BULLETIN
EDEI-812

SEPTEMBER, 1999
NEW

KRAMER

ELECTRIC DEFROST EVAPORATORS

LPE - LVE - MSE - CSE - HSE - CED - KED

INSTALLATION, START-UP AND MAINTENANCE INSTRUCTIONS

14230 Lochridge Blvd - Covington, Georgia 30014
(770) 778 - 5800 - Fax (770) 788 - 5820

SAFETY RECOMMENDATIONS
Disconnect all power sources before servicing.

When uncrating avoid contact with staples, nails, splinters and sharp edges. The sheet metal and coil have sharp edges. Care must be taken when uncrating to prevent damage to the equipment and prevent injury to the people working with it. Take time and care to be safe.

This equipment should be installed, started-up, and operated by certified and experienced commercial refrigeration technicians. System piping must be in accordance with good refrigeration practice. Field wiring must conform to the equipment specplate requirements, wiring diagram, and local and national electrical codes. Use only copper conductors.

Read and study this complete installation and service manual before starting to work.

WORK SAFELY!

RECEIVING
A responsible person should inspect the crating or carton for possible shipping damage. Check each shipment with the bill of lading to make sure all items are received in good condition. Report any shortages or damages to the delivering carrier. Damaged material is the responsibility of the carrier and a freight claim should be filed with them.
DO NOT return damaged equipment to the manufacturer without prior approval.

APPLICATION OF ELECTRIC DEFROST EVAPORATORS
The evaporators covered in this bulletin are designed to operate at room temperatures below 35°F. LPE, CSE and MSE models are recommended for room temperatures to -20°F, model CED and KED to -30°F, and model HSE to -10°F. Model CED and KED are available with D type, direct drive fans as standard or an optional PP type, high output cast aluminum pressure propeller fan blade.

Model LVE, with Low Air Velocity, is recommended for 28°F to 34°F rooms. The low velocity air flow makes this unit ideal for meat holding rooms. Meat will hold longer and look better at 28 to 30°F than it will at higher temperatures. Meat at this temperature is not frozen hard but it is firm, and therefore much easier to handle, saw and cut.

System TD should be limited to 16° TD MAXIMUM on medium temperature systems and 11° TD MAXIMUM on low temperature systems. Most low temperature systems should be selected to operate at 8° to 10° TD. The greater the TD, the faster frost will accumulate on the coil requiring more frequent defrosts. A wider TD also means reduced system capacity for a given room temperature and therefore, more compressor run time.

HANDLING
Move evaporators with care. Use gloves to protect your hands. The sheet metal edges can be sharp. Contact with fins should be avoided. Fins should be protected while the unit is being handled. The fins are easily bent if hit. Damaged fins must be straightened. Use care when lifting not to damage the sheet metal or copper connections. Do not lift against the center of the drain pan.

WORK SAFELY!

PLEASE - Record the model and serial numbers now and keep for future reference!

Evaporator Model No. _____ Serial No. _____

PIPING

All piping must be clean and dry. Keep it capped to prevent dirt and moisture from entering. Do not leave piping open to the atmosphere overnight. When brazing, keep dry nitrogen flowing through the lines to prevent internal oxide and scale formation. Use a high temperature silver brazing alloy. An off cycle pumpdown, with the room thermostat controlling the liquid solenoid, is recommended, and is mandatory to maintain compressor warranty on electric defrost systems.

Suction lines should slope a MINIMUM of 1/4 inch per foot in the direction of flow to insure oil return. "P" traps must be used at the bottom of every suction riser and at 15 foot intervals. To control compressor superheat and return gas temperature it may be necessary to insulate the suction line, especially if long line runs are subjected to high ambient temperatures. Liquid-suction line heat exchangers are often used with electric defrost systems and are highly recommended to obtain optimum performance.

See page 6 and 7 for line sizing recommendations. Take caution not to undersize lines. The liquid solenoid should be installed near the expansion valve inlet, inside the refrigerated space or in the evaporator end housing. Secure the liquid line at the evaporator. When the liquid solenoid opens and closes the liquid line experiences a "SHOCK" and tends to move forcefully. Without proper support, the joints at the solenoid, expansion valve, distributor, and distributor leads will fracture. Line supports are inexpensive compared to refrigerant loss and downtime. All piping must be supported to prevent vibration and breaking. Tube clamps should have a cushion surface for protecting the tubing.

Expansion valves should be selected from the valve manufacturers literature. If liquid subcooling is present, be sure to use the correction factor to determine the correct size valve. Avoid oversizing the valve which can cause hunting and floodback. On KS Electric Defrost Systems, always use the expansion valves supplied with each evaporator. Read and retain the expansion valve instructions. The expansion valve bulb must be clamped securely on the side of a horizontal run of suction line, before any traps, preferably at the 4 o'clock or 8 o'clock position. The bulb must be in complete contact with clean copper tube and must not bridge any uneven surface. Use the bulb clamp supplied with the expansion valve. Take care not to distort or crush the expansion valve bulb when tightening the clamp. See page 9 for expansion valve adjustment recommendations.

