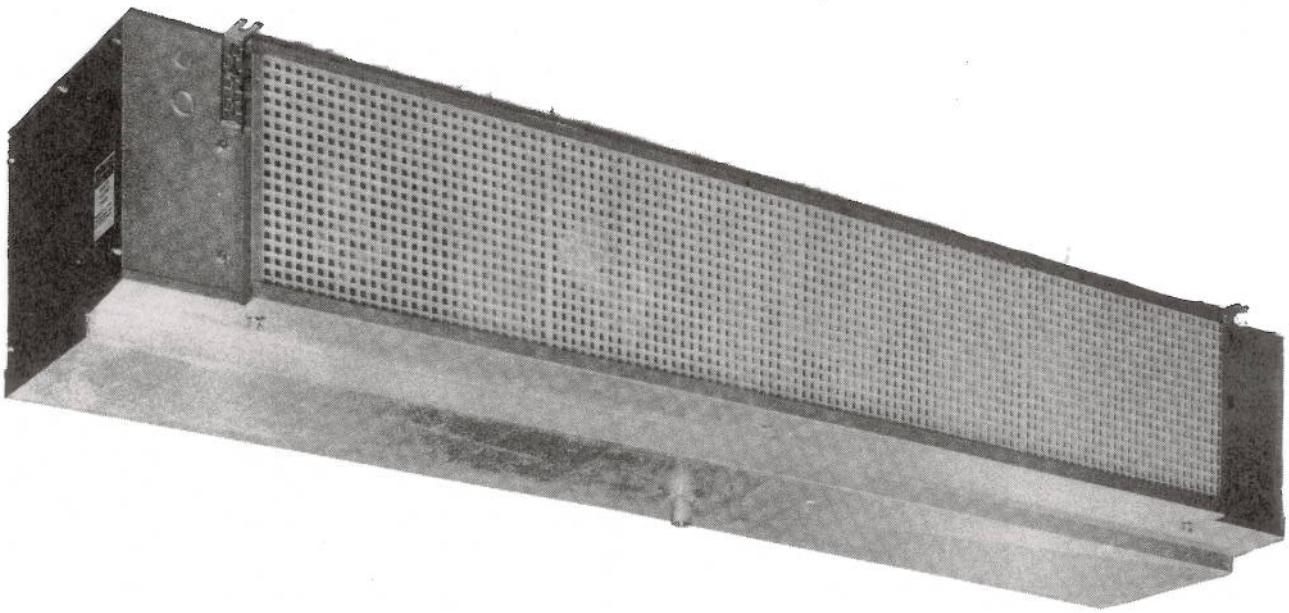
SnyderGeneral Corporation
REFRIGERATION PRODUCTS GROUP

INSTALLATION AND MAINTENANCE DATA

BULLETIN NO. IM 228-4
October, 1986
PART NO. 9089550 REV. B

LOW TEMPERATURE ELECTRIC DEFROST LO-SILHOUETTE UNIT COOLER



Models ELC-035C thru -360D

TABLE OF CONTENTS

INSPECTION

When the equipment is received, all items should be carefully checked against the bill of lading to make sure all crates and cartons have been received. All units should be carefully inspected for damage when received. If any damage is found it should be reported to the carrier immediately and a claim should be filed. The unit nameplate should be checked to make sure that the voltage agrees with the power supply available.

INSTALLATION

NOTE: Installation and maintenance are to be performed only by qualified personnel who are familiar with local codes and regulations, and experienced with this type of equipment. CAUTION: Sharp edges and coil surfaces are a potential injury hazard. Avoid contact with them.

LOCATION

ELC units draw air in through the coil and discharge through the fans. For the best operation, units should be located away from doors or should be placed in such a way that air from an open door cannot be drawn directly into the unit coil. See Figure 1 for airflow direction and recommended minimum clearances.

Units must also be installed to provide for proper drainage of condensate. Refer to drain line recommendations on page 5.

MOUNTING

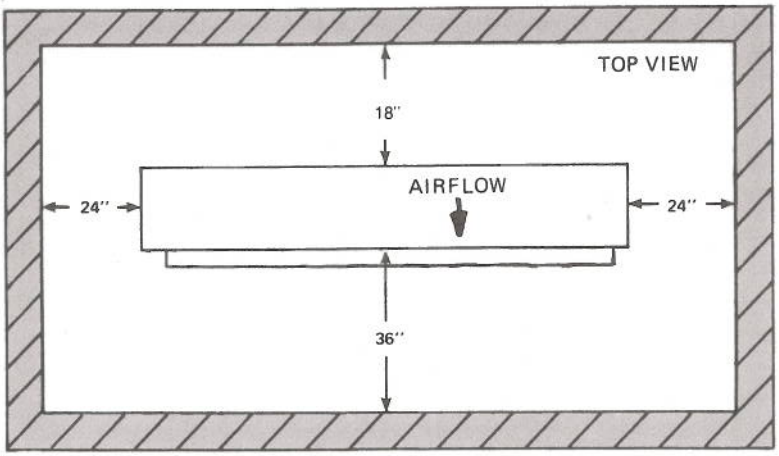
These units contain a single center drain connection and do not require any unit pitch for condensate drainage. Units should be mounted as level as possible to assure proper unit operation. The bolts, lag screws or hanger rod used to hang these units should be at least 5/16" diameter.

To insure NSF Standard 7 acceptance the following must be incorporated into the installation:

A. The area between the top of the unit cooler and the adjacent ceiling must be sealed or exposed in such a way to facilitate hand cleaning without the use of tools.

B. Ends of open hanger channels must be sealed to prevent accumulation of foreign matter.

Figure 1. MINIMUM UNIT CLEARANCES



NOTE: Leave space equal to unit height between bottom of unit and product. Do not stock product in front of fans.

Table 1. PHYSICAL DATA

ELC UNIT SIZE	CONNECTION SIZES (INCHES)				APPROXIMATE REFRIGERANT CHARGE (LBS.)	APPROXIMATE SHIPPING WEIGHT (LBS.)
	DISTRIBUTOR INLET	SUCTION	EXTERNAL EQUALIZER	DRAIN		
035C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	2.8	70
050C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	1.5	87
070C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	3.3	95
090C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	4.9	116
105C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	4.9	120
120C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	6.4	141
140C	1/2 FL.	7/8 O.D.	1/4 FL.	3/4 F.P.S.	6.4	144
160C	1/2 FL.	1-1/8 O.D.	1/4 FL.	3/4 F.P.S.	7.9	166
175C	1/2 FL.	1-1/8 O.D.	1/4 FL.	3/4 F.P.S.	7.9	170
210C	1/2 FL.	1-1/8 O.D.	1/4 FL.	3/4 F.P.S.	9.5	195
250D	7/8 ODM	1-3/8 O.D.	1/4 FL.	3/4 F.P.S.	16.0	260
300D	1-1/8 ODM	1-5/8 O.D.	1/4 FL.	3/4 F.P.S.	21.0	268
360D	1-1/8 ODM	1-5/8 O.D.	1/4 FL.	3/4 F.P.S.	21.0	270

REFRIGERANT PIPING

GENERAL

Install all refrigeration components in accordance with applicable local and national codes and in accordance with good practice for proper system operation. The system should be designed with an automatic compressor pump-down cycle to prevent liquid slugging of the compressor after a defrost cycle.

Connect the suction line to the connection extending through the unit cabinet and run the liquid line through the opening provided in the cabinet. See Table 1 for suction connection, distributor inlet and external equalizer line sizes. See Tables 2, 3 and 4 for line sizing information.

Refrigeration lines should be sized to avoid excessive pressure drop. All horizontal suction lines should be sloped towards the compressor at the rate of 1" per 10 ft. for good oil return. Vertical suction risers of more than 5 ft. should be trapped at the bottom with a P-trap or equivalent field fabricated trap.

