HE S Series
TUBE-ICE MACHINE

INSTALLATION & START-UP INSTRUCTIONS

Part Number: 12A4171S0702

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Installing Your Tube-Ice Machine

! WARNING !
Only service personnel experienced and certified in refrigeration and qualified to work with high voltage electrical equipment should be allowed to install or work on this Tube-Ice® machine.
! WARNING !

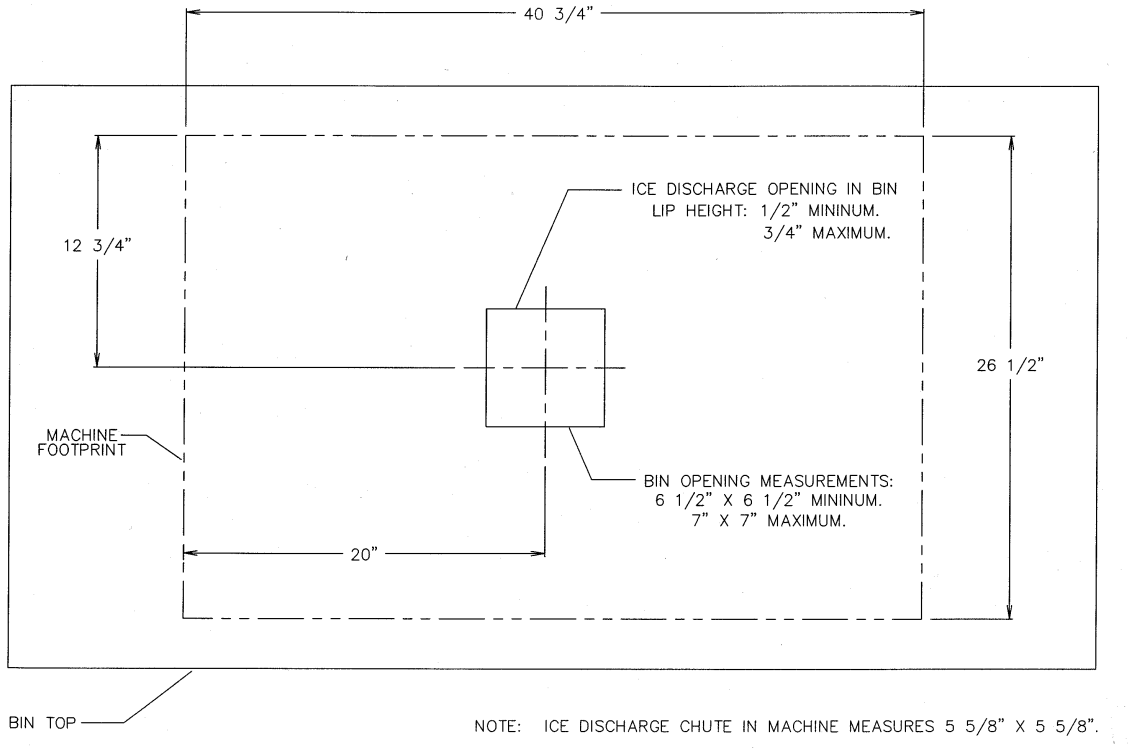
Important Notice.

The Warranty Registration / Start-Up Form must be completed and returned to Vogt Tube-Ice® to initiate and assure a full warranty. A postage paid envelope is provided or you may fax the report to 800-770-8648.

Bin Installation. Set the bin on solid, level footing. Inside the bin you will find the four legs. Screw these legs to the bottom of the bin. You can make MINOR leveling adjustments by using these legs as leveling screws, as outlined in the manufacturer's instructions.

Setting the ice machine on the ice bin. Once the ice storage bin is level, the Tube-Ice® machine can be elevated and placed on the bin top. Using the dimensions in FIGURE-1 below, mark the machine footprint on the bin top by measuring over from the ice chute opening.

Note: Above machine footprint shown with stainless casings



Machine footprint with no casings: 40" X 26"
Machine footprint with plastic casings: 41" X 27 1/2"

FIGURE - 1
Ice Bin to Machine Layout

FIGURES 2 and 3 illustrate two methods of lifting & setting Tube-Ice® machine on a ice storage bin.

! CAUTION !
The approximate weight of the machine is 1360 pounds. Always use equipment with adequate load-carrying capacity.
! CAUTION !

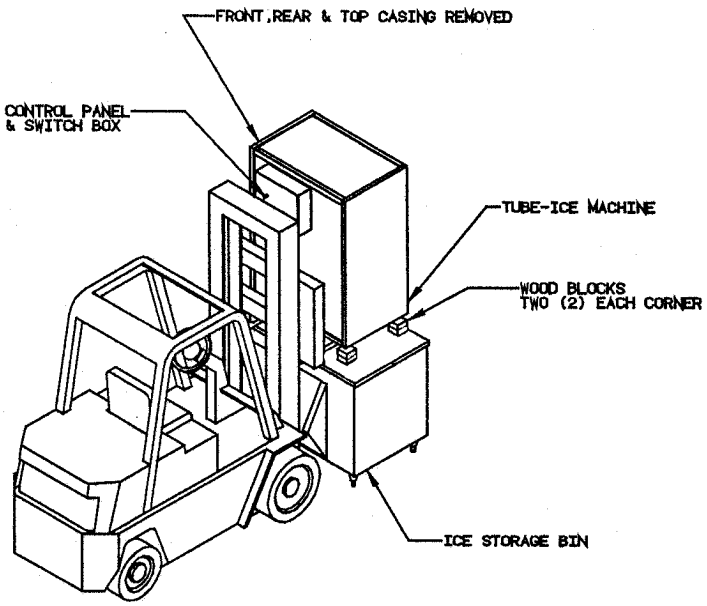


FIGURE - 2
Forklift-&-Blocks Method

You need: + forklift truck with adequate load and height capacities
+ (8) 2X4 wood blocks 8 in. long
+ (2) wooden 2X4's measuring 3-ft. long
+ pry bar

Step 1. Position Tube-Ice® machine on forks.

! CAUTION !
The Tube-Ice® machine may be somewhat top heavy on the rear.
! CAUTION !

Step 2. Stack wood blocks in each corner of the drip pan on top of the ice storage bin.
Step 3. Lift and set Tube-Ice® machine on wood blocks.
Step 4. Remove forklift.
Step 5. Stack 3-ft. long 2X4's beside drip pan, overlapping front and back of bin.
Step 6. Using a pry bar with fulcrum on 2X4's, raise side of machine enough to remove TOP wood blocks.

! CAUTION !
Do not remove top AND bottom blocks at the same time.
! CAUTION !

Step 7. Repeat steps 5 and 6 on other side.
Step 8. With machine sitting on one (1) block under each corner, repeat steps 5, 6, and 7 remove remaining blocks. Drip pan flanges may bend slightly.
Step 9. Straighten bent drip pan flanges.
Step 10. Check alignment of ice chute to bin opening.

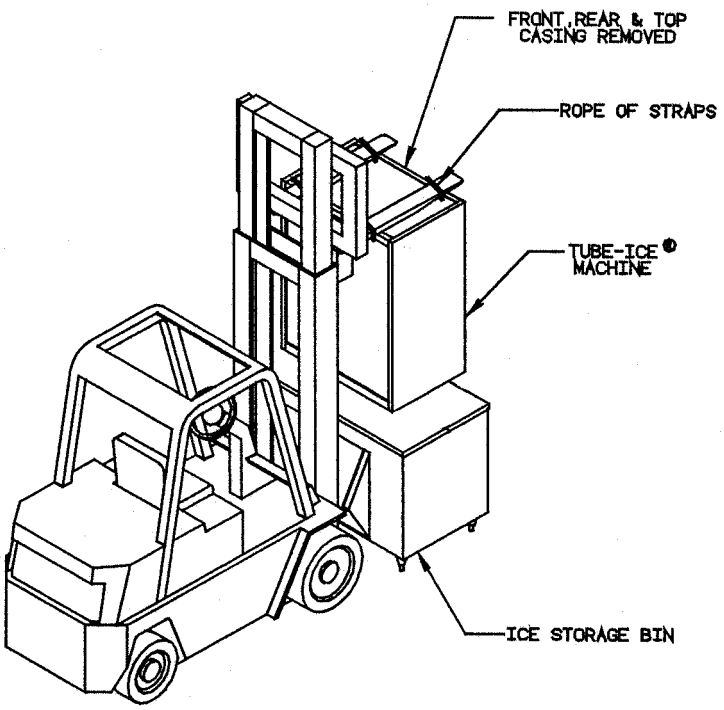


FIGURE - 3
Forklift-&-Rope or Lifting Straps Method

You need: + extra headroom
+ Forklift with adequate load and height capacities
+ 1/2" rope or four lifting straps to bind forks to top angles

Step 1. Remove front, rear, and top access panels.

Step 2. Position fork truck so that forks are resting flat on top angles of Tube-Ice® machine.

Step 3. Use the rope or straps to securely bind forks to the top angles.

! CAUTION !
Be sure the bin is level and is set in its proper location. See the space diagram, FIGURE 6.
! CAUTION !

Step 4. Lift Tube-Ice® machine and set into drip pan of bin.

Step 5. Remove rope or straps and fork truck.

Step 6. Check alignment of ice chute to bin opening.

Sealing Ice Machine to Bin Top.

For machines installed on bins that do not have a drip pan, the perimeter of the ice machine must be sealed with silicone. A tube of silicone sealant, and instructions are shipped inside the ice machine for this purpose. (See FIGURE-4 and the instructions below)

1. Set machine on bin making sure that ice discharge chute is centered over bin top opening.
2. Apply approximately 1/8" fillet bead of silicone to all sides of frame where it meets bin top as shown in Detail "A". **NOTE:** make sure that silicone bead on frame does not interfere with proper casing fitup.

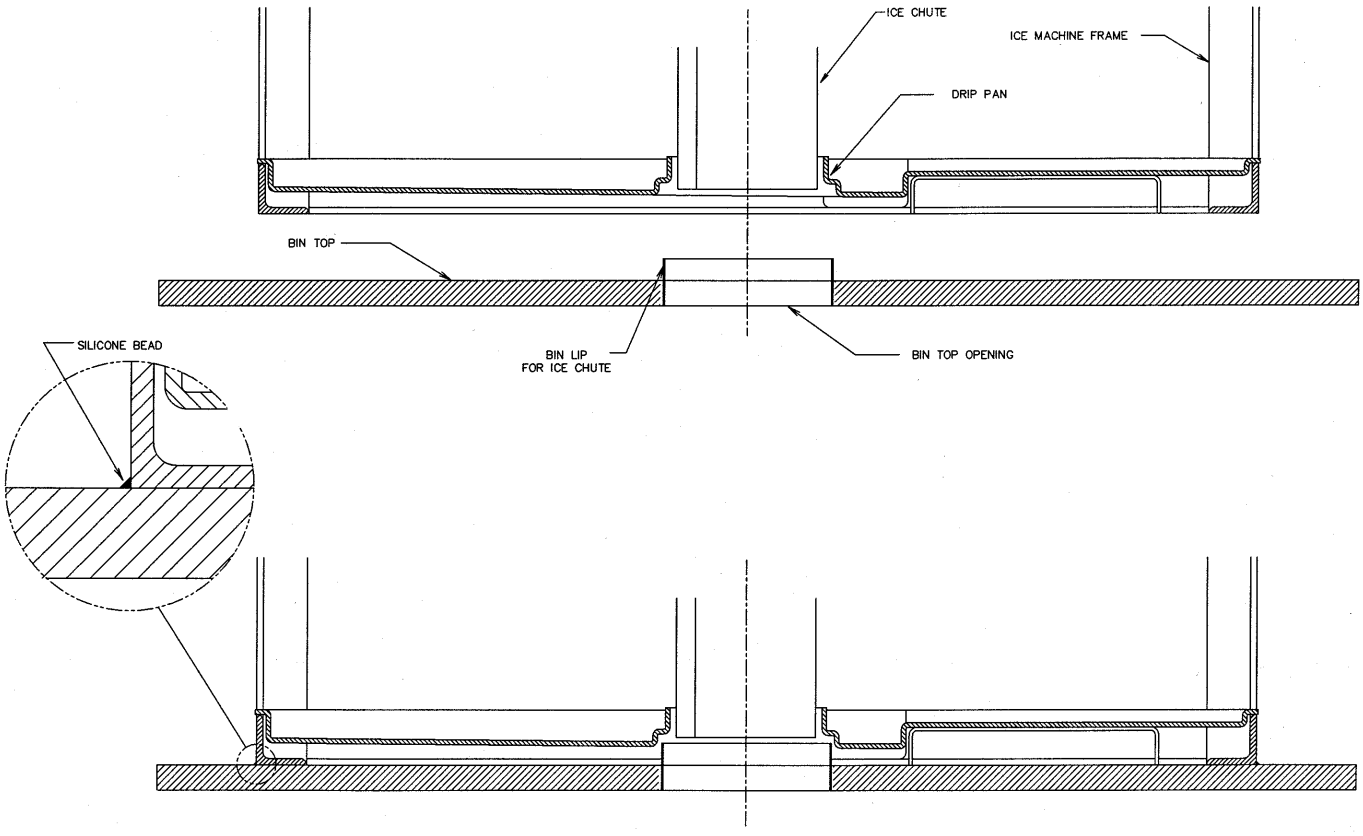


FIGURE – 4
Machine to Bin Top Installation

Connecting Electrical, Water & Drains

! WARNING !
The scroll compressor is phase sensitive. The compressor rotation must be checked before the unit is operated. Failure to do so may affect compressor warranty.
! WARNING !

All electrical, water, drains, and air-cooled condenser connections are made at the rear of the ice machine. See FIGURE-5 below for location information of all connecting points.

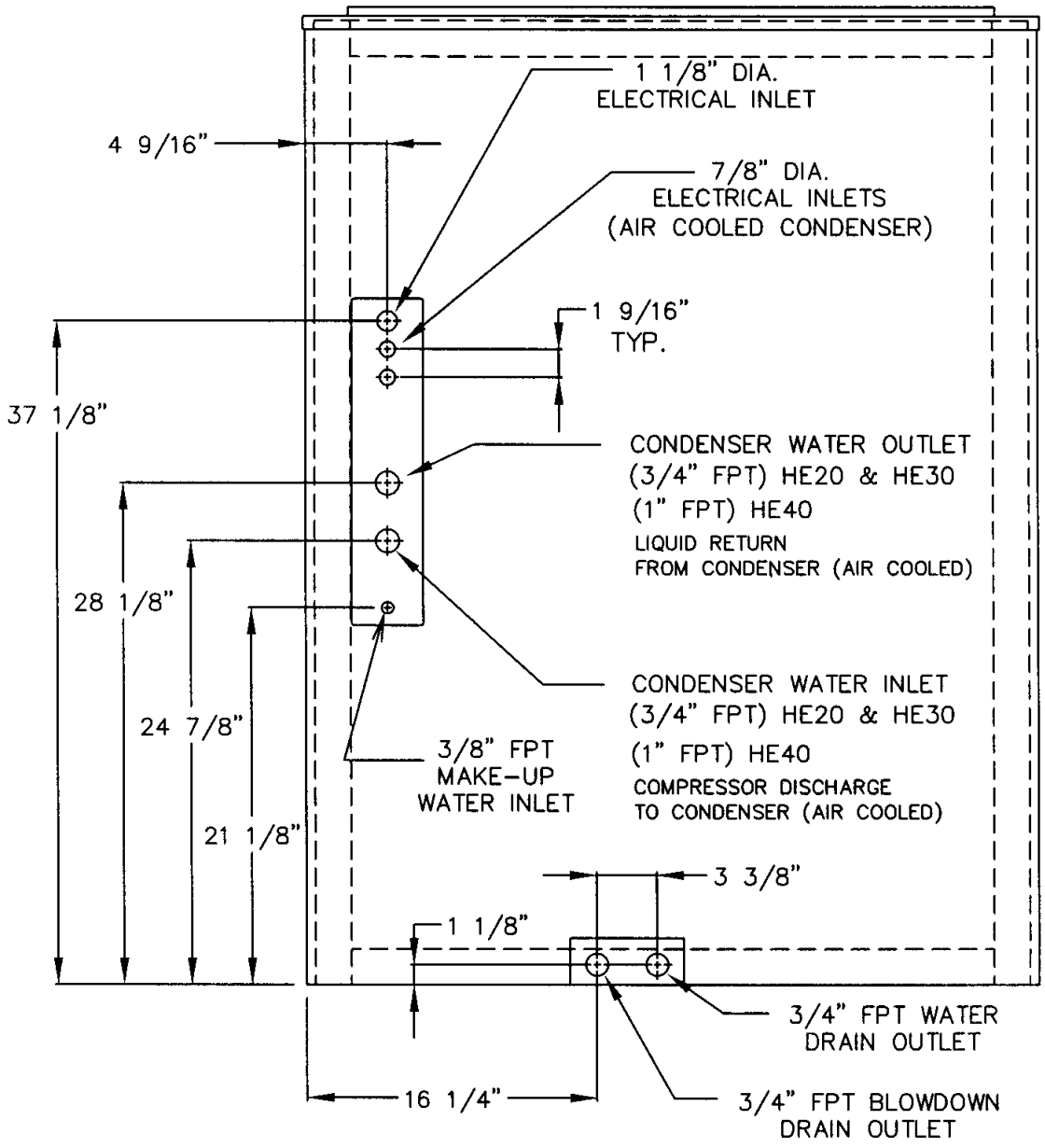


FIGURE – 5
Rear Utility Connection Layout

Wiring And Electrical Connection.