The drain line should run directly from each evaporator and exit the freezer as quickly as possible. It should be pitched a MINIMUM of 4 inches per foot. The drain line must always be as large as the drain pan connection or larger. Do not reduce the drain line size. Some evaporators defrost quickly and therefore a large volume of condensate must be drained rapidly. There should be no traps or sharp changes of direction within the freezer. Drain lines should have a trap where the ambient is always above 33°F or be protected from freezing by continuous heating. The entire drain connection, drain line and trap may be heated and insulated. Traps will prevent warm, moist air from being drawn up through the drain line, which will form ice in the drain pan or on the bottom of the coil. Drain lines should run to an open drain. They should never be directly connected to a sewer. Never let the condensate run onto walkways or floors creating a safety hazard. Inspect the drain pan and connection periodically to be sure it is clean and clear for free draining.

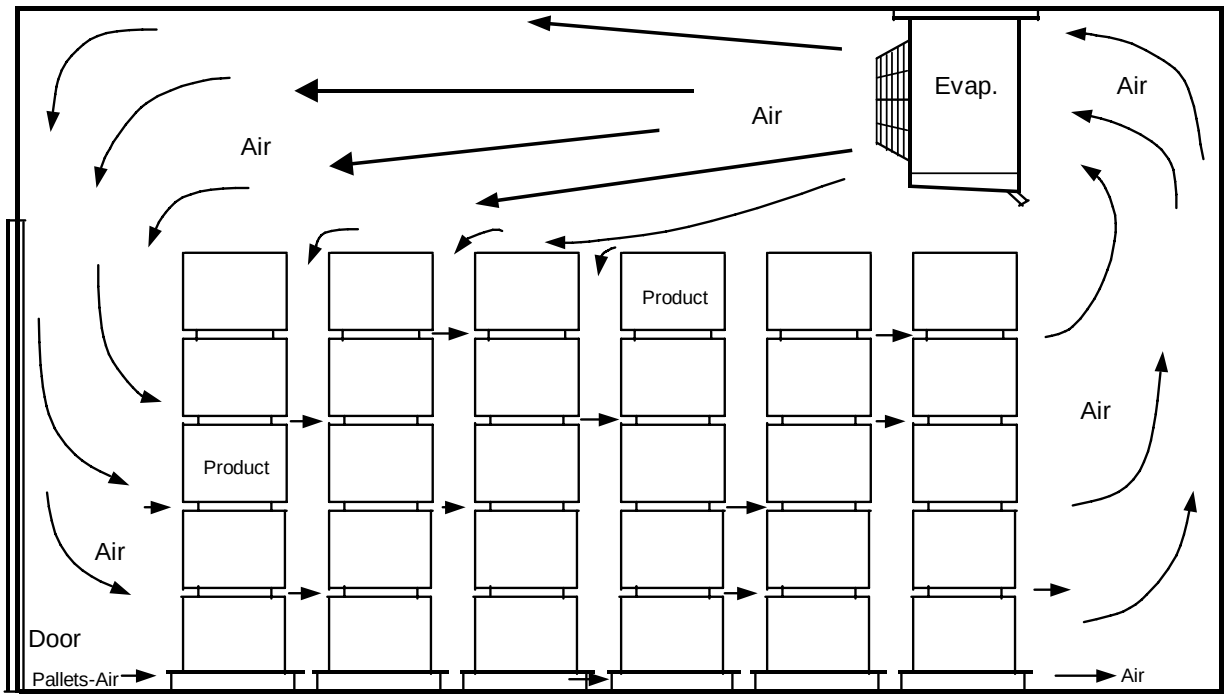
LOCATING WALK-IN EVAPORATORS

Locate evaporators so the air pattern will cover the room and air circulates through the product. Do not restrict the inlet or outlet air stream. ***Do not place evaporators above or close to doors.*** When possible, direct the air stream toward doors or down an aisle-way. Always leave open space for good air circulation and servicing the unit. Leave space between cartons of product for the fastest temperature reduction and freezing. Baffles or auxiliary fans may be required to direct air to specific areas of a room. The manner in which the product is stacked will influence pull-down time and air circulation. See below for a recommended evaporator location and air circulation pattern. This method provides fast product cooling and freezing. The larger the mass of product, the longer it takes to extract the heat from the center of that mass. Divide the mass by separating the product with spacers as shown or leave air space between cartons so the cold air can wash the heat away quicker. Do not store product against a wall or directly on the floor. Always leave 1 or more inches of air space along side walls and each end wall space should be equivalent to the evaporator height or more. Do not locate evaporators where there will be ceiling beams, truss, or other obstructions that will interfere with the discharge air stream. Do not stack product in front of the evaporator higher than 12 inches below the bottom of the drain pan.