MULTIPLE UNIT PIPING

Figure 2 shows typical piping for multiple units. When more than one unit is installed in a room, it is recommended that all units be defrosted at the same time. Otherwise, air movement in the room from the operating unit(s) may slow down defrosting or even prevent a complete defrosting. Also, simultaneous defrosting permits the use of one timer which results in installation cost savings. See the "Field Wiring" section of this bulletin for information on wiring multiple units.

EXPANSION VALVE INSTALLATION

Select the proper thermostatic expansion valve from Table 5. The valve must be the externally equalized type. It can be mounted inside the unit end compartment. See Table 1 for distributor inlet size and external line size. The expansion valve bulb must be located on a horizontal length of line as close as possible to the suction header. Fasten the bulb securely so there is tight line-to-line contact. If there is a P-trap in the suction line the bulb must be installed upstream of the trap (between the unit and trap).

Figure 2. MULTIPLE UNIT PIPING

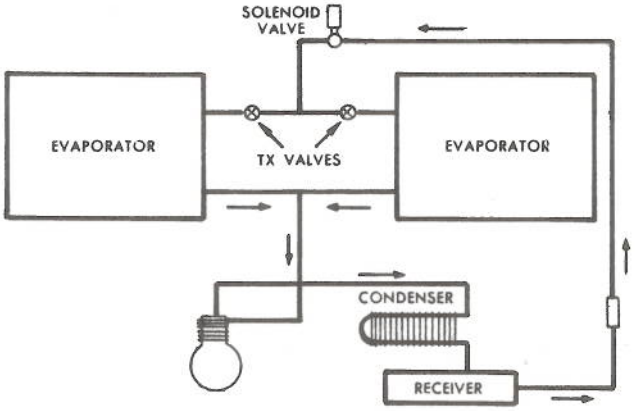


Table 2. LINE SIZES FOR REFRIGERANT 502

Unit Cooler Capacity BTU/HR	Suction Line Size–O.D. in inches–Type L Copper Tubing. Line Size Basis: –10 to –30=1.3 lbs. P.D.; –30 to –50=1.0 lbs. P.D. Suction Temperature Range (F)										Liquid Line Size O.D. in inches Type L Copper Tubing				
	–10 to –30					–30 to –50					Equiv. Liquid Line Lengths (Ft.)				
	Equivalent Suction Line Lengths (Ft.)														
	25	50	75	100	150	25	50	75	100	150	25	50	75	100	150
2,000	1/2	1/2	5/8	5/8	7/8	1/2	5/8	7/8	7/8	7/8	1/4	1/4	1/4	1/4	1/4
3,000	1/2	5/8	5/8	5/8	7/8	5/8	5/8	7/8	7/8	7/8	1/4	1/4	1/4	3/8	3/8
4,000	5/8	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	1/4	3/8	3/8	3/8	3/8
5,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1/4	3/8	3/8	3/8	3/8
6,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	3/8	3/8	3/8	3/8	3/8
7,000	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	3/8	3/8	3/8	3/8	3/8
8,000	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	3/8	3/8	3/8	3/8	1/2
9,000	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	3/8	3/8	3/8	3/8	1/2
10,000	7/8	7/8	1 1/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	3/8	3/8	3/8	3/8	1/2
12,000	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	3/8	3/8	3/8	1/2	1/2
14,000	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	3/8	3/8	1/2	1/2	1/2
16,000	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8	3/8	1/2	1/2	1/2	1/2
18,000	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	3/8	1/2	1/2	1/2	1/2
20,000	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8	3/8	1/2	1/2	1/2	1/2
25,000	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	1/2	1/2	1/2	1/2	5/8
30,000	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 5/8	1 5/8	1 5/8	2 1/8	1/2	1/2	5/8	5/8	5/8
35,000	1 1/8	1 3/8	1 5/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	1/2	1/2	5/8	5/8	5/8
40,000	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	1/2	5/8	5/8	5/8	5/8
45,000	1 3/8	1 5/8	1 5/8	1 5/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	1/2	5/8	5/8	5/8	7/8
50,000	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	1/2	5/8	5/8	7/8	7/8
60,000	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	5/8	5/8	7/8	7/8	7/8
70,000	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 1/8	2 5/8	2 5/8	5/8	5/8	7/8	7/8	7/8
80,000	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	5/8	7/8	7/8	7/8	7/8
90,000	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	5/8	7/8	7/8	7/8	7/8
100,000	1 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 1/8	2 5/8	2 5/8	2 5/8	3 1/8	5/8	7/8	7/8	7/8	7/8
125,000	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	2 1/8	2 5/8	2 5/8	3 1/8	3 1/8	5/8	7/8	7/8	7/8	1 1/8
150,000	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	2 5/8	2 5/8	3 1/8	3 1/8	3 1/8	7/8	7/8	7/8	1 1/8	1 1/8

Table 3. LINE SIZES FOR REFRIGERANT 12

Unit Cooler Capacity BTU/HR	Suction Line Size—O.D. in inches—Type L Copper Tubing Line Size Basis: +50 to +30=3 lbs. P.D.; +30 to +10=2 lbs. P.D. Suction Temperature Range (F) +50 to +30 Equivalent Suction Line Lengths (Ft.)					+30 to +10					Liquid Line Size O.D. in inches Type L Copper Tubing Equiv. Liquid Line Lengths (Ft.)				
	25	50	75	100	150	25	50	75	100	150	25	50	75	100	150
5,000	1/2	1/2	1/2	1/2	5/8	1/2	5/8	5/8	5/8	5/8	1/4	3/8	3/8	3/8	3/8
6,000	1/2	1/2	5/8	5/8	5/8	1/2	5/8	5/8	5/8	7/8	1/4	3/8	3/8	3/8	3/8
7,000	1/2	1/2	5/8	5/8	5/8	5/8	5/8	7/8	7/8	7/8	3/8	3/8	3/8	3/8	3/8
8,000	1/2	5/8	5/8	5/8	7/8	5/8	5/8	7/8	7/8	7/8	3/8	3/8	3/8	3/8	1/2
9,000	1/2	5/8	5/8	5/8	7/8	5/8	7/8	7/8	7/8	7/8	3/8	3/8	3/8	1/2	1/2
10,000	5/8	5/8	5/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	3/8	3/8	1/2	1/2	1/2
12,000	5/8	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	3/8	3/8	1/2	1/2	1/2
14,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	3/8	1/2	1/2	1/2	1/2
16,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	3/8	1/2	1/2	1/2	1/2
18,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	1/2	1/2	1/2	1/2	1/2
20,000	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1/2	1/2	1/2	1/2	5/8
25,000	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1/2	1/2	1/2	5/8	5/8
30,000	7/8	7/8	1 1/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1/2	1/2	5/8	5/8	5/8
35,000	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1/2	5/8	5/8	5/8	5/8
40,000	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1/2	5/8	5/8	5/8	7/8
45,000	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	1/2	5/8	5/8	5/8	7/8
50,000	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	1/2	5/8	5/8	7/8	7/8
60,000	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8	5/8	5/8	7/8	7/8	7/8
70,000	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8	5/8	5/8	7/8	7/8	7/8
80,000	1 1/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	5/8	7/8	7/8	7/8	7/8
90,000	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	5/8	7/8	7/8	7/8	7/8
100,000	1 3/8	1 3/8	1 5/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	7/8	7/8	7/8	7/8	7/8
125,000	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	7/8	7/8	7/8	7/8	1 1/8
150,000	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 1/8	7/8	7/8	7/8	1 1/8	1 1/8

