



Installation, Start-Up and Service Instructions

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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.
- See Table 1A or 1B for physical data.

	<p style="text-align: center; margin: 0;">ELECTRIC SHOCK HAZARD</p> <p style="margin: 0;">Open all remote disconnects before servicing this equipment.</p>
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BEFORE INSTALLATION

Rigging — Preferred method is with spreader bars from above the unit. Use 2-in. (50 mm) OD pipe or hooks in lifting holes. Rig with 4 cables and spreader bars. All panels must be in place when rigging. See rigging label on unit for details concerning shipping weights, distance between lifting holes, center of gravity, and spreader bar dimensions. See Fig. 2.

If overhead rigging is not possible, place unit on skid or pad for rolling or dragging. When rolling, use minimum of 3 rollers. When dragging, pull the pad. *Do not apply force to the unit.* When in final position, raise from above to lift unit off pad.

<p>⚠ CAUTION</p> <p>All panels must be in place when rigging.</p>
--

Table 1A — Physical Data — English

UNIT 38AKS	028	034	044
COMPRESSOR No. ...Type No. Cyls (ea)...Speed, Rpm (60/50 Hz) Capacity Steps Oil Charge*, Pt Oil Pressure Switch (psi) Set Points — Cutout Differential — Cut-in Crankcase Heater (watts) Protection Capacity Control (Psig) No. 1 Load Unload No. 2 Load Unload	1...06E9265 20.0 76 58 78 60	Reciprocating Semi-Hermetic 1...06E9275 6...1750/1460 3 20.0 6 ± 2 14 Max. 180 See Note Suction Pressure Unloader(s) Unloader Settings 76 58 Unloader Settings 78 60	1...06E9299 19.0 76 58 78 60
REFRIGERANT CHARGE, R-22 Approximate lb	30.5	43.5	65
COIL STORAGE (at 125 F liquid temperature and 80% full), lb	37.7	56.6	84.4
CONDENSER FANS, Type No. ...Diameter, in. Total Airflow, Cfm Speed, Rpm 60/50 Hz		Propeller Type, Direct Driven 2...30 15,700 1140/950	3...30 23,700
CONDENSER COIL, Type Rows...Fins/in. Total Face Area, sq ft	2...19 39.2	Horizontal Plate Fin 3...17 39.2	3...17 58.4

*See Service, Oil Charge, for Carrier-approved oil.

NOTE: Circuit breaker is in main power circuit.

Table 1B — Physical Data — SI

UNIT 38AKS	028	034	044
COMPRESSOR No. ...Type No. Cyls (ea)...Speed, R/s (60/50 Hz) Capacity Steps Oil Charge*, L Oil Pressure Switch (kPa) Set Points — Cutout Differential — Cut-in Crankcase Heater (watts) Protection Capacity Control (kPa) No. 1 Load Unload No. 2 Load Unload	1...06E9265 9.4 524 400 538 414	Reciprocating Semi-Hermetic 1...06E9275 6...29.2/24.3 3 9.4 41.4 ± 13.8 96.5 Max. 180 See Note Suction Pressure Unloader(s) Unloader Settings 524 400 Unloader Settings 538 414	1...06E9299 9.0 524 400 538 414
REFRIGERANT CHARGE, R-22 Approximate, kg	13.8	19.7	29.5
COIL STORAGE (at 52 C liquid temperature and 80% full), kg	17.1	25.7	38.3
CONDENSER FANS, Type No. ...Diameter, mm Total Airflow, L/s Speed, R/s (60/50 Hz)		Propeller Type, Direct Driven 2...762 7,400 19.0/15.8	3...762 11,200 19.0/15.8
CONDENSER COIL, Type Rows...Fins/mm Total Face Area, sq m	2...1.34 3.64	Horizontal Plate Fin 3...1.49 3.64	3...1.49 5.43

*See Service, Oil Charge, for Carrier-approved oil.

NOTE: Circuit breaker is in main power circuit.

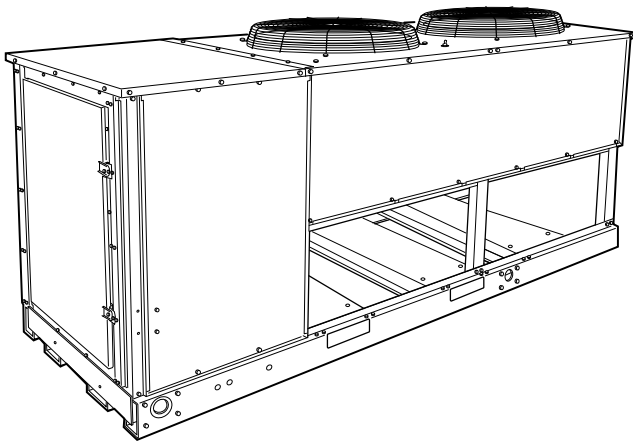
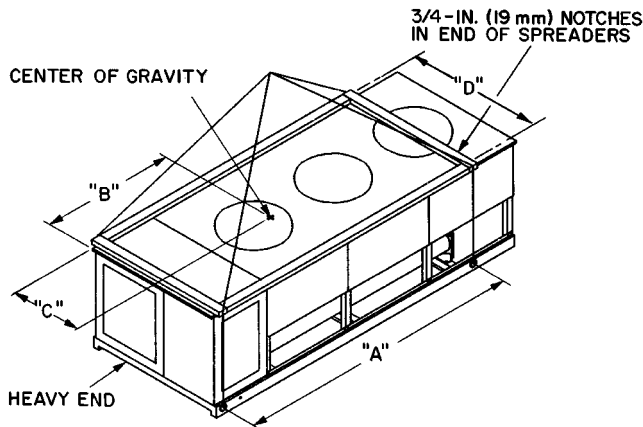


Fig. 1 — 38AKS Units



NOTES:

1. Use 2 in. OD (50 mm) pipe or hooks in lifting holes.
2. Rig with 4 cables and spread with 2 "D" long and two "A" long 2 x 4's in. (50 x 100 mm) or equal.
3. Run the rigging cables to a central suspension point so that the angle from the horizontal is not less than 45 degrees.

⚠ CAUTION

All panels must be in place when rigging.

UNIT 38AKS	MAX SHIP. WT		LIFTING HOLES "A"		CENTER OF GRAVITY				"D"	
					"B"		"C"			
	Lb	Kg	in.	mm	in.	mm	in.	mm	in.	mm
028	1924	872	81	2057	43.0	1092	28.0	711	73.5	1867
034	2115	960	81	2057	43.0	1092	28.0	711	73.5	1867
044	2797	1207	99	2515	49.0	1245	30.5	775	73.5	1867

Fig. 2 — Rigging with Spreader Bars (Field Supplied)

Placing Unit — There must be 4 ft (1220 mm) for service on all sides of unit, and a minimum of 8 ft (2440 mm) clear air space above unit. For multiple units, allow 8 ft (2440 mm) separation between units for airflow and service.

Mounting Unit — When unit is in proper location, use of mounting holes in base rails is recommended for securing unit to supporting structure or for mounting unit on vibration isolators, if required. Fasteners for mounting unit are field supplied. Be sure to mount unit level to ensure proper oil return to compressors.

Compressor Mounting — As shipped, compressor is held down by 4 bolts. After unit is installed loosen each bolt using nut indicated in Fig. 3 until flatwasher (3/8 in. [9.5 mm]) can be moved with finger pressure.

INSTALLATION

Refrigerant Piping Connections — Line sizes depend on length of piping required between condensing unit and evaporator. See Table 2A or 2B. It is important to consider liquid lift and compressor oil return. Refer to Part 3 of Carrier System Design Manual for line sizing information, and Fig. 4 for recommended piping details.

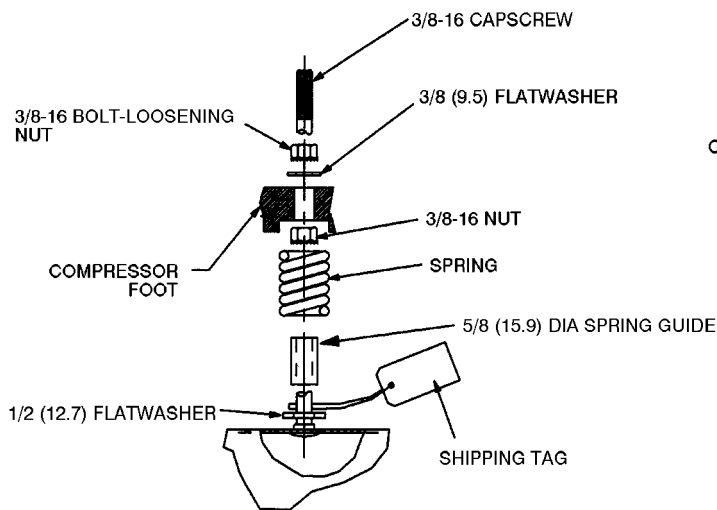
Liquid Line Solenoid Drop Control — The factory-supplied solenoid valve must be installed at the indoor unit (fan coil) per Fig. 5, and wired per wiring label found on unit. The solenoid assures that system refrigerant is in the high-pressure side (condenser and liquid line) of the system during the off cycle. Refrigerant migration is minimized.

Factory-supplied liquid line solenoid valve connecting sizes are 7/8-in. (22.2 mm) ODF for inlet and 7/8-in. (22.2 mm) ODM for outlet.

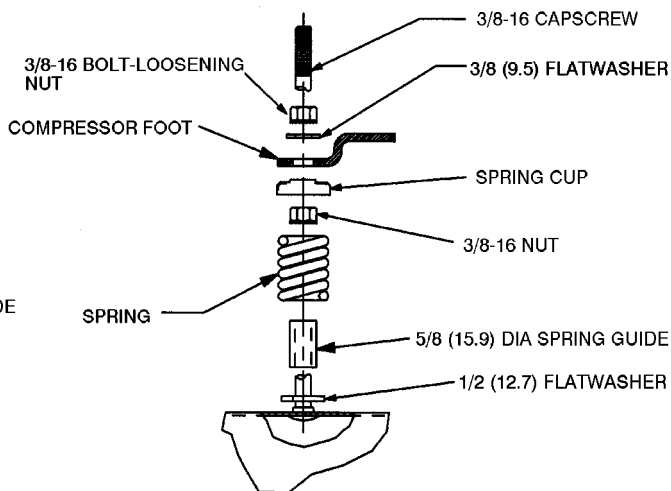
⚠ WARNING

Failure to properly install liquid line solenoid at the indoor unit as described, without Carrier authorization, may VOID warranty.

Filter Drier and Moisture Indicator — Every unit should have a filter drier and a sight glass (moisture indicator) field installed. Select the filter drier for maximum unit capacity and minimum pressure drop. Figure 5 shows recommended locations of filter drier(s) and sight glass. Complete the refrigerant piping from the evaporator to the condenser before opening the liquid and suction lines at the condensing unit. One filter drier may be installed at location A in Fig. 5, or 2 filter driers may be installed at locations B.