MOUNTING EVAPORATORS

The ceiling structure must have adequate strength to support the refrigeration equipment plus all other loads. Weight of equipment, piping, controls, accessories, refrigerant and people must always be calculated and considered. Stainless steel fasteners are recommended for mounting evaporators. Use a ***minimum*** 5/16 inch fastener with LPE, HSE and LVE; 3/8 inch fasteners with MSE and CSE; and 1/2 inch fasteners with CED and KED evaporators. Use large flat washers next to the hanger bars and if evaporators are suspended from threaded rods they must also have a nut and washer above the hanger bar to securely hold the unit to the rod. Tighten all fasteners to prevent coming loose during operation.

TYPICAL EVAPORATOR LOCATION IN A FREEZER

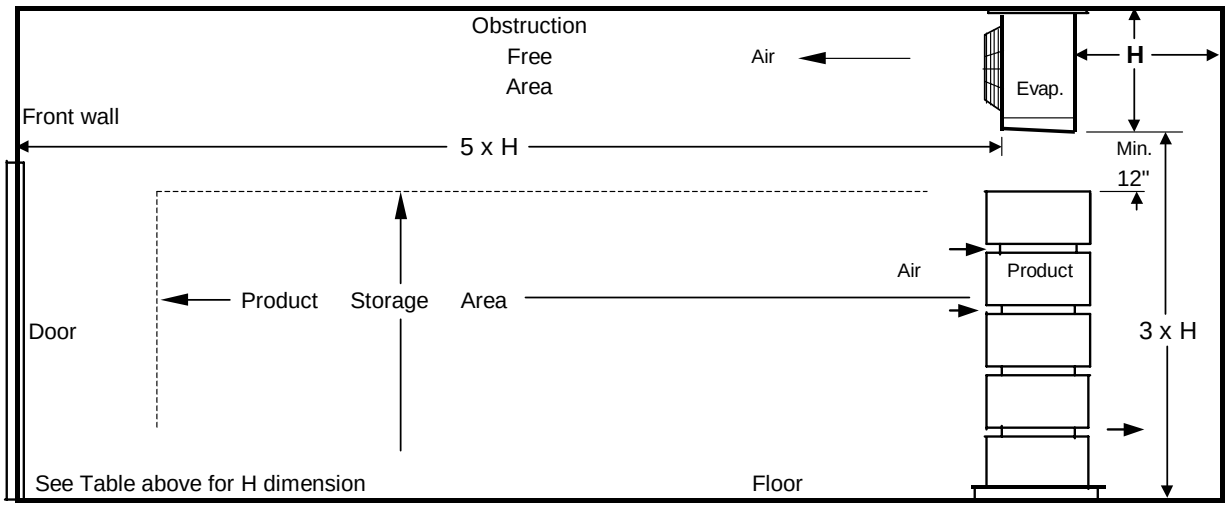


LOCATING WALK-IN EVAPORATORS

MINIMUM DIMENSION FOR GOOD AIR CIRCULATION AND EVAPORATOR PERFORMANCE

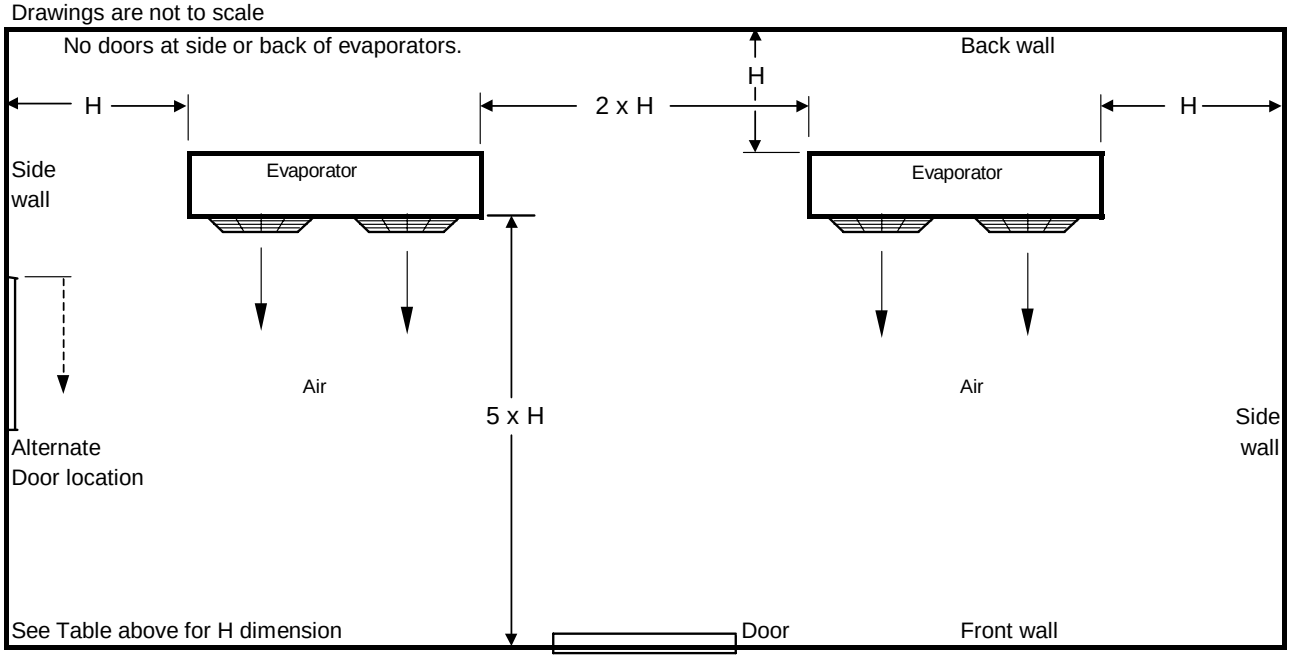
EVAPORATOR HEIGHT (Key Dim.) ***H***	**Unit to Back Wall *** ***1 x H***	**Unit to Side Wall** ***1 x H***	**Unit to Unit** ***2 x H***	**Unit to Front Wall** ***5 x H***	**Unit to Floor** ***3 x H***
12"	12"	12"	24"	60"	60" ‡
15"	15"	15"	30"	75"	60" ‡
18"	18"	18"	36"	90"	60" ‡
24"	24"	24"	48"	120"	72"
30"	30"	30"	60"	150"	90"
36"	36"	36"	72"	180"	108"
42"	42"	42"	84"	210"	126"
48"	48"	48"	96"	240"	144"

* Critical Minimum Dimension H = Height of Evaporator ‡ Minimum walk-in height of 7'-0"



SIDE VIEW

Drawings are not to scale



TOP VIEW

ELECTRIC DEFROST EVAPORATOR

RECOMMENDED LINE SIZE • R-22

EVAPORATOR	+25°F SUCTION			+15°F SUCTION			+5°F SUCTION			-10°F SUCTION			-25°F SUCTION			LIQUID LINE			EVAPORATOR
BTUH	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	BTUH
3000	3/8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	1/2	1/2	5/8	1/2	5/8	5/8	3/8	3/8	3/8	3000
4000	1/2	1/2	5/8	1/2	1/2	5/8	1/2	1/2	5/8	5/8	5/8	5/8	5/8	5/8	7/8	3/8	3/8	3/8	4000
