Carrier®
HEATING & COOLING

38AH024-034
Air-Cooled Condensing Units
50/60 Hz

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.
- See Table 1A or 1B for Physical Data.

ELECTRIC SHOCK HAZARD

Open all remote disconnects before servicing this equipment.

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 condensing unit on skid or pad for rolling or dragging. When rolling, use minimum 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.

⚠ CAUTION

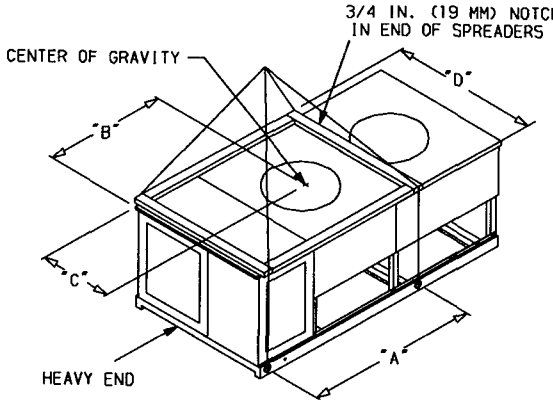
All panels must be in place when rigging. Do not fork units if no skid is supplied. If unit has skid, truck from sides only.

Placing Unit — There must be 4 ft (1200 mm) for service and for unrestricted airflow 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.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Book 1 Tab 3a | PC 111 | Catalog No 563-739 | Printed in U.S A | Form 38AH-7SI | Pg 1 | 4-93 | Replaces: New

Fig. 1 – Model 38AH (Size 024 Shown)



NOTES:
1. Use 2 in OD (50 mm) pipe or hooks in lifting holes
2. Rig with 4 cables and spread with two 'D' long and two 'A' long 2 x 4 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
4 Shipping weights include skid

⚠ CAUTION

All panels must be in place with rigging.

NOTICE TO RIGGERS

UNIT 38AH	MAX SHIPPING WEIGHT		LIFTING HOLES 'A'		CENTER OF GRAVITY 'B'		CENTER OF GRAVITY 'C'		DISTANCE BETWEEN RIGGING CABLES 'D'	
	lbs	kgs	in.	mm	in.	mm	in.	mm	in.	mm
024	2240	1018	81	2057	40 0	1016	32.8	832	73 5	1867
024C	2403	1092			43.0	1092				
028	2300	1045			39 3	997				
028C	2463	1120			42.3	1073				
034	2360	1073			41 0	1041				
034C	2577	1171			44 0	1118				

Fig. 2 – Rigging Label

Table 1A — Physical Data — English

UNIT 38AH	024		028		034	
	Circuit 1	Circuit 2	Circuit 1	Circuit 2	Circuit 1	Circuit 2
OPERATING WEIGHT (lb)						
With Aluminum-Fin Coil	1760		1820		1880	
With Copper-Fin Coil	1923		1982		2097	
COMPRESSOR	Reciprocating Semi-Hermetic					
Type	06DH824	06DA824	06DH328	06DA328	06DH328	06DA537
Quantity Cylinders (ea)	6	6	6	6	6	6
Speed (rpm) — 60 Hz	1750	1750	1750	1750	1750	1750
— 50 Hz	1450	1450	1450	1450	1450	1450
Capacity Steps						
(FIOP or Acy) — %	100	100	100	100	100	100
— %	66*	—	66*	—	66*	—
— %	33†	—	33†	—	33†	—
Unloader Setting (psig)	Factory Installed					
— Load	76	—	76	—	76	—
— Unload	58	—	58	—	58	—
OIL CHARGE PER CIRCUIT (Pt)	10					
REFRIGERANT, TYPE**	R-22					
Shipping Charge (lb)	3	3	3	3	3	3
Operating Charge, Typical (lb)	20	20	20	20	25	25
CONDENSER FANS	Propeller Type — Direct Driven					
Quantity...Dia (in.)	2.. 30		2 30		2. .30	
Nominal Hp	1 0		1 0		1.0	
Nominal Airflow (cfm)	16,700		16,700		15,700	
Speed (rpm) — 60 Hz	1140					
— 50 Hz	950					
Watts (ea) — 50/60 Hz	1550					
CONDENSER COIL	Enhanced Copper Tubes, Aluminum Lanced Fin					
Rows...Fins/in.	2...19		2 .19		3...17	
Total Face Area (sq ft)	39 20		39 20		39.20	
Storage Cap. (lb)††	37 7		37.7		56.6	
CONTROLS						
Pressurestat (psig)						
High Pressure						
Cutout	426 ± 7					
Cut-in	320 ± 20					
Low Pressure						
Cutout	27 ± 3					
Cut-in	44 ± 5					
Oil Pressure	Manual Reset					
Cutout (Diff)	6 0					
Cut-in (Diff)	8.8					
FAN CYCLING CONTROLS						
No. 2 Fan:						
Temp Close (F)	70 ± 3					
Temp Open (F)	60 ± 3					
PRESSURE RELIEF	Fusible Plug					
Location	Liquid Line, Suction Line, Compressor					
Temp (F)	210					
CONNECTIONS (Sweat) (ea ckt)						
Suction — in. OD	1⅜					
Liquid — in. OD	⅝					

LEGEND

Diff — Differential
FIOP — Factory-Installed Option
VAV — Variable Air Volume

*Standard unit — single suction pressure-actuated unloader on compressor no 1
†VAV FIOP — double electrically actuated unloaders on compressor no 1
**With 25 ft of interconnecting piping
††Condenser 80% full of liquid R-22 at 120 F

Table 1B — Physical Data — SI

UNIT 38AH	024		028		034	
	Circuit 1	Circuit 2	Circuit 1	Circuit 2	Circuit 1	Circuit 2
OPERATING WEIGHT (kg)						
With Aluminum-Fin Coil	798 3		825 6		853 0	
With Copper-Fin Coil	872 3		899.0		951.2	
COMPRESSOR			Reciprocating Semi-Hermetic			
Type	06DH824	06DA824	06DH328	06DA328	06DH328	06DA537
Quantity Cylinders (ea)	6	6	6	6	6	6
Speed (r/s) — 60 Hz	29.2	29.2	29.2	29 2	29.2	29 2
— 50 Hz	24.3	24 3	24 3	24.3	24.3	24.3
Capacity Steps						
(FIOP or Acy) — %	100	100	100	100	100	100
— %	66*	—	66*	—	66*	—
— %	33†	—	33†	—	33†	—
Unloader Setting (kPa)			Factory Installed			
— Load	524	—	524	—	524	—
— Unload	400	—	400	—	400	—
OIL CHARGE PER CIRCUIT (L)	4.73					
REFRIGERANT, TYPE**	R-22					
Shipping Charge (kg)	1 36	1 36	1.36	1.36	1 36	1.36
Operating Charge, Typical (kg)	9.1	9.1	9 1	9.1	11.4	11.4
CONDENSER FANS			Propeller Type — Direct Driven			
Quantity...Dia (mm)	2 ..762		2 762		2...762	
Nominal Hp	1.0		1.0		1.0	
Nominal Airflow (L/s)	7870		7870		7400	
Speed (r/s) — 60 Hz			19			
— 50 Hz			16			
Watts (ea) — 50/60 Hz			1550			
CONDENSER COIL			Enhanced Copper Tubes, Aluminum Lanced Fin			
Rows...Fins/m	2 ..748		2 748		3 670	
Total Face Area (sq m)	3.64		3 64		3.64	
Storage Cap. (kg)††	17 4		17 4		26.0	
CONTROLS						
Pressurestat (kPa)						
High Pressure						
Cutout			2937 ± 48			
Cut-in			2206 ± 138			
Low Pressure						
Cutout			186 ± 21			
Cut-in			303 ± 34			
Oil Pressure			Manual Reset			
Cutout (Diff)			41.4			
Cut-in (Diff)			60.7			
FAN CYCLING CONTROLS						
No. 2 Fan:						
Temp Close (C)			21 1 ± 1.6			
Temp Open (C)			15 6 ± 1.6			
PRESSURE RELIEF			Fusible Plug			
Location			Liquid Line, Suction Line, Compressor			
Temp (C)			99			
CONNECTIONS (Sweat) (ea ckt)						
Suction — in. OD			1⅜			
Liquid — in. OD			⅝			

LEGEND

Diff — Differential
FIOP — Factory-Installed Option
VAV — Variable Air Volume

*Standard unit — single suction pressure-actuated unloader on compressor no. 1
†VAV FIOP — double electrically actuated unloaders on compressor no 1
**With 7.6 m of interconnecting piping
††Condenser 80% full of liquid R-22 at 48.8 C.

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 until the snubber washer can be moved with finger pressure. See Fig. 3.

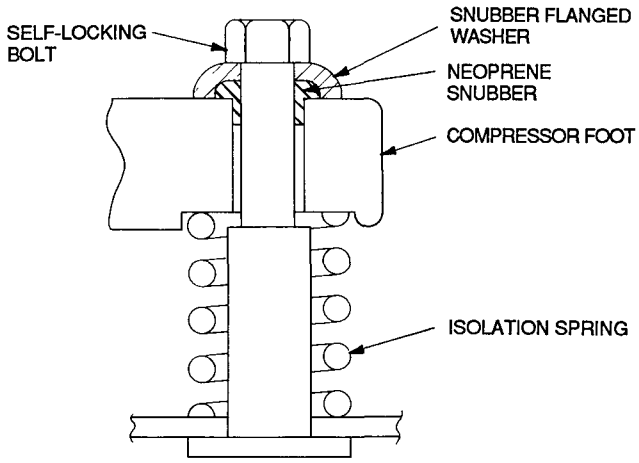


Fig. 3 — Compressor Mounting

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.

Solenoid Drop Refrigerant Control — All units are factory wired to operate on solenoid drop refrigerant control. A field-supplied liquid line solenoid valve must be installed in the liquid line ahead of the indoor coil. See Fig. 5. Wires from solenoid valve do not need to be in conduit as coil voltage is 24 v (class 2 circuit).

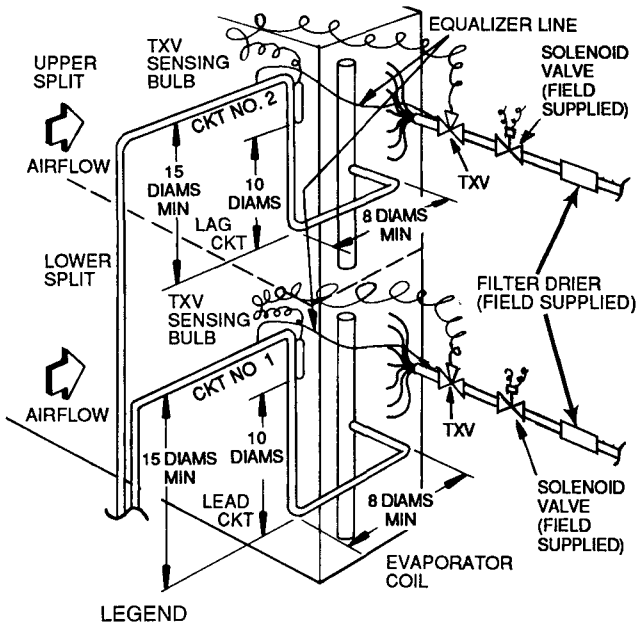
⚠ WARNING

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(es). Complete the refrigerant piping from the evaporator to the condenser before opening the liquid and suction lines at the condensing unit.

