KR Series

UNIT COOLERS

Installation and Operation Manual

Part Number: E108318_T

Products that provide lasting solutions.

BEFORE YOU BEGIN

Read the safety information completely and carefully.

The precautions and use of the procedures described herein are intended to use the product correctly and safely. Comply with the precautions described below to protect you and others from possible injuries. Relative to their potential danger, the relevant matters are divided into four parts as defined by ANSIZ535.5

ANSI Z535.5 DEFINITIONS

• **DANGER –** Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury.

• **WARNING –** Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury.

• **CAUTION –** Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury.

• **NOTICE –** *Not related to personal injury* **–** Indicates[s] situations, which if not avoided, could result in damage to equipment.

* *

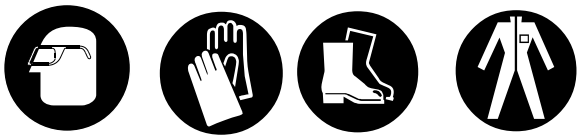
Environmental Concerns

Hussmann recommends responsible handling of refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those that contain Hydrogen, Chlorine, Fluorine, and Carbon (HCFCs). Only certified technicians may handle these refrigerants.
All technicians must be aware and follow the requirements set forth by the Federal Clean Air Act (Section 608) for any service procedure being performed on this equipment that involves refrigerant. Additionally, some states have other requirements that must be adhered to for responsible management of refrigerants.

WARNING

PERSONAL PROTECTION EQUIPMENT (PPE)

Only qualified personnel should install and service this equipment. Personal Protection Equipment (PPE) is required whenever servicing this equipment. Wear safety glasses, gloves, protective boots or shoes, long pants, and a long-sleeve shirt as required when working with this equipment. Observe all precautions on tags, stickers, labels and literature attached to this equipment.



CAUTION

Contractors shall strictly adhere to specifications provided by the Engineer of Record (EOR), as well as US Environmental Protection Agency regulations, OSHA regulations, and all other federal, state and local codes. This work should only be done by qualified, licensed contractors. There are numerous hazards, not limited to, but including: burns due to high temperatures, high pressures, toxic substances, electrical arcs and shocks, very heavy equipment with specific lift points and structural constraints, food and product damage or contamination, public safety, noise, and possible environmental damage. Never leave operating compressors unattended during the manual soft-start process. Always power rocker switches off when unattended.

WARNING

Proper Field Wiring and Grounding Required! Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

This warning does not mean that Hussmann products will cause cancer or reproductive harm, or is in violation of any product-safety standards or requirements. As clarified by the California State government, Proposition 65 can be considered more of a 'right to know' law than a pure product safety law. When used as designed, Hussmann believes that our products are not harmful. We provide the Proposition 65 warning to stay in compliance with California State law. It is your responsibility to provide accurate Proposition 65 warning labels to your customers when necessary. For more information on Proposition 65, please visit the California State government website.

WARNING

— LOCK OUT/TAG OUT —

To avoid serious injury or death from electrical shock, always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as controllers, electrical panels, condensers, lights, fans, and heaters.

CAUTION

This manual was written in accordance with originally perscribed equipment that is subject to change. Hussmann reserves the right to change all or part of the equipment for future stores such as, but not limited to, controllers, valves and electrical specifications. It is the installers responsibility to reference the refrigeration drawings supplied for each installation, as directed by the Engineer of Record.

WARNING

This equipment is prohibited from use in California with any refrigerants on the "List of Prohibited Substances" for that specific end-use, per California Code of Regulations, title 17, section 95374.

Use in other locations is limited to refrigerants permitted by country, state, or local laws and is the responsibility of the installer/end-user to ensure only permitted refrigerants are used.

This disclosure statement has been reviewed and approved by Hussmann and Hussmann attests, under penalty of perjury, that these statements are true and accurate.

TABLE OF CONTENTS

TABLES

FIGURES

KR	D	2	6	A	-	125	T	D	A	A

Unit Type

KR - Compact Series

DOE Application

D - DOE and NRCan
A - Non-Regulated

Number of Fans

Fin Spacing

4, 6 FPI

Type of Defrost

A - Air Defrost
E - Electric Defrost with Electric Pan Heat
G - 3 Pipe Hot Gas with Gas Pan Heat #
H - 3 Pipe Hot Gas with Electric Pan Heat #
K - 2 Pipe Kool Gas with Gas Pan Heat ##
P - 2 Pipe Kool Gas with Electric Pan Heat ##
R - Heat Reclaim #

BTU/H in Hundreds (00)

Refrigerant

N - Stock Unit ***	G - Stock Unit ****
S - R-404A	Q - R-407A T - R-448A
P - R-507A	F - R-407F R - R-449A

B - Glycol / Brine
C - CO_2 (standard pressure)
H - CO_2 (high pressure)

Motor Type

D - Dual Speed EC
V - Variable Speed EC
B - PSC Motors **

Motor Voltage

A - 208-230/1/60
B - 115/1/60

Heater Voltage

A - 208-230/1/60
B - 115/1/60 *
K - 208-230/3/60

* Available on pan heaters for "H" and "P" defrost options only.
** PSC motors are not allowed in USA or Canada for any evaporator solution and few selected models in Mexico (check with your sales representative for the models).
** 'N' Stock Units are for non-glide or glide refrigerants (consult I/O manual for complete refrigerant listing).
*** 'G' Stock Units are for glide refrigerants only (consult I/O manual for complete refrigerant listing).
# G, H, R defrost types not available for CO_2 (C or H) refrigerant.
K, P defrost types not available for C refrigerant, H refrigerant will be available soon.

The KR Low Profile Evaporators are certified under NOM-012-ENER-2019 Standard: Energy efficiency of condenser and evaporator units for refrigeration application in Mexico.

Additional refrigerants are shown in the TABLE classified as Glide and Non- Glide for selection of dual speed or variable speed motors to meet DOE/NRCan regulations.

Glide Refrigerants	
Dewpoint to bubble	TD
R-401A	9.8
R-401B	9.4
R-407A	10.5
R-407F	10.6
R-407H	11.4
R-409A	14.8
R-409B	13.5
R-417A	7.6
R-422A	7
R-4220	7
R-438A	10.8
R-448A	10.5
R-449A	9.7

Non-glide refrigerants	
Dewpoint to bubble	TD
R-134a	0
R-22	0
R-402A (HP80)	2.6
R-402B	3.1
R-404A	1
R-408A	0.7
R-410A	0.2
R-502	0
R-507A	0
R-513A	0.1

1 RECEIPT OF EQUIPMENT

1.1 INSPECTION

All equipment should be carefully checked for damage or shortages as soon as it is received. Each shipment should be carefully checked against the bill of lading. If any damage or shortage is evident, a notation must be made on the delivery receipt before it is signed, and a claim should then be filed against the freight carrier.

1.2 LOSS OF GAS HOLDING CHARGE

Each unit cooler is leak tested, evacuated to remove moisture and then shipped with a gas holding charge. Absence of this charge may indicate a leak has developed in transit. The system should not be charged with refrigerant until it is verified that there is no leak, or the source of the leak is located.

2 LOCATION RECOMMENDATIONS

For all defrost types (Air, Electric and Hot gas 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.

3 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 enough clearance above for cleaning the top.

FIGURE 1: UNIT DIMENSIONS

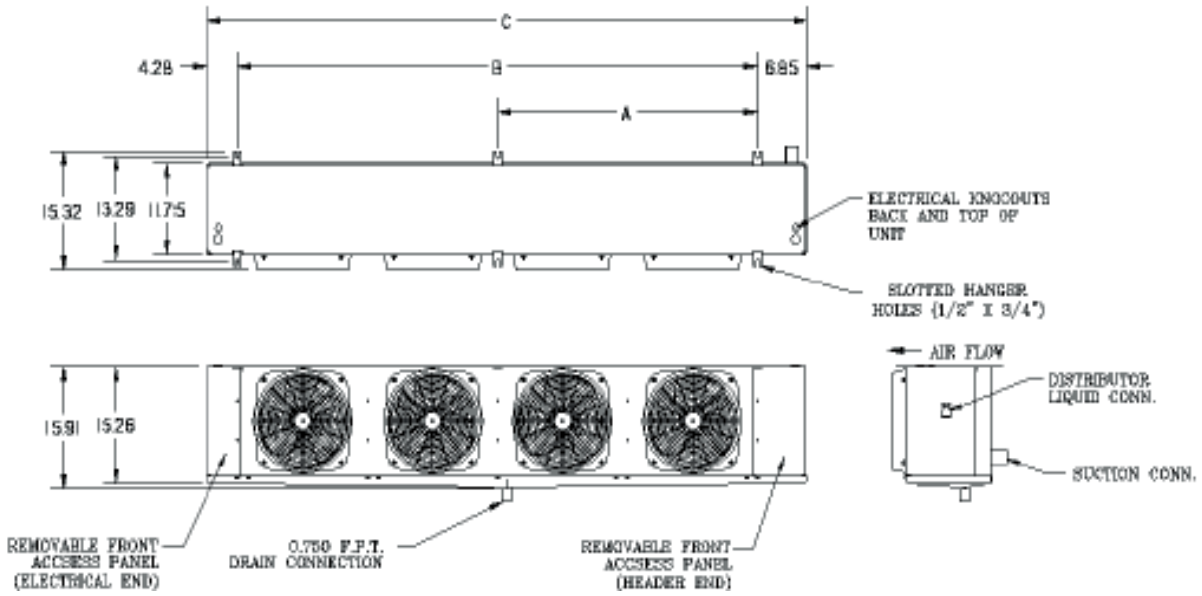


TABLE 1A: ELECTRIC DEFROST UNIT DIMENSIONS AND CONNECTION SIZES

MODEL NUMBERS	Refrigeration Connections				DIMENSIONS (IN)				
	All Except [H] Refrigerant		[H] Refrigerant						
	LIQ	SUCT	LIQ	SUCT	L (C)	W	H	(A)	(B)
KR*14E-037[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.90	N/A	18
KR*24E-074[ ]{ }	1/2”	7/8”	3/8”	5/8”	47.13	15.32	15.90	N/A	36
KR*34E-111[ ]{ }	1/2”	7/8”	3/8”	5/8”	65.13	15.32	15.90	N/A	54
KR*44E-148[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	83.13	15.32	15.90	36	72
KR*54E-185[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	101.1	15.32	15.90	45	90
KR*64E-220[ ]{ }	1/2”	1-1/8”	1/2”	5/8”	119.1	15.32	15.90	54	108
KR*16E-035[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.90	N/A	18
KR*16E-045[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.90	N/A	18
KR*26E-090[ ]{ }	1/2”	7/8”	3/8”	5/8”	47.13	15.32	15.90	N/A	36
KR*36E-135[ ]{ }	1/2”	7/8”	3/8”	5/8”	65.13	15.32	15.90	N/A	54
KR*46E-180[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	83.13	15.32	15.90	36	72
KR*56E-192[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	101.1	15.32	15.90	45	90
KR*66E-270[ ]{ }	1/2”	1-1/8”	1/2”	5/8”	119.1	15.32	15.90	54	108

**Replace with ‘D’ or ‘A’ where ‘D’ units are DOE compliant and ‘A’ are for non-regulated applications.*
[ ] Replace with the refrigerant letter code refer to the model nomenclature.
{ } Motor type designation, replace with ‘D’ for Dual Speed or ‘V’ for Variable Speed.

TABLE 1B: GAS DEFROST UNIT DIMENSIONS AND CONNECTION SIZES

MODEL NUMBERS	Refrigeration Connections					DIMENSIONS (IN)				
	All Refrigerant Options Except [H]			Refrigerant [H]						
	LIQ	SUCT	3-PIPE HOT GAS	LIQ	SUCT	L (C)	W	H	(A)	(B)
KR*14( )-037[ ]{ }	1/2”	5/8”	1/2”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KR*24( )-074[ ]{ }	1/2”	7/8”	1/2”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KR*34( )-111[ ]{ }	1/2”	7/8”	1/2”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KR*44( )-148[ ]{ }	1/2”	1-1/8”	1/2”	3/8”	5/8”	83.13	15.32	15.9	36	72
KR*54( )-185[ ]{ }	1/2”	1-1/8”	1/2”	3/8”	5/8”	101.1	15.32	15.9	45	90
KR*64( )-220[ ]{ }	1/2”	1-1/8”	1/2”	1/2”	5/8”	119.1	15.32	15.9	54	108
KR*16( )-035[ ]{ }	1/2”	5/8”	1/2”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KR*16( )-045[ ]{ }	1/2”	5/8”	1/2”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KR*26( )-090[ ]{ }	1/2”	7/8”	1/2”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KR*36( )-135[ ]{ }	1/2”	7/8”	1/2”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KR*46( )-180[ ]{ }	1/2”	1-1/8”	1/2”	3/8”	5/8”	83.13	15.32	15.9	36	72
KR*56( )-192[ ]{ }	1/2”	1-1/8”	1/2”	3/8”	5/8”	101.1	15.32	15.9	45	90
KR*66( )-270[ ]{ }	1/2”	1-1/8”	1/2”	1/2”	5/8”	119.1	15.32	15.9	54	108

3-pipe hot gas defrost and (G) and (H) defrost types not available for CO_2 refrigerant ([C] or [H])
(K) and (P) defrost types not available for [C] refrigerant type; [H] will be available soon
** Replace with ‘D’ or ‘A’ where ‘D’ units are DOE compliant and ‘A’ are for non-regulated applications.( ) Gas defrost type K, H, G or P. See definition below.*
[ ] Replace with the refrigerant letter code refer to the model nomenclature.
{ } Motor type designation, replace with ‘D’ for Dual Speed or ‘V’ for Variable Speed.

TABLE 1C: AIR DEFROST UNIT DIMENSIONS AND CONNECTION SIZES

MODEL NUMBERS	Refrigeration Connections				DIMENSIONS (IN)				
	All Refrigerant Options Except [H]		Refrigerant [H]						
	LIQ	SUCT	LIQ	SUCT	L (C)	W	H	(A)	(B)
KRD16A-040[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KRD16A-060[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KRD26A-089[ ]{ }	1/2”	7/8”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KRD26A-125[ ]{ }	1/2”	7/8”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KRD36A-134[ ]{ }	1/2”	7/8”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KRD36A-170[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KRD46A-216[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	83.13	15.32	15.9	36	72
KRD56A-242[ ]{ }	1/2”	1-1/8”	3/8”	5/8”	101.13	15.32	15.9	45	90
KRD66A-340[ ]{ }	1/2”	1-3/8”	1/2”	5/8”	119.13	15.32	15.9	54	108
KRD14A-058[ ]{ }	1/2”	5/8”	3/8”	5/8”	29.13	15.32	15.9	N/A	18
KRD24A-096[ ]{ }	1/2”	5/8”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KRD24A-117[ ]{ }	1/2”	5/8”	3/8”	5/8”	47.13	15.32	15.9	N/A	36
KRD34A-143[ ]{ }	1/2”	5/8”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KRD34A-173[ ]{ }	1/2”	5/8”	3/8”	5/8”	65.13	15.32	15.9	N/A	54
KRD44A-191[ ]{ }	1/2”	5/8”	3/8”	5/8”	83.13	15.32	15.9	36	72
KRD44A-232[ ]{ }	1/2”	5/8”	3/8”	5/8”	83.13	15.32	15.9	36	72
KRD54A-290[ ]{ }	1/2”	5/8”	3/8”	5/8”	101.13	15.32	15.9	45	90
KRD64A-348[ ]{ }	1/2”	5/8”	1/2”	5/8”	119.13	15.32	15.9	54	108

[ ] Replace with the refrigerant letter code refer to the model nomenclature.
{ } Motor type designation, replace with ‘D’ for Dual Speed or ‘V’ for Variable Speed.