6000	1/2	1/2	5/8	1/2	5/8	5/8	5/8	5/8	5/8	5/8	5/8	7/8	5/8	7/8	7/8	3/8	3/8	3/8	6000
9000	5/8	5/8	5/8	5/8	5/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	3/8	3/8	3/8	9000
12000	5/8	7/8	7/8	5/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	3/8	3/8	3/8	12000
15000	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	3/8	3/8	3/8	15000
18000	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	3/8	3/8	1/2	18000
24000	7/8	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	3/8	1/2	1/2	24000
30000	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	3/8	1/2	1/2	30000
36000	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1/2	1/2	1/2	36000
42000	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1/2	1/2	1/2	42000
48000	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1/2	1/2	5/8	48000
60000	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	2 1/8	1/2	1/2	5/8	60000
75000	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	1/2	5/8	5/8	75000
90000	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	5/8	5/8	7/8	90000
120000	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	5/8	5/8	7/8	120000
150000	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	7/8	7/8	7/8	150000
180000	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	7/8	7/8	7/8	180000
210000	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	7/8	7/8	7/8	210000
240000	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	7/8	7/8	1 1/8	240000
300000	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	3 1/8	2 5/8	3 1/8	3 1/8	7/8	1 1/8	1 1/8	300000

All Line Sizes are for O.D. Type L, ACR, or RS copper tube. All Lengths are "Equivalent Feet."

Shading indicates Maximum Suction Riser Size. Diameter of riser must not be larger than horizontal run.

All line sizes selected for 2°F equivalent pressure loss maximum.

Consider double suction risers if capacity control is used.

Suction traps must be used for proper oil return.

Liquid line is from receiver to expansion valve.