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

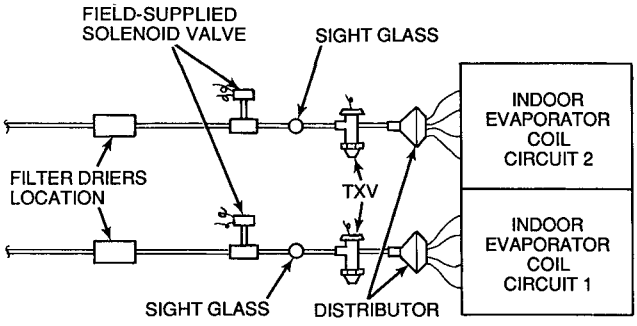
Piping Procedure — Do not remove run-around pipe from suction and liquid line stubs until piping connections



TXV — Thermostatic Expansion Valve

NOTES:
1. Lower section is first on and last off.
2. For more complete piping information, refer to Carrier System Design Manual, Part 3, or E20-II refrigerant piping computer program

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

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.

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 degree 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.

Copy continued on page 7.

Table 2A — Refrigerant Piping Sizes — 60 Hz

SINGLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING FOR EACH CIRCUIT — ft (m)									
		0-25 (0-7.6)		25-50 (7.6-15.2)		50-75 (15.2-22.9)		75-100 (22.9-30.5)		100-200 (30.5-61.0)	
		L	S	L	S	L	S	L	S	L	S
024	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8*
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8†	7/8	1 5/8†
028	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8*	7/8	2 1/8**
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8†	7/8	2 1/8**
034	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8*	7/8	2 1/8**
	Ckt 2	1/2	1 3/8	5/8	1 5/8	7/8	1 5/8	7/8	1 5/8	7/8	2 1/8†

DOUBLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING — ft (m)								
		50-75 (15.2-22.9)			75-100 (22.9-30.5)			100-200 (30.5-61.0)		
		A	B	C	A	B	C	A	B	C
024	Ckt 1	—	—	—	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
	Ckt 2	—	—	—	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
028	Ckt 1	—	—	—	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
	Ckt 2	—	—	—	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
034	Ckt 1	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
	Ckt 2	—	—	—	—	—	—	1 3/8	1 5/8	2 1/8

Table 2B — Refrigerant Piping Sizes — 50 Hz

SINGLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING FOR EACH CIRCUIT — ft (m)									
		0-25 (0-7.6)		25-50 (7.6-15.2)		50-75 (15.2-22.9)		75-100 (22.9-30.5)		100-200 (30.5-61.0)	
		L	S	L	S	L	S	L	S	L	S
024	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8*
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8†	7/8	1 5/8†
028	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8*	7/8	1 5/8**
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	5/8	1 5/8†	7/8	1 5/8**
034	Ckt 1	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8*	7/8	2 1/8*
	Ckt 2	1/2	1 1/8	5/8	1 3/8	5/8	1 3/8	7/8	1 5/8	7/8	2 1/8†

DOUBLE SUCTION RISERS

UNIT 38AH		LENGTH OF INTERCONNECTING PIPING — ft (m)					
		75-100 (22.9-30.5)			100-200 (30.5-61.0)		
		A	B	C	A	B	C
024	Ckt 1	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
	Ckt 2	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
028	Ckt 1	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
	Ckt 2	1 1/8	1 3/8	1 5/8	1 1/8	1 3/8	1 5/8
034	Ckt 1	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8
	Ckt 2	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8

LEGEND

L — Liquid Line
S — Suction Line

*Double suction riser required if evaporator is below condensing unit and 2 unloaders are used

†Double suction riser required if evaporator is below condensing unit and compressor is equipped with 2 unloaders. Note the only time circuit no. 2 may be equipped with 2 unloaders is if it is serving its own air handler and the unit does not require low ambient operation (Motormaster® III control).

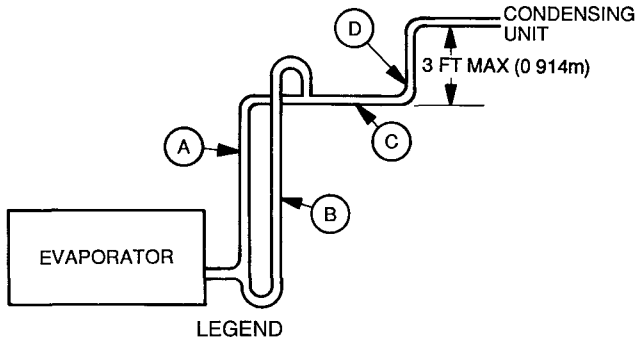
**Double suction riser required if evaporator is below condensing unit and compressor has one or more unloaders

NOTES:

1. All line sizes are inches OD.
2. Standard unit comes with one pressure-operated unloader on circuit no. 1. If unit serves one air handler, an additional unloader may be field installed on circuit no 1 compressor only. If the unit serves 2 separate air handlers and low-ambient operation is required (Motormaster III control), each circuit's compressor may be equipped with *only one* unloader.
3. Equivalent line sizes in mm are as follows:

in.	mm	in.	mm
1/2	12.7	1 3/8	34 9
5/8	15.9	1 5/8	41.3
7/8	22.2	2 1/8	54 0
1 1/8	28.6		

UNIT 38AH	MAXIMUM LIQUID LIFT PER CIRCUIT	
	ft	m
024	76	23.2
028	73	22.2
034	100	30.5



LEGEND

(A) — Suction Riser without Trap
(B) — Suction Riser with Trap
(C) — Suction Line to Condensing Unit
(D) — Use Single Suction Pipe Diameter Shown for 75 ft (22 9 m) Interconnecting Pipe in Table Above

3. Size the suction line from the evaporator through the riser for high velocity. 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 condensing unit is below the evaporator, the riser at the evaporator does not have to extend as high as the top level of a given evaporator circuit. 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. Other fusible plugs are located on the compressor(s) and on the suction line(s).

VAV (Variable Air Volume) APPLICATIONS — Field-supplied suction line accumulators (one per circuit) (Replacement Components Division, Carrier Part No. KH73LZ001) are required for VAV applications in outdoor units.

⚠ WARNING

Failure to install accumulator in outdoor unit VAV applications may VOID warranty.

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

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 8.

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. Standard]) 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

1. 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.
2. *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 closed to prevent an excessive accumulation of refrigerant in the compressor oil.*
3. Power entry is at compressor end only.
4. Maximum field wire sizes allowed by lugs on terminal block are as follows:

V-PH-HZ	WIRE SIZE
208/230-3-60	350 kcmil (177.90 sq mm)
380-3-60 460-3-60 575-3-60	2/0 AWG (67 42 sq mm)
230-3-50	350 kcmil (177.90 sq mm)
346-3-50 400-3-50	2/0 AWG (67.42 sq mm)

5. 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.

FIELD CONNECTIONS

1. Main Power — Bring wires from the fused disconnect switch through hole in bottom rail of unit to control box (Fig. 6) and connect to terminals 11, 12, 13 on line side of terminal block TB1 (see Fig. 7 or 8). To comply with NEC Article 440-14, the disconnect must be located within sight from and readily accessible from the unit.
2. 24-v Control Power — Units have single point power connections. Control circuit is directly connected internally to unit. Maximum 24-v control circuit is 3.2 amps.

   NOTE: For wire runs, use the following sizes of insulated wire:

Ft		
0-50	50-75	Over 75
No 18 AWG 35 C Min	No 16 AWG 35 C Min	No 14 AWG 35 C Min
M		
0-15.2	15.2-22.9	Over 22.9
0 82 sq mm 35 C Min	1.30 sq mm 35 C Min	2 08 sq mm 35 C Min

3. 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 (Carrier part no. HR81JE001) is available from Service Parts Center, or equivalent can be field supplied. This should be electrically interlocked in the control circuit as shown on the label diagram affixed to the access panel on end of unit. Note that for a single air handler with constant volume controls (those shown in Fig. 7 and 8), the airflow switch must be used in combination with a relay having 2 sets of normally open contacts (Carrier part no. HN61KK040 or equivalent). For wiring, see unit label diagram on inside of unit access door.
4. ModuPanel™ Connections — Refer to Fig. 9 and 10 for field connections.
5. 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 breakers inside unit shut down the compressor and condenser fans, crankcase heater remains on.

Table 3 — Electrical Data

60 HERTZ

UNIT 38AH		UNIT						COMPRESSOR				FAN MOTORS†		
		Volts 3 Ph, 60 Hz	Supplied*		MCA	MOCP (Fuse)	ICF	RLA		LRA		Qty	FLA (ea)	Hp
			Min	Max				Ckt 1	Ckt 2	Ckt 1	Ckt 2			
024	500	208/230	187	254	100 8	125	408.4	39.3	39.3	198	198	2	6.2	1
	200	380	342	418	61 8	80	193.8	24 0	24.0	93	93	2	3 9	
	600	460	414	508	50.3	60	204.2	19 6	19 6	99	99	2	3 1	
	100	575	518	632	42 1	50	168.4	15.7	15 7	79	79	2	3.4	
028	500	208/230	187	254	110.5	150	468.4	43.6	43 6	228	228	2	6 2	1
	200	380	342	418	67.2	90	215 8	26 4	26 4	104	104	2	3 9	
	600	460	414	508	55.9	70	234 2	22 1	22 1	114	114	2	3 1	
	100	575	518	632	47.1	60	188.8	19.7	19 7	91	91	2	3.4	
034	500	208/230	187	254	135 5	175	506.4	43.6	63.6	228	266	2	6 2	1
	200	380	342	418	77.0	110	256 8	26.4	34 3	104	145	2	3 9	
	600	460	414	508	65.8	90	340.2	22.1	30.0	114	120	2	3.1	
	100	575	518	632	53 3	70	193.8	17.9	22 9	91	36	2	3 4	

50 HERTZ

UNIT 38AH		UNIT						COMPRESSOR				FAN MOTORS†		
		Volts 3 Ph, 50 Hz	Supplied*		MCA	MOCP (Fuse)	ICF	RLA		LRA		Qty	FLA (ea)	Hp
			Min	Max				Ckt 1	Ckt 2	Ckt 1	Ckt 2			
024	800	230	198	254	101 2	125	268.8	39.3	39.3	128	128	2	6.4	1
	300	346	311	380	62.8	80	194.8	24 0	24.0	93	93	2	4 4	
	900	400	342	400	46.5	60	204 0	18 0	18.0	99	99	2	3.0	
028	800	230	198	254	110 9	150	298 8	43.6	43.6	143	143	2	6 4	1
	300	346	311	380	68.2	90	216.8	26.4	26.4	104	104	2	4 4	
	900	400	342	400	55.7	70	234 0	22 1	22 1	114	114	2	3 0	
034	800	230	198	254	135.9	175	355 8	43.6	63 6	143	200	2	6.4	1
	300	346	311	380	78 1	110	257.8	26.4	34.3	104	145	2	4.4	
	900	400	342	400	65.1	90	240 0	22 1	30 0	114	120	2	3 0	

LEGEND

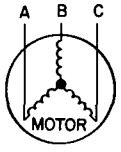
FLA — Full Load Amps
ICF — Maximum Instantaneous Current Flow during starting (the point in the starting sequence where the sum of the LRA for the starting compressor, plus the total RLA for all running compressors, plus the total FLA for all running fan motors is maximum)
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps (complies with National Electrical Code [NEC], Section 430-24) (U.S.A Standard)
MOCP — Maximum Overcurrent Protection
RLA — Rated Load Amps

*Units are suitable for use on electrical systems where voltage supplied to unit terminals is not below or above listed minimum and maximum limits
†All fans are protected by a single circuit breaker.

