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 Tables 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.

NOTE: Service areas — Allow 3 ft (914 mm) on both sides and 2 ft (610 mm) on both ends of unit for servicing.

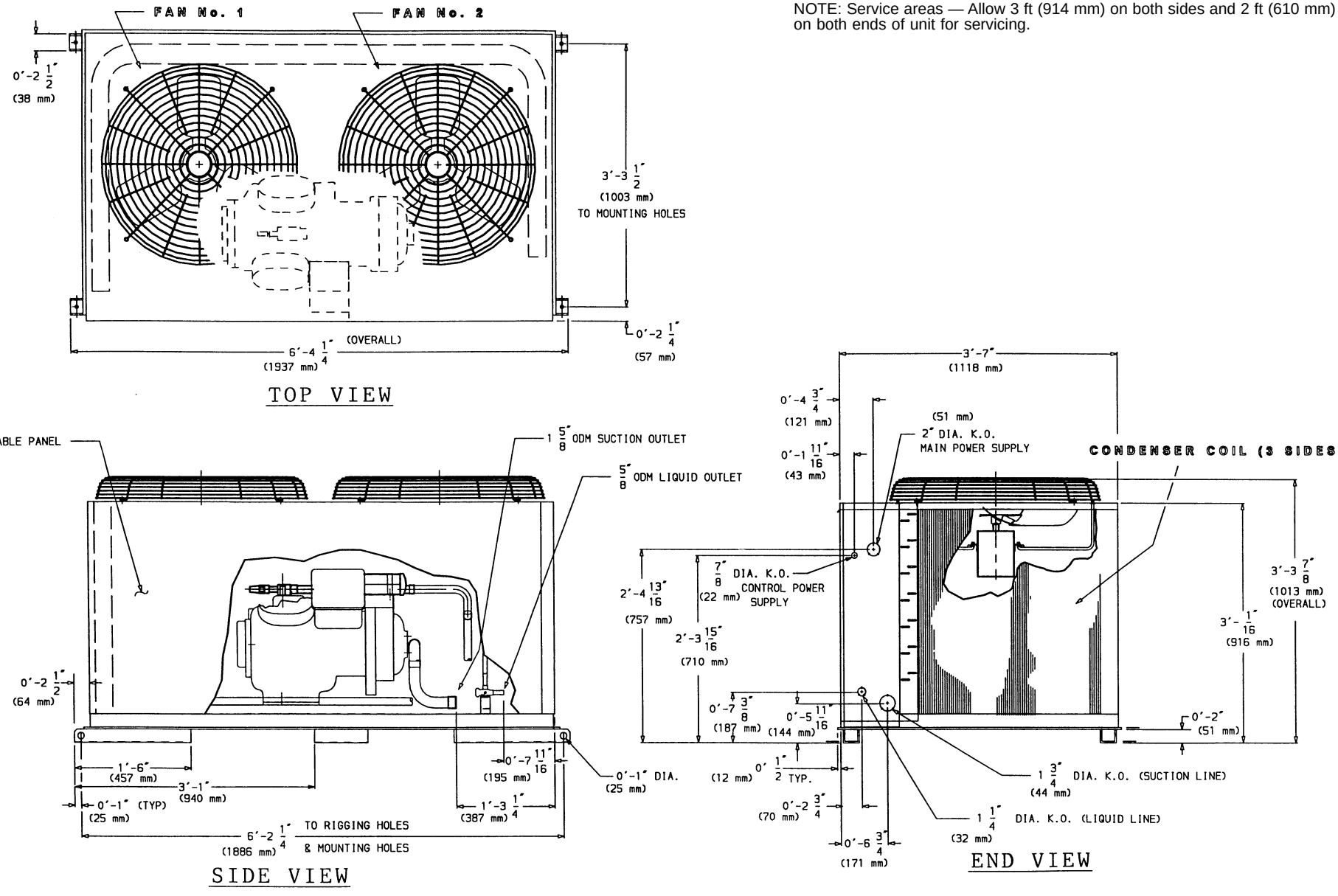
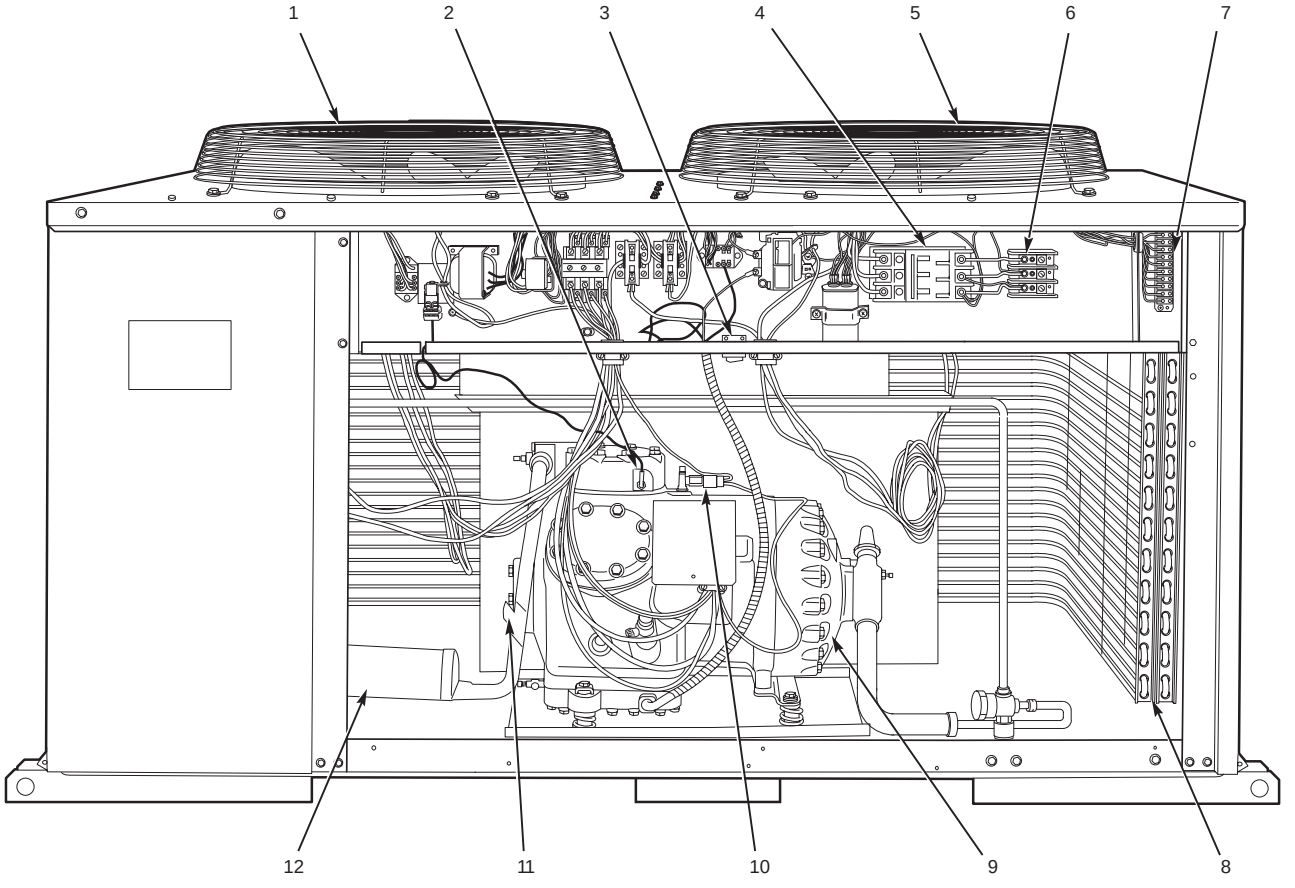