Component																
Long radius L, Straight thru T	1	2	2	2	3	3	4	5	6							
90° turn T	3	3	4	5	7	8	10	12	15							
Smooth (1 size) reducer	2	2	3	3	4	5	6	7	8	10'	15'	20'	25'	30'	40'	
Trap	4	5	6	7	8	10	13	16	19	2°	3°	4°	4°	5°	7°	R-22
Ball valve (full flow)	1	1	1	2	2	2	3	3	4	2°	2°	3°	3°	4°	5°	R-404A, R-507

ELECTRIC DEFROST EVAPORATOR

RECOMMENDED LINE SIZE • R-404A, R-507

EVAPORATOR	+20°F SUCTION			+10°F SUCTION			-10°F SUCTION			-25°F SUCTION			-40°F SUCTION			LIQUID LINE			EVAPORATOR
BTUH	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	30'	60'	100'	BTUH
3000	3/8	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	1/2	5/8	5/8	1/2	5/8	5/8	3/8	3/8	3/8	3000
4000	1/2	1/2	5/8	1/2	1/2	5/8	1/2	5/8	5/8	1/2	5/8	7/8	1/2	5/8	7/8	3/8	3/8	3/8	4000
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9000	5/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	3/8	3/8	3/8	9000
12000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	3/8	3/8	3/8	12000
15000	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	3/8	3/8	1/2	15000
18000	7/8	7/8	1 1/8	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	3/8	3/8	1/2	18000
24000	7/8	7/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	3/8	1/2	1/2	24000
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42000	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1/2	1/2	5/8	42000
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60000	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1/2	5/8	5/8	60000
75000	1 1/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	5/8	5/8	5/8	75000
90000	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	5/8	5/8	7/8	90000
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300000	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	2 5/8	2 5/8	3 1/8	2 5/8	3 1/8	3 5/8	1 1/8	1 1/8	1 3/8	300000

All Line Sizes are for O.D. Type L, ACR, or RS copper tube. All Lengths are "Equivalent Feet."

Shading indicates Maximum Suction Riser Size. Diameter of riser must not be larger than horizontal run.

All lines selected for 2°F equivalent pressure loss maximum.

Consider double suction risers if capacity control is used.

See page 6 for "equivalent feet" of valves and fittings.

Suction traps must be used for proper oil return.

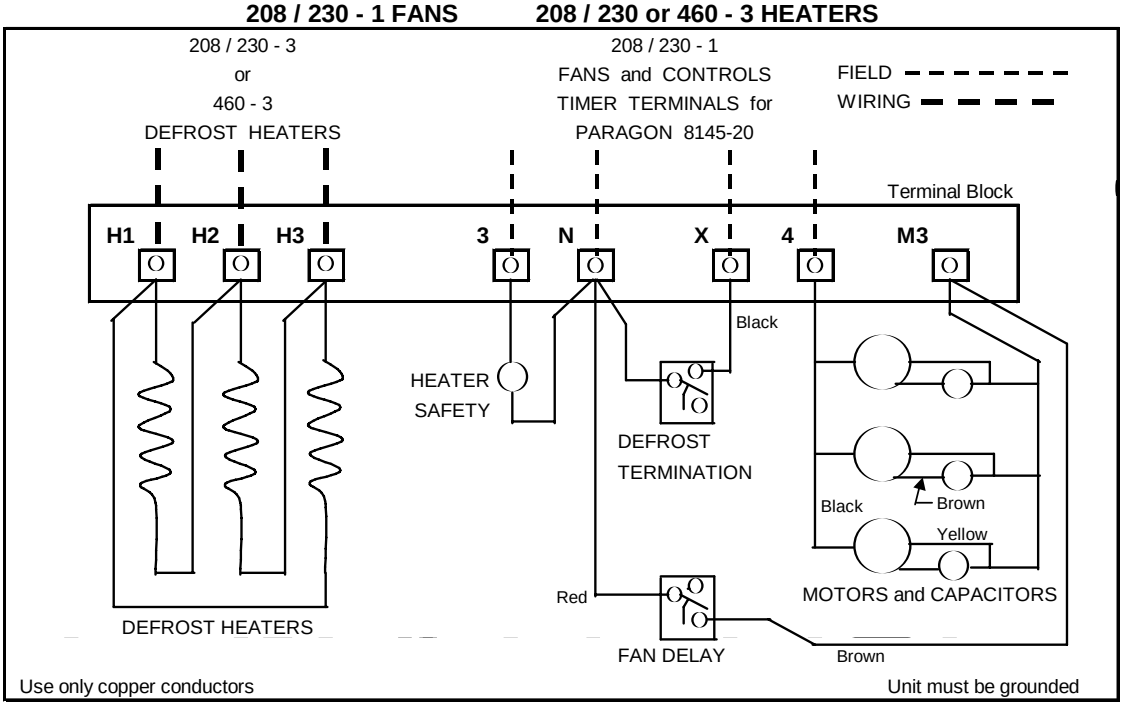
Liquid line is from receiver to expansion valve.