4 DRAIN LINE

The drain line should be as short and as steeply pitched as possible with a minimum of ¼" drop per running foot. Any traps in the drain line must be in an ambient above freezing location. If the temperature sur- rounding the trap or drain line is below freezing (32°F) 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 at the drain connection in the drain pan 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.

Long runs of drain line (i.e., more than a few feet) should be supported by hangers to avoid damage to the drain pan.

5 REFRIGERATION PIPING

System design must conform to all local and national codes, laws, and regulations applying to the site of installation. In addition the safety code for mechanical refrigeration (ASME B31.5) should be followed as a guide for installation and operation practice.

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.

There are two typical methods of defrosting a unit with hot gas. FIGUREs 7A. and 7B (in section 9 "Sequence of Operation") show typical piping arrangements for 3 pipe hot gas defrost. FIGUREs 8A and 8B show typical piping arrangements for reverse cycle defrost.

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

Special Instructions for R-744 (CO_2) Systems

A. If the refrigeration system is de-energized, venting of the R-744 through the pressure regulating relief valves on the refrigeration system can occur. In such cases, the system may need to be recharged with R-744, but in any case, the pressure regulating relief valve(s) are not to be defeated or capped. The relief setting shall not be altered.
B. A sufficient number of pressure relief and pressure regulating relief valves may need to be provided based on the system capacity and located such that no stop valve is provided between the relief valves and the parts or section of the system being protected.

For Liquid Overfeed CO_2:
To properly protect and control systems using pumped liquid overfeed R-744, the solenoid, isolation, and pressure relief valves shall be arranged as shown in either FIGURE 2 or 3, according to the solenoid valve arrangement. To handle the requirements of liquid R-744 high pressure solenoid valves are to be used.

FIGURE 2: MULTIPLE UNIT COOLERS CONTROLLED BY A SINGLE SOLENOID

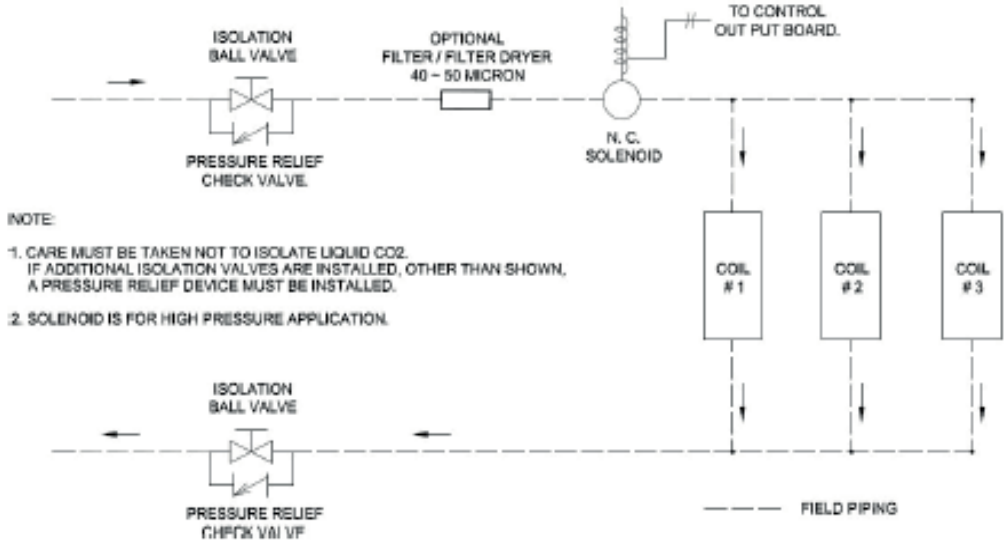
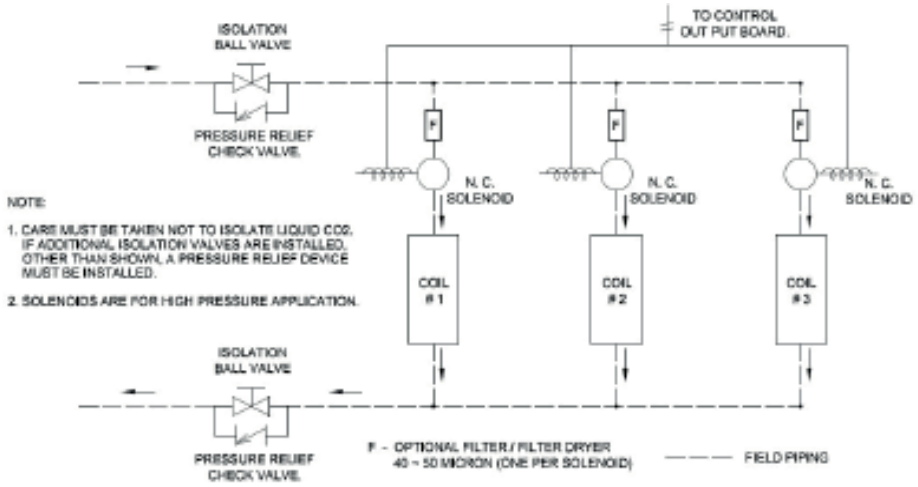


FIGURE 3: MULTIPLE UNIT COOLERS CONTROLLED BY MULTIPLE SOLENOIDS



6 REFRIGERANT DISTRIBUTOR NOZZLES

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 provides information on nozzle used based on refrigerant. There may be one, two, or three envelopes with nozzles located near the distributor.

The nozzles provided with the unit have been selected for design conditions of 10°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. Consult factory for additional information.

The nozzle must be installed in the distributor or the auxiliary side connector before the expansion valve is installed. There are nozzle identification numbers stamped on one side of the nozzle. Ensure the numbers are visible (for identification information) when inserting the nozzle into the distributor. 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 TABLEs 2A and 2B:

TABLE 2A: AIR DEFROST MODELS DISTRIBUTOR NOZZLE SELECTIONS

MODELS	DISTRIBUTOR NOZZLES[1]			
	R-404A	R-407A	R-448A	R-744 (CO_2)
KRD16A-060[ ]{ }	L - 3/4	L - 1/2	L - 1/2	N/A
KRD26A-125[ ]{ }	L - 1-1/2	L - 1	L - 1	N/A
KRD36A-170[ ]{ }	L - 2	L - 1-1/2	L - 1-1/2	L - 1/3
KRD46A-216[ ]{ }	L - 2-1/2	L - 2	L - 2	L - 1/2
KRD56A-242[ ]{ }	L - 2-1/2	L - 2	L - 2	L - 3/4
KRD66A-340[ ]{ }	L - 4	L - 3	L - 3	L - 3/4
KRD16A-040[ ]{ }	Single Pass	Single Pass	Single Pass	N/A
KRD26A-089[ ]{ }	L - 1	L - 3/4	L - 3/4	N/A
KRD36A-134[ ]{ }	L - 2	L - 1-1/2	L - 1-1/2	N/A
KRD14A-058[ ]{ }	L - 3/4	L - 1/2	L - 1/2	N/A
KRD24A-117[ ]{ }	L - 1-1/2	L - 1	L - 1	N/A
KRD34A-173[ ]{ }	L - 2	L - 1-1/2	L - 1-1/2	L - 1/3
KRD44A-232[ ]{ }	L - 2-1/2	L - 2	L-2	L- 1
KRD54A-290[ ]{ }	L - 3	L - 2-1/2	L - 2-1/2	L - 1/2
KRD64A-348[ ]{ }	J - 4	J - 3	J - 3	L - 3/4
KRD24A-096[ ]{ }	L - 1	L - 3/4	L - 3/4	N/A
KRD34A-143[ ]{ }	L - 1-1/2	L - 1-1/2	L - 1-1/2	N/A
KRD44A-191[ ]{ }	L - 2	L - 1-1/2	L - 1-1/2	L - 1/3

CO_2 models with "N/A" require no distributor as they use a single circuit coil.
Distributor nozzle selections are based on 25° F (-3.9° C) suction temperature, 10° F (-12.2° C) T.D., and 33° F (0.6° C) liquid temperature.
[ ] Replace with the refrigerant letter code refer to the model nomenclature.
{ } Motor type designation, replace with 'D' for Dual Speed or 'V' for Variable Speed.

TABLE 2B: ELECTRIC AND GAS DEFROST MODELS DISTRIBUTOR NOZZLE SELECTIONS

MODELS	DISTRIBUTOR NOZZLES[1]			
	R-404A	R-407A	R-448A	R-744 (CO_2)
KR*14E-037[ ]{ }	L - 3/4	L - 1/2	L - 1/2	N/A
KR*24E-074[ ]{ }	L - 1-1/2	L - 1	L - 1	N/A
KR*34E-111[ ]{ }	L - 2	L - 1-1/2	L - 1-1/2	L - 1/3
KR*44E-148[ ]{ }	L - 2	L - 2	L - 2	L - 1/2
KR*54E-185[ ]{ }	L - 4	L - 2-1/2	L - 2-1/2	L - 3/4
KR*64E-220[ ]{ }	L - 4	L - 3	L - 3	L - 3/4
KR*16E-035[ ]{ }	L - 3/4	L - 1/2	L - 1/2	N/A
KR*16E-045[ ]{ }	L - 3/4	L - 3/4	L - 3/4	N/A
KR*26E-090[ ]{ }	L - 1-1/2	L - 1-1/2	L - 1-1/2	N/A
KR*36E-135[ ]{ }	L - 2-1/2	L - 2	L - 2	L - 1/2
KR*46E-180[ ]{ }	L - 3	L - 2-1/2	L - 2-1/2	L - 3/4
KR*56E-192[ ]{ }	L - 4	L - 2-1/2	L - 2-1/2	L - 3/4
KR*66E-270[ ]{ }	L - 6	L - 4	L - 4	L - 1

CO2 models with "N/A" require no distributor as they use a single circuit coil.
Distributor nozzle selections are based on -20° F (-28.9° C) suction temperature, 10° F (-12.2° C) T.D., and 33° F (0.6° C) liquid temperature, and 38° F.

KR Electrical Defrost Unit Coolers (PN E108318_T)

NOTE 1: **If R-449A is used, use the same Nozzle as mentioned for R-448A**
If R-407F is used, use the same Nozzle as mentioned for R-407A
If R-507 is used, use the same Nozzle as mentioned for R-404A

7 EXPANSION VALVE

TABLE 7A: RECOMMENDED EXPANSION VALVES FOR AIR DEFROST MODELS

MODELS	TXV [2]			CO_2 ELECTRONIC EXPANSION VALVES			
				640 PSI (44.1 bar)	640 PSI (44.1 bar) / 1,305 PSI (90 bar)		1,305 PSI (90 bar)
				SPORLAN	DANFOSS AKV 10P	SPORLAN	SPORLAN
	R-404A	R-407A	R-448A	STP	PWM	PWM	STP
KRD16A-060[ ]{ }	SBFSE-AA-C EGSE-1/2-C	SBFNE-AA-C EGNE-1/2-C	SBFDE-AA-C EGDE-1/3-C	SER-AA	AKV 10P1	SPW-1	SER-AA-HP
KRD26A-125[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-A-C EGNE-1-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P3	SPW-3	SER-A-HP
KRD36A-170[ ]{ }	SBFSE-B-C EGSE-1-1/2-C	SBFNE-A-C EGNE-1-1/2-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P4	SPW-4	SER-A-HP
KRD46A-216[ ]{ }	SBFSE-B-C EGSE-1-1/2-C	SBFNE-A-C EGNE-1-1/2-C	SBFDE-A-C EGDE-1-C	SER-B	AKV 10P5	SPW-5	SER-B-HP
KRD56A-242[ ]{ }	SBFSE-B-C EGSE-2-C	SBFNE-B-C EGNE-2-C	SBFDE-B-C EGDE-1-1/2-C	SER-B	AKV 10P6	SPW-6	SER-B-HP
KRD66A-340[ ]{ }	SBFSE-C-C EGSE-2-C	SBFNE-B-C EGNE-3-C	SBFDE-B-C EGDE-2-1/2-C	SER-B	AKV 10P6	SPW-6	SER-B-HP
KRD16A-040[ ]{ }	SBFSE-AA-C EGSE-1/4-C	SBFNE-AAA-C EGNE-1/3-C	SBFDE-AAA-C EGDE-1/4-C	SER-AA	AKV 10P1	SPW-0	SER-AA-HP
KRD26A-089[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-AA-C EGNE-3/4-C	SBFDE-AA-C EGDE-1/2-C	SER-AA	AKV 10P2	SPW-2	SER-AA-HP
KRD36A-134[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-A-C EGNE-1-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P4	SPW-4	SER-A-HP
KRD14A-058[ ]{ }	SBFSE-AA-C EGSE-1/2-C	SBFNE-AA-C EGNE-1/2-C	SBFDE-AA-C EGDE-1/3-C	SER-AA	AKV 10P1	SPW-1	SER-AA-HP
KRD24A-117[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-A-C EGNE-1-C	SBFDE-A-C EGDE-1/2-C	SER-A	AKV 10P3	SPW-3	SER-A-HP
KRD34A-173[ ]{ }	SBFSE-B-C EGSE-1-1/2-C	SBFNE-A-C EGNE-1-1/2-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P4	SPW-4	SER-A-HP
KRD44A-232[ ]{ }	SBFSE-B-C EGSE-2-C	SBFNE-B-C EGNE-2-C	SBFDE-B-C EGDE-1-1/2-C	SER-B	AKV 10P5	SPW-5	SER-B-HP
KRD54A-290[ ]{ }	SBFSE-C-C EGSE-2-C	SBFNE-B-C EGNE-3-C	SBFDE-B-C EGDE-1-1/2-C	SER-B	AKV 10P5	SPW-5	SER-B-HP
KRD64A-348[ ]{ }	SBFSE-C-C EGSE-2-C	SBFNE-B-C EGNE-3-C	SBFDE-B-C EGDE-2-1/2-C	SER-B	AKV 10P6	SPW-6	SER-B-HP
KRD24A-096[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-AA-C EGNE-3/4-C	SBFDE-AA-C EGDE-1/2-C	SER-AA	AKV 10P3	SPW-3	SER-AA-HP
KRD34A-143[ ]{ }	SBFSE-A-C EGSE-1-C	SBFNE-A-C EGNE-1-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P4	SPW-4	SER-A-HP
KRD44A-191[ ]{ }	SBFSE-B-C EGSE-1-1/2-C	SBFNE-A-C EGNE-1-1/2-C	SBFDE-A-C EGDE-1-C	SER-A	AKV 10P4	SPW-4	SER-A-HP

TXV selections are based on 25° F (-3.9° C) suction temperature, 10° F (-12.2° C) T.D., 33° F (0.6° C) liquid temperature, and 38° F (3.3° C) condensing temperature.