! WARNING !
Only service personnel experienced in refrigeration and qualified to work with high voltage electrical equipment should be allowed to install or work on the Tube-Ice® machine.
! WARNING !

Refer to TABLE-1 below to properly size wiring connections. A fused disconnect must be provided near the Tube-Ice® machine. Connect 3-phase power to terminals L1, L2, L3 for operation of the Tube-Ice® machine and its controls. (See FIGURE-6) If one leg of the 3 phase power is higher or lower ("Wild"), then it should be connected to terminal #L2. Connect the "Ground" wire to the "Ground" terminal provided. On dual voltage, 50 Hz machines, the 220V single phase should be connected to terminals L4 and L5.

Note: When initially starting the machine, **the scroll compressor must be phased properly.** If the compressor is run backwards for an extended period of time, the compressor may be damaged.

208/230V Air-cooled condenser should be wired to terminals 20,21,22 and 23. (see FIG. 11 & 12). 460V air cooled condensers should be wired to terminals B1, B2, B3, 22 & 23.

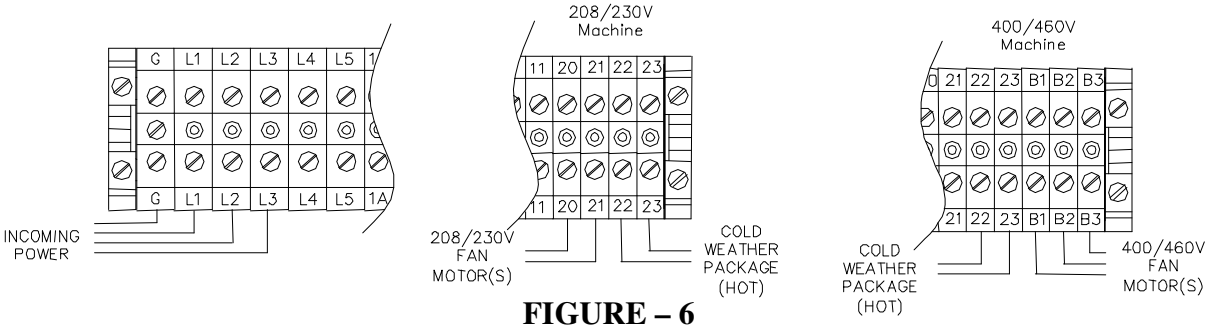


FIGURE – 6
Terminal Block Connections

Standard Voltages:		Water Cooled			Air Cooled		
Model	**Voltage**	**F.L.A.**	**Min. Ampacity**	**Max. Fuse**	**F.L.A.**	**Min. Ampacity**	**Max. Fuse**
HES20	208/230, 3p, 60 hz	18.0	20.9	30	21.4	24.3	35
	460, 3p, 60 hz	9.0	10.4	15	10.3	11.7	20
	220, 3p, 50 hz	19	21.0	35	22.4	25.3	35
	400, 3p, 50 hz	9.5	10.9	15	10.8	12.2	15
HES30	208/230, 3p, 60 hz	21.6	25.4	40	25.5	29.3	40
	460, 3p, 60 hz	10.7	12.6	15	12.0	13.9	20
	220, 3p, 50 hz	22.6	26.4	40	26.5	30.3	45
	400, 3p, 50 hz	11.2	13.1	20	12.5	14.4	20
HES40	208/230, 3p, 60 hz	27.3	32.5	50	35.1	40.3	60
	460, 3p, 60 hz	13.3	15.8	30	17.3	19.8	30
	220, 3p, 50 hz	28.3	33.5	50	36.1	41.3	60
	400, 3p, 50 hz	15.3	18.2	25	17.9	20.8	30

TABLE – 1
Electrical Specifications

Piping and Drain Connections.

All connections are located at the rear of the machine. Water-cooled machines will have five water connections (air cooled will have three water connections) on the freezing unit. See FIGURE-7 to locate connections.

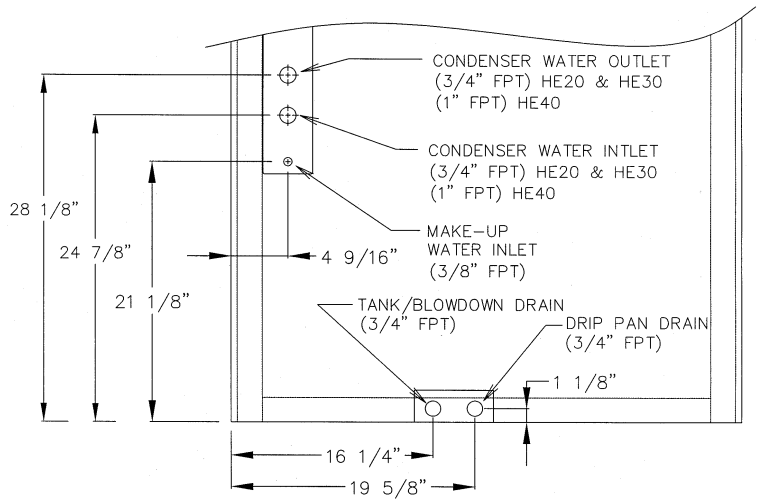
! CAUTION !
Exterior shut-off valves must be provided in the water inlet lines. The minimum inlet water pressure for satisfactory operation of the machine is 30 psig. The maximum allowable pressure is 100 psig.
! CAUTION !

Model	20	30	40
Make Up Water In	3/8" FPT	3/8" FPT	3/8" FPT
Water Tank Drain	3/4" FPT	3/4" FPT	3/4" FPT
Drip Pan Drain	3/4" FPT	3/4" FPT	3/4" FPT
Condenser Water In	3/4" FPT	3/4" FPT	1" FPT
Condenser Water Out	3/4" FPT	3/4" FPT	1" FPT

TABLE - 2
Water Supply and Drains

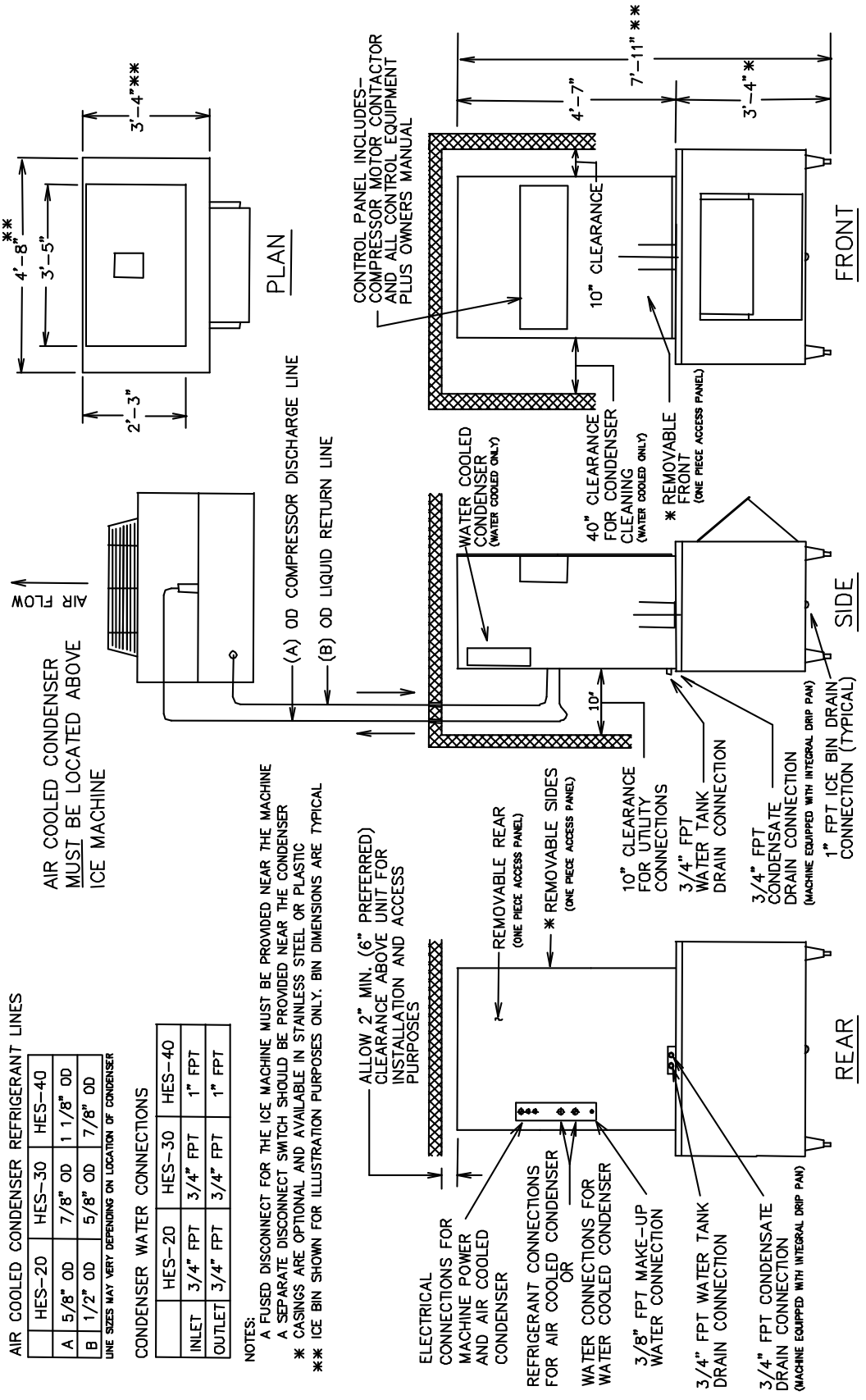
The condenser water outlet, water tank drain, drip drain and ice storage bin drain connections must be extended to an open drain or sump and arranged for visible discharge. See FIGURE-7 for water and drain connections on machine. See FIGURE-8 of typical space diagram drawing for ice storage bin drain connection.

! CAUTION !
These lines must NOT be connected into a pressure tight common header due to the possibility that warm condenser water may back up into the water pan, drip pan or the ice storage bin. The condenser water outlet MUST be piped separately to the drain.
! CAUTION !



Note: Above drawing shown with plastic side casings (1/2" thick)

FIGURE –7
Water Connections



AIR COOLED CONDENSER REFRIGERANT LINES

	HES-20	HES-30	HES-40
A	5/8" OD	7/8" OD	1 1/8" OD
B	1/2" OD	5/8" OD	7/8" OD

LINE SIZES MAY VARY DEPENDING ON LOCATION OF CONDENSER

CONDENSER WATER CONNECTIONS

	HES-20	HES-30	HES-40
INLET	3/4" FPT	3/4" FPT	1" FPT
OUTLET	3/4" FPT	3/4" FPT	1" FPT

NOTES:
A FUSED DISCONNECT FOR THE ICE MACHINE MUST BE PROVIDED NEAR THE MACHINE
A SEPARATE DISCONNECT SWITCH SHOULD BE PROVIDED NEAR THE CONDENSER
* CASINGS ARE OPTIONAL AND AVAILABLE IN STAINLESS STEEL OR PLASTIC
** ICE BIN SHOWN FOR ILLUSTRATION PURPOSES ONLY. BIN DIMENSIONS ARE TYPICAL

FIGURE - 8
Typical Space Diagram

Air-Cooled Condenser Installation Instructions

! WARNING !
These installation guidelines must be followed to obtain reliable operation from air-cooled ice machines. If these guidelines are not followed, the compressor warranty will not be honored.
! WARNING !

1. Use only Vogt approved condensers. Any exceptions to this policy must be obtained in writing prior to installation and operation of the ice machine.

2. Outdoor condensers **must** be installed with vertical airflow. Indoor condensers used for heat recovery may be installed with either horizontal or vertical airflow.

3. The condenser **must** be mounted above the ice machine, with liquid refrigerant from the condenser outlet draining freely (1/4" per foot slope) in the direction of normal operating flow (back to the ice machine) with no traps in the liquid line.

4. Flooding head pressure controls such as Alco Headmaster are **not** to be used, since they cause excessive subcooling of the returned liquid refrigerant and interfere with reliable ice harvest.

5. The discharge and liquid lines must be insulated with 1/2" thick Armaflex insulation or equal.

6. **Horizontal runs in the discharge** line should slope 1/4" per foot in the normal direction of flow (away from the ice machine).

7. Traps must be installed in discharge lines at the base of all vertical risers. There should be no intentional traps in liquid lines. Trap volume should be kept to a minimum. Typical details are shown in FIGURE-10. Long vertical runs should have traps every 20 feet.

8. Use only ACR grade copper pipe, Type L. Recommended line sizes are shown in TABLE-3.

9. Distance between ice machine and condenser must not exceed 150 equivalent feet. Refer to Condenser Equivalent Line Size worksheet. (See TABLE-5)

10. Condensers must be provided with a cold weather valve kit per FIGURE-9A. These valves allow one-half of the condenser to be disabled in cold weather. Running the ice machine with one half the condenser in cold weather makes it easier to maintain minimum necessary condensing pressure, particularly in windy conditions. The coil thermostat should be set to close at 35°F. for multiple fan condensers or 50°F for single fan condensers.

11. Condensers with multiple fans must be provided with a thermostat to turn off unneeded fans in cold weather. Turning off unneeded fans reduces on-off cycling of the fan(s) and allows for a steadier condensing pressure. The fan thermostat should be set at 50°F.

12. When extreme cold conditions are expected or encountered (temperatures below 0°F and wind greater than 15 MPH), it may be necessary to install a protective enclosure around the condenser. Other apparatuses such as louvers may be used. Contact the factory for suggestions.

13. After installation, the field-installed lines are to be evacuated to a vacuum of 500 microns or less and held for at least one hour. Use ¼" access connection located on compressor discharge line and liquid return line (32). After the vacuum pump is removed, vacuum should hold at 500 microns or less for at least 5 minutes and the lines pressurized with R-22 to 25-psig minimum.

14. The volume of refrigerant supplied with the machine is sufficient to fill the condenser and condenser lines when length of pipe (one way) is 75 feet or less. When the length of lines is longer than 75 feet, additional refrigerant must be added as noted below. Instructions for adding refrigerant are included further in these instructions.

Liquid Line Size	75 ft.	100 ft.	125 ft.	150 ft.
1/2"	none	None	None	2
5/8"	none	2	4	6
7/8"	none	4	8	12
1-1/8"	none	6	12	18

TABLE - 3
Pounds R-404A to Add Vs. Liquid Line Length

15. All piping must be done in accordance with applicable local and national codes. Such codes may include "The Safety Code for Mechanical Refrigeration (ANSI B9.1), and "The Code for Refrigerant Piping" (ANSI B31.5).

16. The following installation guidelines are strongly suggested. While they do not affect the machine warranty, they may be required for safe operation, and to comply with all applicable electrical and mechanical codes.

17. Local electrical code must be checked for wiring method.

18. The installer must provide a lockable disconnect switch(s) adjacent to the condenser. The power is fused at the machine by a 15 amp breaker.

19. Electrical connections between the condenser and the Tube-Ice® machine require minimum 12 ga. wire. See FIGURE-11 &12.

20. All electrical fittings and components exposed to the weather must be suitable for outdoor installation.

The design total heat rejection for each Tube-Ice® machine, the recommended air-cooled condenser, and condenser physical and electrical data are shown in TABLE-4. Only the condensers shown are UL listed with the ice machines. Other condensers may be individually UL listed, but are not UL listed with the Tube-Ice® machines, and cannot be recommended by Vogt Tube-Ice. Catalog energy efficiency ratings of the ice machines are based on use of the recommended condenser.

Condensers supplied by Vogt must be utilized. The use of non-Vogt condensers will void the compressor warranty. For continuous operation at ambient above 95°F, consult the factory about using a larger condenser.

