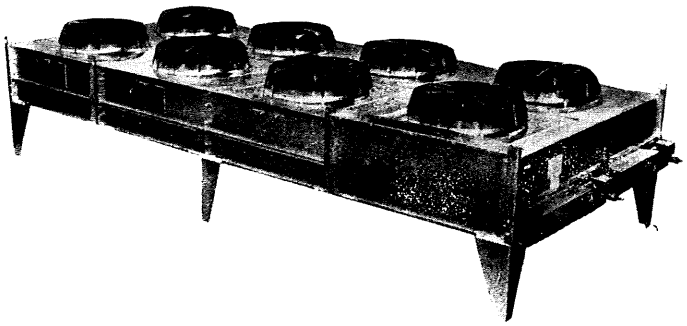
KRACK

Direct Drive Remote Air Cooled Condensers



MODEL KEY

AC V F 3 4 10

- AC — AIR COOLED CONDENSER
- V — AIR DISCHARGE
  - V-VERTICAL UP
  - H- HORIZONTAL
- F — MODULE LETTER CODE
- 3 — NUMBER OF FANS
- 4 — ROWS DEEP
- 10 — FINS/INCH

MODULE LETTER CODE

	HP	RPM	FAN DIA.	SUR-FACE	FACE TUBES
ONE FAN WIDE					
F	1	850	30	3/8	36
G	1	850	30	1/2	30
J	1 1/2	1140	30	3/8	36
Y	1 1/2	1140	30	1/2	30
TWO FANS WIDE					
V	1	850	30	3/8	2 X 36
W	1	850	30	1/2	2 X 30
K	1 1/2	1140	30	3/8	2 X 36
Z	1 1/2	1140	30	1/2	2 X 30

UL LISTED
8, 10 and 12 FINS/INCH
VERTICAL and HORIZONTAL AIR DISCHARGE
LOW AMBIENT FAN CYCLING or FLOODING CONTROLS
10,000 to 2,000,000 BTUH

KRACK

KRACK LIMITED WARRANTY

KRACK CORPORATION MAKES NO EXPRESS OR IMPLIED WARRANTIES AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE.

Krack products, as manufactured by Krack Corporation, hereinafter referred to as the manufacturer, are warranted to be free of defects in material and workmanship under normal use and service for a period of one (1) year after delivery to the original user, but in no case more than (18) months after date of manufacture. The manufacturer's obligation under this warranty shall be limited to repair or replacement of any part or parts returned to the manufacturer within said period, transportation charges prepaid, with instructions to be returned, charges collect, and which in the manufacturer's examination shall disclose to be inherently defective.

This warranty shall not apply to Krack products which shall have been improperly installed or repaired, or altered in any way outside of the manufacturer's factory or been subject to misuse, negligence, or accident. Equipment or component or component parts such as valves, electric motors, electric heater and electric accessories manufactured by others and used as the part of or in connection with Krack products carry only the warranty of the manufacturer thereof.

The motor compressors furnished with Krack-Pak condensing units and Krack compressor packages are subject to the terms of our standard warranties set forth above, except that motor compressor replacements or exchanges shall be made to the nearest compressor manufacturer's authorized Wholesaler (not at Krack's factory) and no freight shall be allowed for transportation in either direction between the user and said wholesaler. The replacement motor compressors shall be identical to the model of the compressor being replaced. Additional charges which may be incurred through the substitution of other than identical replacements are not covered by this warranty.

Said warranty shall be void if equipment has been subjected to negligence, abuse, misuse, low voltage, corrosive chemicals, excessive pressure, accident, outward damage while in transit, or if operated contrary to the manufacturer's or Krack's recommendations, or if the serial number has been altered, defaced or removed, nor shall Krack be liable for damages when unauthorized service is performed, or parts other than genuine Krack parts are used for repairs.

LIMITATION OF LIABILITY

All remedies with respect to any product or part sold by Krack Corporation shall be limited exclusively to the right to replacement or repair F.O.B. Addison, Illinois, as provided. In no event shall Krack Corporation be liable for consequential or special damages of any nature which may arise in connection with such product or part. The term consequential is expressly intended, but not limited to mean those damages that are not immediately foreseeable to Krack Corporation such as damage claims involving labor charges for removal or installation of said product or part, loss of refrigerant, loss of stored product, lost sales, lost orders, lost profits, lost income, either gross or net all allegedly attributable either directly or indirectly to failure or non-performance of Krack equipment.

FOR GENERAL PRECAUTIONS AND SAFETY PROCEDURE, SEE BULLETIN GP-SP.

GENERAL PRECAUTIONS AND SAFETY PROCEDURES FOR REFRIGERATION COILS AND UNIT COOLERS

BULLETIN GP-SP
MAY 1978

1. The use of any refrigerant can be dangerous. Where people or product can be exposed, frequent visual inspections and continuous monitoring should be made and employed for the detection of any defect or malfunction which could cause the escape of refrigerant, thereby creating a potentially hazardous condition, harmful to both people and/or product. Electronic detection devices should be used for sensing and warning of the presence of refrigerants in the atmosphere. In addition temperature monitoring devices should be employed to warn against loss of refrigeration from whatever cause, and/or rise in temperature in refrigerated areas that would be harmful to people, equipment, and/or product stored. Only experienced, qualified personnel should service, operate, or maintain refrigeration equipment.

2. Where there are liquid lines, or lines which might contain liquid refrigerant, it is important that certain precautions be taken to avoid hydraulic shock or hammer, and also hydraulic lock-up. This latter condition will occur whenever the ambient temperature causes a temperature increase in a section full of trapped solid liquid. If this occurs with the coil as part of the trapped section, bulged or ruptured coil header plugs from liquid expansion pressure will result. Hydraulic shock caused by liquid accumulation in hot gas lines or suction lines used for hot gas defrost can also cause coil damage. Traveling at high velocity, the liquid-slug energy may be sufficient to break coil header caps or plugs right off their lines.

   To protect personnel, product, plant and equipment, remove liquid refrigerant from the coil or section to be isolated before hand valves are closed. Pump out lines to remove liquid accumulation which in combination with high flow velocities produces hydraulic shock and hammer. The operation of any refrigerant coil must be such that the pressure/temperature relationship for that particular refrigerant used is always maintained. If the coil is subjected to a pressure greater than the pressure that would correspond to the saturated temperature for the refrigerant used, coil damage could result.

3. If the unit is suspected of having been damaged in transit, immediately notify the carrier and file a claim with that carrier. The refrigeration coil on all units should be pressurized with 150 psi dry nitrogen gas prior to hanging to insure no damage has occurred after the unit left the factory.

4. Prior to connecting refrigeration and drain line piping to the unit, make sure piping is properly designed and supported according to recognized standards. The unit has not been designed to carry the weight of any external piping and valves.

5. Refrigeration coils and unit coolers must not be used with other than the type refrigerant and refrigerant feed indicated on the equipment nameplate. Refrigerant coils and unit coolers must not be used or subjected to pressures higher than working pressure stamped on the equipment nameplate.

6. All refrigerant piping systems must be properly evacuated to remove non-condensables and moisture prior to charging. A vacuum of a 1000 microns is required to effectively remove moisture. In most cases this requires a separate 2-stage vacuum pump that is not part of the refrigeration system. Do not use the refrigeration system compressor(s) to pull a vacuum as damage to the compressor(s) will result.

   Refrigerant piping systems should be evacuated to remove free moisture even if the system will not be started at the time. Leaving a system idle prior to charging and start-up can result in internal corrosive damage to coil tubes and piping. This is especially true for refrigerant R717 systems employing steel piping and coils. A holding charge of R717 (ammonia) is especially to be avoided under these circumstances. Use 100% dry nitrogen instead

7. Before connecting the final power supply, check the electrical characteristics on the unit nameplate to see that it is in agreement with the power supplied. Only qualified electricians should work on the electrical portion of any unit installation.

   Before performing any electrical work, shut the electrical power to the unit off and make sure it is in the "OFF" and locked position. All wiring must be in accordance with governing electrical codes.

8. Motors in cold rooms may draw greater than nameplate amperage due to the denser, heavier air. Electrical line sizes and services must take this into account. For motors requiring external overload protection, measure motor amps after pulldown and select overloads for this amperage compensating also for the variance in ambient temperature difference between motor location and overload location.

9. Solutions used to clean coils or neutralize bacteria growth must not be corrosive to metals, materials, and/or coatings used in the manufacture of this equipment.

10. If units are installed in atmosphere containing other than water vapor moisture and air, said atmosphere must be checked for compatibility with metals, materials, and coating used in manufacturing of this equipment.

