

KR Series Electric Defrost Unit Coolers

Operating and Installation Manual

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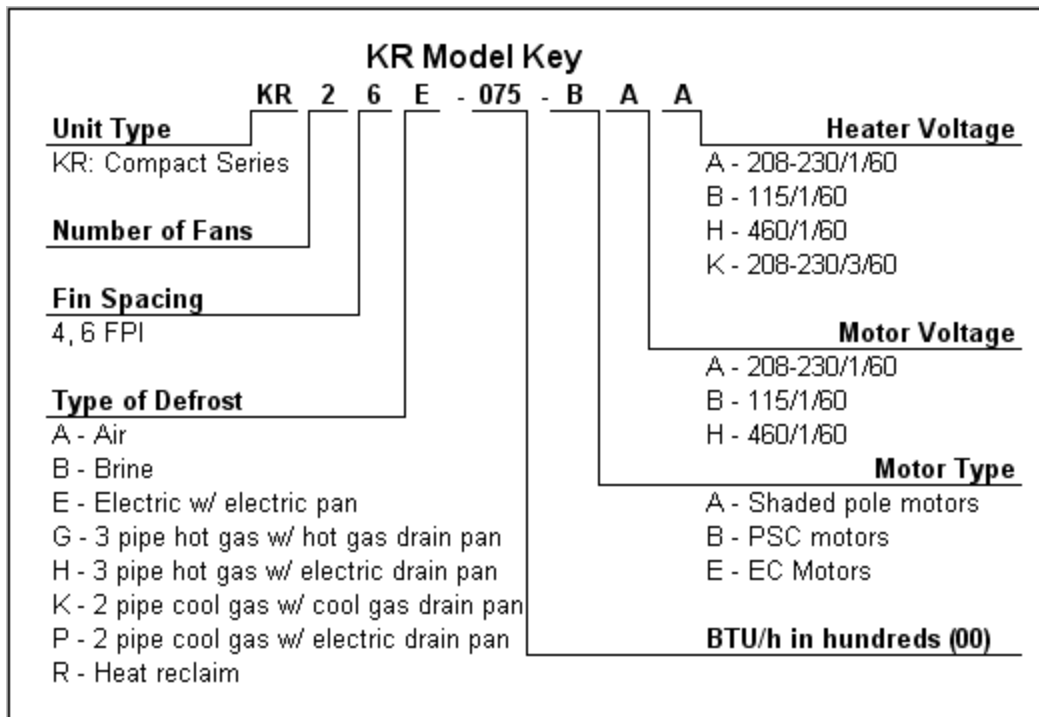
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1 LOCATION RECOMMENDATIONS

Electric defrost unit coolers must have proper airflow to maintain a uniform room temperature and have a complete defrost.

These units are draw thru design thus drawing air thru the cooling coil and discharging it into the room via the unit fans. For best performance it is desirable to arrange the air discharge toward the door of the cooler to minimize the entrance of warm moist air when the door is open. The unit must be at least 12 inches from the wall to assure proper air intake.

2 UNIT MOUNTING

The unit cooler may be suspended with 3/8" diameter hanger rods or flush mounted to the ceiling using 5/16 minimum lag screws with flat washers. Rods should be double nutted top and bottom.

The unit must be level in all directions to insure proper drainage of condensate. Suspended units must have sufficient clearance above for cleaning the top.

Figure 1 Unit Dimensions

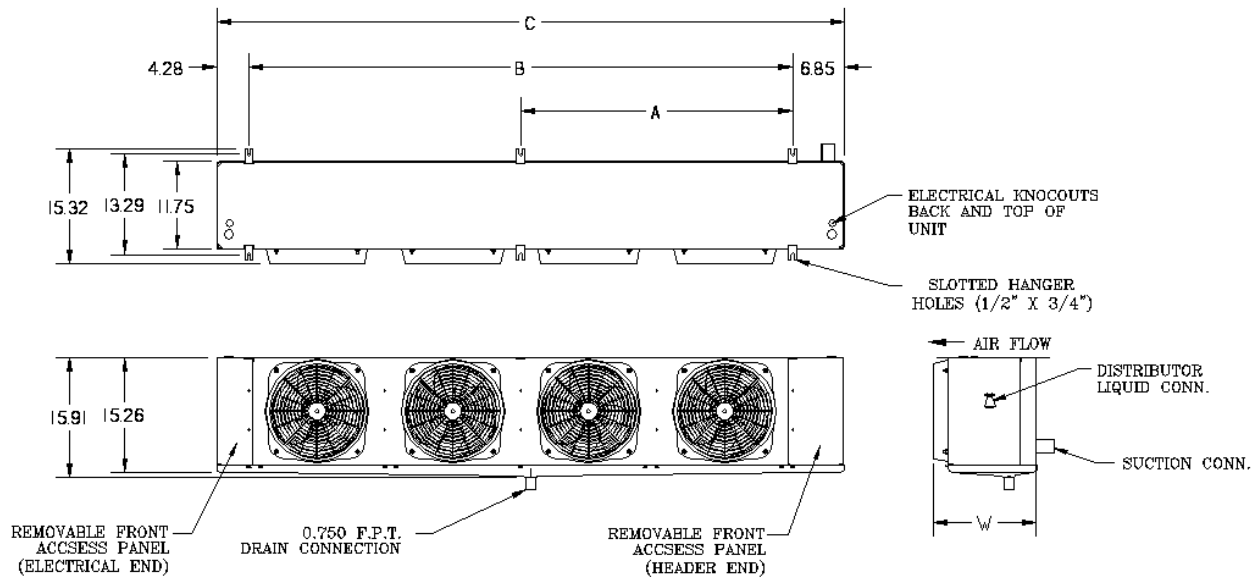


Table 1 Mounting dimensions and sizes of suction, liquid and drain connections.