TABLE 7B: RECOMMENDED EXPANSION VALVES FOR ELECTRIC AND GAS DEFROST MODELS

MODELS	TXV [2]			CO_2 ELECTRONIC EXPANSION VALVES			
				640 PSI (44.1 bar)	640 PSI (44.1 bar) / 1,305 PSI (90 bar)		1,305 PSI (90 bar)
				SPORLAN	DANFOSS AKV 10P	SPORLAN	SPORLAN
	R-404A	R-407A	R-448A	STP	PWM	PWM	STP
KR*14E-037[ ]{ }	SBFSE-AA-Z EGSE-1/4-Z	SBFNE-AA-Z EGNE-1/2-Z	SBFDE-AAA-Z EGDE-1/4-Z	SER-AA	AKV 10P0	SPW-0	SER-AA-HP
KR*24E-074[ ]{ }	SBFSE-A-Z EGSE-1-Z	SBFNE-A-Z EGNE-1-Z	SBFDE-AA-Z EGDE-1/2-Z	SER-AA	AKV 10P2	SPW-2	SER-AA-HP
KR*34E-111[ ]{ }	SBFSE-A-Z EGSE-1-Z	SBFNE-A-Z EGNE-1-1/2-Z	SBFDE-A-Z EGDE-1-Z	SER-AA	AKV 10P3	SPW-3	SER-AA-HP
KR*44E-148[ ]{ }	SBFSE-B-Z EGSE-1-1/2-Z	SBFNE-B-Z EGNE-2-Z	SBFDE-A-Z EGDE-1-Z	SER-AA	AKV 10P3	SPW-3	SER-AA-HP
KR*54E-185[ ]{ }	SBFSE-B-Z EGSE-2-Z	SBFNE-B-Z EGNE-2-Z	SBFDE-A-Z EGDE-1-Z	SER-A	AKV 10P4	SPW-4	SER-A-HP
KR*64E-220[ ]{ }	SBFSE-C-Z EGSE-2-Z	SBFNE-B-Z EGNE-3-Z	SBFDE-B-Z EGDE-1 1/2-Z	SER-A	AKV 10P4	SPW-4	SER-A-HP
KR*16E-035[ ]{ }	SBFSE-AA-Z EGSE-1/4-Z	SBFNE-AA-Z EGNE-1/2-Z	SBFDE-AAA-Z EGDE-1/4-Z	SER-AA	AKV 10P0	SPW-0	SER-AA-HP
KR*16E-045[ ]{ }	SBFSE-AA-Z EGSE-1/2-Z	SBFNE-AA-Z EGNE-3/4-Z	SBFDE-AA-Z EGDE-1/3-Z	SER-AA	AKV 10P1	SPW-0	SER-AA-HP
KR*26E-090[ ]{ }	SBFSE-A-Z EGSE-1-Z	SBFNE-A-Z EGNE-1-Z	SBFDE-A-Z EGDE-1/2-Z	SER-AA	AKV 10P2	SPW-2	SER-AA-HP
KR*36E-135[ ]{ }	SBFSE-B-Z EGSE-1 -1/2-Z	SBFNE-B-Z EGNE-2-Z	SBFDE-A-Z EGDE-1-Z	SER-AA	AKV 10P3	SPW-3	SER-AA-HP
KR*46E-180[ ]{ }	SBFSE-B-Z EGSE-2-Z	SBFNE-B-Z EGNE-2-Z	SBFDE-A-Z EGDE-1-Z	SER-A	AKV 10P4	SPW-3	SER-A-HP
KR*56E-192[ ]{ }	SBFSE-B-Z EGSE-2-Z	SBFNE-B-Z EGNE-2-Z	SBFDE-B-Z EGDE-1 -1/2-Z	SER-A	AKV 10P4	SPW-4	SER-A-HP
KR*66E-270[ ]{ }	SBFSE-C-Z EGSE-2-Z	SBFNE-C-Z EGNE-3-Z	SBFDE-B-Z EGDE-2-1/2-Z	SER-A	AKV 10P4	SPW-4	SER-A-HP

TXV selections are based on -20° F (-28.9° C) suction temperature, 10° F (-12.2° C) T.D., 33° F (0.6° C) liquid temperature, and 38° F (3.3° C) condensing temperature.

For R-507, replace the second 'S' with 'P' in R-404-A TXV. For example, SBFSE-B-C (R- 404A) becomes SBFPE-B-C and EGSE-1-1/2-C becomes EGPE-1-1/2-C (R-507) For R-449A, use the same TXV as R-448A
For R-407F, use the same TXV as R-407A

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 some 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 counterclockwise. 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 (5.6° C to 6.7° C) T.D. system, the valve should be adjusted to maintain 5° F to 6° F (2.8° C to 3.3° C) 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.

8 WIRING

WARNING: All power supplied to the unit must be shut off before opening any compartments, cleaning, or performing maintenance.

The electrical data for the unit is marked on the unit nameplate. Field wiring should comply with NFPA 70® (NEC) 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 8 and 9 for unit amps.

TABLE 8: MOTOR AND DEFROST ELECTRICAL INFORMATION – ELECTRIC DEFROST

No. of Fans	Total Full Load Amps				E(EDL) Heaters Amp				
	PSC Motor (Type B)		EC Motor (Type V&D)		E(EDL) Heaters Watt	230/1/60	230/3/60	E(EDL) Heaters Watt	460/1/60
	115/1/60	230/1/60	115/1/60	230/1/60					
1	0.7	0.3	0.9	0.6	1000	4.3	2.9	64	2.2
2	1.4	0.6	1.8	1.2	2000	8.7	5.8	128	4.4
3	2.1	0.9	2.7	1.8	3000	13	8.7	192	6.6
4	2.8	1.2	3.6	2.4	4000	17.4	11.6	256	8.8
5	3.5	1.5	4.5	3	5000	21.7	14.5	320	11
6	4.2	1.8	5.4	3.6	6000	26.1	17.4	384	13.2

Note: *Air Defrost models have the same motor amps as the ones shown above.*

TABLE 9: MOTOR AND DEFROST ELECTRICAL INFORMATION – HOT GAS DEFROST

No. of Fans	**Total Full Load Amps**				**Defrost Heaters Amps**		
	PSC Motor		**EC Motor**		**Heaters Watts**	**115/1/60**	**230/1/60**
	115/1/60	**230/1/60**	**115/1/60**	**230/1/60**			
1	0.7	0.3	0.9	0.6	300	2.6	1.3
2	1.4	0.6	1.8	1.2	600	5.2	2.6
3	2.1	0.9	2.7	1.8	800	7	3.5
4	2.8	1.2	3.6	2.4	1000	8.7	4.3
5	3.5	1.5	4.5	3.0	1100	9.6	4.8
6	4.2	1.8	5.4	3.6	1400	12.2	6.1

8.1 *AIR DEFROST MODELS WIRING DIAGRAMS*

FIGURE 4A: AIR DEFROST WIRING DIAGRAM FOR MOTOR TYPE B

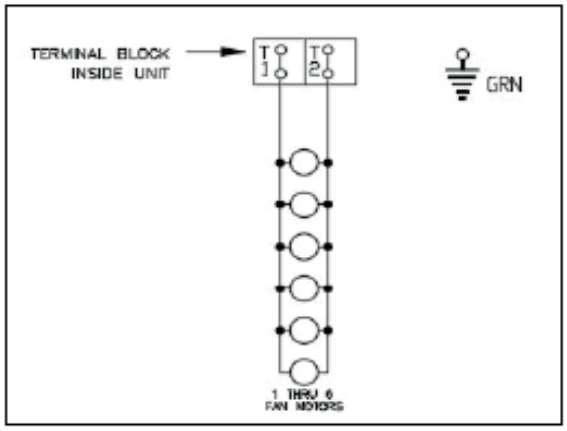


FIGURE 4B: AIR DEFROST WIRING DIAGRAM FOR MOTOR TYPE V

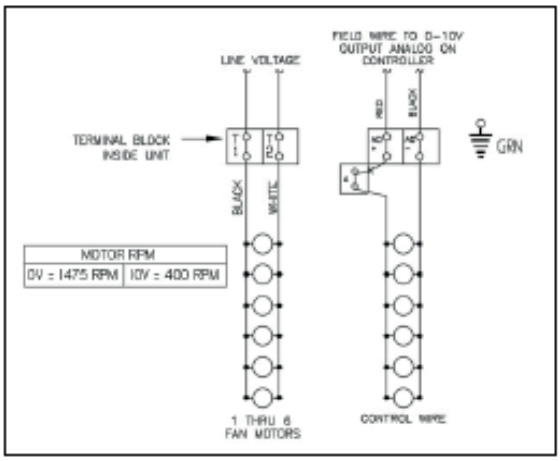


FIGURE 4C: AIR DEFROST WIRING DIAGRAM FOR MOTOR TYPE D

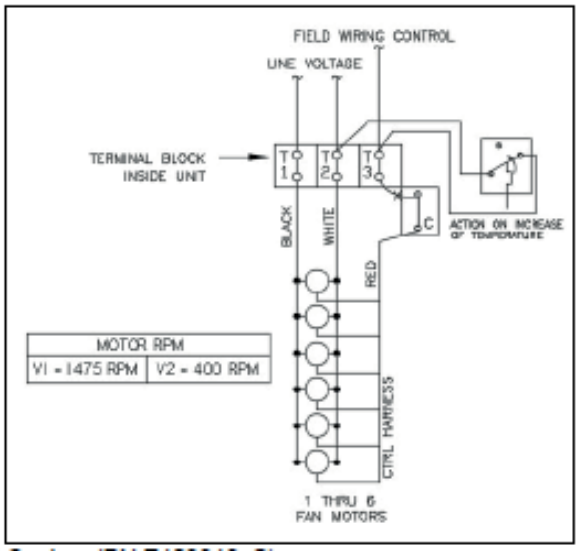


FIGURE 4D: AIR DEFROST WIRING DIAGRAM WITH TIMER - MOTOR TYPE B

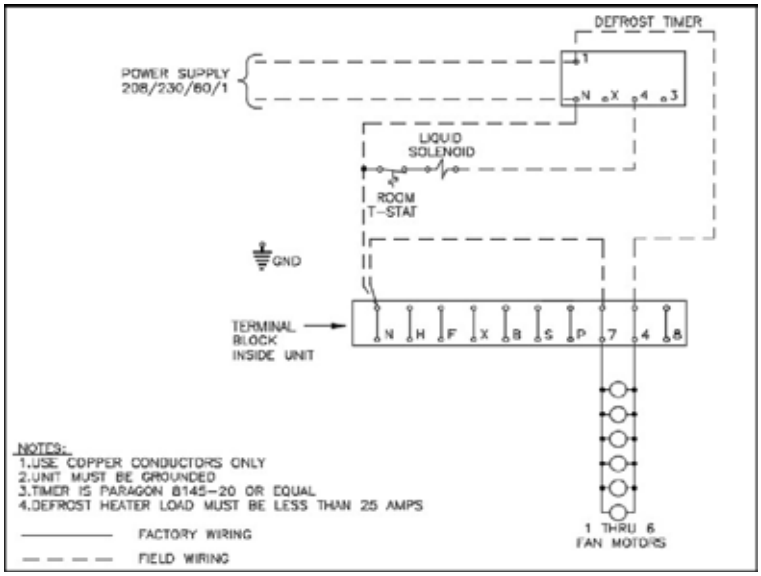


FIGURE 4E: AIR DEFROST WIRING DIAGRAM WITH TIMER - MOTOR TYPE V

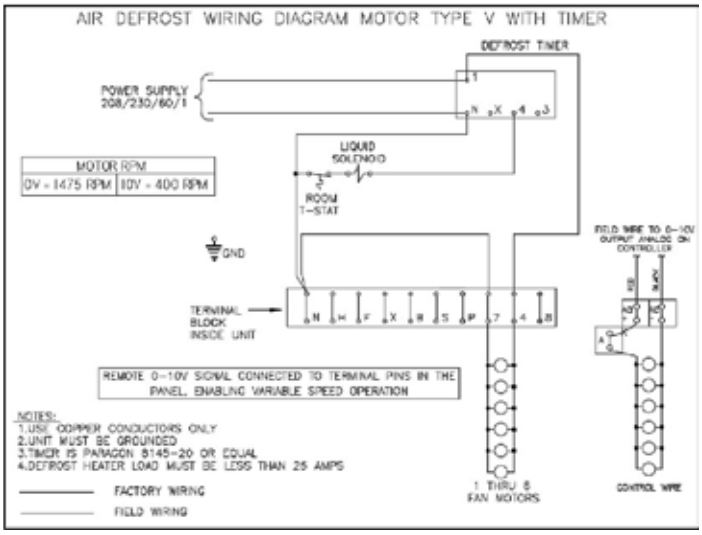
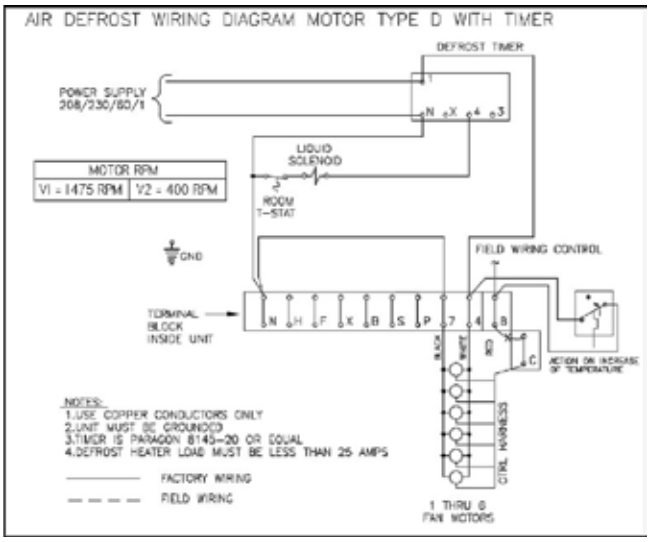