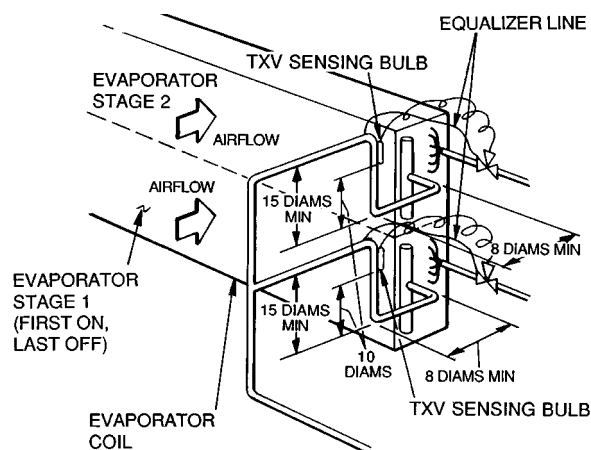
FRONT VIEW



REAR VIEW

NOTE: All dimensions are in inches (mm).

Fig. 3 — Compressor Mounting

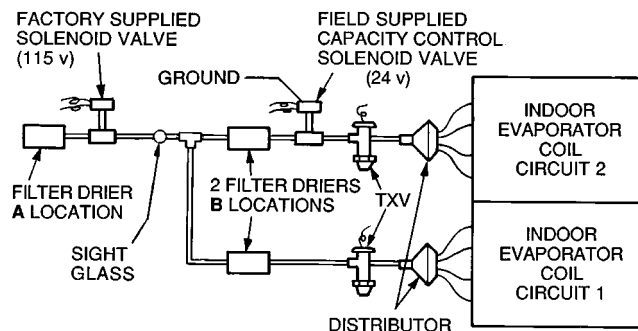


TXV — Thermostatic Expansion Valve

NOTES:

1. Suction line is connected to coil on same side as the entering air.
2. Lower section is first on and last off.
3. For more complete piping information, refer to Carrier System Design Manual, Part 3.

Fig. 4 — Suction Line Piping to Unit with 2 Section Coil Split



TXV — Thermostatic Expansion Valve

Fig. 5 — Liquid Line Solenoid Valve, Filter Drier(s) and Sight Glass Locations

Receiver — No receiver is provided with the unit; it is recommended that one *not* be used.

Piping Procedure — Do not remove run-around pipe from suction and liquid line stubs until piping connections are ready to be made. Pass nitrogen or other inert gas through piping while brazing, to prevent formation of copper oxide.

Install field-supplied thermostatic expansion valve (TXV) in liquid line ahead of each evaporator section. For 2-stage cooling, *the field-supplied capacity control solenoid used must be wired to be opened by control from a 2-stage thermostat.*

SUCTION PIPING AT EVAPORATOR AND TXV BULB LOCATION (See Fig. 5) — The purpose of these recommendations is to achieve good mixing of the refrigerant leaving the evaporator suction header for proper sensing by the TXV bulb.

1. A minimum of two 90° elbows must be installed upstream of the expansion valve bulb location.
2. The TXV sensing bulb should be located on a vertical riser where possible. If a horizontal location is necessary, secure the bulb at approximately the 4 o'clock position.
3. Size the suction line from the evaporator through the riser for high velocity. Enter the suction pipe sizing charts in the Carrier System Design Manual at design tons and equivalent length (for 2° F [1.1° C] loss). If reading falls between 2 sizes on chart, choose the smaller pipe size.

Suction piping for the high velocity section should be selected for about 0.5° F (0.3° C) friction loss. If a 2° F (1.1° C) loss is allowed for the entire suction line, 1.5° F (0.8° C) is left for the balance of the suction line, and it should be sized on that basis. **Check that the high-velocity sizing is adequate for oil return up the riser.**

If an oil return connection at the bottom of this suction header is supplied with an evaporator, this connection must be teed-in ahead of first mixing elbow. When the compressor is below the evaporator, the riser at the evaporator does not have to extend as high as the top level. After a 15-diameter riser has been provided, the suction line may elbow down immediately.

SAFETY RELIEF — A fusible plug is located on unit liquid line before the liquid valve.

Table 2A — Refrigerant Piping Sizes — 60 Hz
SINGLE SUCTION RISERS

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)									
	16-25 (4.9-7.6)		26-50 (7.9-15.2)		51-75 (15.5-22.8)		76-100 (23.2-30.5)		101-200 (30.8-60.9)	
	L	S	L	S	L	S	L	S	L	S
028	7/8	1 1/8	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*
034	7/8	2 1/8	7/8	2 1/8	7/8	2 1/8	1 1/8	2 1/8	1 1/8	2 5/8*
044	7/8	2 1/8	7/8	2 1/8	1 1/8	2 5/8*	1 1/8	2 5/8*	1 1/8	2 5/8*

L — Liquid Line
S — Suction Line

*IMPORTANT — Requires a double suction riser, if evaporator is below condensing unit. See table below.

NOTE: Liquid and suction line sizes are OD (in.) Equivalent sizes in mm are listed below.

DOUBLE SUCTION RISERS — 60 Hz

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)											
	26-50 (7.9-15.2)			51-75 (15.5-22.8)			76-100 (23.2-30.5)			101-200 (30.8-60.9)		
	A	B	C	A	B	C	A	B	C	A	B	C
028	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8
034	—	—	—	—	—	—	—	—	—	1 5/8	2 1/8	2 5/8
044	—	—	—	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8

NOTE: A, B, C dimensions relate to reference diagram.

Table 2B — Refrigerant Piping Sizes — 50 Hz
SINGLE SUCTION RISERS

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)									
	16-25 (4.9-7.6)		26-50 (7.9-15.2)		51-75 (15.5-22.8)		76-100 (23.2-30.5)		101-200 (30.8-60.9)	
	L	S	L	S	L	S	L	S	L	S
028	7/8	1 1/8	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*	7/8	2 1/8*
034	7/8	2 1/8†	7/8	2 1/8*	7/8	2 1/8*	1 1/8	2 5/8*	1 1/8	2 5/8*
044	7/8	2 1/8	7/8	2 1/8	1 1/8	2 5/8*	1 1/8	2 5/8*	1 1/8	2 5/8*

L — Liquid Line
S — Suction Line

*IMPORTANT — Requires a double suction riser, if evaporator is below condensing unit. See table below.

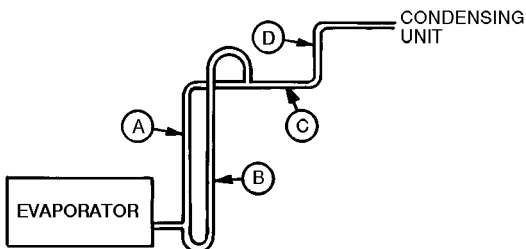
†For riser, use 1 1/8 OD inches.

NOTE: Liquid and suction line sizes are OD (in.) Equivalent sizes in mm are listed below.

DOUBLE SUCTION RISERS — 50 Hz

UNIT 38AKS	LENGTH OF INTERCONNECTING PIPING, FT (M)											
	26-50 (7.9-15.2)			51-75 (15.5-22.8)			76-100 (23.2-30.5)			101-200 (30.8-60.9)		
	A	B	C	A	B	C	A	B	C	A	B	C
028	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8
034	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 5/8
044	—	—	—	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8	1 5/8	2 1/8	2 5/8

NOTE: A, B, C dimensions relate to reference diagram.



- (A) — SUCTION RISER WITHOUT TRAP
- (B) — SUCTION RISER WITH TRAP
- (C) — HORIZONTAL SUCTION LINE TO CONDENSING UNIT
- (D) — SHORT VERTICAL RISER INTO CONDENSING UNIT
SIZED AS FOLLOWS:

Unit Size	Dimension — in. (mm)
028	1 5/8 (41.3)
034	2 1/8 (54.0)
044	2 1/8 (54.0)

MAXIMUM LIQUID LIFT

UNIT 38AKS	60 Hz		50 Hz	
	Ft	M	Ft	M
028	76	23	66	20
034	67	20	60	18
044	76	23	66	20

EQUIVALENT SIZES IN MM

in.	mm
7/8	22.2
1 1/8	28.6
1 3/8	34.9
1 5/8	41.3
2 1/8	54.0
2 5/8	66.7

Power Supply — Electrical characteristics of available power supply must agree with unit nameplate rating. Supply voltage must be within limits shown in Table 3.

closed to prevent an excessive accumulation of refrigerant in the compressor oil.

- Power entry is one end only.
- Maximum field wire sizes allowed by lugs on terminal block are:

UNIT 38AKS	V-Ph-Hz	WIRE SIZE*
028	208/230-3-60	350 kcmil
034	208/230-3-60 230-3-50	
044	208/230-3-60 230-3-50	

LEGEND

AWG — American Wire Gage
kcmil — Thousand Circular Mils
*All other units use 2/0 AWG (67.4 mm²).

IMPORTANT: Operating unit on improper supply voltage, or with excessive phase imbalance, constitutes abuse and may affect Carrier warranty. See Unbalanced 3-Phase Supply Voltage, page 7.

Power Wiring — All power wiring must comply with applicable local and national codes. Install field-supplied branch circuit fused disconnect(s) per NEC (National Electrical Code, U.S.A.) of a type that can be locked OFF or OPEN. Disconnect(s) must be within sight from and readily accessible from unit in compliance with NEC Article 440-14.

GENERAL WIRING NOTES

- A crankcase heater is wired in the control circuit so it is always operable as long as power supply disconnect is on, even if any safety device is open or unit stop-start switch is off. It is protected by a 5-amp circuit breaker in control power.
- The power circuit field supply disconnect should never be open except when unit is being serviced or is to be down for a prolonged period. When operation is resumed, crankcase heater should be energized for 24 hours before start-up. If unit is to be shut down for a prolonged period, it is recommended that the suction and discharge valves be

- Terminals for field power supply are suitable for copper, copper-clad aluminum, or aluminum conductors. Insulation must be rated 167 F (75 C) minimum.

CONDENSER FANS — The fans must rotate counterclockwise when viewed from above. If necessary, correct direction of fan rotation by interchanging any 2 power input wires at disconnect switch. Affix crankcase heater decal (located in installer's packet) to unit disconnect switch.

Table 3 — Electrical Data

60 HZ

UNIT 38AKS		UNIT						COMPRESSOR		FAN MOTORS	
		Volts 3 Ph, 60 Hz	Supplied*		MCA	MOCP (Fuse)	ICF	RLA	LRA	FLA (ea)	Qty
			Min.	Max.							
028	500	208/230	187	254	124.6	200	452.2	89.8	446	6.2	2
	200	380	342	418	64.7	110	250.9	45.5	247	3.9	2
	600	460	414	508	60.7	100	226.1	43.6	223	3.1	2
	100	575	518	632	52.5	80	167.4	36.5	164	3.4	2
034	500	208/230	187	254	145.5	250	512.2	106.5	506	6.2	2
	200	380	342	418	72.5	125	283.9	52.6	280	3.9	2
	600	460	414	508	68.7	110	256.1	50.0	253	3.1	2
	100	575	518	632	54.9	90	179.4	38.5	176	3.4	2
044	500	230	187	254	203.0	350	702.4	147.5	690	6.2	3
	200	380	342	418	111.1	175	389.8	79.5	382	3.9	3
	600	460	414	508	91.0	150	351.2	65.4	345	3.1	3
	100	575	518	632	81.5	125	282.8	57.1	276	3.4	3

50 HZ

UNIT 38AKS		UNIT						COMPRESSOR		FAN MOTORS	
		Volts 3 Ph, 50 Hz	Supplied*		MCA	MOCP (Fuse)	ICF	RLA	LRA	FLA (ea)	Qty
			Min.	Max.							
028	800	230	198	254	109.0	175	348.4	76.9	342	6.4	2
	300	346	311	380	64.9	100	263.4	44.9	259	4.4	2
	900	400	342	400	60.5	100	226.0	43.6	223	3.0	2
034	800	230	198	254	120.2	200	372.4	85.9	366	6.4	2
	300	346	311	380	76.1	125	298.4	53.9	294	4.4	2
	900	400	342	400	68.5	110	256.0	50.0	253	3.0	2
044	800	230	198	254	150.6	250	557.8	105.1	545	6.4	3
	300	346	311	380	112.6	175	408.8	79.5	400	4.4	3
	900	400	342	400	90.8	150	351.0	65.4	345	3.0	3

LEGEND

- CSA — Canadian Standards Association
- 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 FLA for all running fan motors is maximum).
- LRA — Locked Rotor Amps
- MCA — Minimum Circuit Amps (complies with National Electrical Code [NEC, U.S.A.], Section 430-24)
- MOCP — Maximum Overcurrent Protection
- RLA — Rated Load Amps
- UL — Underwriters' Laboratories

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



FIELD CONNECTIONS

- Main Power** — Bring wires from the fused disconnect switch through hole in bottom rail of unit to control box (Fig. 6 and 7) and connect terminals **11** , **12** , and **13** line side of terminal block TB1 (see Fig. 8 and 9A or 9B). To comply with NEC Article 440-14, the disconnect must be located within sight from and readily accessible from unit.
- 24-v Control Power** — Units have single point power connections. Control circuit is directly connected internally to unit. Maximum 24-v control circuit is 3 amps.