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.



AB = 243 v
BC = 236 v
AC = 238 v

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

$$= 239 \text{ v}$$

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.

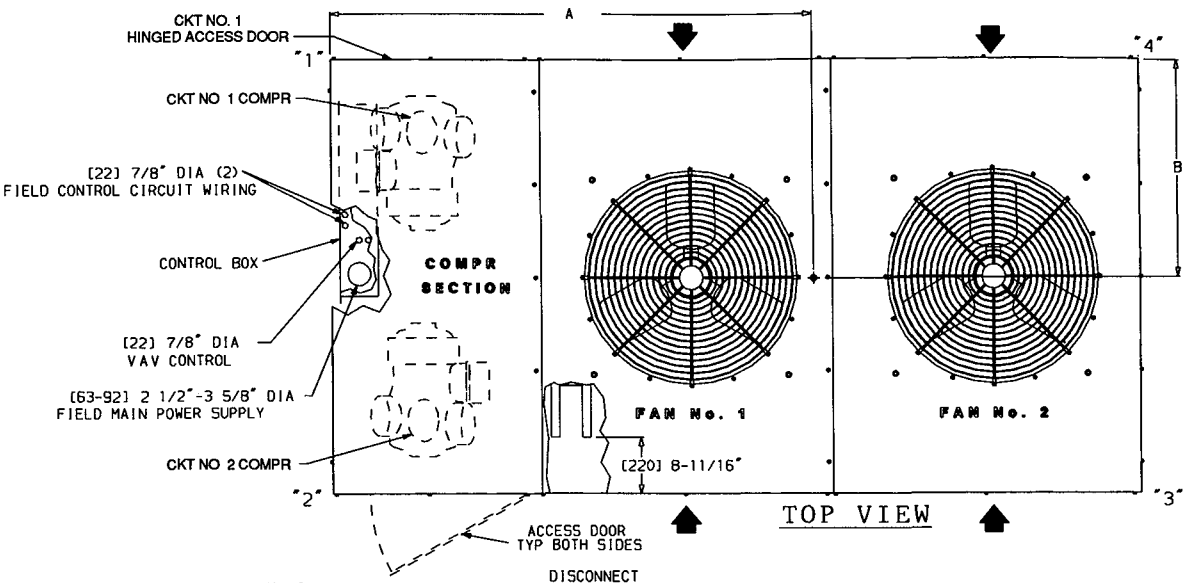
Determine percent voltage imbalance:

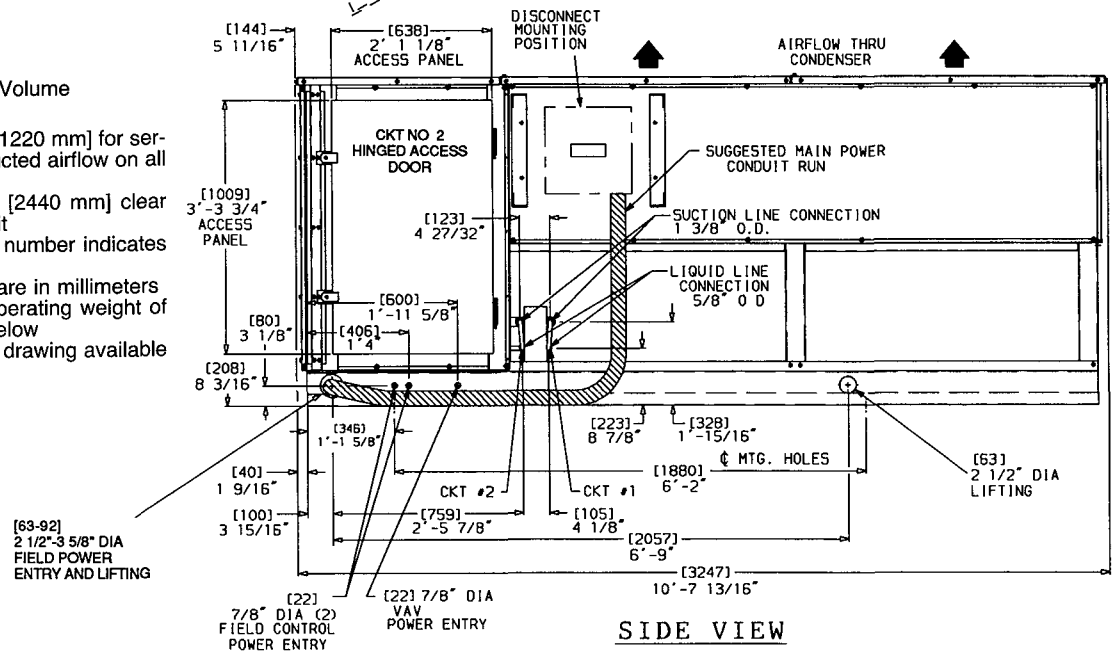
$$\% \text{ Voltage Imbalance} = 100 \times \frac{4}{239}$$

$$= 1.7\%$$

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%.



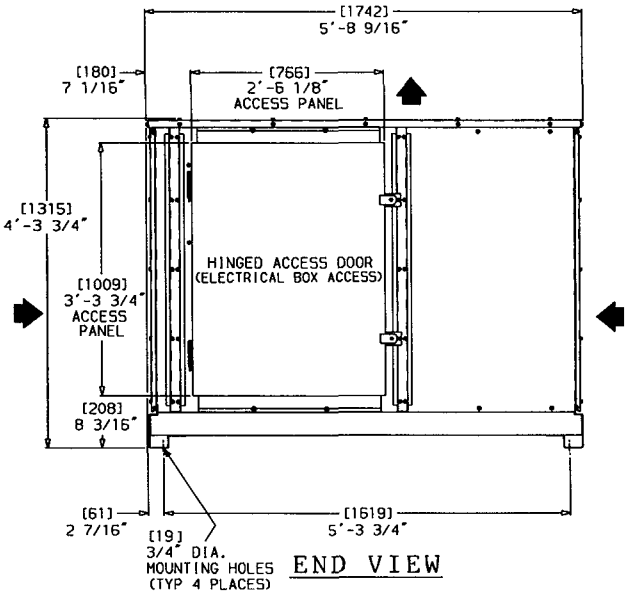


LEGEND

VAV — Variable Air Volume

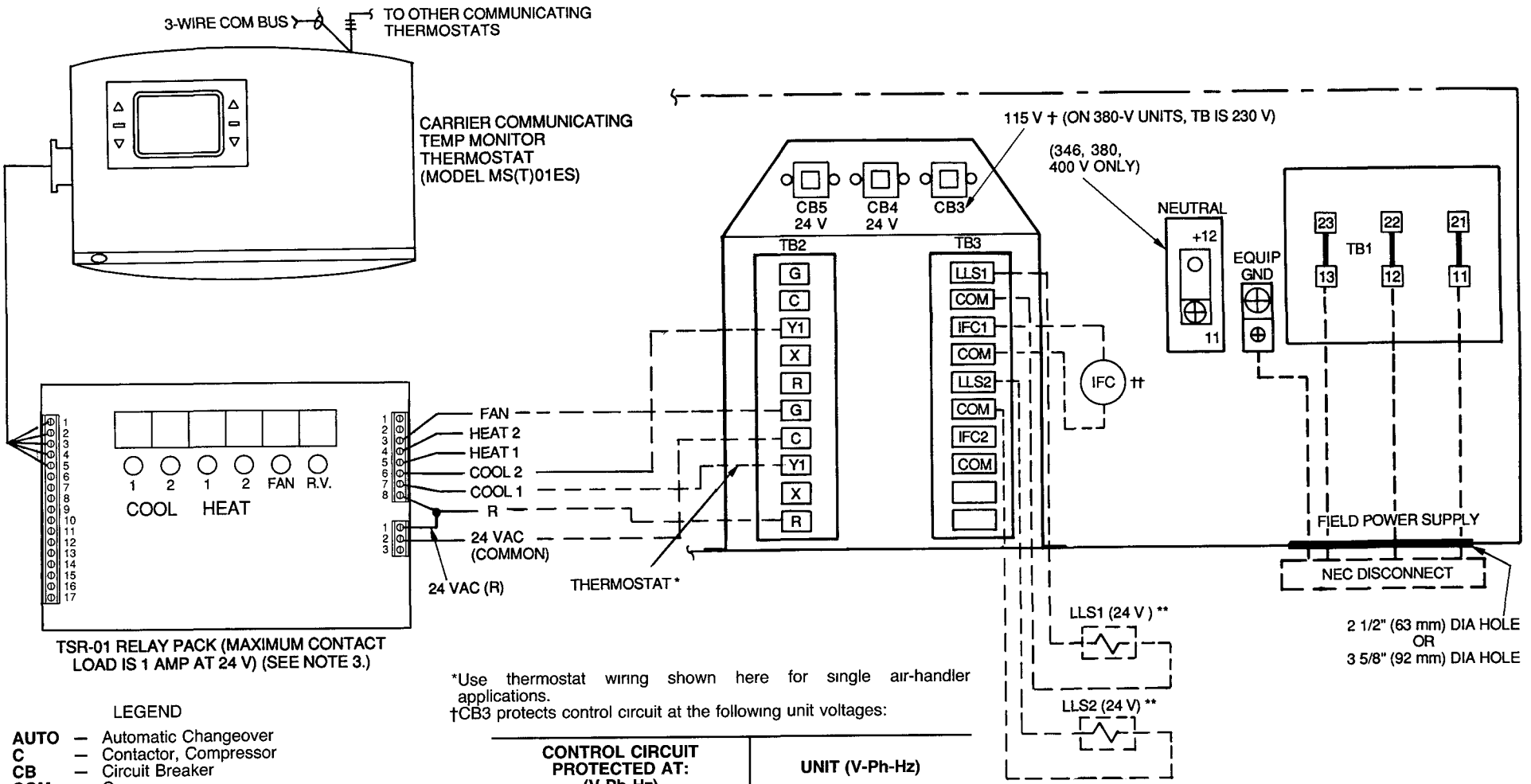
NOTES:

1. There must be 4 ft [1220 mm] for service and for unrestricted airflow on all sides of unit.
2. There must be 8 ft [2440 mm] clear air space above unit
3. "C" is the package number indicates copper coils
4. Dimensions in [ ] are in millimeters
5. The approximate operating weight of the unit is shown below
6. Certified dimension drawing available on request.