FIGURE 4F: AIR DEFROST WIRING DIAGRAM WITH TIMER - MOTOR TYPE D



8.2 *ELECTRIC DEFROST MODELS WIRING DIAGRAMS*

FIGURE 5A: ELECTRIC DEFROST SYSTEM WITH TIMER WIRING - MOTOR TYPE B

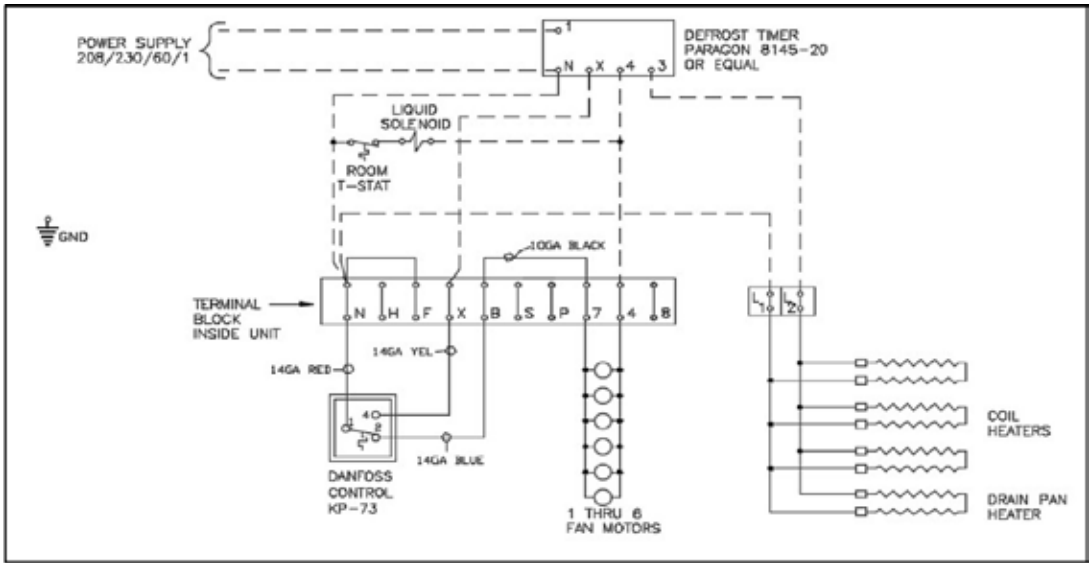


FIGURE 5B: ELECTRIC DEFROST SYSTEM WITH TIMER WIRING - MOTOR TYPE V

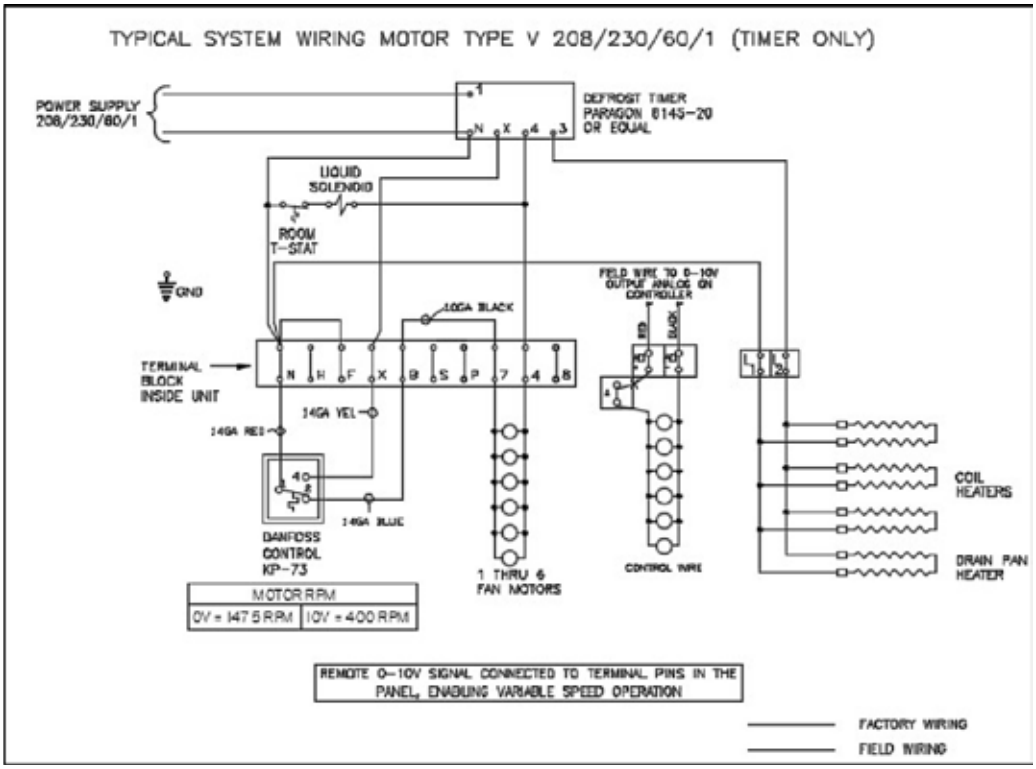


FIGURE 5C: ELECTRIC DEFROST SYSTEM WITH TIMER WIRING - MOTOR TYPE D

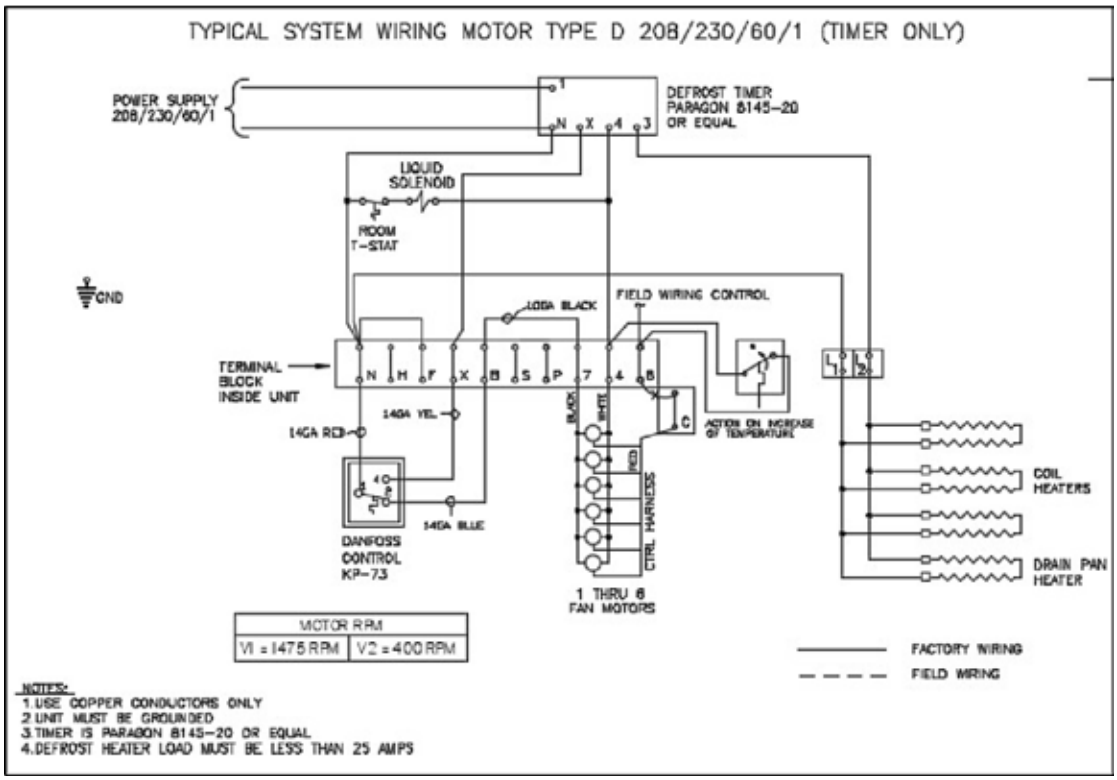


FIGURE 6A: ELECTRIC DEFROST WITH TIMER AND DEFROST CONTACTOR WIRING - MOTOR TYPE B

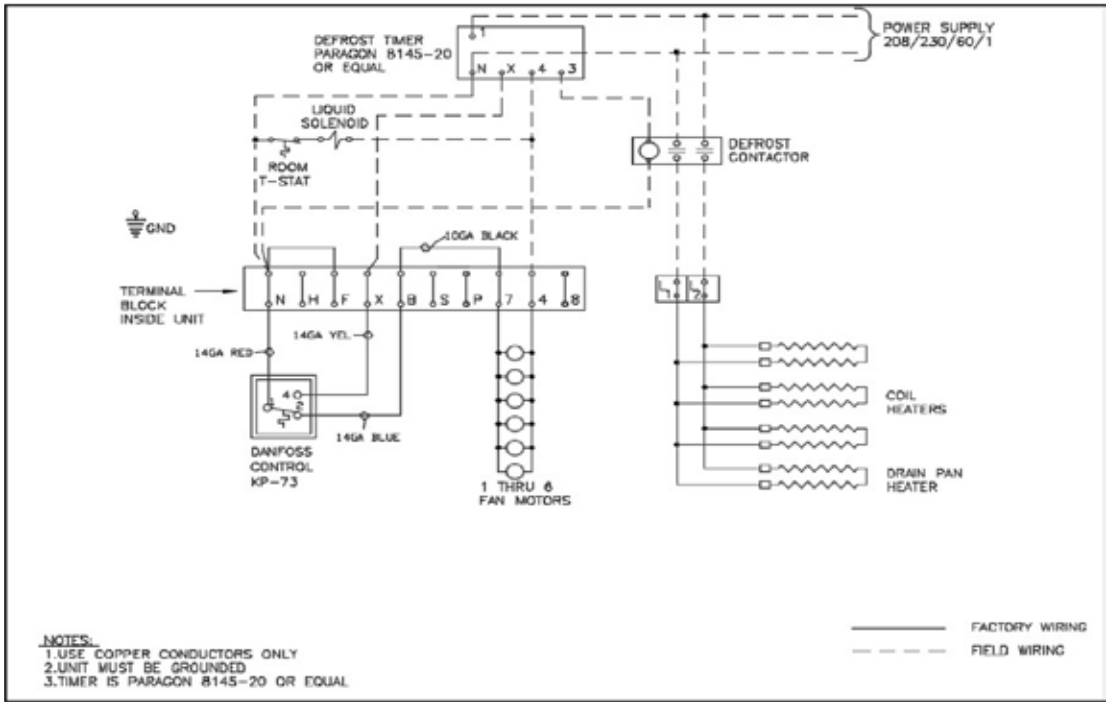


FIGURE 6B: ELECTRIC DEFROST WITH TIMER AND DEFROST CONTACTOR WIRING - MOTOR TYPE V

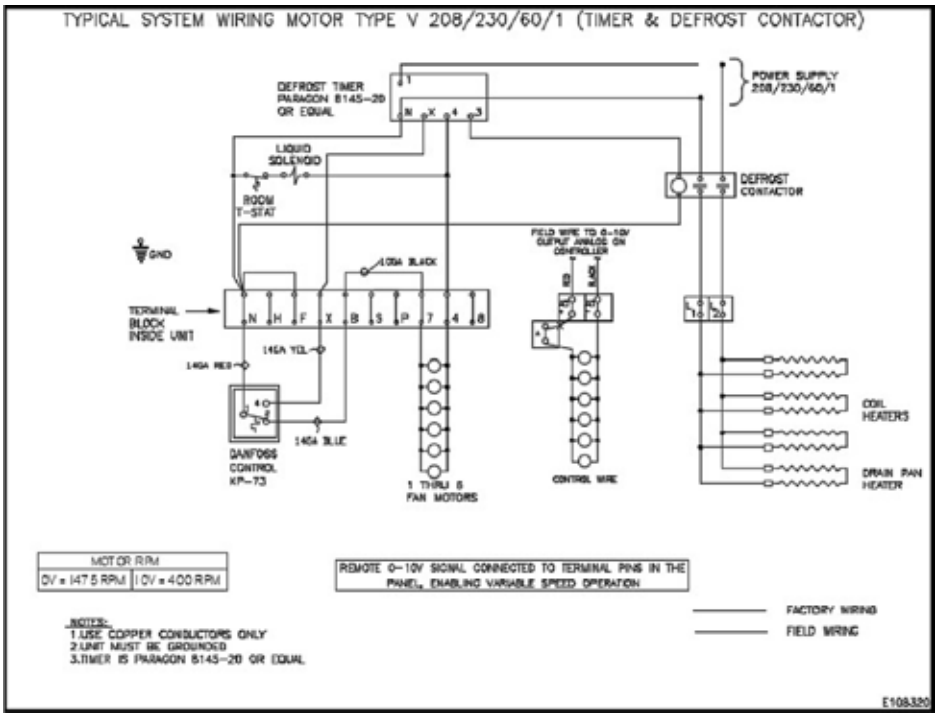


FIGURE 6C: ELECTRIC DEFROST WITH TIMER AND DEFROST CONTACTOR WIRING - MOTOR TYPE D

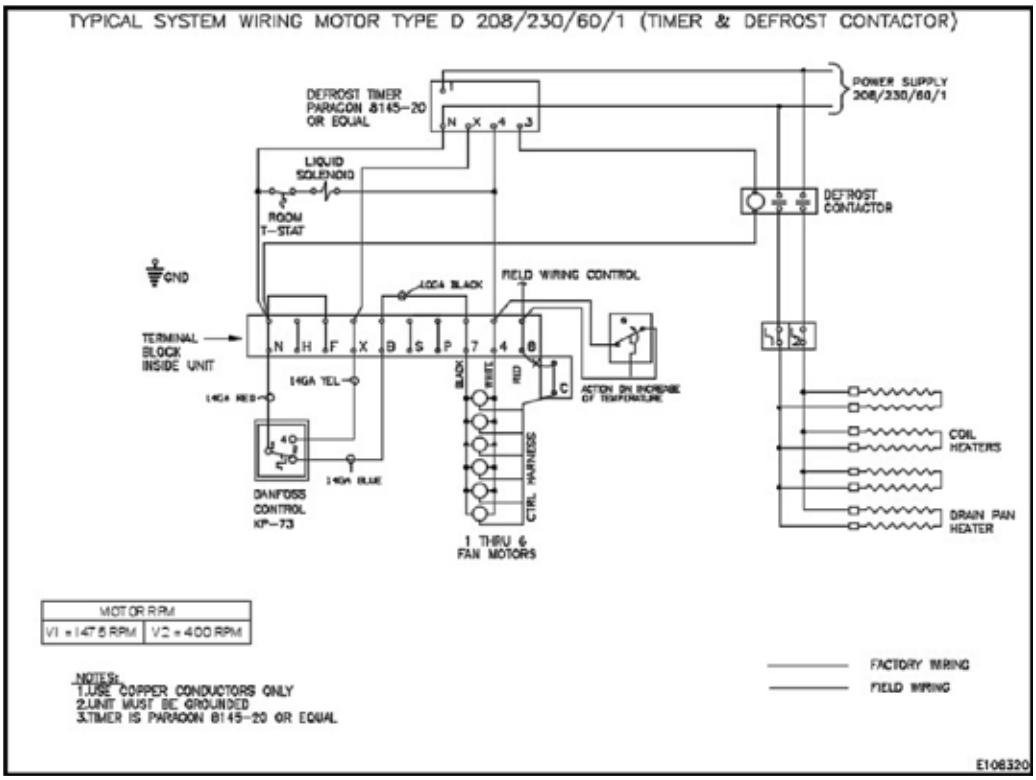


FIGURE 7A: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE B - 3 PHASE HEATERS

