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KYSOR // WARREN

The Leading Edge of Technology

INSTALLATION & OPERATION MANUAL

MODEL: **D6N D6NR**
DAIRY/MEAT

KYSOR // WARREN

DIVISION OF KYSOR INDUSTRIAL CORPORATION

1600 INDUSTRIAL BLVD., CONYERS, GEORGIA 30207 / 404•483•5600
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INSTALLATION AND OPERATING INSTRUCTIONS

FOR

D6N, D6NR MODELS

SELF-SERVICE DAIRY/MEAT CASES

APPLICATION:

The Kysor//Warren multi-shelf self-service dairy/meat cases are designed to merchandise packaged dairy/meat products. These cases should be installed and operated according to the instructions contained in the manual to insure proper performance. They are designed for display of products in an air-conditioned store where temperature and humidity are maintained at a maximum of 75 degree F dry bulb temperature, 55% relative humidity.

<u>MODEL</u>	<u>DESCRIPTION</u>
D6N	Front Load Dairy/Meat - 230v/50 Hz/1 Ph 5 - 16" Two position shelves.
D6NR	Front Roll In Dairy - 230v/50Hz/1 Ph To be used with Roll-In Carts - No Shelves.

*****CAUTION*****

THIS CASE IS TOP HEAVY.
EXTREME CARE SHOULD BE
USED WHEN REMOVING FROM
SKIDS AND DURING INSTALLATION.

GENERAL

These display refrigerators may be installed individually or in a continuous line-up consisting of several 8' and 12' sections by using a joint trim kit. A plexi-glass divider kit must be used between cases operating on different refrigeration systems.

SHIPPING DAMAGE

All equipment should be examined for shipping damage 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. A claim must be filed with the carrier by the consignee for all damages.

NOTE: ALL CLAIMS FOR SHORTAGES MUST BE MADE WITHIN 10 DAYS AFTER RECEIPT OF SHIPMENT.

LOCATION

This refrigerator must be located on a firmly based floor and leveled within plus or minus 1/16". Use the adjustable feet to level your refrigerator.

JOINING

Two or more fixtures of like models can be joined together to form a continuous line-up. Instructions for joining fixtures are included in the joint kit. Before lining up refrigerator, inspect refrigeration lines, electrical connections and controls to insure refrigerators are in proper line-up and are in the proper sequence.

When joining cases extra care must be taken to avoid breaking the silicone caulking at (a) the end of the drain pan and (b) between the lower edge of the fan plenum and rear edge of the drain pan. DO NOT use line up bolts to pull cases together. It is the installer's responsibility to assure that these seals are not broken and to repair as necessary after installation.

WASTE OUTLET

These cases are equipped with a waste outlet connection which terminates in the center of the refrigerator below the insulated bottom at the rear of the case. The water seal is shipped loose for field installation.

INSTALLING DRIP PIPE

Improperly installed drip pipes can seriously effect the operation of this equipment and result in increased maintenance costs. Listed below are some general rules for drip pipe installation.

1. Never use a double water seal.
2. Never use a pipe smaller than the size pipe or water seal supplied with the equipment.
3. Always provide as much fall as possible in drip pipe. (1" fall for each 4' of drip pipe.)
4. Avoid long runs in drip pipe which make it impossible to provide maximum fall in pipe.
5. Provide a drip space between pipe and floor drain or sewer connection.
6. Do not allow drip pipe to come in contact with uninsulated suction lines, which will cause the condensation from your refrigerator to freeze.

CLEANING

To insure minimum maintenance cost, cabinet should be thoroughly emptied and washed out every three months. The exterior should be washed weekly. A mild soap and water solution is recommended for painted surfaces of the cabinet. Do not use cleaners containing abrasive materials which will scratch or dull finish. The waste outlet should be flushed with a bucket of water following each cleaning.

NOTE: THIS CASE DOES NOT HAVE A SEALED BOTTOM OR BOTTOM WASTE OUTLET. DO NOT INTRODUCE WATER DIRECTLY INTO BOTTOM OF CASE.

LOADING

Merchandise should not be placed in the fixture until all controls have been adjusted and the refrigerator is at proper temperature.

At no time should the fixture be stocked beyond the load line or over the front edge of adjustable shelves. In doing so, you will seriously affect the performance which will result in higher product temperatures and increase operating costs.

ELECTRICAL

All field installed wiring must comply with the NATIONAL ELECTRICAL CODES and LOCAL CODES.

ELECTRICAL CONNECTION

An electrical junction box is provided on top of each refrigerator for running your fan, anti-sweat heaters, and defrost circuits.

Make sure that proper voltage is supplied to your refrigerator. Check refrigerator nameplate for the required voltage for fans, anti-sweat heaters, lights and defrost heaters. ALL REFRIGERATORS MUST BE GROUNDED.

Fan motors must operate continuously and panel must be marked sufficiently to prevent the fan motors and anti-sweat heaters from being turned off accidentally. When refrigerators are multiplexed, add the total of these amperage values to determine wire size and circuit protection. Anti-condensate controllers can be used to control the anti-condensate heater.

On electric defrost models, the defrost heater amperages of all cases on defrost circuit should be added together, and if their rating exceeds the defrost time clock or condensing unit breaker capacity, a defrost relay and circuit breaker must be employed and furnished by others. Make sure that proper wire size and branch circuit protection are employed for safe operation.