INSPECTION

PLEASE CHECK THAT POSITIVE PRESSURE EXISTS IN THIS EQUIPMENT BY DEPRESSING ACCESS VALVE.

This coil was pressurized with approximately 15 psig Dry nitrogen following its evacuation to 500 microns to assure the absence of leaks and non-condensables. Should a leak be noted (absence of holding charge) Call Manufacturer **BEFORE** off loading equipment. Try to determine where the leak exists.

ANY damage or abnormal condition to equipment **MUST** be noted at time of delivery **ON** Bill of Lading. The Manufacturer **MUST ALSO** be contacted. Any late delivery that requires additional crane services should also be noted. **FAILURE TO NOTE ANY IRREGULARITIES AT TIME OF DELIVERY MAY WAIVE FUTURE RESPONSIBILITY BY THE MANUFACTURER OR FREIGHT CARRIER.**

All motor nameplates should be checked to make sure they agree with the available power supply and serial # to packing list.

RIGGING AND MOVING

The exact method of handling and setting air cooled condenser depends on the available equipment, the size of the condenser, its final location and other variables. It is therefore, up to the rigger or mover to determine the specific method of handling each unit. Lifting channels are provided at the four corners. In addition intermediate erection plates are provided when required. They are removable after final condenser placement. Under no circumstances should the coil headers or return bends be used in lifting or moving these units. See Fig. 1 for suggested rigging.

ASSEMBLY OF UNITS

Condensers are generally shipped completely assembled except the legs which are shipped loose. The mounting legs are furnished with the necessary bolts, nuts, and washers for field assembly . Condenser and mounting dimensions are found in Table 1 and Fig. 2, nevertheless use only certified drawings for construction dimensions.

INSTALLATION

The condenser is primarily designated for outdoor application. If indoor installation is required, leaving condenser air should be discharged outdoors in order to prevent bypassing the hot discharge air back through the unit.

The air cooled condenser must be installed level to insure proper drainage of liquid refrigerant and oil.

Mounting legs should be securely fastened to supporting steel or concrete pads. Supporting steel should be supported by building columns or load bearing walls. Do not set condensers directly on insulated roofs.

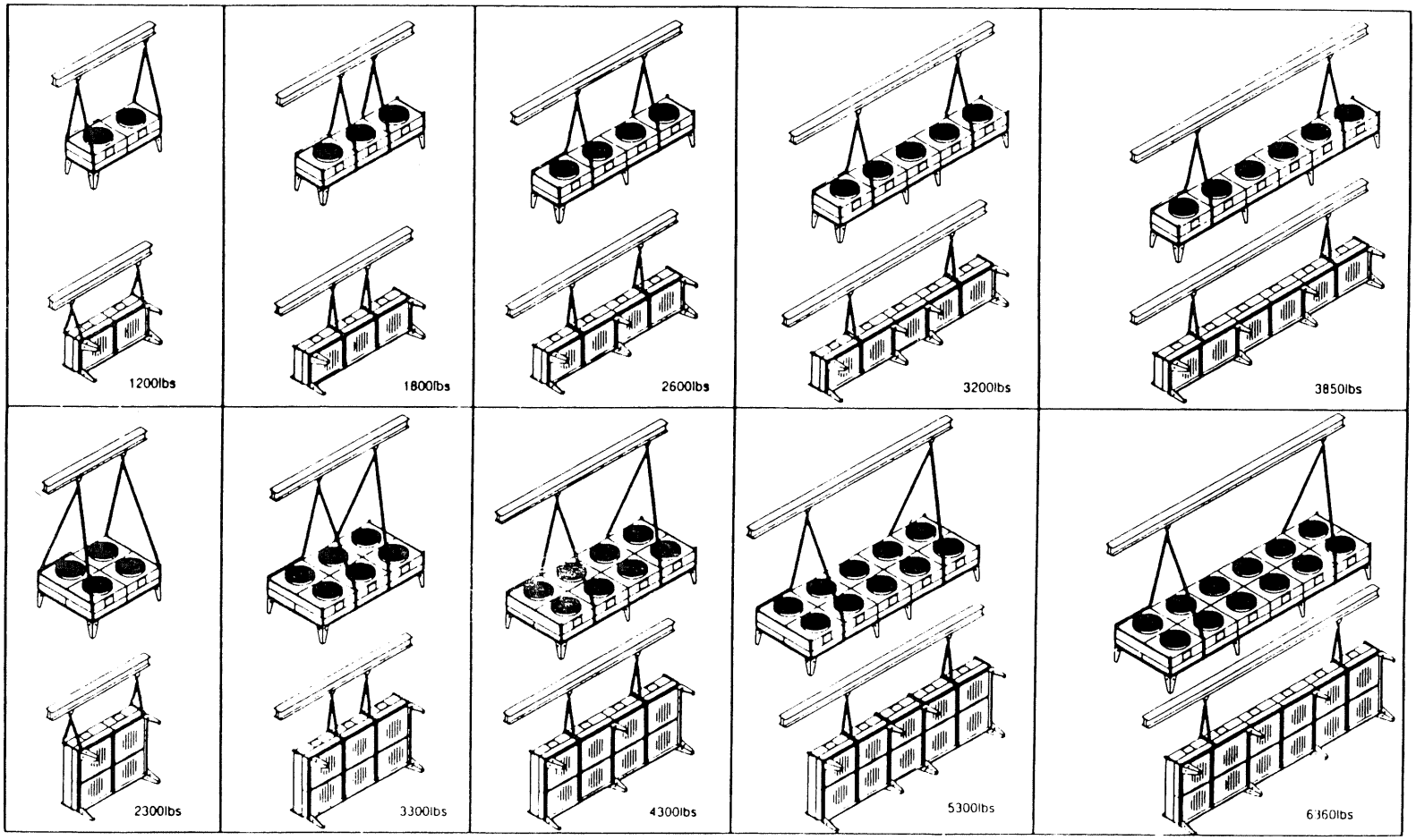
Locate condensers no closer than their width from walls or other condensers. Avoid locations near exhaust fans, plumbing vents, flues or chimneys. Parallel condensers should be the same models resulting in the same refrigerant side pressure drops. Compressor discharge lines should have equal pressure drops to each condenser.

Condenser charge will approximate 30 % of the maximum flooding charge for summer design conditions. Low ambient head pressure controls require an additional charge which is difficult to predict with fan cycling and is maximized with holdback.

Receiver capacity should be adequate to store the condenser summer charge plus the condenser low ambient allowance, plus the evaporator pump out charge, plus an allowance for piping and heat reclaim coil charges. Receiver equalizer lines must be free of traps and be connected to the top of condenser liquid outlets, not the inlet. Equalizers should not be used with holdback controls.

For units that are equipped with gravity dampers see Fig. 4, pg. 9 for raising instructions of gravity damper extensions.

RIGGING FOR LEG ASSEMBLY AND LIFTING UNITS



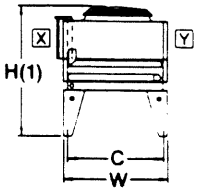
UNMOUNTED LEGS AND LIFTING CHANNELS ARE FURNISHED WITH NECESSARY BOLTS NUTS AND WASHERS FOR MOUNTING TO UNIT EACH LEG AND PLATE IS MOUNTED WITH FOUR BOLTS UNDER NO CIRCUMSTANCES SHOULD THE CONDENSER MANIFOLDS CONTROL PANEL OR RETURN BENDS BE USED FOR LIFTING OR MOVING THE UNITS!