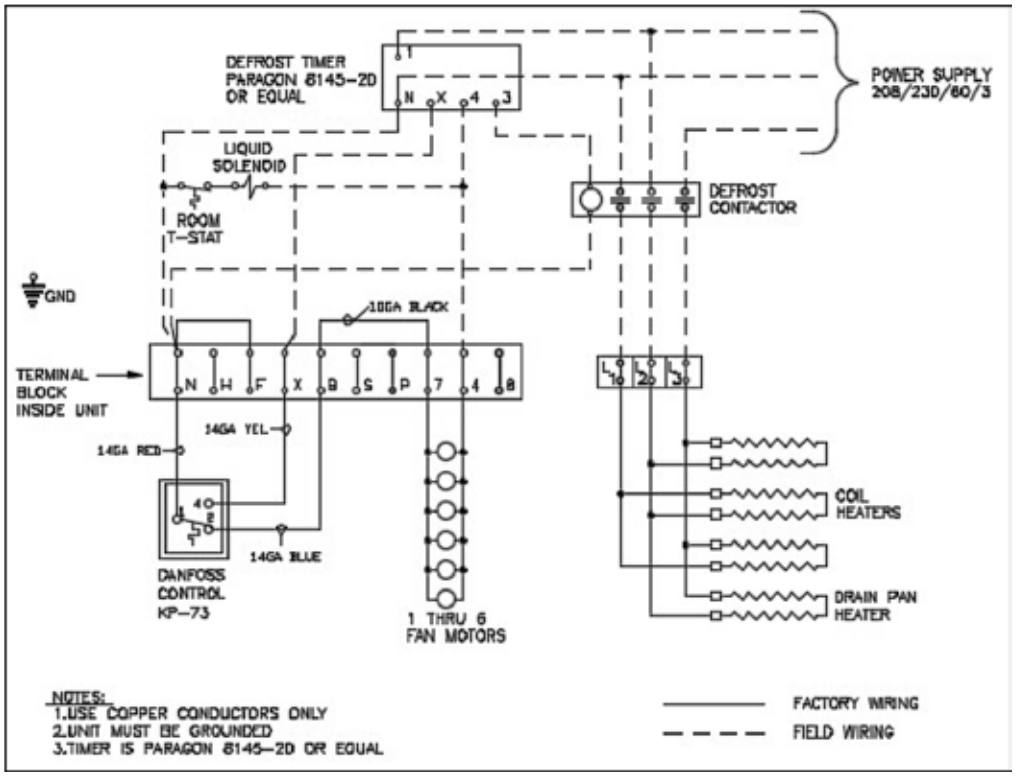


FIGURE 7B: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE V - 3 PHASE HEATERS

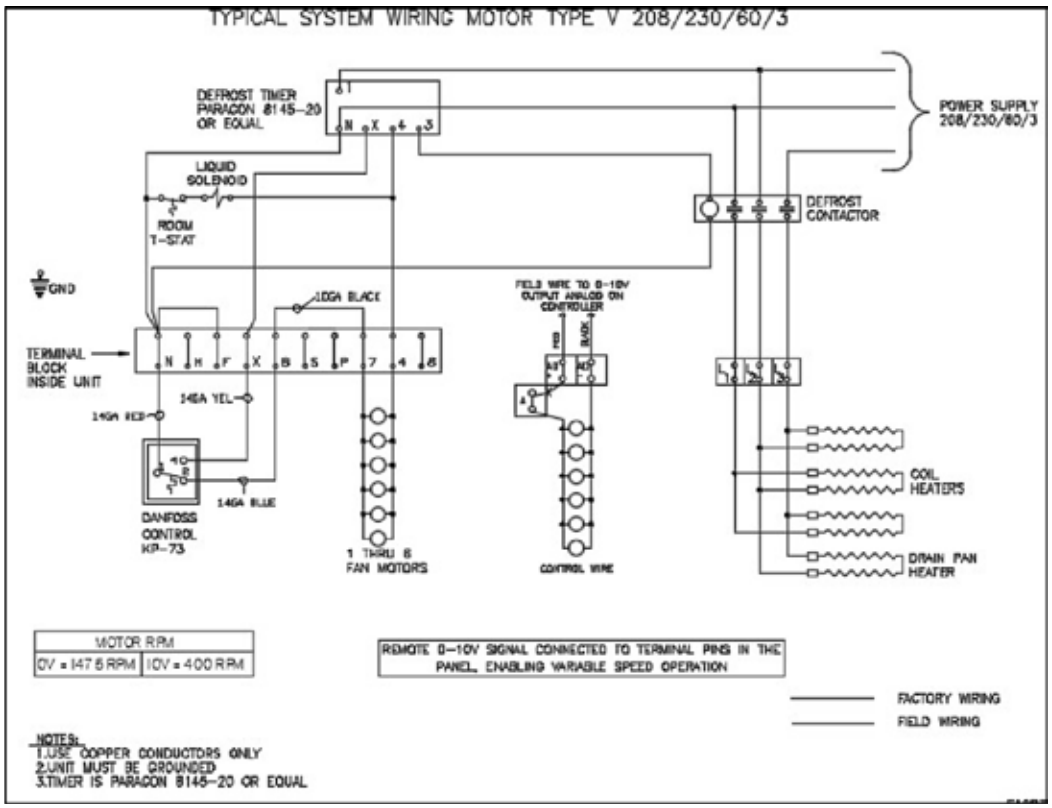


FIGURE 7C: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE D MOTOR - 3 PHASE HEATERS

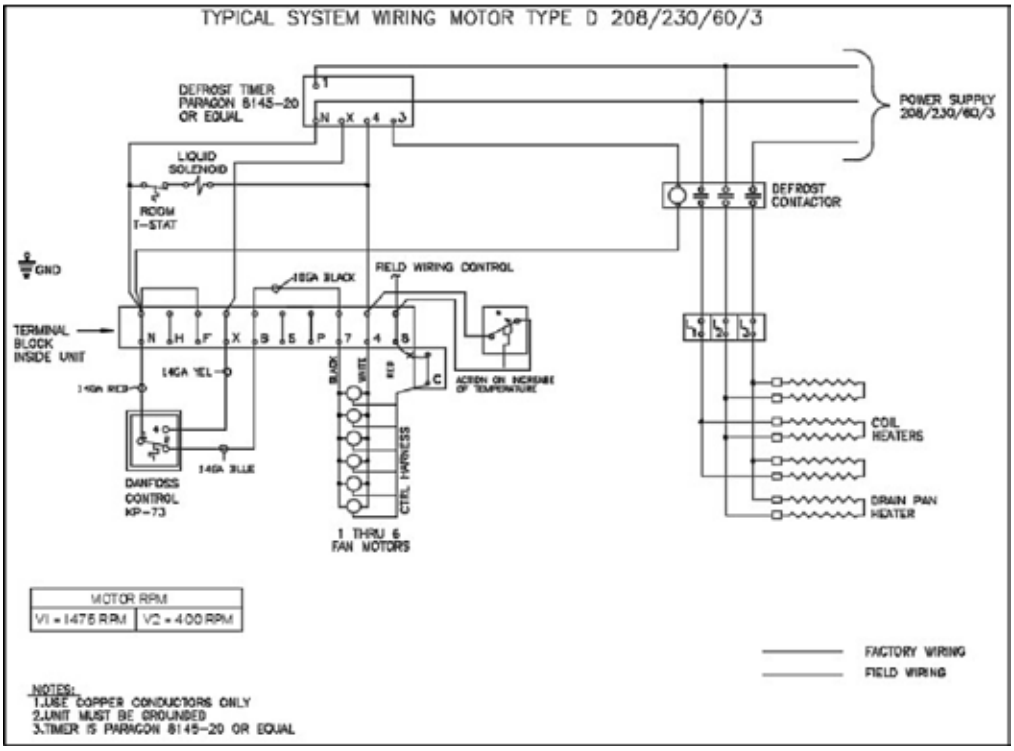


FIGURE 8A: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE B – MULTIPLE EVAPORATORS

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 8 below.

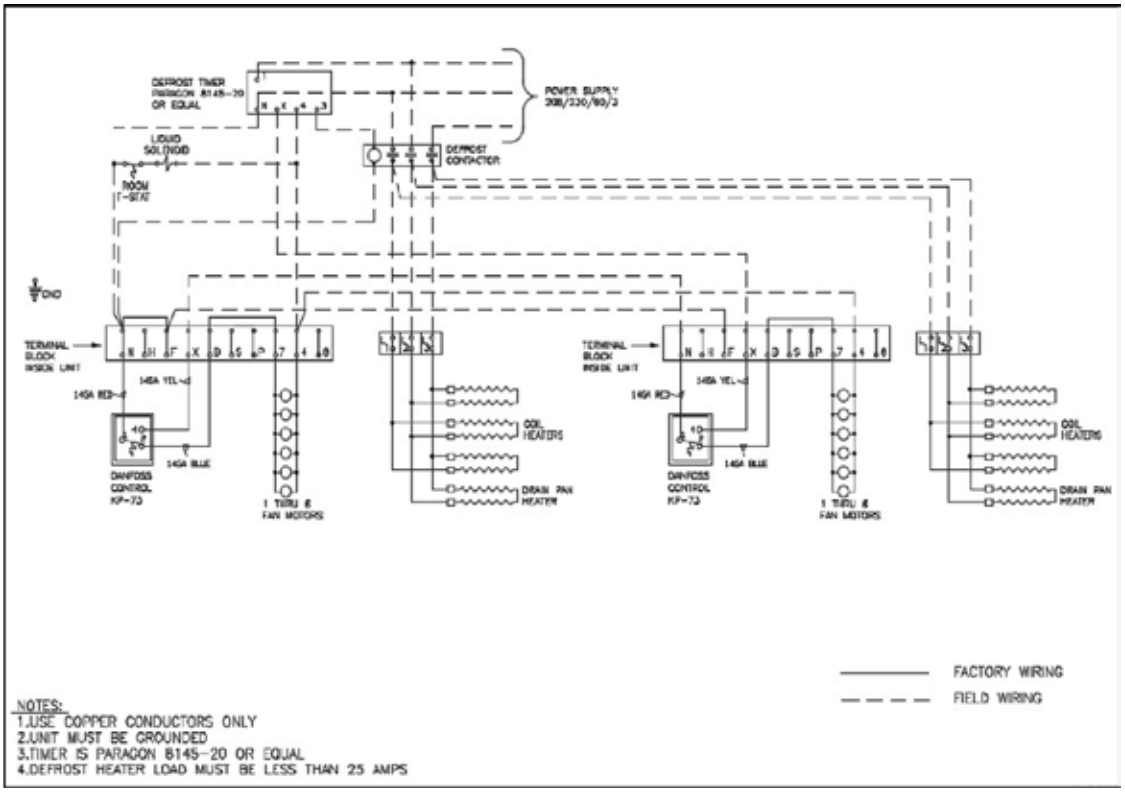


FIGURE 8B: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE V – MULTIPLE EVAPORATORS

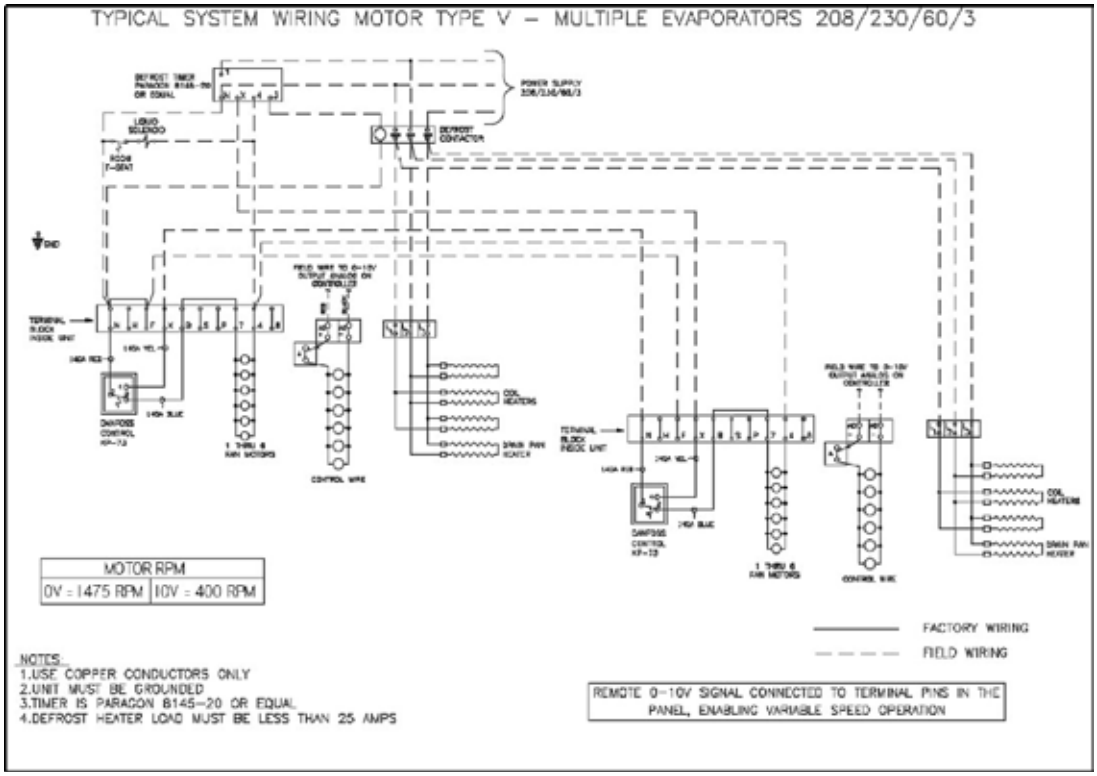
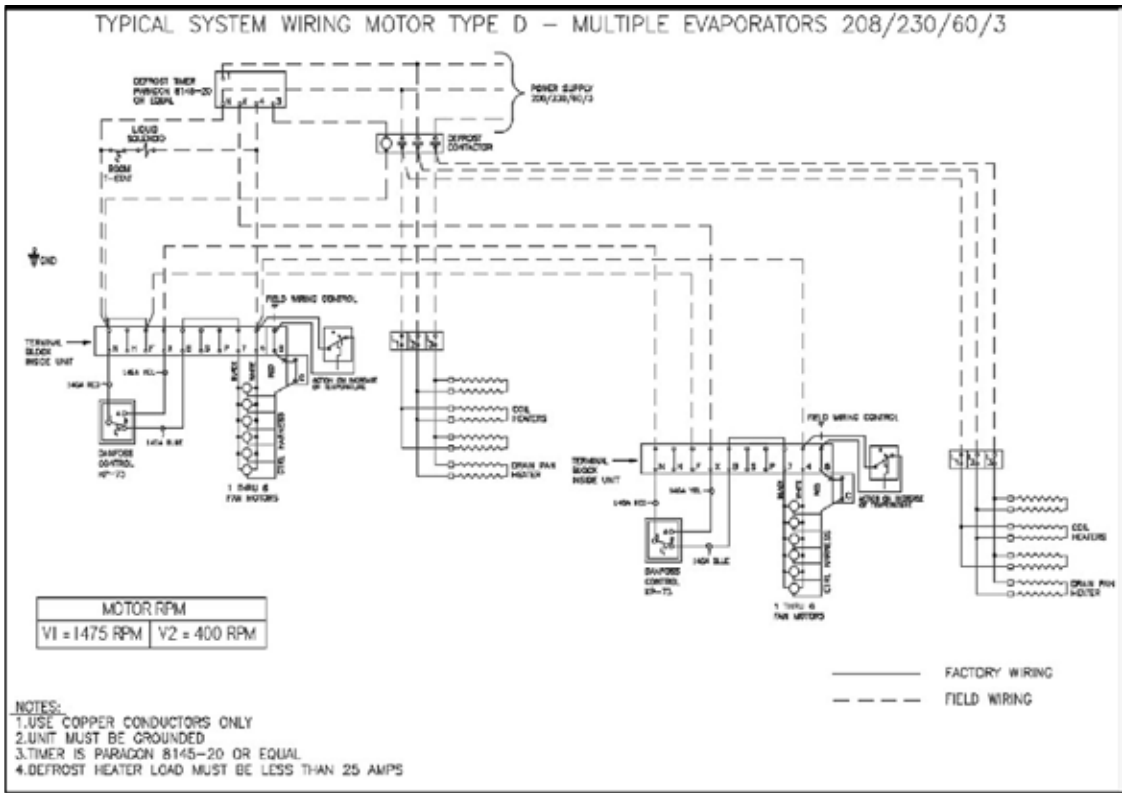


