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KYSOR/WARREN®

The Leading Edge of Technology

INSTALLATION & OPERATION MANUAL

Mastermetic Condensing and Compressor Units
Model MAC, MAD, MAR, RAC, RAD and RAR

1600 INDUSTRIAL BLVD., CONYERS, GA 30207 / 404-483-5600
5201 TRANSPORT BLVD., COLUMBUS, GA 31907

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Introduction

Mastermetic condensing and compressor units are available in sizes ranging from 1/2 through 30 HP (depending on application). These compact single compressor units are designed to operate at maximum efficiency. All units are listed with ETL Testing Laboratories, Inc.

Component parts have been selected for their dependability and availability to keep service problems to a minimum. A large number of options are available to facilitate the condensing unit and fixture installation and are available at a slight additional cost. A discussion of the standard options is contained later in this manual.

Mastermetic Model Nomenclature

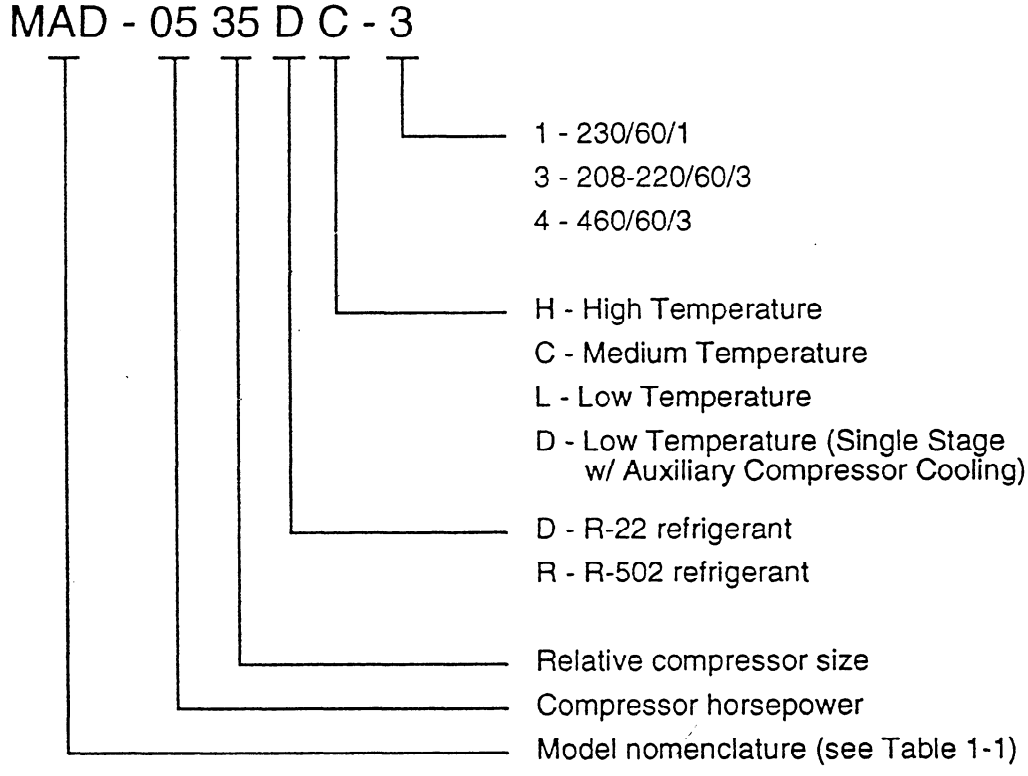


Table 1-1

Designation	Unit Type	Compressor
MAC	Condensing	Carlyle semi-hermetic
MAD	Condensing	Copeland semi-hermetic
MAR	Condensing	Copeland hermetic
RAC	Compressor	Carlyle semi-hermetic
RAD	Compressor	Copeland semi-hermetic
RAR	Compressor	Copeland hermetic

Receipt and Inspection of Equipment

Inspect the Mastermetic Unit and any accessories shipped with it for damage or shortages before and during unloading. If there is any damage, the carrier should be notified immediately and an inspection requested. The delivery receipt must be noted that the equipment was received damaged. If damage is of a concealed nature you must contact the carrier immediately or no later than three (3) days following delivery. It is the responsibility of the consignee to file all claims for damage with the transportation company.

NOTE: Accessory items, such as drier cores, liquid line solenoids, etc. are packaged in a separate carton. Be sure that you receive all items.

Refrigerant Selection

Both R-22 and R-502 are offered commercial temperature applications. For low temperature applications R-502 and R-22 "Demand Cooling"® are specified.

Compressor Selection

The appropriate condensing or compressor unit is selected after the type refrigerant has been determined.

Please note that most of the compressor selections are based on 90° ambient which will produce approximately 105° condensing on low temperature units and 110° condensing on commercial temperature units. If ambients over 90° are expected, then the machine's capacity will decrease of 4% per 5°F increase ambient.

Multiplexing

Multiplexing is the term applied when more than one case line up is supplied by one compressor. When multiplexing, care must be taken to size the compressor to accommodate the entire load at the lowest evaporator temperature requirement for any case in the group. In order to avoid problems associated with dissimilar defrosts, it is preferable to multiplex only the same kind of cases.

Installation

All Mastermetics are shipped with a DRY NITROGEN HOLDING CHARGE. This holding charge prevents unit contamination and allows verification of the pressure integrity of the unit upon customer receipt. Cracking the discharge service valve should allow the nitrogen holding charge to escape. If no nitrogen escapes, a leak in the high side is probable, and steps should be taken to find and repair the leak. Each Mastermetic is factory checked for leaks by electronic leak detectors with a pressure of 400 psig, so the possibility of a leak is very remote. However, on occasion rough handling in transportation may break a line or solder joint. Check all piping for leaks during the installation process.

WARNING:
EFFECTIVE 7/1/92, IT IS ILLEGAL TO KNOWINGLY VENT OR DISCHARGE ANY CFC'S OR HCFC'S TO THE ATMOSPHERE. ALL CFC'S AND HCFC'S MUST BE RECLAIMED OR RECYLED.

Recommended Piping Practices For Kysor//Warren Cases

1) Use only clean sealed copper tubing.

2) Proper size refrigeration lines are essential to good refrigeration performance. Suction lines are more critical that liquid or discharge lines. Oversized suction lines may prevent proper oil return to the compressor. Undersized lines can rob refrigeration capacity and increase operating cost. Consult the technical manual or legend sheet for proper line sizes.

3) Refrigeration lines in cases in line-ups can be reduced. However, the lines should be no smaller than the main trunk lines in at least 1/3 of the cases and no smaller than one size above the case lines to the last

case. Reductions should not exceed one line size per case. It is preferred to bring the main trunk lines in at the center of the line-up. Individual feed lines should be at the bottom of the liquid header.

4) Do not run refrigeration lines from one system through cases on another system.