UNIT 38AH	CORNER WEIGHT — lbs [kg]				CENTER OF GRAVITY		TOTAL UNIT lb [kg]
	"1"	"2"	"3"	"4"	A Dim. in. [mm]	B Dim. in. [mm]	
024	631.6 [286.5]	577.6 [262.0]	263 1 [119 3]	287.7 [130.5]	40.0 [1016]	32.8 [832]	1760 [798 3]
024C	666 5 [302.3]	609 5 [276.5]	309.0 [140.2]	337 9 [153.3]	43.0 [1092]		1923 [872.3]
028	658.7 [298.8]	602.4 [273.3]	267 0 [121.1]	291 9 [132 4]	39.3 [997]		1820 [825 6]
028C	693.0 [314 3]	633 8 [287 5]	313.0 [142.0]	342 2 [155.2]	42.3 [1073]		1982 [899 0]
034	667 0 [302.5]	610 0 [276 7]	288.0 [130 7]	315.0 [142.9]	41 0 [1041]		1880 [853.0]
034C	718 3 [325.8]	656.8 [297.9]	344.8 [156.4]	377.0 [171.0]	44.0 [1117]		2097 [951.2]

Fig. 6 — Dimensional Drawing — Units 38AH024, 028, 034



TSR-01 RELAY PACK (MAXIMUM CONTACT LOAD IS 1 AMP AT 24 V) (SEE NOTE 3.)

LEGEND

AUTO	—	Automatic Changeover
C	—	Contactor, Compressor
CB	—	Circuit Breaker
COM	—	Common
GND	—	Ground
IFC	—	Indoor-Fan Contactor
LLS	—	Liquid Line Solenoid
NEC	—	National Electrical Code (U.S.A. Standard)
R.V.	—	Reversing Valve
TB	—	Terminal Block
TC	—	Thermostat, Cooling
— — —		Field Accessory Wiring
- - - -		Field Control Wiring
———		Factory Wiring
▬ ▬ ▬		Field Power Wiring
▬▬▬		Indicates Common Potential; Does Not Indicate Wiring

*Use thermostat wiring shown here for single air-handler applications.

†CB3 protects control circuit at the following unit voltages:

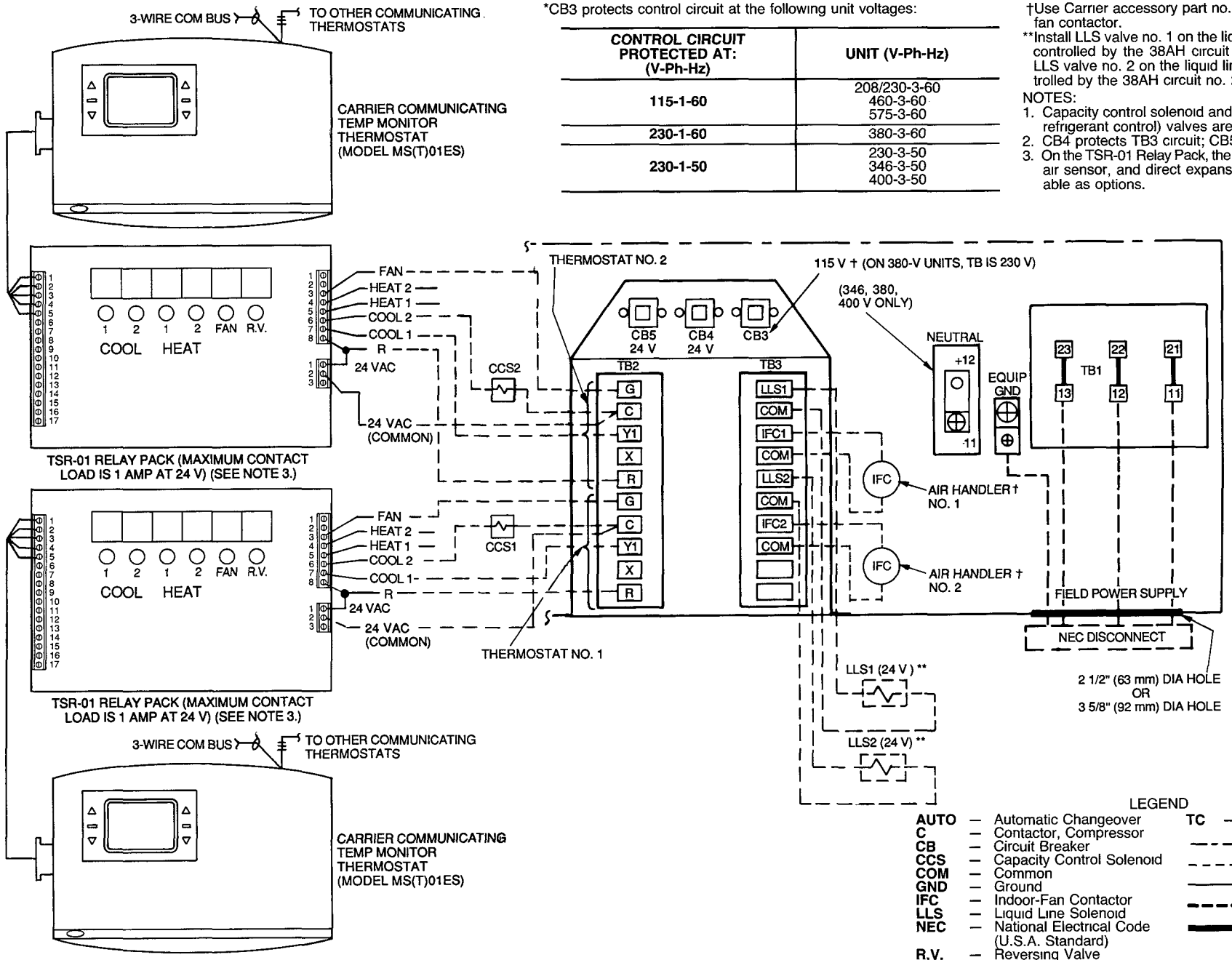
CONTROL CIRCUIT PROTECTED AT: (V-Ph-Hz)	UNIT (V-Ph-Hz)
115-1-60	208/230-3-60 460-3-60 575-3-60
230-1-60	380-3-60
230-1-50	230-3-50 346-3-50 400-3-50

**For a single air handler, LLS valve no. 1 is to be used on the lower (no. 1) evaporator circuit. The LLS valve no. 2 is to be used on the upper (no. 2) evaportor circuit.

††Only one indoor-fan contactor is required on single air-handler applications. Use Carrier accessory part no. 40RR900181 for indoor-fan contactor.

NOTES:
1. CB4 protects TB3 circuit; CB5 protects TB2 circuits.
2. LLS1 and LLS2 are field supplied.
3. TB2 and TB3 are in 24-v circuits.
4. On the TSR-01 Relay Pack, the outside-air sensor, supply-air sensor, and direct expansion coil sensor are available as options.

Fig. 7 — Typical Wiring Schematic — Unit 38AH with Single Air Handler



*CB3 protects control circuit at the following unit voltages:

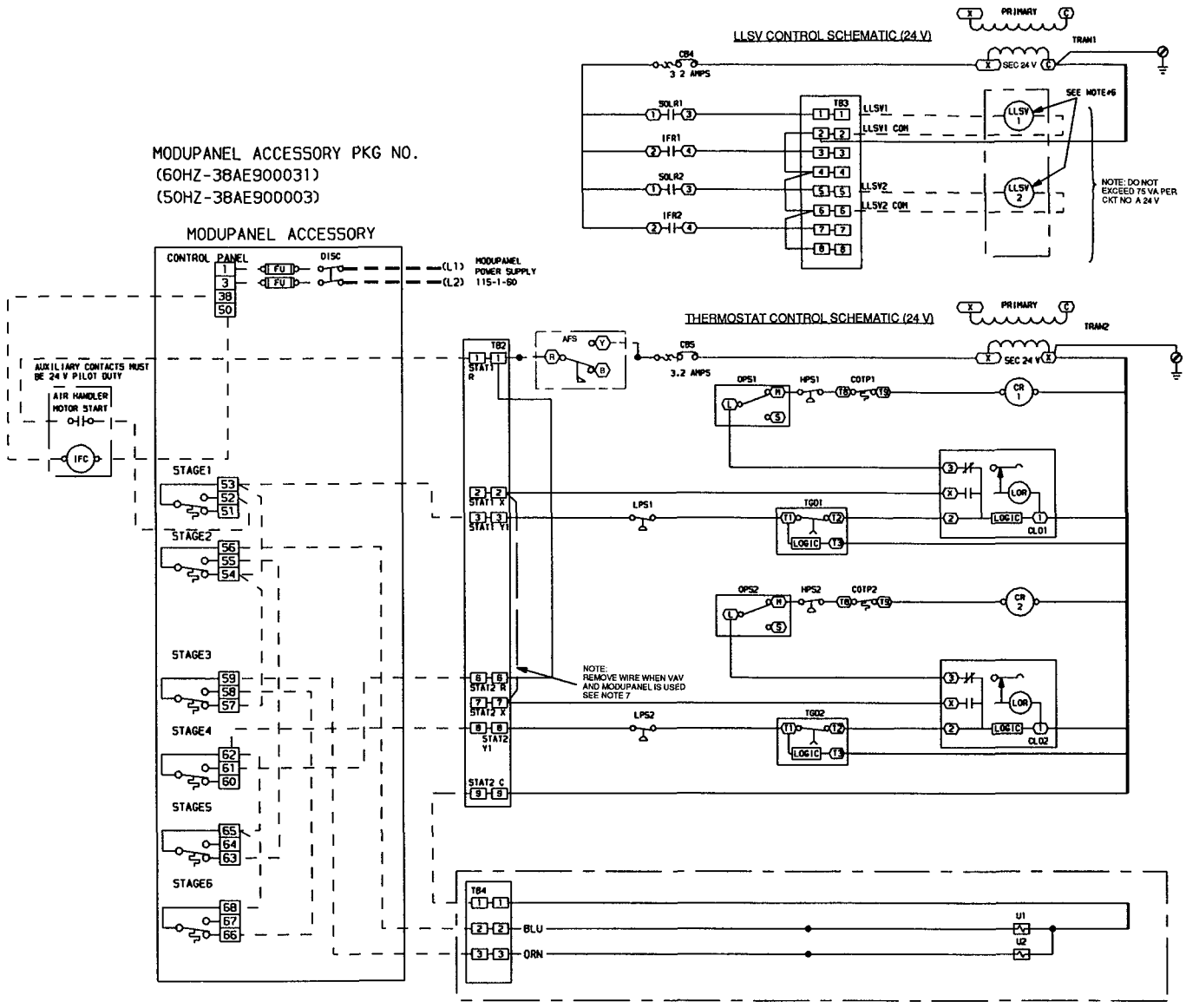
CONTROL CIRCUIT PROTECTED AT: (V-Ph-Hz)	UNIT (V-Ph-Hz)
115-1-60	208/230-3-60 460-3-60 575-3-60
230-1-60	380-3-60
230-1-50	230-3-50 346-3-50 400-3-50

†Use Carrier accessory part no. 40RR900181 for indoor-fan contactor.