FIGURE 8C: ELECTRIC DEFROST SYSTEM WIRING MOTOR TYPE D – MULTIPLE EVAPORATORS



8.3 *GAS DEFROST MODELS WIRING DIAGRAMS*

FIGURE 9A: H - 3 PIPE HOT GAS WITH ELECTRIC PAN HEAT AND P - 2 PIPE KOOL GAS WITH ELECTRIC PAN HEAT – MOTOR TYPE B

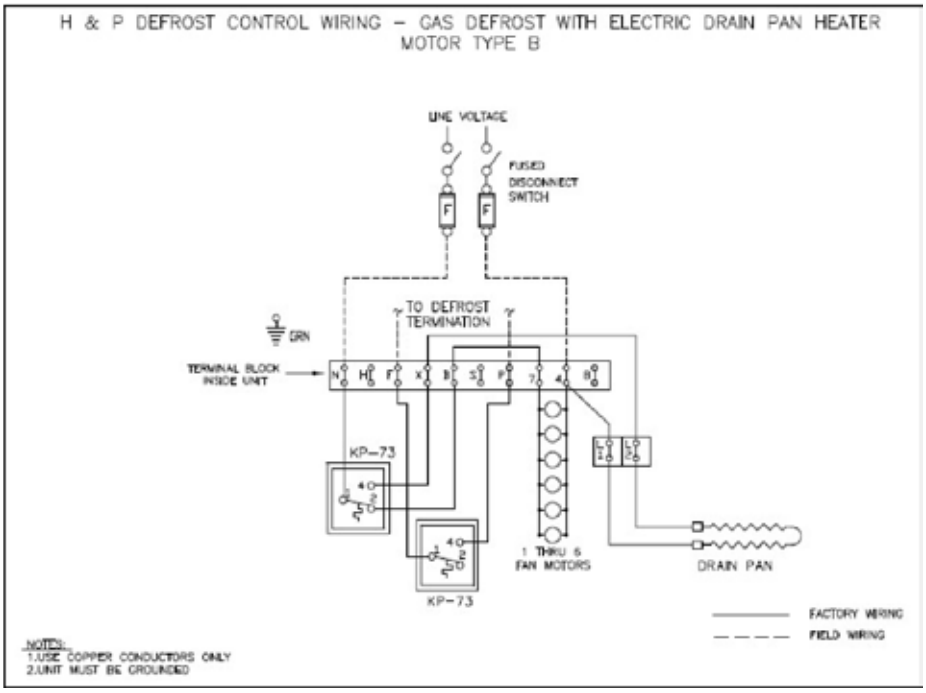


FIGURE 9B: H - 3 PIPE HOT GAS WITH ELECTRIC PAN HEAT AND P - 2 PIPE KOOL GAS WITH ELECTRIC PAN HEAT – MOTOR TYPE V

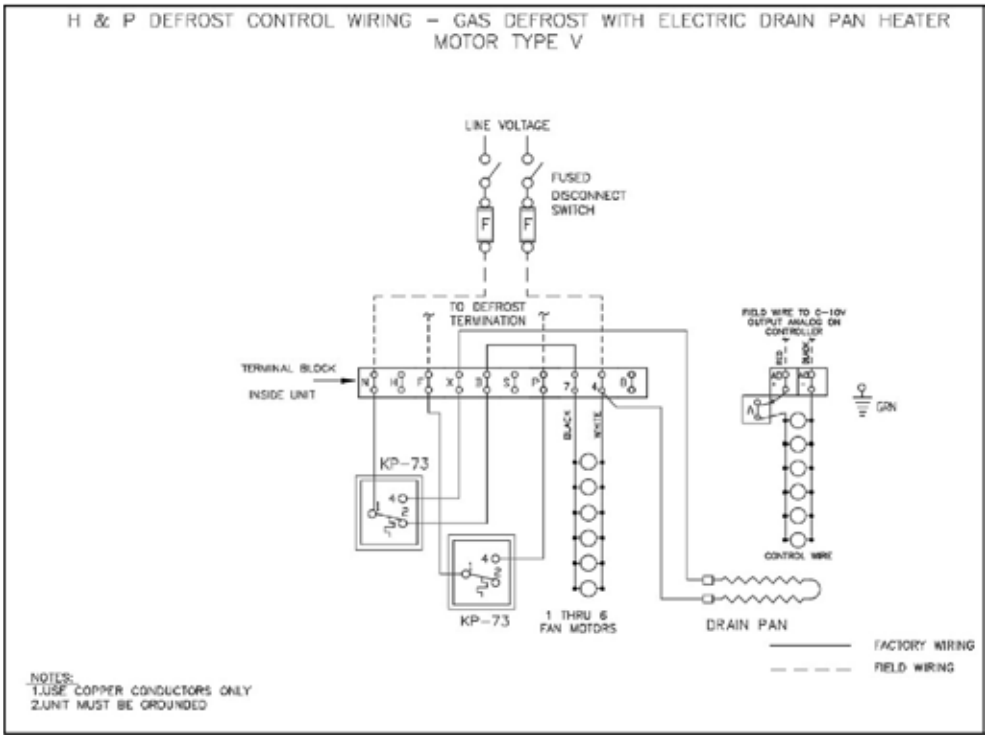


FIGURE 9C: H - 3 PIPE HOT GAS WITH ELECTRIC PAN HEAT AND P - 2 PIPE KOOL GAS WITH ELECTRIC PAN HEAT – MOTOR TYPE D

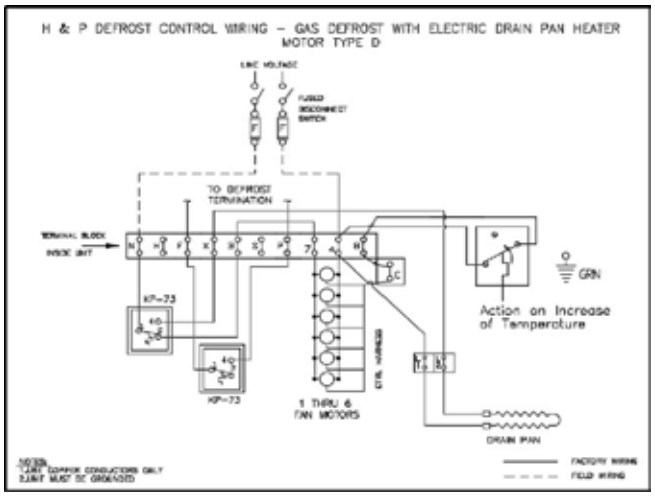


FIGURE 10A: MODEL G - 3 PIPE HOT GAS WITH GAS PAN HEAT AND K - 2 PIPE KOOL GAS WITH GAS PAN HEAT – MOTOR TYPE B

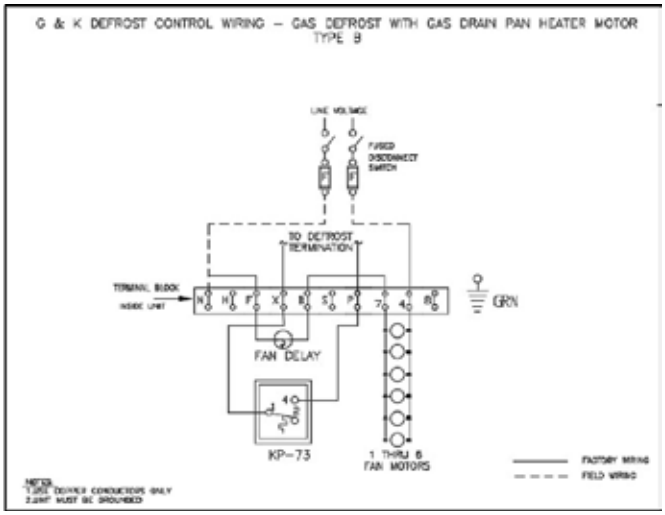


FIGURE 10B: MODELS G - 3 PIPE HOT GAS WITH GAS PAN HEAT AND K - 2 PIPE KOOL GAS WITH GAS PAN HEAT – MOTOR TYPE V

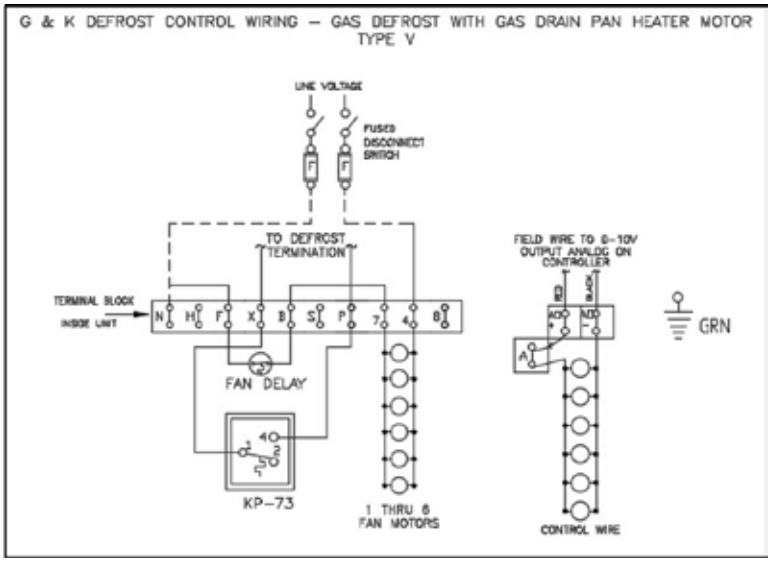
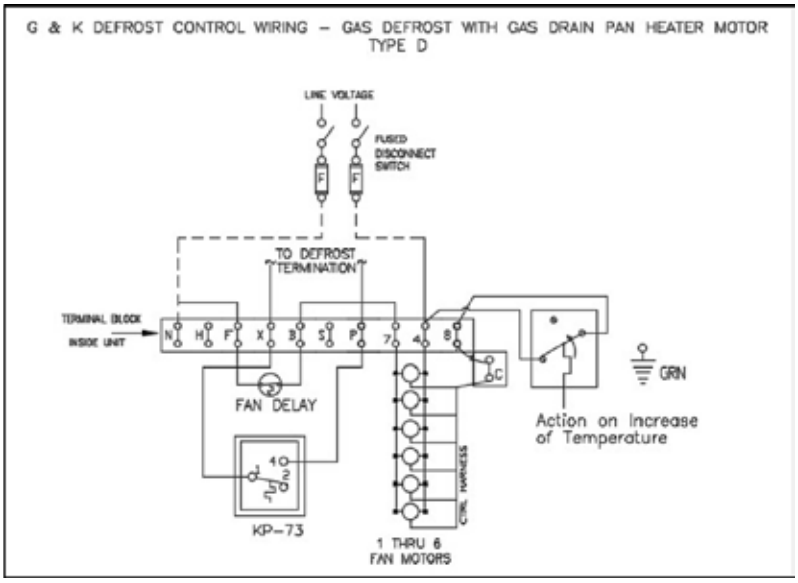


FIGURE 10C: MODEL G - 3 PIPE HOT GAS WITH GAS PAN HEAT AND K - 2 PIPE KOOL GAS WITH GAS PAN HEAT – MOTOR TYPE D



9 SEQUENCE OF OPERATION

Step A – Normal Refrigeration Cycle

1. Power is supplied to terminals “N” and “4” on the defrost timer.
2. The heater safety thermostat is closed. The fan delay thermostat is closed and the defrost termination thermostat is off.
3. The unit cooler fan motors are energized, and the fans operate continuously (the defrost heaters are off).
4. The system compressor operates in accordance with the demand of the room thermostat.
5. 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 settings of the timer would be two defrost periods per 24-hour day. Systems using Carbon Dioxide (R- 744) should defrost at least twice per 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 failsafe (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 two to three 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. 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.

9.1 MODELS H - 3 PIPE HOT GAS WITH ELECTRIC PAN HEAT AND P - 2 PIPE KOOL GAS WITH ELECTRIC PAN HEAT

Three pipe hot gas defrost system - Distribute compressor discharge gas through a separate hot gas line, controlled by a solenoid valve, through a check valve to the refrigerant distributor auxiliary side connection. Defrost condensate and gas vapor is evaporated in a re-evaporator prior to returning to the compressor through the suction line.

Two pipe cool gas defrost system - Distribute compressor discharge gas through the suction line during defrost. Defrost condensate flows through the refrigerant distributor auxiliary side connection and a check valve, bypassing the expansion valve and the liquid line solenoid valve into the liquid line which is reduced in pressure.

The defrost cycle is field controller initiated and terminated.

Step A
Power is supplied to the unit cooler continuously.

Step B
In Case of H, defrost hot gas is supplied to the unit via liquid line and in Case of P, defrost Kool Gas is supplied to the suction line. A factory mounted thermostat (KP73) senses a rise in the coil temperature. The SPDT control turns off the fan motors. If the unit has a drain pan heater, the other portion of the SPDT control is now closed and the drain pan heater is energized.

Step C
When the defrost is complete, the hot gas supply is stopped. The liquid line solenoid is energized, and the coil temperature begins to fall.

Step D
The factory mounted thermostat senses the drop in coil temperature. The SPDT thermostat opens the circuit to the drain pan heater (when supplied) and closes the circuit to the fan motors.

Recommended (SPDT) fan delay/drain pan heater thermostat settings:

Room Temperature	Range	Differential
0°F to +35°F	45°F	15°F
Below 0°F	20°F	10°F

(Note: Fan delay set point = Range – Differential)

A separate SPDT thermostat (KP73) is provided in the coil which can provide a digital defrost termination input.