5) Use dry nitrogen in lines during the brazing to prevent scaling and oxidation.

WARNING:
WHEN USING A HIGH PRESSURE NITROGEN CONTAINER, PROPER REGULATING EQUIPMENT IN GOOD OPERATING CONDITION MUST BE USED.

6) Insulate suction lines from the cases to the compressor with 3/4" wall thickness Armaflex or equal on low temperature cases to provide maximum of 65°F superheated gas back to the compressor and prevent condensation in exposed areas. Insulate suction lines on medium temperature cases with 1/2" thick insulation in exposed areas to prevent condensate dropping.

7) Suction and liquid lines should never be taped or soldered together. Adequate heat exchanger is provided in the case.

8) Refrigeration lines should never be placed in the ground unless they are protected against moisture and electrolysis attack.

9) Always slope suction lines down toward the compressor, 1/2 inch each 10 feet. Do not leave dips in the line that would trap oil.

10) Provide "P" traps at the bottom of suction line risers, 4 feet or higher. Use a double "P" trap for each 20 feet of riser. "P" traps should be the same size as the horizontal line. Consult the technical manual or legend sheet for proper size risers.

11) Use long radius ells and avoid 45° ells.

12) Strap and support tubing to prevent excessive line vibration and noise.

13) Brazing of copper to copper should be with a minimum of 10% silver solder. Copper to brass or copper to steel should be with 45% silver solder.

14) Avoid the use of "bull head" tees in suction lines. An example is where suction gas enters both ends of the tee and exits the center. This can cause a substantial increase in pressure drop in the suction lines.

15) When connecting more than one suction line to a main trunk line, connect each branch line with an inverted trap.

Refrigeration Line Hook-up

For safe operation and trouble-free installations the following steps should be carried out by the installation personnel:

1) After all welds are made, open both ends of the tubing run and connect one end to dry nitrogen line. Blow out the lines with 250 to 350 psig until there is no scale present in the gas coming out of the open end.

2) Check the entire system for leaks.

3) With all valves open, connect a suitable vacuum pump to the Mastermetic and pull a vacuum of at least 1500 Microns (see the Case Installation Manual for

evacuation). If the gauge does not approach this value after a reasonable period, stop the vacuum pump. Check again for system leaks.

4) After leak repair, reconnect the vacuum pump to the Mastermetic and follow the procedure of step 5 above.

5) After holding a vacuum for a long time (at least 2 hours for each fixture in the system) the system is ready to charge.

6) When charging from a large cylinder, use a new drier in the line between the cylinder and the unit, to insure dry refrigerant.

7) After 24 hours operation, install a new drier in liquid line after checking all expansion valve strainers, and compressor suction strainer.

Line Sizing

For a particular job where exact line lengths are known, contact the Application Engineering Department for sizing assistance or ask for the Line Sizing Bulletin.

Accessories

There are many accessories available for the Mastermetic. Use of these accessories will facilitate a rapid installation of both the condensing and refrigerator units. Complete details are available from your local sales representative.

Standard control panel components include a suitable circuit breaker, contactor, proper defrost time clock when specified and dual pressure control. Copper or stainless steel tubing is used for the pressure control connection to eliminate the possibility of capillary line breakage.

Oil safety controls are standard on all Mastermetic compressors that have oil pumps. These controls prevent compressor damage due to low oil pressure. This is a manual reset control and should the control cycle off, it is recommended that the system be examined to determine the cause of the problem. Continued reset of the reset button will probably result in the repeated cycling off if the cause of the low oil pressure is not found and repaired. Minimum oil pressure should be 8-10 psi above suction pressure.

All liquid-line kits have a drier of adequate size, a liquid indicator, and hand valve to isolate the drier when changing is necessary. The drier in a system functions as a filter and moisture remover. When replacing the original drier, make sure to replace it with one of the same characteristics.

Liquid line pump down solenoid valves are available.

Defrost kits are available; both single and three phase, for applications up to 48 ampere load per kit. The contactors are sized for non-inductive (defrost heater) loads and should not be used for compressor loads.

Winter Control

A head pressure control valve is available on RA and MA style indoor units as an option . When "flooding" a condenser to control winter head pressures, additional refrigerant is required to fill the condenser with liquid to cut down on condensing surface. the following chart lists the amount of refrigerant that should be added after the sight glass indicates a full charge

based on ambient temperature when charging the system. This chart is based on 105° condensing temperature and the valve is set to maintain 105° condensing.

IMPORTANT:
IT IS IMPERATIVE THAT THIS CHART BE ADHERED TO FOR PROPER OPERATION IN COLD WEATHER.

Additional charging after a full sight glass (lbs of refrigerant)						
Size (HP)	Ambient Temperatures When Charging					
	10° & below	11° to 24°	25° to 39	40° to 59°	60° to 79°	80° & up
1	1.0	2.5	3.0	3.5	3.5	4.0
1-1/2	1.5	4.0	4.5	5.0	5.5	6.0
2	2.5	5.0	6.0	6.5	7.0	7.5
3	3.0	7.0	8.0	8.5	9.0	10.0
5	3.5	8.5	10.0	10.5	11.0	12.0
7-1/2	5.5	13.0	15.0	16.0	17.5	19.0
10	7.0	16.0	18.0	20.0	21.0	22.0
15	11.0	26.0	30.0	32.5	35.0	37.0
20	14.0	32.0	36.0	40.0	42.0	44.0
25	14.0	32.0	36.0	40.0	42.0	44.0

Control Panels and Time Clocks

Following is a list of Control Panels showing the components of each and their functions based on the most effective current applications in the field. Components listed are for "RWCP" (Regular Warren Control Panel). Components for the "HDCP" (Heavy Duty Control Panel) are the same except a NEMA-rated general purpose Square-D contactor is used in lieu of the definite purpose type.

Control Panel Application and Function

Panel	"Parts"	"Use"
RWCP-1 HDCP-1	Compressor Circuit Breaker Compressor Contactor No Time Clock	For off cycle defrost on produce cases, walk-in produce rooms, meat-cutting rooms, air conditioning, and any system where no defrost is required or where the coils defrost on each "off" cycle.
RWCP-2EC HDCP-2EC	Compressor Circuit Breaker Compressor Contactor Time Clock (8145-20B) Defrost Relay required	Temperature terminated for all cases, walk-in freezers or coolers* using electric defrost and multideck frozen-food refrigerators.

*Liquid-line solenoid is recommended for walk-ins using electric or hot-gas defrost. Not included in panels.

Mastermetic Advantages

Mastermetic air-cooled condensing units meet the most stringent requirements, in performance, size efficiency, and cost of ownership.