MODEL NUMBERS	DIMENSIONS (INCHES)			CONNECTIONS ODS (INCH)	
	A	B	C	LIQUID	SUCTION
KR14E-037	-	18	29-1/8	1/2	5/8
KR24E-065	-	36	47-1/8	1/2	7/8
KR24E-074	-	36	47-1/8	1/2	7/8
KR34E-111	-	54	65-1/8	1/2	7/8
KR44E-148	36	72	83-1/8	1/2	1-1/8
KR54E-185	36	90	101-1/8	1/2	1-1/8
KR64E-213	54	108	119-1/8	1/2	1-1/8
KR64E-220	54	108	119-1/8	1/2	1-1/8
KR16E-035	-	18	29-1/8	1/2	5/8
KR16E-041	-	18	29-1/8	1/2	5/8
KR16E-045	-	18	29-1/8	1/2	5/8
KR26E-067	-	36	47-1/8	1/2	7/8
KR26E-075	-	36	47-1/8	1/2	7/8
KR26E-090	-	36	47-1/8	1/2	7/8
KR36E-126	-	54	65-1/8	1/2	7/8
KR36E-135	-	54	65-1/8	1/2	7/8
KR46E-160	36	72	83-1/8	1/2	1-1/8
KR46E-180	36	72	83-1/8	1/2	1-1/8
KR56E-192	36	90	101-1/8	1/2	1-1/8
KR66E-240	54	108	119-1/8	1/2	1-1/8
KR66E-270	54	108	119-1/8	1/2	1-1/8

3 DRAIN LINE

The drain line should be as short and as steeply pitched as possible with a minimum of 1/4" drop per running foot. Any traps in the drain line must be located in an ambient above freezing. If the temperature surrounding the trap or drain line is below freezing it must be wrapped with a drain line heater. Be sure to also wrap the unit drain coupling. Cover the drain line, drain coupling and heat tape with insulation. Be sure to follow the manufacturer's recommendation when installing the drain line heat tape.

A union is recommended for ease of installation and future servicing. The union should be located as close to the drain pan as possible. Use two wrenches when tightening to prevent the drain fitting from twisting and damaging the unit.

Support long runs of drain line (i.e. more than a few feet) by hangers to avoid damage to the drain pan.

4 REFRIGERATION PIPING

System design must conform to all codes, laws and regulations applying to the site of installation. In addition the safety code for mechanical refrigeration.

Refrigerant line sizes and piping techniques should be obtained from the ASHRAE Guide or equivalent reference. Under no circumstances should the refrigerant connection size of the unit be used as the basis for sizing the lines.

The horizontal suction line should slope away from the unit toward the compressor. Vertical suction risers may require a trap at the bottom of the riser for proper oil return.

For Food Service installations – seal any joint between unit cooler and cooler wall with a sealant Listed by the National Sanitation Foundation.

5 REFRIGERANT DISTRIBUTOR

Distributor nozzles are included using a refrigerant distributor with a changeable nozzle design. The nozzle(s) are packed in individual plastic envelopes along with a retainer ring and instruction card. The instruction card tells what refrigerant the nozzle is to be used with. There may be 1, 2 or 3 envelopes with nozzles located near the distributor.

The nozzles provided with the unit have been selected for design conditions of 9°F to 11°F T.D. and 95°F liquid refrigerant at the expansion valve inlet. If the unit will be operated at conditions that are substantially different from these conditions, it may be necessary to select a different size nozzle. Contact the factory for advice.

The nozzle must be installed before the expansion valve is installed. There are nozzle identification numbers stamped on one side of the nozzle. Be sure to insert the nozzle into the distributor with these numbers visible in case identification is required later. The nozzle is held in place by a retainer ring that is easily inserted or removed with a pair of needle nose pliers.

The standard distributor nozzles provided with the units are listed in Table 2.

Table 2 Distributor nozzles selections

MODEL NUMBERS	DISTRIBUTOR NOZZLE SELECTIONS	
	R-22	R-404A / R-507
KR14E-037	L-1/3	L-3/4
KR24E-065	L-3/4	L-1
KR24E-074	L-3/4	L-1 1/2
KR34E-111	L-1	L-2
KR44E-148	L-1 1/2	L-2 1/2
KR54E-185	L-2 1/2	L-3
KR64E-213	L-2 1/2	L-3
KR64E-220	L-2 1/2	L-3
KR16E-035	L-1/2	L-3/4
KR16E-041	L-1/2	L-3/4
KR16E-045	L-1/2	L-3/4
KR26E-067	L-3/4	L-1
KR26E-075	L-3/4	L-1 1/2
KR26E-090	L-1	L-1 1/2
KR36E-126	L-1 1/2	L-2
KR36E-135	L-1 1/2	L-2
KR46E-160	L-1 1/2	L-3
KR46E-180	L-2	L-3
KR56E-192	L-2	L-3
KR66E-240	L-2 1/2	L-3
KR66E-270	L-3	L-3

Distributor nozzle selections are based on +25°F suction temperature, 10°F T.D. and 95°F liquid temperature.