Ice Machine Model	**HE20**	**HE30**	**HE40**
Recommended Condenser	DVT005 (DVT008)	DVT008 (DVT012)	DVT012 (DVT016)
Note: For continuous operation at ambient above 105 °F, use larger condenser shown in parenthesis			
Total Heat Rejection:			
BTU/hr at 60 Hz. (15°F TD)	35,700	58,800	117,500
BTU/hr at 50 Hz.	32,800	54,100	108,100
Fans:			
Number	1	1 (2)	2
HP, Each	1/3 (1/2)	1/2	1/2
Total, CFM	5,050 (6,450)	6,450 (12,400)	12,400 (12,900)
Full Load Amps:			
1 ph., 208/230V, 60 Hz	3.4 (3.9)	3.9 (7.8)	7.8 (7.8)
3 ph., 208/230V, 60 Hz	N/A	N/A	N/A
3 ph., 460V, 60 Hz	1.3 (1.3)	1.3 (2.6)	2.6 (2.6)
1 ph., 200/220V, 50 Hz	3.4 (3.9)	3.9 (7.8)	7.8 (7.8)
3 ph., 200/220V, 50 Hz	N/A	N/A	N/A
3 ph., 400V, 50 Hz	1.3 (1.3)	1.3 (2.6)	2.6 (2.6)
Weight, lbs.:			
Net	180 (260)	260 (470)	470 (530)
Shipping	320 (390)	390 (520)	520 (680)
Operating (maximum flooded)	195 (285)	285 (500)	500 (560)
Condenser dimensions, inches:			
A (Width)	43”	43”	43”
B (Length)	39.75” (49.75”)	49.75” (69.75”)	69.75”
C (Height)	30” (40”)	40” (60”)	60”
D (Leg centerline)	17”-3	17” - 3	17” - 3
E (Leg centerline)	30” (40”)	40” (60”)	60”
F (Clearance below)	24.5”	24.5”	24.5”
Recommended Line Sizes, OD:			
Liquid (All lengths and orientations)	1/2”	5/8”	7/8”
Discharge Gas			
Vertical Up, All lengths	5/8”	7/8”	1-1/8”
Horizontal Or Down, < 75 ft.	5/8”	7/8”	1-1/8”
Horizontal Or Down, > 75 ft.	7/8”	1-1/8”	1-3/8”
Connections at Condenser:			
Liquid (ODC)	5/8”(7/8”)	7/8”	7/8”
Discharge Gas (ODC)	7/8” (1 1/8”)	1 1/8”	1-1/8” (1-3/8”)
Connections at Machine			
Liquid & Discharge Gas (ODC)	1-1/8”	1-1/8”	1-1/8”

TABLE - 4
Bohn Air-Cooled Condenser Data

	Solenoid Valve				Thermostats	
Condenser	Description	Valve	Valve Rebuild Kit	Replacement Coil	Fan	Solenoid
DVT005	5/8" N.O.	12A4200A0503	12A4199V42	12A2105C04	Penn A19	Penn A319
DVT008	7/8" N.O.	12A4200A0704	12A4199V44	12A2105C04		
DVT012	1 1/8" N.O.	12A4200A0902	12A4199V45	12A2105C04		
DVT016		12A4200A09021	12A4199V55	12A2105C25		

Note: Sporlan Solenoid Valves
Sporlan Solenoid valve OE34S290 (12A4200A0902) discontinued in Aug 2006

TABLE – 4A
Cold Weather Kit Replacement Parts

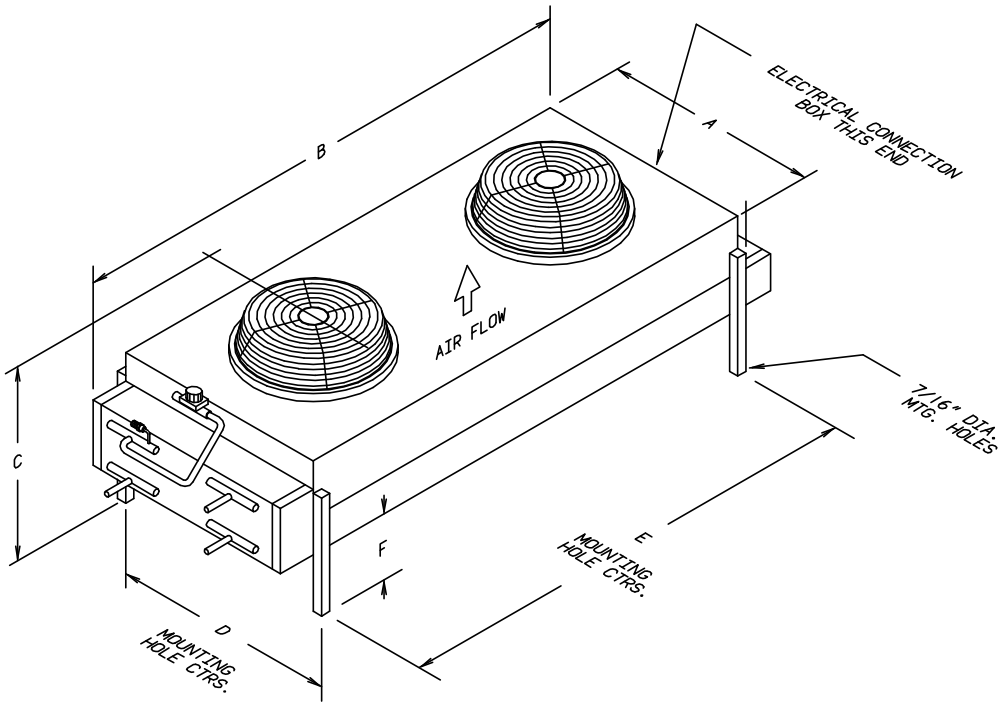
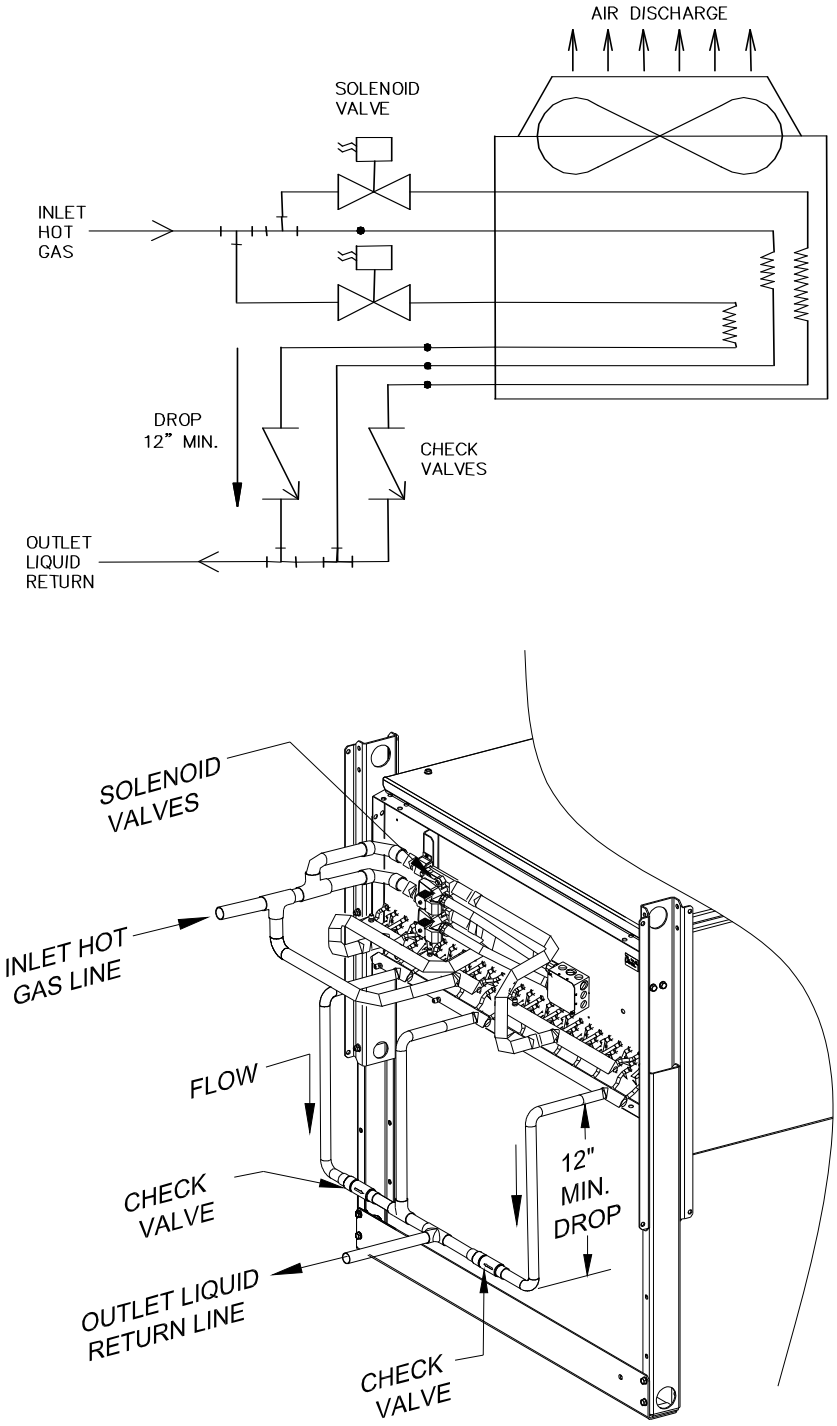


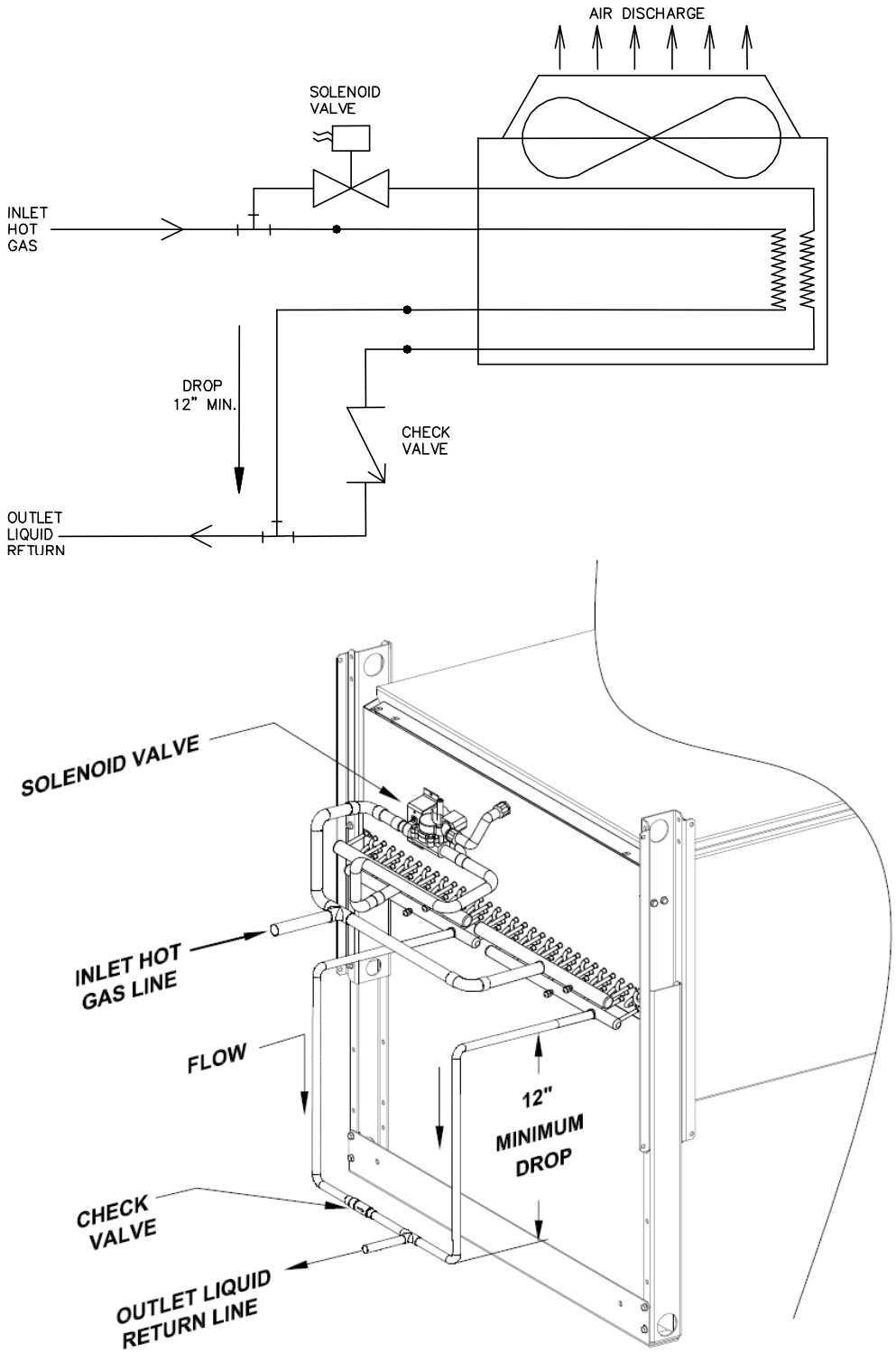
FIGURE - 9
Condenser Dimensions (Condenser pictured: DVT012 or DVT016)

Machine	Bohn Part #	Vogt Part #	Coil Split
HE20	DVT005	12A2115B03	50/50
HE30 & HE20 (High Ambient)	DVT008	12A2115B04	50/25/25
HE40 & HE30 (High Ambient)	DVT012	12A2115B05	50/50
HE40 (High Ambient)	DVT016	12A2115B06	50/50
P112	BNHS02A011	12A2115B07	50/50
P112 (High Ambient)	BNHS02A011(12)	12A2115B08	50/50
P118	BNHS02A015(8)	12A2115B09	50/25/25
P118 (High Ambient)	BNHS02A015(12)	12A2115B10	50/25/25
P18XT	BNHS04A029	12A2115B11	50/50



Note: Check Valves in the return line (labeled "Output Liquid Return Line") is supplied with the condenser.

FIGURE – 9A
Condenser Field Piping / 50-25-25 Coil Split



Note: Check Valve in the return line (labeled "Output Liquid Return Line") is supplied with the condenser.

FIGURE – 9B
Condenser Field Piping / 50-50 Coil Split

CONDENSER EQUIVALENT LINE SIZE WORKSHEET

Discharge Gas Line O.D. _____

Fitting Type	Number Used	Factor	Total
Globe Valve (open)			
Angle Valve (open)			
45° Elbow			
90° Elbow			

Feet of Straight Copper Used	
Total Fitting Factor	
Total Equivalent Feet	

Fitting Factors

Copper Tube O.D. Type "L"	1/2"	5/8"	7/8"	1 1/8"
Globe Valve (open)	14	16	22	28
Angle Valve (open)	7	9	12	15
45° Elbow	.5	1	1	1.5
90° Elbow	1	2	2	3

TABLE - 5

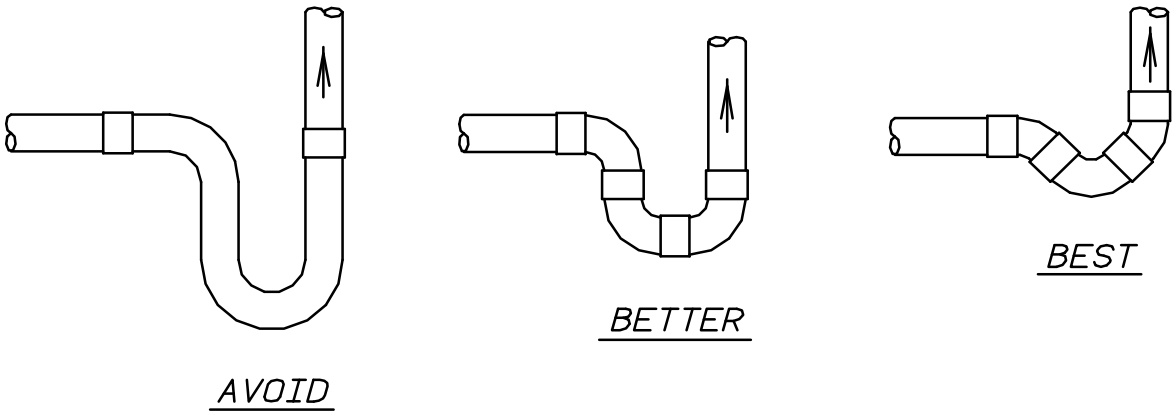
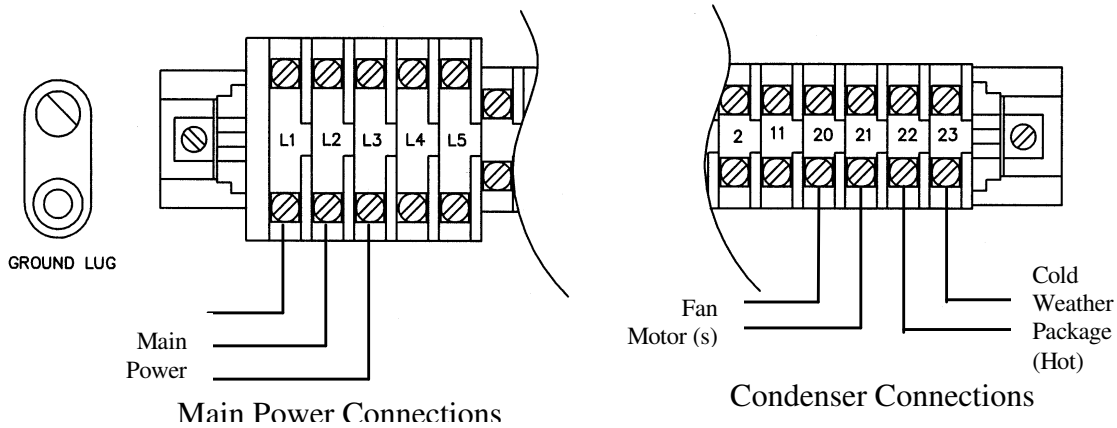


FIGURE - 10
Minimum Traps for Discharge Lines

Wiring Connections to Air-Cooled Condenser.

HE Air-cooled condenser should be wired to terminals 20, 21, 22 and 23 (see FIGURE - 12).



NOTE: All four wires must be run from the ice machine to the remote air-cooled condenser.