Major Advantages of the Mastermetic are

1) low cost of ownership

first cost

installation

maintenance

2) size efficiency

space saving

3) equal or greater capacity than remote air-cooled units

Application of Air-Cooled Mastermetics

In locations where the temperature does not vary to a great extent between summer and winter, no special arrangements are necessary except that the units should be located within an enclosure to keep dust to a minimum. Excessive dust tends to clog the condenser air passages and thereby reduce refrigeration efficiency.

There are three important factors that must be maintained to keep performance at its peak.

1) During the summer, the air entering the condenser must never exceed the outside temperature.
2) Fresh air must be constantly be brought into the room so that no stagnant air pockets will exist.
3) During winter, the air entering the condenser should not be lower than 55° unless an artificial head pressure control is employed.

Compressor Room Ventilation of Air-Cooled Condensing Units

Maximum performance from the Mastermetic requires an adequate fresh air circulation through the machine room. Fresh air circulation is provided by use of electric motor driven fans, suitably located as described below.

The air flow requirements are 800 to 1000 CFM/HP for MAC, MAD and MAR units and 75 to 100 CFM/HP for RAC, RAD and RAR units.

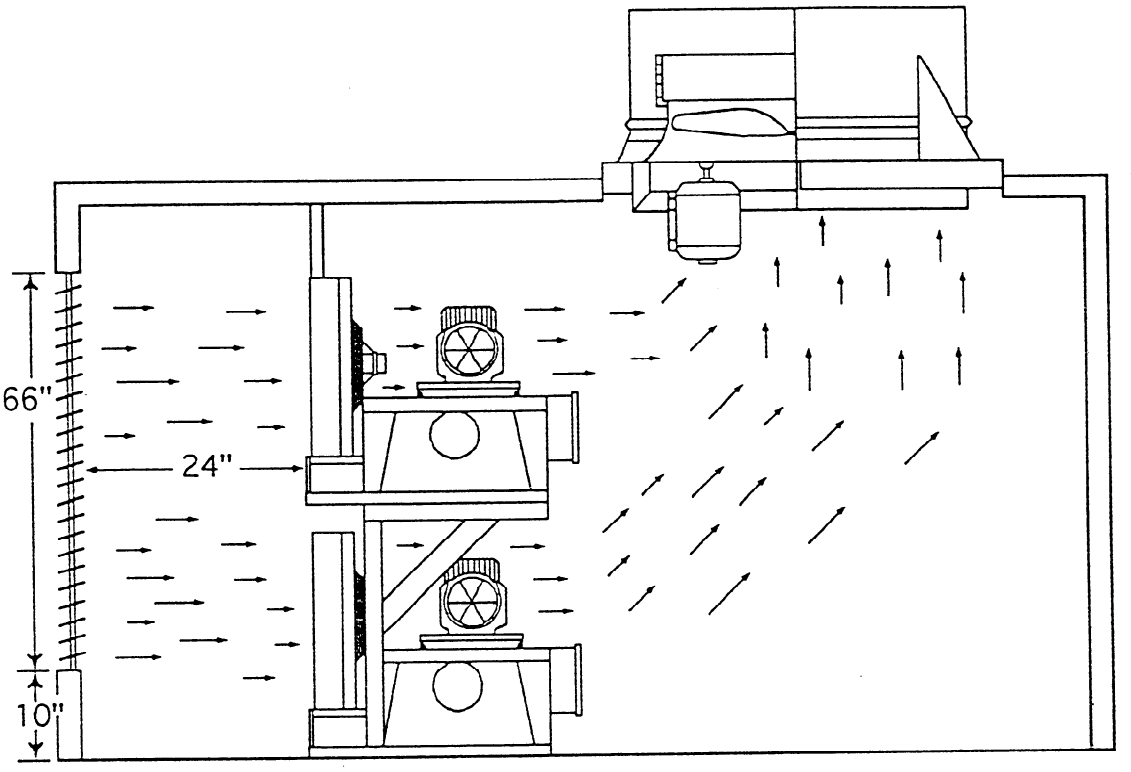
Figure 2-1 represents a typical installation of ventilating fans and intake louvers. In all instances, the fans pull air from the room as exhaust fans, while fresh air enters through the dampers. The air-circulation path(s) shown in Figure 2-1 show an outside wall mounted damper, preferably opposite the condenser(s). An alternate damper position in the roof is also aceptable. The exhaust fans may be either roof or wall mounted.

Figure 2-2 depicts a machine room that uses roof mounted entry and exhaust in the wall for the ventilation air.

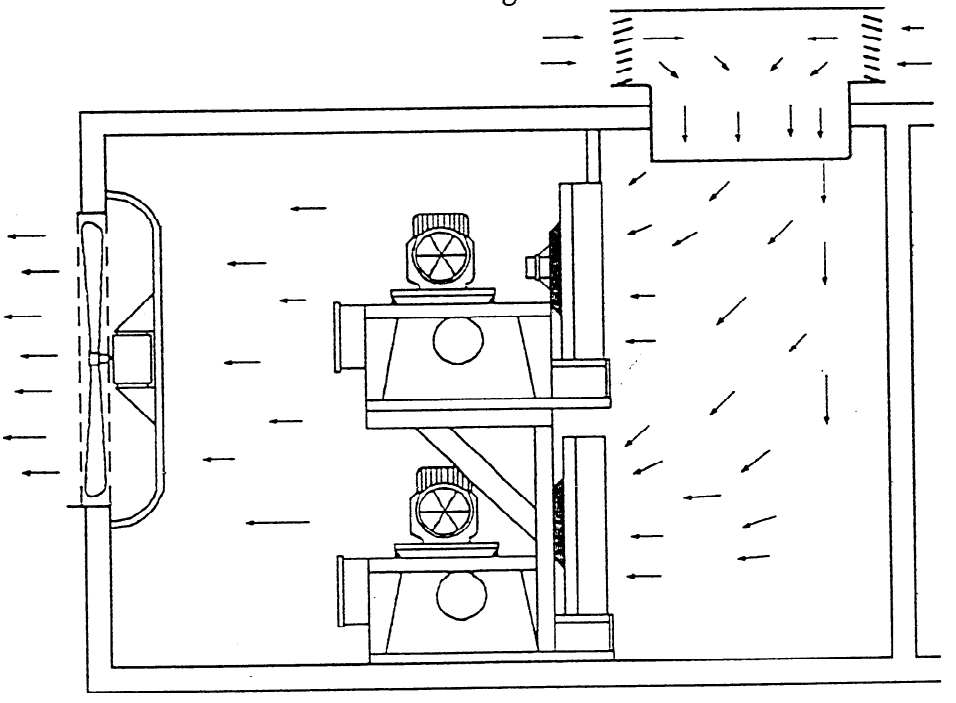
Criteria to determine damper and fan locations are as follow:

1) Eliminate all stagnant air zones within the room.
2) Accommodate the practical requirements of the room location.