NOTE: Wire runs use the following insulated wire:

LENGTH	INSULATED WIRE SIZE*	
	AWG	mm ²
0-50	18	0.82
50-75	16	1.30
Over 75	14	2.08

AWG — American Wire Gage
*35 C minimum.

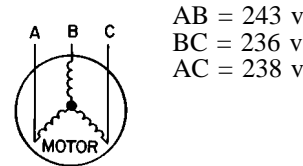
- Control Circuit Interlock** — An airflow switch may be installed in the indoor air handler to prevent unit from running when indoor air is not flowing. This switch (no. HR81JE001) is available from Service Parts Center, or equivalent can be field supplied. This should be electrically interlocked in the control circuit, between thermostat TC1 (stage 1, cooling) and terminal **2** **Y1** on TB3. See Fig. 8 for typical field wiring. This is in the 24-v circuit. Wires must be run in conduit with ground wire.
- Transformer Connections** — See unit wiring label diagram, notes 1 and 2, located behind compressor compartment end access door.

IMPORTANT: Ensure power to the crankcase heater is always on (except when servicing the unit). If circuit breaker inside unit shuts down the compressor, crankcase heater remains on.

UNBALANCED 3-PHASE SUPPLY VOLTAGE — Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 240-3-60.



$$\text{Average Voltage} = \frac{243 + 236 + 238}{3} = 239 \text{ volts}$$

Determine maximum deviation from average voltage:

- (AB) 243 – 239 = 4 v
- (BC) 239 – 236 = 3 v
- (AC) 239 – 238 = 1 v

Maximum deviation is 4 v. Determine percent voltage imbalance:

$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{239} = 1.7\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: Contact your local electric utility company immediately if the supply voltage phase imbalance is more than 2%.

LEGEND

NEC — National Electrical Code
 VAV — Variable Air Volume

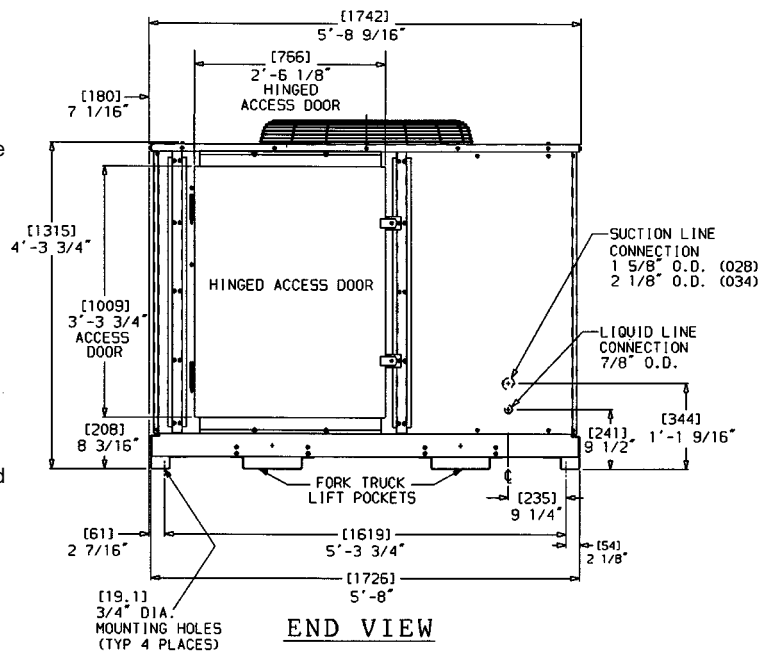
NOTES:

1. There must be minimum (2440 mm) 8 ft. clear air space above unit.
2. The approximate operating weight of the unit is:

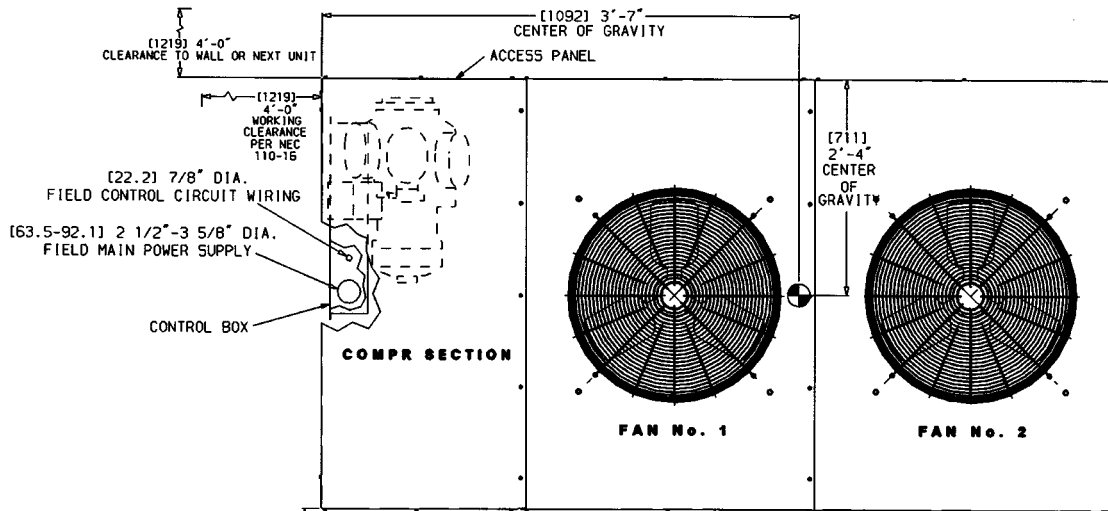
50 AND 60 HZ

UNIT	WT (Lb)	WT (Kg)
38AKS028	1650	748
38AKS028C	1804	818
38AKS034	1803	818
38AKS034C	2009	911

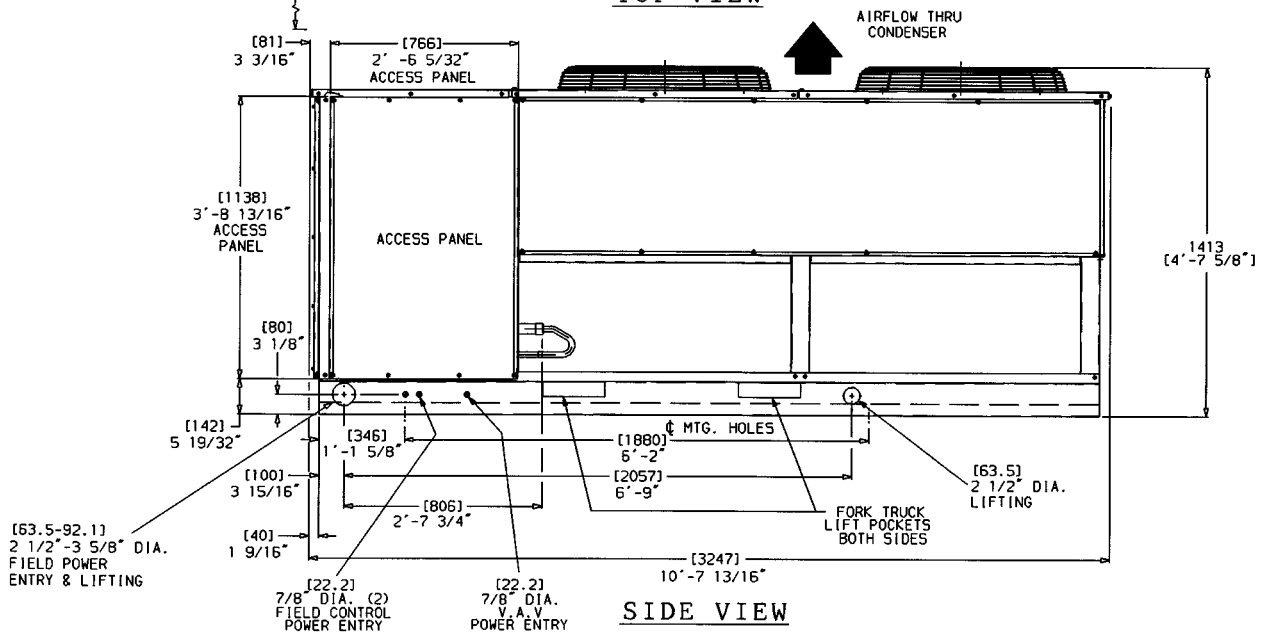
3. A "C" in the model number indicates unit has factory-installed copper coil.



END VIEW



TOP VIEW



SIDE VIEW

Fig. 6 — Dimensional Drawing, 38AKS028,034

LEGEND

NEC — National Electrical Code

NOTES:

1. There must be minimum (2440 mm) 8 ft. clear air space above unit.
2. The approximate operating weight of the unit is:

50 HZ AND 60 HZ

UNIT	WT (Lb)	WT (Kg)
38AKS044	2437	1106
38AKS044C	2745	1246

3. A "C" in the model number indicates unit has factory-installed copper coil.

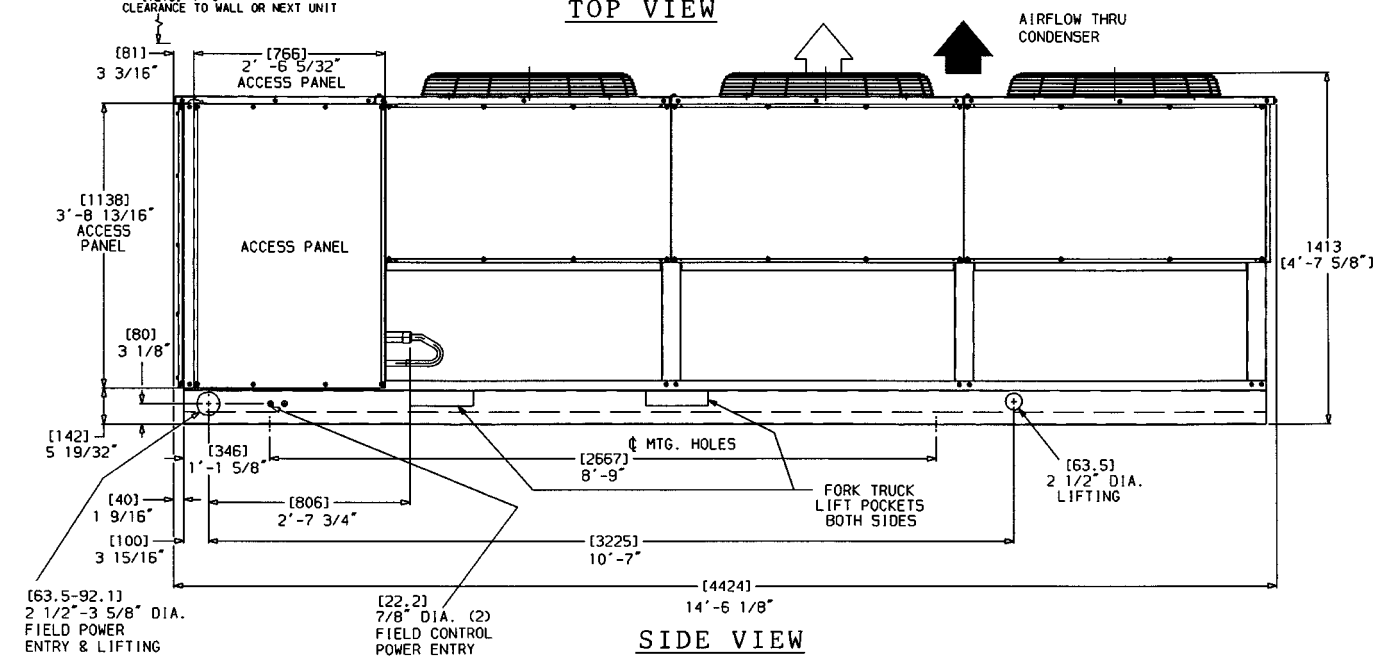
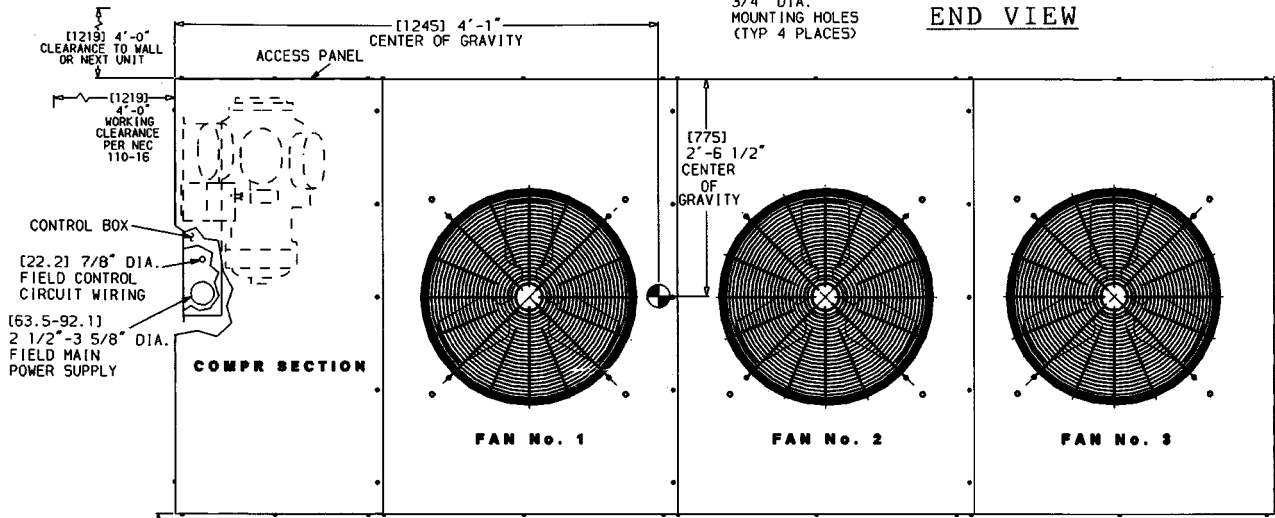
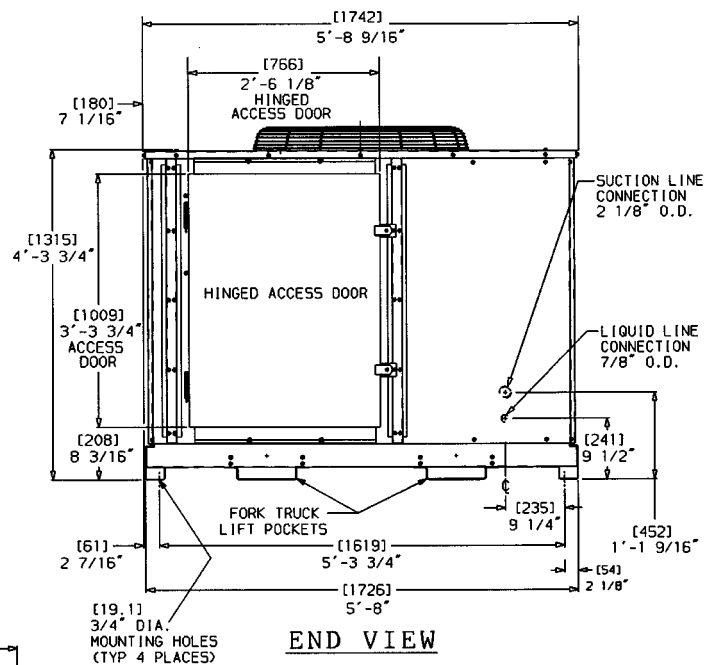


Fig. 7 — Dimensional Drawing, 38AKS044

LEGEND

- AFS — Airflow Switch
- CB — Circuit Breaker
- EQUIP — Equipment
- FU — Fuse
- GND — Ground
- LLS1 — Liquid Line Solenoid for Solenoid Drop Control
- LLS2 — Liquid Line Solenoid for Capacity Control
- NEC — National Electrical Code, U.S.A.
- TB — Terminal Block
- TC — Thermostat Cooling
- Field Power Wiring
- Field Control Wiring
- Factory Installed Wiring

NOTES:

1. Factory wiring in accordance with the NEC. Any field modifications or additions must be in compliance with all applicable codes.
2. All field interlock contacts must have minimum rating of 180 va pilot duty plus capacity required for field-installed equipment. All field interlock contacts in the 24-v control circuit must have minimum rating of 70 va pilot duty plus capacity required for field-installed equipment.
3. For internal unit wiring, reference wiring book or unit wiring label diagram. TB2 is 115-1-60, TB3 is 24-1-60.
4. The following components are not located in the 38AKS unit control box: LLS1, LLS2, field control thermostat, AFS, alarm shut-off switch, and alarm or light.

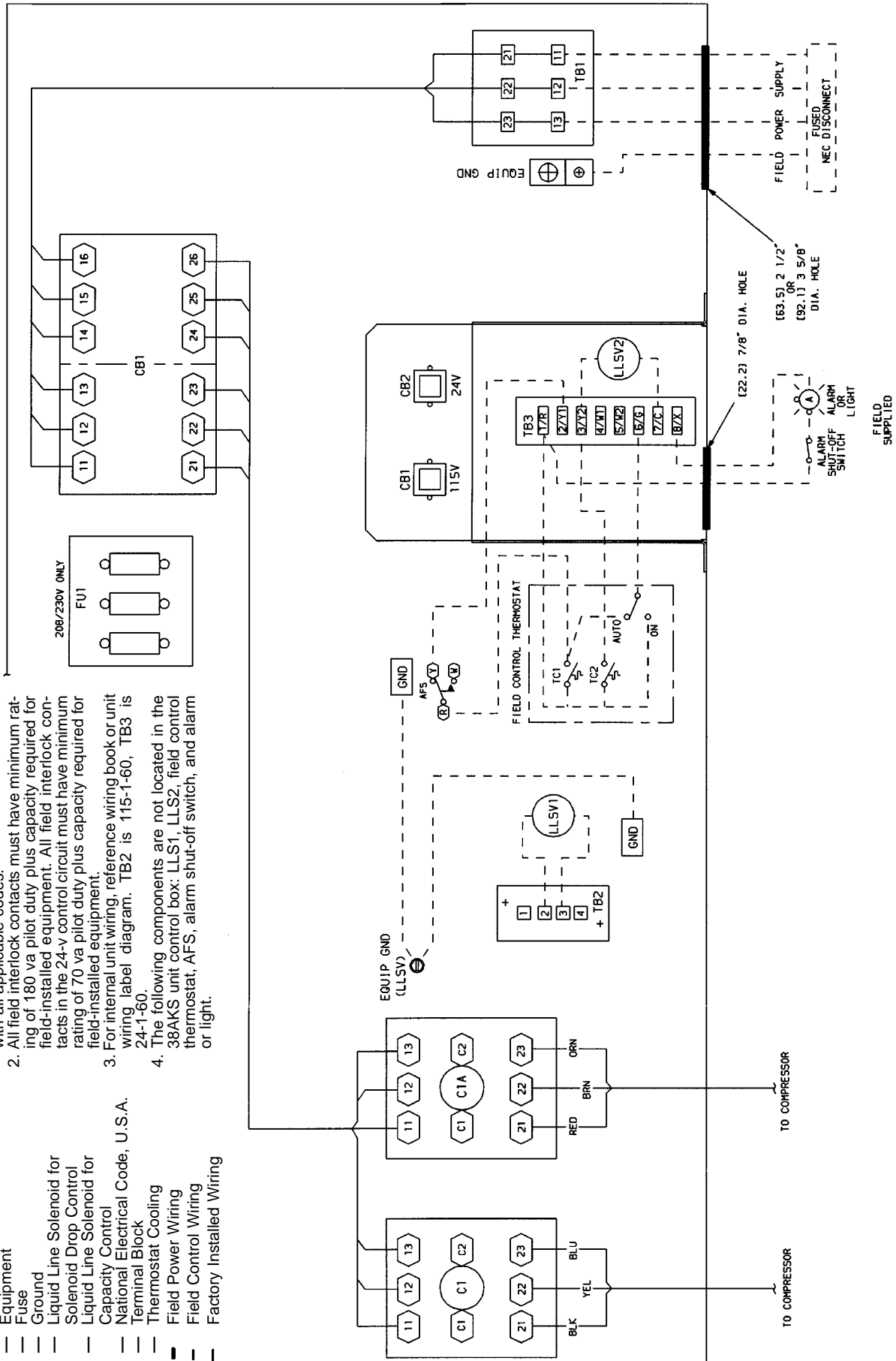


Fig. 8 — Typical Wiring Schematic

LEGEND

BPR — Bypass Relay
 C — Contactor, Compressor
 DB — Circuit Breaker
 CR — Control Relay
 CM — Control Module
 EQUIP — Equipment
 FC — Fan Contactor

FM — Fan Motor
 FU — Fuse
 GND — Ground
 LLSV — Liquid Line Solenoid Valve
 NEC — National Electrical Code (U.S.A.)
 TB — Terminal Block
 TRAN — Transformer