Fig. 1 — Dimensions



LEGEND

1 — No. 1 Fan
2 — High-Pressure Switch
3 — Circuit Breaker — Control Circuit
4 — Circuit Breakers — Power Circuits
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)

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

UNIT 38AKS	013	014	016	024
OPERATING WEIGHT (lb)				
With Aluminum-Fin Coil	732	779	789	900
With Copper-Fin Coil	825	919	929	1040
REFRIGERANT*	R-22			
Shipping Charge (lb)	2.1	3.1	3.1	3.1
Operating Charge, Typical (lb)†	22	23	23	28
COMPRESSOR	Reciprocating, Semi-Hermetic			
Model	06DD824	06DD328	06DD537	06EA250
No. Cylinders	6	6	6	4
Speed (rpm)	1750			
Capacity Steps (%)				
Accessory	33**,66,100	33**,66,100	33**,66,100	—
Standard	66,100	66,100	66,100	50,100
Crankcase Heater Watts	125			
Unloader Setting (psig)				
Load	70 ± 1			
Unload	60 ± 2			
OIL CHARGE (pt)	10	10	10	15.5
CONDENSER FANS	Axial Flow, Direct Drive			
Quantity...Diameter (in.)	2...26			
Nominal Hp	½			
Nominal Airflow (cfm, total)	11,000			
Speed (rpm)	1,075			
Watts (total)	1,460			
CONDENSER COIL	Copper Tubes, Aluminum Fins			
Rows...Fins/in.	2...15	3...15	3...15	3...15
Total Face Area (sq ft)	29.2	29.2	29.2	29.2
Storage Capacity (lb)††	27.2	40.3	39.8	39.8
CONTROLS				
Pressurestat (psig)				
High Pressure				
Cutout	395 ± 10			
Cut-in	295 ± 20			
Low Pressure				
Cutout	27 ± 4			
Cut-in	67 + 7			
FAN CYCLING CONTROLS				
No 2 Fan:				
Close (psig)	255 ± 10			
Open (psig)	160 ± 10			
PRESSURE RELIEF	Fusible Plug			
Location	Compressor	Compressor	Compressor	Liquid Line
Temperature (F)	200	200	200	210
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			
Hot Gas Stub	⅜			

*Unit is factory supplied with holding charge only.
†With 25 ft of interconnecting piping. Operating charge is approximate for maximum system capacity.
**Indicates capacity step (%) with electric unloader accessory.
††Storage capacity is measured at liquid saturated temperatures of 125 F for 38AKS013, 123 F for 38AKS014, and 130 F for 38AKS016 and 024.

Table 1B — Physical Data (SI, 60 Hz)

UNIT 38AKS	013	014	016	024
OPERATING WEIGHT (kg)				
With Aluminum-Fin Coil	332	353	358	408
With Copper-Fin Coil	374	417	421	472
REFRIGERANT*	R-22			
Shipping Charge (kg)	0.95	1.40	1.40	1.40
Operating Charge, Typical (kg)†	10.0	10.4	10.4	12.7
COMPRESSOR	Reciprocating, Semi-Hermetic			
Model	06DD824	06DD328	06DD537	06EA250
No. Cylinders	6	6	6	4
Speed (r/s)	29.2			
Capacity Steps				
Accessory	33**,66,100	33**,66,100	33**,66,100	—
Standard	66,100	66,100	66,100	50,100
Crankcase Heater Watts	125			
Unloader Setting (kPa)				
Load	483 ± 6.9			
Unload	414 ± 13.8			
OIL CHARGE (L)	4.73	4.73	4.73	7.33
CONDENSER FANS	Axial Flow, Direct Drive			
Quantity...Diameter (mm)	2...660			
Nominal kW	0.37			
Nominal Airflow (L/s, total)	5566			
Speed (r/s)	17.9			
Watts (total)	1460			
CONDENSER COIL	Copper Tubes, Aluminum Fins			
Rows...Fins/m	2...590	3...590	3...590	3...590
Total Face Area (sq m)	2.71	2.71	2.71	2.71
Storage Capacity (kg)††	12.3	18.3	18.1	18.1
CONTROLS				
Pressurestat (kPa)				
High Pressure				
Cutout	2724 ± 69			
Cut-in	2034 ± 138			
Low Pressure				
Cutout	186 ± 28			
Cut-in	462 + 48			
FAN CYCLING CONTROLS				
No 2 Fan:				
Close (kPa)	1758 ± 69			
Open (kPa)	1103 ± 69			
PRESSURE RELIEF	Fusible Plug			
Location	Compressor	Compressor	Compressor	Liquid Line
Temperature (C)	93.3	93.3	93.3	98.9
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			
Hot Gas Stub	⅜			

*Unit is factory supplied with holding charge only.
†With 7.6 m of interconnecting piping. Operating charge is approximate for maximum system capacity.
**Indicates capacity step (%) with electric unloader accessory.
††Storage capacity is measured at liquid saturated temperatures of 51.7 C for 38AKS013, 50.6 C for 38AKS014, and 54.4 C for 38AKS016 and 024.

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

UNIT 38AKS	013	014	016	024
OPERATING WEIGHT (lb)				
With Aluminum-Fin Coil	732	779	789	900
With Copper-Fin Coil	825	919	929	1040
REFRIGERANT*	R-22			
Shipping Charge (lb)	2.1	3.1	3.1	3.1
Operating Charge, Typical (lb)†	22	23	23	28
COMPRESSOR	Reciprocating, Semi-Hermetic			
Model	06DD824	06DD328	06DD537	06EA250
No. Cylinders	6	6	6	4
Speed (rpm)	1450			
Capacity Steps				
Accessory	33**,66,100	33**,66,100	33**,66,100	—
Standard	66,100	66,100	66,100	50,100
Crankcase Heater Watts	125			
Unloader Setting (psig)				
Load	70 ± 1			
Unload	60 ± 2			
OIL CHARGE (pt)	10	10	10	15.5
CONDENSER FANS	Axial Flow, Direct Drive			
Quantity...Diameter (in.)	2...26			
Nominal Hp	½			
Nominal Airflow (cfm, total)	9210			
Speed (rpm)	900			
Watts (total)	1050			
CONDENSER COIL	Copper Tubes, Aluminum Fins			
Rows...Fins/in.	2...15	3...15	3...15	3...15
Total Face Area (sq ft)	29.2	29.2	29.2	29.2
Storage Capacity (lb)††	27.2	40.3	39.8	39.8
CONTROLS				
Pressurestat (psig)				
High Pressure				
Cutout	395 ± 10			
Cut-in	295 ± 20			
Low Pressure				
Cutout	27 ± 4			
Cut-in	67 + 7			
FAN CYCLING CONTROLS				
No 2 Fan:				
Close (psig)	255 ± 10			
Open (psig)	160 ± 10			
PRESSURE RELIEF	Fusible Plug			
Location	Compressor	Compressor	Compressor	Liquid Line
Temperature (F)	200	200	200	210
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			
Hot Gas Stub	⅜			

