IMI CORNELIUS INC.
www.cornelius.com

Nordic Ice Maker
Model CCM and CCU Series
Service and Maintenance Manual



TECHNICAL SERVICE
IMI Cornelius, Inc.

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How To Use This Manual

Cornelius provides this manual as an aid to the service technician in installation, operation, and maintenance of the **CCM/CCU Series** (electro-mechanical) cube ice machines. If used properly this manual can also assist the service technician to troubleshoot and diagnose most of the problems that may occur with the machine.

The first two sections of this manual provide general information and maintenance information. The remainder of the manual beginning with Section C provides troubleshooting and service information. Section C contains flow charts called troubleshooting trees. Page C-1 provides instructions on using the troubleshooting trees. Each troubleshooting tree is named to describe a particular problem with the operation of the machine.

When following the troubleshooting trees, the service technician will be led through questions and checks and end up with a probable solution. When using the troubleshooting trees, it is important that the service technician understand the operation and adjustments of the components being checked and the component suspected of malfunctioning. A detailed description of the operation and adjustments of the components as well as other service information is available in the pages that follow Section C.

Sections D, E, and F focus on a particular system in the ice machine: water distribution system, refrigeration system, and it is important that these sections be used together with the Troubleshooting Trees in Section C.

Most aspects of the CCM/CCU Series machines are covered in this manual, however, should you encounter any conditions not addressed herein, please contact the Cornelius Technical Service Department for assistance. You may also e-mail the Cornelius Technical Service Department:

E-Mail: tech.service@Cornelius.com

Website : www.cornelius.com

Telephone Number
800-238-3600 All Departments

Any Service communication must include:
- Model Number
- Serial number
- A detailed explanation of the problem

Note the warning symbol where it appears in this manual.
It is an alert for important safety information on a hazard that might cause serious injury.
Keep this manual for future reference.



The CCM/CCU Series Service Parts Manuals are available separately.

Cornelius products are not designed for outdoor installation.

Model and Serial Number Format

Sample Data Plate

MODEL NUMBER
CCM0630RF2

SERIAL NUMBER
87A0708GC004

AC SUPPLY VOLTAGE ~ 208–230 HERTZ 60
TOTAL LOAD AMPS PHASE 1
MINIMUM CIRCUIT AMPACITY 13.0 WIRES 2
MAX FUSE SIZE OR HACR TYPE CIRCUIT BREAKER 15.0
HEATER WATTS

MOTORS		VOLTS	RLA/FLA	W/HP	LRA
1	COMPRESSOR	208–230	8.7		43.3
1	FAN	230	1.7*	1/4HP	
	DRIVE				
1	HARVEST	230	.1	3W	
1	PUMP	208–230	.3	35W	

RATED POWER CONSUMPTION (KW) 0
REFRIGERANT R404A CHARGE/CIRCUIT 132 OZ 3736 GRAMS
NUMBER OF REFRIGERANT CIRCUITS 1
DESIGN PRESSURES P.S.I. 252 –LO 500 –HI
BARS 17.7 –LO 35.1 –HI

c UL LISTED 361P US
NSF COMPONENT
ICE MAKER WITHOUT STORAGE MEANS LESS CONDENSER

*Fan motor rating on condenser employed must not exceed the above fan motor rating.

IMI CORNELIUS
MADE IN U.S.A.

RATED ENERGY EFFICIENCY
(KWH/100 LB) 6.8 (KJ/KG) 555.6
MINIMUM BIN ENERGY EFFICIENCY (%) NA
Verified in Accordance With Energy Standard CAN/CSA 742–98 and ARI 810–91 by Underwriters Laboratories Inc.

MODEL NUMBER CCM0630RF2
SERIAL NUMBER 87A0708GC004
VOLTS/HERTZ/PHASE 208–230/60/1 MAX FUSE SIZE 15.0
REFRIGERANT R404A CHARGE/CIRCUIT 132 OZ 3736 GRAMS

c UL LISTED 361P US
NSF
ICE MAKER WITHOUT STORAGE MEANS LESS CONDENSER

The serial number format and machine specifics are detailed on the data plate.

Model Number

CCM 06 30 A H 1 2

- 2 — Engineering Rev Level
- 1 — Voltage:1=115V, 2=230V, 3=230V 3ph 5=50Hz.
- H — Cube Size: H=Half Cube, F=Full Cube
- A — Condenser Type: A=Air, W=Water, R=Remote
- 30 — Cabinet Width (in inches)
- 06 — Approximate Production X 10 in 24 hours 70°F Air / 50°F Water
- CCM — Series: **C**ornelius **C**uber **M**odular (**U**=**U**ndercounter)

← Large data plate will be placed on the back of the unit.

Serial Number

87 A 0708 GC 004

- 004 — Sequencial Serial Number
- GC — Product Line
  - GC=Cuber
  - GB=Remote Condenser
  - GA= Dispenser
- 0708 — Date Code, Year Month format. (2007 August 08)
- A — Revision Level (Internal)
- 87 — Manufacturing Facility

← Small data plate will be placed by the service valves.

Note: The date code will change monthly and yearly to reflect the date of manufacture.