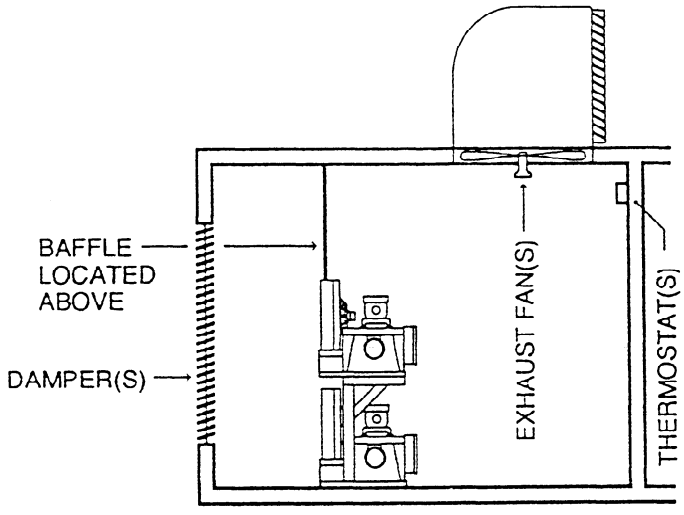
Proper location of fan thermostats is necessary for a uniform response of the exhaust fans. Figure 2-3 and 2-4 illustrate correct grouping; on the inside wall, near each other, and centered on the wall. Referring to the plan view, note that the exhaust fans are numbered 1, 2, 3, with individual thermostats. For ideal conditions the compressor room should maintain approximately 80°F when possible. With this in mind, thermostat 1 should be set to operate the fan at 75°F, thermostat 2 at 80°F and thermostat 3 at 85°F, all fans should operate. As the room temperature decreases, the fans react in sequence. If motorized dampers are employed, the thermostat operating the lower motor should be set 5°F below the lowest exhaust fan cut-in temperature.



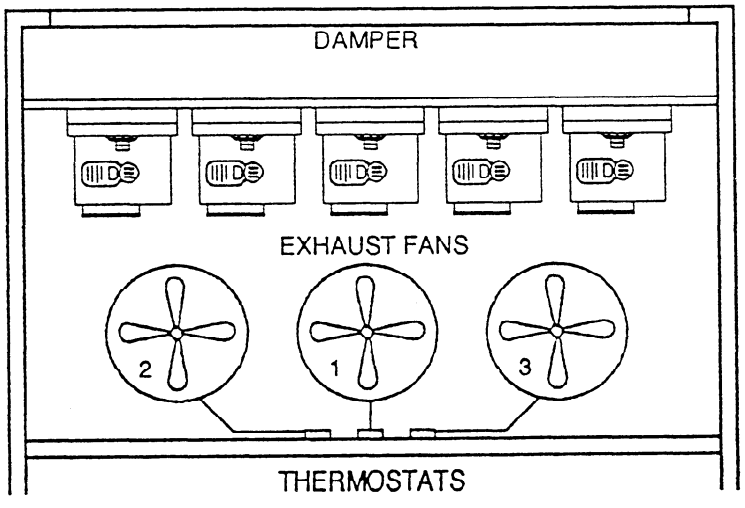
Ventilation Figure 2-1



Ventilation Figure 2-2



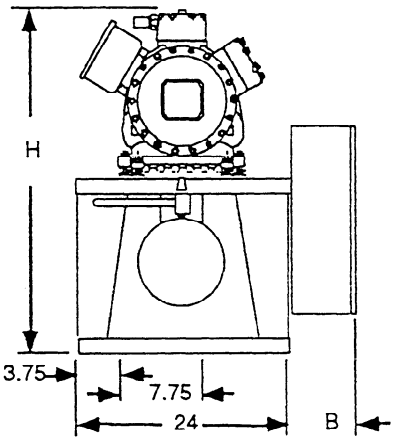
Ventilation Figure 2-3

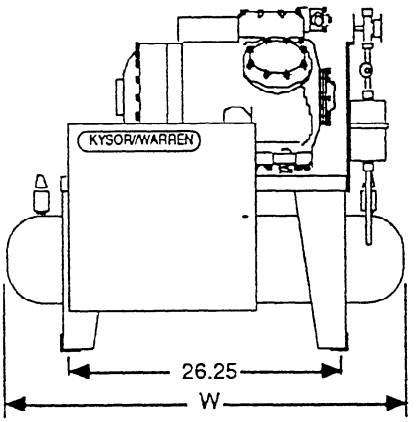


Ventilation Figure 2-4

At 70°F the thermostat opens damper 33%.
At 75°F the thermostat opens damper 66% and starts exhaust fan #1.
AT 80°F the thermostat opens damper 100% and starts exhaust fan #2.
At 85°F the thermostat starts exhaust fan #3.

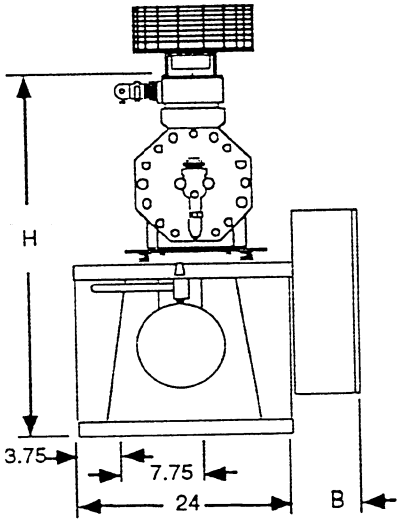
Dimensions for model RAC

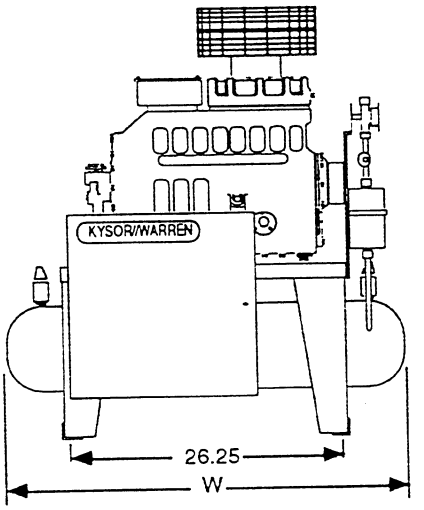




DH	DC	RL	Compressor	H w/HC Fan	H w/o HC Fan	W	B	Rec	MCA	MOPD
		0210	06DR109	41	32	38	5	2	10.8	15
0305	0305		06DM808						15.5	25
		0310	06DR013	44	33					
0505	0505		06DM313					3	24.1	40
	0535		06DM316							
		0510	06DR316							
		0560	06DR718	46	35					
0655			06DA818					4	39.3	70
	0645	0660	06DR820							
	0665	0690	06DR724	45	34					
0755			06DA824				6.50	5	49.5	80
	0775	0760	06DR228							
1005			06DA328			49		6	55.4	90
	1005		06DM337							
		1010	06DR337							
1505			06DA537						79.5	125
	1505		06EM150	50	39				80.4	
		1510	06ER150						74.1	
2005			06EA250						92.9	150
		2010	06ER165							
		2060	06ER175							
2505	2505		06EA265						113.4	200
	2535		06EM175							
3005			06EA275						145.5	250
		3010	06ER099							
	3505		06EM199						162.5	
4005			06EA299						192.0	300