6 EXPANSION VALVE

Table 3 Recommended Expansion valves

MODEL NUMBERS	BTUH@ 10°F T.D.	-20°F SUCTION TEMPERATURE		
		R-22	R-404A *	
KR16E-035	3,500	SBFVE-AA-ZP40 EGVE-1/2-ZP40	SBFSE-AA-ZP EGSE-1/4-ZP	
KR14E-037	3,700		SBFSE-AA-ZP EGSE-1/2-ZP	
KR16E-041	4,100	SBFVE-AA-ZP40 EGVE-3/4-ZP40	SBFSE-A-ZP EGSE-1/2-ZP	
KR16E-045	4,500			
KR24E-065	6,500			
KR26E-067	6,700			
KR24E-074	7,400			
KR26E-075	7,500			
KR26E-090	9,000	SBFVE-A-ZP40 EGVE-1-ZP40	SBFSE-A-ZP EGSE-1-ZP	
KR34E-111	11,100	SBFVE-A-ZP40 EGVE-1½-ZP40		
KR36E-126	12,600			
KR36E-135	13,500			
KR44E-148	14,800	SBFVE-B-ZP40 EGVE-2-ZP40	SBFSE-B-ZP EGSE-1½-ZP	
KR46E-160	16,000			
KR46E-180	18,000			
KR54E-185	18,500			
KR56E-192	19,200		SBFSE-B-ZP EGSE-2-ZP	
KR64E-213	21,300			
KR64E-220	22,000		SBFSE-C-ZP EGSE-2-ZP	
KR66E-240	24,000	SBFVE-B-ZP40 EGVE-3-ZP40	SBFSE-C-ZP	
KR66E-270	27,000	SBFVE-C-ZP40 EGVE-3-ZP40		

* If R507 is used, change S to P. For example, SBFSE-B-C (R404A) becomes SBFPE-B-C (R-507).

Before installing the unit, install the expansion valve and connect the equalizer tube (not required on single fan units).

Expansion valves are adjusted at the factory prior to shipment. The setting will be okay for many applications, but in other applications adjustments may need to be made.

It is important that the operation of the expansion valve be checked out after the system has balanced out at the desired room temperature. If the coil is being starved it is necessary to reduce the superheat setting of the valve by turning the adjusting stem counter-clockwise. If the superheat is too low it is necessary to increase the superheat setting of the valve by turning the adjusting stem clockwise. It is recommended that for a 10°F to 12°F T.D. system, the valve should be adjusted to maintain 5°F to 6°F superheat.

To prevent overshooting the desired setting, only one turn of the stem should be made at a time. As much as 30 minutes may be required for the new balance to take place after an adjustment is made. Always tighten the adjusting stem packing nut and replace the seal cap tightly after the adjustment is complete.

7 WIRING

The electrical data for the unit is marked on the unit nameplate. Field wiring should comply with N.E.C. and local codes. The field wiring compartment is constructed as part of the unit cooler enclosure. Wiring connections are made at the terminal block provided inside the unit on the end opposite the refrigerant connections. The unit must be grounded. Refer to Table 4 for unit amps.

Refer to figures 1-5 for unit wiring:

- Figure 2 illustrates the wiring for a single unit with the defrost heaters wired for 208/230/60/1 operation.
- Figure 3 illustrates the wiring for a single unit with the defrost heaters wired for 208/230/60/1 operation controlled by a defrost contactor.
- Figure 4 illustrates the wiring for a single unit with the defrost heaters wired for 208/230/60/3 operation.
- Figure 5 illustrates the wiring for multiple units with the defrost heaters wired for 208/230/60/3 operation.
- Figure 6 illustrates the wiring for a single unit with the defrost heaters wired for 460/60/1 operation.

When defrosting two or more units at one time with a single time clock, the defrost termination thermostats must be wired in series as shown in Figure 4.

Table 4 Motors and Heaters Electrical Information

Fan Q-ty	Total Full Load Amp				
	PSC Motor		EC Motor		SP Motor
	115/60/1	208/230/60/1	115/60/1	208/230/60/1	460/60/1
1	0.8	0.5	0.54	0.27	0.3
2	1.6	1.0	1.08	0.54	0.6
3	2.4	1.5	1.62	0.81	0.9
4	3.2	2.0	2.16	1.08	1.2
5	4	2.5	2.7	1.35	1.5
6	4.8	3.0	3.24	1.62	1.8

Fan Q-ty	E(EDL) Heaters Watt	E(EDL) Heaters Amp			H(HGE),P(KGE) Heaters Watt	H(HGE), P(KGE) Heaters Amp		
		208/230/60/1	208/230/60/3	460/60/1		208/230/60/1	208/230/60/3	460/60/1
1	1000	4.4	2.9	2.2	300	1.3	0.8	0.7
2	2000	8.8	5.8	4.4	600	2.6	1.5	1.3
3	3000	13.2	8.7	6.6	800	3.5	2	1.7
4	4000	17.6	11.6	8.8	1000	4.3	2.5	2.2
5	5000	22	14.5	11	1100	4.8	2.8	2.4
6	6000	26.4	17.4	13.2	1400	6.1	3.5	3

8 SEQUENCE OF OPERATION

Step A -- Normal Refrigeration Cycle

1. Power is supplied to "N" and "4" terminals by the timer.
2. The heater safety thermostat is closed. The fan delay thermostat is closed and the defrost termination thermostat is off.
3. The unit fans operate continually and the defrost heaters are off.
4. The compressor operates in accordance with the demand of the room thermostat. Frost slowly builds up on the evaporator fins.