*Unit is factory supplied with holding charge only.
†With 25 ft of interconnecting piping. Operating charge is approximate for maximum system capacity.
**Indicates capacity step (%) with electric unloader accessory.
††Storage capacity is measured at liquid saturated temperatures of 125 F for 38AKS013, 123 F for 38AKS014, and 130 F for 38AKS016 and 024.

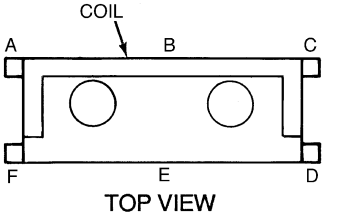
Table 1D — Physical Data (SI, 50 Hz)

UNIT 38AKS	013	014	016	024
OPERATING WEIGHT (kg)				
With Aluminum-Fin Coil	332	353	358	408
With Copper-Fin Coil	374	417	421	472
REFRIGERANT*	R-22			
Shipping Charge (kg)	0.95	1.40	1.40	1.40
Operating Charge, Typical (kg)†	10.0	10.4	10.4	12.7
COMPRESSOR	Reciprocating, Semi-Hermetic			
Model	06DD824	06DD328	06DD537	06EA250
No. Cylinders	6	6	6	4
Speed (r/s)	24.2			
Capacity Steps				
Accessory	33**,66,100	33**,66,100	33**,66,100	—
Standard	66,100	66,100	66,100	50,100
Crankcase Heater Watts	125			
Unloader Setting (kPa)				
Load	483 ± 6.9			
Unload	414 ± 13.8			
OIL CHARGE (L)	4.73	4.73	4.73	7.33
CONDENSER FANS	Axial Flow, Direct Drive			
Quantity...Diameter (mm)	2...660			
Nominal kW	0.37			
Nominal Airflow (L/s, total)	4660			
Speed (r/s)	15.0			
Watts (total)	1050			
CONDENSER COIL	Copper Tubes, Aluminum Fins			
Rows...Fins/m	2...590	3...590	3...590	3...590
Total Face Area (sq m)	2.71	2.71	2.71	2.71
Storage Capacity (kg)††	12.3	18.3	18.1	18.1
CONTROLS				
Pressurestat (kPa)				
High Pressure				
Cutout	2724 ± 69			
Cut-in	2034 ± 138			
Low Pressure				
Cutout	186 ± 28			
Cut-in	462 + 48			
FAN CYCLING CONTROLS				
No 2 Fan:				
Close (kPa)	1758 ± 69			
Open (kPa)	1103 ± 69			
PRESSURE RELIEF	Fusible Plug			
Location	Compressor	Compressor	Compressor	Liquid Line
Temperature (C)	93.3	93.3	93.3	98.9
PIPING CONNECTIONS (in. ODM)				
Suction	1⅛	1⅜	1⅜	1⅝
Liquid	⅝			
Hot Gas Stub	⅜			

*Unit is factory supplied with holding charge only.
†With 7.6 m of interconnecting piping. Operating charge is approximate for maximum system capacity.
**Indicates capacity step (%) with electric unloader accessory.
††Storage capacity is measured at liquid saturated temperatures of 51.7 C for 38AKS013, 50.6 C for 38AKS014, and 54.4 C for 38AKS016 and 024.

Table 2 — Weight Distribution

UNIT 38AKS	WEIGHT													
	Total Operating		Support Point											
			A		B		C		D		E		F	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
013	732	332	94	43	93	42	93	42	149	68	151	68	152	69
013C	825	374	119	54	116	53	115	52	157	71	159	72	159	72
014	779	353	95	43	94	43	94	43	164	74	166	75	166	75
014C	919	417	131	59	129	59	128	58	176	80	177	80	178	81
016	789	358	95	43	95	43	96	44	167	76	168	76	168	76
016C	929	421	131	59	130	59	130	59	178	81	180	82	180	82
024	900	408	119	54	114	52	113	51	179	81	185	84	190	86
024C	1040	472	155	70	150	68	146	66	191	87	196	89	202	92



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.**

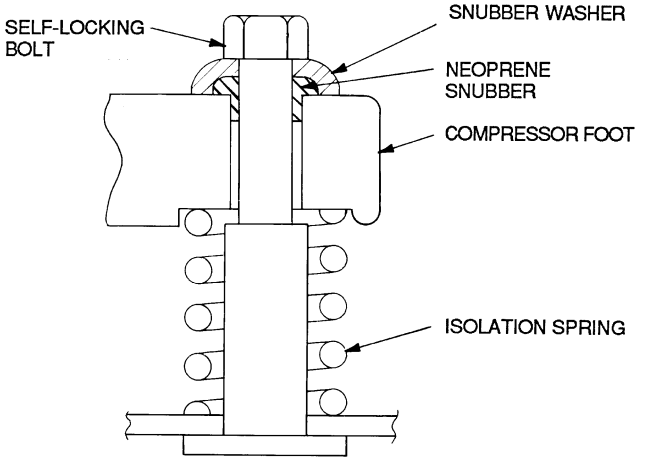


Fig. 3 — Compressor Mounting

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 3-5B and also refer to Part 3 of Carrier System Design Manual and E20-II® software for design details and line sizing. Refer to indoor unit installation instructions for additional information.

NOTE: Use the piping data in Tables 3-5B as a general guide only. For more precise calculations, refer to Carrier System Design manual or E20-II software.

Condensing units with multiple-step unloading *may require double suction risers* to assure proper oil return at minimum load operating condition. See Tables 4A-5B and Fig. 4. Reduction of evaporator coil surface should be analyzed to provide sufficient refrigerant velocity to return oil to the compressor. Liquid line solenoid valves may be used in certain situations to accomplish this. Hot gas bypass, if used, should be introduced before the evaporator.

Note that refrigerant suction piping should be insulated.