ELECTRICAL

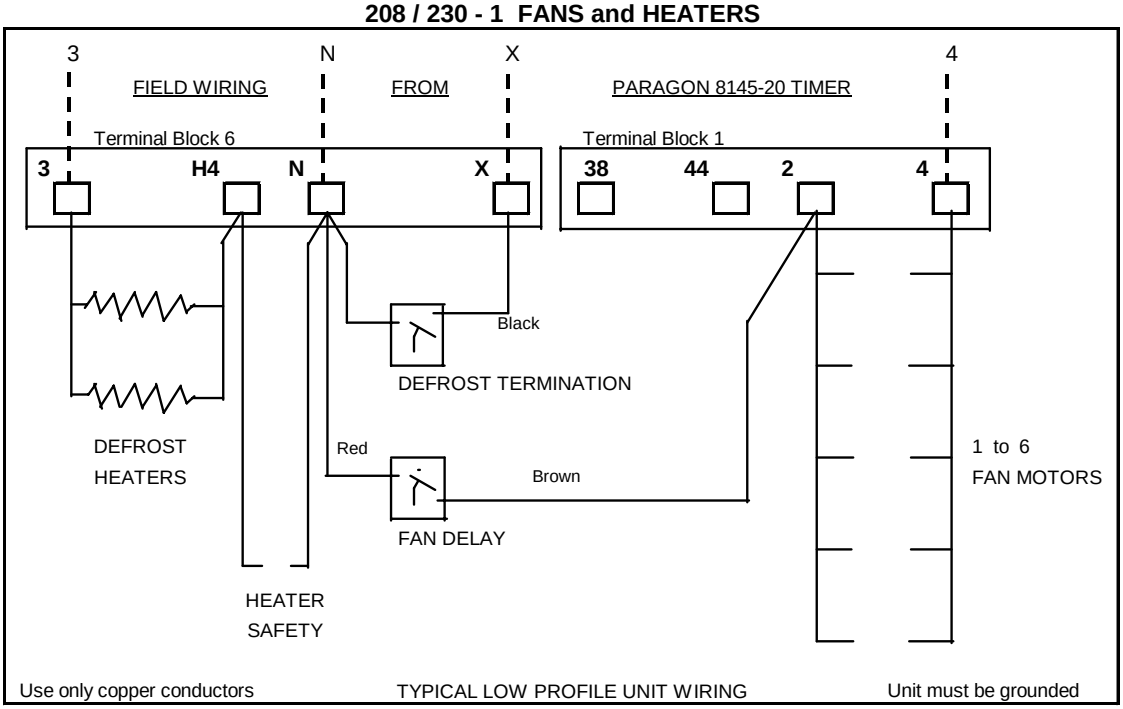
All wiring must be in compliance with national and local codes. Use copper conductors of the proper size to handle the connected load. The specplate on the evaporator is marked with the electrical ratings. Consult the wiring diagram in the electrical end. Determine if the evaporator fans require a separate power source or if powered by the control circuit. Field wiring should enter through electrical bushings and conduit must be sealed internally to prevent outside air being drawn in. Check wiring connections to be sure they did not vibrate loose in shipment. Spin each fan blade to be sure it turns freely.

TYPICAL ELECTRIC DEFROST EVAPORATOR WIRING

208 / 230 - 1 FANS 208 / 230 or 460 - 3 HEATERS



208 / 230 - 1 FANS and HEATERS



START-UP and PULL DOWN

A thorough leak test and evacuation must precede charging and start-up. Refer to the condensing unit or system installation instructions. Check the compressor oil level before and during start-up. Check fan blades for correct rotation. The control circuit should be energized at least 12 hours and preferably 24 hours before charging and start-up to open the liquid line solenoid and turn on the crankcase heater. This will assist with a good, deep evacuation and provide added compressor protection during charging and start-up.

Do not leave equipment unattended during start-up. Evaporator fan motors may require a jumper until the room has cooled sufficiently to keep the fans from cycling. High moisture levels in new rooms can cause rapid frost build up on the evaporator coil. It may be necessary to manually initiate a defrost. Do not allow the coil to become completely blocked with frost.

EXPANSION VALVE ADJUSTMENT - EVAPORATOR SUPERHEAT

Expansion valves will usually need adjustment. Evaporator superheat should be approximately 6° to 12°F. Low temperature evaporators will operate most efficiently with 6° to 8° superheat at design room temperature. Obtain evaporator superheat by accurately measuring the suction line temperature at the expansion valve bulb. Obtain pressure at the Schrader fitting on the suction connection. Convert the pressure to temperature using a pressure-temperature chart. Subtract the converted temperature from the measured temperature to obtain superheat. For close coupled systems with short line runs it may be necessary to slightly increase superheat at the evaporator to insure the minimum desirable (25°F) superheat at the compressor.