Step B – Defrost Cycle

1. Defrosting of the evaporator is started by the timer at predetermined intervals – typical KR Electrical Defrost Unit Coolers (PN E108318_E)

settings of the timer would be two defrost periods per 24 hour day.

2. The timer mechanically disconnects power to terminal "4" thus closing the liquid line solenoid valve and shutting off the evaporator fan motors. Simultaneously power is connected to timer terminal "3" which allows current to flow to the defrost heaters.
3. The heaters, embedded in slots in the coil face, give up heat directly to the evaporator fins. This heat raises the coil temperature to 32°F causing the frost to melt.
4. As the frost melts it drips into the heated drain pan and flows down the drain.
5. When the frost has completely melted from the coil (typical cycle length is 20 to 25 minutes) the coil continues to warm up above 32°F.
6. When the coil reaches the temperature setting of the defrost termination thermostat, it closes which allows current to flow to terminal "X" on the timer which energizes the switching solenoid in the timer. The timer disconnects power to terminal "3" thus turning off the defrost heaters. At the same instant power is connected to terminal "4" of the timer. The heater safety thermostat may open but under normal conditions it will remain closed. The heater safety thermostat would open only if the defrost termination thermostat fails to close. The timer has a fail safe (inner dial) which should be set for 30 minutes.

Step C – Return to Normal Refrigeration Cycle

1. Because there is power at terminal "4" the liquid line solenoid opens and the compressor restarts.
2. The evaporator fan motor(s) remain off because the fan delay thermostat is open. This prevents warm air from being blown into the refrigerated area.
3. The evaporator coil cools down approaching operating temperature.
4. When the coil temperature reaches 25°F (approximately 2 to 3 minutes after defrost termination) the fan delay thermostat closes, thus allowing the fan motors to restart. The unit is now back in operation.

NOTE: On systems where the room temperature is above +25°F the fan delay thermostat may not close for an extended period of time. If the fan delay time is too long, it is permissible to install a jumper wire between terminals "F" and "B" at the unit. This allows the fans to turn on immediately after the defrost period.

9 PRE-STARTUP

Check fan set screws, electrical terminals and all other fasteners for tightness. Be sure the thermostatic expansion valve bulb is properly located and strapped.

Check the defrost timer to see that it is set for the correct time of day and the starting pins have been installed (normally two per day) and the fail safe (inner) dial has been set at 30 minutes.

When the system is first started up, the box temperature is typically above the opening temperature of the fan delay thermostat. The fans may remain off for a lengthy period of time. To prevent this it is permissible to install a temporary jumper wire between terminals "F" and "B". Once the box temperature is below +25°F the jumper wire should be removed.

Figure 2 Typical System Wiring 208/230/60/1 (Timer Only)

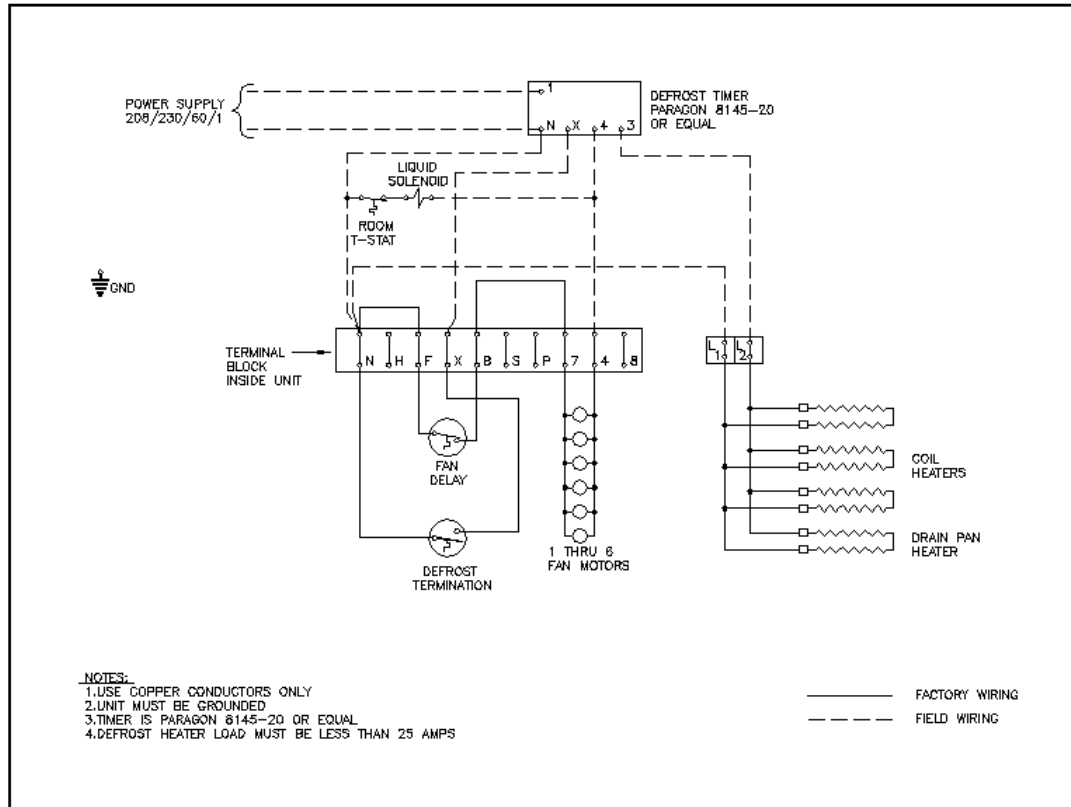


Figure 3 Typical System Wiring 208/230/60/1 (Timer & Defrost Contractor)