FIGURE 11A: MODEL H (HGE) – 3 PIPE HOT GAS DEFROST WITH ELECTRIC PAN HEAT

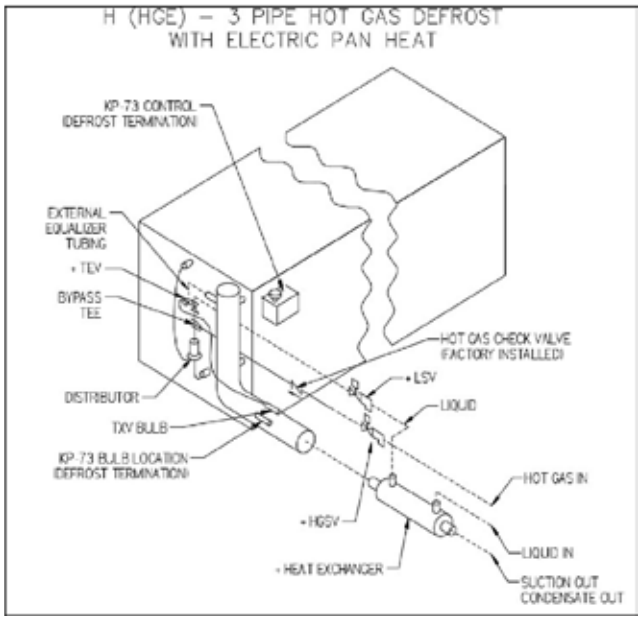
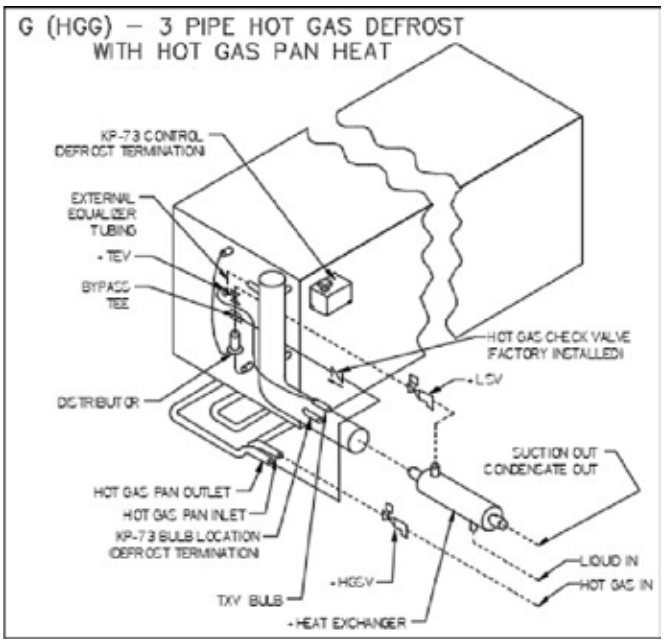


FIGURE 11B: MODEL G (HGG) – 3 PIPE HOT GAS DEFROST WITH HOT GAS PAN HEAT



9.2 MODELS G – 3 PIPE HOT GAS WITH GAS PAN HEAT AND K - 2 PIPE KOOL GAS WITH GAS PAN HEAT

Three pipe hot gas defrost system - Distribute compressor discharge gas through a separate hot gas line, controlled by a solenoid valve, through a check valve to the refrigerant distributor auxiliary side connection. Defrost condensate and gas vapor is evaporated in a re-evaporator prior to returning to the compressor through the suction line.

Two pipe cool gas defrost system - Distribute compressor discharge gas through the suction line during defrost. Defrost condensate flows through the refrigerant distributor auxiliary side connection and a check valve, bypassing the expansion valve and the liquid line solenoid valve into the liquid line which is reduced in pressure.

The defrost cycle is field controller initiated and terminated.

Step A

Power is supplied to the unit cooler continuously.

Step B

In Case of H, defrost hot gas is supplied to the unit via liquid line and in Case of P, defrost Kool Gas is supplied to the suction line. A factory mounted thermostat (Klixon) senses a rise in the coil temperature. The SPDT control turns off the fan motors.

Step C

When the defrost is complete, the hot gas supply is stopped. The liquid line solenoid is energized, and the coil temperature begins to fall.

Step D

The factory mounted thermostat senses the drop in coil temperature and closes the circuit to the fan motors.

A separate SPDT thermostat (KP73) is provided in the coil which can provide a digital defrost termination input.

FIGURE 12A: MODEL P (KGE) – 2 PIPE KOOL GAS DEFROST WITH ELECTRIC PAN HEAT

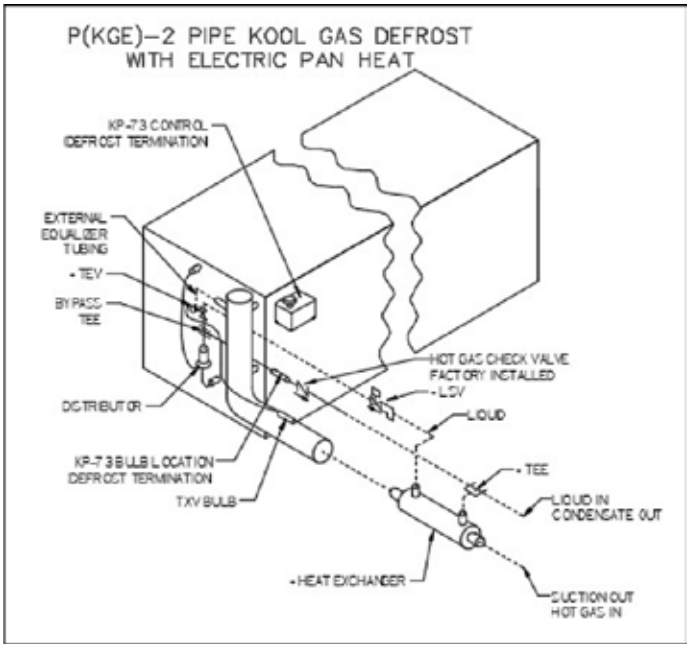
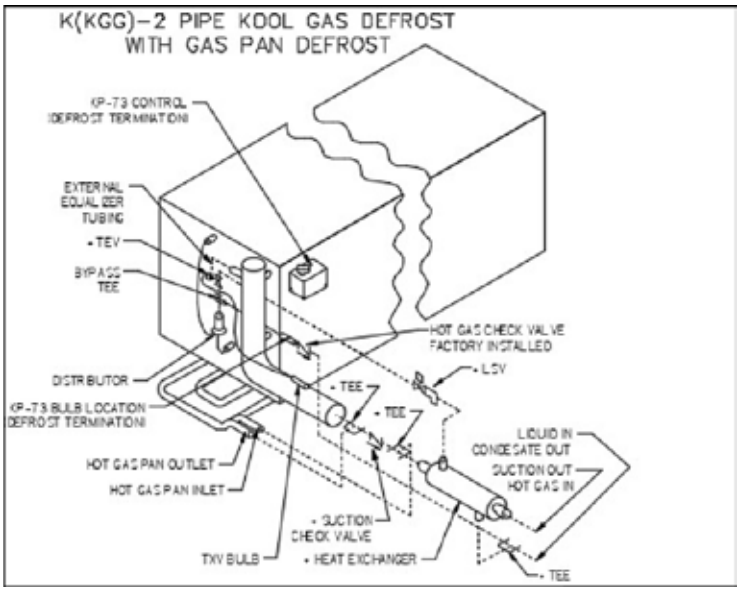


FIGURE 12B: MODEL K (KGG) – 2 PIPE KOOL GAS DEFROST WITH GAS PAN DEFROST



9.3 *DUAL SPEED MOTOR SEQUENCE OF OPERATION –*

KR coils uses Dual Speed EC motors for fans used in DOE applications with the default being the high speed and the second speed set as the minimum speed. Fans will be in Min speed/Full speed or Off in scenarios below:

Minimum speed

- When the room temperature or the refrigeration setpoint is met, the fan will operate at half speed.

Full Speed

- When the room temperature or refrigeration setpoint Is not met and the fan will run at full speed.

Fan off

- For EL/Gas defrost evaporators, during defrost fans will turn off.

A field control option is available for this motor to run at minimum speed and another option is available for an installed room thermostat to operate this as a dual speed motor. When using the installed room thermostat option, do not use the same thermostat to control the LLSV.

When using an installed thermostat, the SPDT switch of the thermostat will open when the room temperature is above the setpoint and will not supply voltage through the control harness to motor. When the room temperature is met, the SPDT switch of the thermostat will close and send the voltage through the control harness and make motor to run at minimum speed.

When using the field controller, the motor low speed is controlled through an output, the output may energize or de-energized based on room temperature input. Control harness should get voltage only when the controller energized or de-energized the connected output.

When using the field-installed thermostat, the same concept of installed thermostat will be applicable.

Wiring Connections –

Dual Speed motors will have three wires - Black, White, and Red. Black and white wires will be always wired to terminal pin 7 and 4 for fan power. The red wire, which is named as control harness, is connected to terminal 8. If the motor gets the supply through the control harness, it will run in minimum speed.

9.4 *VARIABLE SPEED MOTOR SEQUENCE OF OPERATION*

Variable speed motor need 0-10V signal from filed, 0-10V signal wires will be connected to terminal allotted in the Evaporator panel (Terminals 5 and 6). 0V being the high speed, 1475 RPM and 10V being minimum speed of 400 RPM. Speed varies based on the analog signal received by motor.

9.5 *VARIABLE SPEED MOTOR WITH SYSTEM 450 – SEQUENCE OF OPERATION*

An installed System 450 C450CPN-4 controller will be utilized to supply a 0-10V signal to the variable speed motor. Temperature sensor installed in the evaporator and wired to the System 450 control module will be utilized to measure the box temperature.

SYSTEM 450 PARAMETERS –

Set Point (SP) – is the target value that the control system drives toward. Set point at which Fan motor will run at full speed. – Target Box Temperature

End Point (EP) – is the maximum deviation from the target value. Setpoint at which Fan motors will run at Minimum speed **– Target Box Temperature – 5°F**

Output at Setpoint (OSP) – is the signal strength level of the analog output when the input sensor is at Setpoint (SP). The OSP is expressed as a percentage (0 to 100%) of the full-scale output. **Output signal strength at setpoint, i.e., Analog signal at setpoint. 0% - 0V**

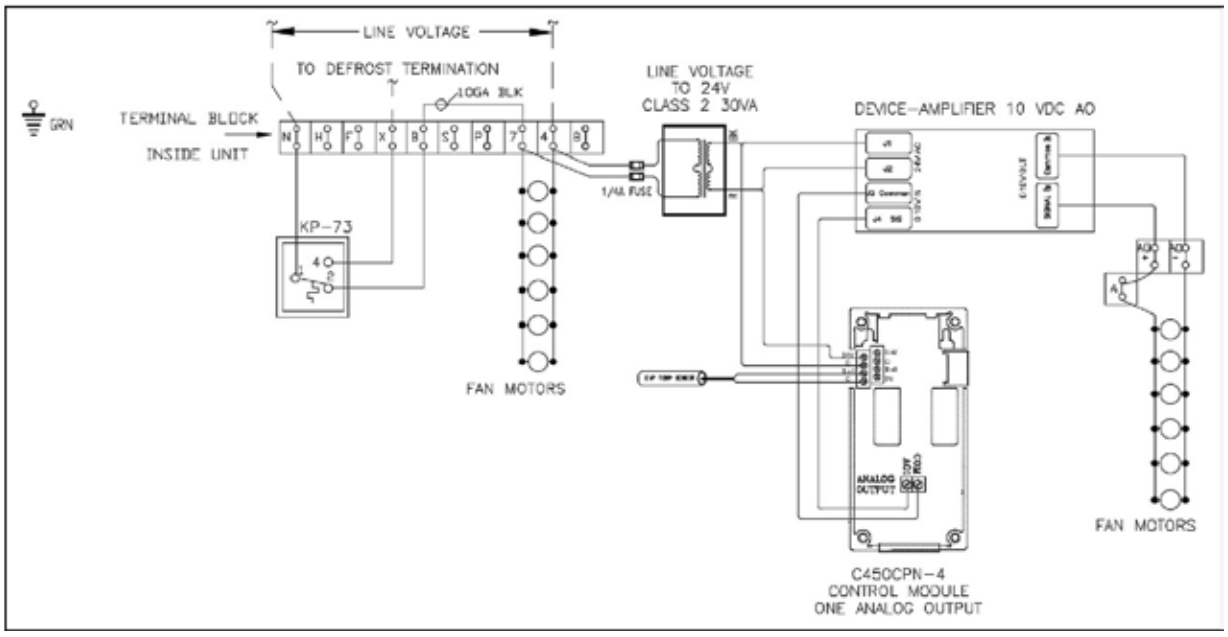
Output at Endpoint (OEP) – value (OEP) is the signal strength level of the analog output when the input sensor is at the End Point (EP). The OEP is expressed as a percentage (0 to 100%) of the full-scale output. **Output signal strength at endpoint, i.e., Analog signal at endpoint. 100% - 10V**

Fan motor will receive 0V signal at Setpoint (SP) from System 450 controller, the fans will run at full speed. At Endpoint (EP), fans will receive 10V signal, the fans will run at minimum speed. The analog signal varies between setpoint to endpoint proportionally based on the box temperature measured by installed temperature sensor thus varies the fan speed proportionally.

Signal Amplifier is used enhance the analog signal strength from System 450 and then feed the signal to the motor to vary the fan speed. (Signal amplifier needed for KR, GH, GL, and LH evaporator coils only).

Sensor Failure Mode –
System 450 allows the user to select the mode of operation for control system outputs in the event of a sensor (or sensor wiring) failure of the sensor that the outputs reference. Set **SNF as OFF.** Analog output SNF OFF = Output Signal Strength at Set point (OSP). i.e., Analog output will fail at OSP setpoint. Sending 0V signal to motor.

FIGURE 13: WIRING DRAWING OF EVAPORATOR WITH SYSTEM 450 AND SIGNAL AMPLIFIER.



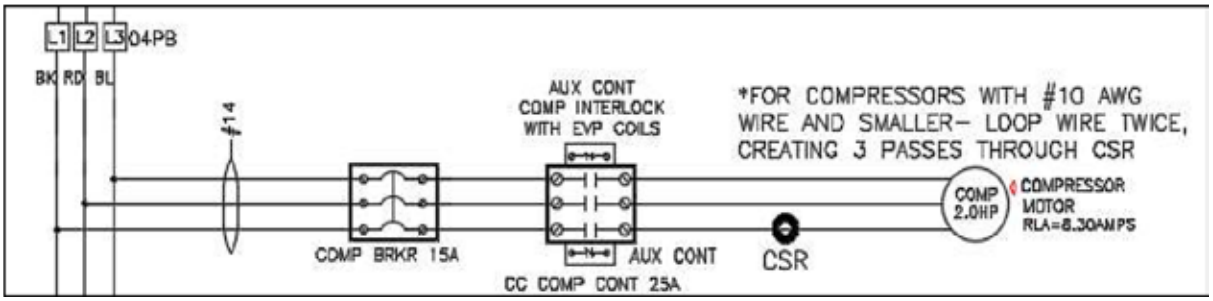
9.6 *INTERLOCKING SINGLE COMPRESSOR UNIT WITH KRACK COIL*

When a single compressor unit is utilized with a Krack evaporator, the evaporator fan should run at full speed whenever the compressor is running (i.e., when using evaporator with dual speed motor fans), and variable speed motor fans the fan speed should not modulate when the compressor is running. Fan speed can modulate only when compressor is turned off due to system operation.

When Krack evaporator coils are used with single compressor units from Hussmann (HE-Series, H-Series, and C-Series), there is a provision given to interlock the compressor with evaporator fans.

Single compressor units use a contactor for compressor operation, a NC Aux contact attached to the main contactor and will be used to interlock.