**Install LLS valve no. 1 on the liquid line of the air handler controlled by the 38AH circuit no. 1 thermostat. Install LLS valve no. 2 on the liquid line of the air handler controlled by the 38AH circuit no. 2 thermostat.

NOTES:
1. Capacity control solenoid and liquid line (solenoid drop refrigerant control) valves are field supplied.
2. CB4 protects TB3 circuit; CB5 protects TB2 circuit.
3. On the TSR-01 Relay Pack, the outside-air sensor, supply-air sensor, and direct expansion coil sensor are available as options.

Fig. 8 — Typical Wiring Schematic — Unit 38AH with 2 Air Handlers



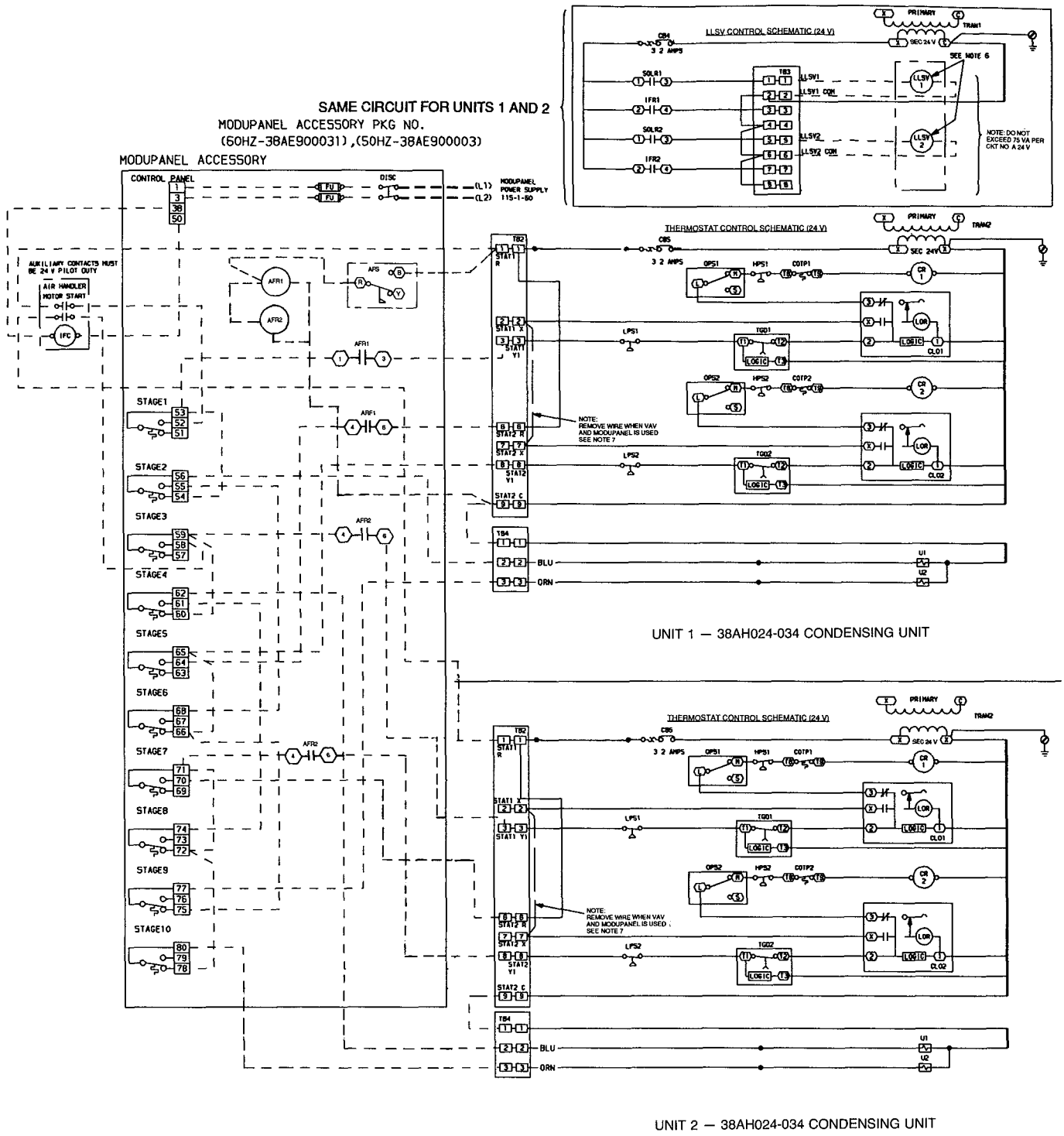
LEGEND

AFS	— Airflow Switch	**LLSV**	— Liquid Line Solenoid Valve		Terminal Block Connection
C	— Contactor, Compressor	**LOR**	— Lock-Out Relay		Marked Terminal
CB	— Circuit Breaker	**LPS**	— Low-Pressure Switch		Unmarked Terminal
CLO	— Compressor Lock-Out	**OPS**	— Oil Pressure Switch		Unmarked Splice
COM	— Common	**PL**	— Plug Assembly		Field Accessory Wiring
COTP	— Compressor Overcurrent Protection	**SOLR**	— Solenoid Relay		Factory Wiring
CR	— Control Relay	**STAT**	— Thermostat		Field Control Wiring
DISC	— Disconnect	**TB**	— Terminal Block		Field Power Wiring
HPS	— High-Pressure Switch	**TGD**	— Time Guard® Device		Indicates Common Potential; Does Not Represent Wiring
IPC	— Indoor-Fan Contactor	**TRAN**	— Transformer		
IPR	— Indoor-Fan Relay	**U**	— Unloader (Solenoid)		
kcmil	— thousand circular mils	**VA**	— Volt-Ampere		
LLS	— Liquid Line Solenoid	**VAV**	— Variable Air Volume		

NOTES TO FIG. 9 AND 10

1 Factory wiring is in accordance with National Electrical Code (NEC) (U.S A. Standard) Field modifications or additions must be in compliance with all applicable codes
2 Wiring for field power supply must be rated 75 C minimum. Use copper, copper-clad aluminum, or aluminum conductors Maximum incoming wire size for main terminal block (TB1) is 350 max kcmil (230 v). All other voltages 2/0 AWG (American Wire Gage) maximum
3. Terminal blocks TB2, TB3, and TB4 are for external field control connections Control connections are to be class 2 wiring.
4. Field-supplied components connected to TB3 (e.g., LLS1 and LLS2) cannot exceed 75 va total inductive load at 24 vac, so that TRAN1 does not become overloaded The air handler auxiliary motor starter contacts must have a minimum rating of 30 va at 24 vac The airflow switch must have minimum contact rating of 125 va at 24 vac.
5. Replacement of factory wires must be with type 105 C wire or its equivalent
6. Field-supplied liquid line solenoid valves installed at the evaporator are required on circuits no. 1 and 2 on all units
7. ModuPanel control is wired for one air handler only Remove wire between TB2-2 to TB2-7 for ModuPanel control applications

Fig. 9 — Typical Wiring Schematic — VAV ModuPanel™ One Dual-Circuit Condensing Unit with Air Handler



LEGEND

AFR	— Airflow Relay	
AFS	— Airflow Switch	
C	— Contactor, Compressor	
CB	— Circuit Breaker	
CLO	— Compressor Lock-Out	
COM	— Common	
COTP	— Compressor Overcurrent Protection	
CR	— Control Relay	
DISC	— Disconnect	
HPS	— High-Pressure Switch	
IPC	— Indoor-Fan Contactor	
IPR	— Indoor-Fan Relay	
kcmil	— thousand circular mils	
LLS	— Liquid Line Solenoid	
LLSV	— Liquid Line Solenoid Valve	
LOR	— Lock-Out Relay	
LPS	— Low-Pressure Switch	
OPS	— Oil Pressure Switch	
PL	— Plug Assembly	
SOLR	— Solenoid Relay	
STAT	— Thermostat	
TB	— Terminal Block	
TGD	— Time Guard® Device	
TRAN	— Transformer	
U	— Unloader (Solenoid)	
VA	— Volt-Ampere	
VAV	— Variable Air Volume	

Terminal Block Connection
Marked Terminal
Unmarked Terminal
Unmarked Splice
Field Accessory Wiring
Factory Wiring
Field Control Wiring
Field Power Wiring
Indicates Common Potential, Does Not Represent Wiring

Fig. 10 — Typical Wiring Schematic — VAV ModuPanel™, Two Dual-Circuit Condensing Units with Air Handler

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. See Fig. 9 or 10.
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 valves.
4. Check tightness of all electrical connections.
5. Compressor oil level should be visible in sight glass. Adjust the oil level as required. No oil should be removed unless the crankcase heater has been energized for at least 24 hours. See Service section, Oil Charge on page 18.
6. Be sure unit is properly leak checked, dehydrated, and charged. See Preliminary Charge, below.
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. Fan motors are 3-phase. Check rotation of fans during first start-up check. Fan rotation is counterclockwise as viewed from top of unit. If fan is not turning counterclockwise, reverse 2 of the power wires.
10. Be sure compressor floats freely on the mounting springs and that snubber washers can be moved with finger pressure. See Compressor Mounting, page 5, and Fig. 3 for loosening compressor bolts.

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

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. See approximate refrigerant charge in Table 1A or 1B. Charge according to the values in the Charging Chart, Fig. 11, page 16.

START-UP

Compressor crankcase heaters must be on for 24 hours before start-up. To energize the crankcase heaters, set the space thermostat above the ambient so there will be no demand for cooling. Close the field disconnect and turn on the fan circuit breakers. Leave the compressor circuit breakers off/open. The crankcase heaters are now 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.

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 heaters are securely in place.
5. Check that compressor crankcase heaters have 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, this page.
8. If any leads are detected, evacuate and dehydrate as previously outlined in Pre-Start-Up section, Leak Test and Dehydration, this page.

Preliminary Oil Charge — Each compressor is factory charged with oil (see Table 1A or 1B). 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 is as follows:

ADD OIL — Close suction service valve and pump down crankcase to 2 psig (14 kPa). (Low-pressure switch must be jumpered.) Wait a few minutes and repeat until pressure remains steady at 2 psig (14 kPa). Remove oil fill plug above the bull's-eye, add oil through plug hole, and replace plug. Run compressor for 20 minutes and check oil level.

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 thermostats are set above ambient so that there is no demand for cooling. Only the crankcase heaters will be energized.

Next, close the compressor circuit breakers and then reset space thermostat TC1 below ambient so that a call for stage one cooling is ensured. If compressor does not start, set thermostat lower.

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

If 38AH is connected to a single 2-stage cooling thermostat (one fan coil), start-up of circuit no. 1 compressor will be delayed from one second to 5 minutes from the time the call for cooling is initiated (see Fig. 12). TC2 (thermostat contacts 2) close 1½° F (0.7° C) lower than TC1. After these contacts close, start up of circuit no. 2 compressor will be delayed from one second to 5 minutes from the time the call for cooling is initiated (see Fig. 12).