Chart #1 shows the electrical ratings for your refrigerator. This is the same information that appears on your refrigeration nameplate.

REFRIGERATION FAN MOTORS

The fan motors employed are permanently oiled for the life of the motor and requires no periodic maintenance. They are wired according to the enclosed wiring diagram and must run continuously.

For proper operation, lower insulated pans must be in place and sealed. If not sealed properly, undercase air return will pull refrigerated air from the display case.

ANTI-SWEAT HEATERS

An anti sweat heater is provided in front of the honeycomb to prevent condensation at the air outlet.

EXPANSION VALVE

The expansion valve furnished with your refrigerator has been sized for maximum coil efficiency. To adjust superheat, place a thermocouple under the expansion valve bulb. Read the suction line pressure as near coil as possible. (If at the condensing unit, estimate suction line loss at 2PSIG.) Convert coil suction pressure to temperature. The difference between coil temperature and the thermocouple temperature is superheat. (Use average superheat when expansion valve is hunting.) Do not set superheat until cases have pulled down to operating temperature and never open or close valve over 1/4 turn between adjustments and allow 10 minutes or more between adjustments. Superheat should be set to 6-8-degree F.

REFRIGERATION LINES

The refrigeration lines are located under the top access cover on all cases. A refrigeration outlet is provided in access cover as indicated on the plan view. Make sure all refrigeration lines lie as close to the refrigerator bottom so as not to obstruct the air pattern. See the section on "Recommended Piping Practices" for for additional details on piping practices.

These 8' and 12' refrigerators have polyurethane foamed-in-place insulation. In opening a ferrule hole, simply heat a piece of copper tubing of the same size as the tubing to be employed and force it through the ferrule hole.

NOTE: SEAL AROUND LINES AFTER CONNECTIONS ARE MADE. KEEP DIRECT FLAME AWAY FROM THE REFRIGERATOR, AS HEAT WILL DISINTEGRATE THE INSULATION.

REFRIGERANT

HCFC-22 expansion valves are standard. If another refrigerant is used, the order must specify the expansion valve to be supplied.

HEAT EXCHANGER

Heat exchangers are standard in these refrigerators. They aid to increase operating efficiency and reduce frosting and flood-back to compressor.

OPERATION

On single condensing unit systems a thermostat should be used to control temperatures. The thermostat bulb should be mounted in the discharge air. On parallel units, temperature control can be provided by EPR valve, thermostat and liquid line solenoid or solid state low pressure controls on compressor unit. Chart #2 shows approximate settings for merchandisers. Since many variables are present in each installation, such as store temperature, length of tubing runs, temperature desired in refrigerator, etc., Chart #2 is only a guide for the installer.

DEHYDRATION OF REFRIGERATION SYSTEMS

Please read carefully before placing system into operation. After laying refrigerant lines, they should be blown out before making final connection at fixture or condensing unit. Use dry nitrogen to prevent any foreign matter being left in the lines. Keep pressure below 250 pounds. To prevent scaling due to brazing, dry nitrogen should be allowed to flow through lines while brazing operations are taking place.

After the refrigeration system has been pressure-tested and proven leak-free, it is recommended that the system be dehydrated with a vacuum pump to 1000 microns for the first two evacuations and 500 microns on the third. The triple evacuation method requires evacuating the system three successive times and breaking each vacuum with dry refrigerant. Allow the pressure to rise above atmospheric pressure.

CAUTION: DURING INSTALLATION AND SERVICE OF THIS EQUIPMENT, PRECAUTIONS SHOULD BE TAKEN TO PREVENT LOSS OF REFRIGERANT TO THE ATMOSPHERE.

CONTROL DESCRIPTION

OFF-TIME DEFROST

Off-time defrost is standard on these models. The fans run continuously and defrost termination is by pressure or time (fail safe). See Chart #2 for defrost settings.

ELECTRIC DEFROST MODELS

For optional electric defrost, electric heaters are utilized to melt the frost and ice on the coil. The heaters are located in the air stream in front of the coil. The defrost cycle is time initiated and should be temperature terminated. Case fans operate continuously in defrost and refrigeration. As a safety precaution, a safety cut-off Klixon is wired in series with the defrost heater to turn the heater off at temperatures above 70-degree F.

HOT GAS DEFROST MODELS

On hot gas defrost models, (optional for parallel compressors operation only) hot gas is routed through the suction line and evaporator coil. It exits the coil through a by-pass around the expansion valve and heat exchanger to return to the liquid line where the condensed liquid is used to feed the other cases on the same parallel unit. The case fans continue to operate during defrost to warm up the drain pan and air ducts. The defrost cycle is time initiated and should be temperature terminated. (see Diagram for special piping)

CHART #1

<u>MODEL</u>	<u>EVAPORATOR FANS 230/50</u>	<u>ANTI-SWEAT HEATER 230/50</u>
D6N - 5	.87	.27
D6N - 8	1.16	.36
D6N - 12	1.74	.64
D6NR - 8	1.16	.36
D6NR - 12	1.74	.64

NOTE: CASES ARE NOT FURNISHED WITH CANOPY OR SHELF LIGHT.