Table 4. LINE SIZES FOR REFRIGERANT 22

Unit Cooler Capacity BTU/HR	Suction Line Size—O.D. in inches—Type L Copper Tubing Line Size Basis: +50 to +30=4 lbs. P.D.; +30 to +10=3 lbs. P.D. Suction Temperature Range (F) +50 to +30 Equivalent Suction Line Lengths (Ft.)					+30 to +10					Liquid Line Size O.D. in inches Type L Copper Tubing Equiv. Liquid Line Lengths (Ft.)				
	25	50	75	100	150	25	50	75	100	150	25	50	75	100	150
7,000	1/2	1/2	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	1/4	1/4	3/8	3/8	3/8
8,000	1/2	1/2	1/2	1/2	5/8	1/2	1/2	5/8	5/8	5/8	1/4	3/8	3/8	3/8	3/8
9,000	1/2	1/2	1/2	5/8	5/8	1/2	5/8	5/8	5/8	5/8	1/4	3/8	3/8	3/8	3/8
10,000	1/2	1/2	1/2	5/8	5/8	1/2	5/8	5/8	5/8	7/8	1/4	3/8	3/8	3/8	3/8
12,000	1/2	1/2	5/8	5/8	5/8	5/8	5/8	5/8	7/8	7/8	3/8	3/8	3/8	3/8	3/8
14,000	1/2	5/8	5/8	5/8	7/8	5/8	5/8	7/8	7/8	7/8	3/8	3/8	3/8	3/8	1/2
16,000	1/2	5/8	5/8	7/8	7/8	5/8	5/8	7/8	7/8	7/8	3/8	3/8	3/8	1/2	1/2
18,000	5/8	5/8	5/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	3/8	3/8	1/2	1/2	1/2
20,000	5/8	5/8	7/8	7/8	7/8	5/8	7/8	7/8	7/8	7/8	3/8	3/8	1/2	1/2	1/2
25,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	3/8	1/2	1/2	1/2	1/2
30,000	5/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1/2	1/2	1/2	1/2	1/2
35,000	7/8	7/8	7/8	7/8	7/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1/2	1/2	1/2	1/2	1/2
40,000	7/8	7/8	7/8	7/8	1 1/8	7/8	7/8	1 1/8	1 1/8	1 1/8	1/2	1/2	1/2	1/2	5/8
45,000	7/8	7/8	7/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1/2	1/2	1/2	5/8	5/8
50,000	7/8	7/8	1 1/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1/2	1/2	1/2	5/8	5/8
60,000	7/8	7/8	1 1/8	1 1/8	1 1/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1/2	1/2	5/8	5/8	5/8
70,000	7/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8	1/2	1/2	5/8	5/8	7/8
80,000	7/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1/2	5/8	5/8	5/8	7/8
90,000	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8	1 1/8	1 1/8	1 3/8	1 3/8	1 5/8	5/8	5/8	5/8	7/8	7/8
100,000	1 1/8	1 1/8	1 3/8	1 3/8	1 3/8	1 1/8	1 3/8	1 3/8	1 5/8	1 5/8	5/8	7/8	7/8	7/8	7/8
125,000	1 3/8	1 3/8	1 3/8	1 3/8	1 5/8	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	5/8	7/8	7/8	7/8	7/8
150,000	1 3/8	1 3/8	1 3/8	1 5/8	1 5/8	1 3/8	1 5/8	1 5/8	1 5/8	2 1/8	7/8	7/8	7/8	7/8	1 1/8
200,000	1 3/8	1 3/8	1 5/8	1 5/8	2 1/8	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	7/8	7/8	7/8	1 1/8	1 1/8
250,000	1 3/8	1 5/8	1 5/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	7/8	7/8	1 1/8	1 1/8	1 1/8
300,000	1 3/8	1 5/8	2 1/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	7/8	1 1/8	1 1/8	1 1/8	1 3/8
350,000	1 5/8	1 5/8	2 1/8	2 1/8	2 1/8	1 5/8	2 1/8	2 1/8	2 5/8	2 5/8	1 1/8	1 1/8	1 1/8	1 1/8	1 3/8
400,000	1 5/8	2 1/8	2 1/8	2 1/8	2 5/8	2 1/8	2 1/8	2 5/8	2 5/8	2 5/8	1 1/8	1 1/8	1 1/8	1 3/8	1 3/8

Table 5. THERMAL EXPANSION VALVE SELECTION

ELC UNIT SIZE	BTUH AT 10°TD	RECOMMENDED EXPANSION VALVE (1 & 2)					
		R-12		R-22		R-502	
		SPORLAN	ALCO	SPORLAN	ALCO	SPORLAN	ALCO
035C	3,500	GFE-½-Z	HCE½FW	GVE-½-ZP	HCE½HW	GRE-½-ZP	HCE½RW35
050C	5,000	GFE-1-ZP	HCE1FW	GVE-½-ZP	HCE½HW	GRE-½-ZP	HCE½RW35
070C	7,000	GRE-1-ZP	HCE1FW	GVE-1-ZP	HCE1HW	GRE-½-ZP	HCE1RW35
090C	9,000	GFE-1-ZP	HCE1FW	GVE-1-ZP	HCE1HW	GRE-1-ZP	HCE1RW35
105C	10,500	GFE-1½-ZP	HCE1½FW	GVE-1½-ZP	HCE1HW	GRE-1-ZP	HCE1RW35
120C	12,000	GFE-2-ZP	HCE1½FW	GVE-1½-ZP	GCE1½HW	GRE-1½-ZP	HCE1½RW35
140C	14,000	GFE-2-ZP	HCE1½FW	GVE-1½-ZP	HCE1½HW	GRE-1½-ZP	HCE1½RW35
160C	16,000	CFE-2½-ZP	HCE2FW	GVE-2-ZP	HCE1½HW	GRE-2-ZP	HCE1½RW35
175C	17,500	CFE-2½-ZP	HCE2FW	GVE-2-ZP	HCE1½HW	GRE-2-ZP	HCE1½RW35
210C	21,000	SFE-3-ZP	TCLE3FW	SVE-2-ZP	TCLE3HW	SRE-2-ZP	TCLE2RW35
250D	25,000	SFE-5-ZP	TCLE3FW	SVE-3-ZP	TCLE3HW	SRE-3-ZP	TCLE2RW35
300D	30,000	SFE-5-ZP	TCLE4FW	SVE-4-ZP	TCLE5HW	SRE-4-ZP	TCLE3RW35
360D	36,000	PFE-8-ZP	TCLE6½FW	SVE-4-ZP	TCLE5HW	SRE-4-ZP	TCLE3RW35

1. Valve selection for evaporator range of 0° to -30°F.
2. For SEASONMISER systems, contact your representative for expansion valve selection.

DRAIN LINE

ELC units are furnished with a 3/4" F.P.S. drain connection in the middle of the drain pan. Units are designed with their own drain pan pitch to facilitate condensate drainage and should be mounted as level as possible to assure proper unit operation.

Drain lines should be pitched downwards 1" per foot and should exit from the freezer as quickly as possible. A trap in the drain line is recommended and should be located outside of the freezer.

It is necessary to heat the drain line inside the refrigerated space to prevent condensate from freezing. Electrical heating cable or tape can be used. The heater should be connected so that it is on continuously. It is recommended that the drain line be insulated to prevent heat loss. A heat input of 20 watts per lineal foot of 1" drain line for 0°F (−18°C) room applications and 30 watts per lineal foot for −20°F (−29°C) rooms is satisfactory.

FIELD WIRING
MODELS ELC-035C THRU -210C

NOTE: All wiring must be done in accordance with applicable codes and local ordinances.

Unit wiring is shown in Diagrams 1 and 2. Knockouts are provided in the cabinet for connection of field wiring. All field wiring connections are made to terminal blocks PB1 and PB2. Make sure the unit is properly grounded to the terminal provided. Table 6 shows wiring information for the motors and heaters.