FIGURE - 11

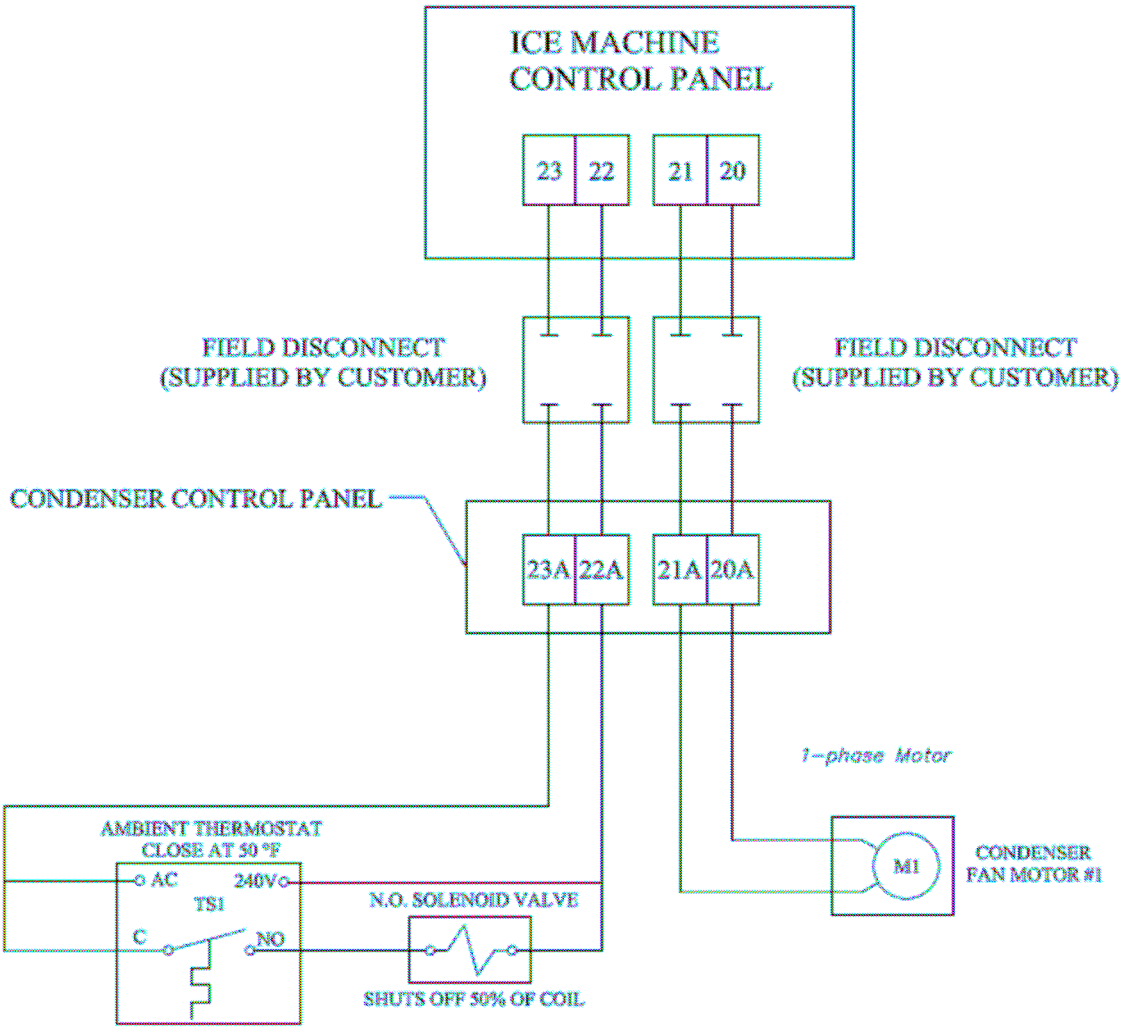


FIGURE - 12
Wiring For BOHN DVT005 with Cold Weather Valve and Single Fan, 50/50 Condenser Split

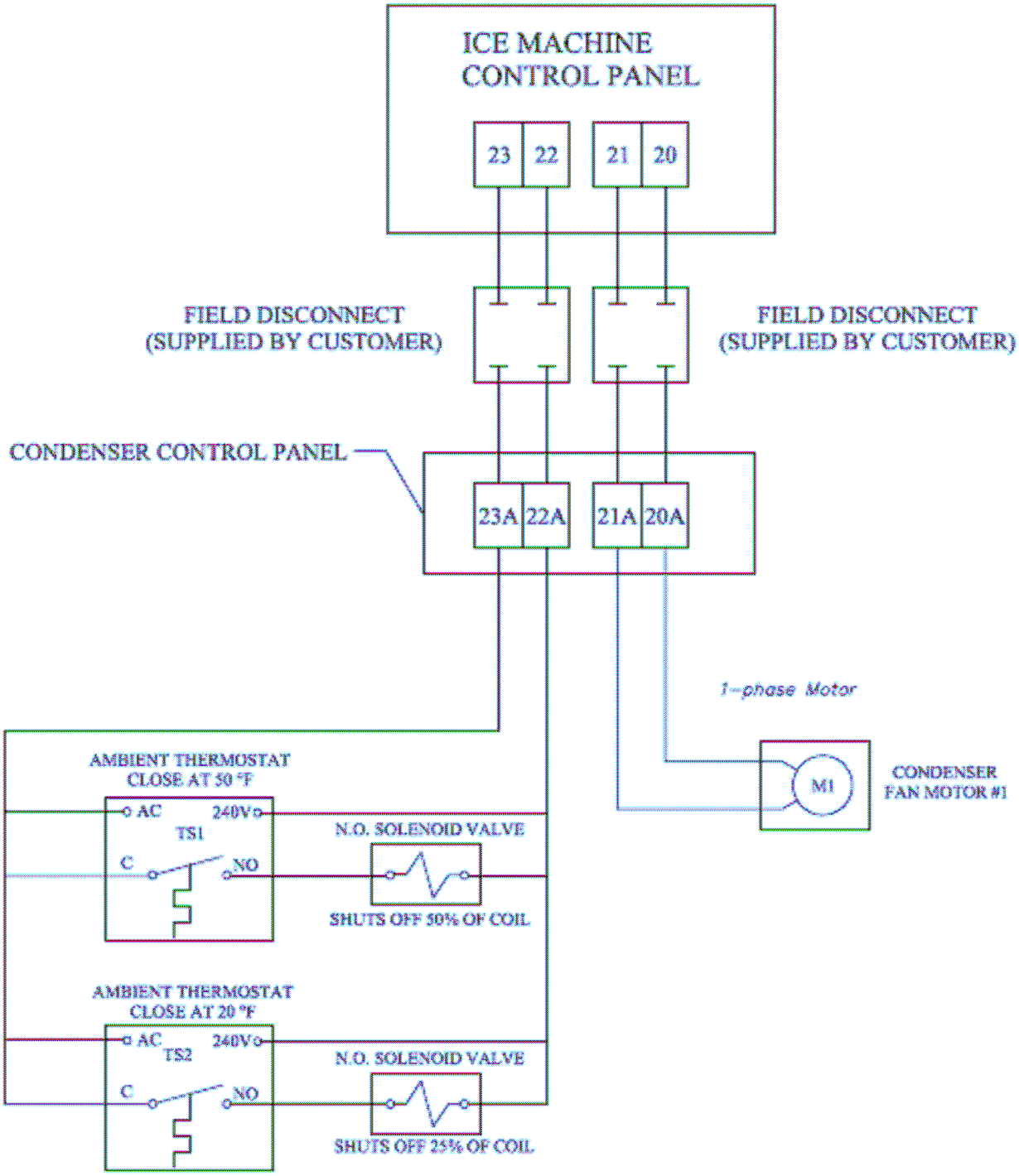


FIGURE – 12A
Wiring For BOHN DVT008 with Cold Weather Valve and Single Fan, 50/25/25 Condenser Split

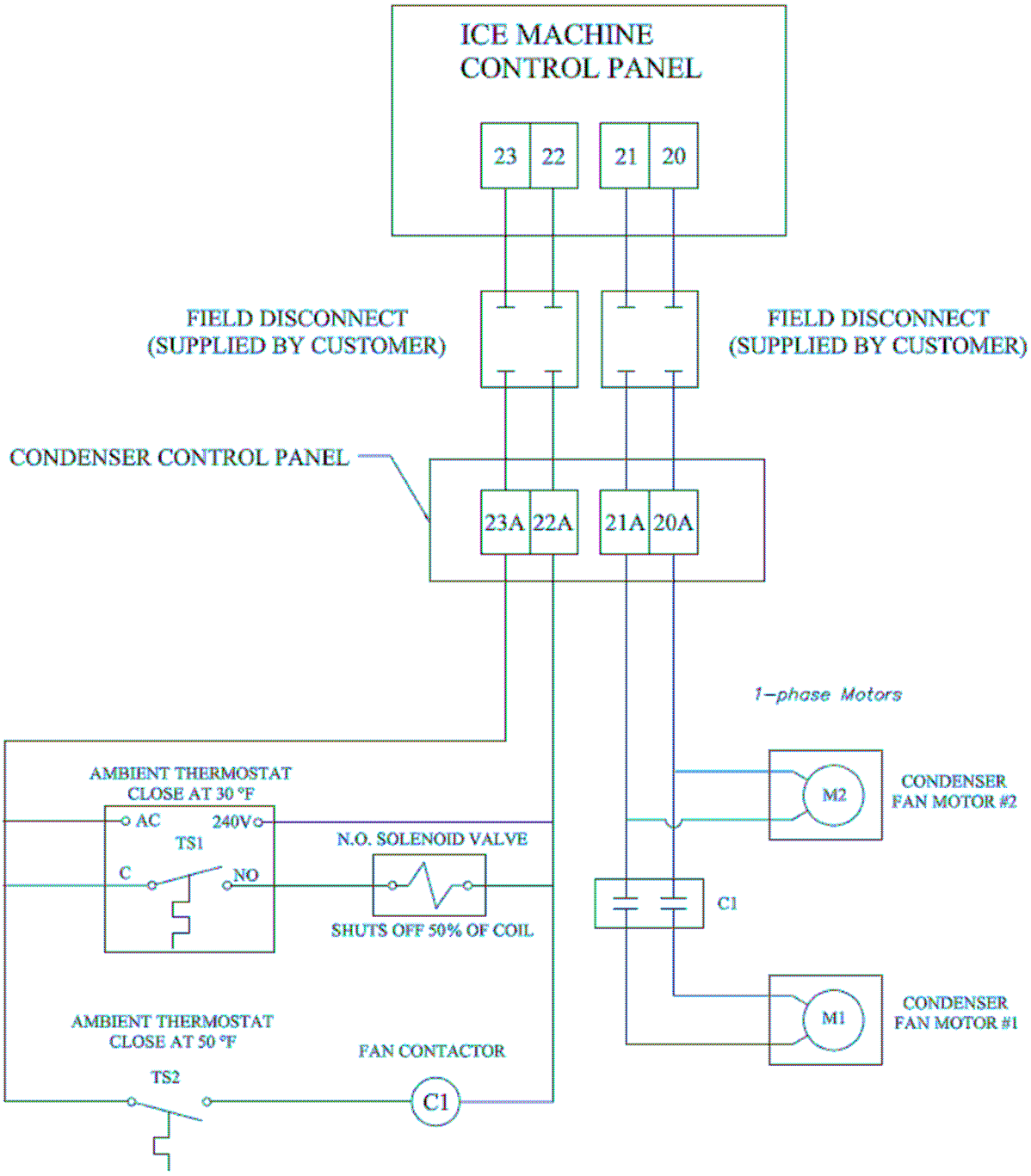


FIGURE – 12B
Wiring For BOHN DVT012 /DVT016 with Cold Weather Valve and Two Fan, 50/50 Condenser Split

Refrigerant Connections to Air-Cooled Condenser.

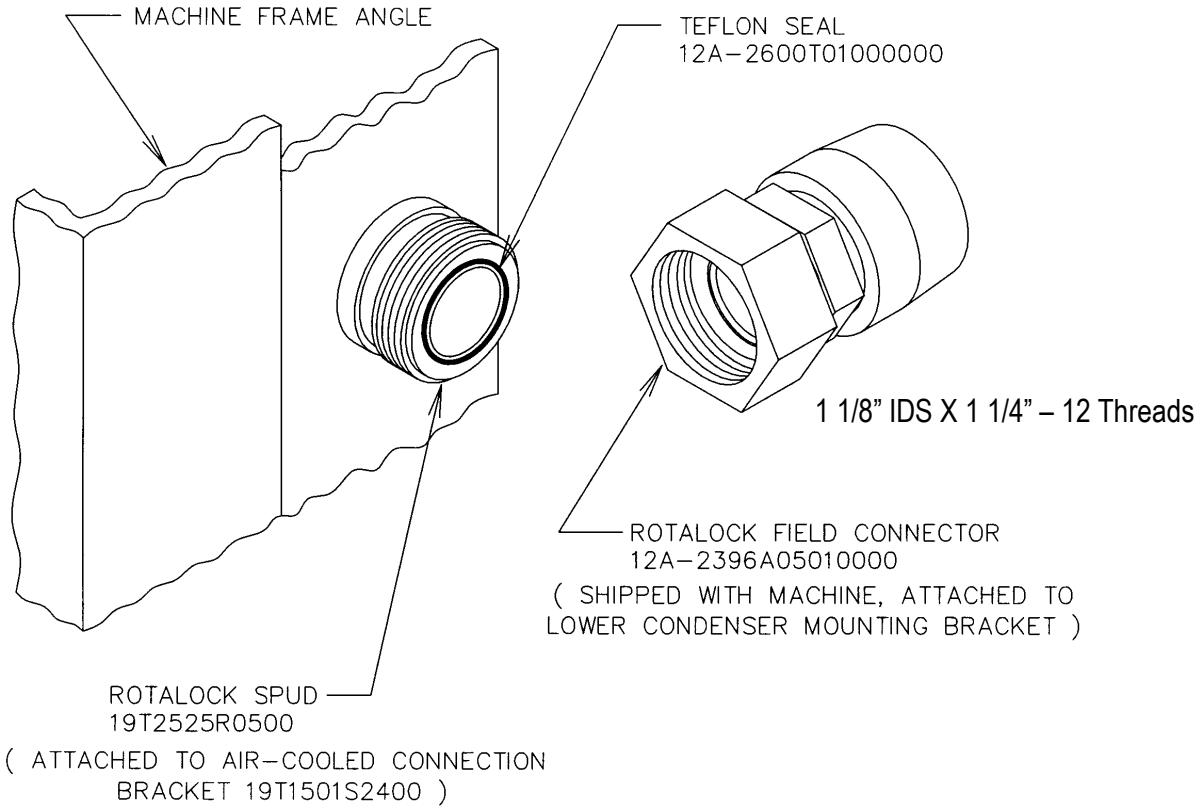


FIGURE - 13
Field Attachment, Air Cooled Condenser Refrigerant Tubing

FOLLOW THESE PROCEDURES TO MAKE A TIGHT JOINT

1. Solder or braze condenser-tubing ends to the female Rotalock connectors.
2. Remove dust caps if used, making sure that component plastic seals are intact.
3. Wipe off connector and spud-threaded surfaces with a clean cloth to prevent the inclusion of dirt, or any foreign material in the system.
4. Connector coupling nut should be screwed onto Rotalock spud using the proper amount of torque (See TABLE-4).

Spud Size	Amount of Torque
1/2" – 5/8"	30-40 FT LBS
7/8"	50-60 FT LBS
1 1/8"	**80-100 FT LBS**

TABLE – 6
Torque Ratings

Ice Bin Thermostat Sensor Installation.

Each machine is equipped with an electronic ice bin thermostat. To assure proper protection for the machine, the sensor of the ice bin thermostat must be located so that ice will contact it when the bin is full (See FIGURE-14). The distance between the ice chute and the sensor allows space for the machine to make an additional discharge of ice AFTER the ice contacts the probe WITHOUT the ice building up into the discharge opening of the chute.

Note: The probe should also be mounted on the backside of the bracket, opposite of the front of the bin to reduce the possibility of damage from ice removal equipment.

The control panel is electrically connected so that the bin thermostat will stop the machine only upon the completion of a harvest period and a partial pump down cycle.

When both cylinder and crushed ice are produced and separately stored in a divided bin, the control sensor of thermostat BC1 is placed in the crushed ice section of the storage bin (left side) and the control sensor of thermostat BC2 is placed in the cylinder ice section (right side of bin).

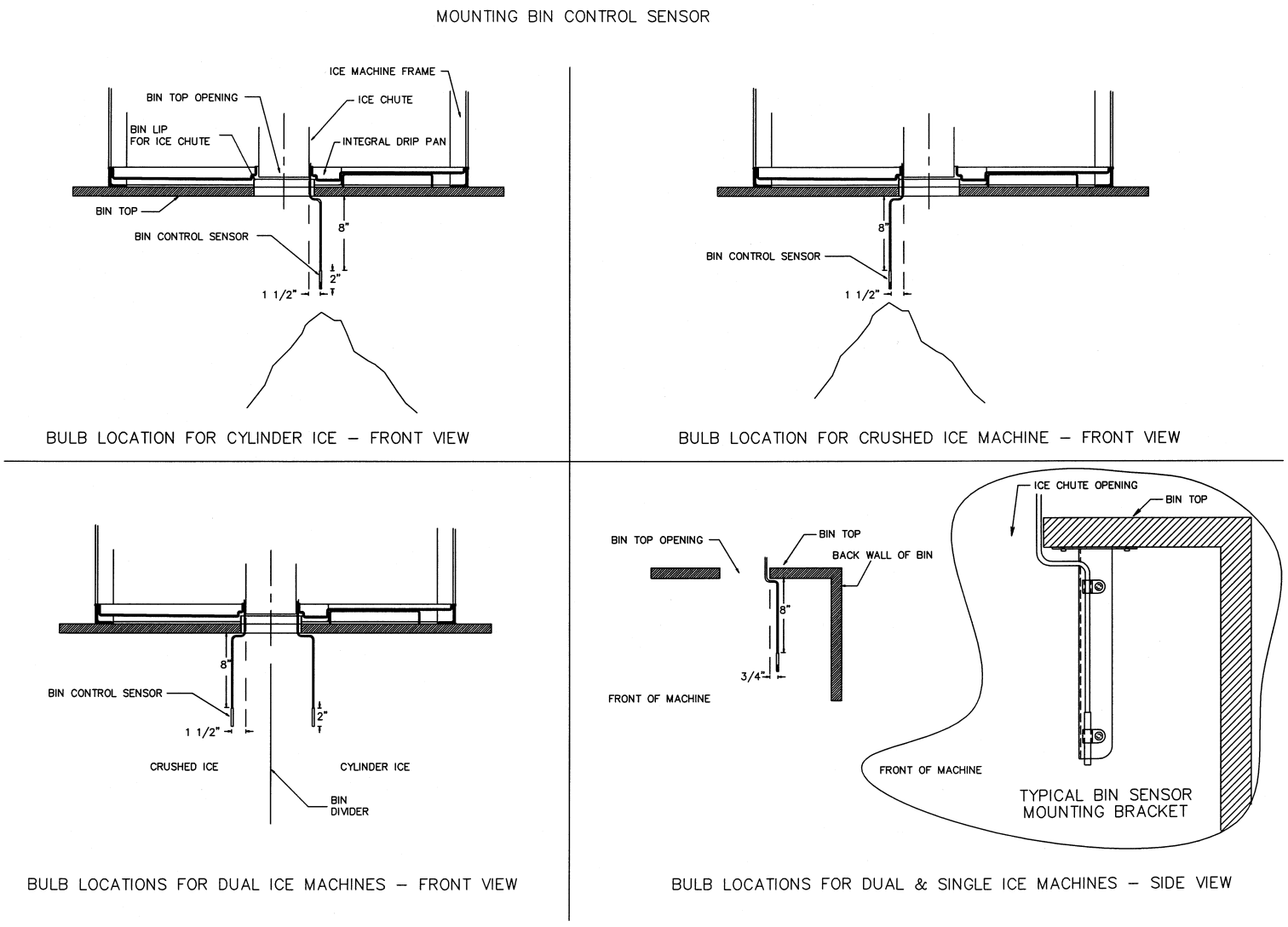


FIGURE - 14
Location Of Thermostat Sensors In Ice Storage Bin

Note: Drip loop not necessary for Electronic Thermostat

Programming the Electronic Bin Thermostat.