CHART 1A

AIR FLOW REQUIREMENTS

	<u>DISCHARGE</u>	<u>RETURN</u>
D6N - 5	445 fpm	380 fpm
D6N - 8	430 fpm	360 fpm
D6N - 12	405 fpm	480 fpm
D6NR - 8	430 fpm	360 fpm
D6NR - 12	405 fpm	480 fpm

CHART #2

RECOMMENDED CONTROL SETTINGS

<u>MODEL</u>	<u>REFRIGERANT & APPLICANT</u>	<u>EPR VALVE</u>	<u>(DISC. AIR TEMP DG F)</u>	
			<u>CUT-OUT</u>	<u>CUT-IN</u>
D6N	HCFC-22 Dairy	38#	28	32
D6NR	HCFC-22 Dairy	38#	28	32
D6N	HCFC-22 Meat	33#	20	24

<u>MODEL</u>	<u>*DEFROST PERIODS FREQUENCY</u>	<u>TEMPERATURE TERMINATION (1)</u>	<u>FAIL SAFE SETTING</u>	
			<u>HOT GAS</u>	<u>ELECTRIC</u>
D6N	6/24 hours	hotgas 65-degF elect. 55-degF	20 min.	30 min.
D6NR	6/24 hours	hotgas 65-degF elect. 55-degF	20 min.	30 min.

(1) Temperature measured in discharge air

*Defrost frequency is at design conditions. Higher temperature or humidity may require more frequent defrost setting.

<u>BTU LOAD REQUIREMENTS**</u>	<u>5'</u>	<u>8'</u>	<u>12'</u>
D6N-Dairy * -9.4 deg-C	8550	13680	20520
D6N-Meat * -12.2 deg-C	9600	15360	23040
D6NR-Dairy * -9.4 deg-C	-	16420	24300

** Above ratings are based on 24 hour continuous run with no allowance for defrost or pull down.

PARTS LIST

D6N

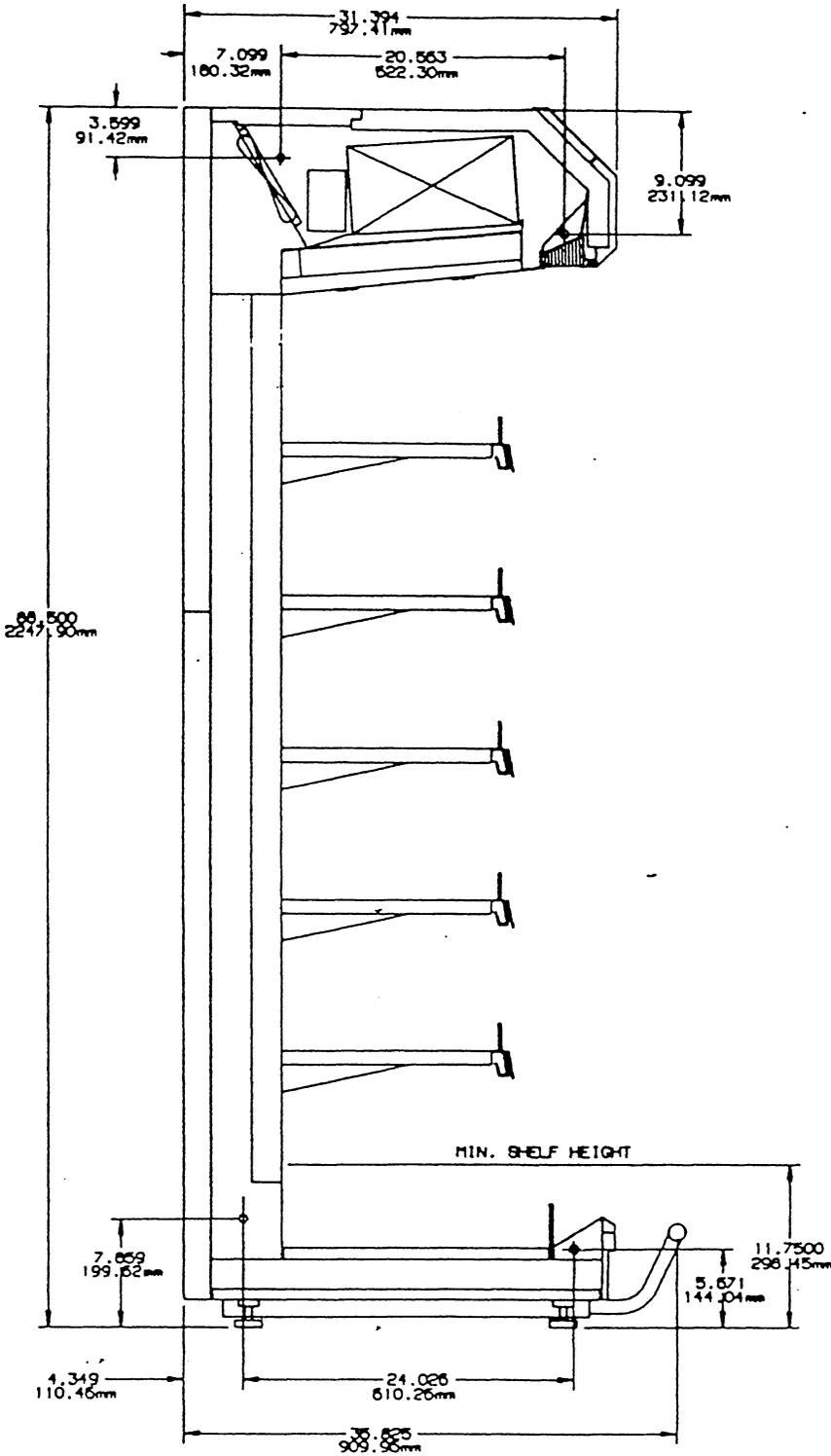
<u>DESCRIPTION</u>	<u>PART NO.</u>	<u>5'</u>	<u>8'</u>	<u>12'</u>
Expansion Valve (BFVE-A-C)	3A11-049	1	1	1
Evap Fan Motor (230 Volt)	9A10-060	3	4	6
Evap Fan Blade (CCW- 37 deg)	9B10-060	3	4	6
Shelf Bracket LH	54X15-562	(1 per kit)		
Shelf Bracket RH	54X15-563	(1 per kit)		
Lower Deck Pan Rear LH & RH	54N18-264	1		
	54N18-243		1	1
Lower Deck Pan Rear Center	54N18-246			1
Lower Deck Pan Front LH & RH	54N18-267	1		
	54N18-250		1	1
Lower Deck Pan Front Center	54N18-255			1
Upper Deck Pan	54N18-260	1		
	54N18-242		4	6
Kickplate Assembly	55A32-433	1		
	55A32-436		1	
	55A32-438			1