⚠ 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. 11.

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 each circuit to run fully loaded for 20 minutes. Running oil level should be within view of the crankcase sight glass. Stop the compressors 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 circuit 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.

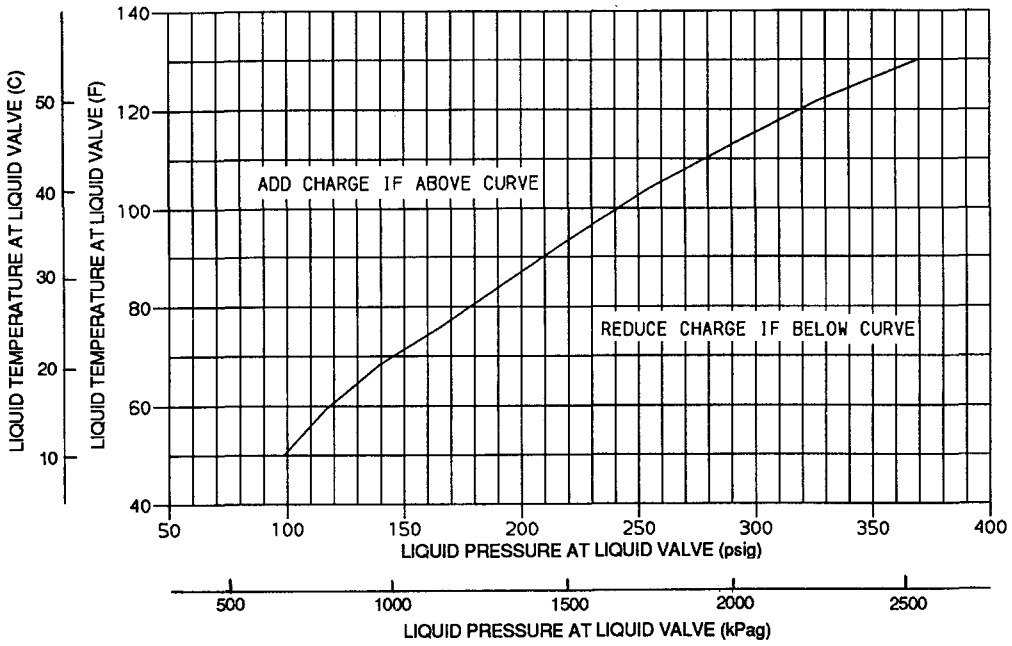
If the initial check shows too much oil (too high in the sight glass) remove oil to proper level. See Preliminary Oil Charge, page 14, for proper procedure for adding and removing oil.

When the above checks are complete, repeat the procedure with the unit operating at minimum load conditions. For this minimum load check, operate each circuit's compressor individually and unloaded to minimum step.

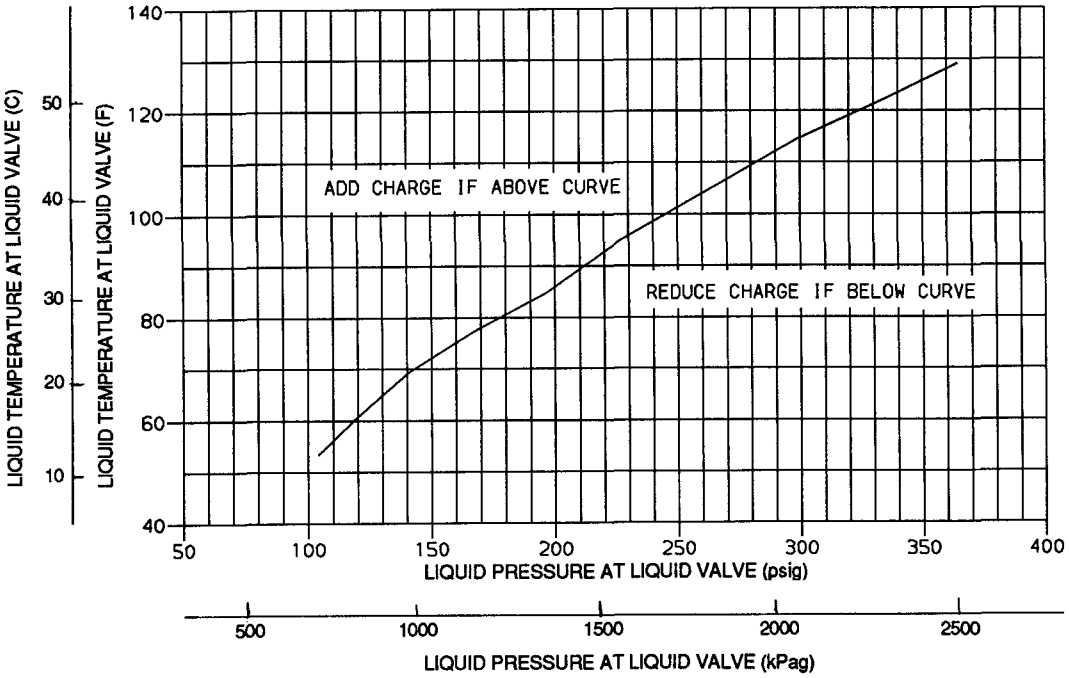
Unload the compressor(s) by turning the control set point adjustment nut counterclockwise until the adjustment nut stops. The unloader is now at 0 psig (0 kPag) set point. If electric actuated unloaders are installed, energize the solenoid to unload the compressor.

Return unloader to original setting after checks are complete.

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



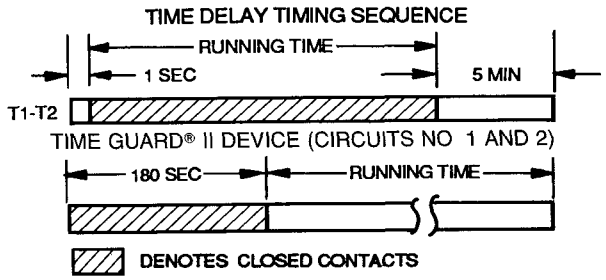
UNITS 38AH024 AND 028



UNIT 38AH034

NOTE: All outdoor fans must be operating

Fig. 11 — Units 38AH024-034 Charging Chart, 50/60 Hz (Circuits No. 1 and 2)



ACCESSORY WINTER-START KIT
(CARRIER PART NO. 38AE900021)

Fig. 12 — Timer Sequence Chart

SEQUENCE OF OPERATION

Single Air Handler, 2-Stage Cool Thermostat

— At start-up, the thermostat calls for first-stage cooling (TCI closes) and with all safety devices satisfied, circuit no. 1 control relay (CR1) closes, deenergizing the crankcase heater at compressor no. 1. The indoor-fan motor starts immediately, and the liquid line solenoid valve (LLSV) for solenoid drop refrigeration control on circuit no. 1 opens. Outdoor-fan motor no.1 and compressor no. 1 start after one second. Fan no. 2 starts if the outdoor ambient is above 60 F (15.6 C).

On standard units, compressor no. 1 operates either fully loaded or at one step of unloading depending on the suction pressure, which in turn is dependent on the evaporator load conditions. As cooling demand increases, TC2 of the 2-stage thermostat energizes control relay no. 2. CR2 deenergizes the crankcase heater at compressor no. 2 and brings on compressor no. 2 after one second. The LLSV for solenoid drop refrigerant control (circuit no. 2) opens as soon as CR2 is energized. On standard units, compressor no. 2 operates fully loaded.

As cooling demand is satisfied, thermostat contacts TC2 break and deenergize CR2 which then deenergizes compressor no. 2 and energizes its crankcase heater. The LLSV on circuit no. 2 closes, preventing refrigerant migration back to compressor no. 2 during the off cycle. If the space temperature continues to decrease, stage 1 thermostat contacts TC1 break and deenergize CR1. Immediately after CR1 is deenergized, compressor no. 1 shuts off and its crankcase heater is energized. The LLSV on circuit no. 1 closes, preventing refrigerant migration back to compressor no. 1 during the off cycle. Outdoor-fan motors no. 1 and 2 deenergize as soon as CR1 is deenergized.

NOTE: If thermostat fan switch is in the auto position, the indoor fan will cycle on and off as the thermostat calls for cooling (or heating). If the fan switch is in the continuous position, the fan will run as long as the outdoor unit is powered up.

Two Air Handlers — Two 2-Stage Cool Thermostats (One Per Air Handler) — At start-up of circuit no. 1, the thermostat controlling circuit no. 1 calls for first stage of cooling when thermostat contact TC1 closes. If all safety devices are satisfied, circuit no. 1 control relay CR1 energizes which deenergizes the crankcase heater inside compressor no. 1. The indoor-fan motor on the circuit no. 1 fan coil starts immediately, and the main liquid line solenoid valve (LLSV) for solenoid drop refrigerant control on circuit no. 1 opens. Outdoor-fan motor no. 1 and compressor no. 1 start after one second. Fan no. 2 starts if the outdoor ambient is above 60 F (15.6 C).

On standard units, compressor no. 1 operates either fully loaded or at one step of unloading depending on the suction pressure, which in turn is dependent on the evaporator load conditions. As cooling demand increases, TC2 of the 2-stage thermostat energizes the capacity control LLSV resulting in full activity of the evaporator surface. The fully active evaporator surface will raise the suction pressure until the pressure-operated capacity control valve setting is exceeded, so that the compressor becomes fully loaded.

The thermostat controlling circuit no. 2 calls for first stage of cooling when thermostat contact TC2 closes. Assuming all safety devices are satisfied, circuit no.2 control relay CR2 energizes, which deenergizes the crankcase heater inside compressor no. 2. The indoor-fan motor on circuit no. 2 fan coil starts immediately, and the main LLSV for solenoid drop refrigerant control on circuit no. 2 opens. Compressor no. 2 starts after one second. The outdoor fans are already running if circuit no. 1 is running. If circuit no. 1 is not running when thermostat no. 2 calls for cooling, the outdoor fans are off. In this situation, outdoor-fan motor no. 1 starts when compressor no. 2 starts. Outdoor-fan motor no. 2 comes on if the outdoor ambient is above 60 F (15.6 C).

As cooling demand is satisfied at thermostat no. 1 or 2 (whichever comes first), contacts TC2 break, and the capacity control LLSV on that circuit is deenergized. This prevents refrigerant flow through the upper (circuit no. 1 or 2) evaporator section causing the suction pressure to drop and the compressor on that circuit to unload.

NOTE: Circuit no. 2 does not have a factory-installed unloader. If desired, one must be added in the field.

As the space temperature drops further, the space thermostat contacts TC1 open which will deenergize control relay CR1 or CR2. Immediately after CR1 or CR2 is deenergized, the compressor CR1 or CR2 control is shut off and its crankcase heater is energized. The LLSV on that circuit closes, preventing refrigeration migration back to the compressor during the off cycle. Outdoor-fan motors no. 1 and 2 are deenergized only if the space thermostats for both circuits no. 1 and 2 are not calling for cooling.