FIGURE 14 – SETUP IN SINGLE COMPRESSOR UNIT - (COMPRESSOR INTERLOCK)



Aux contact in Single compressor unit wired to terminal pins.

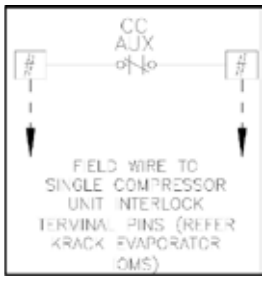
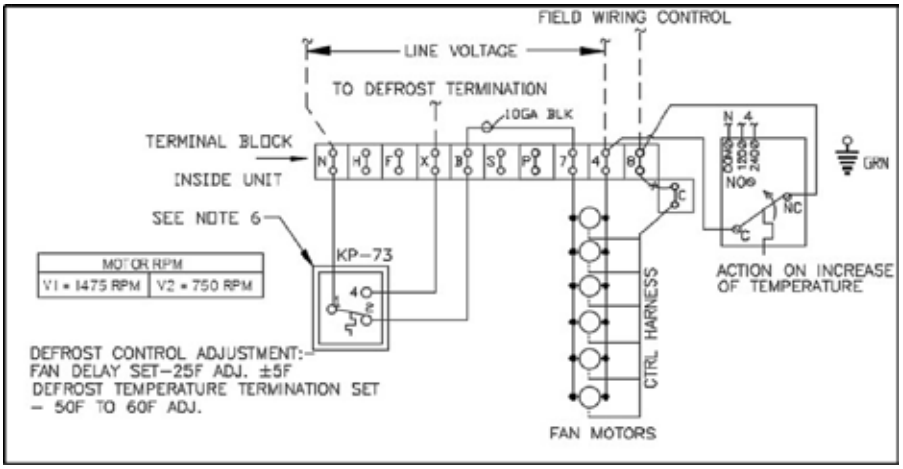


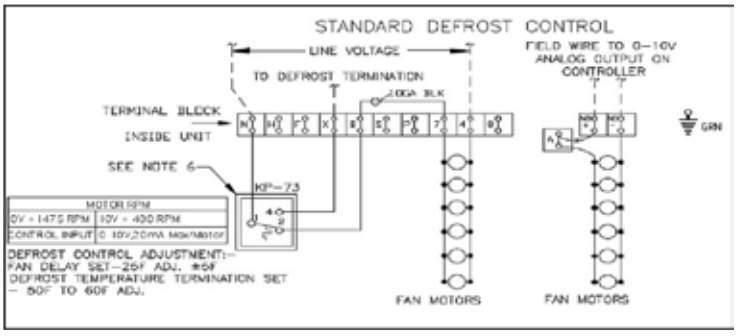
FIGURE 15: DUAL SPEED MOTOR EVAPORATER COILS – (MOTORS WITH CONTROL HARNESS)



Aux contact in Single compressor unit wired to terminal pin 8 and C.

In the case of a dual speed motor coil with control harness, the jumper between terminal 8 and C should be removed and then the aux contact from single compressor unit wired in series. Whenever the compressor contactor is energized, the Aux contact energizes, and NC contacts changes state to NO, there by opening the control harness circuit. So, whenever compressor is on, fans will never go to low speed mode, even getting signal from the room thermostat or filed controller.

FIGURE 16: VARIABLE SPEED MOTOR EVAPORATER COILS



In the case of variable speed motor coils, the jumper between the terminal A0+ and A should be removed and then the aux contact from the single compressor unit be wired in series. Whenever the compressor contactor is energized, the aux contact energizes, and NC contacts changes state to NO, there by opening the analog 10V signal circuit. Whenever the controller sends the 10V signal, it goes through the aux contact, and ensuring the compressor is on deactivating the analog signal circuit. When the compressor is ON, the fans will never be able to modulate, though the controller is signaling the fans to modulate.

10 PRE-STARTUP

After installation is complete, a review of the following items should be performed before the system is placed into operation:

Check electrical connections, fan blade set screws, fan motors, guards, and all other fasteners for tightness. Ensure the thermostatic expansion valve bulb is properly located, strapped, and insulated. With the system operating, check the supply voltage. It must be within +/- 10% of the voltage marked on the unit nameplate.

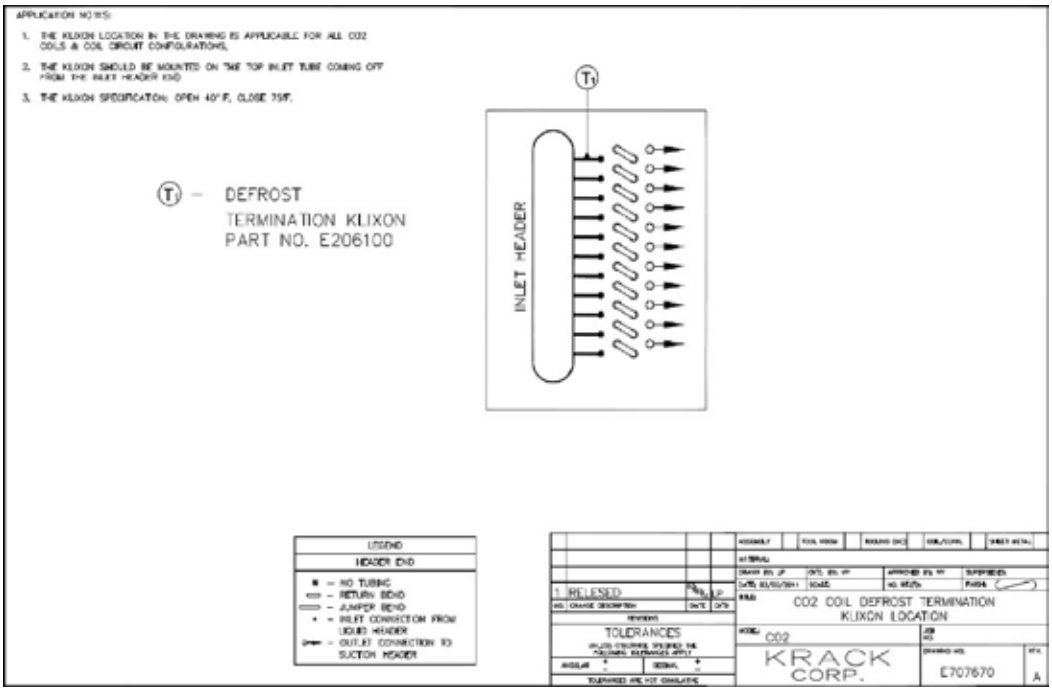
For electric defrost systems, check the defrost timer to see that is set for the correct time of day, and that the starting pins have been installed (normally two per day). The defrost should be scheduled for times when the freezer doors are not likely to be open.

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.

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 an extended period. To prevent this, it is permissible to install a temporary jumper wire between terminals “F” and “B” or “N” and “B” depending on the unit wiring arrangement. Once the box temperature is below +25°F, the jumper wire should be removed.

For units using liquid overfeed R-744 (CO_2), the defrost termination thermostat is to be located on the topmost inlet tube from the inlet header as shown in FIGURE 17.

FIGURE 17: DEFROST TERMINATION THERMOSTAT LOCATION FOR CARBON DIOXIDE (R-744)



11 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 18: REPLACEMENT PARTS

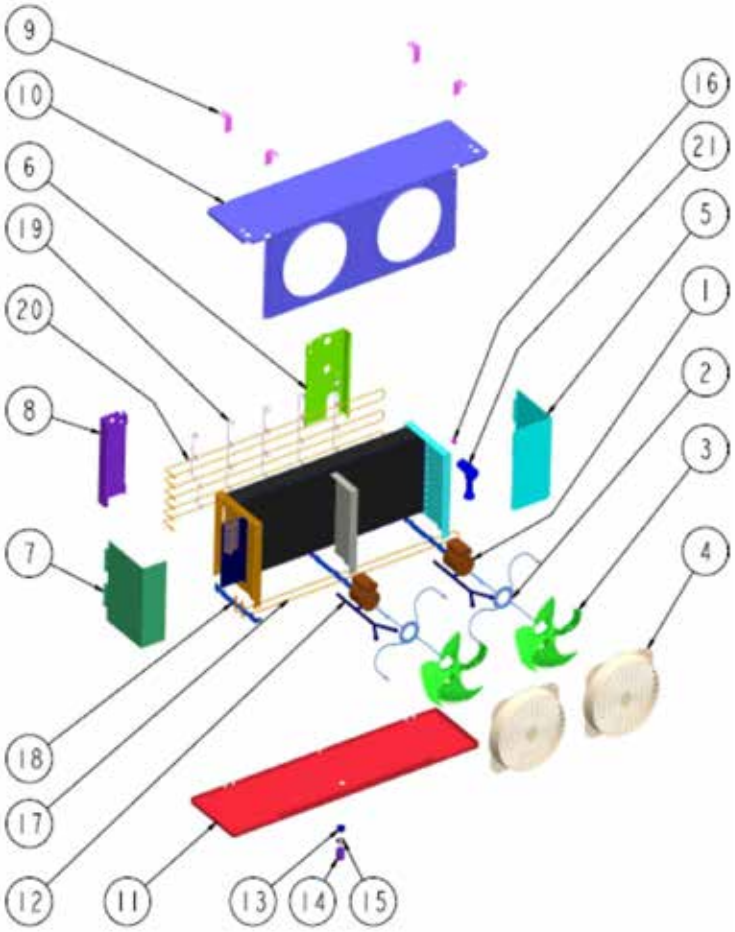


TABLE 10 REPLACEMENT PARTS

Item	General Description	Options Description	Krack Aftermarket Part Number
1	MOTOR	SP 460V	E206446
		PSC 115V	E206447
		PSC 230V	E206448
		EC 115V	E410410001
		EC 208/230V	E410410001
		EC 115/230V DUAL Speed	3047945
		EC 115/230V VAR SPEED	3047948
2	MOTOR MOUNT	MOTOR MOUNT	E316578
3	FAN BLADE	LOW NOISE FAN BLADE	E316580
4	FAN GUARD	PLASTIC	E316655
		WIRE	E316579
5	HEADER COVER FRONT	HEADER COVER FRONT	E108007
6	HEADER COVER BACK	HEADER COVER BACK	E108031
7	RB COVER FRONT	RB COVER FRONT	E108009
8	RB COVER BACK	RB COVER BACK	E108010
9	HANGER	HANGER	E108013
10	FAN/TOP PANEL	1 FAN	E108001
		2 FAN	E108002
		3 FAN	E108003
		4 FAN	E108004
		5 FAN	E108005
		6 FAN	E108006
11	DRAIN PAN	1 FAN	CE107073
		2 FAN	CE107075
		3 FAN	CE107076
		4 FAN	CE107077
		5 FAN	CE107078
		6 FAN	CE107079
12	WIRING HARNESS	1 FAN 115-230V	E206449
		2 FAN 115-230V	E206450
		3 FAN 115-230V	E206451
		4 FAN 115-230V	E206452
		5 FAN 115-230V	E206453
		6 FAN 115-230V	E206454
		1 FAN 460V	E206518
		2 FAN 460V	E206519
		3 FAN 460V	E206520
		4 FAN 460V	E206521
		5 FAN 460V	E206522
		6 FAN 460V	E206523
	DUAL Speed HARNESS	HARNESS-2SP 1 FAN	3105724
		HARNESS-2SP 2 FAN	3105725
		HARNESS-2SP 3 FAN	3105726
		HARNESS-2SP 4 FAN	3105727
		HARNESS-2SP 5 FAN	3105728
		HARNESS-2SP 6 FAN	3105729
	VARIABLE SPEED HARNESS	HARNESS-VS 1 FAN	3086202

		HARNESS-VS 2 FAN	3086203
		HARNESS-VS 3 FAN	3086204
		HARNESS-VS 4 FAN	3086205
		HARNESS-VS 5 FAN	3086206
		HARNESS-VS 6 FAN	3086207
13	ALUMINUM DRAIN FITTING		E206462
14	ALUMINUM CONDUIT COUPLING		E206463
15	DRAIN FITTING GASKET		E206464
16	THERMOSTATS AND FAN SPEED CONTROLS	DEFROST TERM (14T32)	E206100
		HEATER SAFETY (14T21)	109560
		FAN DELAY (14T31)	E201818
		KP-73	E205004
		SYSTEM 450 CONTROLLER	3059162
		AMPLIFIER 10 VDC AO	3122367
		A99BC-300 TEMP SENSOR	E205564
		ROOM THERMOSTAT	E206766
17	PAN HEATERS	1 FAN 115V	E201883
		1 FAN 230V	E201884
		2 FAN 115V	E201889
		2 FAN 230V	E201890
		3 FAN 115V	E201892
		3 FAN 230V	E201893
		4 FAN 115V	E201895
		4 FAN 230V	E201896
		5 FAN 115V	E201898
		5 FAN 230V	E201899
		6 FAN 115V	E201901
		6 FAN 230V	E201902
18	DRAIN PAN HEATER BRACKET		E107025
19	FACE HEATER SUPPORT CLIP		E102007
20	COIL HEATERS	230V 1 FAN	E206455
		230V 2 FAN	E206457
		230V 3 FAN	E206458
		230V 4 FAN	E206459
		230V 5 FAN	E206460
		230V 6 FAN	E206461
21	EXPANSION VALVE	SBFVE-A-ZP40	E205324
		SBFSE-A-ZP	E205360
		EGVE-2-ZP40	E205735
		EGVE-1 1/2-ZP40	E205792
		EGVE-1-ZP40	E205821
		EGVE-3/4-ZP40	E205838
		EGVE-1/2-ZP40	E205854
		SBFSE-B-ZP	E205920
		SBFVE-B-ZP40	E205927
		SBFVE-AA-ZP40	E205973
		EGVE-3-ZP40	E206058
		EGSE-2-ZP	E206165
		SBFSE-AA-ZP	E206169
		EGSE-1-ZP	E206178
		EGSE-1/2-ZP	E206212

		EGSE-1/4-ZP	E206235
		EGSE-1½-ZP	E206317
		SBFVE-C-ZP40	E206600
		SBFSE-C-ZP	E311124
N/A	LONG THROW ADAPTERS	GALVANIZED	E202347
	AUX CONTACT FOR SINGLE COMP	C320KG2 AUX CONT 1 NC 25-75A	E209975002
N/A	INTERLOCK	C320DPG01 AUX CONT 1 NC 90A	E209976002
N/A	ELECTRONIC EXPANSION VALVE	SPW-0	3090855
		SPW-1	3090859
		SPW-2	3090860
		SPW-3	3090861
		SPW-4	3090862
		SPW-5	3114314
		SPW-6	3114315
		AKV-10P0	3092970
		AKV-10P1	3092971
		AKV-10P2	3092972
		AKV-10P3	3092973
		AKV-10P4	3092974
		AKV-10P5	3092975
		AKV-10P6	3092976
		SER-AA-HP	3197668
		SER-A-HP	3197669
		SER-B-HP	3213518

Use your QR reader to
reference current document
version on www.krack.com.

Krack, a Hussmann Corporation brand
1049 Lily Cache Lane, Suite A
Bolingbrook, Illinois 60440
Ph: 630.629.7500

www.krack.com