PARTS LIST

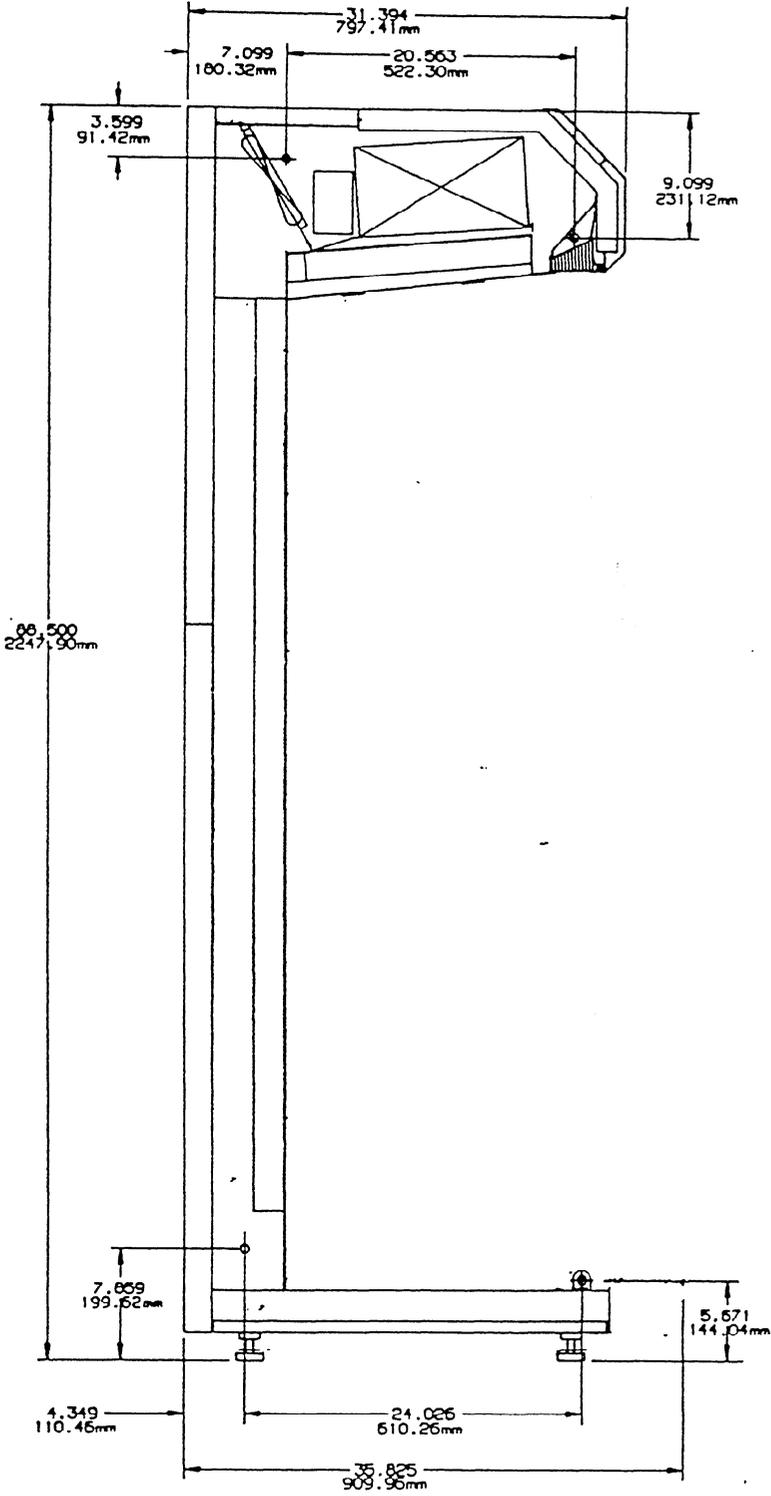
D6NR

<u>DESCRIPTION</u>	<u>PART NO.</u>	<u>5'</u>	<u>8'</u>	<u>12'</u>
Expansion Valve (BFVE-A-C)	3A11-049	1	1	1
Evap. Fan Motor (230V)	9A10-060	3	4	6
Evap. Fan Blade (CCW 37 deg.)	9B10-060	3	4	6
Shelf Bracket LH	54X15-562	(1 per kit)		
Shelf Bracket RH	54X15-563	(1 per kit)		
Shelf (1 per kit)	54X15-573	1		
	54X15-574		1	1