MULTIPLE UNIT INSTALLATIONS

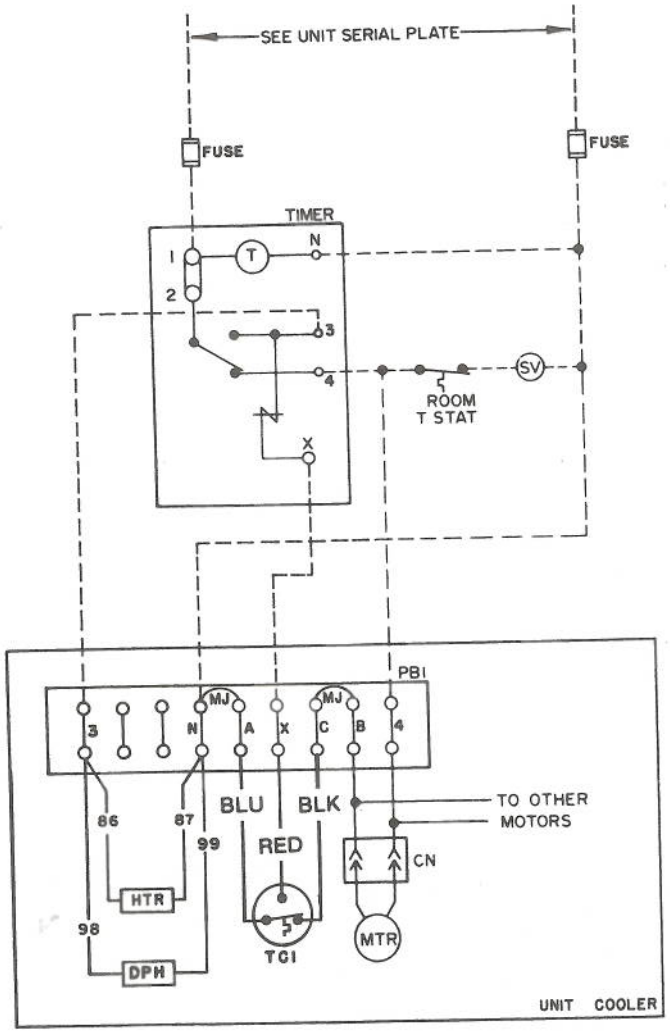
Diagram 3 shows wiring for a typical multiple unit installation. The field wiring is indicated by dashed lines. Select defrost heater fusing and conductors as for single unit installations. If the fan motor branch circuit is sub-fused, select fuses for a maximum of 175% of the FLA of one fan motor (1.75 x 80 amps) plus 100% of the FLA of the remaining motors.

If the total defrost heater load exceeds the contact rating of the timer, the heaters must be controlled with contactors.

The black to red terminals of all termination thermostats (TC1) must be wired in series so that a defrost cycle is not terminated until the temperature of the TC1 bulb in all units has risen to the termination temperature. Thermostat TC1 also serves as fan delay thermostat after a defrost cycle. As shown in Diagram 3 all fan motors should be wired to terminal C on PB1 in one of the units. Do not exceed 10 amps. Terminal C in the other units is not used. In this way, the unit with the fan motors wired to terminal 5 controls the fan delay for all of the units.

NOTE: The mechanical jumpers between terminals B and C and between A and N should be removed from terminal block PB1 on all units except the unit controlling the fan delay.

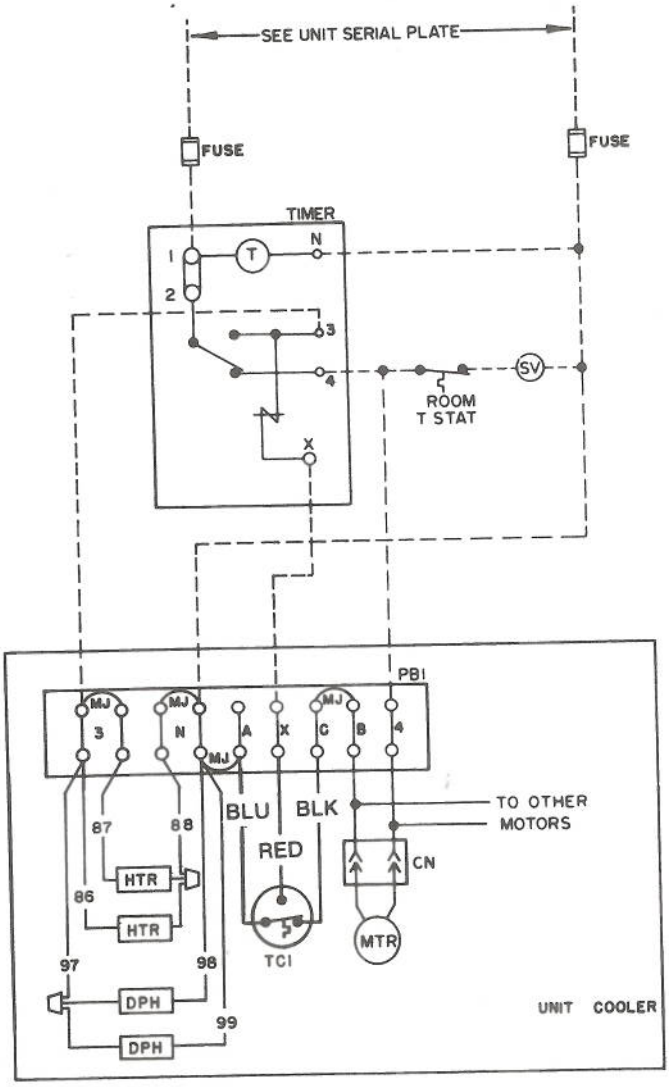
Diagram 1. MODELS ELC-035C thru -175C



LEGEND

PBI	POWER BLOCK
DPH	DRAIN PAN HEATER
HTR.	COIL HEATER
MTR.	MOTOR
TCI	TEMPERATURE CONTROL
MJ	MECHANICAL JUMPER
SV	SOLENOID VALVE
CN	WIRE HARNESS CONNECTION
----	FIELD WIRING

Diagram 2. MODEL ELC-210C

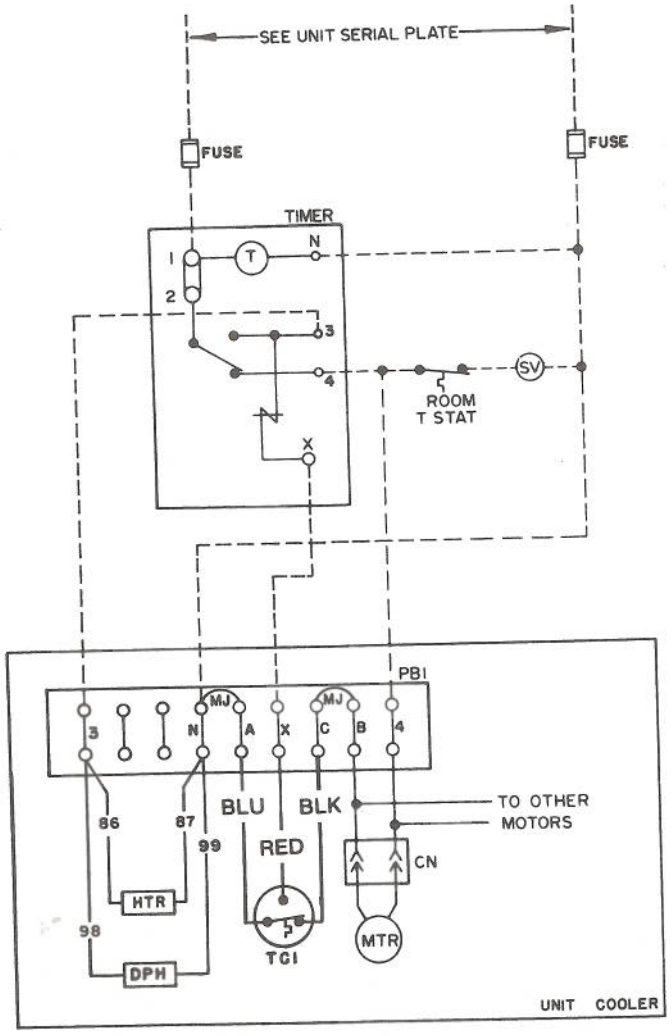


LEGEND

PBI	POWER BLOCK
DPH	DRAIN PAN HEATER
HTR.	COIL HEATER
MTR.	MOTOR
TCI	TEMPERATURE CONTROL
MJ	MECHANICAL JUMPER
SV	SOLENOID VALVE
CN	WIRE HARNESS CONNECTION
----	FIELD WIRING
⏢	WIRE CONNECTOR