Table 3 — Liquid Line Data

UNIT 38AKS	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)
013	52 (15.8)		7 (48.3)	2 (1.1)	5/8 (15.88)
014	67 (20.4)				
016	82 (25.0				
024	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 Units

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
013	½	1⅛	½	1⅛	⅝	1⅜	⅝	1⅜	⅝	1⅝*
014	½	1⅛	½	1⅜	⅝	1⅜	⅝	1⅝*	⅞	1⅝*
016	½	1⅜	⅝	1⅜	⅝	1⅝	⅞	1⅝	⅞	2⅛*
024	⅝	1⅝	⅝	1⅝	⅞	1⅝	⅞	2⅛	⅞	2⅛

LEGEND

L — Liquid
S — Suction

Close-coupled.

*Requires a double suction riser if 2 unloaders are used and the evaporator is below the condensing unit. See Table 4B and Fig. 4 for more information.

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.
3. Line size conversion to mm:

in.	mm
½	12.7
⅝	15.9
⅞	22.2
1⅛	28.6
1⅜	34.9
1⅝	41.3
2⅛	54.0

Table 4B — Refrigerant Piping Sizes, Double Suction Risers — 60 Hz Units

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)					
	50-75 (15-23)			75-100 (23-30)		
	Line Size (in. OD)					
	A	B	C	A	B	C
013	—	—	—	1⅛	1⅜	1⅝
014	1⅛	1⅜	1⅝	1⅛	1⅜	1⅝
016	—	—	—	1⅜	1⅝	2⅛

NOTES:
1. See Fig. 4 for "A," "B," and "C" dimensions.
2. No double suction risers are needed for unit size 024.
3. See Table 4A for line size conversion to mm.

Table 5A — Refrigerant Piping Sizes — 50 Hz Units

COND 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
013	½	1⅛	½	1⅛	⅝	1⅜	⅝	1⅜	⅝	1⅜*
014	½	1⅛	⅝	1⅜	⅝	1⅜	⅞	1⅝*	⅞	1⅝*
016	⅝	1⅜	⅝	1⅜	⅝	1⅝*	⅞	1⅝*	⅞	1⅝*
024	⅝	1⅜	⅝	1⅜	⅝	1⅝	⅞	1⅝	⅞	1⅝

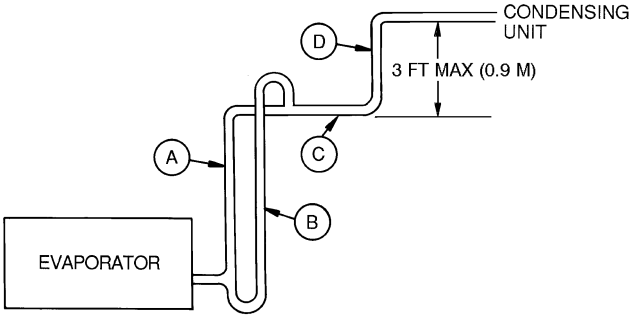
*Requires a double suction riser if 2 unloaders are used and the evaporator is below the condensing unit. See Table 5B and Fig. 4 for more information.

NOTES:
1. Pipe sizes are based on 2 F (1.1 C) max loss for liquid lines and 1.5 F (0.8 C) max loss for suction lines, selected at maximum length for each interval and for matched systems at nominal rating conditions, nominal airflow.
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.
3. See Table 4A for line size conversion to mm.

Table 5B — Refrigerant Piping Sizes, Double Suction Risers — 50 Hz Units

COND UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING FT (M)								
	25-50 (7.5-15)			50-75 (15-23)			75-100 (23-30)		
	Line Size (in. OD)								
	A	B	C	A	B	C	A	B	C
013	—	—	—	—	—	—	1⅛	1⅜	1⅝
014	—	—	—	1⅛	1⅜	1⅝	1⅛	1⅜	1⅝
016	1⅛	1⅜	1⅝	1⅛	1⅜	1⅝	1⅛	1⅜	1⅝

NOTES:
1. See Fig. 4 for "A," "B," and "C" dimensions.
2. Double suction risers are not required for unit size 024.
3. See Table 4A for line size conversion to mm.



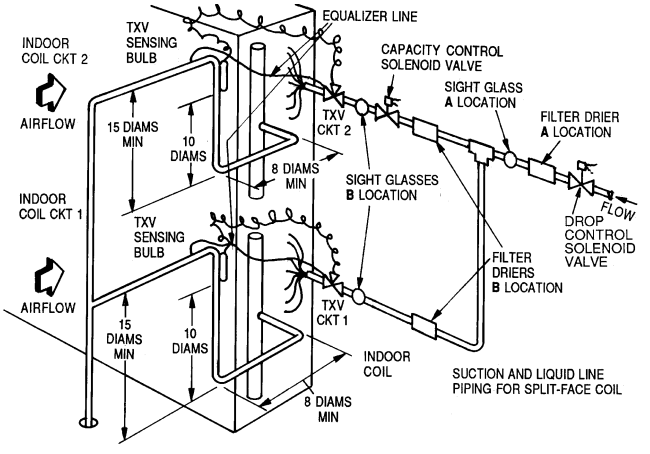
LEGEND

(A) Suction Riser *Without* Trap
(B) Suction Riser *With* Trap
(C) Suction Line to Condensing Unit
(D) Short Vertical Riser Into Condensing Unit:
38AKS013 — 1⅛ in. OD
38AKS014,016 — 1⅜ in. OD
38AKS024 — 1⅝ in. OD

Fig. 4 — Suction Line Piping

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. 5. 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 — Thermostatic Expansion Valve

Fig. 5 — 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. 5) between condensing unit (38AKS) and fan coil (40RM, 39 Series). (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 a 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. 5.

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.

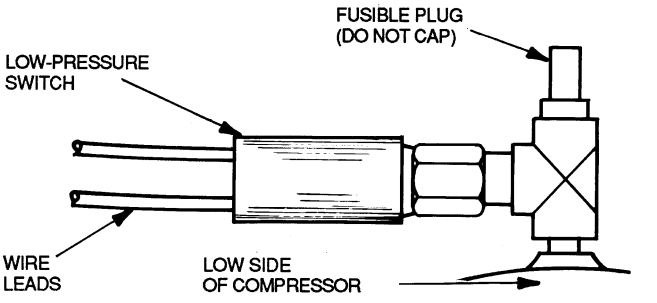
⚠ WARNING

Recover holding charge prior to removal of runaround piping loop.

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 a field-supplied liquid moisture indicator in the piping immediately leaving outdoor unit.
6. If necessary, install field-supplied thermostatic expansion valve(s) (TXVs) in air handler.

If 2 TXVs are installed and two-step cooling is desired, install field-supplied liquid line solenoid valve ahead of the upper TXV (see Fig. 5).

PROVIDE SAFETY RELIEF — A fusible plug is located on the compressor crankcase or in the liquid line (Fig. 6). 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. 6 — Location of Fusible Plug (38AKS)

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.