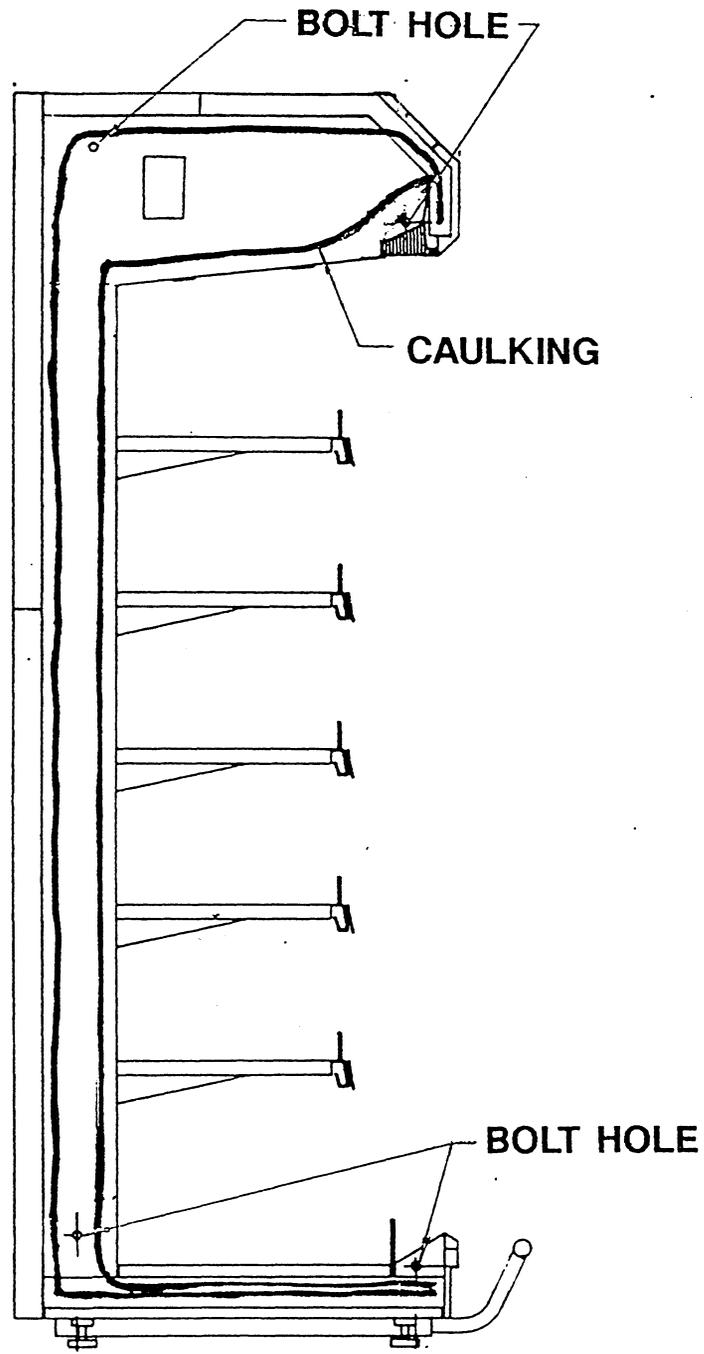
D6N



D6NR



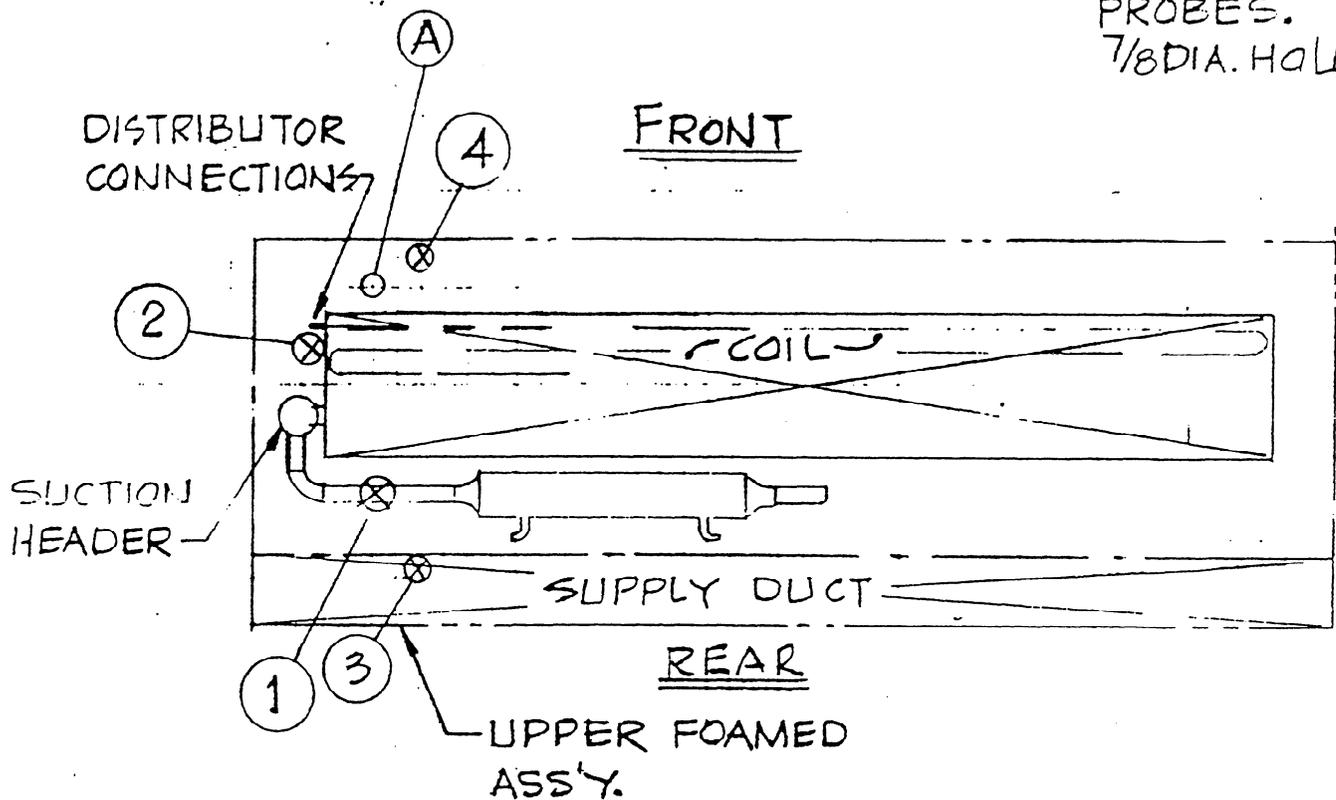
D6N



D6N



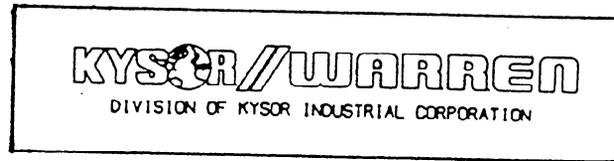
(A) OUTSIDE CONNECTION FOR THE TEMPKEY PROBES.
7/8 DIA. HOLE (1)



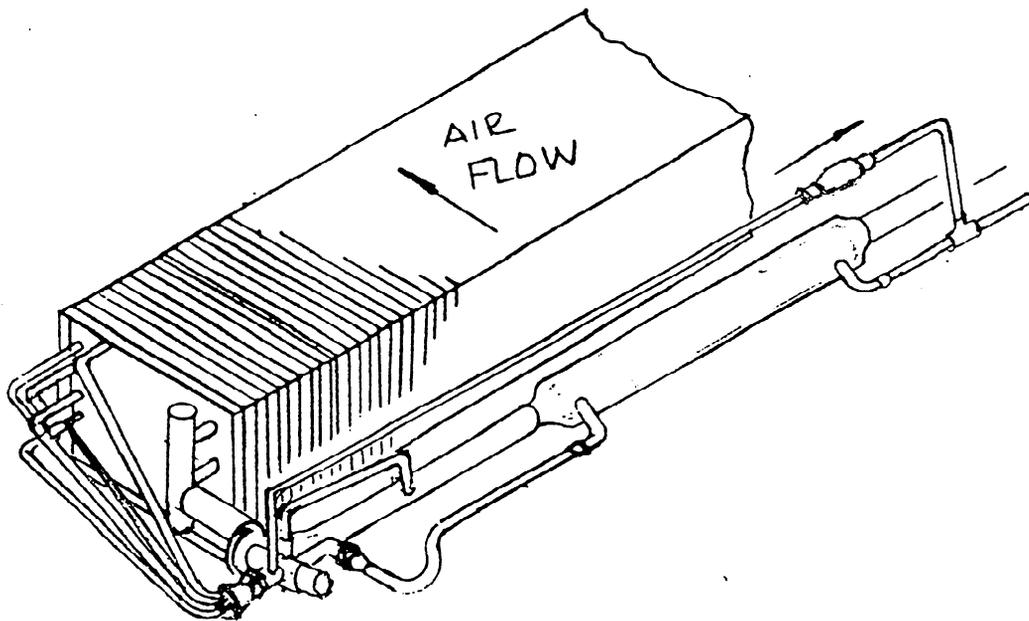
- ① SUCTION LINE TEMP. SENSOR (SAME LOCATION AS TXV)
INSULATE BULB
- ② EVAPORATOR TEMP. SENSOR (@ THE 1ST BEND AFTER THE DISTRIBUTOR)
- ③ AIR ON TEMP. SENSOR
- ④ AIR OFF TEMP. SENSOR (SAME LOCATION AS THE WOODLEY PROBE)