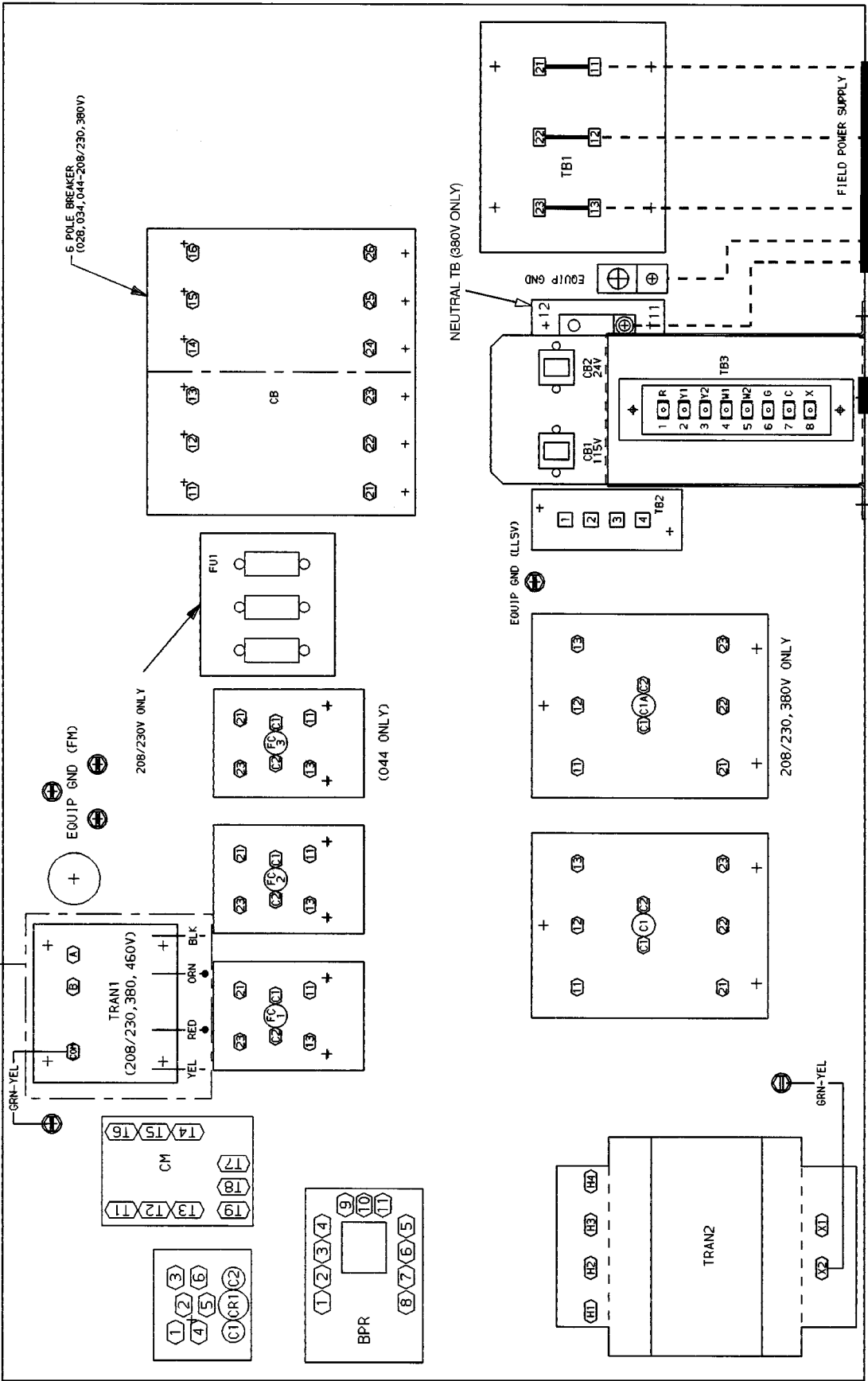
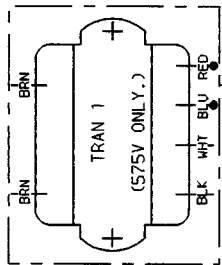


Fig. 9A — Component Arrangement — 60 Hz

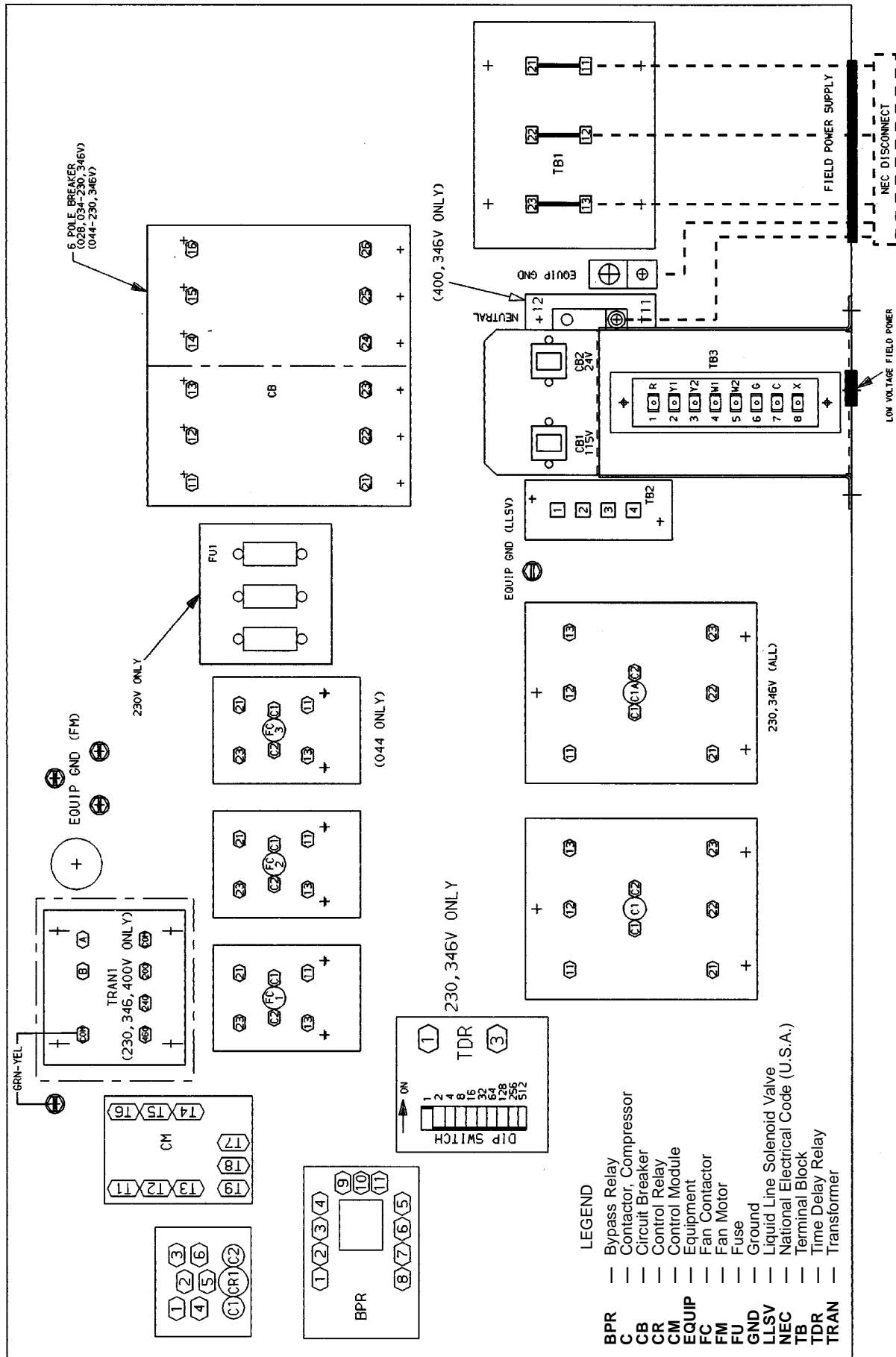


Fig. 9B — Component Arrangement — 50 Hz

START-UP

Initial Check

⚠ CAUTION

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

1. Check all auxiliary components, such as air-handling equipment, and other equipment. Consult the manufacturer's instructions regarding any other equipment connected to the condensing unit. If used, airflow switch must be properly installed. See Fig. 8.
2. Backseat (open) compressor suction and discharge valves. Close valves one turn to allow pressure to reach test gages.
3. Open liquid line service valve.
4. Set thermostat.
5. Check tightness of all electrical connections.
6. Compressor oil level should be visible in sight glass. See Service, Oil Charge section on page 19.
7. Be sure unit is properly leak tested, dehydrated, and charged. See below.
8. Electrical power source must agree with nameplate rating.
9. Crankcase heater must be firmly locked into compressor crankcase. Be sure crankcase is warm (heater should be on for 24 hours before starting compressor).
10. Be sure compressor floats freely on the mounting springs. See Compressor Mounting section on page 2 and Fig. 3 for loosening compressor bolts.

Leak Test and Dehydration — Leak test the entire refrigerant system by the pressure method described in the Carrier Training Booklet; GTAC II, Module 4 - System Dehydration.

Preliminary Charge — Refer to Carrier Training Booklet; GTAC II, Module 5 for charging methods and procedures. Charge system with approximately 25 lbs (11.3 kg) of R-22 by the liquid charging method (charging through liquid service valve), on the high side, and charging by weight. Charge per Fig. 10-12.

Start Unit — Close field disconnect. Set thermostat above ambient temperature so that there is no demand for cooling. Now, only the crankcase heater is energized. 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.

Close the compressor circuit breaker, then reset the indoor thermostat below ambient temperature, so that a call for cooling is ensured.

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

The start-up of the compressor can occur between 3 seconds and approximately 5 minutes from the time the control circuit is energized due to the anti-short cycle feature of the control module (CM).

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

See Fig. 10-12 for the particular unit being charged. Measure pressure at the liquid line service valve, being sure a Schrader depressor is used if required. Also, measure liquid line temperature as close to the liquid service valve as possible. Add or reduce charge until the pressure and temperature conditions of the charging charge curve are met. If liquid pressure and temperature point fall above curve, add charge. If liquid pressure and temperature point fall below curve, reduce the charge until the conditions match the curve.

⚠ CAUTION

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

Operation — Refer to control circuit diagram on the unit, or in the unit wiring book.

Control Module (CM) — The unit control module is located in the control section of the control box. See Fig. 9A or 9B. It performs several functions. The CM has a built-in compressor anti-short-cycle timer which will not allow the compressor to restart until 5 minutes (+90 seconds/-75 seconds) have elapsed since the previous shutdown.

The compressor oil pressure is monitored through the CM. The unit is allowed to remain operational as long as the oil pressure safety switch (OPS) has not been open for more than 2 minutes after the compressor has started. If after start-up, the OPS is open for more than 2 minutes, the CM shuts down the compressor and places the unit in a lockout condition. The CM activates the fault indication circuit, and the field-supplied unit service lamp is illuminated (if so equipped). The unit cannot be restarted until power is interrupted at the unit, resetting the CM. The 5-minute recycle time relay is initiated.

The CM also monitors the high-pressure switch (HPS) and compressor thermal protection. If at any time the HPS opens, the CM shuts down the compressor and places the unit in a lockout condition. The CM activates the fault indication circuit, and the field-supplied unit service lamp is illuminated (if so equipped). The unit cannot be restarted until the HPS is reset and until power is interrupted at the unit, resetting the CM. The 5-minute recycle time relay is initiated.

If the unit shuts down on an automatic reset switch, such as the low-pressure switch (LPS), the compressor will be allowed to restart when the switch recloses and the CM anti-short-cycle time has elapsed.