MODELS ACVF, ACVG, ACVV, ACVW, ACVJ, ACVK, ACVY & ACVZ

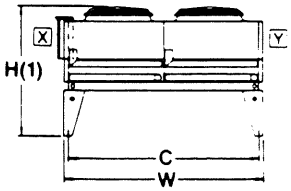
FIG. 1

PHYSICAL DATA

HEADER END VIEW



F, G, J, Y MODULES



V, W, K, Z MODULES

SIDE VIEWS

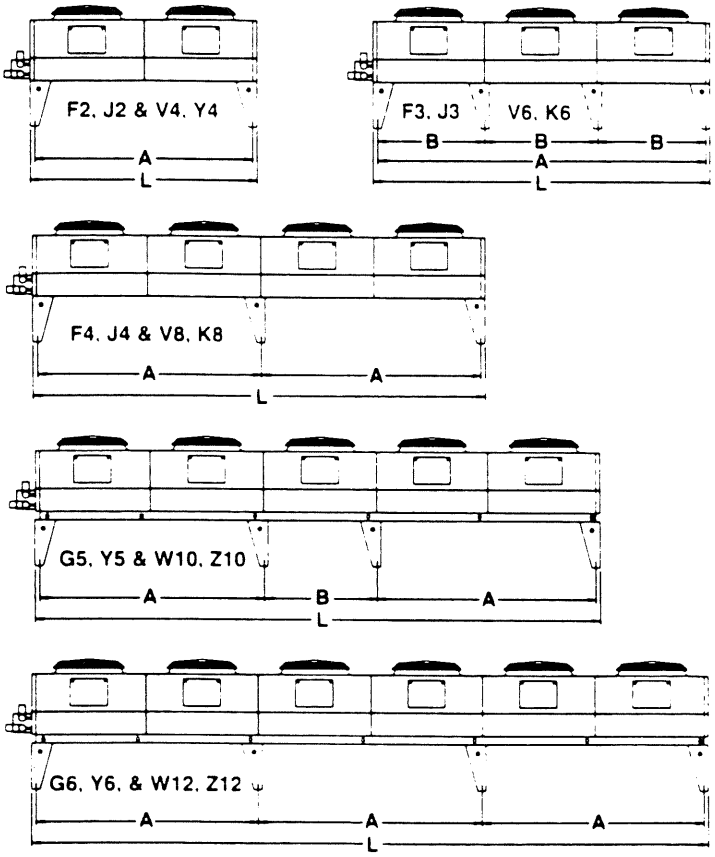


FIG. 2

MODEL	DIMENSIONAL DATA					ELECTRICAL DATA FAN MOTOR TOTAL RATED FULL LOAD AMPS			CONNECTIONS O.D. IN.		SOUND LEVEL DECIBELS (A) SCALE @ 6 FT DISTANCE
	L	W	H #	A	B	208-3	230-3	460-3	INLET	OUTLET	
ONE FAN WIDE											
F-2	112	48	55	108	44	8.8	8.0	4.0	1 5/8	1 5/8	77
F-3	166	48	55	54/54/54	44	13.2	12.0	6.0	2 1/8	2 1/8	79
F-4	220	48	55	108/108	44	17.6	16.0	8.0	2 1/8	2 1/8	80
G-5	274	48	58	108/54/108	44	22.0	20.0	10.0	2 5/8	2 5/8	81
G-6	328	48	58	108/108/108	44	26.4	24.0	12.0	2 5/8	2 5/8	82
J-2	112	48	55	108	44	15.4	14.0	7.0	1 5/8	1 5/8	98
J-3	166	48	55	54/54/54	44	23.1	21.0	10.5	2 1/8	2 1/8	100
J-4	220	48	55	108/108	44	30.8	28.0	14.0	2 1/8	2 1/8	101
Y-5	274	48	58	108/54/108	44	38.5	35.0	17.5	2 5/8	2 5/8	102
Y-6	328	48	58	108/108/108	44	46.2	42.0	21.0	2 5/8	2 5/8	103
TWO FANS WIDE											
V-4	112	96	55	108	92	17.6	16.0	8.0	(2) 1 5/8	(2) 1 5/8	78
V-6	166	96	55	54/54/54	92	26.4	24.0	12.0	(2) 2 1/8	(2) 2 1/8	80
V-8	220	96	55	108/108	92	35.2	32.0	16.0	(2) 2 1/8	(2) 2 1/8	82
W-10	274	96	58	108/54/108	92	44.0	40.0	20.0	(2) 2 5/8	(2) 2 5/8	83
W-12	328	96	58	108/108/108	92	52.8	48.0	24.0	(2) 2 5/8	(2) 2 5/8	84
K-4	112	96	55	108	92	30.8	28.0	14.0	(2) 1 5/8	(2) 1 5/8	101
K-6	166	96	55	54/54/54	92	46.2	42.0	21.0	(2) 2 1/8	(2) 2 1/8	103
K-8	220	96	55	108/108	92	61.6	56.0	28.0	(2) 2 1/8	(2) 2 1/8	104
Z-10	274	96	58	108/54/108	92	77.0	70.0	35.0	(2) 2 5/8	(2) 2 5/8	105
Z-12	328	96	58	108/108/108	92	92.4	84.0	42.0	(2) 2 5/8	(2) 2 5/8	106

H dimension includes 22" field assembled legs. Add 20" for optional 42" legs.

Min. unit circuit amps = 1.25 x FLA of one motor + FLA of remaining motors.

Max. unit overload protection = 2.25 x FLA of one motor + FLA of remaining motors.

Variable speed motors and control - contact factory.

ACH (horiz. air discharge) dimensions, fantrol location ,and unit support - contact factory.

☒ Standard fantrol location ☒ Optional fantrol location - must be specified.

USE CERTIFIED DRAWINGS FOR CONSTRUCTION

TABLE 1

TOTAL HEAT OF REJECTION CAPACITY - BTUH (000 OMITED)												
MODEL-ACV MODULE NO. FANS ROW DEPTH FINS/INCH	RATINGS BASED ON 85-115°F ENTERING AIR TEMPERATURE TD IS SATURATED CONDENSING TEMP. MINUS ENTERING AIR TEMP.								AIR FLOW CFM	MAX. FLOOD CHARG LBS.	WEIGHT INCL. FLOOD CHARGE LBS.	AVAILABLE CIRCUITS
	R22 TD				R502 TD							
	10	15	20	25	10	15	20	25				
ONE FAN WIDE												
F-2310	114.0	171.0	228.0	285.0	110.9	166.4	221.8	277.3	21938	48	988	27
F-2312	120.5	180.8	241.0	301.3	117.2	175.9	234.5	293.1	21600	48	1003	27
F-2408	126.5	189.8	253.0	316.3	123.1	184.6	246.2	307.7	20925	64	1051	36
F-2410	133.0	199.5	266.0	332.5	129.4	194.1	258.8	323.5	20250	64	1066	36
F-2412	138.5	207.8	277.0	346.3	134.8	202.1	269.5	336.9	19744	64	1081	36
F-3310	171.0	256.5	342.0	427.5	166.4	249.6	332.8	416.0	32906	72	1411	54
F-3312	181.0	271.5	362.0	452.5	176.1	264.2	352.2	440.3	32400	72	1441	54
F-3408	190.0	285.0	380.0	475.0	184.9	277.3	369.7	462.2	31388	96	1514	72
F-3410	199.5	299.3	399.0	498.8	194.1	291.2	388.2	485.3	30375	96	1544	72
F-3412	208.0	312.0	416.0	520.0	202.4	303.6	404.8	506.0	29616	96	1574	72
F-4310	228.0	342.0	456.0	570.0	221.8	332.8	443.7	554.6	43875	96	1973	54
F-4312	241.0	361.5	482.0	602.5	234.5	351.7	469.0	586.2	43200	96	2021	54
F-4408	253.0	379.5	506.0	632.5	246.2	369.3	492.3	615.4	41850	128	2144	72
F-4410	266.0	399.0	532.0	665.0	258.8	388.2	517.6	647.0	40500	128	2192	72
F-4412	277.5	416.3	555.0	693.8	270.0	405.0	540.0	675.0	39488	128	2240	72
G-5408	322.5	483.8	645.0	806.3	313.8	470.7	627.6	784.5	53156	237	2805	60
G-5410	345.0	517.5	690.0	862.5	335.7	503.5	671.4	839.2	52734	237	2910	60
G-5412	357.5	536.3	715.0	893.8	347.8	521.8	695.7	869.6	52313	237	3020	60
G-6408	387.0	580.5	774.0	967.5	376.6	564.8	753.1	941.4	63788	285	3370	60
G-6410	414.0	621.0	828.0	1035.0	402.8	604.2	805.6	1007.1	63281	285	3460	60
G-6412	429.0	643.5	858.0	1072.5	417.4	626.1	843.8	1043.5	62775	285	3555	60
TWO FANS WIDE												
V-4310	228.0	342.0	456.0	570.0	221.8	332.8	443.7	554.6	43875	96	1816	54
V-4312	241.0	361.5	482.0	602.5	234.5	351.7	469.0	586.2	43200	96	1846	54
V-4408	253.0	379.5	506.0	632.5	246.2	369.3	492.3	615.4	41850	128	1941	72
V-4410	266.0	399.0	532.0	665.0	258.8	388.2	517.6	647.0	40500	128	1971	72
V-4412	277.0	415.5	554.0	692.5	269.5	404.3	539.0	673.8	39488	128	2001	72
V-6310	342.0	513.0	684.0	855.0	332.8	499.1	665.5	831.9	65813	144	2601	108
V-6312	362.0	543.0	724.0	905.0	352.2	528.3	704.5	880.6	64800	144	2661	108
V-6408	380.0	570.0	760.0	950.0	369.7	554.6	739.5	924.4	62775	191	2769	144
V-6410	399.0	598.5	798.0	997.5	388.2	582.3	776.5	970.6	60750	191	2829	144
V-6412	416.0	624.0	832.0	1040.0	404.8	607.2	809.5	1011.9	59231	191	2889	144
V-8310	456.0	684.0	912.0	1140.0	443.7	665.5	887.4	1109.2	87750	191	3289	108
V-8312	482.0	723.0	964.0	1205.0	469.0	703.5	938.0	1172.5	86400	191	3369	108
V-8408	506.0	759.0	1012.0	1265.0	492.3	738.5	984.7	1230.8	83700	255	3573	144
V-8410	532.0	798.0	1064.0	1330.0	517.6	776.5	1035.3	1294.1	81000	255	3653	144
V-8412	555.0	832.5	1110.0	1387.5	540.0	810.0	1080.0	1350.0	78975	255	3733	144
W-10408	645.0	967.5	1290.0	1612.5	627.6	941.4	1255.2	1569.0	106313	474	4680	120
W-10410	690.0	1035.0	1380.0	1725.0	671.4	1007.1	1342.7	1678.4	105469	474	4855	120
W-10412	715.0	1072.5	1430.0	1787.0	695.7	1043.5	1391.4	1739.2	104625	474	5020	120
W-12408	774.0	1161.0	1548.0	1935.0	753.1	1129.7	1506.2	1882.8	127575	570	5585	120
W-12410	828.0	1242.0	1656.0	2070.0	805.6	1208.5	1611.3	2014.1	126563	570	5805	120
W-12412	858.0	1287.0	1716.0	2145.0	834.8	1252.3	1669.7	2087.1	125550	570	6030	120