NOTE: If thermostat fan switch is in the auto position, the indoor fan will cycle on and off as the thermostat calls for cooling (or heating). If the fan switch is in the continuous position, the fan will run as long as the outdoor unit is powered up.

Restart — Manual reset of the 24-v control circuit is necessary if unit shutdown is caused by automatic reset devices (including COTP [compressor overcurrent protection] and HPS [high-pressure switch]) or if shutdown is caused by manual reset devices (including OPS [oil pressure switch] and compressor circuit breaker protection). To restart the unit when COTP or HPS has tripped (*after COTP and HPS have reset automatically),* open and then close the thermostat contacts. Opening and then closing thermostat contacts interrupt and reapply 24-v power to the compressor lockout (CLO1 and CLO2) which resets the devices.

It is necessary to manually reset the compressor circuit breaker and OPS at the unit if either of these safeties should shut down the unit.

> IMPORTANT: If either OPS trips, it must be reset **first** before making and breaking the thermostat contacts to reset CLO1 and CLO2. If this procedure is not followed, the CLO1 and CLO2 cannot reset.

If the LPS (low-pressure switch) is not closed, the call for cooling is interrupted and the Time Guard® device is activated. This deenergizes control relay(s) (CR1 or CR2) and deenergizes the compressor for a 5-minute time period. At the end of this 5-minute period, if the LPS is closed, the compressor restarts. If the system is low on charge, LPS cannot reset and the unit will stay off on this safety.

Causes of Complete Unit Shutdown:

- interruption of supplied power
- open compressor overtemperature protection (COTP)
- compressor electrical overload protection (CB1 or CB2)
- open high-pressure or low-pressure safety switches
- open oil pressure switch

SERVICE

⚠ CAUTION

Turn off all power to unit before proceeding.

Access for Servicing (See Fig. 13)

COMPRESSOR SECTION — The compressor compartment has 2 side doors and one front door for servicing, providing access to compressors, all components of the refrigeration system, electrical controls, and control box. After opening the front door an inner cover must be removed for access to control box.

OIL PRESSURE SAFETY SWITCH — Switch is reset by opening either access door on either side of the unit. Circuit no. 1 oil pressure safety switch is reset by opening the side access door on the left side of the unit (as viewed from the compressor end). Circuit no. 2 oil pressure safety switch is reset by opening the side access door on the right side of the unit. Circuit no. 1 liquid line service valve is located directly below circuit no. 1 oil pressure switch. Circuit no. 2 liquid line service valve is located directly below circuit no. 2 oil pressure switch.

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. Recheck rotation of fan(s) after service work on motors.

Fan Adjustment (See Fig. 14)

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

COMPRESSOR	AMOUNT pints (liters)
06D824	10 (4.73)
06D328	10 (4.73)
06D537	10 (4.73)

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

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

IMPORTANT: Do not use drained oil or use oil that has been exposed to atmosphere. Refer to GTAC II, Module 5; Charging, Recovery, Recycling, and Reclamation for procedures to add oil. To remove excess oil, isolate the compressor by use of the service valves, slowly relieve the internal pressure, and then use the oil drain plug at the bottom of the compressor to remove the excess oil.

Liquid Shutoff/Charging Valve — Valve is located inside the compressor compartment and is provided with ¼-in. flare connection for field charging.

Capacity Control, Suction Pressure — Actuated Unloaders — Each controls 2 cylinders. Unloaders are factory set (see Table 1A or 1B) but may be field adjusted.

CONTROL SET POINT — The control set point (cylinder load point) is adjustable from 0 to 85 psig (0 to 586 kPa). To adjust, turn control set point adjustment nut (Fig. 15) clockwise to its bottom stop. In this position, set point is 85 psig (0 to 586 kPa). Then turn adjustment counterclockwise to desired control set point. Every full turn counterclockwise decreases set point by 7.5 psig (51.7 kPa).

PRESSURE DIFFERENTIAL — The pressure differential (difference between cylinder load and unload points) is adjustable from 6 to 22 psig (41 to 15.2 kPa). To adjust, turn pressure differential adjustment screw (Fig. 15) counterclockwise to its backstop position. In this position, differential is 6 psig (41 kPa). Then, turn adjustment clockwise to desired pressure differential. Every full turn clockwise increases differential by 1.5 psig. (10.34 kPa).

Capacity Control, Electrically Operated Unloaders (Variable Air Volume, Factory-Installed Option Units) — Each controls 2 cylinders. Electric unloaders are not field adjustable. Circuit no. 1 compressor on this factory-installed option has 2 electric unloaders. For service, replace any failed solenoid.

Oil Pressure Safety Switch (OPS) — In the control circuit, switch 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.

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

TIME GUARD® Control — Control prevents compressor from short cycling. See Sequence of Operation.

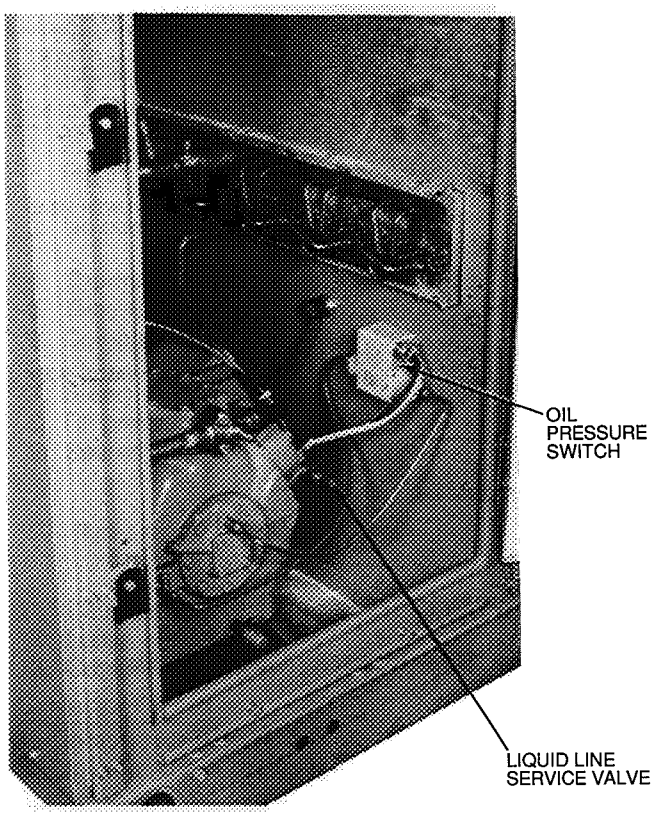
CRANKCASE HEATERS — Heaters minimize absorption of liquid refrigerant by oil in crankcase during brief or extended shutdown periods. The control circuit is maintained if compressor fan motor circuit breakers are turned off. The main disconnect must be on to energize crankcase heater.

IMPORTANT: Never open any switch or disconnect that deenergizes the crankcase heaters 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 heaters for 24 hours before starting the compressor.

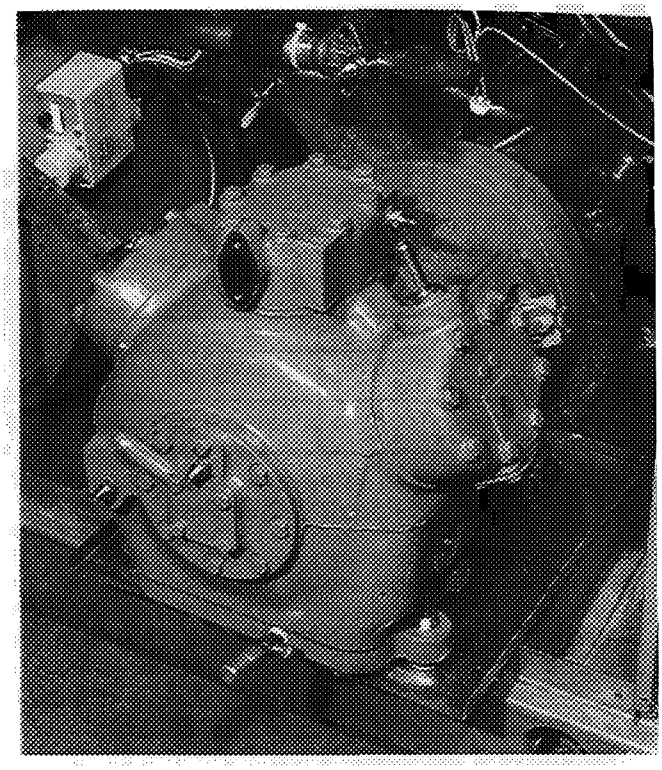
High-Pressure Switches — Switches have fixed, nonadjustable settings. Switches are mounted on the compressors.

Low-Pressure Switches — Switches have fixed, nonadjustable settings. The switches are mounted on the compressors.

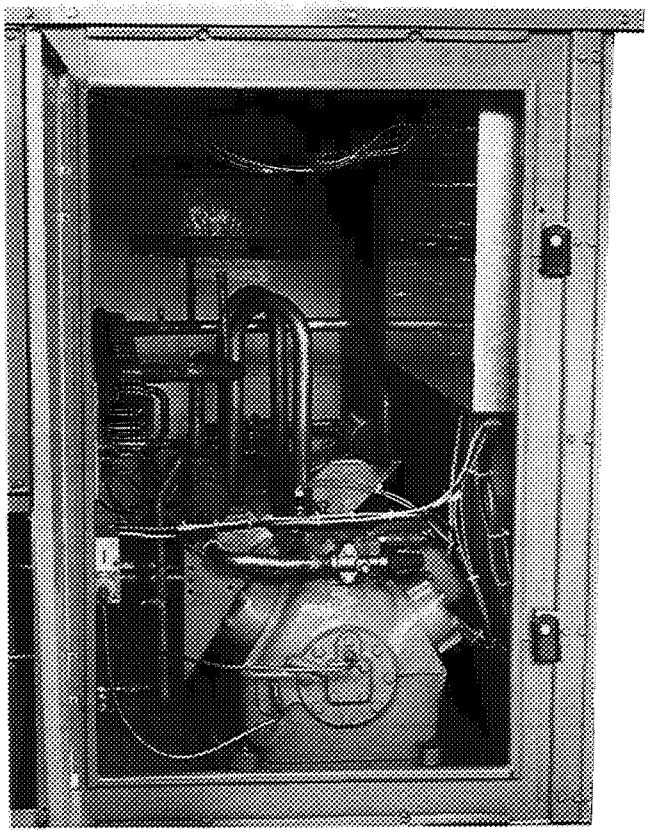
TO CHECK — Slowly close liquid shutoff valve and allow compressor to pump down. Do not allow compressor pump down below 2 psig (13.8 kPa). Compressor should shut down when suction pressure drops to cutout pressure in Table 4, and should restart when pressure builds up to cut-in pressure shown.