BOTH OUTDOOR FANS MUST BE OPERATING

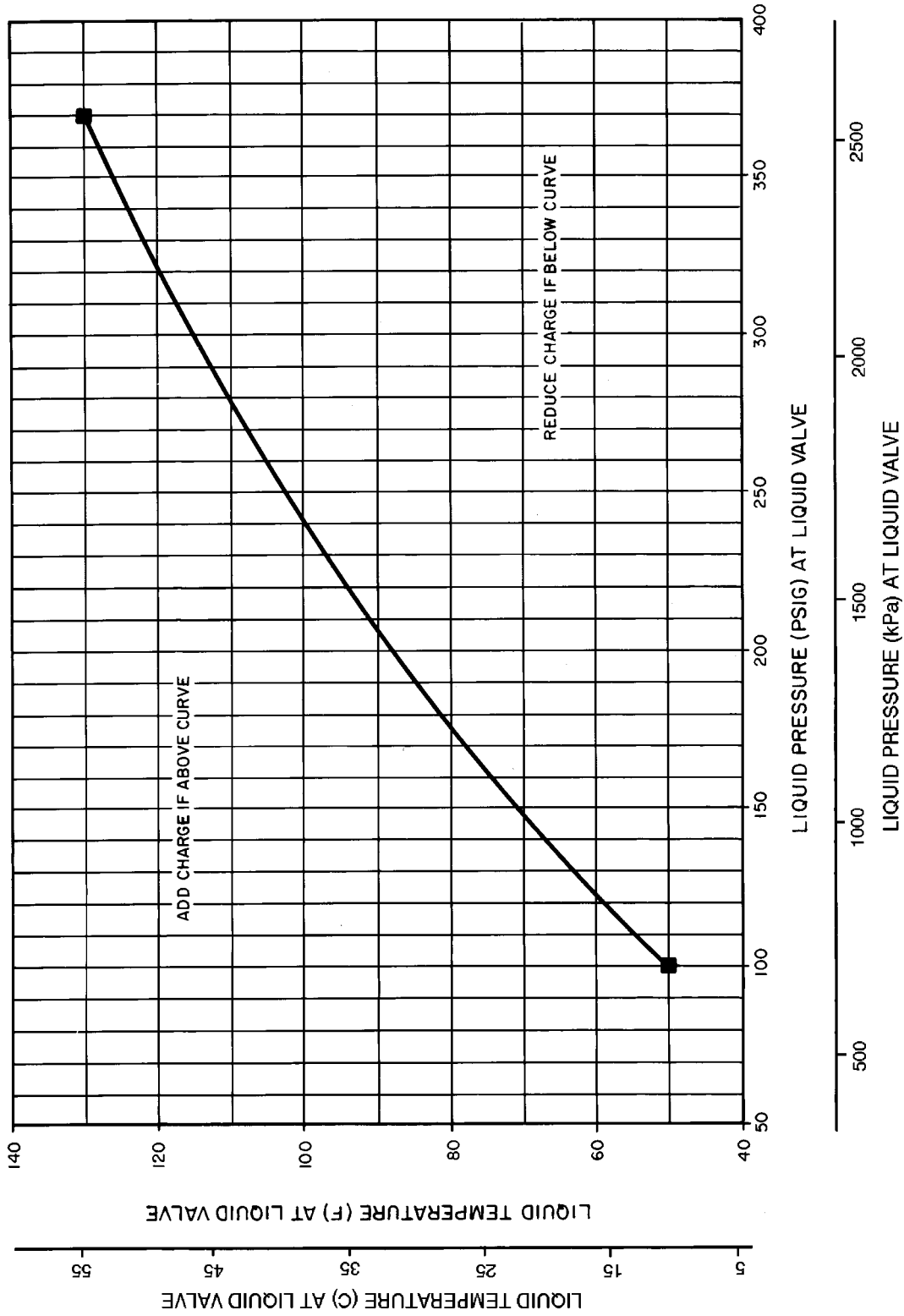


Fig. 10 — 38AKS028 Charging Chart, 50/60 Hz

BOTH OUTDOOR FANS MUST BE OPERATING

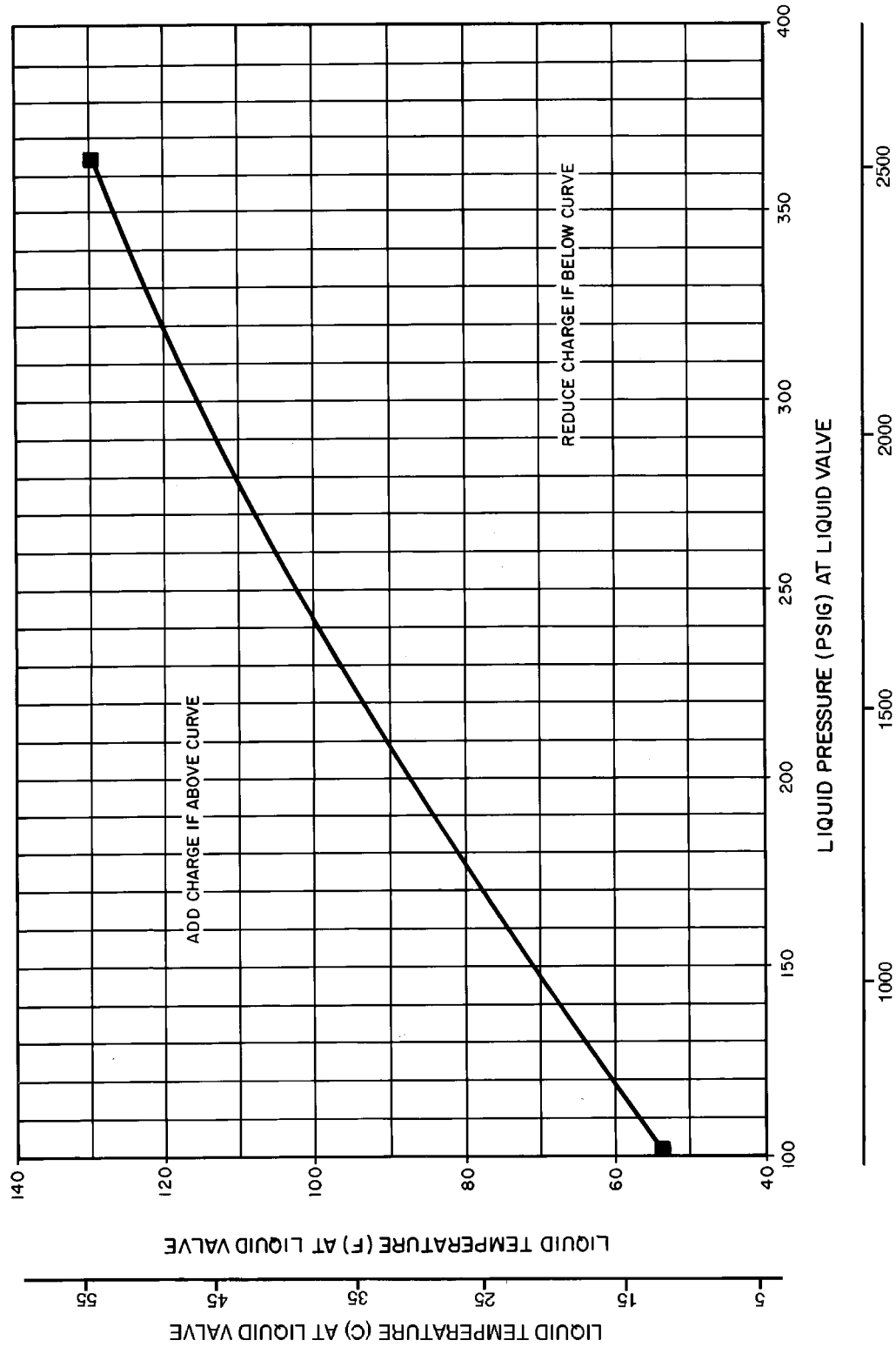
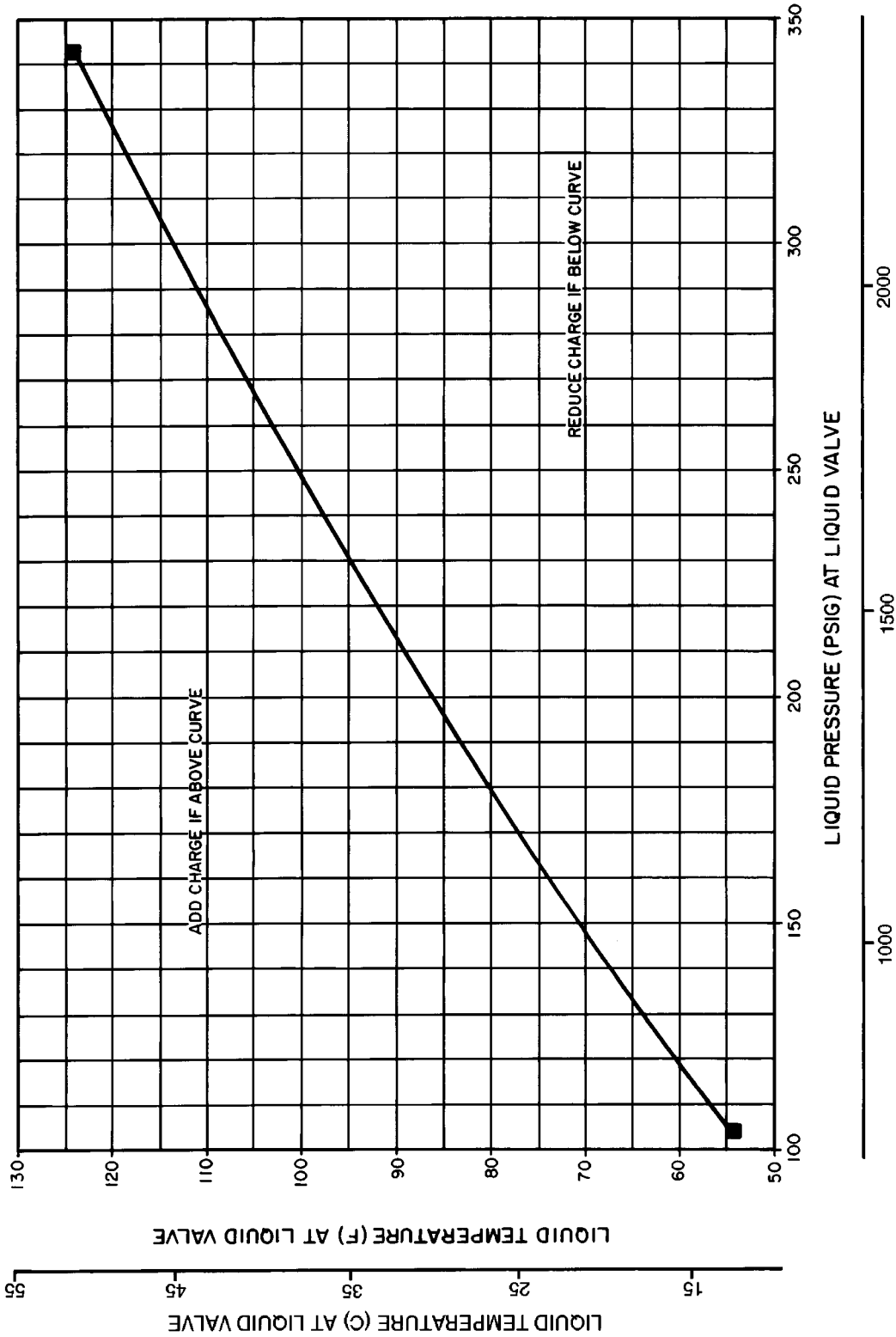


Fig. 11 — 38AKS034 Charging Chart, 50/60 Hz

ALL OUTDOOR FANS MUST BE OPERATING



LIQUID PRESSURE (kPa) AT LIQUID VALVE

Fig. 12 — 38AKS044 Charging Chart, 50/60 Hz

FOR SERVICING ONLY — To speed up the 5-minute anti-short cycle, a temporary jumper may be placed between terminals T1 and T6 of the control module.