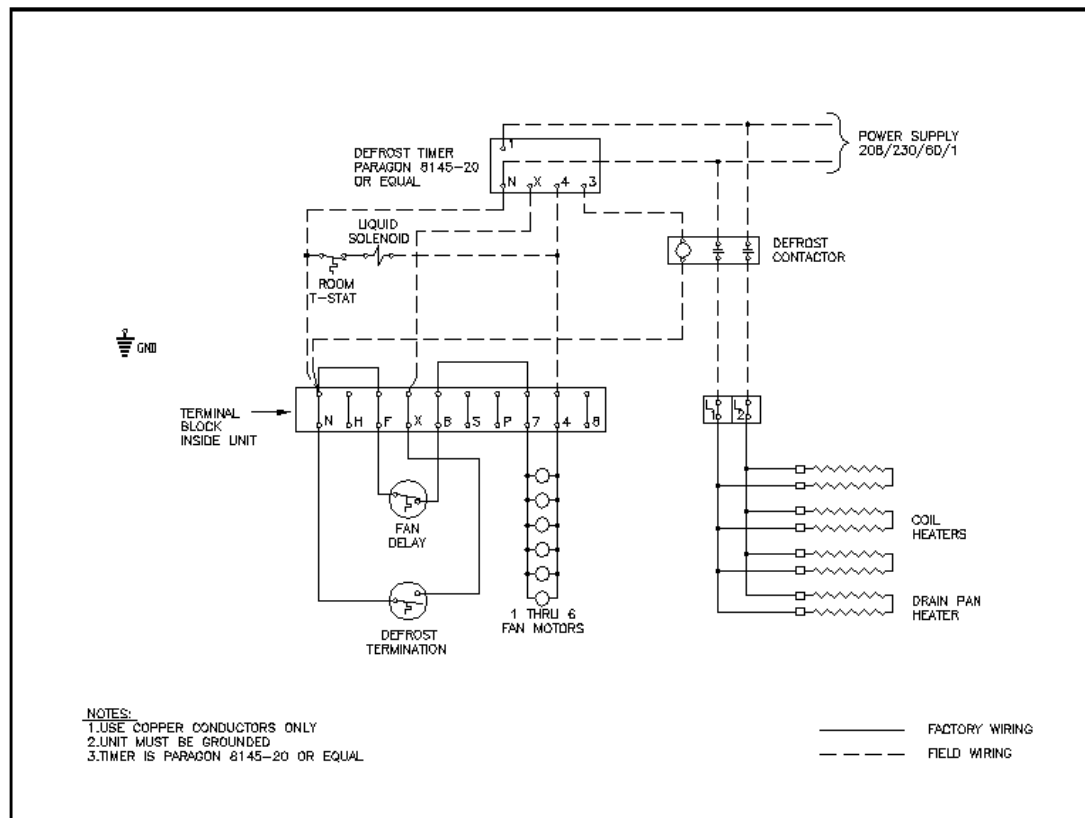


Figure 4 Typical System Wiring 208/230/60/3

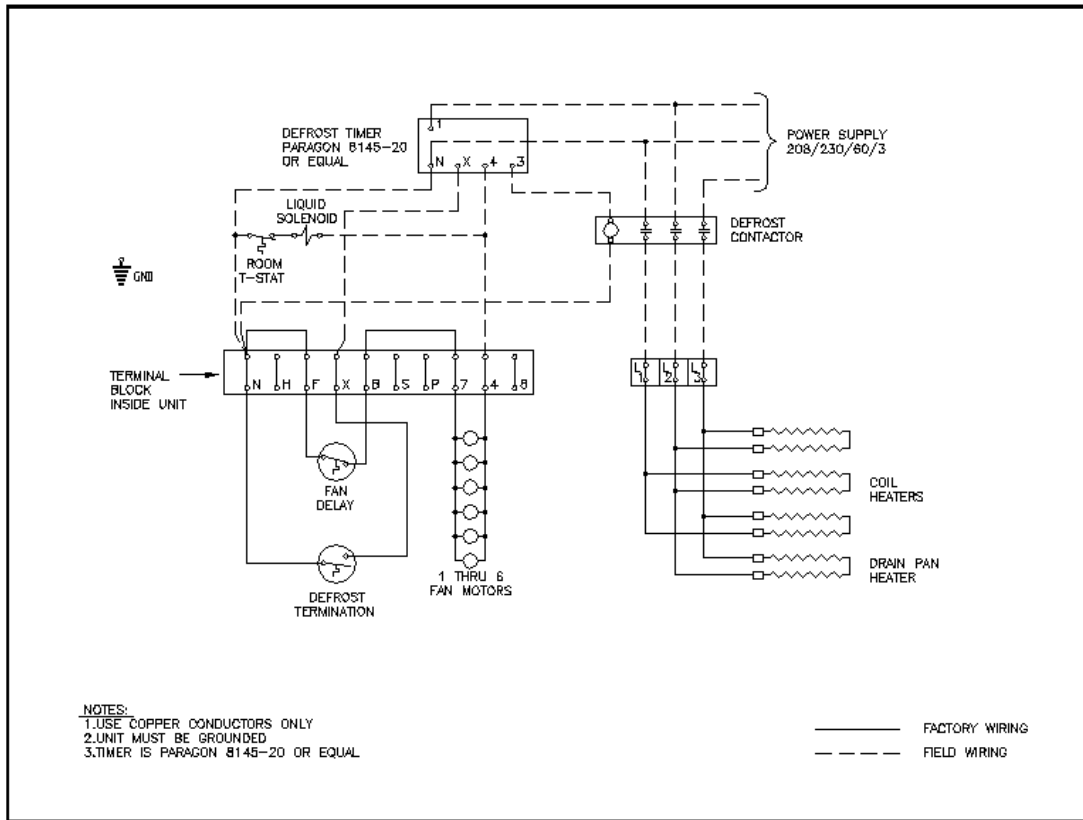