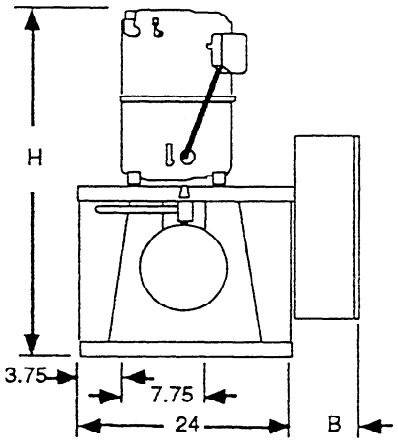
Dimensions for model RAD

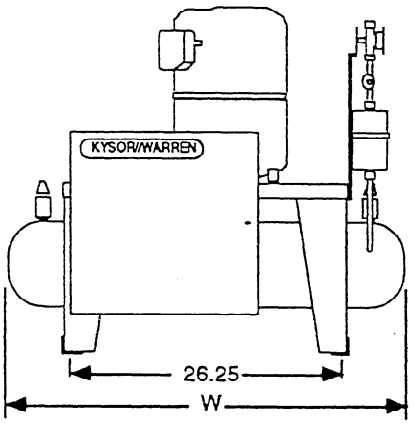




DH	DC	DD	RL	Compressor	H w/HC Fan	H w/o HC Fan	W	B	Rec	MCA	MOPD
0045	0045			HAG1-0050-TAC	33	29	31	5	1	3.0	15
	0055			HAJ1-0050-TAC						2.8	
0075	0075			KAN1-0075-TAC						4.4	
	0085			KAE1-0075-TAC						4.3	
0105	0105			KAR1-0100-TAC						5.4	
0135	0135			KAM1-0100-TAC						5.6	
		0115		KAJA-0101-TAC							
			0110	KAJ1-0100-TAC						4.3	
0155	0155			KAGA-0150-TAC						6.9	
			0160	KALA-0150-TAC						6.8	
0205	0205	0205		KAKA-0200-TAC			38		2	8.5	
			0210	EAV1-0200-TAC						8.3	
	0215			ERC1-0200-TAC						8.5	
0295	0295	0295		EAD1-0320-TAC						15.5	25
0305	0305			ERF1-0310-TAC		32				14.6	
			0310	LAH1-0310-TAC						13.4	20
			0330	LAC1-0310-TAC						12.5	
	0325			3RA1-0310-TAC						16.4	25
		0365	0360	2DF3-0300-TFC	44	35				21.0	35
		0415	0410	2DL3-0400-TFC						32.9	50
0505	0505			2DC3-0500-TFC					3	27.9	
0535	0535			2DD3-0500-TFC							
		0615	0610	2DA3-0600-TFC					4	36.0	60
		0635	0630	2DB3-0600-TFC							
		0695	0690	3DA3-0600-TFC	45	36				37.9	
0745	0745			2DL3-0750-TFC	44	35			5	39.5	70
0765	0765			2DA3-0750-TFC						40.0	70
		0765	0760	3DB3-0750-TFC	45	36			4	55.1	70
0775	0775			3DA3-0750-TFC				6.50	5	51.3	90
		0915	0910	3DF3-0900-TFC						48.8	80
		1015	1010	3DS3-1000-TFC						52.5	90
1005	1005			3DB3-1000-TFC			49		6	54.5	
		1095	1090	4DA3-1000-TSK	42					52.5	
1205	1205			3DF3-1200-TFC	45					60.3	100
1505	1505			3DS3-1500-TFC						74.5	125
		1515	1510	4DL3-1500-TSK	42					65.8	100
2005	2005			4DA3-2000-TSK						83.3	125
		2215	2210	4DT3-2200-TSK						82.5	
2505	2505			4DH3-2500-TSK						102.8	175
		2715	2710	6DL3-2700-TSK	47					101.0	
3005	3005			4DJ3-3000-TSK	42					117.5	200
			3010	6DT3-3000-TSK	47					119.5	
3505	3505			6DG3-3500-TSN						[illegible]	250
4005	4005			6DJ3-4000-TSN	49	38				[illegible]	300

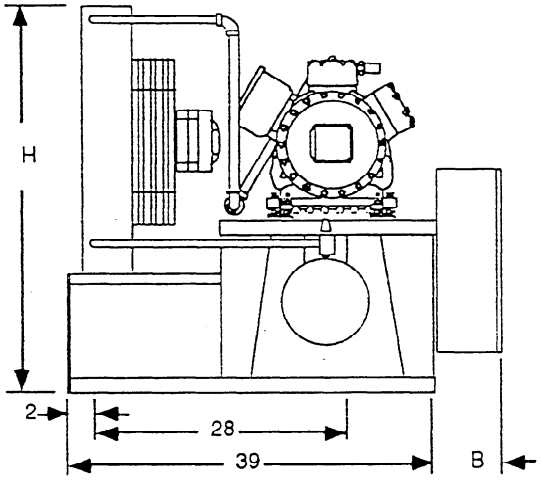
Dimensions for model RAR

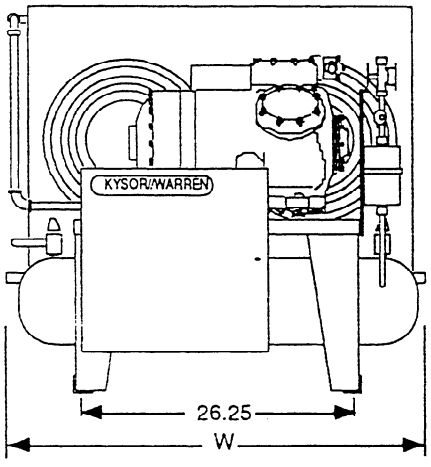




DH	DC	Compressor	H	W	B	Rec	MCA	MOPD
0045	0045	JRE1-0050-IAV	26	31	5	1	6.3	15
0055	0055	JRF4-0050-IAV	27				8.0	
0075	0075	RSE4-0075-IAV	29				8.9	
	0085	RSN6-0075-IAV					8.6	
0105	0105	RRG4-0100-PFV					7.5	
		RSL2-0100-CAV	28				13.0	20
0125	0125	REK3-0125-TFC	29				5.9	15
0155	0155	REB3-0150-TFC					10.6	
	0165	RSL4-0175-TFC					9.3	
0175	0175	REY3-0175-TFC					8.1	
0185	0185	CRA1-0150-TFC	31				11.6	20
0205	0205	CRD1-0200-TF5		38		2	10.9	15
0225	0225	CRE1-0225-TF5					13.3	20
0255	0255	CRF1-0250-TF5					14.3	25
0265	0265	CRG3-0250-TF5					15.0	
0275	0275	CRH3-0275-TF5	32				15.6	
0305	0305	CRJ3-0300-TF5				3	17.9	30
0325	0325	CRK3-0325-TF5					19.1	
0355	0355	CRL3-0350-TF5					21.0	35
0405	0405	CRM3-0400-TF5	33				22.4	40
		CRP5-0450-TF5				4	24.5	
0505	0505	CRN5-0500-TF5					26.8	45