TABLE 2

TOTAL HEAT OF REJECTION CAPACITY - BTUH (000 OMITED)												
MODEL-ACV MODULE NO. FANS ROW DEPTH FINS/INCH	RATINGS BASED ON 85-115°F ENTERING AIR TEMPERATURE TD IS SATURATED CONDENSING TEMP. MINUS ENTERING AIR TEMP.								AIR FLOW CFM	MAX. FLOOD CHARG LBS.	WEIGHT INCL. FLOOD CHARGE LBS.	AVAILABLE CIRCUITS
	R22 TD				R502 TD							
	10	15	20	25	10	15	20	25				
ONE FAN WIDE												
J-2310	127.7	191.6	255.4	319.3	124.2	186.3	248.4	310.5	28688	48	988	27
J-2312	139.2	208.8	278.4	348.0	135.4	203.1	270.8	338.5	28216	48	1003	27
J-2408	146.1	219.2	292.2	365.3	142.1	213.2	284.2	355.3	27338	64	1051	36
J-2410	153.0	229.5	306.0	382.5	148.8	223.2	297.6	372.0	26494	64	1066	36
J-2412	159.9	239.9	319.8	399.8	155.5	233.3	311.0	388.8	25820	64	1081	36
J-3310	196.7	295.1	393.4	491.7	191.3	287.0	382.6	478.3	43032	72	1411	54
J-3312	208.2	312.3	416.4	520.5	202.5	303.8	405.0	506.3	42324	72	1441	54
J-3408	218.5	327.8	437.0	546.3	212.6	318.9	425.2	531.5	41007	96	1514	72
J-3410	230.0	345.0	460.0	575.0	223.7	335.6	447.4	559.2	39741	96	1544	72
J-3412	239.2	358.8	478.4	598.0	232.7	349.1	465.4	581.8	38730	96	1574	72
J-4310	262.2	393.3	524.4	655.5	255.1	382.7	510.2	637.8	57376	96	1973	54
J-4312	277.2	415.8	554.4	693.0	269.6	404.4	539.2	674.0	56432	96	2021	54
J-4408	291.0	436.5	582.0	727.5	283.0	424.5	566.0	707.5	54676	128	2144	72
J-4410	305.9	458.9	611.8	764.7	297.6	446.4	595.2	744.0	52988	128	2192	72
J-4412	318.6	477.9	637.2	796.5	309.9	464.9	619.8	774.8	51640	128	2240	72
Y-5408	371.5	557.3	743.0	928.8	361.3	542.0	722.6	903.3	68345	237	2805	60
Y-5410	396.8	595.2	793.6	992.0	386.0	579.0	772.0	965.0	66235	237	2910	60
Y-5412	411.7	617.6	823.4	1029.3	400.5	600.8	801.0	1001.3	64550	237	3020	60
Y-6408	445.1	667.7	890.2	1112.8	432.9	649.4	865.8	1082.3	82014	285	3370	60
Y-6410	476.1	714.2	952.2	1190.3	463.2	694.8	926.4	1158.0	79482	285	3460	60
Y-6412	493.4	740.1	986.8	1233.5	479.9	719.8	959.8	1199.8	77460	285	3555	60
TWO FANS WIDE												
K-4310	262.2	393.3	524.4	655.5	255.1	382.7	510.2	637.8	57376	96	1816	54
K-4312	277.2	415.8	554.4	693.0	269.6	404.4	539.2	674.0	56432	96	1846	54
K-4408	291.0	436.5	582.0	727.5	283.0	424.5	566.0	707.5	54676	128	1941	72
K-4410	305.9	458.9	611.8	764.7	297.6	446.4	595.2	744.0	52988	128	1971	72
K-4412	318.6	477.9	637.2	796.5	309.9	464.9	619.8	774.8	51640	128	2001	72
K-6310	393.3	589.9	786.6	983.3	382.6	573.9	765.2	956.5	86064	144	2601	108
K-6312	416.3	624.5	832.6	1040.8	405.0	607.5	810.0	1012.5	84648	144	2661	108
K-6408	437.0	655.5	874.0	1092.5	425.1	637.7	850.2	1062.8	82014	191	2769	144
K-6410	458.9	688.4	917.8	1147.3	446.4	669.6	892.8	1116.0	79482	191	2829	144
K-6412	478.4	717.6	956.8	1196.0	465.4	698.1	930.8	1163.5	77460	191	2889	144
K-8310	524.4	786.6	1048.8	1311.0	510.1	765.2	1020.2	1275.3	114752	191	3289	108
K-8312	554.3	831.4	1108.6	1385.8	539.2	808.8	1078.4	1348.0	112864	191	3369	108
K-8408	581.9	872.8	1163.8	1454.8	566.1	849.2	1132.2	1415.3	109352	255	3573	144
K-8410	611.8	917.7	1223.6	1529.5	595.2	892.8	1190.4	1488.0	105976	255	3653	144
K-8412	638.3	957.4	1276.6	1595.8	620.9	931.3	1241.8	1552.3	103280	255	3733	144
Z-10408	741.8	1112.7	1483.6	1854.5	721.6	1082.4	1443.2	1804.0	136690	474	4680	120
Z-10410	793.5	1190.3	1587.0	1983.8	771.9	1157.9	1543.8	1929.8	132470	474	4855	120
Z-10412	822.3	1233.5	1644.6	2055.8	799.9	1199.9	1599.8	1999.8	129100	474	5020	120
Z-12408	890.1	1335.2	1780.2	2225.3	865.9	1298.9	1731.8	2164.8	164028	570	5585	120
Z-12410	952.2	1428.3	1904.4	2380.5	926.3	1389.5	1852.6	2315.8	158964	570	5805	120
Z-12412	986.7	1480.1	1973.4	2466.8	959.9	1439.9	1919.8	2399.8	154920	570	6030	120

TABLE 2A

REFRIGERANT PIPING

All refrigerant piping practices should be in accordance with local codes and the latest ANSI B 9.1 and B 31.5 standards. Recommended piping sizes should be in accordance with the latest ASHRAE guide lines.

A purge valve should be installed at the highest point of each hot gas discharge line to allow non-condensable gases to be removed from the system only when the compressors are off. Non-condensables in operating systems are best collected at the condenser outlet. Use a tee in the horizontal outlet with a purge valve on top of a 12-18 inch high, full size vertical extension.

If not done properly or carefully this type of purging can be a major source of refrigerant emissions which is believed to the attack earth's ozone layer. Installation of a mechanical or thermal purge unit designed to eliminate the loss of refrigerant to the atmosphere is an excellent alternative to the manual purge method.

Compressor discharge lines should be sized to minimize pressure drops and maintain oil return velocities. An increase in discharge line pressure drop increases the required horsepower while decreasing compressor capacity. Each discharge connection should be looped to the top of the condenser. Avoid piping discharge gas lines so that an uneven pressure drop is created between compressor system and multiple condensers.