ELC UNIT SIZE	NO. FAN MOTORS
035C	1
050C	2
070C	2
090C	2
105C	3
120C	3
140C	4
160C	4
175C	5
210C	6

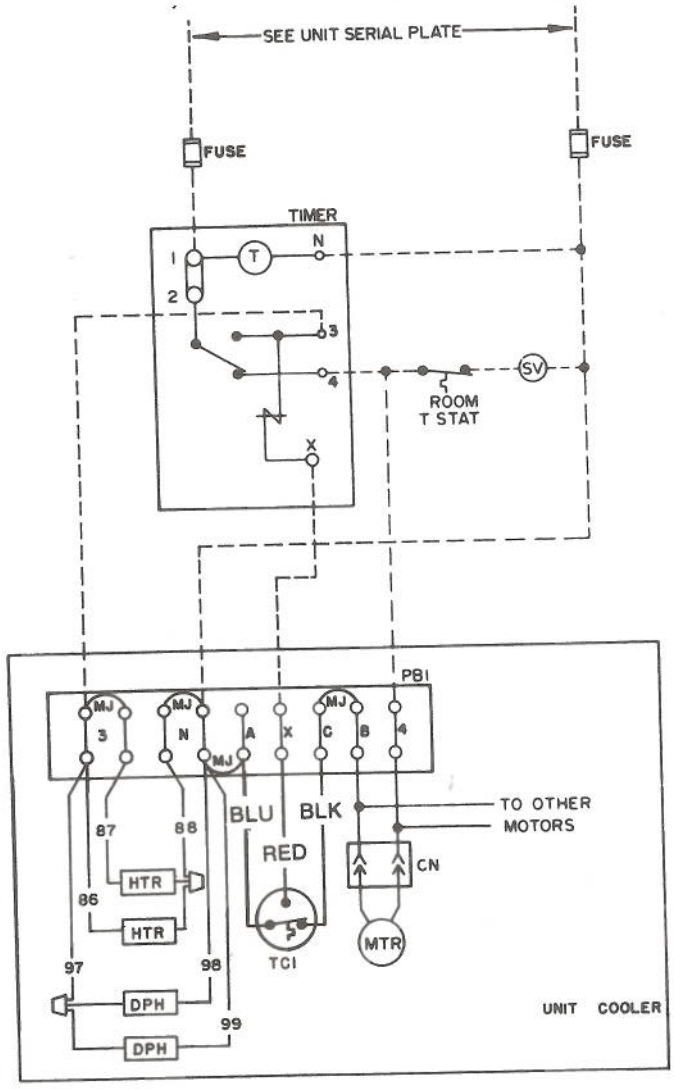
Diagram 1. MODELS ELC-035C thru -175C



LEGEND

PBI	POWER BLOCK
DPH	DRAIN PAN HEATER
HTR.	COIL HEATER
MTR.	MOTOR
TCI	TEMPERATURE CONTROL
MJ	MECHANICAL JUMPER
SV	SOLENOID VALVE
CN	WIRE HARNESS CONNECTION
----	FIELD WIRING

Diagram 2. MODEL ELC-210C



LEGEND

PBI	POWER BLOCK
DPH	DRAIN PAN HEATER
HTR.	COIL HEATER
MTR.	MOTOR
TCI	TEMPERATURE CONTROL
MJ	MECHANICAL JUMPER
SV	SOLENOID VALVE
CN	WIRE HARNESS CONNECTION
----	FIELD WIRING
⏢	WIRE CONNECTOR

ELC UNIT SIZE	NO. FAN MOTORS
035C	1
050C	2
070C	2
090C	2
105C	3
120C	3
140C	4
160C	4
175C	5
210C	6

Diagram 3.

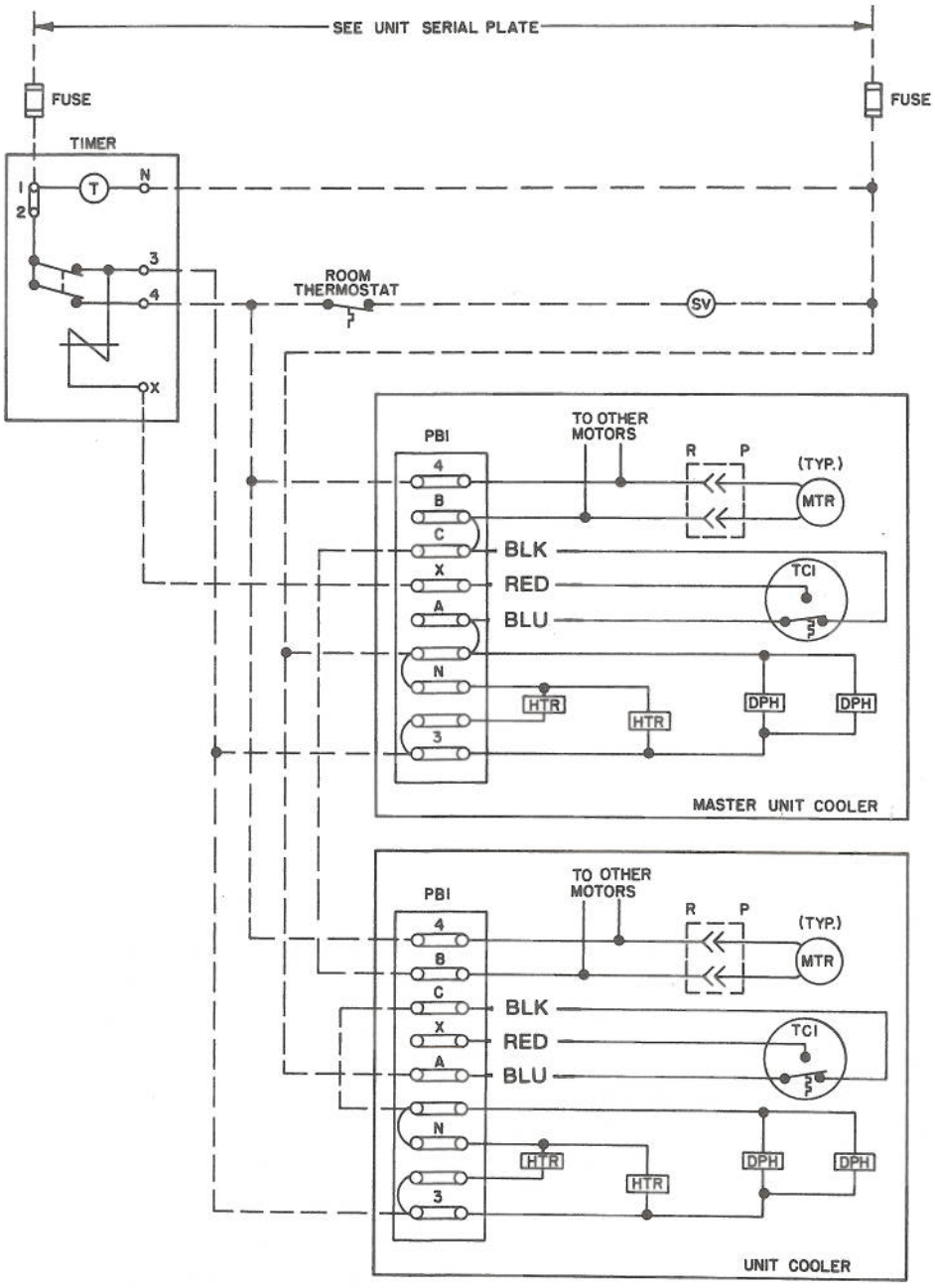


Table 6. MOTOR AND HEATER CIRCUITS ELECTRICAL DATA

ELC UNIT SIZE	208-230/60/1 SUPPLY			208/1 SUPPLY		230/1 SUPPLY	
	TOTAL MOTOR AMPS	MIN. CIRCUIT AMPS	MAX. FUSE AMPS	TOTAL HEATER WATTS	TOTAL HEATER AMPS	TOTAL HEATER WATTS	TOTAL HEATER AMPS
035C	0.9	1.2	15	757	3.6	925	4.0
050C	1.8	2.1	15	1309	6.3	1600	7.0
070C	1.8	2.1	15	1309	6.3	1600	7.0
090C	1.8	2.1	15	1857	8.9	2270	9.9
105C	2.7	3.0	15	1857	8.9	2270	9.9
120C	2.7	3.0	15	2404	11.6	2940	12.8
140C	3.6	3.9	15	2404	11.6	2940	12.8
160C	3.6	3.9	15	2957	14.2	3615	15.7
175C	4.5	4.8	15	2957	14.2	3615	15.7
210C	5.4	5.7	15	3504	16.8	4285	18.6

NOTE: Size wires in accordance with the latest issue of the NEC and local wiring codes.

