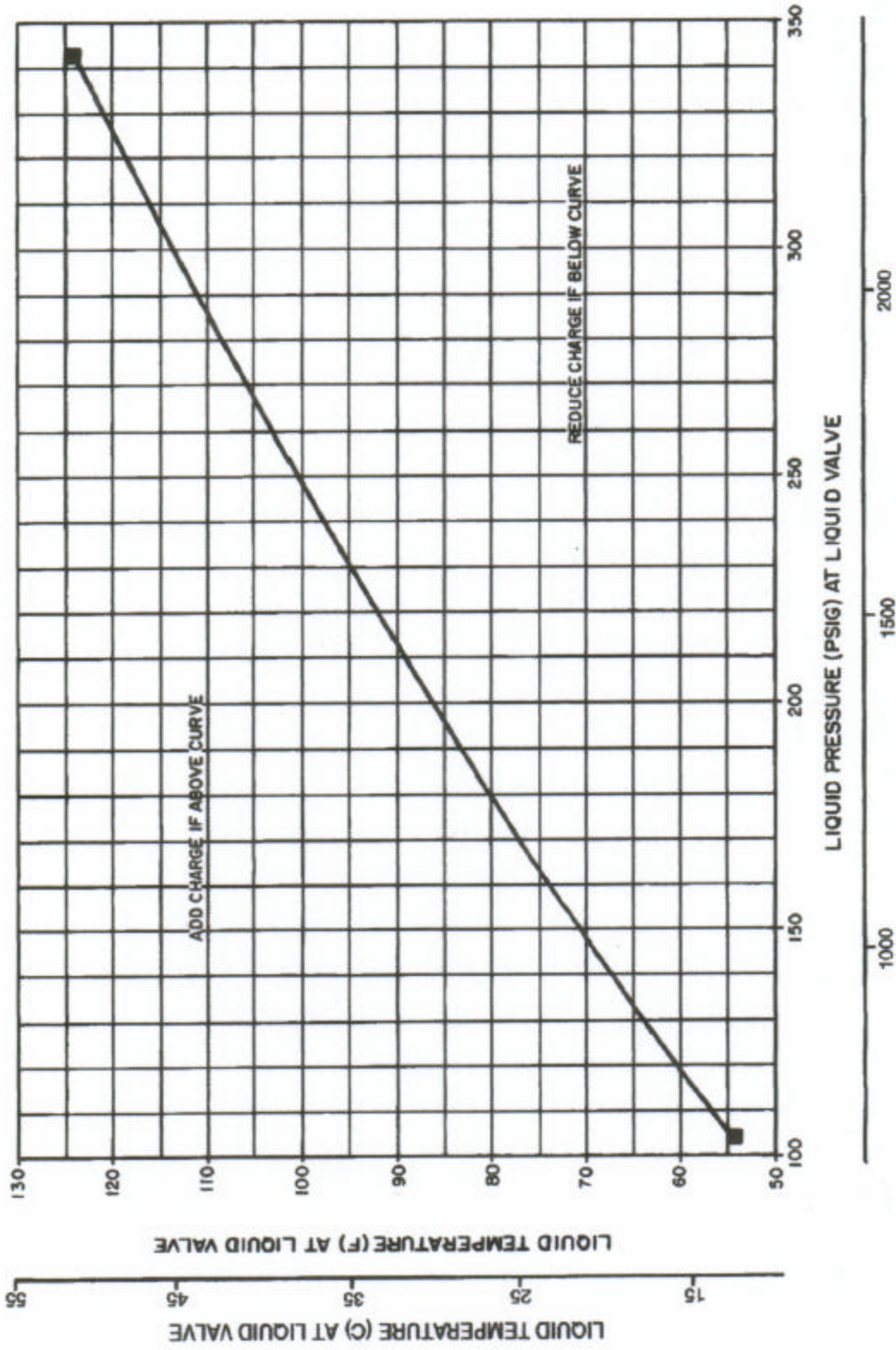


FIG. 13 - 38AKS034 CHARGING CHART

ALL OUTDOOR FANS MUST BE OPERATING



LIQUID PRESSURE (PSIG) AT LIQUID VALVE

LIQUID PRESSURE (kPa) AT LIQUID VALVE

FIG. 14 - 38AKS044 CHARGING CHART

When installed, a field supplied solenoid shuts of the liquid line to prevent refrigerant migration back to the compressor during the off cycle.