▲ CAUTION

This jumper must be removed after servicing is complete. Failure to remove this jumper is considered abusive treatment and will void the Carrier warranty.

Bypass Relay (BPR) — All units are equipped with a BPR located in the control section of the control box. See Fig. 9A or 9B. The function of the BPR is to provide a 2-minute bypass of the LPS at start-up, and to energize the unloader(s) at start-up to provide unloaded compressor starting. Two minutes after the compressor starts, the BPR completes its function and is no longer active in the control circuit until the next restart of the unit.

Time-Delay Relay (TDR) (50 Hz Only) — This solid-state delay-on-make relay is factory set for a 1-second delay. The number 1 dip switch is set to the ON position, and all the other dip switches are set to the OFF position. Once the control relay (CR) is energized, the compressor contactor C1 is powered, and the first set of compressor windings is energized. After the 1-second time delay, contactor C1A is powered and the second set of compressor windings is energized (part-wind start).

Sequence of Operation — When space thermostat calls for cooling, the no. 1 condenser fan and compressor start after CM initial time delay of 3 (+2/-1) seconds. If an optional airflow switch is used, compressor and no. 1 condenser fan will not start until sufficient indoor airflow has closed the switch. After 3 seconds the compressor starts and the liquid line solenoid valve for solenoid drop control opens. The crankcase heater is deenergized. If the head pressure reaches 260 psig (1792 kPa) the second condenser fan starts. Fan no. 3 (38AKS044 only) starts if outdoor ambient air rises above 80 F (26.7 C).

If cooling demand is low, suction pressure at the compressor drops. As the pressure drops, the compressor unloads 2 banks of cylinders as required. If cooling demand is high and 2-stage operation is used, the second stage of the thermostat activates the capacity control liquid line solenoid which activates the second stage evaporator coil. The compressor cylinders load or unload in response to compressor suction pressure to meet evaporator load.

Two minutes after compressor starts, the BPR timer is deenergized and the LPS bypass is deactivated. If the LPS trips during the first 2 minutes of operation, the compressor will remain operational. If the LPS trips after 2 minutes, the compressor operation is interrupted, and the compressor cannot restart until the 5-minute CM anti-short cycle timer expires.

As the space cooling load is satisfied, the second stage of the thermostat opens, and closes the field-supplied capacity control liquid line solenoid valve to deactivate the second stage coil. The compressor adjusts the number of active cylinders to meet the new load. When the space temperature is satisfied, the first stage of the thermostat opens and the control relay and the BPR open. This closes the solenoid drop control valve. The compressor stops and the crankcase heater is energized, preventing refrigerant from migrating to the compressor during the off cycle (solenoid drop refrigerant control). The CM anti-short cycling timer is energized and runs for approximately 5 minutes. During this time, the compressor is not able to restart.

Complete Unit Stoppage

CAUSES — Interruption of supplied power, compressor over-temperature protection, or open HPS causes compressor stoppage.

RESTART — The unit recycles and restarts automatically under the CM when power is restored. Stoppage by HPS, or compressor circuit breaker requires manual resetting of the control circuit. To restart the CM timer when HPS is tripped, it is necessary to interrupt power to the unit, restarting the CM logic. It is necessary to manually reset the compressor circuit breaker at the unit.

If LPS is not closed within 2 minutes after compressor starts, the compressor locks out and the outdoor fans continue to run. It stays locked out for 5 minutes until the CM anti-short cycle timer expires. After 5 minutes, the LPS is bypassed by the BPR (winter start control). It remains jumpered for 2 minutes. Because the LPS is jumpered, the compressor restarts and runs for the 2-minute time period. At the end of this 2 minutes, if the LPS has still not closed, the compressor is again locked out. The outdoor fans continue to run as long as there is a call for cooling. Automatic reset of the LPS causes the CM to recycle so that the compressor can start.

If sufficient compressor oil pressure has not been built within 2 minutes after the compressor starts, the unit is completely deenergized until the oil pressure switch is manually reset at the unit.

▲ CAUTION

If unit or circuit stoppage occurs more than once due to any safety device, the trouble should be corrected before any attempt to restart.

SERVICE

▲ CAUTION

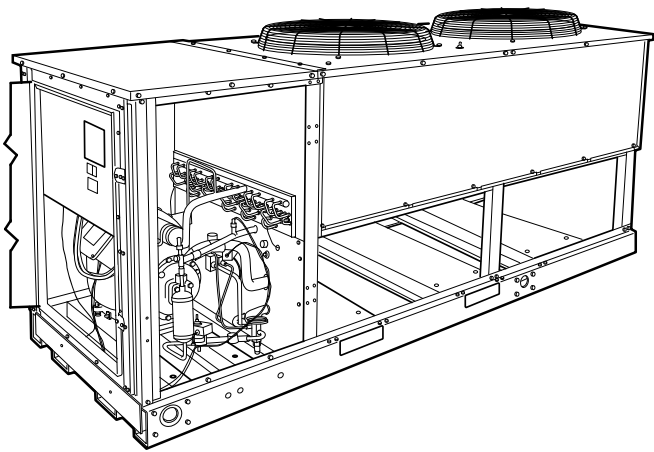
Turn off all power to unit before proceeding.

Access for Servicing (See Fig. 13)

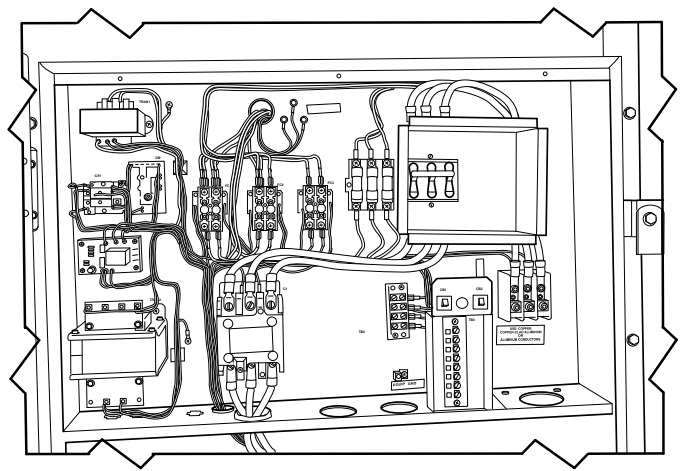
COMPRESSOR SECTION — The compressor compartment has 2 side access panels and one front door for servicing, providing access to compressor, all components of the refrigerant system, electrical controls, and control box. After opening front door there is an inner cover that must be removed for access to control box (except 208/230-v and 460-v units).

OIL PRESSURE SAFETY SWITCH — Switch is manually reset, and accessed by removing the side access panel on the left side of the unit (as viewed from the compressor end). See Fig. 13. The OPS is found in the compressor junction box. Open the compressor circuit breaker prior to removing the compressor junction box cover in order to access the OPS. The liquid line service valve can be found behind the side access door on the right side of the unit (as viewed from the compressor end).

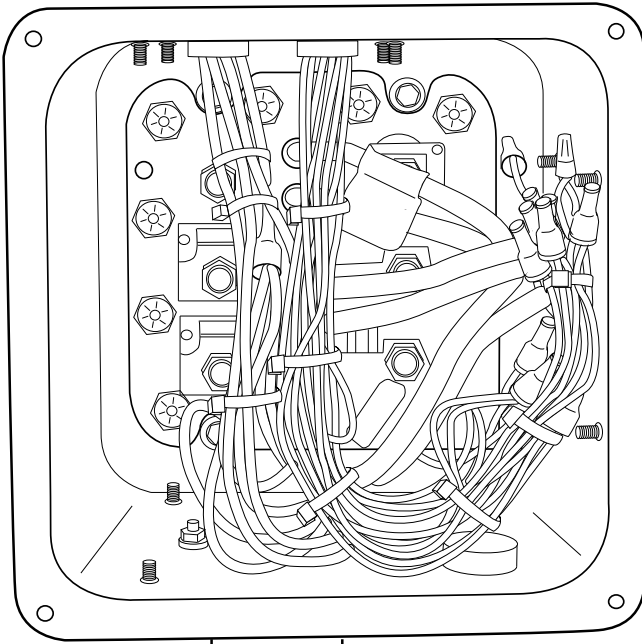
CONDENSER SECTION — Condenser fan motors and fans can be serviced by removal of outlet grilles or side panels. If a fan motor is serviced, be sure the wire fan guard is in place over each fan before starting unit. See Fig. 14 for proper fan adjustment. Tighten fan hub securely on motor shaft with setscrew which bears against the key. Be sure to replace Permagum and rubber cap over end of motor shaft to protect against moisture causing fan to rust on shaft.



COMPRESSOR END AND RIGHT-SIDE VIEW

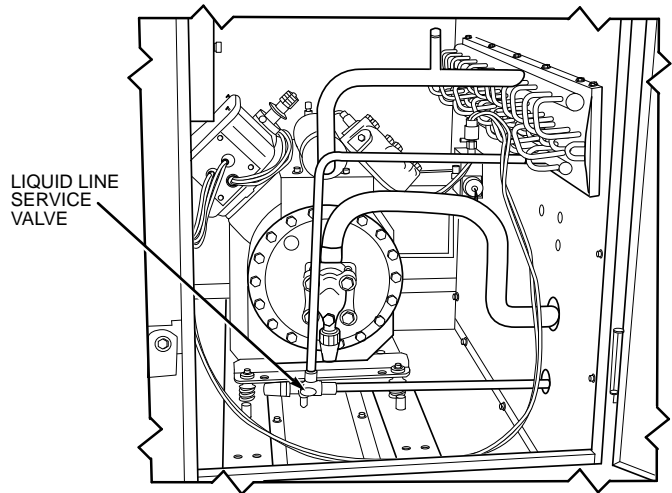


COMPRESSOR END, CONTROL PANEL REMOVED



OIL PRESSURE SAFETY SWITCH

COMPRESSOR END, LEFT-SIDE ACCESS DOOR
(JUNCTION BOX COVER REMOVED)

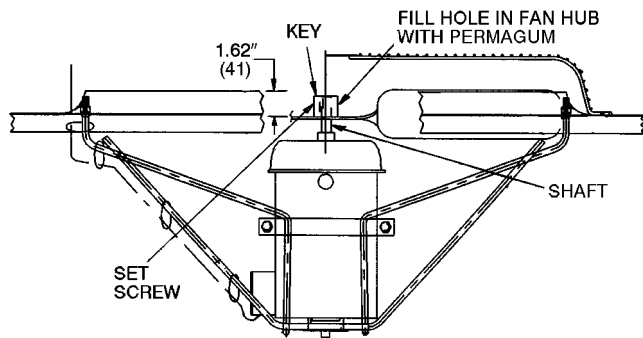


LIQUID LINE
SERVICE
VALVE

COMPRESSOR END, RIGHT-SIDE ACCESS DOOR

Fig. 13 — 38AKS Unit with Access Panels Removed

Fan Adjustment — Adjust fan as shown in Fig. 14.



NOTE: Dimension in () is in millimeters.