FIELD WIRING
MODELS ELC-250D thru -360D

Standard wiring for 208-230V single-phase supply circuit is shown in Diagram 4. All overcurrent protection is field furnished and must be sized in accordance with local and national codes. See Table 7 for motor circuit load and Table 8 for the defrost heater circuit load. The unit must be properly grounded to the terminal provided before operation.

The defrost timer may be used to control the motor and control circuit, but a contactor should be used in the defrost circuit as shown.

Field wiring from a three-phase power supply is shown in Diagram 5. Remove jumpers between terminals 2 to 3 and 4 to 5. Relocate one jumper between terminals 3 to 4. Retighten all screws.

Diagram 4. SINGLE PHASE UNIT WIRING

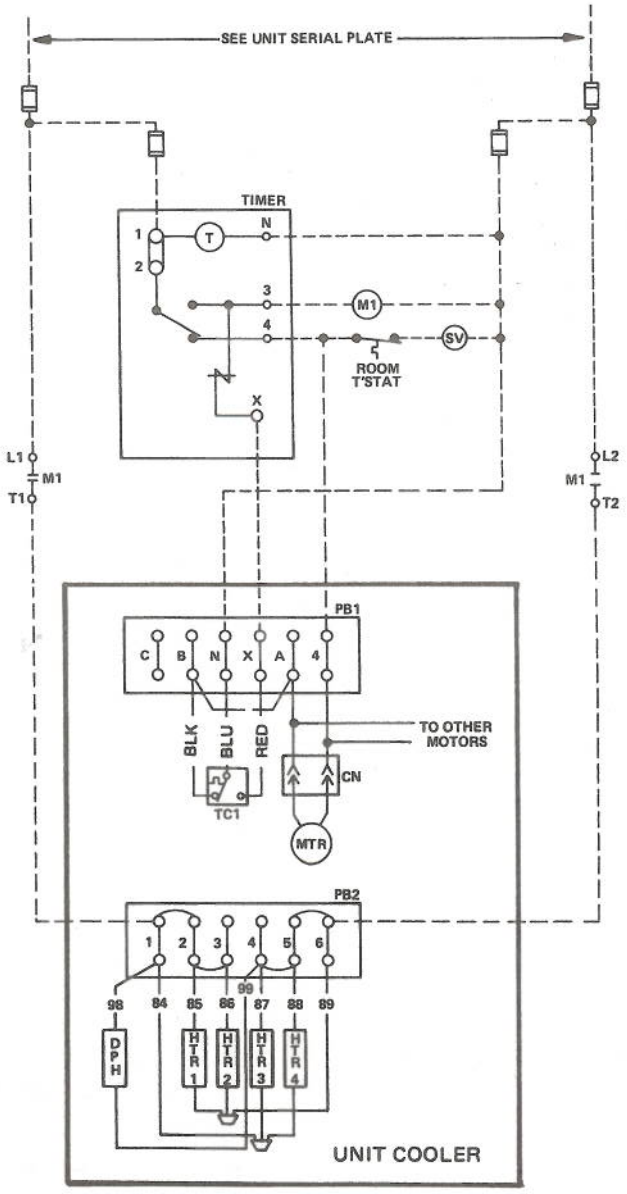
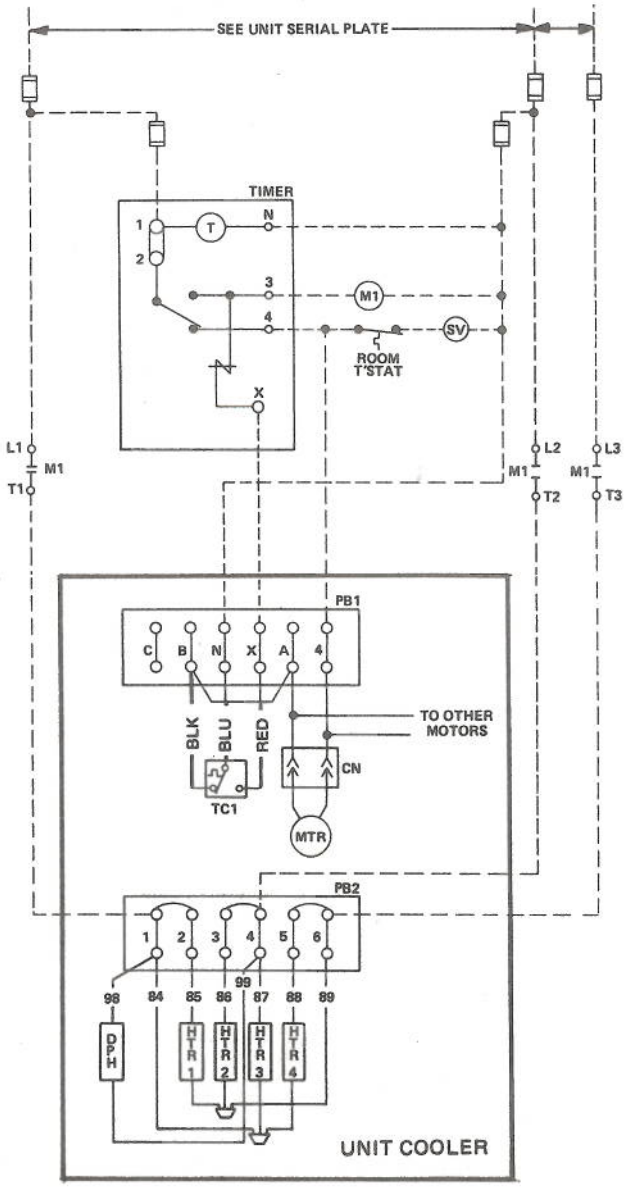


Diagram 5. THREE PHASE UNIT WIRING



LEGEND

DPH	Drain Pan Heater	M1	Heater Contactor
HTR	Heater	SV	Solenoid Valve
MTR	Motor	CN	Wire Harness Connection
TC1	Temperature Control	PB1 PB2	Power Block

MULTIPLE UNIT INSTALLATION

When multiple units are operated in one room, defrosting all units at the same time is recommended to avoid possible problems with slow or incomplete defrosting due to stray air currents.

Since all units will probably not require the same amount of time to remove the frost load, a control system should be selected to reduce the risk of damage due to overheating. One such system uses a separate defrost contactor to control the heater load. Each contactor is controlled by the thermostat provided on the unit cooler. As each unit is defrosted, the contactor is de-energized.

The fail-safe pointer on the timer should be adjusted to reset the refrigeration cycle after all units are defrosted; 15 minutes will generally provide enough time to defrost all units. See page 11 of this bulletin for instructions on setting the defrost timer.

Diagram 6 shows a typical wiring schematic for this control system. Note the jumper wire between terminals A and B on all units except one unit has been removed. This unit provides the fan delay and terminates the defrost cycle. When the thermostat reaches approximately 25°, all the fans will start.

With this system, the master unit must be the last unit to defrost. Therefore, the unit closest to the door or other high moisture load should initially be selected as the master unit. A spare wire may be run between terminal X on the slave units to terminal C on the master unit. The slave unit can then be easily changed to a master unit by relocating the wire from terminal X on the timer to terminal C of the old master unit.

A fan contactor must be used in the motor circuit when total motor current exceeds 10 amps. Diagram 7 shows this contactor wired into the circuit.

Diagram 6.