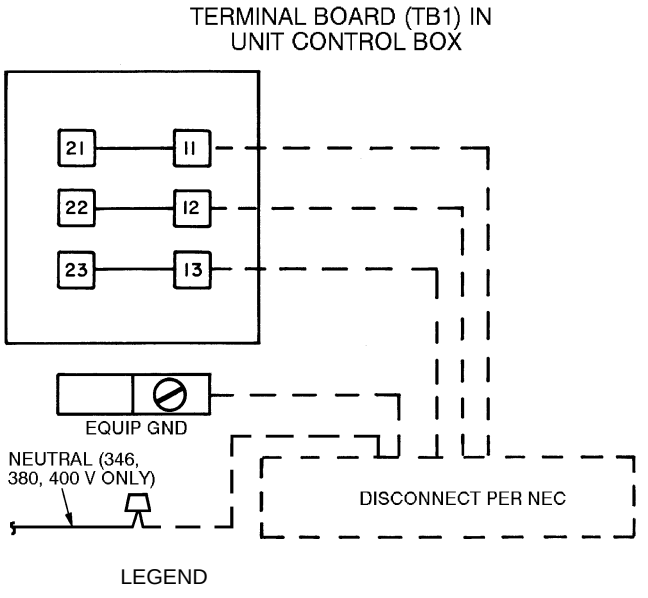
Step 5 — Complete Electrical Connections

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 6A and 6B.

Route power wires through opening in unit end panel to connection in unit control box as shown on unit label diagram and in Fig. 7. Unit must be grounded.

Affix crankcase heater warning sticker to unit disconnect switch.

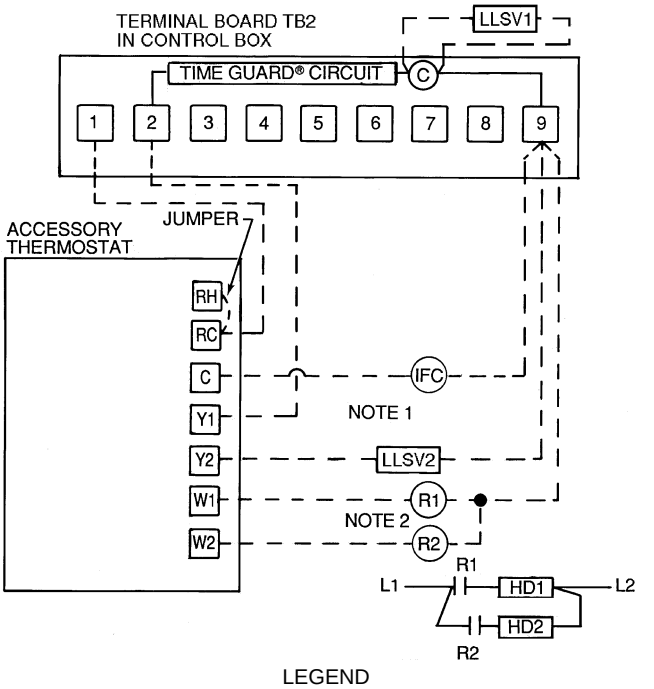
CONTROL CIRCUIT WIRING — Control voltage is 24 v. See Fig. 8 and unit label diagram for field-supplied wiring details. Route control wires through opening in unit end panel to connection in unit control box.



LEGEND

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

Fig. 7 — Main Power Supply Wiring



LEGEND

C — Compressor Contactor
HD — Heating Device
IFC — Indoor-Fan Contactor
LLSV1 — Liquid Line Solenoid Valve 1 — Refrigerant Migration Control
LLSV2 — Liquid Line Solenoid Valve 2 — Capacity Control
R — Relay
——— Factory Wiring
– – – – Field Wiring

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 (60 Hz) or 38AD900003 (50 Hz and 380-3-60).

Fig. 8 — Remote Thermostat Wiring

Table 6A — Electrical Data (3 Ph/60 Hz)

UNIT 38AKS	UNIT							COMPR		FAN MOTORS (Single Phase)			
	Model	Volts			MCA	ICF	MOCP (Fuse Only)	RLA	LRA	Total Fans	FLA (ea) Fan No.		kW
		Nameplate	Supplied*								1	2	
			Min	Max									
013	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	
014	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	
016	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	
024	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	

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).

Table 6B — Electrical Data (3 Ph/50 Hz)

UNIT 38AKS	UNIT							COMPR		FAN MOTORS 230 v (Single Phase)			
	Model	Volts			MCA	ICF	MOCP (Fuse Only)	RLA	LRA	Total Fans	FLA (ea) Fan No.		kW
		Nameplate	Supplied*								1	2	
			Min	Max									
013	803 903	230 400	198 342	264 457	47.5 31.4	134 80	75 50	32.9 20.0	128 74	2	2.9	3.5	1.20
014	803 903	230 400	198 342	264 457	51.0 34.0	149 89	75 50	35.7 22.1	143 83	2	2.9	3.5	1.20
016	803 903	230 400	198 342	264 457	66.9 43.0	206 121	100 60	47.9 29.3	200 115	2	2.9	3.5	1.20
024	803 303 903	230 346 400	198 311 342	254 380 440	91.8 51.5 50.2	213 121 179	150 80 80	67.9 33.3 34.6	207 115 173	2	2.9	3.5	1.20

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

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. If unit has field-installed accessories, be sure all are properly installed and correctly wired. If used, airflow switch must be properly installed.
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, this page.
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 8, and Fig. 3 for loosening compressor bolts.

Leak Test and Dehydration — Leak test the entire refrigerant system using soap bubbles and/or an electronic leak detector. Evacuate and dehydrate entire refrigerant system by use of methods described in GTAC II, Module 4, System Dehydration.

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 — Refer to GTAC II, Module 5, Charging, Recovery, Recycling, and Reclamation for charging methods and procedures. Charge each system with R-22 by the liquid charging method (through liquid service valve) on the high side. Charge according to the values in the Charging Chart, Fig. 10, 11, or 12.

START-UP

Compressor crankcase heater must be on for 24 hours before start-up. After the heater has been on for 24 hours, the unit can be started. If no time has elapsed since the preliminary charge step has been completed, it is unnecessary to wait the 24-hour period.

Preliminary Checks

1. Ensure that compressor service valves are backseated.
2. Verify that each compressor floats freely on its mounting springs.
3. Check that electric power supply agrees with 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 and dehydrate as previously outlined in Pre-Start-Up section, Leak Test and Dehydration.
9. All internal wiring connections must be tight, and all barriers and covers must be in place.

Preliminary Oil Charge — Compressor is factory charged with oil (see Tables 1A-1D). 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:

Petroleum Specialties Inc. . . . . Cryol 150A

Texaco, 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.

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.

After starting, there is a delay of at least 3 seconds before compressor starts.

⚠ 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 refrigeration mechanic.

With all fans operating, adjust the refrigerant charge in accordance with the unit charging charts located on the inside of the control box doors and in Fig. 10-12.

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.

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 charged 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.