It is good engineering practice not to exceed a pressure drop corresponding to a saturation temperature change of 2 °F. Table 2 indicates discharge line capacities based on evaporator tonnage equal to a pressure drop equivalent to 2 °F per 1000 feet of line.

If discharge lines are sized according to Table 2 oil should be satisfactorily carried through the system. However, special precautions must be taken if the system is designed to operate at reduced compressor capacity. A vertical hot gas line sized to carry oil at minimum load conditions could develop excessive pressure drop at full load conditions. If this be the case a double riser discharge line should be used as shown in Fig. 3.

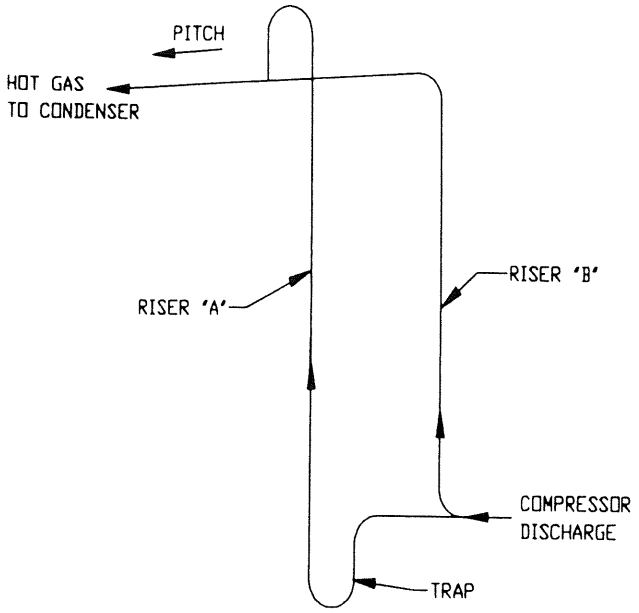


FIG. 3

Note:

1. Riser"B" sized for minimum load condition.
2. Riser "A" sized so that the combined cross sectional area of both risers is equal to the cross sectional area of a single riser which would be sized for acceptable pressure drop at full load.

Liquid line piping must be arranged so that it is free draining from the condenser to the receiver. It is best to pipe liquid drains so that there is an immediate drop at least 2 to 3 feet at the condenser outlet before headering or running horizontally. This liquid line must be free of any traps or loops and constantly pitched downhill towards the receiver. Avoid long horizontal lines on roofs. The liquid line is sized so the velocity does not exceed 100 FPM. Table 2 shows liquid line capacity in evaporator or compressor tons.

Where the ambient temperature can get below the equipment room temperature a check valve must be installed in the liquid line to prevent liquid migration at the condenser. "Off the line" condenser coil sections will also have refrigerant pressures corresponding to the ambient. Consequently check valves or isolating valves should also be installed in the liquid drains to prevent

RAISING INSTRUCTIONS FOR GRAVITY DAMPER EXTENSION

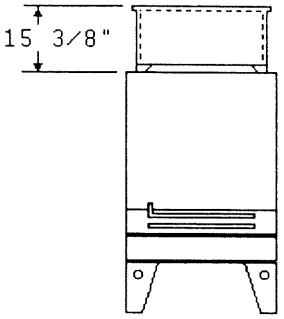
UNIT(S) WILL BE RECEIVED BY CUSTOMER WITH GRAVITY DAMPER EXTENSIONS IN SHIPPING POSITION, (SEE ILLUSTRATION PROVIDED OR SHEET 1 OF CUSTOMER DRAWINGS). IN THIS POSITION THE EXTENSIONS ARE HELD TO GRAVITY DAMPER HOUSING BY 8-#14-1/2" LONG HEX WASHER HEAD SCREWS (2 PER SIDE).

WHEN CUSTOMER RECEIVES THE UNIT(S) IN THE FIELD, THE EXTENSIONS MUST BE RAISED. PROCEDURE FOR RAISING THE EXTENSION ARE AS FOLLOWS:

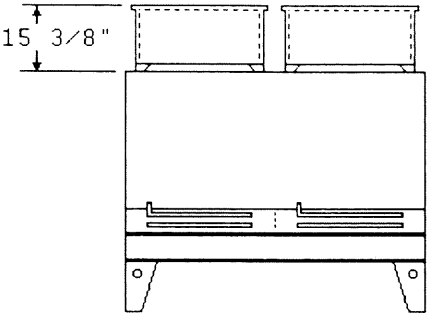
STEP #1: REMOVE ALL HEX SCREWS FROM EXTENSIONS.
STEP #2: RAISE EXTENSION AND MATCH HOLES PROVIDED ON BOTTOM OF EXTENSION SIDES AND RE-INSTALL ALL 8 HEX SCREWS.

NOTE: ALL 8 HEX SCREWS MUST BE RE-INSTALLED FOR VIBRATION PURPOSES.

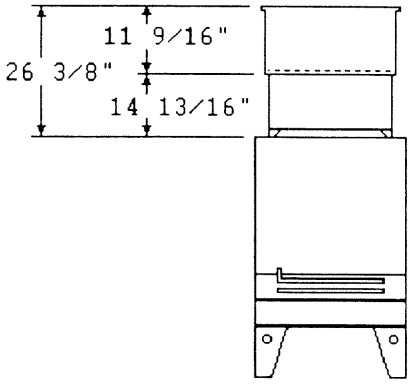
SINGLE BANK UNITS

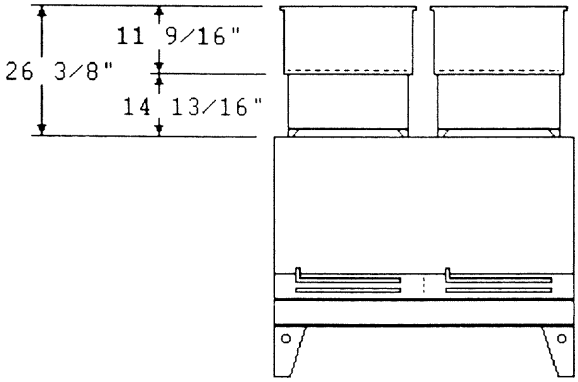


DOUBLE BANK UNITS



THE ABOVE ILLUSTRATION SHOWS
DAMPER EXTENSIONS IN SHIPPING POSITION.





THE ABOVE ILLUSTRATION SHOWS
DAMPER EXTENSION IN RAISED POSITION
IN FIELD.

DIMENSIONS ARE FOR GENERAL REFERENCE ONLY-DON'T USE FOR CONSTRUCTION PURPOSES.

FIG.4

REFRIGERANT LINE CAPACITY

LINE SIZE TYPE L O D INCHES	CAPACITY IN EVAPORATOR OR COMPRESSOR TONS						WEIGHT OF REFRIGERANT	
	DISCHARGE LINE CONDENSER INLET CONNECTION COMPRESSOR SATURATED SUCTION TEMPERATURE °F				LIQUID DRAIN LINE CONDENSER TO RECIEVER CONDENSER OUTLET CONNECTION 100 FPM VELOCITY		LBS. PER 100 LINEAL FT. LIQUID LINE 100 °F	
	R22		R502					
	-40	40	-40	40	R22	R502	R22	R502
5/8	2.1	2.4	1.7	2.1	3.6	2.6	11.3	11.7
7/8	5.6	6.3	4.4	5.6	7.4	5.3	23.4	24.2
1 1/8	11.2	12.7	8.8	11.2	12.7	9.1	40.0	41.5
1 3/8	19.5	22.1	15.4	19.5	19.2	13.9	60.5	62.8
1 5/8	29	34	24	31	27	20	85	88
2 1/8	64	73	50	63	47	34	150	155
2 5/8	113	127	88	112	73	53	232	240
3 1/8	176	199	140	178	104	75	330	340
3 5/8	262	297	207	264	141	102	446	461
4 1/8	376	426	291	371	183	132	584	602

TABLE 2

refrigerant migration and receiver pressure loss. On systems as described with a liquid line check valve, a relief valve or a relief type check valve must be used to relieve dangerous hydraulic pressures. This condition could be caused by the warming of the cooled liquid refrigerant which might hydraulically be locked up in the system.

SUBCOOLING

Liquid subcooling may be accomplished with a section of circuits in the coil or with a separate coil section under the last operating fans. Liquid outlet temperature will approach the entering air temperature by approximately 5 °F. This subcooling benefit is not economical unless the TD is 15 °F or higher.

ELECTRICAL WIRING

The electrical installation should be in accordance with the National Electric Code and any local codes and/or regulations.