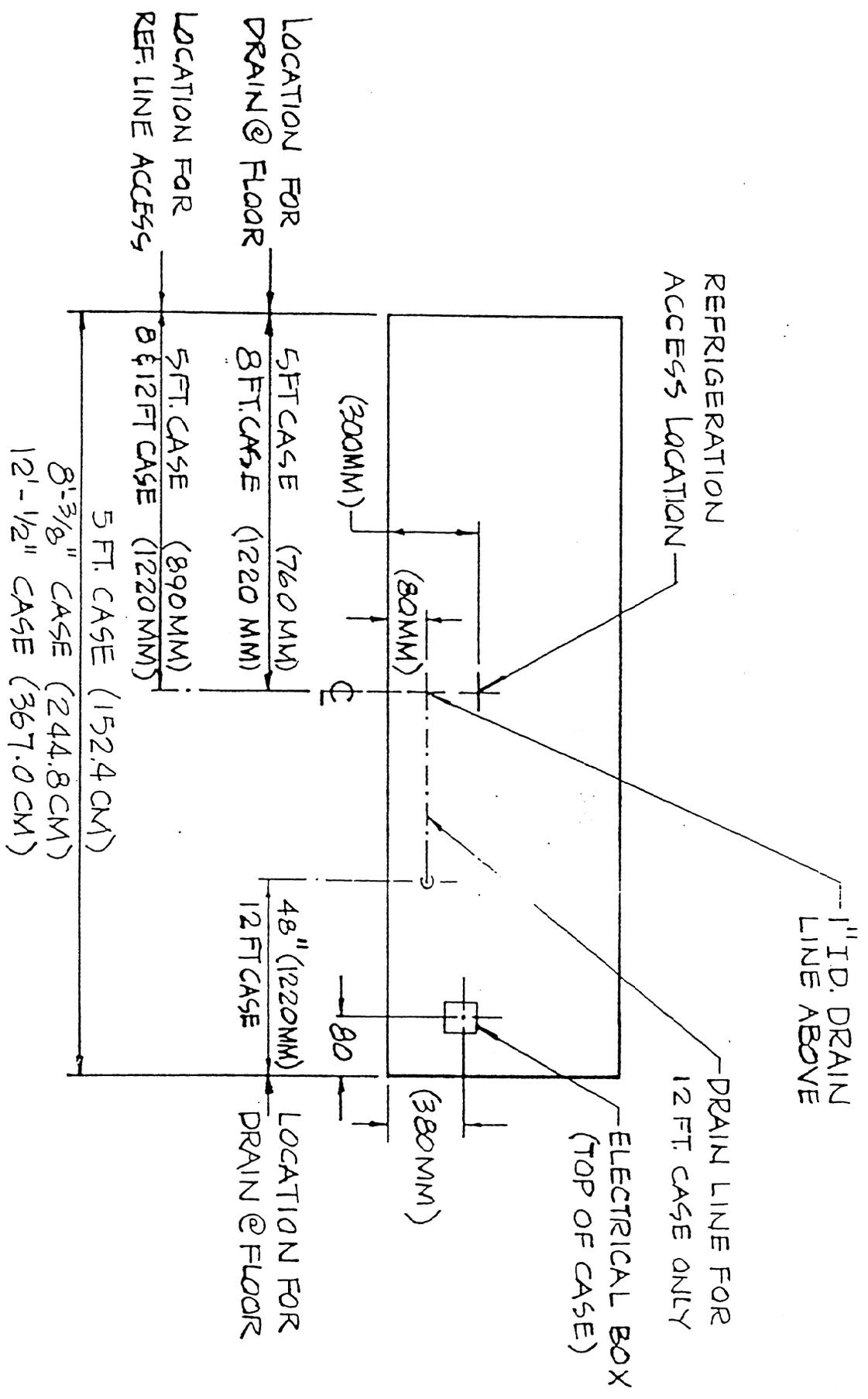
WOODLEY PROBE TO BE IN LINE WITH THE FAN MOTOR ON THE L.H. SIDE OF EA. CASE BETWEEN COIL & HONEYCOMB