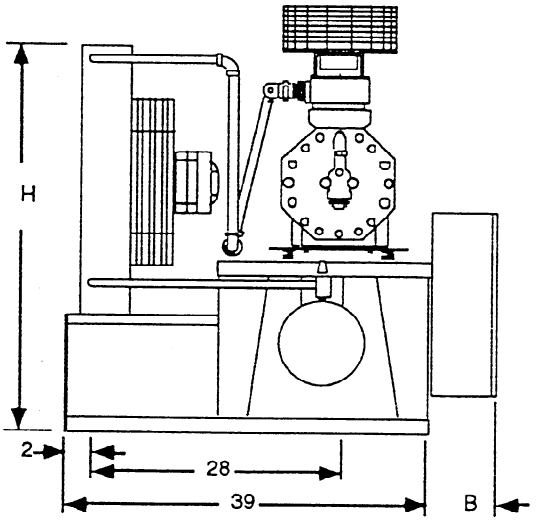
Dimensions for model MAC

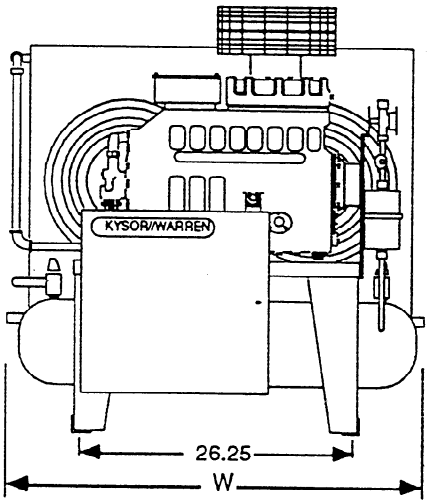




DH	DC	RL	Compressor	H w/HC Fan	H w/o HC Fan	W	B	Rec	Cond	MCA	MOPD
		0210	06DR109	41	36	38	5	2	3	13.8	20
0305	0305		06DM808							18.5	30
		0310	06DR013	44							
0505			06DM313		42.5			3	6	27.1	45
	0505				36				5		
	0535		06DM316		42.5				6		
		0510	06DR316		36				5		
		0560	06DR718	46	42.5				6		
0655			06DA818					4	8	43.8	70
	0645		06DR820								
		0660							7		
	0665	0690	06DR724	47.5	47.5				9		
0755			06DA824				6.50	5	10	55.5	90
	0775		06DR228	79.5	79.5				11		
		0760		47.5	47.5				9	54.0	
1005			06DA328	79.5	79.5	49		6	11	61.4	100
	1005		06DM337						12	64.4	
		1010	06DR337						11	61.4	
1505			06DA537						13	88.5	150
	1505		06EM150							89.4	
		1510	06ER150						12	83.1	125
2005			06EA250	90.5	90.5				15	104.9	175
		2010	06ER165	79.5	79.5				13	101.9	
		2060	06ER175	90.5	90.5				15	104.9	
	2505		06EA265							125.4	200

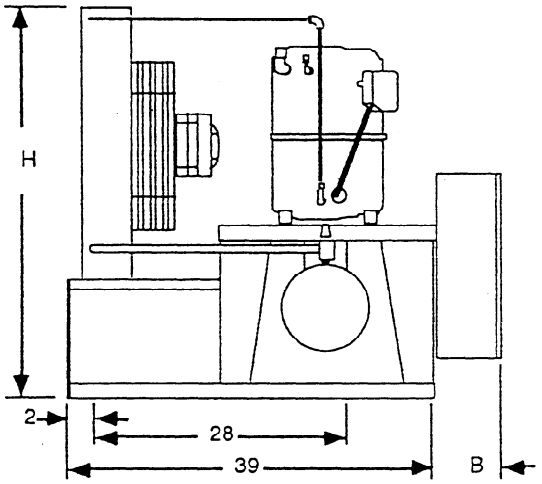
Dimensions for model MAD

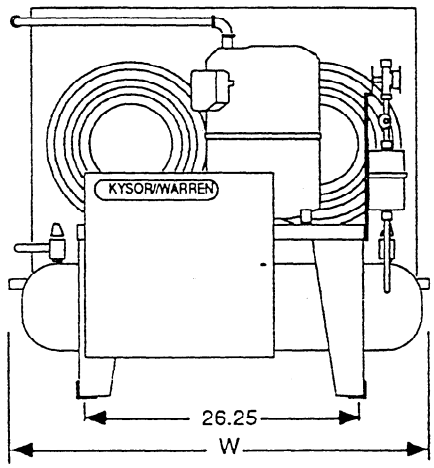




DH	DC	DD	RL	Compressor	H w/HC Fan	H w/o HC Fan	W	B	Rec	Cond	MCA	MOPD
0045	0045			HAG1-0050-TAC	N/A	36	31	5	1	1	4.5	15
	0055			HAJ1-0050-TAC							4.3	
0075	0075			KAN1-0075-TAC							5.9	
	0085			KAE1-0075-TAC							5.8	
0105	0105			KAR1-0100-TAC						2	6.9	
0135	0135			KAM1-0100-TAC							7.1	
		0115		KAJA-0101-TAC						1	7.1	
			0110	KAJ1-0100-TAC							5.8	
0155	0155			KAGA-0150-TAC						2	8.4	
			0160	KALA-0150-TAC							8.3	
0205	0205	0205		KAKA-0200-TAC			38		2		10.0	
			0210	EAV1-0200-TAC	N/A						9.8	
	0215			ERC1-0200-TAC							10.0	
0295				EAD1-0320-TAC						3	18.5	30
		0295								2	17.0	25
0305	0305			ERF1-0310-TAC	N/A					3	17.6	
			0310	LAH1-0310-TAC							16.4	
			0330	LAC1-0310-TAC							15.5	
	0325			3RA1-0310-TAC						4	19.4	30
		0365	0360	2DF3-0300-TFC	46					3	24.0	40
		0415	0410	2DL3-0400-TFC						4	35.9	60
0505				2DC3-0500-TFC		42.5			3	6	30.9	50
	0505					36				5		
0535	0535			2DD3-0500-TFC		42.5				6		
		0615	0610	2DA3-0600-TFC		36			4	5	39.0	60
		0635	0630	2DB3-0600-TFC		42.5				6	38.3	
		0695	0690	3DA3-0600-TFC	47						40.9	70
0745	0745			2DL3-0750-TFC	46				5	7	44.0	
0765	0765			2DA3-0750-TFC						8	44.5	
		0765	0760	3DB3-0750-TFC	47				4	7	43.9	
0775				3DA3-0750-TFC	47.5	47.5		6.50	5	10	55.8	90
	0775									9	55.8	
		0915	0910	3DF3-0900-TFC							53.3	
		1015	1010	3DS3-1000-TFC						10	58.5	
1005	1005			3DB3-1000-TFC	79.5	79.5	49		6	11	60.5	100
		1095	1090	4DA3-1000-TSK							58.5	90
1205	1205			3DF3-1200-TFC						12	69.3	100
1505				3DS3-1500-TFC						13	84.7	125
	1505									12	84.7	
		1515	1510	4DL3-1500-TSK							74.8	
2005				4DA3-2000-TSK	90.5	90.5				14	92.3	150
	2005				79.5	79.5				13	92.3	
		2215	2210	4DT3-2200-TSK	90.5	90.5				14	91.5	
	2505			4DH3-2500-TSK						15	114.8	175
		2715	2710	6DL3-2700-TSK							113.0	