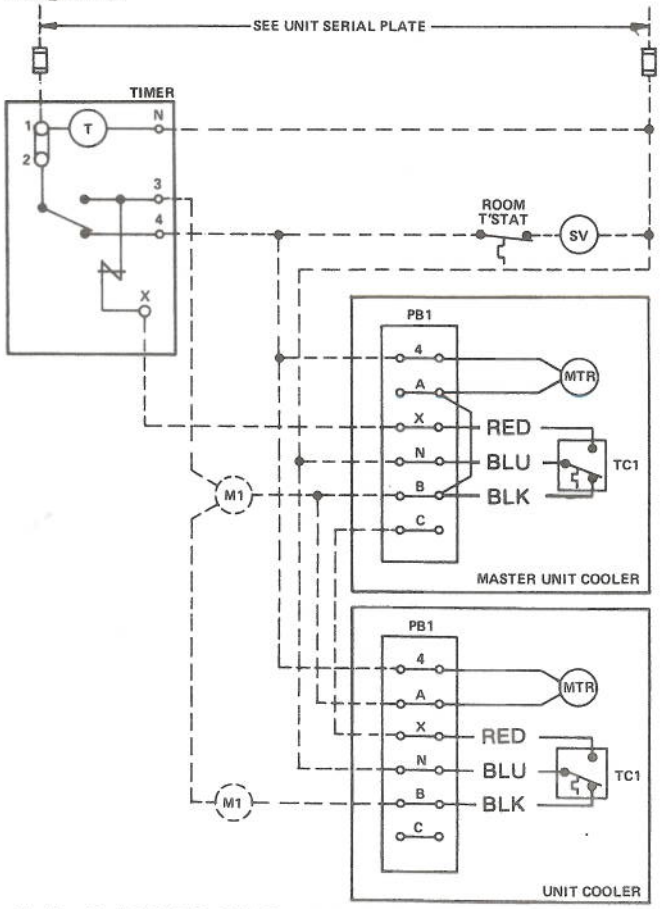
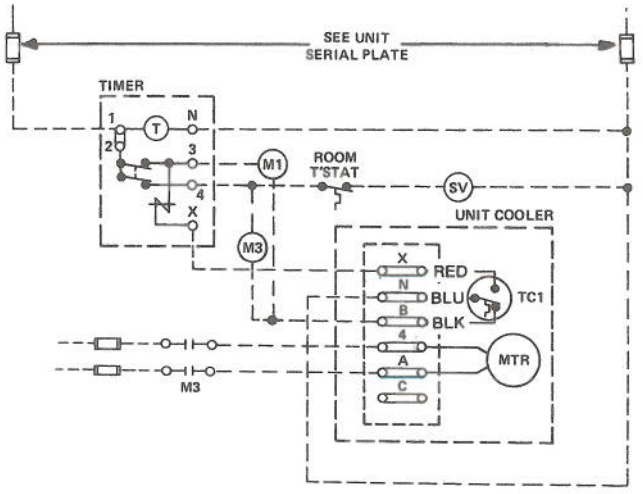


Diagram 7.



LEGEND

PB1,PB2	Power Block
DPH	Drain Pan Heater
HTR	Heater
MTR	Motor
TC1	Temperature Control
M1	Heater Contactor
M3	Fan Contactor
SV	Solenoid Valve
CN	Wire Harness Connection

Table 7. MOTOR CIRCUIT ELECTRICAL DATA

ELC UNIT SIZE	TOTAL MOTOR AMPS	MINIMUM CIRCUIT AMPS (1)	MAXIMUM FUSE SIZE	TOTAL MOTOR WATTS	TOTAL MOTOR HEAT (BTU/24 H.R.)
250D	3.6	3.4	15	480	39,400
300D	3.6	3.4	15	480	39,400
360D	5.4	5.0	15	720	51,100

Table 8. DEFROST HEATER CIRCUIT ELECTRICAL DATA

ELC UNIT SIZE	208 VOLT SUPPLY			230 VOLT SUPPLY		
	TOTAL WATTS	AMPS 3-PHASE	AMPS 1-PHASE	TOTAL WATTS	AMPS 3-PHASE	AMPS 1-PHASE
250D	7300	24/19/18	35	8950	26/22/21	39
300D	7300	24/19/18	35	8950	26/22/21	39
360D	7300	24/19/18	35	8950	26/22/21	39

NOTE: Size wires in accordance with the latest issue of the NEC and local wiring codes.

SYSTEM CHECK

BEFORE START-UP

1. Make sure unit voltage agrees with supply voltage.
2. Make sure system is wired correctly.
3. Check to make sure all electrical terminals are tight.
4. Make sure all piping is done completely and in accordance with good practice.
5. Make sure fan setscrews are tight.
6. Make sure that suction, discharge and receiver service valves are open.
7. Make sure unit is mounted securely using all the hangers and is level as possible.
8. Make sure the drain connection is tightened to the drain line securely.
9. Pour water into the drain pan to check for complete drainage of drain pan and drain line.
10. Make sure the fail-safe of the standard McQuay timer is initially set for a maximum of 30 minutes.

AFTER START-UP

1. On initial start-up, the fans will not start until the coil temperature reaches about 25°F (–1°C). Also it is normal for the fans to cycle a few times until the room temperature is pulled down.
2. Check the compressor for possible overload immediately after start-up.
3. Check the system for proper refrigerant and oil charge.
4. Check the expansion valve superheat setting. It is important that the valve is set properly for efficient operation and even frost formation.
5. Make sure the drain line heater is working properly.
6. Heavy moisture loads are usually encountered when starting a system for the first time. This will cause a rapid frost build-up on the unit. During the initial pull-down we suggest that the frost build-up be watched and that the unit be defrosted manually as required.
7. Observe the system as it goes through the first defrost cycle to make sure that the timer, defrost heaters, termination thermostat and other system components function properly.
8. On multiple unit installations, check to be sure all units are defrosted before resetting the refrigeration cycle.

MAINTENANCE

Units should be checked once a month or more often for proper defrosting because the amount and pattern of frosting can vary greatly. It is dependent on the temperature of the room, the type of product being stored, how often new product is brought into the room and the percentage of time the door to the room is open. It may be necessary to periodically change the number of defrost cycles or adjust the duration of defrost. Also, if the coil is not defrosting completely, check for faulty defrost heaters.

Under normal usage conditions, maintenance should cover the following items at least once every six months.

1. Tighten all electrical connections.
2. Tighten fan setscrews.
3. Motors are provided with permanently lubricated type bearings.
4. Clean the coil surface.
5. Check the refrigerant charge and oil level in the system.
6. Check the operation of the control system.
7. Clean the drain pan and check for proper drainage.
8. Check the drain line heater.

UNIT OPERATION

COOLING CYCLE

In a typical system installation, wired as shown in the previous diagrams, power is supplied constantly to the unit fan motors. The room temperature is controlled by a room thermostat which operates the liquid line solenoid valve to control the compressor operation.

DEFROST CYCLE

General – The defrost cycle is initiated by the defrost timer. The timer circuit shuts off the unit fans, closes the liquid line solenoid valve to initiate compressor pumpdown, and energizes the defrost heaters. The heaters warm the coil, causing the frost to melt and drain away. When the defrost termination thermostat temperature reaches the thermostat setpoint, it terminates the defrost cycle. The defrost heaters are de-energized and the liquid line solenoid valve is energized allowing the compressor to run. The unit fans will not restart until the coil temperature has pulled down below the freezing point. If the defrost termination thermostat fails to terminate the defrost, the fail-safe setting of the standard McQuay timer will automatically terminate it. See the section "Setting Defrost Timer" in this bulletin for instructions on setting the fail-safe.