Figure 5 Typical System Wiring – Multiple Evaporators 208/230/60/3

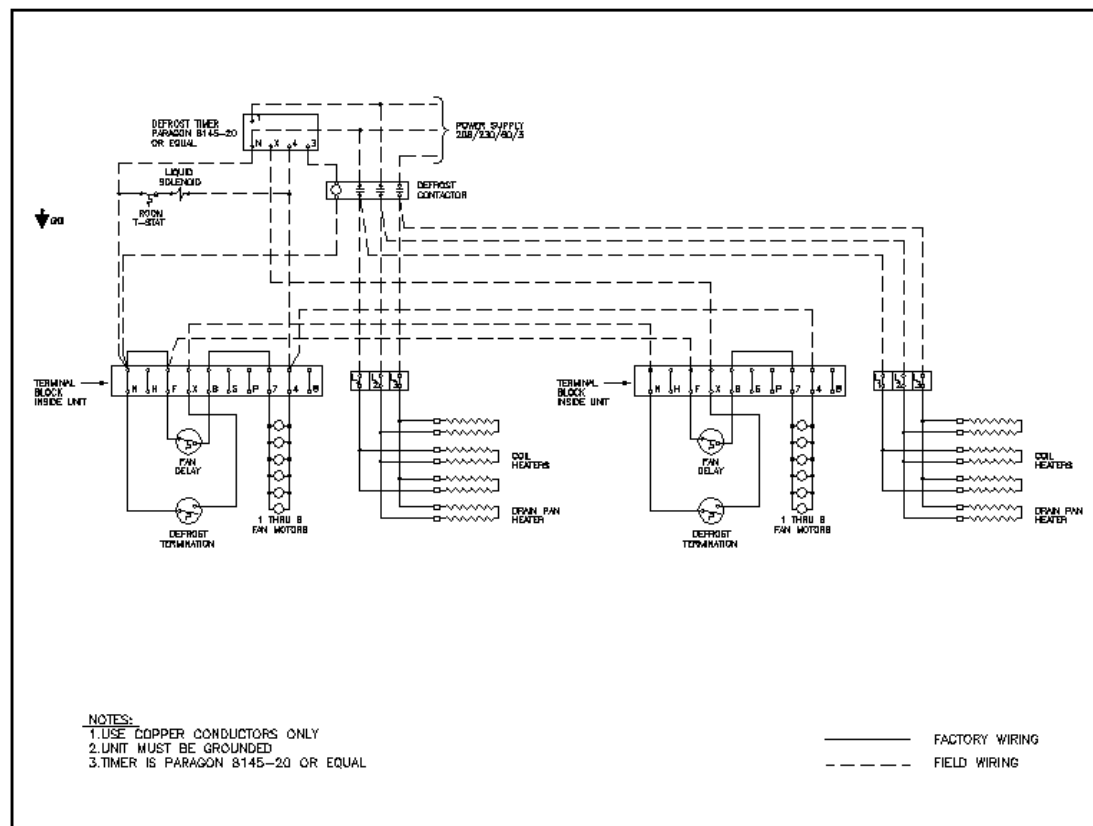
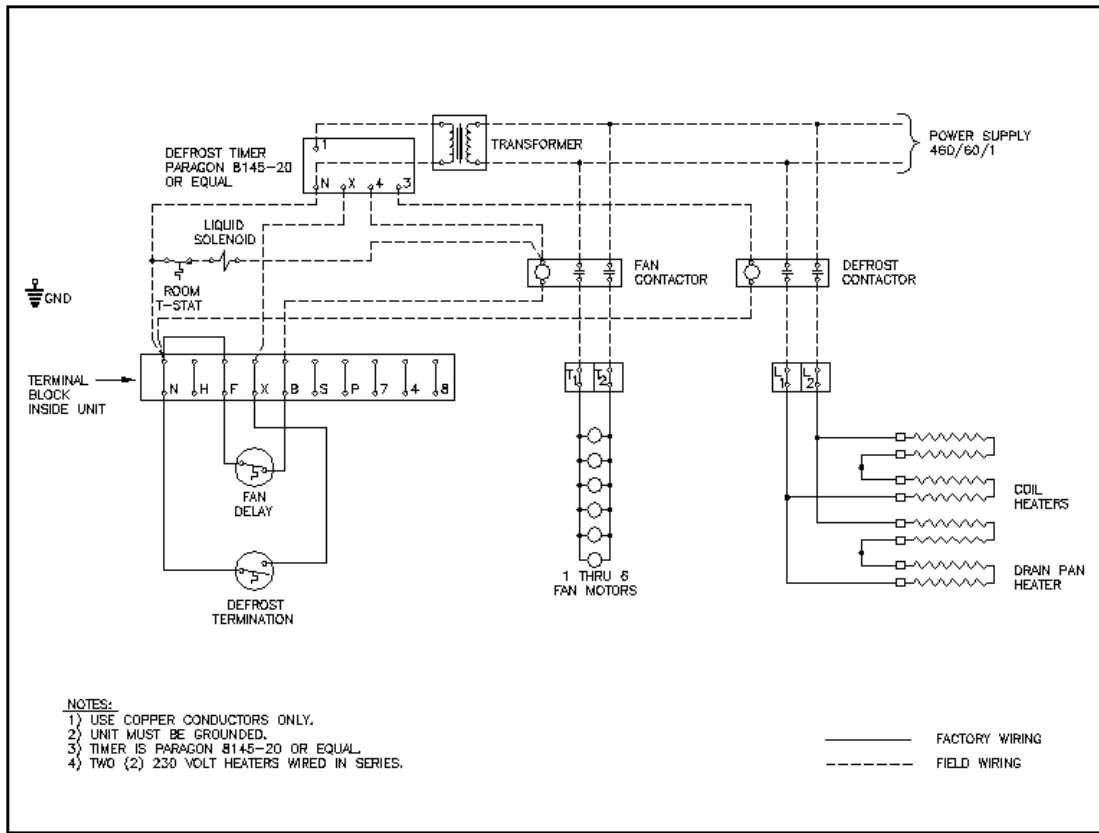