The electronic bin thermostat has a LCD readout that displays the temperature in the bin at the sensor. **The control has been preset and locked out at the factory to shut the machine down at 38°F and to re-start at 40°F.** The control retains the program even if power is cut to the machine. Under special conditions, the settings may need to be changed. The lockout switch is located on the inside of the control. Removal of the four screws on the face of the control will reveal the lock-switch.

Follow the instructions below to reset the switch.

1) Press the "SET" button to enter the sensors setup mode
2) Select between "C"- Celsius and "F" - Fahrenheit
   Use the up ↑ or down ↓ key to select "F"
3) Press the "SET" button to set the Set point (S1 will be blinking)
   Use the up ↑ or down ↓ key to set the temperature at 38°F
4) Press the "SET" button to set the Differential (DIF 1 will be blinking)
   Use the up ↑ or down ↓ key to set the differential at 2°F
5) Select between "C1"- Cooling mode and "H1" - Heating mode
   Use the up ↑ or down ↓ key to select "C1"

Machine will shut off when temperature drops to 38°F and come on when temperature reaches 40°F.

Note: The sensor will automatically exit the programming mode if no keys are depressed for a period of thirty seconds. Any settings that have been input to the control will be accepted at that point.

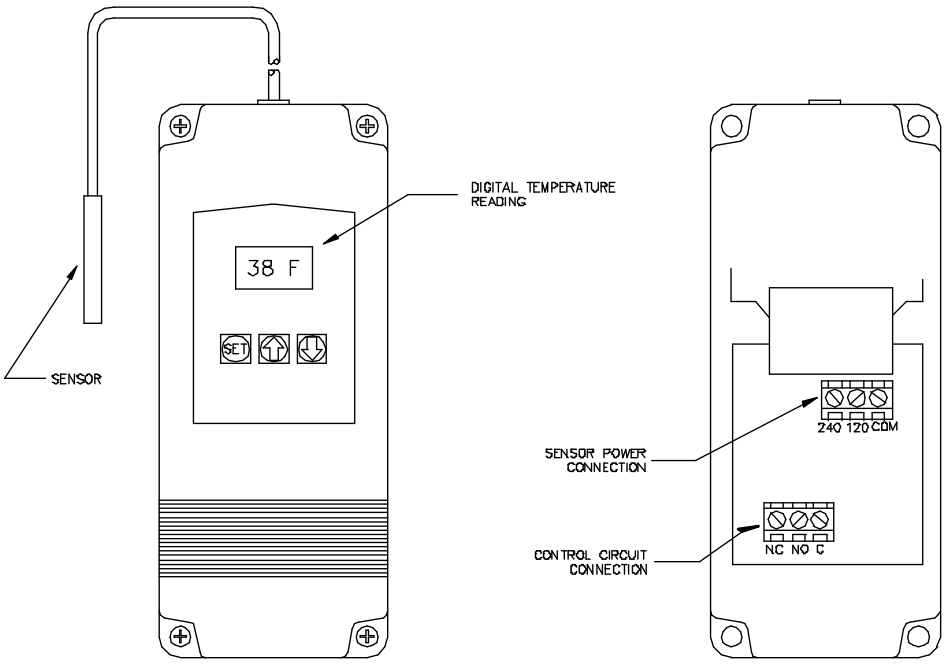


FIGURE – 15
Electronic Thermostat

Note: If damaged, the sensor can be replaced without replacing entire unit.
Replacement sensor part #: 12A 2117G0901. Electronic temperature control part #: 12A2117G09. Sensor cable can be extended up to 400 feet. For more information, consult Tube-Ice® Technical Service Department.

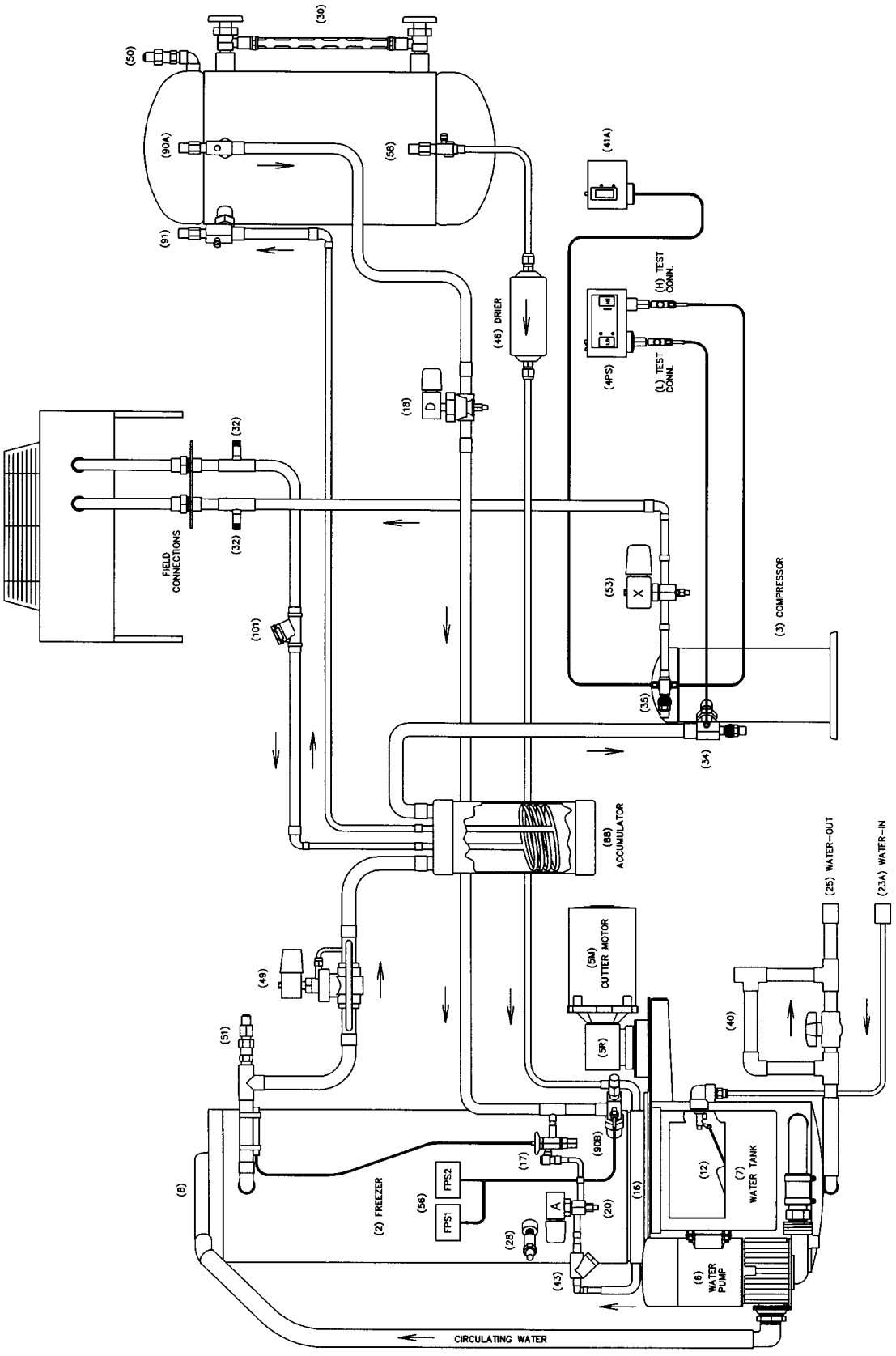


FIGURE – 16
Piping Schematic, Air-Cooled

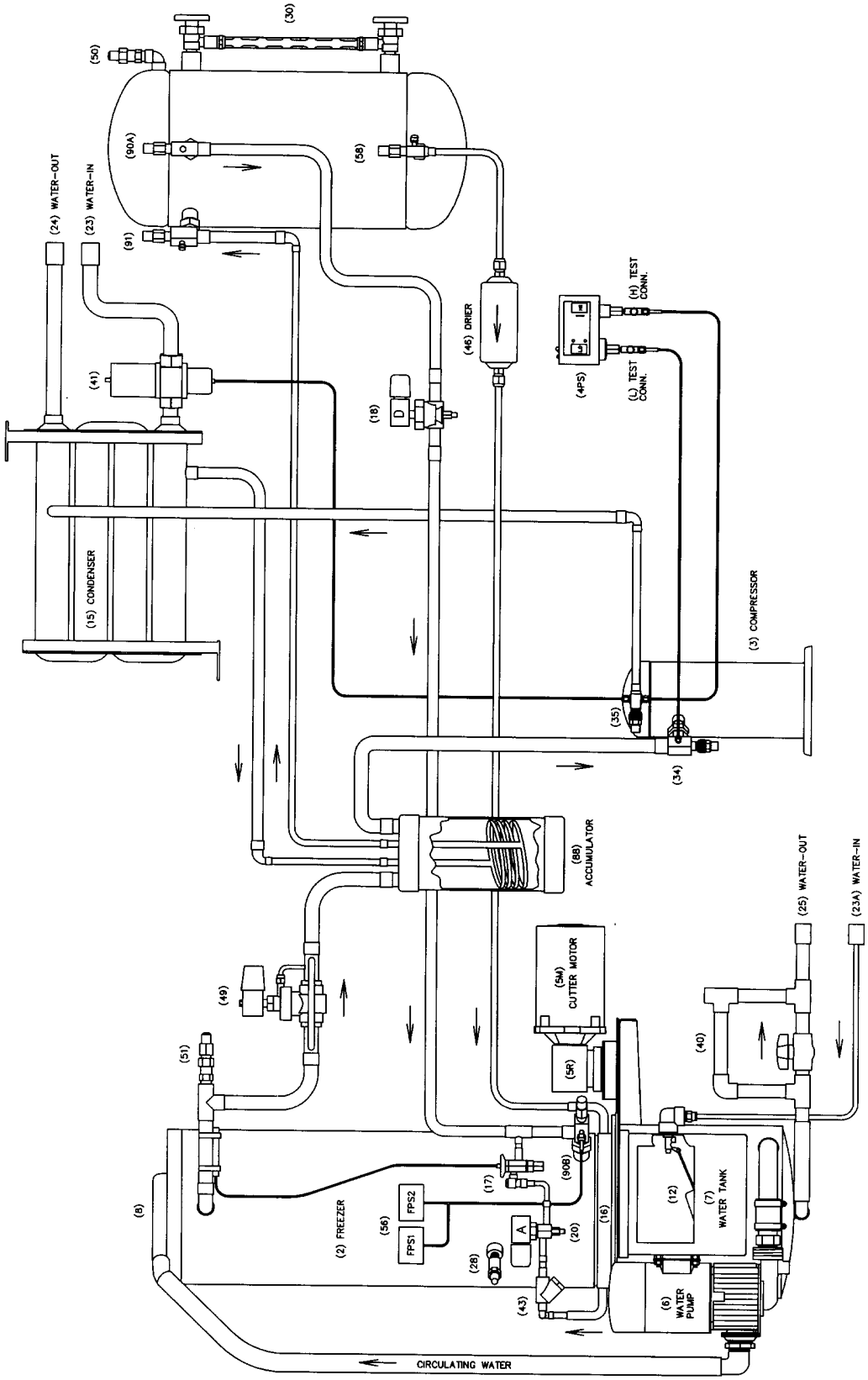


FIGURE -17
Piping Schematic, Water Cooled

Initial Start-Up & Operation

Start-Up Checklist

NOTICE: The Warranty / Registration Start-Up Form located at the back of the manual must be completed and returned in the postage paid envelope or faxed to 800-770-8648 to initiate the warranty.

In order to prepare the machine for start-up, it will be necessary to remove the front and right side panels for access to the various valves and for observation. To remove any side panels, the top cover must be removed first. The side panels have a top flange that hangs over the top angle of the machine frame. The panels are secured to the sides of the machine with industrial magnets. To remove a side panel, first pull the lower section of the panel away from the machine to disengage the magnets, then lift up and away to clear the top angle of the machine.

For valve number reference, see FIGURES 16 & 17 for piping schematics.

1. _____ The machine is shipped with the total refrigerant charge isolated in the receiver. Open the upper and lower gage cock valves on the receiver sight glass to check the refrigerant level. The level should be within ½" of the pumpdown level indicated on the receiver. If the level is OK, close the valves and continue with the checklist. If the level is not right, immediately contact the Tube-Ice Technical Service Department at 502-635-3510.
2. _____ See that water-inlet connections are attached to the proper couplings (water cooled units) and to water for ice making. The inlet shutoff valves should be open. The water level in the water pan should be at a height where the make-up water float valve will be closed when the machine is idle.
3. _____ See that compressor crankcase oil level is at proper height of 1/8 to 1/4 of the sight glass with the compressor off. While running, the level should between 1/2 and 7/8 of the sight glass.

! NOTE !
IMPORTANT - In most installations, it will be necessary to add oil to the compressor of air-cooled machines. An oil charging port (1/4" access fitting with schrader) is located on the compressor. Compressor oil should be checked after 24 to 48 hours of operation.
! NOTE !

4. _____ See that the "Ice-Off-Clean" selector switch is in the "Off" position. See FIGURE-18.

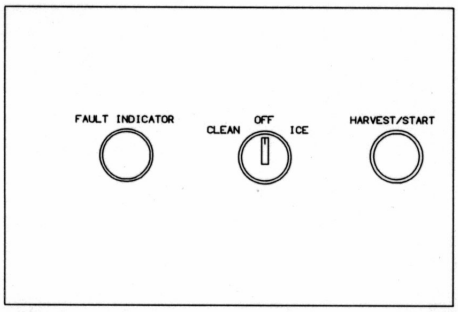


FIGURE - 18
Switch Plate

5. _____ Open compressor service valves (34 and 35), the hand-stop valve (90A) in the thawing gas line, (91) in the condenser return line, and the hand-stop valve (58) in the liquid line. These valves are tagged to indicate that they were closed for shipping purposes.

6. _____ Open the hand stop valve (90B) in the thawing gas at the inlet to the evaporator. After fully opening the valve, make 1/2 turn to the closed position to open the port to the freezer pressure switch. **IMPORTANT** – The machine will not operate if this valve is not set properly.

7. _____ **CHECK TO SEE** that the charging valve (28) is the only stop valve in the various refrigerant lines in the closed position.

! NOTE !
All valves are tagged with instructions.
! NOTE !

8. _____ Immediately after opening all tagged valves, entire machine should be checked for refrigerant leaks with electronic leak detector. Flare fittings may work loose during shipment and valve packing may leak after opening.

! WARNING !
The warranty does not cover leaks of this type after the initial start-up of the unit.
! WARNING !

9. _____ Close exterior disconnect switch to energize crankcase heater and power the PLC.

! CAUTION !
The crankcase heater should be energized for a MINIMUM of 2 HOURS before attempting to operate the compressor.
! CAUTION !

10. _____ **Prime the water pump using the following procedure:** Connect a suction gage to low-pressure test connection and a high-pressure gage to the high-pressure test connection. After the crankcase heater has been energized for **TWO HOURS**, remove the control panel cover and locate the control circuit breakers to the left of the PLC (see FIGURE-19). Move the selector switch to the "Clean" position and push the "Harvest/Start" switch. The water pump should start, however, do not be alarmed if pressure in the evaporator causes the compressor to start also. If the compressor starts, check the compressor rotation. If the compressor is turning in the wrong rotation, **immediately stop the machine using the control circuit breaker and correct wiring as outlined in step 11**. Prime the water pump by using the control circuit breaker to start and stop the pump motor.

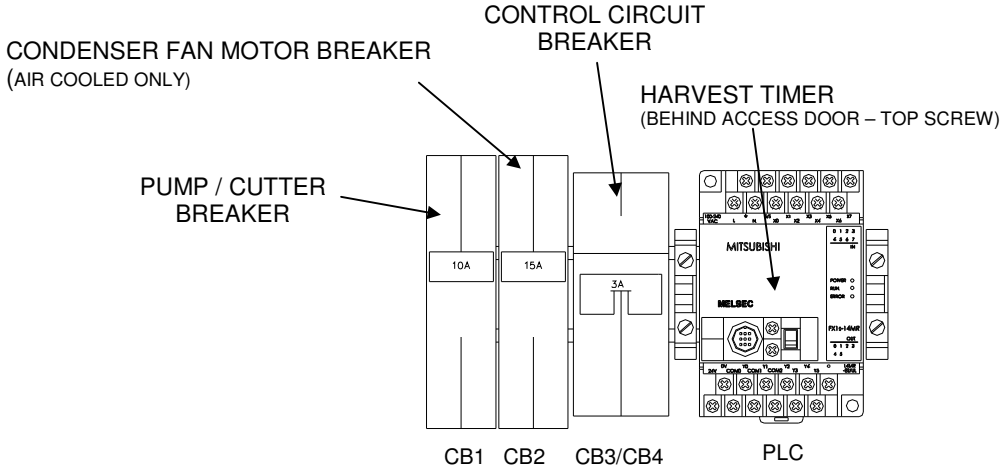


FIGURE - 19
Circuit Breakers

11. _____ **Check compressor rotation of the scroll compressor using the following procedure:** Move the selector switch to the "Ice" position and press the "Harvest/Start" switch. The liquid line solenoid valve (20) will open and feed liquid into the evaporator for approximately 2 minutes. The machine will not operate until the low pressure rises sufficiently (to approximately 40 psig) to close the low-pressure switch (4PS) & open the cylinder ice freezer pressure switch (FPS2). Suction pressure must decrease and discharge pressure increase immediately. A scroll compressor will also be very noisy when rotating in the opposite direction. To change rotation, reverse two (2) of the three (3) compressor wires L1, L2, and L3 either at the control panel terminal block, or at the compressor junction box. **CAUTION:** Always disconnect power to the machine before attempting electrical modifications.

! CAUTION !
If the compressor runs backwards for an extended period of time, damage may occur to the compressor and the warranty may be voided.
! CAUTION !

12. _____ Once the water has been primed, move the selector switch to the "Ice" position and push the "Harvest/Start" switch. The liquid line solenoid valve (20) will open and feed liquid into the evaporator for approximately 2 minutes. The machine will not operate until the low pressure raises sufficiently (to approximately 40 psig) to close the low-pressure switch (4PS) & open the cylinder ice freezer pressure switch (FPS2).

13. _____ Operate the machine several cycles while completing the **Warranty/Registration Start-up Form**. Mail the completed report in the postage paid envelope or fax to 800-770-8648.

! CAUTION !
If it should ever become necessary to add refrigerant to the system, charging valve (28) is provided for this purpose. Be sure to follow all local and federal regulations regarding the handling of refrigerants and their illegal emission into the atmosphere.
! CAUTION !

General Machine Information

Refrigerant Charge. Each HES Series Tube-Ice machine is charged with refrigerant and test operated at the factory before shipment. The total charge of R-404A is approximately 90lbs. This is not a critical charge. The operating level indicated on the receiver is intended as an approximate level only. As long as the machine is operating satisfactorily, there should be no need to add refrigerant. However, as indicated in the instructions for air-cooled condenser installation, it may be necessary to add refrigerant to the system for line sets over 75 feet in length.

! CAUTION !
Refrigerant should only be added in the total pumpdown mode.
! CAUTION !

Total Pumpdown Mode. Total pumpdown is initiated by setting the selector switch to the "Clean" position. The machine will continue to run in the current cycle and proceed to the Total Pumpdown Mode at the completion of the next harvest cycle. At this time the compressor and water pump will run, the "A" (liquid feed) solenoid valve will close and the freezer will begin to pump down. As the suction pressure decreases, the freezer pressure switch will initiate a harvest cycle to clear the partially formed ice cylinders from the freezer. This harvest cycle will end after one minute and the total pumpdown will resume, continuing until the compressor cycles off by the low-pressure switch. At this time, only the water pump will be running. **Note:** The liquid line will contain refrigerant from the receiver to the liquid feed "A" valve (20). Move the selector switch to the "Off" position. The machine is now pumped down.

Note: If the machine is in the Total Pumpdown mode for an extended period of time, (over 15 minutes for HES-40, over 20 minutes for HES-30, over 25 minutes for HES-20) and the compressor does not shut off, a problem exists.

If freezer pressure is not pulling down, one of the following problems may be true: liquid feed, "A" valve (20) or Thaw gas, "D" valve (18) is leaking, or the compressor may be damaged.

If freezer pressure is pulling down but the compressor does not shut off, a problem may exist with the High/Low pressure safety switch.

Adding Refrigerant. Once total pumpdown mode is achieved, open the upper and lower gage cock valves to view the level of refrigerant in the system. Connect a charging hose to the charging valve (28) located at the base of the evaporator. It is important that no air or other non-condensable gases enter the system when charging refrigerant into the unit. Open the charging valve to the refrigerant cylinder to begin feeding **liquid**. Turn the selector switch back to the "Clean" position and push the "Harvest/Start" switch. The water pump will start immediately. The compressor will start as soon as the pressure rises sufficiently to reset the low-pressure switch. The compressor will pump refrigerant into the receiver as it is fed into the evaporator. The refrigerant level should rise accordingly in the sight glass. One inch (1") is equivalent to 5 lbs. in the receiver. Once the level is within an inch of the target level, close the charging valve and the compressor will continue until tripping the low-pressure switch. Repeat the procedure if necessary.

To restart the machine after a total pumpdown, set the selector switch to the "Ice" position and push the "Harvest/Start" switch. At this time, the "A" (liquid feed) solenoid valve will open for 2 minutes and the machine will start in a freeze cycle.

! CAUTION !
If the power has been turned off to the machine, make sure the compressor crankcase is warm and there is no liquid refrigerant in with the oil before restarting the unit.
! CAUTION !

Adjustable Blowdown (for clearer ice). A petcock is installed on the overflow from water pump to provide means for obtaining blowdown from the water tank during the freezing period. This supplements the blowdown that is discharged during the thawing period through the bypass piping connected to the drain of the water tank. (See "Automatic Blowdown" below).

The petcock was set at the factory to discharge enough water during the freeze cycle to produce clear ice for operating conditions. After installation it should be adjusted to the minimum rate required to maintain production of clear ice and checked after a few days of ice making. See FIGURE-20, automatic blowdown / petcock

Automatic Blowdown (harvest cycle). A patented feature of this machine is the automatic blowdown (40), which is provided to eliminate or reduce the necessity for frequent flushing or cleaning of the water tank (7) to remove accumulated salts or solids in the water as a result of the freezing action.

A principle feature of the blowdown arrangement is a drain by-pass effect which is initiated during each thawing period when the water pump is stopped and the water in the freezer tubes returns to the water tank thereby raising the water level higher than the by-pass piping (40) and causing a portion of the water to drain from the bottom of the tank (approximately 1 gal/cycle).

The water level, controlled by the float valve (12), regulates the quantity of blowdown during the thawing period. An optional solenoid valve can be furnished in place of the drain valve to permit additional if required.

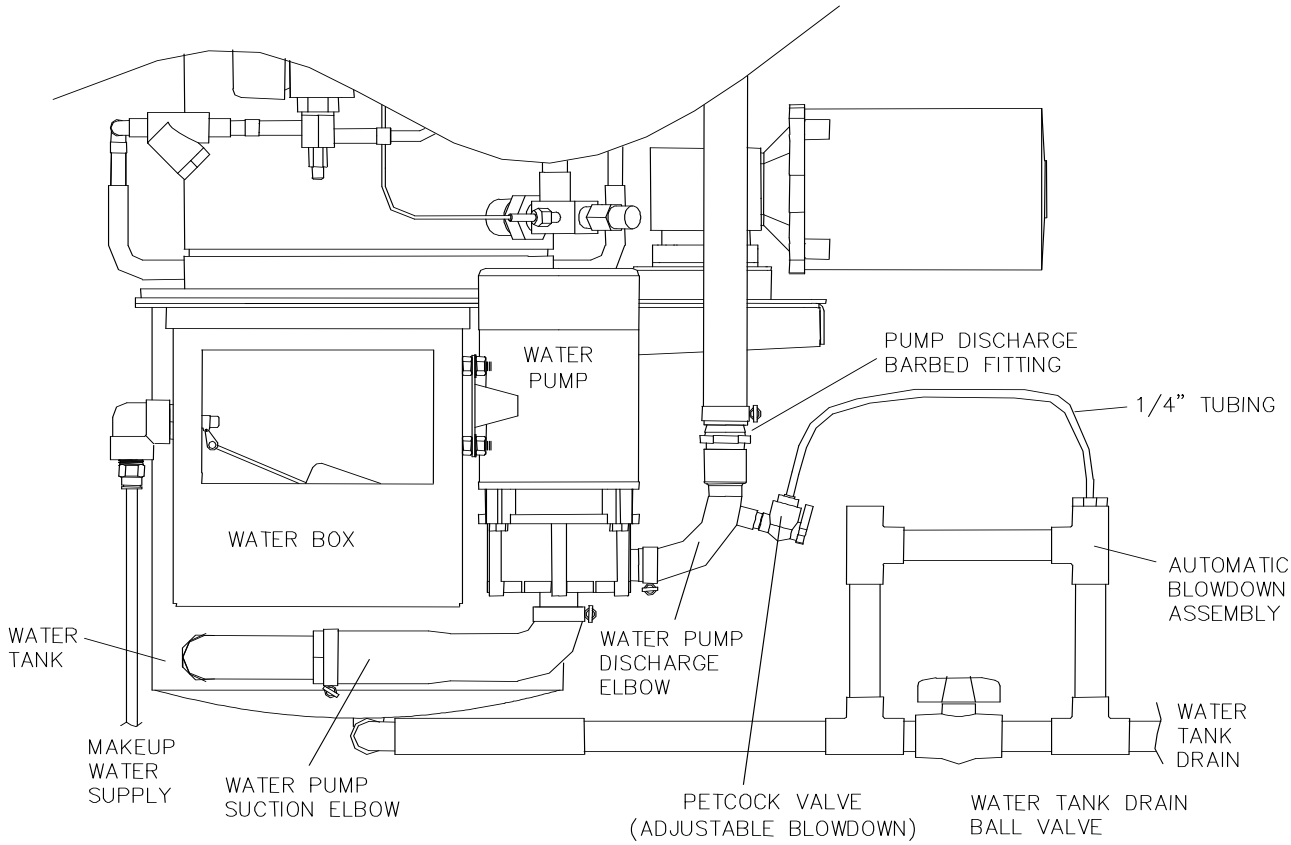


FIGURE - 20
Automatic Blowdown / Petcock

Troubleshooting. The HES Series ("S" for *Smart*) is equipped with a PLC (programmable logic controller) that controls all aspects of the operation. One of the functions of the PLC is to shut down the machine when a problem arises and send a signal to the fault indicator light located on the far-left side of the electrical panel. The red light is visible through the opening in the front casing and will blink when a problem has caused the machine to shut down (See FIGURE-21).
Note: The Fault Light will flash the designated number of times ONLY if the fault is a not a auto restart fault or a auto-restart fault that has occurred three consecutive times. For your reference, TABLE-7 contains a list of the PLC Inputs, Outputs, and fault codes.

PLC Inputs

#	Description
0	Cylinder Ice Indicator
1	Crushed Ice Indicator
2	Freezer Pressure Switch
3	Start / Manual Harvest
4	Clean Switch
5	Pump / Cutter Overload ("off" when tripped)
6	High / Low Pressure safety ("off" when tripped)
7	N/A

PLC Outputs

#	Description
0	Machine Fault Indicator Light
1	"A" valve
2	Compressor
3	Reversing Relay
4	Water Pump
5	Cutter / "D" valve / Suction Stop

Machine Faults

#	Description	Restart	Off Delay
1	High / Low Press – Freeze	No	N/A
2	High / Low Press – Harvest	No	N/A
3	High / Low Press - Partial Pumpdown	No	N/A
4	High / Low Press - Total Pumpdown	No	N/A
5	Short Cycle	Yes	2 hrs
6	Long Cycle	No	N/A
7	Pump Motor Overload	Yes	30 min
8	Cutter Motor Overload	Yes	30 min
N/A	Power Failure	Yes	2 hrs

Note: The machine may be off on a fault and not flashing an error code if the fault is an auto-restart fault and it is not the third consecutive occurrence of this fault.

TABLE – 7
PLC Inputs, Outputs, and Fault Codes

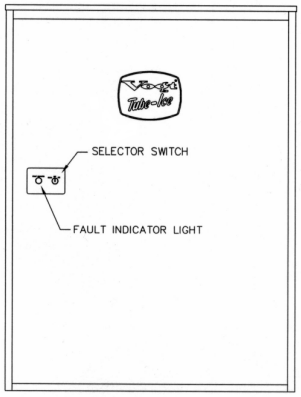


FIGURE - 21
Fault Indicator / Selector Switch Location

Copeland Performance Alert (CPA). This device is used to monitor the compressor discharge temperature, compressor current and phase, as well as control voltage to the compressor contactor. If a problem is detected, the compressor will shut off. The fault light on the CPA will flash a certain number of times to indicate the fault that occurred. See table below.

NOTE: When this occurs, the ice machine will continue to run but the compressor will not be on. The ice machine will eventually shut off on a "Long Cycle Fault".

Some faults, referred to as "lockout" faults, will require cycling power to the Performance Alert to reset. This can be done by switching CB1 to the "off" position for 5 seconds, then back "on".

NOTE: If ice machine has a High/Low pressure fault, the Performance Alert can detect low control voltage at the compressor contactor and flash 9 times. This will clear when the machine is re-start.

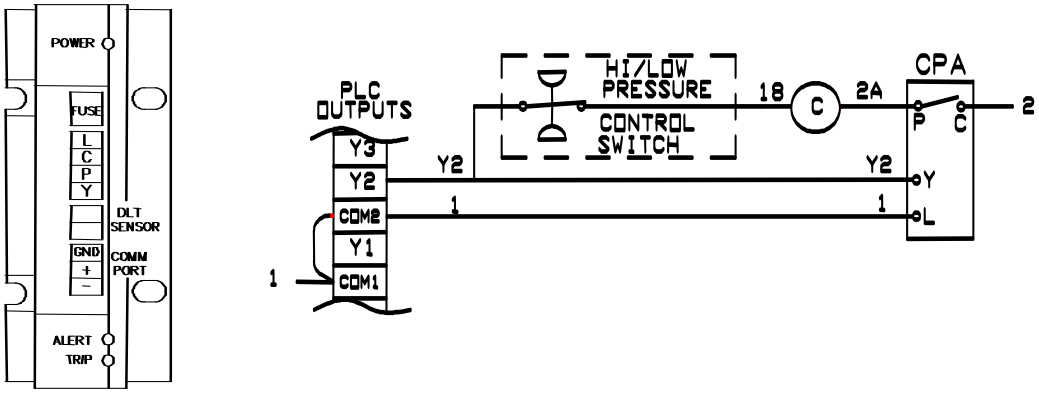


FIGURE 22
Copeland Performance Alert Wiring

Alert Codes	System Conditions	Description
1	**High Discharge Temperature**	Discharge Temperature above set point (default 230 Deg F) adjustable 170 to 281
4	**Lock Rotor**	4 Consecutive Compressor trips after run time of 1 to 15 seconds indicating compressor won't start
6	**Missing Phase**	Demand signal is present but current is missing in one phase
7	**Reverse Phase (Scroll only)**	Demand signal is present but current is not detected in the correct sequence
8	Welded Contactor	No demand signal but current has been detected in one or both phases
9	Low Voltage	Control voltage dips below 85V for 110V or 170V for 220V
11	DLT Sensor Failure	Discharge Temperature Sensor short or open circuit

Note:

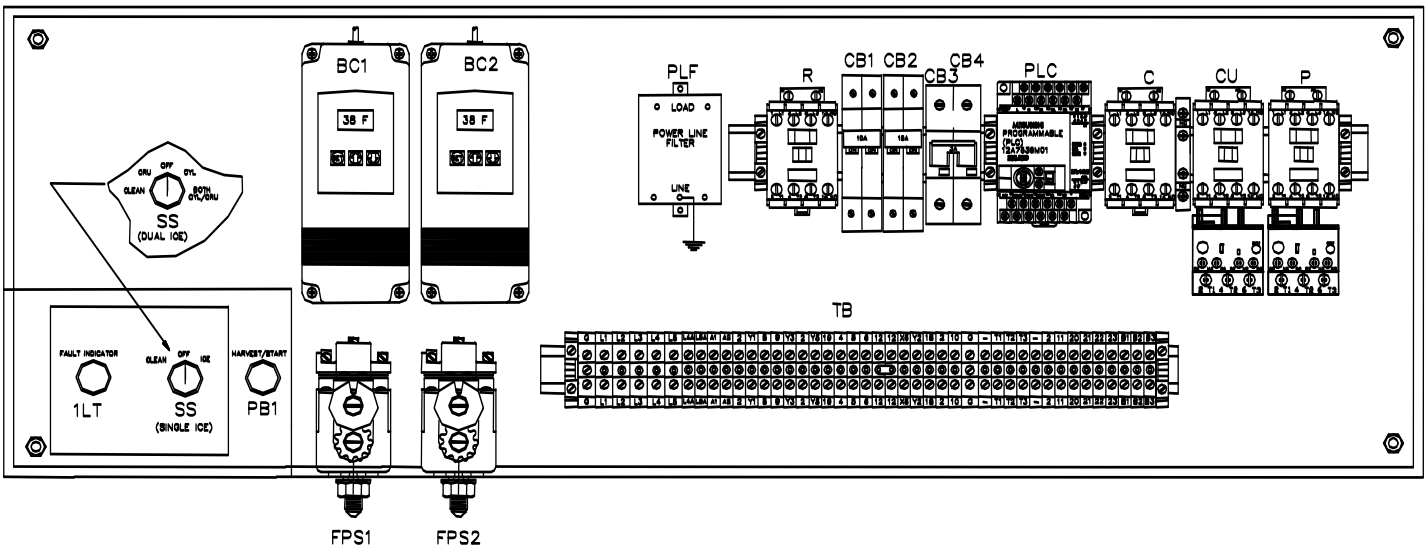
Faults 1, 4, 6, 7, 9 will shut off compressor with a off time of 20 minutes (adjustable from 10 to 40 minutes).

If fault 1, 4, 6 or 7 occurs ("LOCKOUT"), fault must be manually reset by cycling power to the Performance Alert.

Lockout Configuration

Code		Minimum	Maximum	Default
1	High Discharge Temp	2	6	**4**
4	Locked Rotor	2	10	**4**
6	Missing Phase	1	10	**10**
7	Reverse Phase	1	1	**1**

TABLE 8
Copeland Performance Alert Codes



Note: Machines manufactured after May 1999 will use Allen-Bradley controls

Figure – 23A
Control Panel Layout

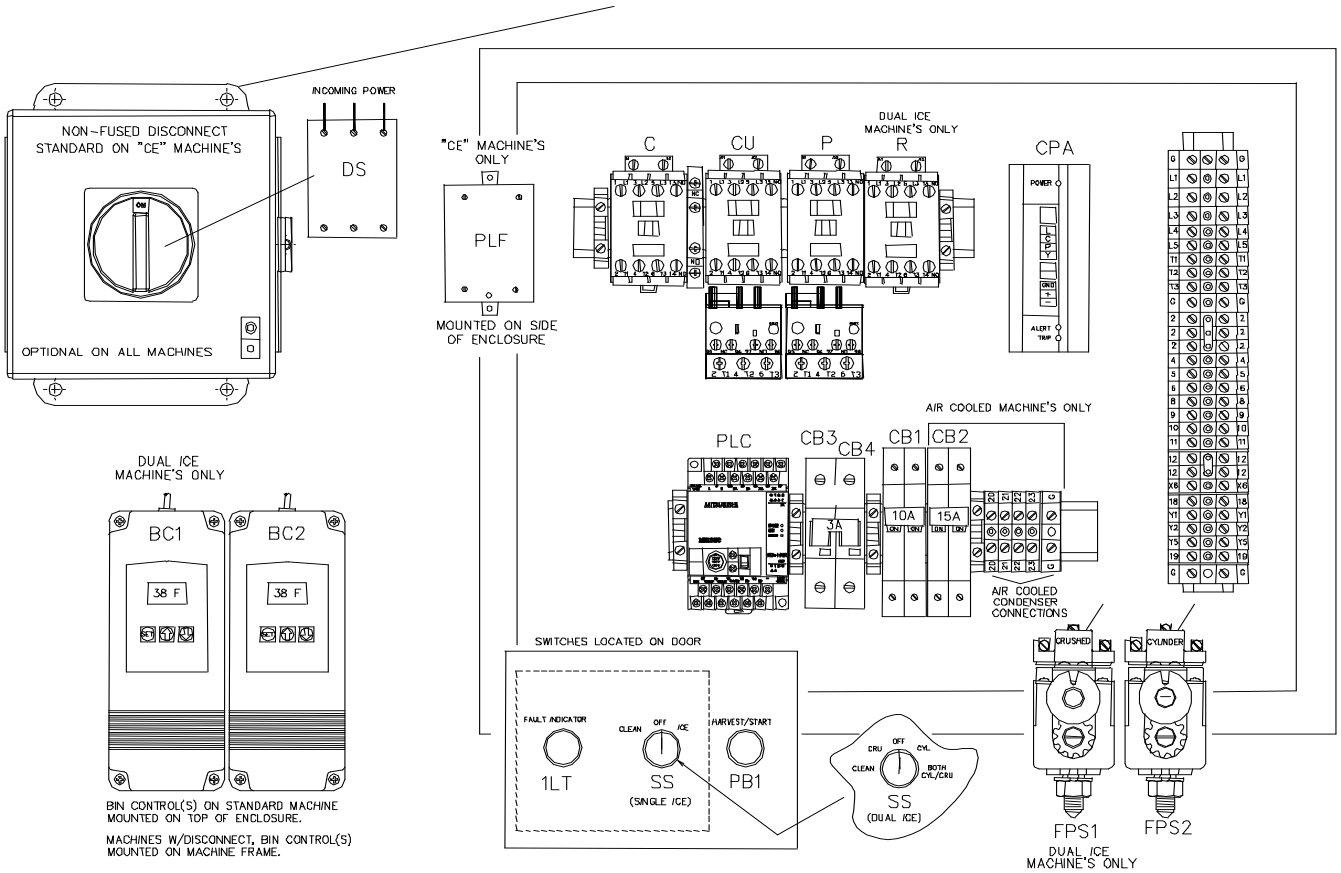
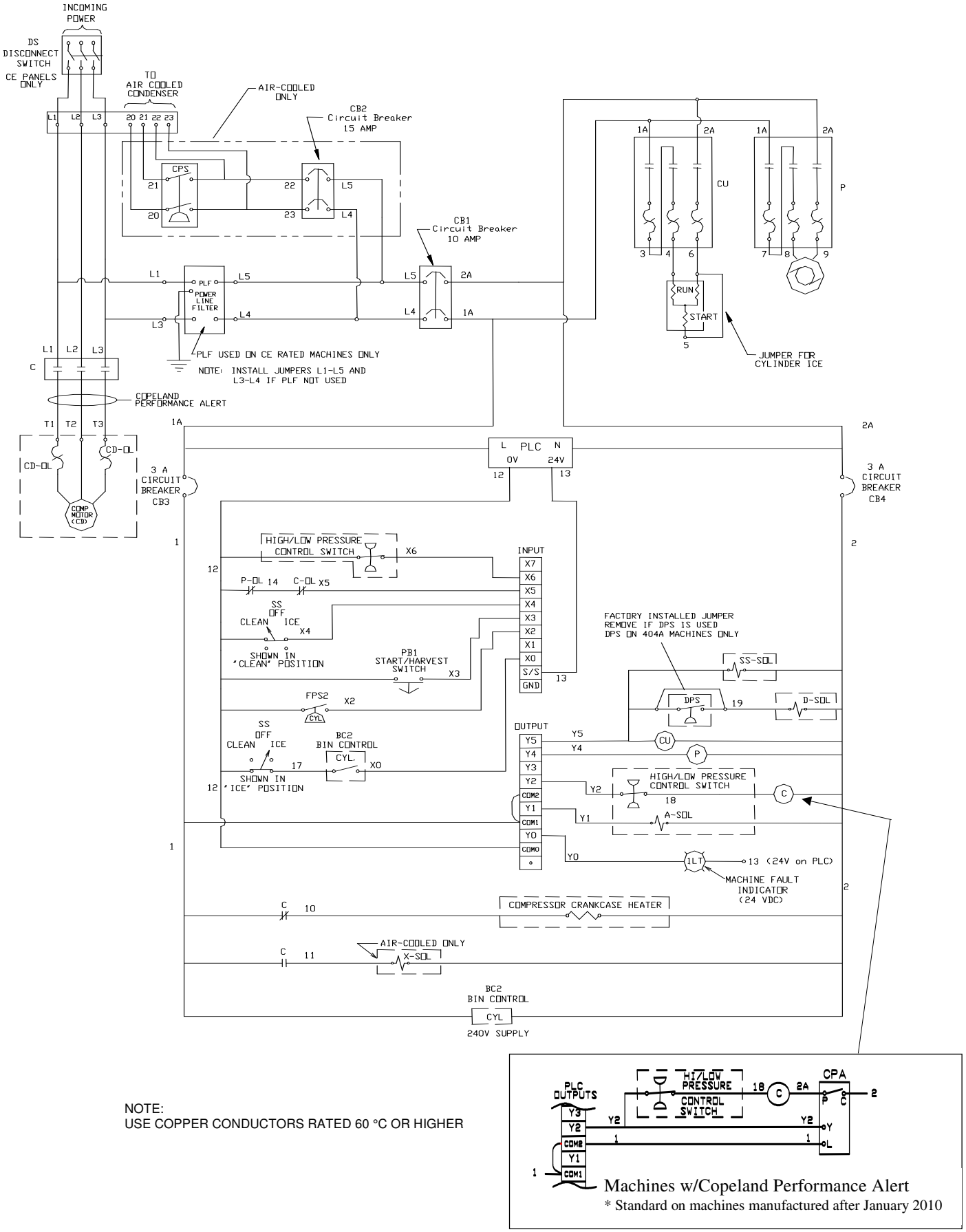


Figure – 23B
Control Panel Layout with Hoffman Enclosure (Door Open)

	Vogt Part #		
Reference	**Cutler-Hammer**	**Allen-Bradley**	**Description**
BC1	12A2117G09	SAME	CRUSHED ICE BIN CONTROL (DUAL ICE ONLY)
BC2	12A2117G09	SAME	CYLINDER ICE BIN CONTROL
C	12A7516E10	12A7516E26	COMPRESSOR CONTACTOR
	12A7518E15	12A7518E30	COMPRESSOR AUX CONTACT
CB1	12A7515E18	SAME	PUMP / CUTTER MOTOR CIRCUIT BREAKER (10 AMP)
CB2	12A7515E19	SAME	* CONDENSER FAN MOTOR CIRCUIT BREAKER (15 AMP)
CB3 & CB4	12A7515E20 (QTY 2)	12A7515E21	CONTROL CIRCUIT BREAKER (3 AMP)
CPA	N/A	12A7700P02	COPELAND PERFORMANCE ALERT
CU	12A7530E11	12A7516E23	CUTTER MOTOR STARTER / CONTACTOR
	12A7508H2108	12A7538E01	CUTTER OL HEATERS (3.38-5.54 A) / OL RELAY (3.2-16 A)
FPS1	12A2117E04	SAME	FREEZER PRESSURE SWITCH (DUAL ICE ONLY)
FPS2	12A2117E04	SAME	FREEZER PRESSURE SWITCH
FU1-FU3	N/A	12A7504E13	CONDENSER FAN MOTOR FUSES, 6A, 600V (400/460V MACH)
FU10 & FU20	N/A	12A7504E14	CONTROL CIRCUIT FUSES, 7A, 600V (400/460V MACH)
P	12A7530E11	12A7516E23	PUMP MOTOR STARTER / CONTACTOR
	12A7508H2109	12A7538E01	PUMP O.L. HEATERS (4.96-8.16 A) / OL RELAY (3.2-16 A)
PB1	12A7500E45	12A7500E56 12A7500E75	HARVEST / START BUTTON CONTACT BLOCK (FOR ALLEN-BRADLEY ONLY)
PLF	N/A	12A7537S06	POWER LINE FILTER (CE MACHINES ONLY)
PLC	SAME	12A7536M01	PROGRAMMABLE CONTROLLER
R	12A7517E18	12A7517E27	REVERSING RELAY (DUAL ICE ONLY)
SS	12A7500E43	SAME	5 POSITION SELECTOR SWITCH (DUAL ICE)
	12A7500E44	12A7500E61 12A7500E73	3 POSITION SELECTOR (SINGLE ICE) CONTACT BLOCK (FOR ALLEN-BRADLEY ONLY)
TB	N / A	N / A	TERMINAL BLOCK
TEST	N / A	N / A	TEST BLOCK (ON CUTLER-HAMMER - FACTORY USE ONLY)
1LT	12A7500E46	12A7500E65	FAULT INDICATOR LIGHT

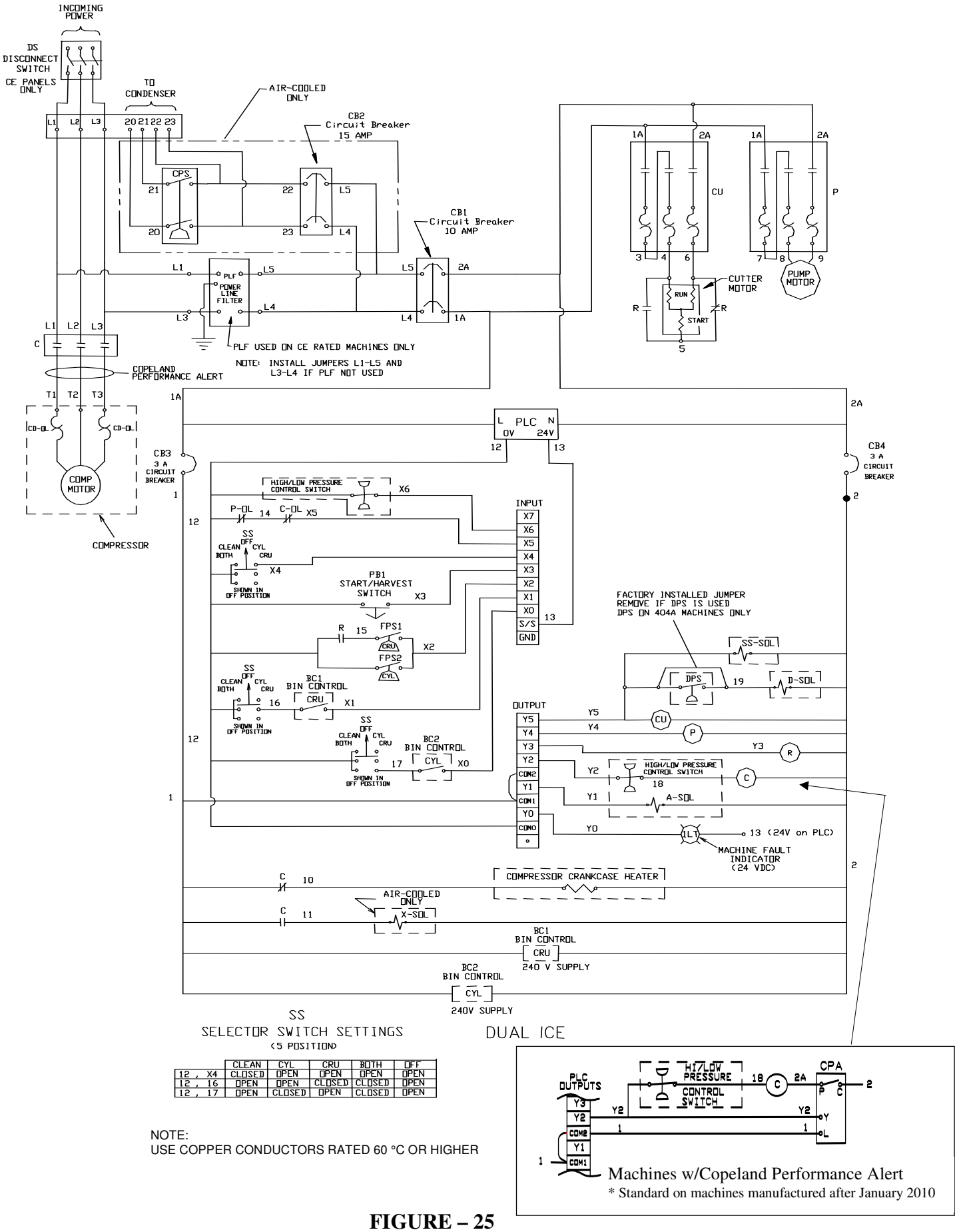
***Note:** AIR COOLED ONLY

TABLE – 9
Control Panel Parts



NOTE:
USE COPPER CONDUCTORS RATED 60 °C OR HIGHER

FIGURE – 24
HES Wiring Schematic, Single Ice



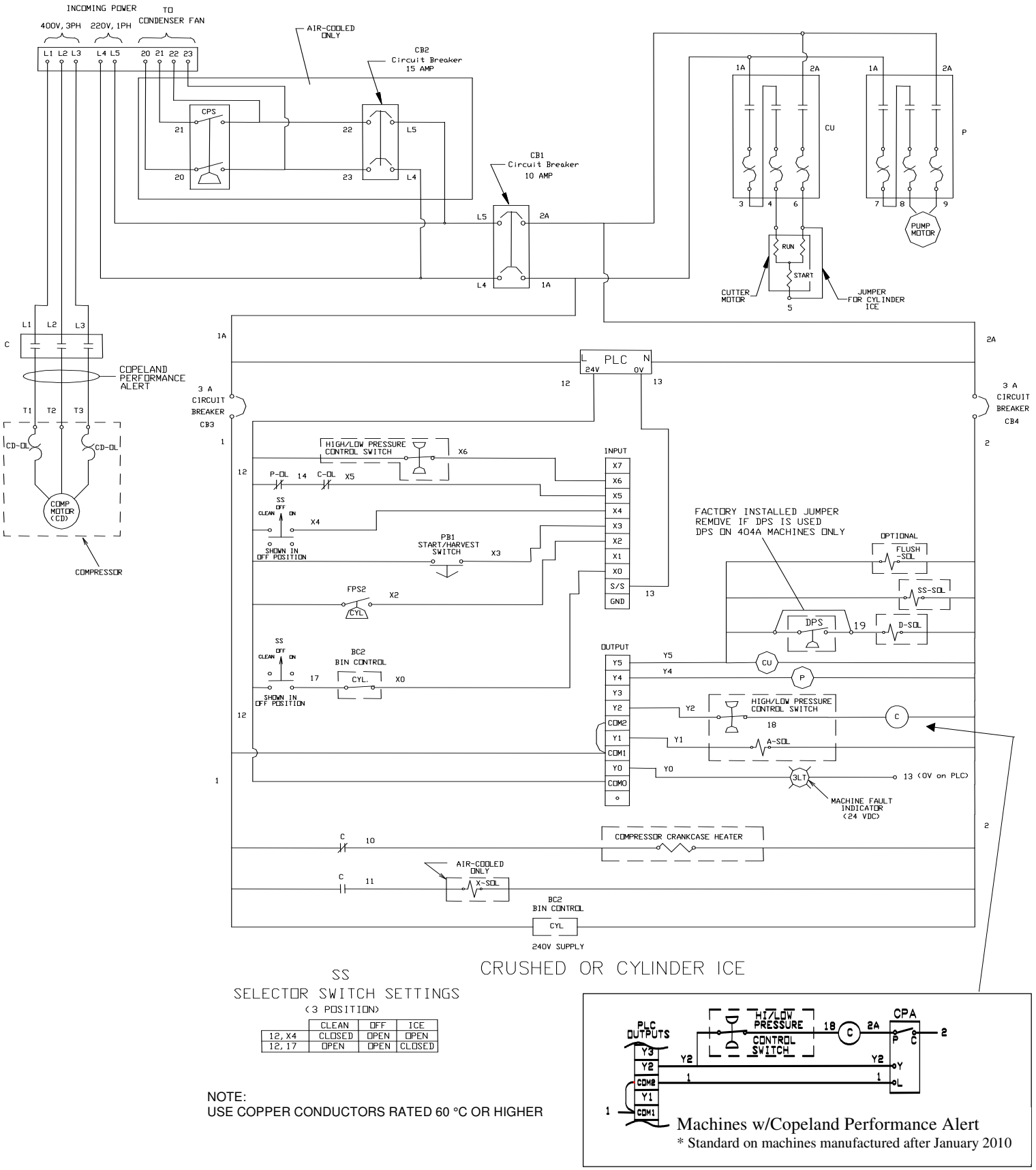
SS
SELECTOR SWITCH SETTINGS
(5 POSITION)