Dimensions for model MAR





DH	DC	Compressor	H	W	B	Rec	Cond	MCA	MOPD
0045	0045	JRE1-0050-IAV	36	31	5	1	1	7.8	15
0055	0055	JRF4-0050-IAV					1	9.5	
0075		RSE4-0075-IAV					2	10.4	
	0075						1		
	0085	RSN6-0075-IAV						8.4	
0105	0105	RRG4-0100-PFV					2	9.0	
		RSL2-0100-CAV						14.5	20
0125	0125	REK3-0125-TFC						7.4	15
0155	0155	REB3-0150-TFC						12.1	20
	0165	RSL4-0175-TFC						10.8	15
0175	0175	REY3-0175-TFC						9.6	
0185	0185	CRA1-0150-TFC						13.1	20
0205	0205	CRD1-0200-TF5		38		2		12.4	
0225		CRE1-0225-TF5					3	16.3	25
	0225						2	14.8	
0255		CRF1-0250-TF5					3	17.3	
	0255						2	15.8	
0265	0265	CRG3-0250-TF5					3	18.0	
0275	0275	CRH3-0275-TF5						18.6	30
0305	0305	CRJ3-0300-TF5				3		20.9	
0325	0325	CRK3-0325-TF5						22.1	35
0355		CRL3-0350-TF5					4	24.0	40
	0355						3		
0405		CRM3-0400-TF5					5	25.4	
	0405						4		
		CRP5-0450-TF5				4	5	27.5	45
							4		
0505		CRN5-0500-TF5	42.5				6	29.8	50
	0505		36				4		

Dimension Notes (All Models)

1. H dimension is the maximum height of unit.
2. Any unit with an H dimension greater than 48 inches can not be double stacked.
3. Allow 48 inches for bottom unit (with or without head cooling fan) for double stacked height.
4. Dimension B is 9.50 inches when HDCP control box is used.
5. MCA (minimum circuit ampacity) and MOPD (maximum overcurrent protective device) ratings shown are for 208/60/3.

Condenser Data

Cond Number	Assy Part Number	Btuh/°TD	Rows	FPI	Fin Height	Finned Length	CFM	Fan Model	Number of Fans
1	51U29021	439	1	8	22.5	22	2491	TY1626	1
2	51U29022	1050	3				2188		
3	51U29016	1792				35	4058		2
4	51U29017	2144	4				3825		
5	51U29018	2401	5				3618		
6	51V18107	3039	3	10	37.5	42	4767		
7	51V18106	3538					6499		3
8	51U29019	4197	4				6199		
9	51U29020	4530			42.5		6461		
10	51V18111	5030					7760		4
11	51V18129	6078	3		75		9534		
12	51V18113	7167					12999		6
13	51V18112	8395	4				12399		
14	51V18114	9060			85		12922		
15	51V18108	10060					15521		8

Condenser Notes

1. All coils are copper tube with aluminum plate type fins.
2. The fan motor is 1/4 HP, 1550 RPM with an amp draw of 1.5 at 208/60/1.

Receiver Pump Down Capacity

Receiver	Dimensions	R22	R502
1	6.25 x 21	19	19
2	6.625 x 38	37	39
3	8.625 x 38	64	67
4	9.75 x 38	80	83
5	10.75 x 38	98	102
6	10.75 x 49	128	134

Receiver Notes

1. Pump down capacity is in pounds at 80% full and 100°F saturated liquid.
2. Any receiver in this list may be optionally substituted for the standard receiver listed in the dimensional tables on all units.

Initial Control Settings

Reprinted from ENGINEERING BULLETIN: #90-130-7 dated 7/26/90

NOTE: The following recommended settings are based upon 75°F/55% RH store conditions and properly loaded cases. Some adjustments may be required in both case temperature and defrost frequency after initial opening dates, and store settles down to usual traffic and environment.

General Control Recommendations

1) Thermostats are recommended as the primary control with Mastermetic units except on service meat cases.
2) Low pressure controls may require different settings if cases are controlled by thermostats.
3) EPR valves should only be used on Parallel System units on cases requiring higher temperature evaporators than the system design level. EPR valves are not recommended for ice cream applications.
4) Service meat cases should always have EPR as primary control and temperature thermostat as secondary control for peak performance.
5) All reach-in's must have a positive temperature control by thermostat or EPR. Control settings indicated are for safety only and are not intended for temperature control.

Defrost Control Settings

Application	Case Model	F/S-AD	F/S-E	F/S-OC	F/S-HG	Def/Day
Beverage	DV5H1		44			3
Dairy	BQD/BRQD		30	40	20	4
	C1W(all)			40		4
	D61		30	40	20	4
	D6(R)L1		30	40	20	6
	WALK-IN			60		3
Deli	D61		30	40	20	4
	M4(A)(G)1	45		50	18	6
	S3 - Blower			60		1
	WALK-IN			60		3
Frozen Food	BIL1/EBIL1	60	60		46	1
	IL1	60	60		46	1
	L5(F)(A)1	60	30		30	6
	LM1(G)1	54			46	4
	LV5H1		70		34	1
	WALK-IN		34		18	2-4
	WTL1/EWTL1	40	40		36	1
	XL1	60	60		46	1
Ice Cream	BIL1/EBIL1		60		46	1-2
	I5F		34		18	6
	IL1		60		46	1-2
	IV5H1		70		34	1
	WALK-IN		34		18	2-4
	WTL1/EWTL1		60		46	1-2
	XL1		60		46	1-2
Meat	M1A(G)1	45		50	18	3
	M4A(G)1	45		50	18	6
	S3-Gravity			80		1-2
	WALK-IN		34		18	2-4
Meat Prep	WALK-IN			60		1
Produce	HZV1,ZV1,TZP			32		4
	P1W(all)			32		4
	WALK-IN		60		3	