D6N

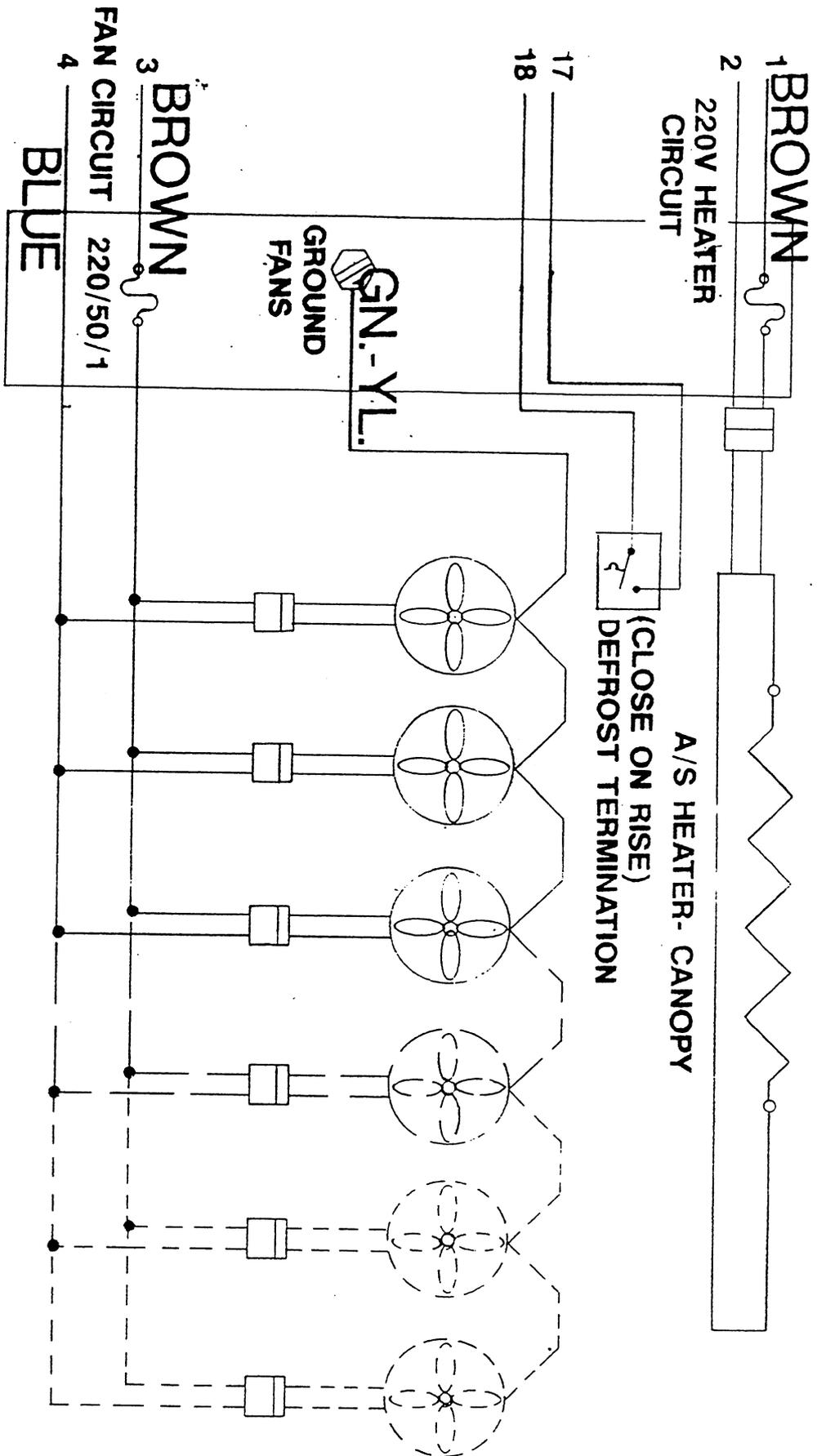


HOT GAS DEFROST





LETTER	REVISED	DATE	BY
DATE	10-2-90	TITLE	PLAN VIEW
SCALE	NONE		MODEL D6N D6NR
DRAWN	gm		
APPROVED	[Signature]		
KYSOR/WORREN		DRAWING NUMBER	
DIVISION OF KYSOR INDUSTRIAL CORPORATION		PA-22741	



EVAPORATOR FAN MOTOR

LEGEND

_____	5'
_____	8'
_____	12'

B	REMOVED FUSE FROM DEFROST TERM.	8-29-89	QW
A	ADD FUSES & CHANGED GRD. WIRE COLOR TO G./YEL.	8-2-90	PM
LETTER		REVISED	DATE
DATE	8-15-89		
SCALE	NONE		
DRAWN	RLB		
APPD.	QW		

WIRING DIAGRAM
D6N D6NR

APPD. QW

KYSOR WARREN / SHERER
DIVISION OF KYSOR INDUSTRIAL CORPORATION

DRAWING NUMBER
PA-22619 B

P.P.# 31C10-412

RECOMMENDED PIPING PRACTICES FOR KYSOR//WARREN CASES

1. Proper size refrigeration lines are essential to good refrigeration performance. Suction lines are more critical than 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.
2. 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 line-up. Liquid lines on systems on hot gas defrost must be increased one line size above the main trunk line for the entire line-up. Individual feed lines should be at the bottom of the liquid header.
3. Do not run refrigeration lines from one system through cases on another system.
4. Use dry nitrogen in lines during the brazing to prevent scaling and oxidation.
5. 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 Degree 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 droppage.
6. Suction and liquid lines should never be taped or soldered together. Adequate heat exchanger is provided in the case.
7. Refrigeration lines should never be placed in the ground unless they are protected against moisture and electrolysis attack.
8. Always slope suction lines down toward the compressor, 1/2" each 10'. Do not leave dips in the line that would trap oil.
9. Provide "P" traps at the bottom of suction line risers, 4' or longer. Use a double "P" trap for each 20' of risers. "P" traps should be the same size as the horizontal line. Consult the technical manual or legend sheet for proper size risers.
10. Use long radius ells and avoid 45 Degree ells.

RECOMMENDED PIPING PRACTICES FOR KYSOR//WARREN CASES (continued)

11. Provide expansion loops in suction lines on systems on hot gas defrost. See Engineering Bulletin #85-204-3 for detail.
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. Copper to brass or copper to steel should be with 45% silver.
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.

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



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 continental 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.