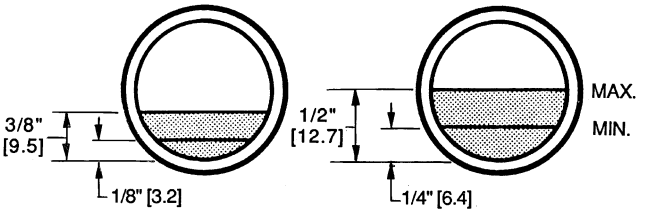
Check Compressor Oil Level — After adjusting the refrigerant charge, allow the compressor to run fully loaded for 20 minutes. Running oil level should be within view of the crankcase sight glass. Stop the compressor at the field power supply disconnect and check the crankcase oil level. Add oil only 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, this page, 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.

Unload the compressor by turning the control set point adjustment nut counterclockwise until the adjustment nut stops. The unloader is now at 0 psig (0 kPag) set point. If electric actuated unloaders are installed, energize the solenoid to unload the compressor.

Return unloader to original setting after checks are complete.



38AKS024 (06E COMPRESSOR) | 38AKS013,014,016 (06D COMPRESSOR)

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.

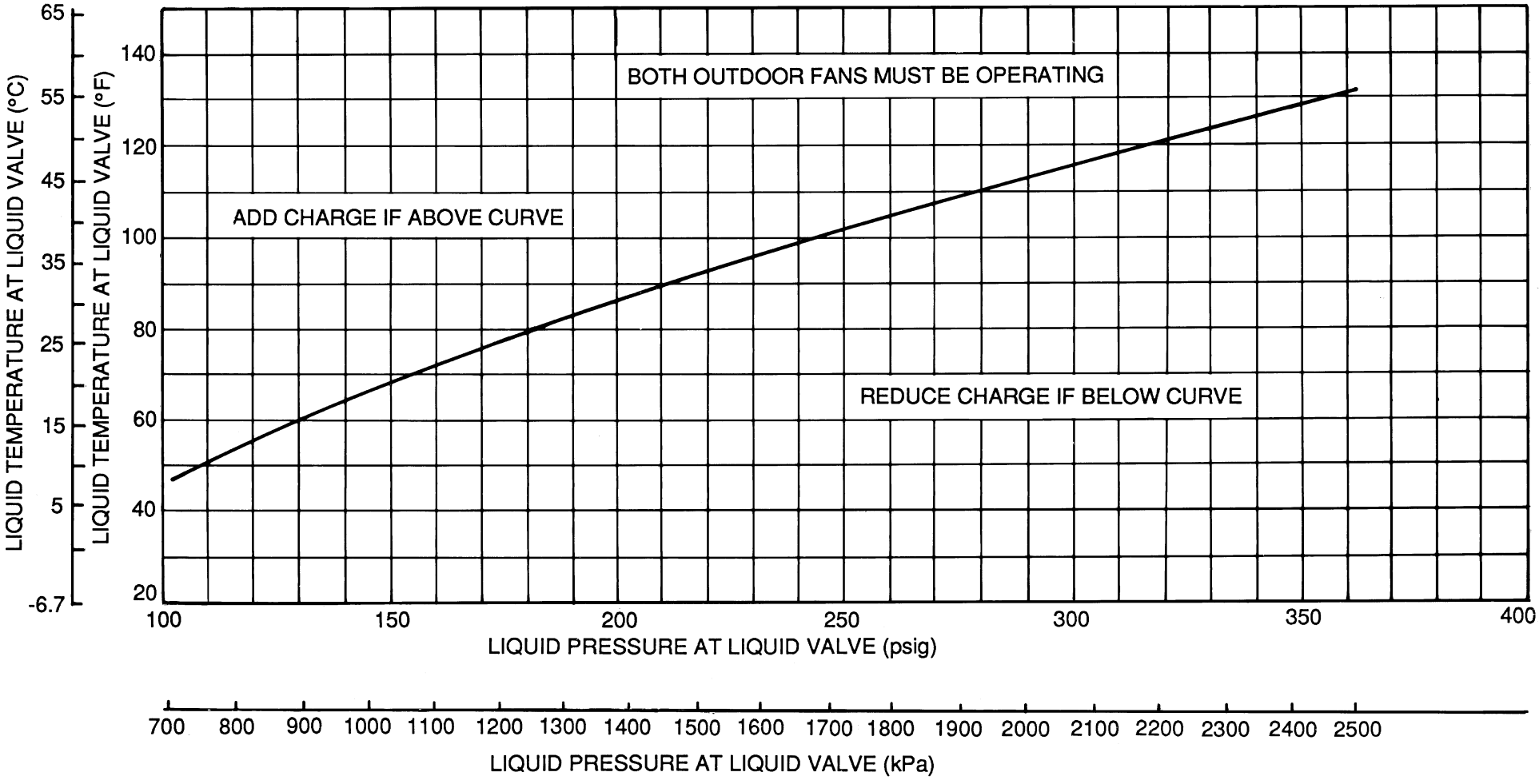


Fig. 10 — 38AKS013 and 38AKS024 Charging Chart

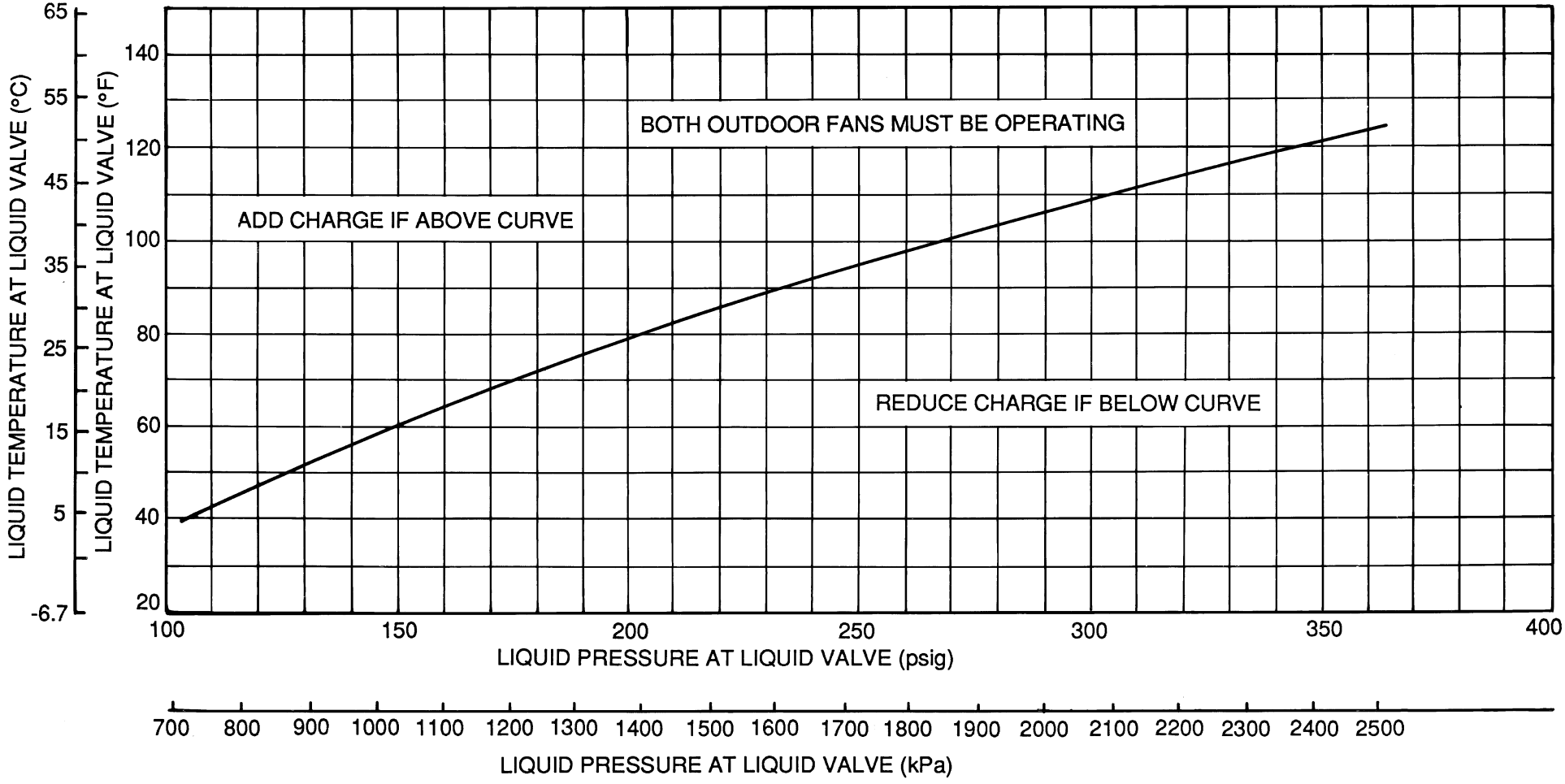


Fig. 11 — 38AKS014 Charging Chart

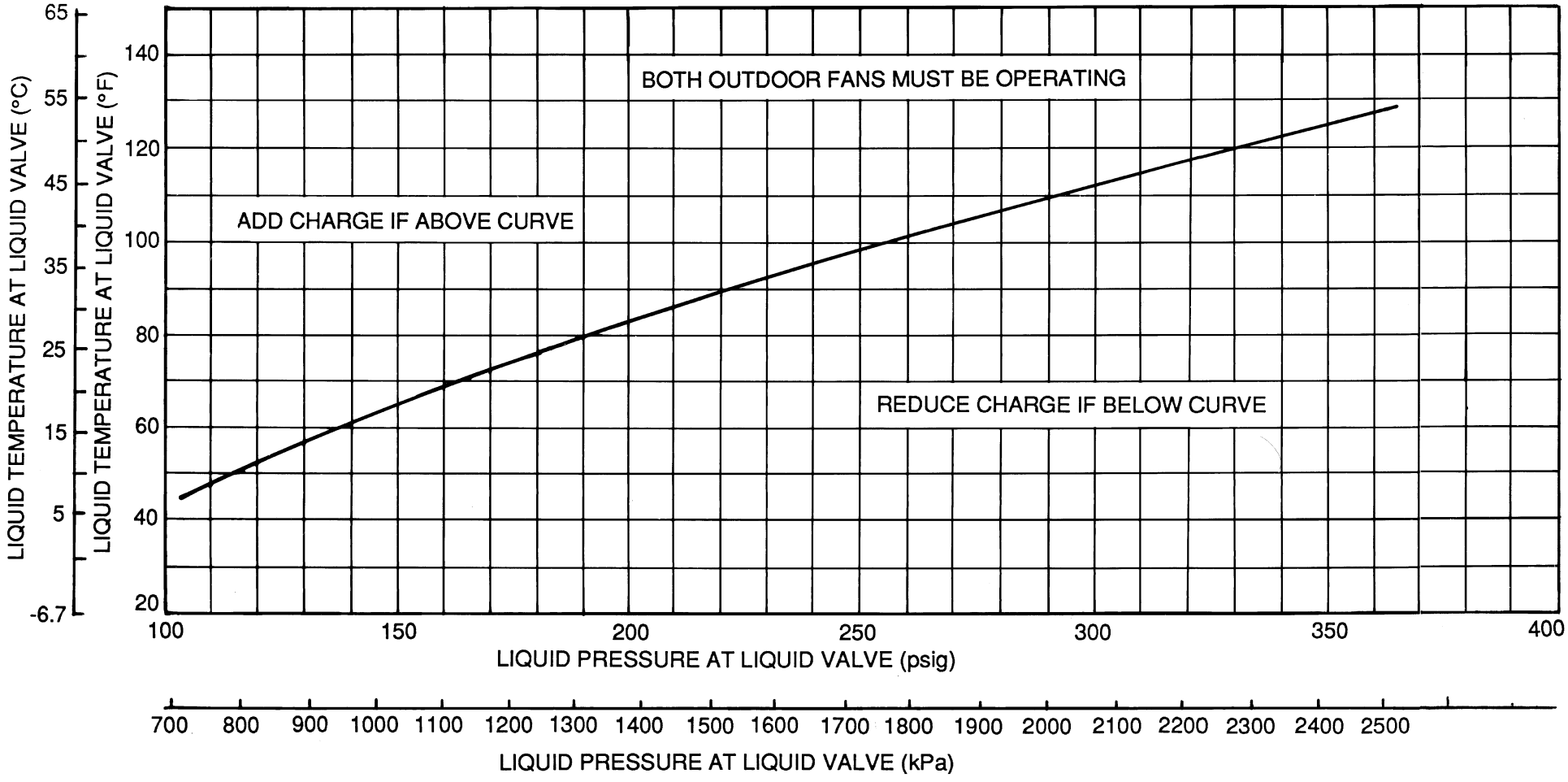


Fig. 12 — 38AKS016 Charging Chart

OPERATING SEQUENCE

Cooling — When the first stage (TC1) of the cooling thermostat closes, the timer starts. After approximately 3 seconds, the timer expires, energizing the compressor and fan motor no. 1. 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 unit fan cycles with the compressor. When the switch is set at ON, the indoor unit 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 unit relay. When the fan switch is set at AUTO, the indoor unit fan cycles with the heating control. The indoor unit fan runs continuously when the fan switch is set at ON.

Causes of complete unit shutdown are: interruption of supplied power, open compressor internal protector (IP), open control circuit breaker, or an open high- or low-pressure safety switch.

Fan Cycling — Head pressure control is accomplished by cycling the fans. The no. 2 fan responds to liquid line pressure, cycling on at approximately 255 psig (1758 kPa) and off at approximately 160 psig (1103 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. 13) 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 kPag). To adjust, turn pressure differential adjustment screw (Fig. 13) counterclockwise to its back stop position. In this position, differential is 6 psig (41.4 kPag). Next, turn adjustment clockwise to desired pressure differential setting. Every full turn clockwise increases differential by 1.5 psig (10.3 kPag).