Control Settings R502

Application	Case Model	AIR TEMP	EPR	LP C/I	LP C/O
Beverage	DV5H1	34/38	52	30	10
Dairy	BQD/BRQD	24/28	43	60	46
	C1W(all)	28/32	50	60	46
	D61	28/32	52	60	46
	D6(R)L1	28/32	43	60	40
	WALK-IN	35/39	54	65	51
Deli	D61	24/28	43	60	40
	M4(A)(G)1	25/29	42	63	42
	S3-Blower	28/32	54	50	24
	WALK-IN	33/38	52	63	49
Frozen Food	BIL1/EBIL1	-10/0	12	16	9
	IL1	-10/0	12	16	9
	L5(F)(A)1	-5/0	14	10	4
	LM1(G)1	-10/0	12	16	9
	LV5H1	-5/0	18	15	5
	WALK-IN	-10/-5	15	16	9
	WTL1/EWTL1	-10/0	12	16	9
	XL1	-10/0	12	16	9
Ice Cream	BIL1/EBIL1	-28/-24	N/A	8	2
	I5F	-22/-12	N/A	12	5
	IL1	-28/-24	N/A	8	2
	IV5H1	-15/-12	N/A	8	1
	WALK-IN	-15/-10	12	N/A	N/A
	WTL1/EWTL1	-28/-24	N/A	8	2
	XL1	-28/-24	N/A	8	2
Meat	M1A(G)1	20/24	47	63	37
	M4A(G)1	20/24	47	63	37
	S3-Gravity	34/38	54	50	24
	WALK-IN	28/32	51	65	51
Meat Prep	WALK-IN	45/50	65	N/A	N/A
Produce	HZV1,ZV1,TZP	38/42	50	68	52
	P1W(all)	38/42	50	68	52
	WALK-IN	35/39	54	65	51

Control Settings R22

Application	Case Model	AIR TEMP	EPR	LP C/I	LP C/O
Beverage	DV5H1	34/38	43	22	7
Dairy	BQD/BRQD	24/28	38	54	34
	C1W(all)	28/32	38	50	38
	D61	28/32	43	54	34
	D6(R)L1	28/32	38	54	29
	WALK-IN	35/39	44	54	34
Deli	D61	24/28	38	54	34
	M4(A)(G)1	25/29	38	54	30
	S3-Blower	28/32	43	42	17
	WALK-IN	33/38	41	50	34
Frozen Food	BIL1/EBIL1	-10/0	8	8	1
	IL1	-10/0	8	8	1
	L5(F)(A)1	-5/0	8	8	1
	LM1(G)1	-10/0	8	8	1
	LV5H1	-5/0	13	8	1
	WALK-IN	-10/-5	10	8	1
	WTL1/EWTL1	-10/0	8	8	1
	XL1	-10/0	8	8	1
Ice Cream	BIL1/EBIL1	-28/-24	N/A	4	1
	I5F	-22/-12	N/A	4	1
	IL1	-28/-24	N/A	4	1
	IV5H1	-15/-12	8	4	1
	WALK-IN	-15/-10	7	4	1
	WTL1/EWTL1	-28/-24	N/A	4	1
	XL1	-28/-24	N/A	4	1
Meat	M1A(G)1	20/24	38	50	29
	M4A(G)1	20/24	38	50	29
	S3-Gravity	34/38	43	42	17
	WALK-IN	28/32	41	50	29
Meat Prep	WALK-IN	45/50	55	N/A	N/A
Produce	HZV1,ZV1,TZP	38/42	43	65	42
	P1W(all)	38/42	43	65	42
	WALK-IN	35/39			

IN THE CONSTANT EFFORT TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO CHANGE AT ANY TIME SPECIFICATIONS, DESIGN, OR PRICES WITHOUT INCURRING OBLIGATION.

KYSOR/WARREN

DIVISION OF KYSOR INDUSTRIAL CORPORATION

P.O. Box C
1600 Industrial Blvd.
Conyers, Georgia 30207
404 483-5600

ONE-YEAR WARRANTY

KYSOR/WARREN warrants to the original purchaser this new equipment and all parts thereof, to be free from defects in material and workmanship under normal use and service. If any part or parts of the equipment should prove defective during the period of one year from installation date (not to exceed one year and thirty days from the date of original shipment from the factory), KYSOR/WARREN hereby guarantees to replace or repair, without charge (F.O.B. CONYERS, GEORGIA), such part or parts as prove defective, and which KYSOR/WARREN's examination discloses to its satisfaction to be thus defective, with a new or functionally operative part. The liability of KYSOR/WARREN under this warranty shall be limited to claims made by the original purchaser to KYSOR/WARREN or its local distributor within the warranty period.

GLAZING: Glass is not guaranteed against breakage. If this refrigerator is equipped with a glazing assembly carrying the manufacturer's brand name (Thermopane, Twindow, etc.), the manufacturer's glazing warranty in effect at the time of this shipment is extended to that assembly. It is void outside the continential United States.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS, AND ALL OTHER OBLIGATIONS OR LIABILITIES OF KYSOR/WARREN.

THIS WARRANTY SHALL NOT APPLY:

1. To the condensing unit used with refrigerated equipment unless same was sold and shipped by KYSOR/WARREN.
2. When this equipment or any part thereof is damaged by fire, flood, act of God, or when the original model and serial—number plate has been altered, defaced, or removed.
3. When this equipment or any part thereof is subject to accident, alteration, abuse, misuse, tampering, operation on low or improper voltages, or is put to a use other than recommended by KYSOR/WARREN.
4. When this equipment or any part thereof is damaged, or when operation is impaired, due to failure to follow installation manual (improper installation is the responsibility of the installer).
5. Outside the continental United States.
6. To labor cost for replacement of parts, or for freight or shipping expenses.
7. If the Warranty holder fails to comply with all the provisions, terms and conditions of this Warranty.

Parts replaced under this Warranty are warranted only through the remainder of the original Warranty. KYSOR/WARREN may, at its option and in its discretion, elect to honor this Warranty and to disregard the original purchaser's noncompliance with any of the provisions, terms and conditions of this Warranty.

THIS WARRANTY DOES NOT COVER CONSEQUENTIAL DAMAGES.

KYSOR/WARREN shall not be liable under any circumstances for any consequential damages, including loss of profits, additional labor costs, loss of refrigerant or food products, or injury to person or property caused by defective material or parts or for any delay in the performance of this Warranty due to causes beyond its control. The foregoing shall constitute the sole and exclusive remedy of any purchaser and the sole and exclusive liability of KYSOR/WARREN in connection with this product.