SERVICE

Capacity Control – For compressors equipped with an unloader, 2 cylinders are unloaded to provide capacity control. The unloader may be suction-pressure actuated or electrically operated.

Suction pressure-actuated unloader as shown in Fig 15, is controlled by suction pressure that automatically unloads when system load is low and loads up when system load increases. Factory setting is 10 turns from bottom stop (CCW) before R-22 charging (control set point) (see Tables 2A-2B).

CONTROL SET POINT (cylinder load point) is adjustable from 0 to 85 psig (586 kPa). To adjust, turn control set point adjustment nut (Fig. 15) 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). For 38AKS016 & 024: 2 turns CCW. For 38AKS028, 034 & 044: 1 ½ turns CCW.

Electric unloader as shown in Figure 16, needs an electric solenoid coil wired in the control circuit, usually controlled by the thermostat.

Time Guard Circuit – Circuit prevents short cycling by providing a delay of 3 minutes before restarting compressor after shutdown from safety device action.

On start-up, the Time Guard timer causes a delay of approximately 3 minutes seconds after thermostat closes. Refer to label diagram of the unit.

Crankcase Heater – The heater prevents refrigerant migration and compressor oil dilution during shutdown whenever compressor is not operating. It is wired to cycle with the compressor; the heater is off when compressor is running, and on when compressor is off.

Both compressor service valves must be closed (front seated) whenever the crankcase heater is de-energized for more than 6 hours. The crankcase heater is operable as long as the control circuit is energized.

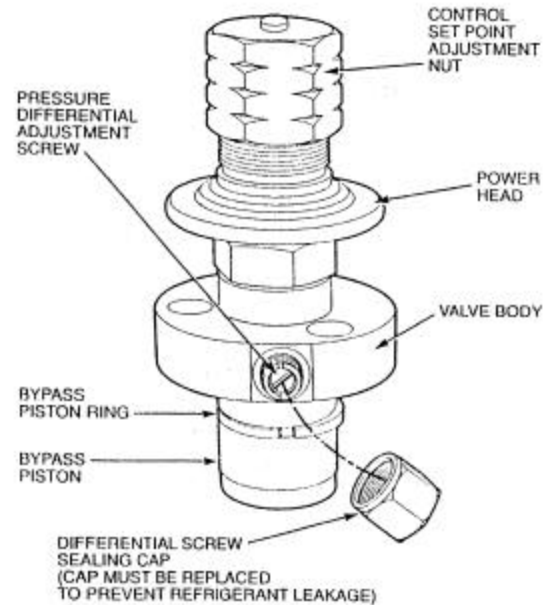


Fig. 15 – Suction Pressure Unloader



Fig. 16 – Electric Solenoid Coil Unloader

COMPRESSOR OVERTEMPERATURE PROTECTION (IP) – A thermostat installed in compressor motor winding reacts to excessively high winding temperatures and shuts off the compressor. (This is applicable only for 06D Compressor, not on 06E.) Discharge Temp. Sensor is on Cylinder Head for 06E, externally.

TIME GUARD CONTROL – Control prevents compressor from short cycling. See Operating Sequence.

CRANKCASE HEATER – Heater minimizes absorption of liquid refrigerant by oil in crankcase during brief or extended shutdown periods. The control circuit is maintained if compressor fan motor circuit breakers are turned off. The main disconnect must be on to energize crankcase heater.

IMPORTANT: Never open any switch or disconnect that energizes the crankcase heater unless unit is being serviced or is to be shutdown for a prolonged period. After a prolonged shutdown on a service job, energize the crankcase heater for 24 hours before starting the compressor.

High Pressure Switches – Switches have fixed, nonadjustable settings. Switches are mounted on the compressors.