Figure 6 Typical System Wiring 460/60/1



10 REPLACEMENT PARTS

Listed below are the major replacement parts. When ordering parts it is imperative that you obtain the complete model and serial number of the unit.

Figure 7 Replacement Parts

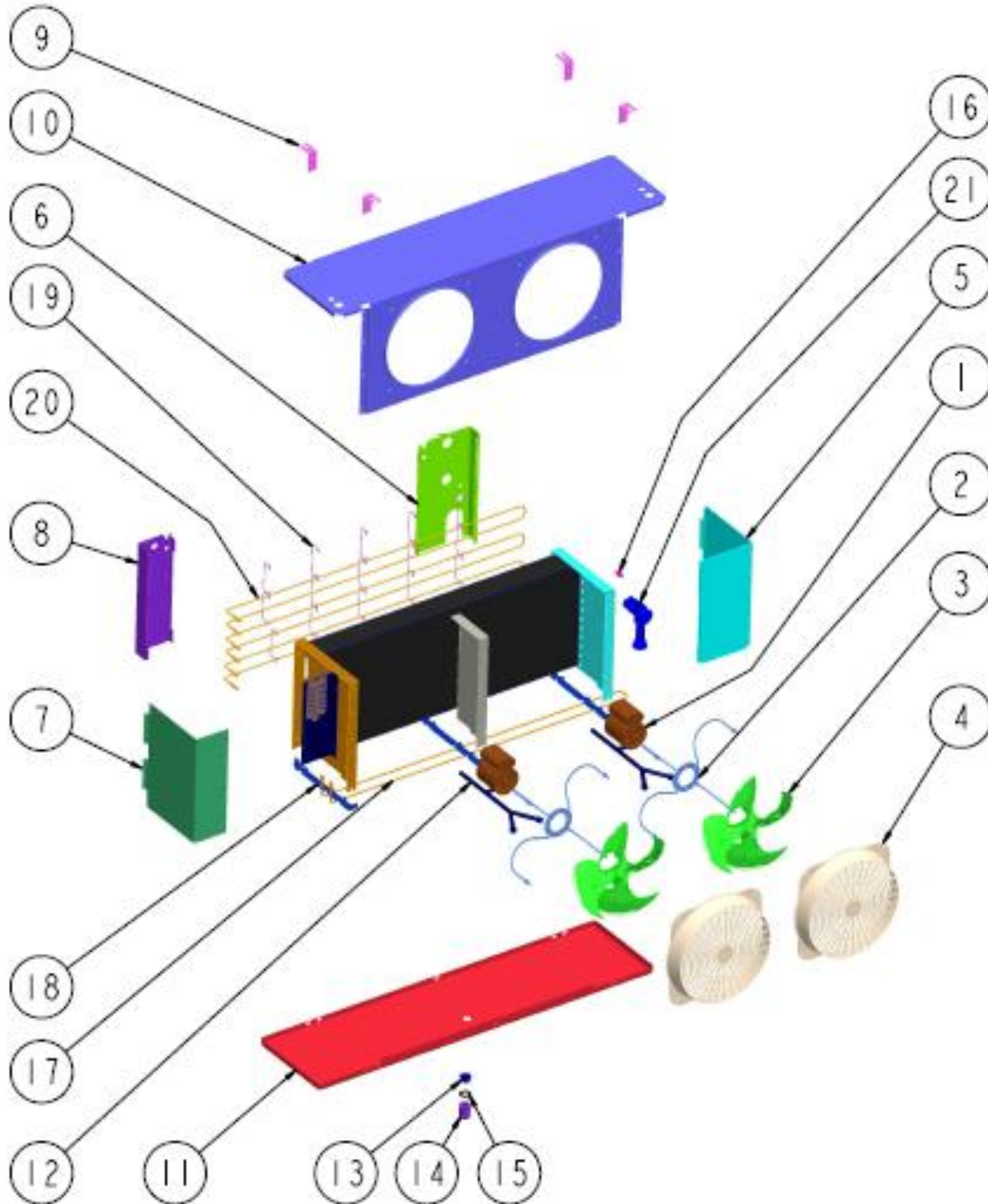


Table 5 Replacement Parts

Item	General Description	Options Description	Krack BOM Part Number	Hussmann Aftermarket Part Number
1	Motor	SP 460V PSC 115V PSC 230V EC 115V EC 208/230V	E206446 E206447 E206448 E317007 E317008	MO.4410146 MO.4410806 MO.4410807 MO.4410689 MO.4410690
2	Motor Mount	Motor Mount	E316578	BR.4911162
3	Fan Blade	Low Noise Fan Blade	E316580	FB.4780670
4	Fan Guard	Plastic Wire	E316655 E316579	FG.4914791 FG.4915231
5	Header Cover Front	Header Cover Front	E108007	MM.4967735
6	Header Cover Back	Header Cover Back	E108031	MM.4968214
7	RB Cover Front	RB Cover Front	E108009	MM.4967694
8	RB Cover Back	RB Cover Back	E108010	MM.4968211
9	Hanger	Hanger	E108013	call
10	Fan/Top Panel	1 Fan 2 Fan 3 Fan 4 Fan 5 Fan 6 Fan	E108001 E108002 E108003 E108004 E108005 E108006	call TP.4968208 call call TP.4968209 TP.4968210
11	Drain Pan	1 Fan 2 Fan 3 Fan 4 Fan 5 Fan 6 Fan	CE107073 CE107075 CE107076 CE107077 CE107078 CE107079	DP.4915035 DP.4967654 DP.4967655 DP.4967656 DP.4967657 DP.4967658
12	Wiring Harness	1 Fan 115-230V 2 Fan 115-230V 3 Fan 115-230V 4 Fan 115-230V 5 Fan 115-230V 6 Fan 115-230V 1 Fan 460V 2 Fan 460V 3 Fan 460V 4 Fan 460V 5 Fan 460V 6 Fan 460V	E206449 E206450 E206451 E206452 E206453 E206454 E206518 E206519 E206520 E206521 E206522 E206523	EP.4440176 EP.4440175 EP.4440174 EP.4440173 EP.4440172 EP.4440171 EP.4481835 EP.4481836 EP.4441023 EP.4441022 call call