Fig. 14 — Location of Prop on Motor Shaft from Outside of Orifice Ring

Oil Charge — Compressors are factory charged with oil as follows:

COMPRESSOR	AMOUNT pints (liters)
06E9265	20.0 (9.4)
06E9275	20.0 (9.4)
06E9299	19.0 (9.0)

When additional oil or a complete charge is required, use only Carrier-approved compressor oil:

Petroleum Specialities Inc.Cryol 150
 Texaco, Inc.Capella WF-32
 Witco Chemical Corp.Suniso 3 GS

IMPORTANT: Do not use drained oil or use oil that has been exposed to atmosphere. Refer to Carrier Training Booklet, GTAC II, Module 5, for procedures to add oil. To remove oil, isolate the compressor, reclaim internal compressor charge, and use the compressor drain plug.

Liquid Shutoff/Charging Valve — Valve is located inside the compressor compartment and is provided with 1/4-in. flare connection for field charging.

Capacity Control — Capacity control is by 2 suction pressure actuated unloaders. Each controls 2 cylinders. Unloaders are factory set (see Table 1A or 1B) but may be field adjusted. Number 1 unloader is on cylinder bank on same side of compressor as terminal box.

CONTROL SET POINT — The control set point (cylinder load point) is adjustable from 0 to 85 psig (0 to 586 kPag). To adjust, turn control set point adjustment nut (Fig. 15) clockwise to its bottom stop. In this position, set point is 85 psig (586 kPag). Then, turn adjustment counterclockwise to desired control set point. Every full turn counterclockwise decreases set point by 7.5 psig (52 kPag).

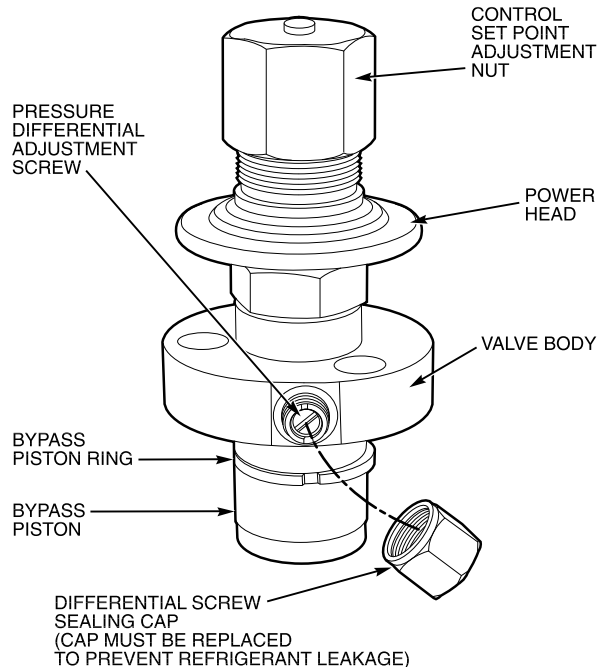


Fig. 15 — Capacity Control Valve

PRESSURE DIFFERENTIAL — The pressure differential (difference between cylinder load and unload points) is adjustable from 6 to 22 psig (41 to 152 kPag). To adjust, turn pressure differential adjustment screw (Fig. 15) counterclockwise to its backstop position. In this position, differential is 6 psig (41 kPag). Then, turn adjustment clockwise to desired pressure differential. Every full turn clockwise increases differential by 1.5 psig (10 kPag).

Oil Pressure Safety Switch (OPS) — The OPS in the control circuit stops the compressor and unit, if proper oil pressure differential is not established at start-up or maintained during operation. If OPS stops the unit, determine the cause and correct before restarting unit. Failure to do so will constitute abuse. *Equipment failure due to abuse may void the warranty.*

Compressor Protection

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

CONTROL MODULE TIMER — This control protects compressor against short cycling. See Sequence of Operation on page 17.

CRANKCASE HEATER — This minimizes absorption of liquid refrigerant by oil in crankcase during brief or extended shutdown periods.

IMPORTANT: Never open any switch or disconnect that deenergizes 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 Switch — This switch has fixed, non-adjustable settings. Switch is mounted on the compressor (See Table 4).

Low-Pressure Switch — This switch has fixed, non-adjustable settings. Switch is mounted on the compressor. (See Table 4.)

Table 4 — Pressure Switch Settings, psig (kPa)

HIGH PRESSURE		LOW PRESSURE	
Cutout	Cut-in	Cutout	Cut-in
426 ± 7 (2937 ± 48)	320 ± 20 (2206 ± 138)	27 ± 3 (186 ± 21)	44 ± 5 (303 ± 34)

Winter Start Control — Bypass relay timer bypasses low-pressure switch for 2 minutes on unit start-up.

Head Pressure Control — Control maintains adequate discharge pressure under low ambient temperature conditions. See Table 5.

FAN CYCLING — These 38AKS units have standard provision for fully automatic intermediate-season head pressure control through condenser fan cycling. Fan no. 2 is cycled by a fan cycling pressure switch (FCPS) which responds to variation in discharge pressure. The pressure sensor is located in the liquid line of the refrigerant circuit. Fan no. 3 cycling is controlled by outdoor-air temperature through an air temperature switch (ATS) (38AKS044 units only).

Table 5 — Minimum Outdoor-Air Operating Temperature

UNIT 38AKS	COMPR CAP. (%)	COND TEMP, F (C)	MIN OUTDOOR TEMP, F (C)	
			Standard Unit	Low Ambient Control (Motormaster®)
028	100	90 (32)	31 (-1)	-20 (-29)
	67	80 (27)	35 (2)	-20 (-29)
	33	70 (21)	43 (6)	-20 (-29)
034	100	90 (32)	30 (-1)	-20 (-29)
	67	80 (27)	34 (1)	-20 (-29)
	33	70 (21)	42 (6)	-20 (-29)
044	100	90 (32)	25 (-4)	-20 (-29)
	67	80 (27)	30 (-1)	-20 (-29)
	33	70 (21)	35 (2)	-20 (-29)

The ATS is located in the lower divider panel between the compressor compartment and condenser section. Through a hole in the panel, the sensing element is exposed to air entering the no. 1 fan compartment. Fan no. 1 is noncycling. Table 6 shows the operating settings of the FCPS and the ATS.

Table 6 — Fan Cycling Controls

CONTROL BY	SWITCH OPENS	SWITCH CLOSSES
Temp, F (C)	70 ± 3 (21 ± 1.7)	80 ± 3 (27 ± 1.7)
Pressure, psig (kPa)	160 ± 10 (1103 ± 69)	260 ± 15 (1793 ± 103)

NOTE: See Fig. 6 and 7 for fan arrangement.

TROUBLESHOOTING

SYMPTOM AND PROBABLE CAUSE	PROBABLE REMEDY
COMPRESSOR DOES NOT RUN <ol style="list-style-type: none"> 1. Control circuit breaker tripped 2. Power line open 3. Oil pressure switch tripped 4. Safety device tripped 5. Contactor stuck open 6. Loose terminal connection 7. Improperly wired controls 8. Seized compressor 9. Low line voltage 10. Compressor motor defective 	<ol style="list-style-type: none"> 1. Reset control circuit breaker 2. Reset circuit breaker 3. Reset oil pressure switch at unit 4. Reset control circuit with thermostat 5. Replace contactor 6. Check connections 7. Check and rewire 8. Check motor winding for open or short. Replace compressor, if necessary 9. Check line voltage — determine location of voltage drop and remedy deficiency 10. Check motor winding for open or short. Replace compressor, if necessary
COMPRESSOR STOPS ON LOW-PRESSURE CONTROL <ol style="list-style-type: none"> 1. Compressor suction shutoff valve partially closed 2. Low refrigerant charge 3. Liquid line solenoid valve(s) fails to open 4. Liquid line shutoff valve closed 	<ol style="list-style-type: none"> 1. Open valve 2. Add refrigerant 3. Check liquid line solenoid valve for proper operation. Replace if necessary 4. Open valve
COMPRESSOR STOPS ON HIGH-PRESSURE CONTROL <ol style="list-style-type: none"> 1. Compressor discharge valve partially closed 2. Air in system 3. Condenser fan(s) not operating 4. System is overcharged. 	<ol style="list-style-type: none"> 1. Open valve or replace if defective 2. Purge and evacuate system 3. Check motor wiring and repair or replace if defective 4. Reclaim charge as needed
UNIT OPERATES TOO LONG OR CONTINUOUSLY <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
SYSTEM IS NOISY <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. Replace compressor if bearings are worn
COMPRESSOR LOSES OIL <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 relays. Check heater and replace if defective 3. Check piping for oil return. Replace if necessary
FROSTED SUCTION LINE <ol style="list-style-type: none"> 1. Expansion valve admitting excess refrigerant 	<ol style="list-style-type: none"> 1. Adjust expansion valve
HOT LIQUID LINE <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
FROSTED LIQUID LINE <ol style="list-style-type: none"> 1. Restricted filter drier 	<ol style="list-style-type: none"> 1. Remove restriction or replace
COMPRESSOR WILL NOT UNLOAD <ol style="list-style-type: none"> 1. Defective unloader 2. Defective capacity control solenoid valve 3. Miswired liquid line solenoid 4. Weak, broken, or wrong valve body spring 	<ol style="list-style-type: none"> 1. Replace 2. Replace valve 3. Rewire correctly 4. Replace spring
COMPRESSOR WILL NOT LOAD <ol style="list-style-type: none"> 1. Miswired capacity control liquid solenoid 2. Defective capacity control solenoid valve 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

PACKAGED SERVICE TRAINING

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

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

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

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

START-UP CHECKLIST
(Remove and store in job file)

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? (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) _____

PIPING

ARE LIQUID LINE SOLENOID VALVE(S) LOCATED AT THE EVAPORATOR COIL AS REQUIRED? (Y/N) _____

HAVE LEAK CHECKS BEEN MADE AT COMPRESSOR, CONDENSER, EVAPORATOR, 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) _____

ARE THE COMPRESSOR OIL SIGHT GLASSES SHOWING ABOUT 1/2 FULL? (Y/N) _____

CHECK VOLTAGE IMBALANCE

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

$(AB + AC + BC)/3 = \text{AVERAGE VOLTAGE} = \text{_____ V}$

$\text{MAXIMUM DEVIATION FROM AVERAGE VOLTAGE} = \text{_____ V}$

$\text{VOLTAGE IMBALANCE} = 100 \times (\text{MAX DEVIATION})/(\text{AVERAGE VOLTAGE}) = \text{_____ \%}$

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

CUT ALONG DOTTED LINE

C. Start-Up

CHECK EVAPORATOR FAN SPEED AND RECORD. _____

CHECK CONDENSER FAN SPEED AND RECORD. _____

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

OIL PRESSURE _____
SUCTION PRESSURE _____
SUCTION LINE TEMP _____
DISCHARGE PRESSURE _____
DISCHARGE LINE TEMP _____
ENTERING CONDENSER AIR TEMP _____
LEAVING CONDENSER AIR TEMP _____
EVAP ENTERING AIR DB TEMP _____
EVAP ENTERING AIR WB TEMP _____
EVAP LEAVING AIR DB TEMP _____
EVAP LEAVING AIR WB TEMP _____
COMPRESSOR AMPS (L1) _____
COMPRESSOR AMPS (L2) _____
COMPRESSOR AMPS (L3) _____

CHECK THE COMPRESSOR OIL LEVEL SIGHT GLASSES; ARE THE SIGHT GLASSES SHOWING OIL LEVEL AT 1/8 TO 1/3 FULL? (Y/N) _____

NOTES:

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