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 160 ± 10 psig (1103 ± 69 kPa) as pressure decreases, and cycles it back on at 255 ± 10 psig (1758 ± 69 kPa).

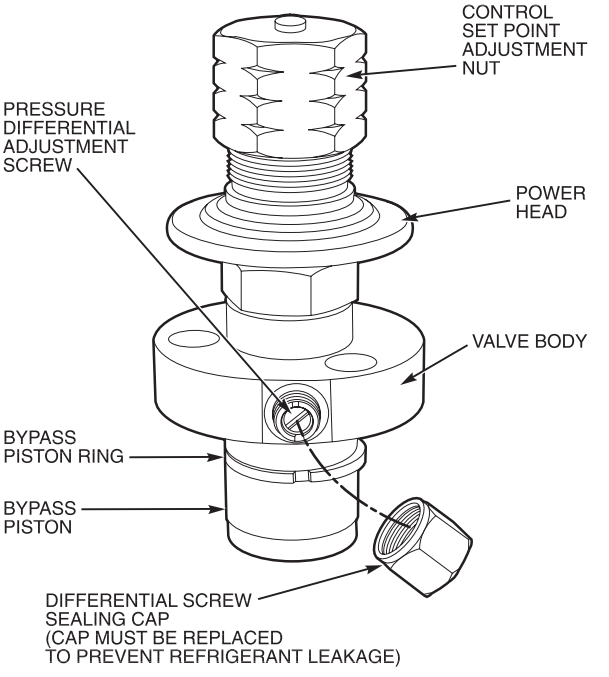


Fig. 13 — Compressor Capacity Control Unloader

Time Guard II Circuit — 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. 14 and to label diagram on unit.

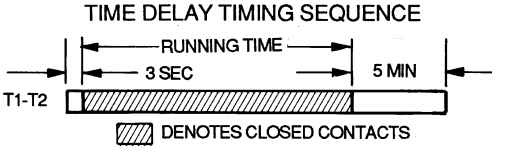


Fig. 14 — Timer Sequence Chart

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 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 whenever the crankcase heater is deenergized for more than 6 hours. The crankcase heater is operable as long as the control circuit is energized.

Compressor Protection

CIRCUIT BREAKER — Calibrated trip manual reset, ambient compensated, magnetic breaker protects against motor overload and locked rotor conditions.

COMPRESSOR OVERTEMPERATURE PROTECTION (IP) — A thermostat installed on compressor motor winding reacts to excessively high winding temperatures and shuts off the compressor.

TIME GUARD® II 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 shut down 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 1A-1D, 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 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 15 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 low velocity water, blown out with low-pressure compressed air, or brushed *(do not use wire brush)*. Fan motors are drip-proof but not waterproof. Do NOT use acid cleaners.

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 (38AKS013) or 3 rows of fins (38AKS014-024) 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. 16.
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. 17.
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.

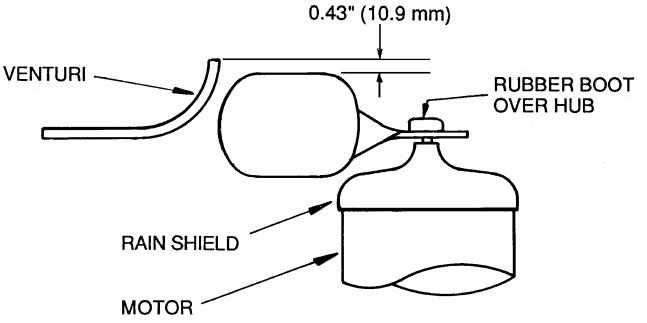


Fig. 15 — Outdoor Fan

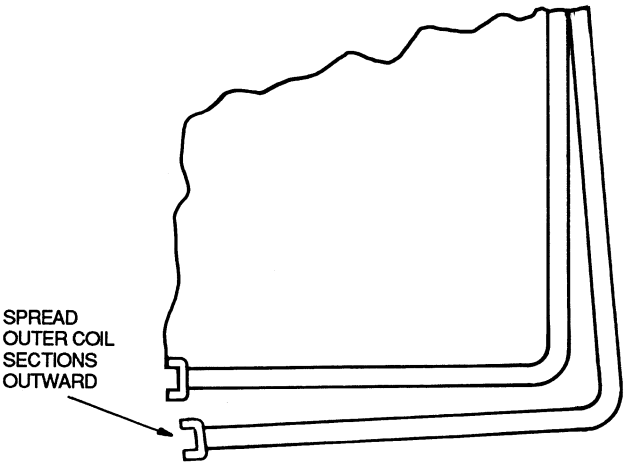


Fig. 17 — Coil Cleaning (Typical)

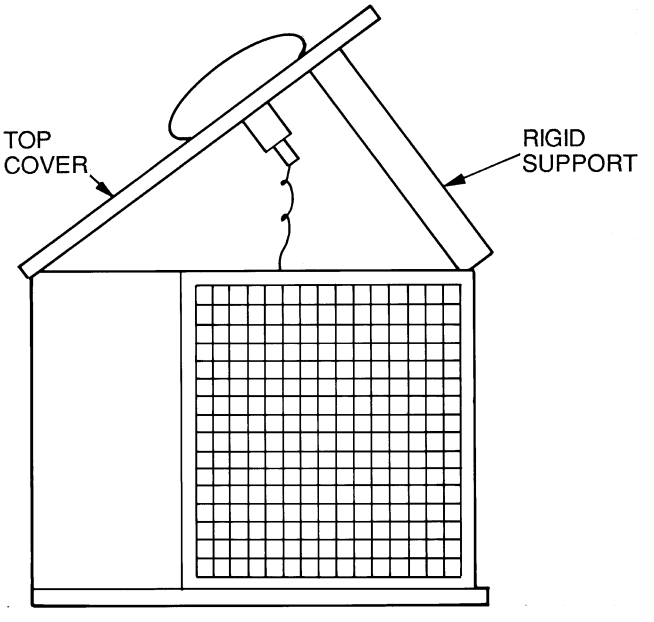


Fig. 16 — Pivot and Support Top Cover

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 control circuit breaker; reset if tripped or replace if defective.
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. Recover refrigerant and recharge as required.
6. Refrigerant overcharge.	6. Recover refrigerant 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.

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 INDOOR COILS AS REQUIRED? (Y/N) _____

HAVE LEAK CHECKS BEEN MADE AT COMPRESSOR, OUTDOOR AND INDOOR COILS, 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.

C. Start-Up

CHECK INDOOR UNIT FAN SPEED AND RECORD. _____

CHECK OUTDOOR UNIT 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 OUTDOOR UNIT AIR TEMP	_____
LEAVING OUTDOOR UNIT AIR TEMP	_____
INDOOR UNIT ENTERING-AIR DB (dry bulb) TEMP	_____
INDOOR UNIT ENTERING-AIR WB (wet bulb) TEMP	_____
INDOOR UNIT LEAVING-AIR DB TEMP	_____
INDOOR UNIT 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:

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE