

# **INSTALLATION INSTRUCTIONS**

## **WALL MOUNTED CHILLED WATER FAN COIL**

### **MODELS**

**WC391-M**

**WC391-C**

**DATE: 07-12-94**

**MANUAL 2100-242 REV.  
SUPERSEDES REV.  
FILE VOL. III, TAB 17**

## SECTION 1 --GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help you install the air conditioner or heat pump. You can usually find these at your local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code	-ANSI/NFPA 70
Standard For The Installation Of Air Conditioning and Ventilating Systems	-ANSI/NFPA 90A
Standard For Warm Air Heating and Air Conditioning Systems	-ANSI/NFPA 90B
Load Calculation For Residential Winter and Summer Air Conditioning	-ACCA Manual J
Duct Design For Residential Winter and Summer Air Conditioning and Equipment Selection	-ACCA Manual D

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### FOR MORE INFORMATION, CONTACT THESE PUBLISHERS

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Other patents pending.

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PART 1 -- WALL MOUNT GENERAL INFORMATION

CHILLED WATER WALL MOUNTED FAN COIL MODEL NOMENCLATURE

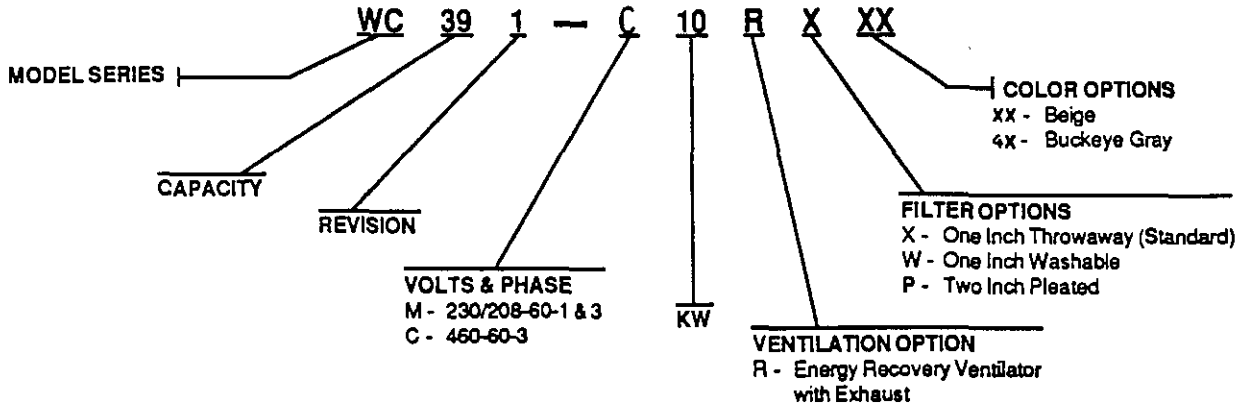


TABLE 1 ELECTRIC HEAT TABLE

Model	WC391-M				WC391-C	
	240-1		208-1		460	
KW	A	BTU	A	BTU	A	BTU
5	20.8	17065	18.1	12800	--	--
10	41.6	34130	36.2	25600	--	--
6	14.4	20500	12.5	15360	7.2	20500
9	21.7	30600	18.7	23030	10.8	30600

**SHIPPING DAMAGE**

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

# COOLING APPLICATION DATA

WC391 (Total for Both Circuits)

1130 CFM, .1" ESP, Hi-Fan Speed, 80° DB 67°F WB Return Air

42° Ent. Water					45° Ent. Water				
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	52,000	30,900	9.0	27.7	10	40,300	27,800	8.1	20.0
12	43,000	29,350	7.5	17.5	12	37,700	27,100	6.7	15.0
14	34,400	27,900	6.2	11.6	14	35,250	26,400	5.4	10.2

925 CFM, .1" ESP, Lo-Fan Speed, 80° DB 67°F WB Return Air

42° Ent. Water					45° Ent. Water				
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	44,700	27,700	9.2	28.5	10	35,400	24,000	7.8	19.0
12	36,950	26,300	7.6	18.2	12	32,400	22,900	6.2	12.0
14	30,700	24,950	6.2	11.6	14	29,650	21,850	5.0	8.1

1130 CFM, .1" ESP, Hi-Fan Speed, 75° DB 63°F WB Return Air

42° Ent. Water					45° Ent. Water				
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	42,650	29,650	8.9	27.0	10	32,300	25,450	7.0	15.2
12	35,250	24,675	7.3	17.0	12	29,200	23,800	5.2	8.5
14	29,100	20,500	6.0	10.7	14	26,400	22,250	3.9	4.7

925 CFM, .1" ESP, Lo-Fan Speed, 75° DB 63°F WB Return Air

42° Ent. Water					45° Ent. Water				
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	36,650	26,600	9.2	28.5	10	28,400	22,000	6.1	10.5
12	30,300	22,100	7.6	18.2	12	25,000	20,100	4.4	7.1
14	26,000	18,300	6.2	11.6	14	22,200	18,400	3.2	3.8

LOWER CIRCUIT OF COIL ONLY

.1 ESP, 80°F DB 67°F WB Return Air

Hi Fan Speed (1130 CFM)					Low Fan Speed (925 CFM)				
45° F Ent. Water									
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	21,600	14,700	4.6	16.0	10	18,500	12,800	4.0	12.0

.1 ESP, 75°F DB 63°F WB Return Air

Hi Fan Speed (1130 CFM)					Low Fan Speed (925 CFM)				
45° F Ent. Water									
TR	TC	SC	GPM	PD	TR	TC	SC	GPM	PD
10	15,350	12,100	3.4	9.0	10	12,750	10,100	3.0	6.0

EWT = Entering Water Temperature

TR = Water Temperature Rise

TC = Total Cooling

SC = Sensible Cooling

GPM = Gallons Per Minute

PD = Water Pressure Drop Ft. H<sub>2</sub>O

FIGURE 1  
UNIT DIMENSIONS

UNIT	WIDTH (W)	DEPTH (D)	HEIGHT (H)	SUPPLY		RETURN		E	F	G	I	J	K
				A	B	C	B						
WC391	30-1/8	17-1/4	51-3/16	7-7/8	27-7/8	13-7/8	27-7/8	39-7/8	24-3/8	18	39	1-3/8	15-1/2

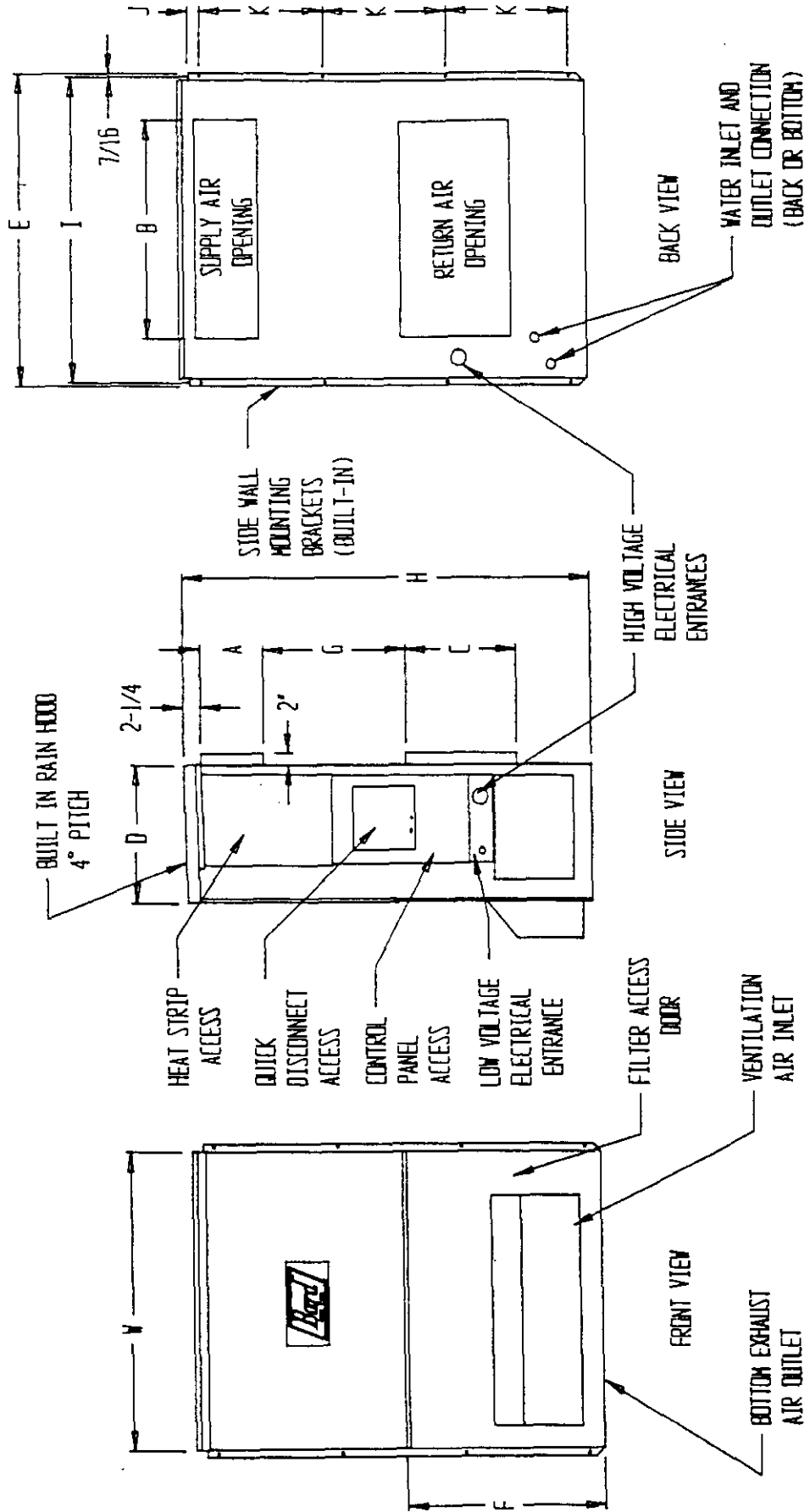




TABLE 2

## ELECTRICAL SPECIFICATIONS

SINGLE CIRCUIT										
Model	Rated Volts and Phase	No. Field Power Ckts.	(3) Minimum Circuit Ampacity	(1) Maximum External Fuse Or Circuit Breaker	(2) Field Power Wire Size	(2) Ground Wire Size	(3) Minimum Circuit Ampacity		(1) Maximum External Fuse Or Ckt. Breaker	
							Ckt A	Ckt B	Ckt A	Ckt B
WC391-M00	230/208-1	1	5	15	14	14	N/A	N/A	N/A	N/A
M05		1	32	35	8	10	N/A	N/A	N/A	N/A
M10		1	58	60	6	10	47	26	50	30
WC391-M06	230/208-3	1	24	25	10	10	N/A	N/A	N/A	N/A
M09		1	33	35	8	10	N/A	N/A	N/A	N/A
WC391-C00	460-3	1	3	10	14	14	N/A	N/A	N/A	N/A
C06		1	12	15	14	14	N/A	N/A	N/A	N/A
C09		1	17	20	12	12	N/A	N/A	N/A	N/A

(1) Maximum size of the time delay fuse or HACR type circuit breaker for protection of field wiring conductors.

(2) Based on 75°C copper wire. All wiring must conform to NEC and all local codes.

(3) These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electric Code (latest revision), article 310 for power conductor sizing.

Caution: When more than one field power conductor circuit is run thru one conduit, the conductors must be derated. Pay special attention to note 8 of table 310 regarding Ampacity Adjustment Factors when more than 3 conductors are in a raceway.

**GENERAL**

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

These instructions explain the recommended method to install the chilled water fan coil unit and the electrical wiring connections to the unit.

These instructions and any instructions packaged with any separate equipment required to make up the entire system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See the back side of the cover sheet of this instruction for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss or gain calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

## DUCT WORK

All duct work, supply and return, must be properly sized for the design air flow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

Refer to Table 6 for maximum static pressure available for duct design.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unconditioned spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

A 1/4-inch clearance to combustible material for the first three feet of duct attached to the outlet air frame is required. See Pages 5, 6 and 7 Wall Mounting Instructions and Figures 2 and 3 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. It is recommended that on this type of installation that a filter grille be located in the wall. Filters must be of sufficient size to allow a maximum velocity of 400 FPM.

NOTE: If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.

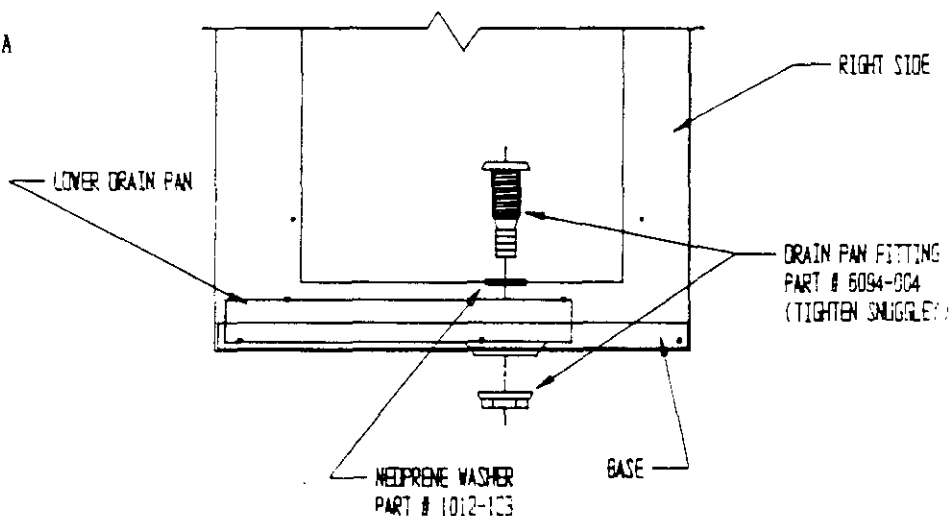
## FILTERS

A 1-inch throwaway filter is supplied with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the service door. A 1-inch washable filter and 2-inch pleated filter are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2-inch filter by bending the small tabs down and out of the way.

## CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the lower drain pan. A plastic fitting is supplied for use in the bottom drain pan to exit the unit. This fitting is shipped in the lower drain pan. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage. (See Figure 1A)

FIGURE 1A



## PART 2 -- INSTALLATION INSTRUCTIONS

### **WALL MOUNTING INFORMATION**

1. Two holes, for the supply and return air openings, must be cut through the wall as shown in Figure 2.
2. On wood-frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration. **WARNING:** Fire hazard can result if 1/4-inch clearance to combustible materials for supply air duct is not maintained. See Figure 2.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installing unit.

### **MOUNTING THE UNIT**

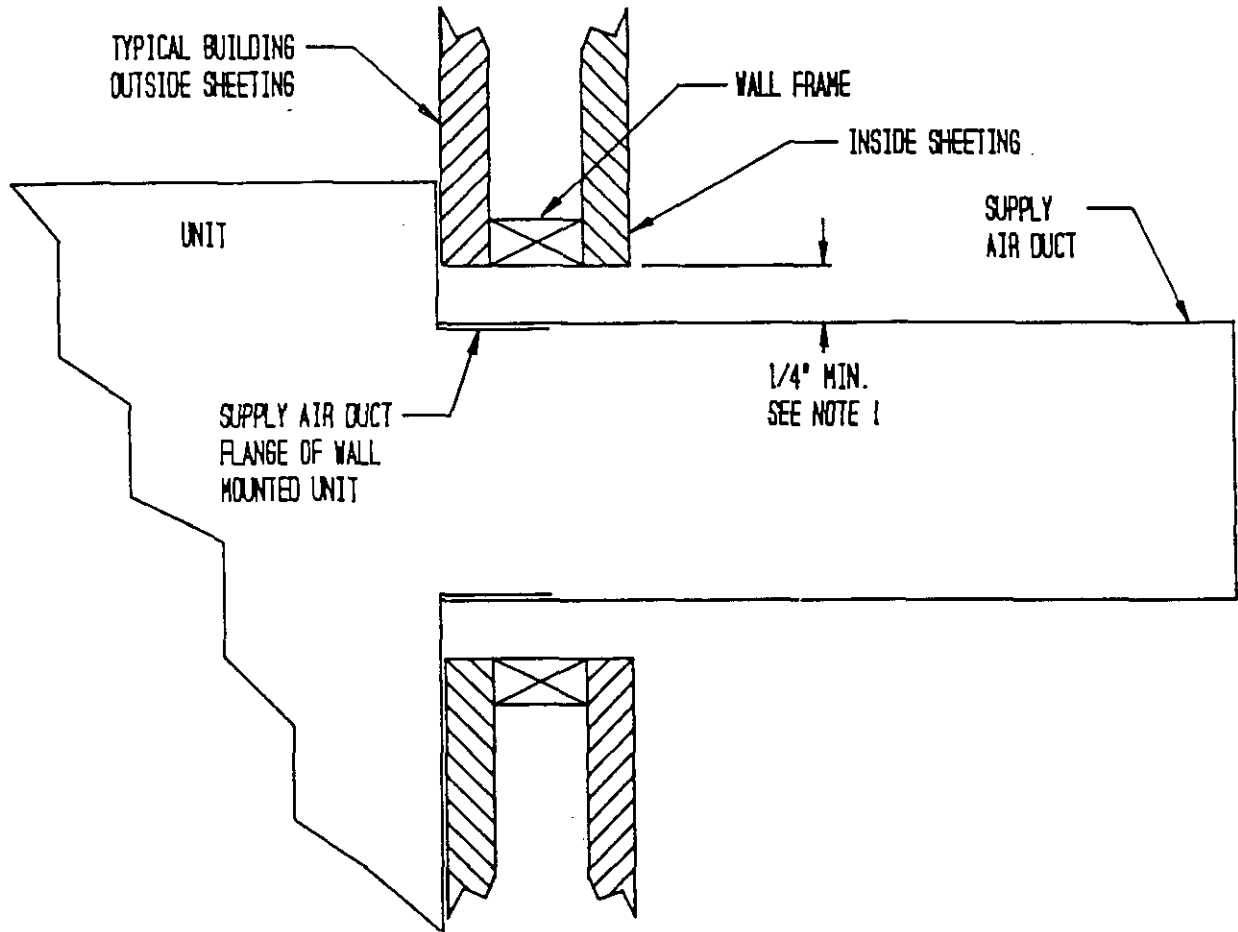
1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket is provided for ease of installation, but is not required.
2. The unit itself is suitable for "0" inch clearance, but the supply air duct flange and the first three feet of supply air duct require a minimum of 1/4-inch clearance to combustible material. If a combustible wall, use a minimum of 28-1/2" x 8-1/2" dimensions for sizing. However, it is generally recommended that a 1" clearance is used for ease of installation and maintaining the required clearance to combustible material. The supply air opening would then be 30" x 10". See Figures 2 and 3 for details.

\*\*\*\*\*  
**WARNING:** Failure to provide the 1/4-inch clearance between the supply duct and a combustible surface for the first three feet of duct can result in fire.  
\*\*\*\*\*

3. Locate and mark lag bolt locations and bottom mounting bracket location, if desired. See Figure 2.
4. Mount bottom mounting bracket, if used.
5. Hook top rain flashing under back bend of top. Top rain flashing is shipped attached to the back of the unit on the right side.
6. Position unit in opening and secure with 5/16 lag bolts; use 3/4 inch diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 2.
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.
9. On side by side installations, maintain a minimum of 20 inches clearance on right side to allow access to control panel and heat strips and allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.



FIGURE 3  
ELECTRIC HEAT CLEARANCE



Side section view of supply air duct for wall mounted unit showing 1/4" clearance to combustible surfaces.

NOTE 1:

**WARNING**

A minimum of 1/4" clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3 feet of ducting.

It is important to insure that the 1/4" minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire.

## WIRING--MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or "HACR Type" circuit breaker size. Each outdoor unit is marked with a "Minimum Circuit Ampacity". This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only". These instructions MUST BE adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse and wire sizes (75°C copper) for all models, including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a "Maximum Time Delay Relay Fuse" or "HACR Type" circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

## WIRING: LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase equipment dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are:

TAP	RANGE
240	253 - 216
208	220 - 187

**NOTE:** The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

Eight (8) wires should be run from thermostat subbase to the 24V terminal board in the unit. An eight conductor, 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown below:

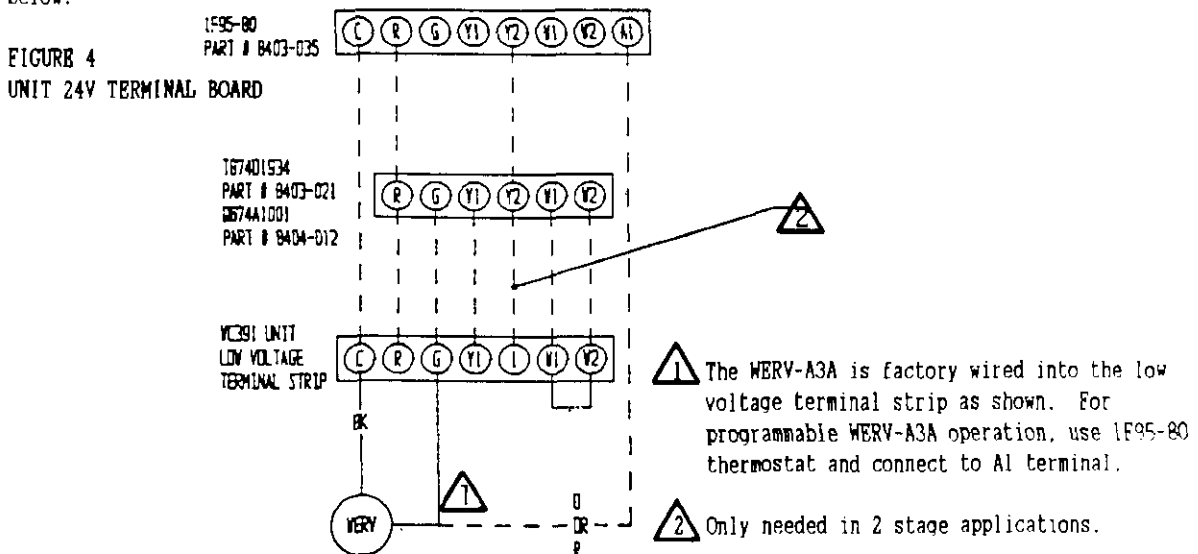


TABLE 3 THERMOSTAT WIRE SIZES

Transformer VA	FLA	Wire Gauge	Maximum Distance
			In Feet
55	2.3	20 Gauge	45
		18 "	60
		16 "	100
		14 "	160
		12 "	250

**WATER VALVE WIRING**

Water Valves shall be 24VAC with power consumption of no more than 8VA. Recommended valve is Erie water valve, part No. 0672C0307GA00. See wiring diagram for proper connection points.

**OUTDOOR FREEZE THERMOSTAT (OPTIONAL)**

If this unit is operated in areas where freezing temperatures occur, a freeze thermostat should be installed. Order kit CMH-14. This kit will turn on the blower of the unit when wired as in Figure 5. This will circulate warm indoor air to prevent coil freeze up.

**USING ETHYLENE GLYCOL FOR NON-FREEZE PROTECTION**

Ethylene glycol/water solutions used to prevent freezing of heat transfer surfaces in low temperature conditions require special consideration. Solution characteristics vary in density, specific heat, etc. requiring a more precise determination of freeze points. In general, glycol/water solutions require greater system flows than water.

The following table provides approximate index values when applying ethylene glycol to water according to weight ratio:

TABLE 4

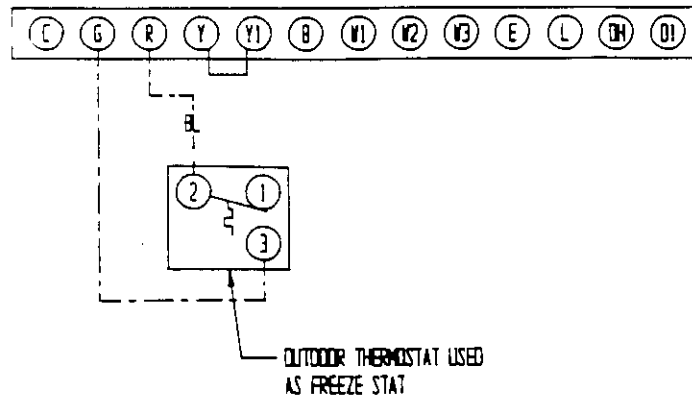
Bulk Mixture		Freezing Points		GPM Add Percentage*
Water	Glycol	F	C	Cooling
100%	0%	+32.0	0	0%
90%	10%	+24.8	- 4.0	2%
85%	15%	+21.0	- 6.1	3%
80%	20%	+15.8	- 9.0	5%
75%	25%	+10.4	-12.0	7%
70%	30%	+ 4.0	-15.6	9%
65%	35%	- 3.0	-19.4	11%
60%	40%	-11.2	-24.0	14%
55%	45%	-21.0	-29.4	17%
50%	50%	-33.0	-36.1	20%
45%	55%	-49.0	-45.0	23%

\*GPM Add Percentages are general guidelines for additional flows based on average bulk temperatures of 40 degrees F for cooling.

As a double check, a hydrometer similar to those used to verify automotive radiator solution freeze points may be used.

## OUTDOOR FREEZE THERMOSTAT WIRING

FIGURE 5



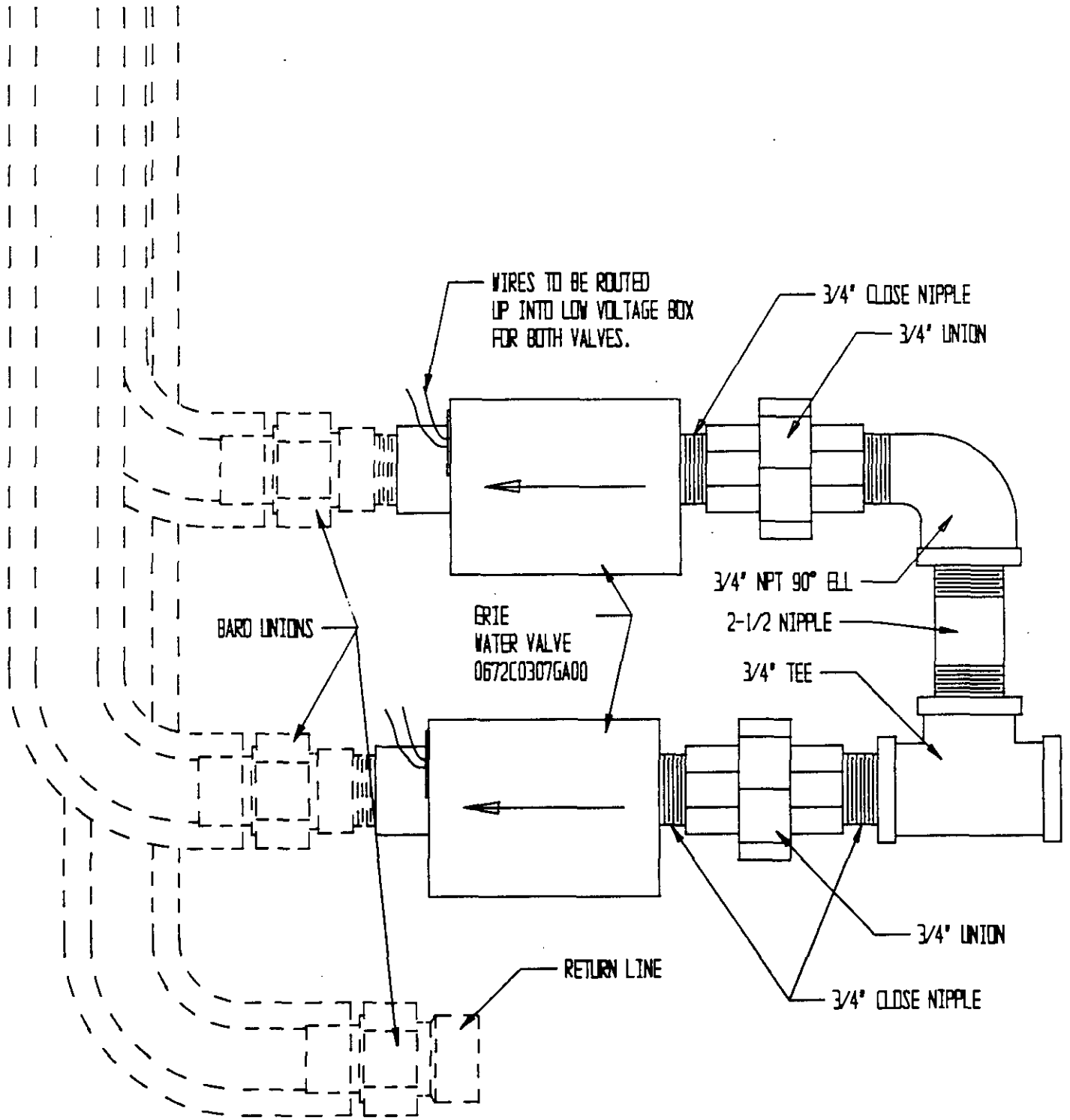
Recommended Set Point 38°

## PIPING

Holes are provided for either back or bottom access to the unit for the chilled water lines. The evaporator is split for use in two stage applications but may be piped for single stage applications. The supply lines are equipped with insulating male unions that are ready to be attached to the water valves. The return line is equipped with an insulating female union. See Figures 6, 7 and 8 for recommended valve and piping layout for one and two stage applications.



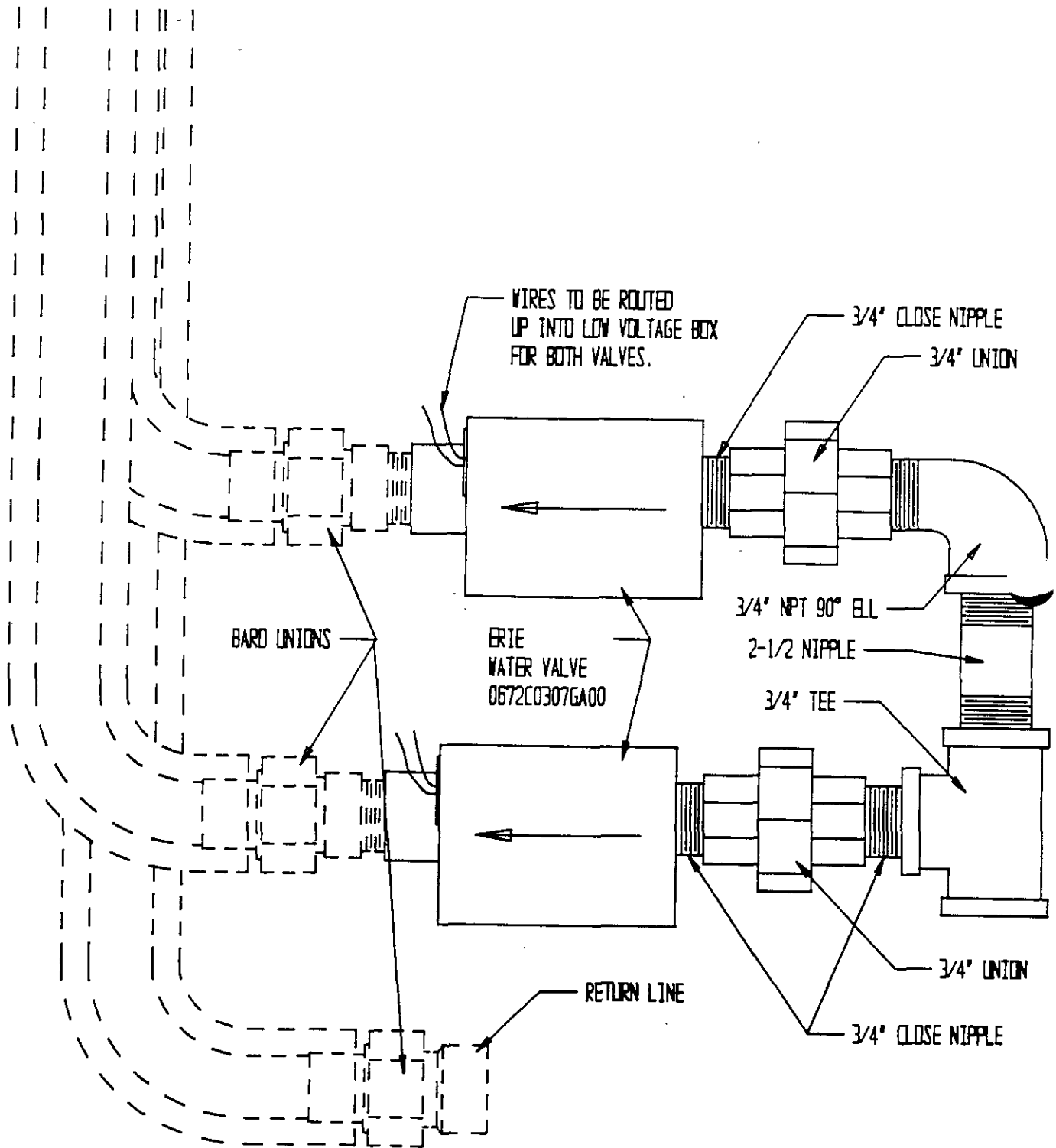
FIGURE 6  
BACK ENTRANCE PIPING



MIS-660  
A-1/2-90

FIGURE 7

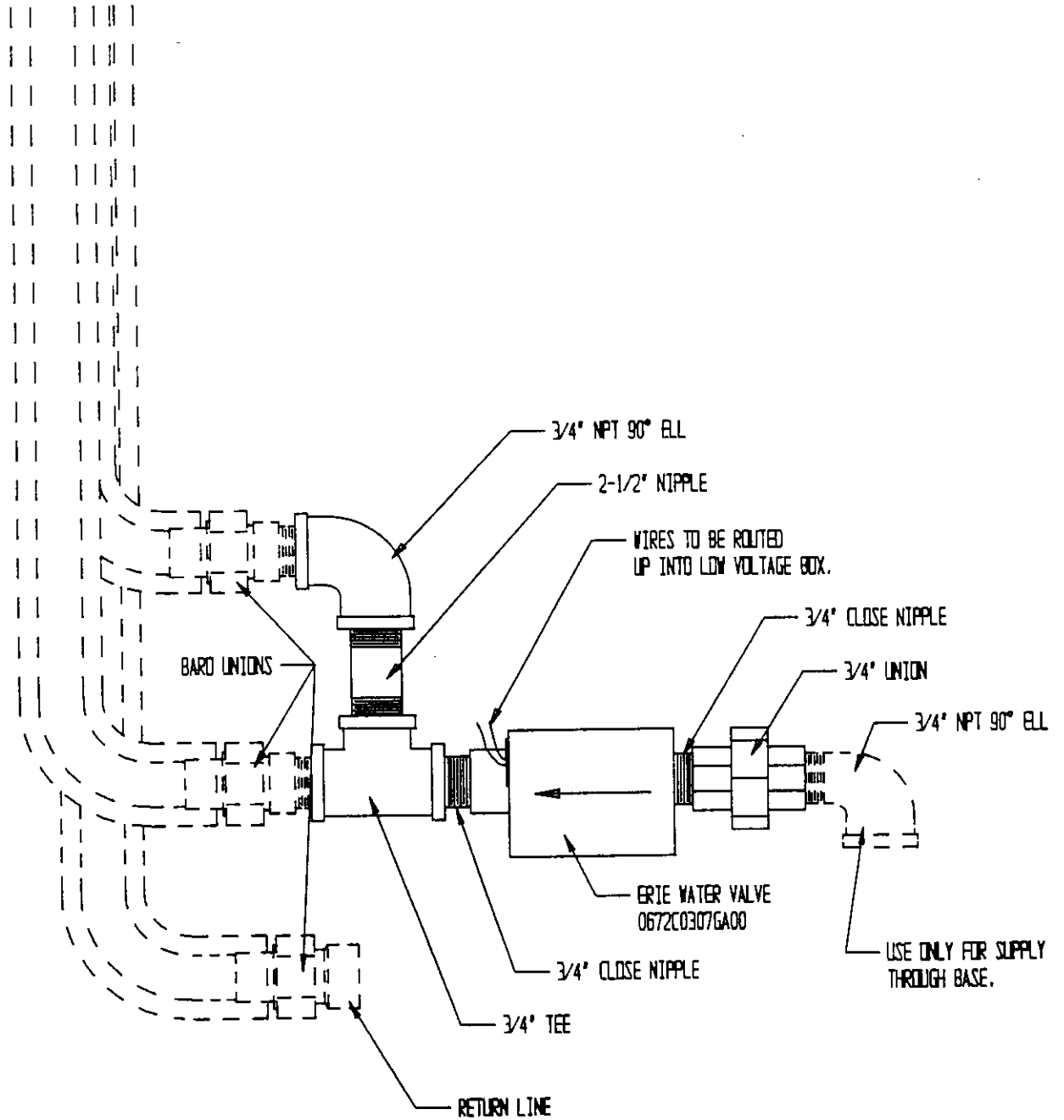
BOTTOM ENTRANCE PIPING



MIS-661  
A-112-90

FIGURE 8

1 STAGE BACK ENTRANCE PIPING



(MIS-694)

### PART 3 -- START-UP

#### **AIR PURGE VALVE**

An air purge valve is supplied with each unit to purge air from the system before startup. This valve is located at the header end of the evaporator. Remove upper door to gain access.

#### **SERVICE HINTS**

Maintain clean air filters at all times.

Check all power fuses or circuit breakers to be sure they are the correct rating.

#### **SEQUENCE OF OPERATION**

**COOLING, FIRST STAGE**--Circuit R-Y closes at thermostat pulling in control relay, energizing stage one water valve. The G (indoor motor) circuit is automatically completed on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation.

**COOLING, SECOND STAGE**--Circuit R-1 makes at the thermostat pulling in control relay 2, and energizing the stage 2 water valve. (2 stage systems only)

**HEATING**--Circuit R-W1 makes energizing the electric heat contactor if so equipped, and starting the indoor blower motor.

**TABLE 5 INDOOR BLOWER PERFORMANCE--CFM @ 230V**

E.S.P. In H <sub>2</sub> O	WC391	
	Lo Speed Dry/Wet Coil	High Speed Dry/Wet Coil
.0	1010 / 980	1300 / 1220
.1	950 / 925	1225 / 1130
.2	900 / 860	1125 / 1020
.3	825 / 785	1025 / 925
.4	738 / 675	900 / 810
.5	---	765 / 675
.6	---	---

**TABLE 6 Recommended Operating Ranges**

Model	Rated CFM*	Rated ESP*	Recommended Airflow Range
WC391	1100	.10	860 - 1220
* Rated CFM and ESP on high speed tap.			

**Table 7 MAXIMUM ESP OF OPERATION**

Model	Front Outlet	
	Low Speed	High Speed
WC391 M00	.50	.50
WC391 M05	.50	.50
WC391 M10	.45	.50
WC391 M06	.50	.50
WC391 M09	.50	.50
Values shown are for units equipped with STD 1" throw-away filter or 1" washable filter. Derate ESP by .15 for 2" pleated filters.		

TABLE 8

## OPTIONAL ACCESSORIES

Model	Description	WC391-M	WC391-C
EHMA03-A05	Heater Package	X	
EHMA03-A10	Heater Package	X	
EHMA03-B06	Heater Package	X	
EHMA03-B09	Heater Package	X	
CME-14	Outdoor Thermostat (ODT)	X	X
EHWC03-C06	Heater Package		X
EHWC03-C09	Heater Package		X