	CLEAN	CYL	CRU	BOTH	OFF
12 , X4	CLOSED	OPEN	OPEN	OPEN	OPEN
12 , 16	OPEN	OPEN	CLOSED	CLOSED	OPEN
12 , 17	OPEN	CLOSED	OPEN	CLOSED	OPEN

DUAL ICE

NOTE:
USE COPPER CONDUCTORS RATED 60 °C OR HIGHER

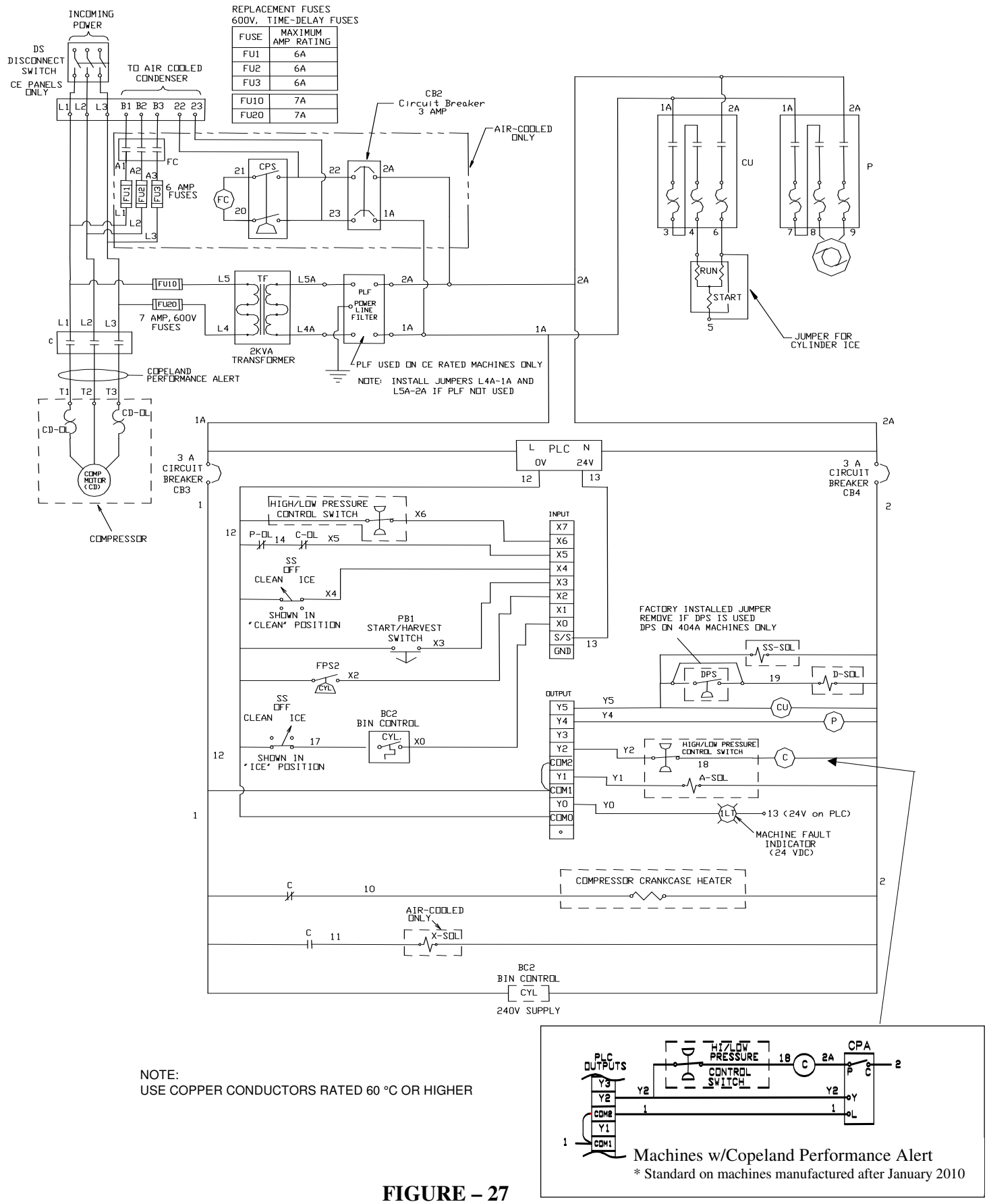
FIGURE – 25
HES Wiring Schematic, Dual Ice



	CLEAN	OFF	ICE
12, X4	CLOSED	OPEN	OPEN
12, 17	OPEN	OPEN	CLOSED

NOTE:
USE COPPER CONDUCTORS RATED 60 °C OR HIGHER

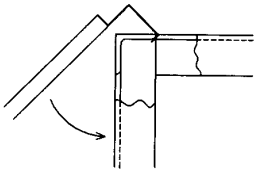
FIGURE – 26
HES Wiring Schematic, Single Ice
(50 HZ, 400V compressor, 200V controls)



NOTE:
USE COPPER CONDUCTORS RATED 60 °C OR HIGHER

FIGURE – 27
HES Wiring Schematic, Single Ice (400V / 460V)

Casing Installation

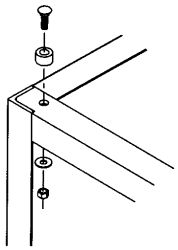


NOTE:

ALL VERTICALLY MOUNTED CASINGS (FRONT, SIDE, REAR) ARE TO BE INSTALLED BY:

(1.) HOOK UPPER FLANGE OF CASING OVER HORIZONTAL EDGE OF UPPER FRAME ANGLE AS SHOWN IN THE ILLUSTRATION ABOVE.

(2.) SLOWLY LOWER CASING UNTIL IT LAYS AGAINST VERTICAL EDGE OF MACHINE.

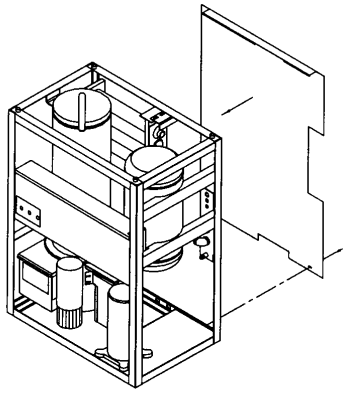


STEP 1

INSTALL SPACER KIT (CARRIAGE BOLTS, PVC SPACERS, HEX NUTS, AND FLAT WASHERS) IN THE 4 HOLES ON THE TOP OF THE ICE MACHINE FRAME.

NOTE:

SPACER KIT IS USED WITH STAINLESS STEEL CASINGS ONLY. WHEN INSTALLING PLASTIC CASINGS, NO SPACER KIT IS USED.

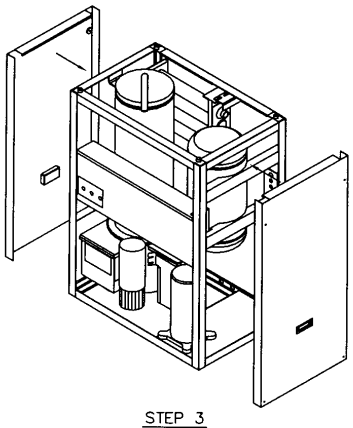


STEP 2

INSTALL REAR CASING

NOTE:

REMOVE CAP SCREWS IN FRAME BEFORE INSTALLING REAR CASING.

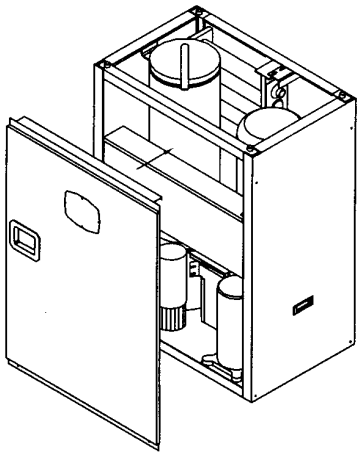


STEP 3

INSTALL SIDE CASINGS

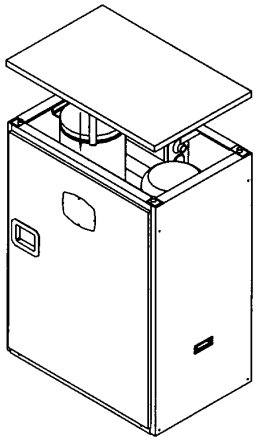
NOTE:

TO REMOVE SIDE CASINGS, PULL UP ON HANDLE APPROX. 1 INCH BEFORE PULLING OUT.



STEP 4

INSTALL FRONT CASING



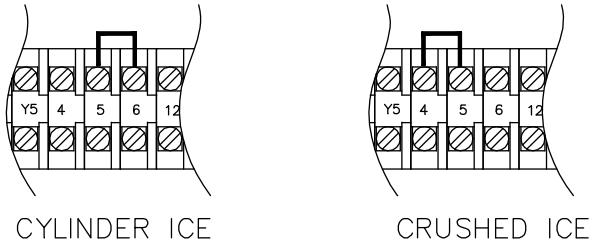
STEP 5

INSTALL TOP CASING

FIGURE – 28
Stainless Casing Installation

Convert from Cylinder Ice to Crushed Ice

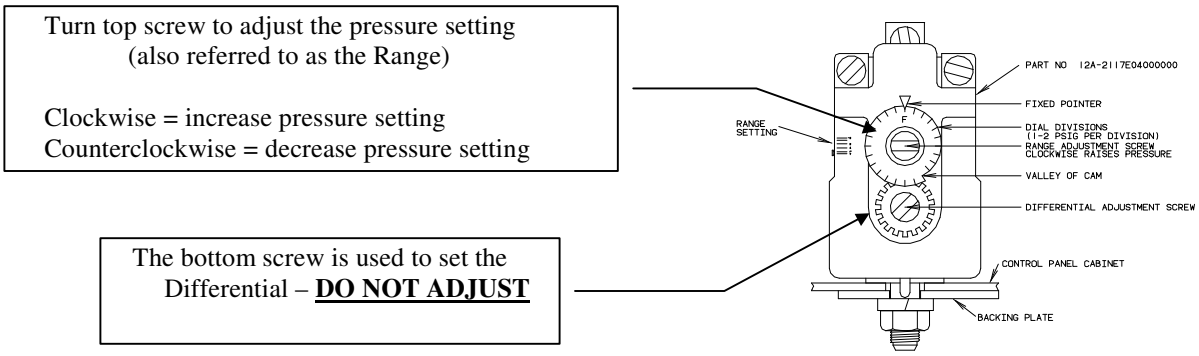
- Remove jumper from #5 and #6 on terminal block and put on #5 and #4. This will reverse the rotation of the cutter motor.



- Adjust Freezer Pressure switch (FPS2) – See table below for recommended pressure settings

	Cylinder Ice (psig)		**Crushed Ice** (psig)	
Machine	**R22**	**404A**	**R22**	**404A**
HES-20S	43 - 45	56 – 58	46 - 48	59 – 61
HES-20M	38 - 40	49 – 52	41 – 43	53 – 56
HES-30S	38 - 40	49 – 52	41 – 43	53 – 56
HES-30M	35 - 37	46 – 48	39 – 41	50 – 53
HES-40S	31 - 33	42 – 44	36 – 38	47 – 49
HES-40M	25 - 27	34 – 37	31 – 33	42 - 44

TABLE 10
Recommended Freezer Pressure Settings



Freezer Pressure Switch (FPS2)

- The pressure switch should be adjusted until the desired ice thickness is obtained--See table below for recommended ice weights

Machine	**Cylinder Ice** (lbs.)	**Crushed Ice** (lbs.)
HES-20S	41 – 43	30 – 32
HES-20M	40 – 42	29 – 31
HES-30S	41 – 43	30 – 32
HES-30M	40 – 42	29 – 31
HES-40S	41 – 43	30 – 32
HES-40M	40 – 42	29 – 31

TABLE 11
Recommended Ice Weights per cycle

Note: Single to Dual Ice Conversion kit available – part #: 12AHES01

Installation Review: A CHECKLIST

Make a visual check to be sure these steps have been taken BEFORE continuing.

CHECK: _____ PRIOR TO OPENING VALVES, check all joints for leaks which may have developed during shipment. {NOTE: The required charge of Refrigerant 22 has been isolated in the Receiver (15R).}

CHECK: _____ All water supply and drain connections for conformity to requirements stipulated in this manual. See FIGURES 5, 7, and TABLE 2.

CHECK: _____ Electrical supply for proper size of fuses and for compliance to local and national codes. See the machine nameplate for minimum circuit ampacity and maximum fuse size.

CHECK: _____ All field installed equipment (air-cooled condenser, ice storage bin, ice spreader, etc.) for proper installation.

CHECK: _____ The applicable portion of the **Warranty Registration/Start-up Form** for proper completion.

NOTE: This machine is controlled by a PLC and can automatically start with power to the machine after a two hour time lapse if the ice switch is in the on position and all other requirements are met.

Tube Ice L.L.C.
1000 W. Ormsby
Louisville, KY 40210
(502) 635-3235
FAX #502-635-3024

Vogt Order Number: _____

THIS FORM MUST BE SENT TO VOGT TO ACTIVATE WARRANTY

Warranty Registration / Start-Up Form
HES20, HES30, HES40

Model Number: _____ **Serial Number:** _____

This form must be filled out completely and signed by the customer in order to assure acceptance by Vogt.

Date of Start-Up: _____ Form Completed By: _____

AC Condenser Model Number: _____ AC Condenser Serial Number: _____

Water Treatment System? ☐ Yes ☐ No Manufacturer: _____ Model: _____

Bin Manufacturer: _____ Model: _____ Bin Capacity: _____ lbs.

Distributor

Company Name: _____ Phone: _____

Address: _____ City: _____ State: _____ Zip: _____

Service Company

Company Name: _____ Phone: _____

Address: _____ City: _____ State: _____ Zip: _____

Customer (location of equipment)

Company Name: _____ Phone: _____

Address: _____ City: _____ State: _____ Zip: _____

PRE-OPERATION CHECK

☐ _____ V _____ PH _____ HZ Power (check supply (actual) at machine)—Notice: Call Vogt if under 195 V
☐ Crankcase heater on for 2 hours minimum, prior to start
☐ All valves opened or closed as tagged
☐ Water supply and drains connected properly
☐ AC condenser cold weather temperature setting(s) Solenoid _____ Fan (HES30 & HES40 only)_____
☐ AC condenser installed above machine: ☐ Yes ☐ No Approx. _____ ft.
☐ AC condenser properly piped—are all lines insulated (see installation and start-up instructions)?
☐ AC condenser line length (in equivalent feet (see installation instructions)) _____
☐ Leak checked entire system including AC condenser and lines (if applicable)
☐ Sufficient make-up water supply (minimum 30 PSIG) Incoming potable water temperature: _____°F
☐ Make-up water float valve adjustment
☐ Compressor oil level, i.e. 1/4 – 1/2 – 3/4: _____
☐ Compressor amps (check at start of freeze cycle) L1 _____ L2 _____ L3 _____
☐ Cutter motor amps _____ (Should not be over 4.1 amps cutting ice—if over, call Vogt)
☐ Water pump amps _____ (Should not be over 5.0 amps—if over, call Vogt)
☐ Condenser motor amps (if applicable) _____
☐ Inside ambient _____ °F (If temperature is below 50°F, call Vogt)
☐ Bin control (s) installed properly
☐ Bin control (s) operate properly to stop and start machine with ice on them
☐ Average hole diameter of ice _____ Clear ice ☐ Yes ☐ No

Freezing cycle time: CYL _____ CRU _____ Harvest cycle time: CYL _____ CRU _____

First ice out: CYL _____ CRU _____ All ice out time: CYL _____ CRU _____

☐ Instruction manual and warranty certificate left on-site Name of person left with: _____

Remarks:_____

_____

_____

_____

Technician Signature: _____ **End User Signature:** _____

I certify that I have performed all of the above procedures.