See Table 1 for electrical specifications and data. Fan motors have inherent thermal overload protection. Be sure to check nameplate on condenser so that it is in agreement with the power to be supplied. All fan motors come pre-wired by means of a wiring harness to a weatherproof junction box. See Fig. 5 , pg. 13 for motor locations and wiring labeling.

The disconnect switch must be provided by others in the field.

Since there are numerous options and types of fan cycling head pressure controls available, always refer to the wiring diagram which is found inside the control panel enclosure for your particular installation. See Fig. 6 , pg. 14 for typical fan cycling control.

START UP

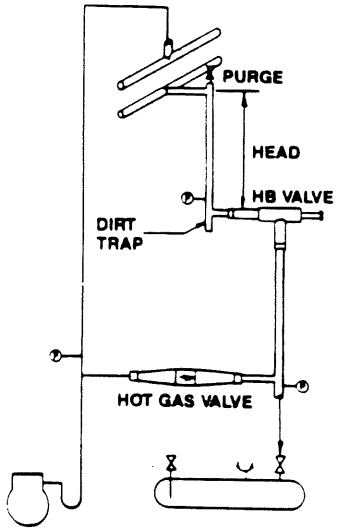
Prior to start up, a complete vacuum in accordance with good refrigeration practice must be pulled on the entire system. Each fan should be checked for freedom of movement and that it is securely fastened to its fan motor shaft. On start up each fan should be checked for proper rotation in accordance with the fan direction arrow decal located on the fan orifice. Make sure all motors are mounted securely.

Make sure all electrical connections are tight and wired according to wiring diagram found in the electrical enclosure.

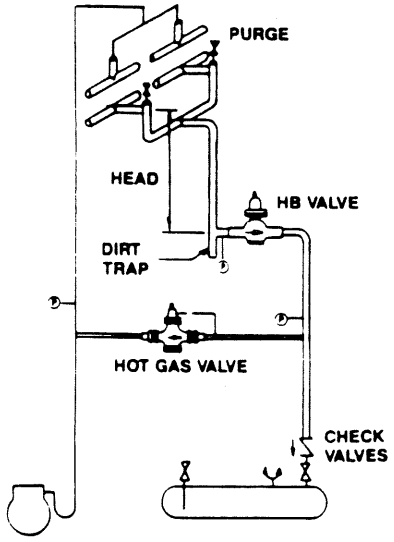
Inspect refrigeration piping to the condenser to make sure that no vibration is occurring in the system.

HOLDBACK FLOODING CONTROL SELECTION DATA

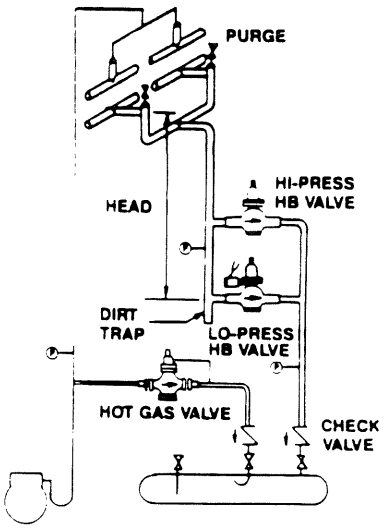
TYPICAL PIPING



KITS HBI-4



KITS HB5-8



KITS HBB5A-8A

HB—Holdback

Automatic condenser liquid holdback valve controls minimum head pressure by flooding condenser. Automatic hot gas valve controls pressure differential between compressor discharge and receiver to no less than 30 psi.

HBB—Dual Holdback

Two automatic holdback valves are utilized.

HI-PRESS—HB valve controls heat reclaim or hot gas defrost pressure.

LO-PRESS—HB valve controls minimum head pressure when the 120V pilot solenoid is energized.

Combination Fantrol/Holdback

Combining any FANTROL with flooding controls will reduce flooding charge and save fan motor energy. One or more fans may be forced to run when dual holdback LO-PRESS valves are energized.

HOLDBACK KITS—1 RECEIVER INLET — **TONS CAPACITY—2, 6, & 16 FT. HEAD ABOVE HB VALVES**

KIT NO.	LIQ. DRAIN	HB VALVE	HG VALVE	CK4A CHECK	R-12 2	R-12 6	R-12 16	R-22 2	R-22 6	R-22 16	R-502 2	R-502 6	R-502 16
HB1	5/8	5/8 ORI-6	5/8 ORD4	NA	6	11	19	8	14	24	5	9	15
HB2	7/8	7/8 ORI-6	5/8 ORD4	NA	6	11	19	8	14	24	5	9	15
HB3	1 1/8	1 1/8 ORI-10	5/8 ORD4	NA	12	22	37	16	29	48	10	17	29
HB4	1 3/8	1 3/8 ORI-10	5/8 ORD4	NA	12	22	37	16	29	48	10	17	29
HB5	1 5/8	1 3/8 A81	7/8 A81	1 1/8	—	36	59	—	49	80	—	27	44
HB6	2 1/8	1 3/8 A81	7/8 A81	1 3/8	—	40	65	—	54	88	—	30	49
HB7	2 5/8	1 5/8 A72	1 3/8 A81L	1 5/8	—	66	108	—	88	144	—	48	78
HB8	3 1/8	2 1/8 A72	1 3/8 A81L	2 1/8	—	98	160	—	130	212	—	72	118

DUAL HOLDBACK KITS—2 RECEIVER INLETS — **TONS CAPACITY—HEAD ABOVE HB VALVES**

KIT NO.	LIQ. DRAIN	LO-PRESS HB VALVE	HI-PRESS HB VALVE	HG VALVE	CK4A CHECKS LIQ.	CK4A CHECKS HG	R-12 6	R-12 16	R-22 6	R-22 16	R-502 6	R-502 16
HBB5A	1 5/8	1 3/8 A81S	7/8 A8A	5/8 A8AL	1 1/8	5/8	36	59	49	80	27	44
HBB6A	2 1/8	1 3/8 A81S	7/8 A8A	5/8 A8AL	1 3/8	5/8	40	65	54	88	30	49
HBB7A	2 5/8	1 5/8 A72S	1 3/8 A81	5/8 A8AL	1 5/8	5/8	66	108	88	144	48	78
HBB8A	3 1/8	2 1/8 A72S	1 3/8 A81	1 3/8 A81L	2 1/8	1 1/8	98	160	130	212	72	118

Notes:

1. Select kit for available liquid head above HB valve to allow coil to completely drain for maximum summer capacity.
2. Receiver to coil outlet equalizing vents should not be used with holdback controls.
3. Separate hot gas connections on receivers with up-turned elbow or baffle reduces HG flow and builds pressure faster.
4. Add liquid drain line charge above HB valve to receiver capacity.
5. Valve sizes are ODS connections.

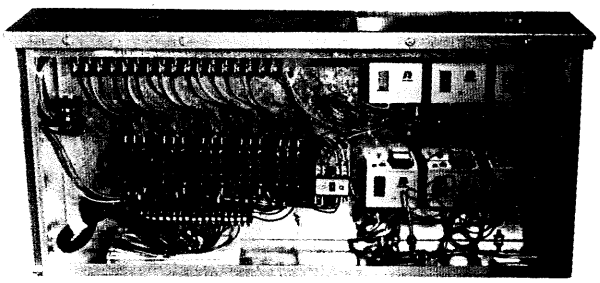
LOW AMBIENT HEAD PRESSURE CONTROL

As the ambient temperature drops, condensing pressure is lowered proportionately. Evaporators require a minimum pressure differential between liquid feed pressure and saturated suction pressure for thermostatic expansion valve and distributor performance.

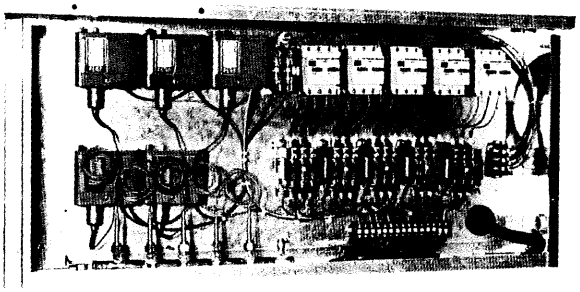
Condenser coil surface must be reduced to maintain head pressure. Cycling fan motors, flooding the coil with refrigerant, isolating part of the coil surface, or a combination of the above will maintain minimum head pressure.

Excess low ambient refrigerant charge will be minimized by manually isolating and pumping out entire condenser or the right half of double fan width models. Holdback flooding control or gravity discharge dampers may be used on the remaining condenser surface.