Low Pressure Switches – Switches have fixed, nonadjustable settings. Switches are mounted on the compressors.

TO CHECK – Slowly close liquid shutoff valve and allow compressor to pump down. Do not allow compressor pump-down below 2 psig (13.8 kPa). Compressor should shut down when suction pressure drops to cutout pressure in Tables 2A-2B, and should restart when pressure builds up to cut-in pressure shown.

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 sealing gum. In case a fan motor must be repaired or replaced, be sure to put a new sealing gum when the fan is reinstalled and be sure the fan guard is in place before starting the unit. Fig. 17 shows the proper position of the mounted fan. Fan motors have permanently lubricated bearings.

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 Preliminary 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. Therefore wrap motors in plastic bags, to be sure.

Clean outdoor coil annually or as required by location or outdoor air conditions. Inspect coil monthly, and clean as required. For 38AKS016 AND 024 fins are not continuous through coil sections; dirt and debris may pass through first section, become trapped between 3 rows of fins and restrict outdoor airflow. Use a flashlight to determine if dirt or debris has collected between coil sections. Cleaning coil of 38AKS028 to 044 is not as hard as cleaning the coil of 38AKS016 and 024 because it has a continuous coil section (3 rows). Clean coil as follows:

1. Turn of 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. 18.
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. 19.
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.