The access panels on the evaporator must always be in place when the evaporator is operating. Do not leave the access panels off after valve adjustment or service.

DEFROST TIMER ADJUSTMENT

Usually, 2 to 4 defrost per day will be satisfactory. In extreme cases 6 defrost per day may be necessary. With a medium frost load, air circulation is still good and coils defrost best. Defrosting with a very light frost load can cause steaming. Allowing a coil to become heavily frosted can reduce air circulation and reduces the system capacity. After the room has pulled down to temperature and the evaporator has gone through 6 or 8 defrost, it should be thoroughly checked after a defrost to make sure the coil and drain pan are clear of all frost and ice. Manually remove any ice accumulations. Fan blades and guards should also be cleared of frost or ice. Defrost termination control adjustment may be necessary. The timer fail safe should be set about 6 to 10 minutes beyond normal termination time. The usual timer fail-safe setting for electric defrost evaporators is 30 to 40 minutes. For optimum system performance and efficiency, set the timer pins to initiate a defrost when the coil has a medium frost load.

EVAPORATOR MAINTENANCE

Disconnect electrical power to the evaporator when inspecting or cleaning. Evaporators should be checked occasionally and cleaned of all dirt or grease accumulation. Fan blades and guards may require more frequent cleaning. DO NOT use ammonia or other cleaning chemicals that are corrosive to copper or aluminum. The drain pan should be lowered and thoroughly cleaned to prevent any drain restriction. The drain connection must be open and clean. Coils must be power washed if they become dirty. We recommend using the System Operation Check List on page 10. Using often can give indication of a problem before it becomes a major issue. The Check List can also assure the owners that their equipment is in good condition and is being maintained properly. The Check List should be retained as a permanent service record document for each system.

REPLACEMENT PARTS

To order replacement parts always include the evaporator model number, serial number, and a complete description of the part. Provide component model numbers, markings, size, function, and state the quantity you are ordering. Providing complete information will insure prompt handling of your order. See page 2 for unit model number and serial number information. See page 11 and 12 for replacement part numbers.

SYSTEM OPERATION CHECK LIST

CUSTOMER _____

ROOM NAME_____ ROOM TEMPERATURE_____°F

Condensing Unit Model No._____ Serial No._____

Evaporator Model No._____ Serial No._____

Date Installed_____ Date Today_____ Ambient Temp._____°F

Evaporator Suction Temp._____°F

Evaporator Suction Pressure_____PSI --- Convert to _____°F

Evaporator Superheat_____° Liquid Temp. entering X-valve _____ °F

Compressor Suction Temp._____°F

Compressor Suction Pressure_____PSI --- Convert to _____°F

Compressor Superheat_____° Condenser Coil Clean _____

Compressor Discharge Pressure_____PSI Sight Glass Clear and Dry_____

Compressor Discharge Line Temp._____°F Liquid Temp. leaving C/U_____°F

Compressor Oil Level_____Glass Receiver Pressure_____PSI

Evaporator Frost Load – Light ☐ Medium ☐ Heavy ☐ _____

Time since last defrost_____hours Timer set: ____ defrost per day, _____ minute Fail Safe

DEFROST – Check Heater Amps _____ - _____ - _____ Specplate Heater Amps_____

Total Defrost Time_____minutes. Fan Delay time_____minutes. Is Coil Clean_____

Defrost Note _____

Room temperature 10 minutes after defrost termination _____°F; 20 minutes _____°F

Room product load and air circulation _____

Compressor oil level 15-30 minutes after defrost_____glass.

SYSTEM ELECTRICAL

Design Voltage_____ Test Voltage (1-2)_____ (1-3)_____ (2-3)_____

Component Amps:	Specplate Amps	(L1)	Test Amps	(L3)
Compressor –	_____	_____	_____	_____
Condenser –	_____	_____	_____	_____
Evaporator –	_____	_____	_____	_____