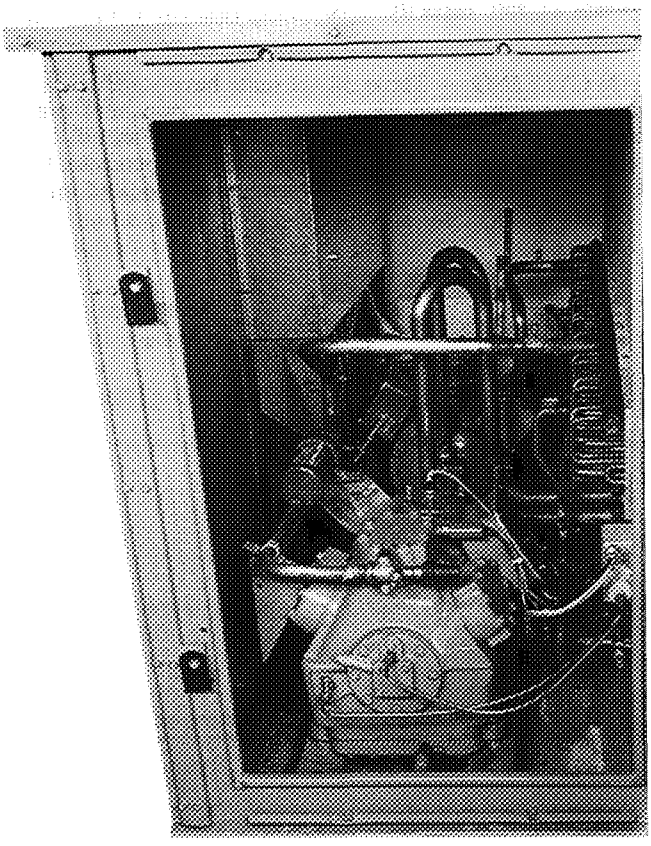
OIL PRESSURE SWITCH AND LIQUID LINE SERVICE VALVE LOCATIONS



06D COMPRESSOR WITH PAN

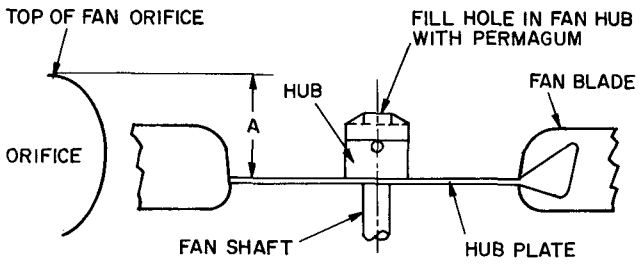


CIRCUIT NO 1



CIRCUIT NO. 2

Fig. 13 — 38AH Unit with Access Panels Removed



PROP LOCATION	"A" in. (mm)
60 Hz 38AH024-034	3.5 (89)
50 Hz 38AH024-034	4.3 (109)

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

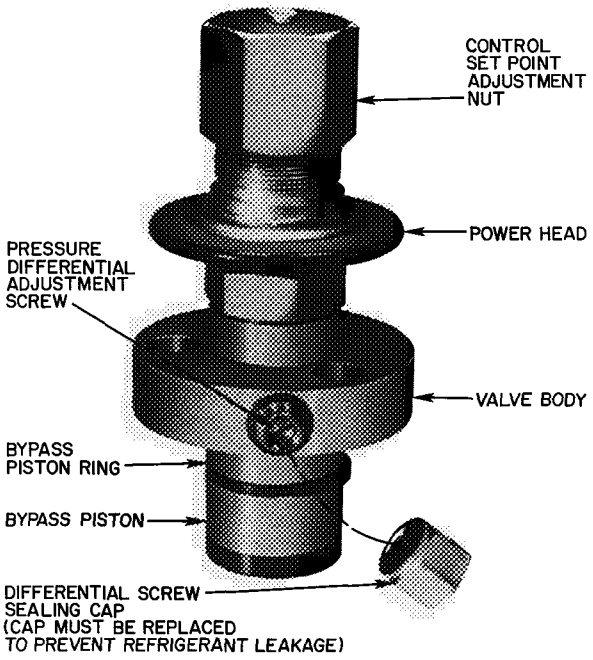


Fig. 15 — Capacity Control Valve

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 — Purchase accessory Carrier part no. 38AE900021 for winter start control.

Head Pressure Control — Control allows system to operate at full capacity under low ambient temperature conditions.

FAN CYCLING — These 38AH units have standard provision for fully automatic intermediate-season head pressure control through condenser fan cycling. Fan no. 2 is cycled by an outdoor-air thermostat which responds to outdoor ambient temperature. The thermostat 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 non-cycling. Table 5 shows the operating settings of the air temperature switch.

Table 5 — Fan Cycling Controls

CONTROL BY	SWITCH OPENS	SWITCH CLOSES
Temp — F (C)	60 ± 3 (15 6 ± 1.7)	70 ± 3 (21.1 ± 1.7)

NOTE: See Fig. 6 for fan arrangement.

TROUBLESHOOTING

PROBLEM	SOLUTION
COMPRESSOR DOES NOT RUN	
Contactor Open	
1. Power off.	1. Restore power.
2. Fuses blown in field power circuit.	2. After finding cause and correcting, replace with correct size fuse.
3. No control power.	3. Check secondary fuse(s); replace with correct type and size. Replace transformer if primary windings receiving power.
4. Thermostat circuit open.	4. Check thermostat setting.
5. Time Guard® II device not operating.	5. Check Time Guard II devices.
6. Compressor circuit breaker tripped.	6. Check for excessive compressor current draw. Reset breaker; replace if defective.
7. Safety device lock-out circuit active.	7. Reset lock-out circuit at thermostat or circuit breaker.
8. Oil pressure switch tripped.	8. See oil pressure switch section.
9. See oil pressure switch section.	9. 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.
10. High-pressure switch open.	10. 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.
11. Compressor overtemperature switch open.	11. Check for open condition. Allow for reset. Replace if defective.
12. Loose electrical connections.	12. Tighten all connections.
13. Compressor stuck.	13. See 06D compressor service literature.
Contactor Closed	
1. Compressor leads loose.	1. Check connections.
2. Motor windings open.	2. See 06D compressor service literature.
3. Single phasing.	3. Check for blown fuse. Check for loose connection at compressor terminal.
COMPRESSOR STOPS ON HIGH-PRESSURE SWITCH	
Outdoor Fan On	
1. High-pressure switch faulty.	1. Replace switch.
2. Reversed fan rotation.	2. Confirm rotation, correct if necessary.
3. Airflow restricted.	3. Remove obstruction.
4. Air recirculating.	4. Clear airflow area.
5. Noncondensables in system.	5. Purge and recharge as required.
6. Refrigerant overcharge.	6. Purge as required.
7. Line voltage incorrect.	7. Consult power company.
8. Refrigerant system restrictions.	8. Check or replace filter drier, expansion valve, etc. Check that compressor discharge service valve is fully open.
Outdoor Fan Off	
1. Fan slips on shaft.	1. Tighten fan hub setscrews.
2. Motor not running.	2. Check power and capacitor.
3. Motor bearings stuck.	3. Replace bearings.
4. Motor overload open.	4. Check overload rating. Check for fan blade obstruction.
5. Motor burned out.	5. Replace motor.
COMPRESSOR CYCLES ON LOW-PRESSURE SWITCH	
Indoor-Air Fan Running	
1. Compressor suction service valve partially closed.	1. Open valve fully.
2. Liquid line solenoid valve(s) fails to open.	2. Check liquid line solenoid valve(s) for proper operation. Replace if necessary.
3. Filter drier plugged.	3. Replace filter drier.
4. Expansion valve power head defective.	4. Replace power head.
5. Low refrigerant charge.	5. Add charge. Check low-pressure switch setting.

TROUBLESHOOTING (cont)

PROBLEM	SOLUTION
COMPRESSOR CYCLES ON LOW-PRESSURE SWITCH (cont)	
Airflow Restricted	
1. Coil iced up.	1. Check refrigerant charge.
2. Coil dirty.	2. Clean coil fins.
3. Air filters dirty.	3. Clean or replace filters.
4. Dampers closed.	4. Check damper operation and position.
Indoor-Air Fan Stopped	
1. Electrical connections loose.	1. Tighten all connections.
2. Fan relay defective.	2. Replace relay.
3. Motor overload open.	3. Power supply.
4. Motor defective.	4. Replace motor.
5. Fan belt broken or slipping.	5. Replace or tighten belt.
COMPRESSOR STOPS ON OIL PRESSURE SWITCH	
1. Oil level too low or too high.	1. Check oil level requirements; adjust oil level until within view of sight glass when running.
2. Compressor is short cycling.	2. Check for a. Thermostat location and operation. b. Safety device lockout circuit operation. c. Low-pressure switch operation.
3. Crankcase heater off.	3. Check relay operation; replace crankcase heater(s), if defective.
4. Low refrigerant charge.	4. Adjust charge as required.
5. Refrigerant floodback.	5. Adjust TXV superheat.
6. Evaporator coil is blocked or iced.	6. Check and correct as required.
7. Evaporator fan not operating.	7. Check and correct as required.
8. Distributor and/or TXV too large.	8. Check sizing at design conditions; change if incorrect for current application.
9. Suction riser too large.	9. Check line sizing at minimum design condition; change piping if incorrect.
10. Defective oil pressure switch.	10. Check switch for proper operation; check capillary lines for plugged lines.
11. Plugged oil pump inlet screen.	11. Clean oil pump screen.
12. Faulty oil pump drive segment.	12. Replace drive segment.
13. Worn oil pump.	13. Replace bearing head assembly.
14. Worn compressor bearings.	14. Replace compressor; see 06D service instructions.
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 06D compressor service literature.
3. Heat load excessive.	3. Check for open doors or windows in vicinity of fan coil

TROUBLESHOOTING (cont)

PROBLEM	SOLUTION
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(S) AND INDOOR FAN CONTROL WIRING CONNECTIONS MADE AND CHECKED? (Y/N) _____

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

HAVE CRANKCASE HEATERS BEEN ENERGIZED FOR 24 HOURS? (Y/N) _____

INDOOR UNIT

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

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

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

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

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

PIPING

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

HAVE LEAK CHECKS BEEN MADE AT COMPRESSORS, CONDENSERS, EVAPORATORS, 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 EVAPORATOR FAN SPEED AND RECORD. _____

CHECK CONDENSER FAN SPEED AND RECORD. _____

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

	COMP A1	COMP B1
OIL PRESSURE	_____	_____
SUCTION PRESSURE	_____	_____
SUCTION LINE TEMP	_____	_____
DISCHARGE PRESSURE	_____	_____
DISCHARGE LINE TEMP	_____	_____
ENTERING CONDENSER AIR TEMP	_____	_____
LEAVING CONDENSER AIR TEMP	_____	_____
EVAP ENTERING-AIR DB (dry bulb) TEMP	_____	_____
EVAP ENTERING AIR WB (wet bulb) TEMP	_____	_____
EVAP LEAVING AIR DB TEMP	_____	_____
EVAP LEAVING AIR WB TEMP	_____	_____
COMPRESSOR AMPS (L1/L2/L3)	_____ / _____ / _____	_____ / _____ / _____

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

NOTES:

PACKAGED SERVICE TRAINING

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

- Unit Familiarization
- Installation Overview
- Maintenance
- Operating Sequence

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

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