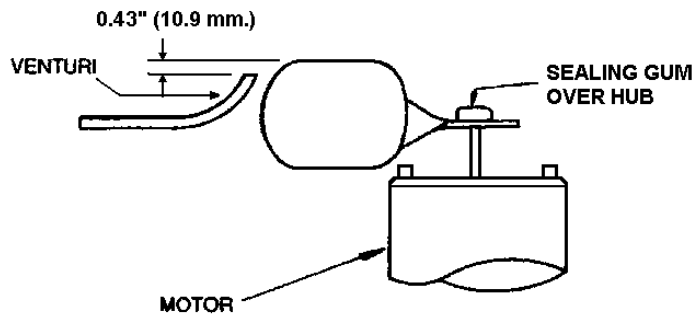


Fig. 17 - Outdoor Fan - 38AKS016 & 024

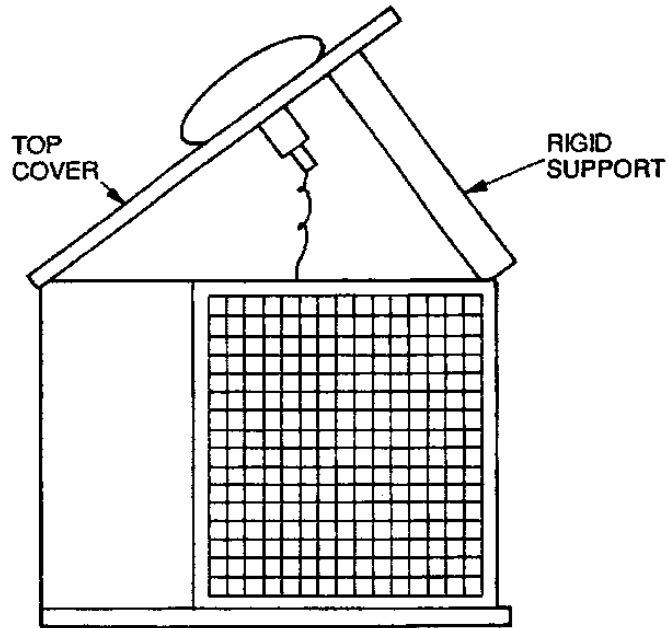


Fig. 18 - Pivot and Support Top Cover - 38AKS016 & 024

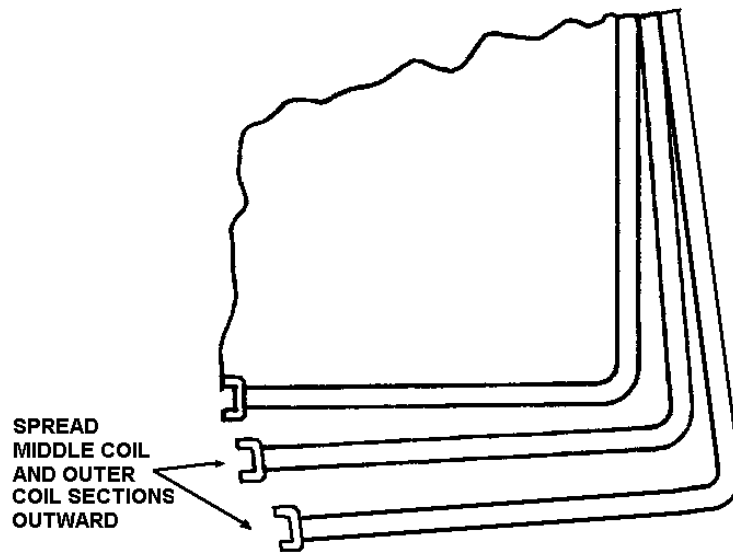


Fig. 19 - Coil Cleaning Typical - 38AKS016 & 024

TROUBLESHOOTING

PROBLEM	SOLUTION
<p>COMPRESSOR DOES NOT RUN</p> <p><u>Contactors Open</u></p> <ol style="list-style-type: none"> 1. Power off. 2. Fuses blown in field power circuit. 3. No control power. 4. Thermostat circuit open. 5. Time Guard II device not operating. 6. Compressor circuit breaker tripped. 7. Safety device lock-out circuit active. 8. Low-pressure switch open. 9. High-pressure switch open. 10. Compressor overtemperature switch open. 11. Loose electrical connections. 12. Compressor stuck. <p><u>Contactors Closed</u></p> <ol style="list-style-type: none"> 1. Compressor leads loose. 2. Motor windings open. 3. Single phasing. 	<ol style="list-style-type: none"> 1. Restore power. 2. After finding cause and correcting, replace with correct size fuse. 3. Check control circuit breaker; reset if tripped or replace if defective. 4. Check thermostat setting. 5. Check Time Guard II devices. 6. Check for excessive compressor current draw. Reset breaker; replace if defective. 7. Reset lock-out circuit at thermostat or circuit breaker. 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. Check for refrigerant overcharge, obstruction or outdoor airflow, air in system, or whether compressor discharge valve is fully open. Be sure outdoor fans are operating correctly. 10. Check for open condition. Allow for reset. Replace if defective. 11. Tighten all connections. 12. See compressor service literature. 1. Check connections and tighten. 2. See compressor service literature. 3. Check for blown fuse. Check for loose connection at compressor terminal. Contact power company.
<p>COMPRESSOR STOPS ON HIGH PRESSURE SWITCH</p> <p><u>Outdoor Fan On</u></p> <ol style="list-style-type: none"> 1. High-pressure switch faulty. 2. Reversed fan rotation. 3. Airflow restricted. 4. Air re-circulating. 5. Noncondensables in system. 6. Refrigerant overcharge. 7. Line voltage incorrect. 8. Refrigerant system restrictions. <p><u>Outdoor Fan Off</u></p> <ol style="list-style-type: none"> 1. Fan slips on shaft. 2. Motor not running. 3. Motor bearings stuck. 4. Motor overload open. 5. Motor burned out. 	<ol style="list-style-type: none"> 1. Replace switch. 2. Confirm rotation, correct if necessary. 3. Remove obstruction. 4. Clear airflow area. 5. Recover refrigerant and recharge as required. 6. Recover refrigerant as required. 7. Consult power company. 8. Check or replace filter drier, expansion valve, etc. Check that compressor discharge service valve is fully open. 1. Tighten fan hub setscrews. 2. Check power and capacitor. 3. Replace bearings. 4. Check overload rating. Check for fan blade obstruction. 5. Replace motor.
<p>COMPRESSOR CYCLES ON LOW PRESSURE SWITCH</p> <p><u>Indoor-Air Fan Running</u></p> <ol style="list-style-type: none"> 1. Compressor suction service valve partially closed. 2. Liquid line solenoid valve(s) fails to open. 3. Filter drier plugged. 4. Expansion valve power head defective. 5. Low refrigerant charge. 	<ol style="list-style-type: none"> 1. Open valve fully. 2. Check liquid line solenoid valve(s) for proper operation. Replace if necessary. 3. Replace filter drier. 4. Replace power head. 5. Add charge. Check low-pressure switch setting. Check system for leaks.