SERVICE NOTES - _____

_____

REPLACEMENT PARTS

GENERAL DESCRIPTION	SIZE - USE- PART NUMBER			
	LPE	**LVE - HSE**	**MSE - CSE**	**CED - KED**
230-1-60 Shaded Pole Motor 460-1-60 Shaded Pole Motor 230-1-60 Shaded Pole Motor	102540004 102540005	9 watt 103104005 16 watt 103104008		
230-1-60 PSC Motor 460-1-60 PSC Motor	108178002	16 watt 107933002	1/8 HP 115248002 1/8 HP 115248003	1/2 HP 049-158 1/2 HP 049-159
230-1-60 PSC Motor 460-1-60 PSC Motor			1/3 HP 205051004 1/3 HP 205051006	3/4 HP 113139000
230/460-3-60 Motor 230/460-3-60 Motor				1/2 HP 049-171 3/4 HP 114639000
2 MFD Capacitor 4 MFD Capacitor 7.5 MFD Capacitor	230V. 202163009	230V. 202163009	 All 1/8 HP 202163012 All 1/3 HP 202163008	*CAPACITORS INCL WITH CED-KED PSC MOTORS*
Motor Mount Motor Mount	210620000	103096003	14" 214837000 20" 210225000	*BASE MOUNT MOTOR BOLTS ON A RAIL*
Fan Blade Fan Blade	107943000	20° Pitch 1020CCW 31° Pitch 1031CCW	14" 214100000 20" 213456000	24" 213142000 30" 213143000
Fan Guard Fan Guard	Std. 205925002 Plastic 205925001	201006003 (WHITE)	14" 213626001 20" 201006009	24" 213144000 30" 202136007
Defrost Termination (Std.) Fan Delay (Std.) Adjustable DTFD (Optional)	103079010 103079009 204464037	103079010 103079009 204464037	103079010 103079009 204464037	*Adjustable DTFD is standard on CED-KED* 204464037
CED - KED PP Pressure Prop Option				0.5" ESP MAXIMUM *Std. CFM at 0.5" ESP* Max. box temp. +25°F
Fan Blade - Cast Aluminum Fan Blade - Cast Aluminum 230/460-3-60 Motor 1 1/2 HP 230/460-3-60 Motor 3 HP				24" 214127000 30" 214128000 For 24") 115114000 For 30") 048-057
PLEASE NOTE				
KRAMER has been manufacturing the highest Quality commercial refrigeration equipment since 1914.	Motors are 1/20 HP, 1550 RPM. Capacitor not included with PSC motor. Fan blade 12". Wire guards are std. Plastic guards for long air throw optional.	Motors are 1550 RPM. All blades 10", hubless. 9 watt motor uses 20° pitch blade and 16 watt motor uses 31° pitch blade Capacitor not included with PSC motor.	19" height models use 1/8 HP motor with 14" fans and guards. 25" height models use 1/3 HP motor with 20" fans and guards. Capacitor not included with motor.	Capacitor is included with PSC motors used on CED and KED. 1/2 HP motor uses 24" fan and guard. 3/4 HP motor uses 30" fan and guard.

See page 12 for replacement heaters.

NOTE:

HEATER REPLACEMENT GUIDE FOR KRAMER ELECTRIC DEFROST EVAPORATORS

EVAP. SIZE	EVAP. SIZE	COIL HEATER QTY.	COIL HEATER PART NO.	RATINGS V0LTS	RATINGS WATTS	DRAIN PAN HEATER QTY.	DRAIN PAN HEATER PART NO.	RATINGS VOLTS	RATINGS WATTS
LPE - 6	**LPE - 4**								
35-41-46	38	1	206240-06	230	500	1	200172-42	230	500
63-71		1	206240-07	230	800	1	200172-43	230	800
92	70-86	1	206240-08	230	1000	1	200172-44	230	1000
120-138	106	1	206240-09	230	1500	1	200172-45	230	1500
162-184	142	1	206240-10	230	2000	1	200172-46	230	2000
220	182	1	206240-11	230	2500	1	200172-47	230	2500
240-265	214	1	206240-12	230	3000	1	200172-48	230	3000
							(coil heaters)		
CSE - 6	**MSE - 4**	**(_**	**230 volt units**		**_ _)**	**(_**	**460 volt units**		**_ _)**
130-150	105-140	3	206240-022	240	1693	3	206240-021	460	1555
185-270-320	175-230-325	3	206240-004	240	2458	3	206240-020	460	2258
460-520	390-510	3	206240-005	240	3538	3	206240-019	460	3249
CED - 6	**KED - 4**								
450-620	400-550	12	113100	115	800	2	113095	230	725
850-1070	750-950	12	113101	115	1150	2	113096	230	660
1360	1200	26	113102	115	1070	4	113097	115	540
1800	1600	26	113103	115	1400	4	113098	115	700
	LVE								
	65	2	205221020	230	1970				
	105	2	205221021	230	2980				
	140-150	2	200172049	230	2980				
	180-215-275	2	200172024	230	1550				
	(PLUS)	2	200172028	230	2480				
	371	4	200172028	230	2480				
HSE - 6	**HSE -4**								
55-63-71	50-60-66	2	208579-001	230	1037				
79-91-103	74-86-94	2	208579-002	230	1490				
125-143	116-130	2	208579-003	230	1943				
163-219	144-174	2	208579-003	230	1943				

NOTE:

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