FAN CYCLING CONTROL PANEL ARRANGEMENTS



Thermal Pressure Fantrol with Fuses TP-G5-F2



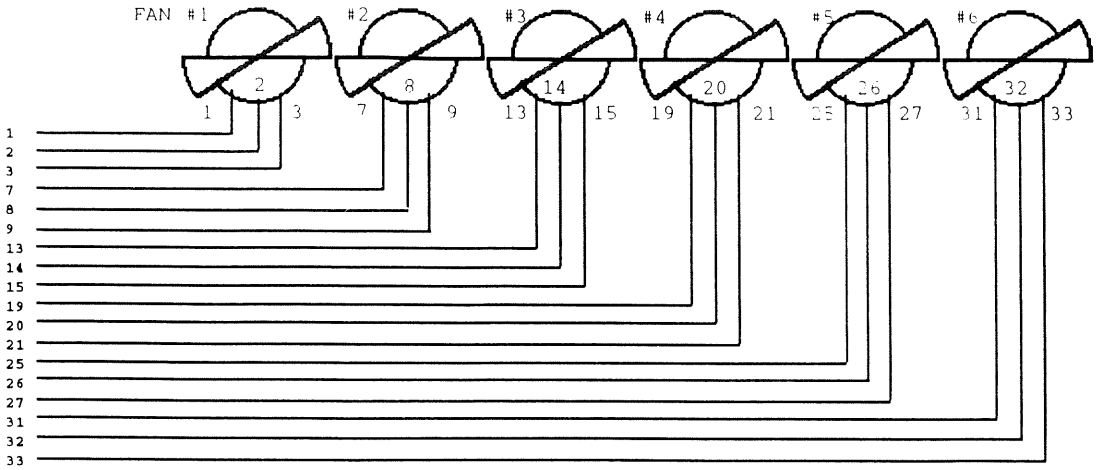
Pressure Fantrol with Circuit Breakers PT-G5-B2

- ThermalFantrol-Thermostats cycle all except header end fans in response to entering air temperature. Use with multi-circuit applications usually requiring holdback controls in each liquid drain to individual receivers.
- Pressure Fantrol-Pressurestats cycle all fans in response to head pressure.
- Thermal Pressure Fantrol-Thermostats cycle all except header end fans which are cycled by a pressurestat.
- Sequencer Option-4 thru 6 individual stats are replaced by a sequencer sensing pressure or temperature with 9 psi or 4°F fixed differential.
- Variable Speed Fantrol-No. 1 or No. 1 and 2 fan motors variable speed controlled in response to head pressure. Other fans pressurestat controlled. 200-230 volts. 460 requires transformer.
- Weather Resistant Control Panel Location-ACV Models- Left side header end When facing refrigerant connections-right side optional.
  ACH Models-Contact Factory.
- Fan Cycling Sequence
  single fan width models-fans cycled individually-the last operating fan at the header end.
  Double fan width models-fans cycled in banks of two-header end fans operating last.
- Two-in-One Control-Each side of double fan width models is controlled as a single fan width model. Specify two single width control panels-one each side.
- Half-Off Control-Right side of double fan width models is arranged to be manually isolated in winter. Manual switch and relay or fan motor circuit breakers isolate right side electrical power.
- Pilot Control Voltage
  Either 115 or 230 volts. A control transformer will be provided for 115V and when fan motor power is other than 200/230/3/60.
- Branch Circuit Protection
  Fan motors have three phase inherent overheat protection. Branch circuits to each motor or bank of two motors are protected by fuses or optional circuit breakers.
- Main Power Disconnect
  As required by codes, disconnects are not included.

CONDENSER STANDARD MOTOR WIRING

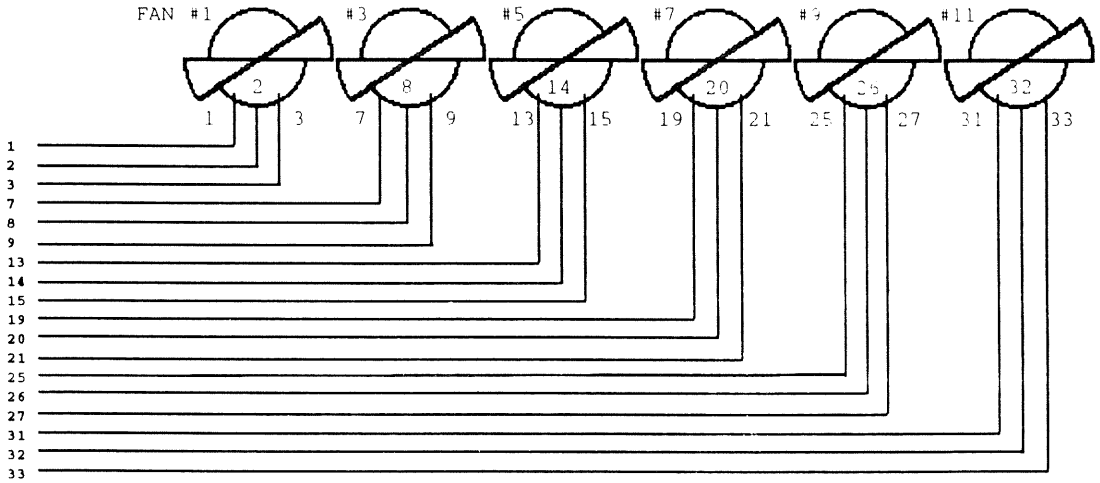
MOTORS ARE WIRED INTO WIRING HARNESSES WITH MOTOR IDENTITY NUMBERS ON BOTH ENDS OF INDIVIDUAL WIRES. FEILD WIRE AS REQUIRED BY LOCAL OR NATIONAL CODES.