TROUBLESHOOTING (cont)

PROBLEM	SOLUTION
<p>COMPRESSOR CYCLES ON LOW PRESSURE SWITCH</p> <p><u>Airflow Restricted</u></p> <ol style="list-style-type: none"> 1. Coil iced up. 2. Coil dirty. 3. Air filters dirty. 4. Dampers closed. <p><u>Indoor-Air Fan Stopped</u></p> <ol style="list-style-type: none"> 1. Electrical connections loose. 2. Fan relay defective. 3. Motor overload open. 4. Motor defective. 5. Fan belt broken or slipping. 	<ol style="list-style-type: none"> 1. Check refrigerant charge. 2. Clean coil fins. 3. Clean or replace filters. 4. Check damper operation and position. <ol style="list-style-type: none"> 1. Tighten all connections. 2. Replace relay. 3. Power supply. 4. Replace motor. 5. Replace or tighten belt.
<p>COMPRESSOR RUNNING BUT COOLING INSUFFICIENT</p> <p><u>Suction Pressure Low</u></p> <ol style="list-style-type: none"> 1. Refrigerant charge low. 2. Head pressure low. 3. Air filters dirty. 4. Expansion valve power head defective. 5. Indoor coil partially iced. 6. Indoor airflow restricted. <p><u>Suction Pressure High</u></p> <ol style="list-style-type: none"> 1. Unloaders not functioning. 2. Compressor valve defective. 3. Heat load excessive. 	<ol style="list-style-type: none"> 1. Add refrigerant. Check system for leaks and fix. 2. Check refrigerant charge. Check outdoor-air fan thermostat settings. 3. Clean or replace filters. 4. Replace power head. 5. Check low pressure setting. 6. Remove obstruction. <ol style="list-style-type: none"> 1. Check unloader adjustments. Check unloader setting. 2. See compressor service literature. 3. Check for open doors or windows in vicinity of fan coil.
<p>UNIT OPERATES TOO LONG OR CONTINUOUSLY.</p> <ol style="list-style-type: none"> 1. Low refrigerant charge. 2. Control contacts fused. 3. Air in system. 4. Partially plugged expansion valve or filter drier. 	<ol style="list-style-type: none"> 1. Add refrigerant. 2. Replace control. 3. Purge and evacuate system. 4. Clean or replace.
<p>SYSTEM IS NOISY</p> <ol style="list-style-type: none"> 1. Piping vibration. 2. Compressor noisy. 	<ol style="list-style-type: none"> 1. Support piping as required. 2. Check valve plates for valve noise. Re-pipe compressor if bearings are worn.
<p>COMPRESSOR LOSES OIL</p> <ol style="list-style-type: none"> 1. Leak in system. 2. Crankcase heaters not energized during shutdown. 3. Improper interconnecting piping design. 	<ol style="list-style-type: none"> 1. Repair leak. 2. Check wiring and delays. Check heater and replace if defective. 3. Check piping for oil return. Replace if necessary.
<p>FROSTED SUCTION LINE</p> <p>Expansion valve admitting excess refrigerant.</p>	<p>Adjust expansion valve.</p>
<p>HOT LIQUID LINE</p> <ol style="list-style-type: none"> 1. Shortage of refrigerant due to leak. 2. Expansion valve opens too wide. 	<ol style="list-style-type: none"> 1. Repair leak and recharge. 2. Adjust expansion valve.
<p>FROSTED LIQUID LINE</p> <ol style="list-style-type: none"> 1. Restricted filter drier. 2. Liquid line solenoid partially closed. 	<ol style="list-style-type: none"> 1. Remove restriction or replace. 2. Replace valve.
<p>COMPRESSOR WILL NOT UNLOAD</p> <ol style="list-style-type: none"> 1. Defective unloader. 2. Defective capacity control solenoid valve (if used). 3. Miswired capacity control liquid line solenoid (if used). 4. Weak, broken, or wrong valve body spring. 	<ol style="list-style-type: none"> 1. Replace unloader. 2. Replace valve. 3. Rewire correctly. 4. Replace spring.
<p>COMPRESSOR WILL NOT LOAD.</p> <ol style="list-style-type: none"> 1. Miswired capacity control liquid line solenoid (if used). 2. Defective capacity control solenoid valve (if used). 3. Plugged strainer (high side). 4. Stuck or damaged unloader piston or piston ring(s). 	<ol style="list-style-type: none"> 1. Rewire correctly. 2. Replace valve. 3. Clean or replace strainer. 4. Clean or replace the necessary parts.