Time Terminated Defrost – Under conditions where the units are used with air entering the coil at above 32°F (0°C), it is recommended that time terminated defrost be used. At temperatures above 32°F (0°C), it is sometimes possible to get icing conditions that cannot be properly controlled with a thermostat. To terminate on time instead of temperature do not wire the defrost termination thermostat to terminal X on the timer. On existing systems, the lead can be removed from terminal X and wrapped with electrical tape to insulate it. When wired this way, the defrost will terminate on the fail-safe setting of the timer. The fan delay feature can be kept in the circuit but there may be a somewhat longer delay due to a warmer coil temperature when the defrost is terminated. **NOTE:** Too long a timer setting may cause overheating of components which will shorten their life; 15 minutes or less should be adequate for most installations.

NOTE: It is possible that a low voltage condition with very heavy frost accumulation could require a timer setting longer than 30 minutes. See the section on "Setting Defrost Timer" in this bulletin. Also, it is important that the units are checked regularly for inoperative defrost heaters.

DEFROST THERMOSTAT

A bimetal disc type thermostat is wired to the control circuit to terminate the defrost cycle when the coil temperature reaches approximately 50°F (10°C). For special conditions where a shorter defrost cycle is required, the thermostat can be relocated lower on the coil by removing the two sheetmetal screws holding the thermostat to the mounting bracket. The thermostat must be fastened to the mounting bracket at the next lower hole pattern.

The bimetal disc thermostat also provides a fan delay to allow moisture on the coil to freeze after defrost termination. On systems where the suction temperature is above approximately 25°F (-1°C), the fans may not start for an extended period of time. This can be corrected by adding a jumper on PB1 between the fan motor and the common terminal of the thermostat. This will allow the fans to start immediately after defrost termination.

If moisture blow-off is encountered without the fan delay, contact your representative or the Refrigeration Application Dept. in Wilmington, North Carolina, for alternate methods.

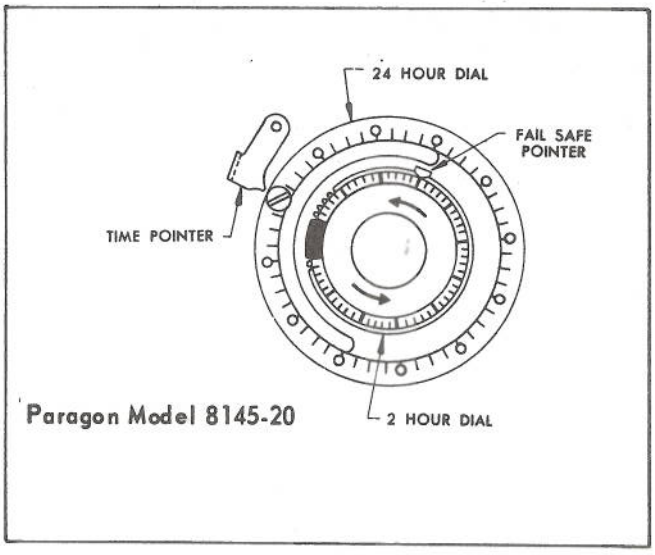
SETTING DEFROST TIMER

The standard timer furnished by McQuay provides control of the frequency of defrosts and also provides a fail-safe feature that terminates the defrost after a set time if the termination thermostat fails to function properly. The standard timer is furnished with a 240 volt clock motor and has a contact rating of 40 amps at 240 volts. The timer should be mounted outside of the refrigerated space. Figure 3 shows the timer dial.

1. To set the number of defrosts every 24 hours, screw a pin into the outer dial at each desired time of defrost.
2. To set the time of day, grasp the center knob and rotate counterclockwise until the correct time of day on the outer dial is lined up with the pointer. Do not attempt to set the timer by grasping and turning the outer dial.
3. To set the fail-safe time, push down the pointer on the inner dial and adjust it to the desired time in minutes.

The timer should initially be set for 2 to 3 defrost cycles per day. However, each installation should be checked so the system operates efficiently with a minimum number of defrost cycles. The fail-safe setting should not normally exceed 30 minutes because of danger of overheating the unit if the defrost cycle is prolonged to long.

Figure 3. TIMER DIAL



HEATER REPLACEMENT

1. Make sure the electrical power to the heaters is turned off.
2. Disconnect heater leads on both ends of the heater to be removed.
3. Remove the sheetmetal screws holding the heater retainer to the header plate on the electrical connection end of the unit.
4. Pull the heater(s) to be replaced out of the tube holes in the coil. It is necessary to lower the drain pan to remove the bottom coil heater.
5. Replacement coil heaters are received coiled in a two-foot diameter coil. Before inserting the heater in the coil, uncoil about one foot of the straight end. This will make it easier to insert the heater into the tube hole.
6. Insert the end of the heater into the tube hole and uncoil it while pushing it through the coil.
7. Attach tube clamp and retaining bracket to new heater just before rubber boot. Push heater in until bracket meets the header plate. Fasten bracket to the header plate to prevent heater "creep."
8. Reconnect the heater leads as shown on the wiring diagram.

NOTE: Replacement heaters for the ELC-035C unit are not coiled. If it is necessary to coil these heaters in order to install them, they may be formed by hand around a cylindrical object which is approximately 24" in diameter.

1. Uncoil the heater as it is pushed through the coil.
2. Remove the heater bracket from the old heater and attach it to the replacement heater.
3. Position the heater bracket and reinstall the sheetmetal screw.
4. Reconnect the heater leads and turn on the electrical power.

FAN AND MOTOR ACCESS

ELC-035C through 360D: To gain access to the unit fan(s) and motor(s), or to remove the grille for cleaning, loosen the 2 thumbscrews on the grille housing. Remove the grille retaining channel and slide the grille out. The grille is split in 16" sections for easy side removal. Access to motor is also possible through the bottom of the unit by opening the drain pan.

Motor removal is accomplished by reaching through fan orifice to unplug motor from wire harness. Loosen fan set screw and remove fan from motor shaft. Remove nuts and washers from studs on front of motor. Reach through orifice, grasp motor, slide motor out of mount and remove motor through opening between motor mount and edge of orifice.

REPLACEMENT PARTS

When contacting the factory for service or replacement parts, refer to the model number and serial number stamped on the unit serial plate. The serial plate is located on the back panel at the electrical connection end of the unit. If replacement parts are required, mention the date of installation of the unit and date of failure, along with an explanation of malfunction and description of the parts required. If possible include the part number as shown in Table 9.

Table 9. Replacement Parts List

PART DESCRIPTION	OLD PART NUMBER	NEW PART NUMBER	UNIT SIZE
MOTOR, 208-230V SHADED POLE	879-386889B-00	038688900	ALL
FAN	862-446952D-00	026215300	035C - 210C
	862-165841B-07	016584107	250D - 360D
TERMINATION THERMOSTAT	860-440742B-00	044074200	ALL
TIMER, 240V	860-011811X-00		ALL
COIL HEATER	861-375280B-01	037528001	035C
	861-375280B-02	037528002	050C & 070C
	861-375280B-03	037528003	090C & 105C
	861-375280B-04	037528004	120C & 140C
	861-375280B-05	037532000	160C & 175C
	(2) 861-446955B-00	044695500	210C
	(4) 861-426427B-00	042646700	250D - 360D
DRAIN PAN HEATER	861-382516B-07	038251607	035C
	861-382516B-08	038251608	050C & 070C
	861-382516B-09	038251609	090C & 105C
	861-382516B-10	038251610	120C & 140C
	861-382516B-11	038251611	160C & 175C
	(2) 861-446956B-00	044695612	210C
	861-325910B-01	032591001	250D - 360D
GRILLE	(1) 701-456403A-00	(1) 045640300	035C
	(2) 701-456403A-00	(2) 045640300	050C - 090C
	(3) 701-456403A-00	(3) 045640300	105C
	(2) 701-456403A-00 (1) 701-456457A-00	(2) 045640300 (1) 045645700	120C
	(3) 701-456403A-00 (1) 701-456457A-00	(3) 045640300 (1) 045645700	140C
	(4) 701-456403A-00 (1) 701-456457A-00	(4) 045640300 (1) 045645700	160C & 175C
	(5) 701-456403A-00 (1) 701-456457A-00	(5) 045640300 (1) 045645700	210C
		(7) 03868400	250D - 360D