1, 2, 3, 4, 5, 6 FANS



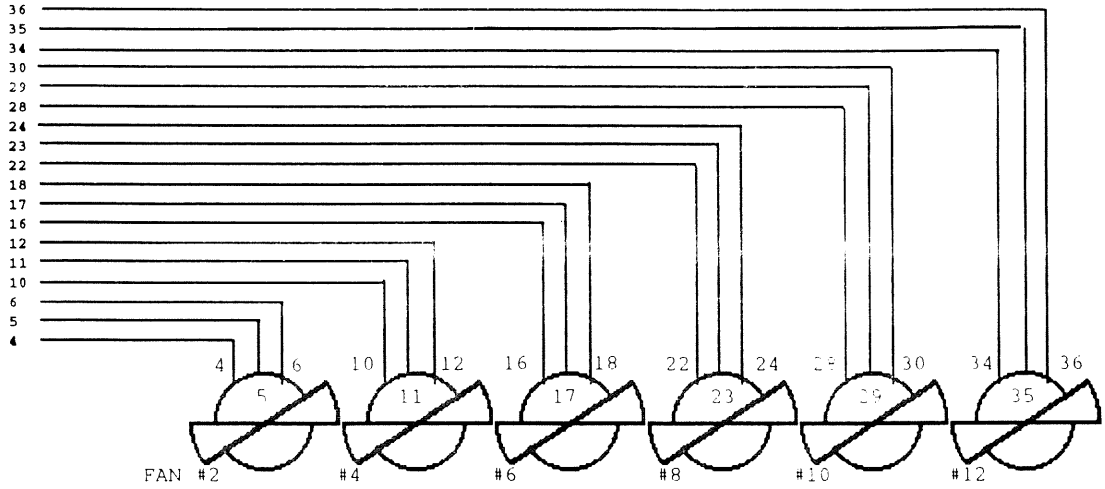
CONNEC-
TION
END

2X2 , 2X3, 2X4, 2X5, 2X6 FANS



LEFT
SIDE

CONNEC-
TION
END

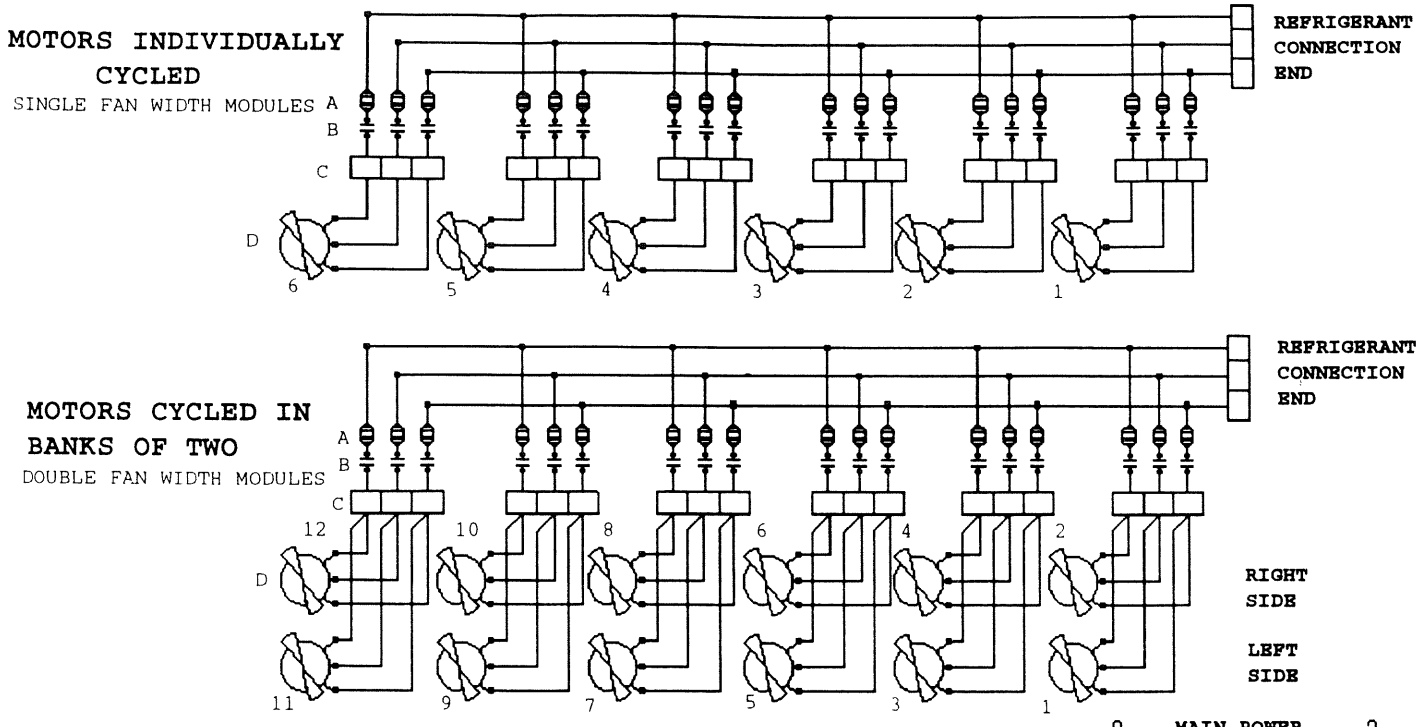


RIGHT
SIDE

FIG. 5

TYPICAL FAN CYCLE CONTROL WIRING

THREE PHASE PILOT CIRCUIT ELECTRICAL CONTROL



A = FUSES OR OPTIONAL CIRCUIT BREAKER
B = FAN MOTOR CONTACTOR
C= TERMINAL STRIP
D = FAN MOTOR
E = PRESSURE OR TEMPERATURE CONTROL
F = CONTROL CIRCUIT FUSES
G = CONTROL TRANSFORMER (WHEN REQUIRED)

FIG. 6

CONTROL PANEL MODEL NO. PV G 06 K A 1 3 2 A A

I II III IV V VI VII VIII IX X

I = TYPE OF CONTROL
- TF = THERMAL FANTROL
- PT = PRESSURETROL
- TP = THERMAL PRESSURE FANTROL
- TS = THERMAL FANTROL WITH SEQUENCER
- PS = PRESSURETROL WITH SEQUENCER
- TD = THERMAL PRESSURE FANTROL WITH SEQUENCER
- PV = PRESSURETROL WITH VARIABLE SPEED CONTROL
- DV = THERMAL PRESSURE FANTROL WITH VARIABLE SPEED CONTROL
- NOTE: CONTACT FACTORY FOR OTHER POSSIBLE CONTROL ARRANGEMENTS

II- MODULE DESIGNATION
- F = IN-LINE 1 HP. 2-4 FANS
- G = IN-LINE 1 HP. 5-6 FANS
- J = IN-LINE 1 1/2 HP 2-4 FANS
- Y = IN-LINE 1 1/2 HP 5-6 FANS
- V = SIDE BY SIDE 1 HP. 4-8 FANS
- W = SIDE BY SIDE 1 HP. 10-12 FANS
- K = SIDE BY SIDE 1 1/2 HP. 4-8 FANS
- Z = SIDE BY SIDE 1 1/2 HP. 10-12 FANS

III-TOTAL FANS 1 THRU 12

IV- POWER VOLTAGE
- A = 208/230-60-1
- B = 115-60-1
- H = 460-60-1
- K = 208/230-60-3
- M = 460-60-3

V= CONTROL VOLTAGE
- A = 208/230 V
- B = 115 V
- C = CONTROL VOLTAGE
- D = 24 V
- E = 208/230 V WITHOUT TRANSFORMER
- F = 115 V WITHOUT TRANSFORMER
- G = NO CONTROL VOLTAGE WITHOUT TRANSFORMER
- H = 24 V WITHOUT TRANSFORMER

VI = CONTROL MANUFACTURER
- 1 = DANFOSS
- 2 = RANCO
- 3 = PENN
- 4 = NO CONTROLS

VII = BRANCH CIRCUIT PROTECTION
- 1 = INDIVIDUAL FUSES AND CONTACTORS
- 2 = IND. CIRCUIT BREAKER AND CONTACTOR PER EACH FAN
- 3 = FUSE AND CONTACTORS PER PAIR OF FANS
- 4 = TERMINAL BLOCKS ONLY
- 5 = CIRCUIT BREAKERS AND CONTACTORS PER PAIR OF FANS

VIII = CONDENSER CLASSIFICATION
- 1 = STANDARD
- 2 = 50 % REDUCTION
- 3 = 50/50 SPLIT
- 4 = NO CONTROLS OPERATION (TERMINAL BLOCKS ONLY)

IX = PANEL INDICATION
- "A" INDICATES 2ND CONTROL PANEL OF TWO PANEL SYSTEM

X = COMBINATION OF ONE OR TWO LETTERS TO IDENTIFY BY PART NO. THE SPECIFIC PANEL.

MAINTENANCE

CAUTION: Disconnect all electrical power before servicing.

Fans and motors are direct connected so that there are no drive belts, sheaves and bearings to service. Motors are permanently lubricated for the life of the motor. Access panels are provided in the fan plenum to allow easy cleaning of the condenser coil.

If a fan motor requires replacing, it should be done through the fan orifice after first removing the fan guard. When replacing motors it is best to place plywood panel on top of coil surface under the motor to protect the coil surface.

For maximum efficiency air cooled condensers should be cleaned of lint and dust every 4 to 6 months so that air flow is not restricted. More frequent cleaning may be necessary under severe conditions.

Cleaning force must be opposite the direction of fan air. Krack furnishes convenient access doors to accommodate cleaning wand and nozzle.

Periodically, electrical connections should be checked and tightened. Loose electrical connections can cause severe electrical damage as well as nuisance tripouts and burnouts.

DESCRIPTION	PART NO.
MOTORS	
3/4 HP 208-230/60/1 VARIABLE SPEED	E205530
1 HP 208-230/460/3	11503
1-1/2 HP 208-230/460/3	E205492
FAN BLADE	
30"	11273
30" 1-1/2 HP MOTOR	E205493
FAN GUARD	
30"	E280792

Fan Operation

The operation of any cycle controller employed on these type units should be programmed so that:

1) First fan, or set of fans, located at the condenser unit's header end function as the first-on/last-off operating fan(s).

2) No rapid cycling of fans is to occur.

These two conditions can cause uneven as well as rapid expansion and contraction of the condenser core tubing, contributing to condenser tube failures. The faulty conditions stated above are most often associated with electronic controllers and should be avoided through correct programming. Most especially, do not include #1 fan(s) in "equal time run" as just another fan motor of the complete unit's fan bank.

Both of these operating conditions produce excessive tube stress within the condenser due to rapid expansion and contraction at the tube sheets and end plates (of the coil section). To best avoid this, follow the following recommendations:

a) Always set the first fan(s), inlet header end of unit to run continuous (down to approximately 30°). Below freezing ambient, they are to be set as the last on-off operation fan(s) at a cycle similar to the remaining unit fans.

b) Set fan cycle rate to be no quicker than fan-on every 5-6 minutes, or minimum 20 psi condensing pressure differential.

For your notice, the following paste-on label applies to this unit:

N O T I C E

THE FIRST FAN OR SET OF FANS, LOCATED AT THE HEADER END, MUST BE OPERATING WHEN ANY COMPRESSOR IS RUNNING. CONSULT UNIT MANUAL FOR SPECIFICS.

WHEN USING ELECTRONIC FAN CYCLING CONTROL:

a) DO NOT PROGRAM #1 FAN(S) FOR EQUAL RUN TIME.

b) SET HEAD PRESSURE (FLOODING) VALVE TO FOLLOW FAN CYCLING.