START-UP CHECKLIST FOR 38AKS CONDENSING UNIT

(MUST BE SENT TO CCAC UPON COMPLETION)

A. PRELIMINARY INFORMATION

Job Name : _____
Location : _____
Installing Contractor : _____
Distributor : _____
Start-up performed by : _____
Start-up Date : _____

EQUIPMENT: Model : _____ Serial No. : _____

COMPRESSOR: Model : _____ Serial No. : _____

Motor No. : _____ Volts : _____ RLA : _____

INDOOR UNIT: Manufacturer : _____

Model : _____ Serial No. : _____

Volts : _____ RLA/KW : _____

B. PRELIMINARY EQUIPMENT CHECK (Yes or No)

Is there any shipping damage? _____ If so, where? _____

Will this damage prevent unit start-up? _____

Check power supply. Does it agree with unit? _____

Has the circuit protection been sized and installed properly? _____

Are the supply wires sized as per requirement? _____

Are the refrigerant lines sized as per requirement? _____

Have the electrical components been checked for tightness? _____

Check Air Systems (Yes or No)

Is air handler operational? _____

Correct rotation? _____

V-belts tension normal? _____

Record motor amperage L1 _____ A, L2 _____ A, L3 _____ A

Check for possible leak caused by shipment

Leak check thoroughly compressor, fusible plugs, thermostatic expansion valve (TXV), filter drier and other parts with electronic leak detector or soap bubbles. _____

Check voltage imbalance AB _____ V, AC _____ V, BC _____ V

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

MAXIMUM DEVIATION FROM AVERAGE VOLTAGE = _____ V

VOLTAGE IMBALANCE = $\frac{(\text{Max. deviation})}{\text{Average Voltage}} \times 100 = \text{_____} \%$ VOLTAGE IMBALANCE

If over 2% Voltage Imbalance, do not attempt to start the unit!

Call local power company for assistance.

Assure that incoming power supply voltage to unit is within the range of **PLUS or MINUS 10%** rated voltage.

C. UNIT START-UP (insert check mark as each item is completed)

- Ensure crankcase heaters have been energized for a minimum of 24 hours prior to start-up.
- Ensure compressor oil level is correct.
- Ensure liquid line service valve is backseated.
- Ensure compressor suction service valve is backseated.
- Ensure compressor discharge service valve is backseated.
- Loosen compressor shipping holddown bolts.
- Check operation of the following:
 - Crankcase Heater.
 - Time Guard II Control.
 - Head Pressure Control.
 - Capacity Control.
 - Low Pressure Switch Control.
 - Oil Pressure Switch (*for AKS024, AKS028, AKS034 & AKS044 only*)
 - Be sure temperature controller is set properly.
 - Set point should be adjusted to the desired room/space temperature.
- Does machine start at first attempt? _____ If not, explain why _____

- Measure the following while machine is in stable operation.
 - Suction Pressure / Saturated Temperature _____ PSIG _____ °F
 - Suction Line Temperature _____ °F
 - Suction Superheat _____ °F
 - Discharge Pressure / Saturated Temperature _____ PSIG _____ °F
 - Discharge Line Temperature _____ °F
 - Discharge Superheat _____ °F
 - Liquid Line Pressure / Saturated Temperature _____ PSIG _____ °F
 - Liquid Line Temperature _____ °F
 - Liquid Subcooling _____ °F