13	Aluminum Drain Fitting		E206462	TP.4550416
14	Aluminum Conduit Coupling		E206463	FB.4914781
15	Drain Fitting Gasket		E206464	GA.4981269

Item	General Description	Options Description	Krack BOM Part Number	Hussmann Aftermarket Part Number
16	Thermostats	Defrost Term (14T32) Heater Safety (14T21) Fan Delay (14T31) KP-73	E206100 10956 E201818 E205004	CT.4480288 CT.4480289 CT.4480287 CT.4480147
17	Pan Heaters	1 Fan 115V 1 Fan 230V 2 Fan 115V 2 Fan 230V 3 Fan 115V 3 Fan 230V 4 Fan 115V 4 Fan 230V 5 Fan 115V 5 Fan 230V 6 Fan 115V 6 Fan 230V	E201883 E201884 E201889 E201890 E201892 E201893 E201895 E201896 E201898 E201899 E201901 E201902	HE.E201883 HE.4850278 HE.4850282 HE.4850283 HE.4850285 HE.4850164 HE.4850288 HE.4850289 HE.4850291 HE.4850292 HE.4850294 HE.4850295
18	Drain Pan Heater Bracket		E107025	BR.4914771
19	Face Heater Support Clip		E102007	HH.4911344
20	Coil Heaters	230V 1 Fan 230V 2 Fan 230V 3 Fan 230V 4 Fan 230V 5 Fan 230V 6 Fan	E206455 E206457 E206458 E206459 E206460 E206461	HE.4850300 HE.4850301 HE.4850302 HE.4850303 HE.4850304 HE.4850305
21	Expansion Valve	SBFVE-A-ZP40 SBFSE-A-ZP EGVE-2-ZP40 EGVE-1 1/2-ZP40 EGVE-1-ZP40 EGVE-3/4-ZP40 EGVE-1/2-ZP40 SBFSE-B-ZP SBFVE-B-ZP40 SBFVE-AA-ZP40 EGVE-3-ZP40 EGSE-2-ZP SBFSE-AA-ZP EGSE-1-ZP EGSE-1/2-ZP EGSE-1/4-ZP EGSE-1½-ZP SBFVE-C-ZP40 SBFSE-C-ZP	E205324 E205360 E205735 E205792 E205821 E205838 E205854 E205920 E205927 E205973 E206058 E206165 E206169 E206178 E206212 E206235 E206317 E206600 E311124	call VR.4612242 call call call call call call call call call call VR.4612380 VR.4612381 call call VR.4612387 call VR.4612422
22	Long Throw Adapters	Galvanized	E202347	call