Electrical and Mechanical Specifications, "CCM/CCU" Series

Model	Ref. Type	Charge Ounces	Back Press. Approx.	Head Press. Approx.	Timer Initiate Setting	Cycle Time Approx. Minutes 70/50-90/70	Batch Weight Pounds	Volt. Cycle Phase
CCU0150A1	R-404a	12	60 - 47	205-400	47	24 - 38	3	115-60-1
CCU0150W1	R-404a	9	60 - 47	250	47	22 - 28	3	115-60-1
CCU0220A1	R-404a	12	60 - 42	218-400	42	17 - 24	3	115-60-1
CCU0220W1	R-404a	9	60 - 41	250	41	17 - 20	3	115-60-1
CCU0220A2	R-404a	12	60 - 41	218-400	41	18 - 28	3	230-60-1
CCU0220W2	R-404a	9	60 - 41	250	41	19 - 23	3	230-60-1
CCU0300A1	R-404a	16	51 - 30	218-400	33	15 - 20	3	115-60-1
CCU0300W1	R-404a	13	60 - 27	250	33	12 - 15	3	115-60-1
CCM0330A1	R-404a	25	60 - 35	200 - 400	36	13 - 17	3	115-60-1
CCM0330W1	R-404a	13	60 - 35	250	35	13 - 16	3	115-60-1
CCM0322A1	R-404a	18	60 - 36	200 - 400	36	14 - 25	3	115-60-1
CCM0322W1	R-404a	11	60 - 36	250	36	12 - 17	3	115-60-1
CCM0430A1	R-404a	30	54 - 39	200-400	44	14 - 20	5.5	115-60-1
CCM0430W1	R-404a	14	60 - 38	250	43	14 - 18	5.5	115-60-1
CCM0430A2	R-404a	30	58 - 34	210 - 400	43	14 -19	5.5	208/230-60-1
CCM0430W2	R-404a	14	57 - 37	250	43	14 - 17	5.5	208/230-60-1
CCM0530A1	R-404a	25	55 - 31	217 - 400	37	13 - 16	5.5	115-60-1
CCM0530W1	R-404a	15	48 - 31	250	38	13 - 15	5.5	115-60-1
CCM0530R1	R-404a	132	50 - 32	240 - 400	39	13 - 16	5.5	115-60-1
CCM0522A1	R-404a	21	56 - 39	212 - 400	46	14 - 20	5.5	115-60-1
CCM0522W1	R-404a	12	54 - 39	250	44	14 - 17	5.5	115-60-1
CCM0630A2	R-404a	24	60 - 46	200-400	35	11 - 15	5.5	208/230-60-1
CCM0630W2	R-404a	17	45 - 40	250	34	11 - 13	5.5	208/230-60-1
CCM0630R2	R-404a	132	44 - 42	240 - 400	38	12 - 15	5.5	208/230-60-1
CCM0830A2	R-404a	27	60 - 35	175 - 400	35	11 - 18	7	208/230-60-1
CCM0830W2	R-404a	24	60 - 35	250	35	10 - 15	7	208/230-60-1
CCM0830R2	R-404a	176	60 - 35	240 - 400	35	9 - 16	7	208/230-60-1
CCM1030A2	R-404a	34	60 - 37	175 - 400	37	9 - 15	7	208/230-60-1
CCM1030W2	R-404a	24	60 - 37	250	37	9 - 13	7	208/230-60-1
CCM1030R2	R-404a	176	60 - 36	240 - 400	36	9 - 14	7	208/230-60-1
CCM1448A2	R-404a	104	60 - 35	175 - 400	35	11 - 17	11	208/230-60-1
CCM1448W2	R-404a	25	60 - 35	250	35	11 - 16	11	208/230-60-1
CCM1448R2	R-404a	240	60 - 35	192 - 400	35	11 - 17	11	208/230-60-1
CCM1448A2 1	R-404a	60	60 - 35	200 - 400	37	11 - 15	11.6	208/230-60-1
CCM1448W2 1	R-404a	30	60 - 35	250	32	11 - 14	11.6	208/230-60-1
CCM1448R2 1	R-404a	240	60 - 35	240 - 400	38	11 - 15	11.6	208/230-60-1
CCM1448A3	R-404a	104	60 - 35	175 - 400	35	12 - 20	11	208/230-60-3
CCM1448W3	R-404a	25	60 - 35	250	35	12 - 18	11	208/230-60-3
CCM1448R3	R-404a	240	60 - 35	240 - 400	35	12 - 20	11	208/230-60-3
CCM1448A3 1	R-404a	60	60 - 35	200 - 400	37	11 - 15	11.6	208/230-60-3
CCM1448W3 1	R-404a	30	60 - 35	250	34	11 - 13	11.6	208/230-60-3
CCM1448R3 1	R-404a	240	60 - 35	240 - 400	38	12 - 14	11.6	208/230-60-3
CCM1530R2	R-404a	240	60 - 35	240 - 400	35	11 - 16	11	208/230-60-1
CCM1530R2 1	R-404a	240	60 - 35	240 - 400	38	11 - 14	11.6	208/230-60-1
CCM1848W2	R-404a	35	60 - 34	250	34	11 - 17	14	208/230-60-1
CCM1848R2	R-404a	400	60 - 37	240 - 400	37	10 - 17	14	208/230-60-1
CCM1848W2 1	R-404a	37	60 - 53	250	38	11 - 13	14	208/230-60-1
CCM1848R2 1	R-404a	272	72 - 61	240 - 400	38	12 - 15	14	208/230-60-1
CCM1848W3	R-404a	35	60 - 35	250	35	10 - 16	14	208/230-60-3
CCM1848R3	R-404a	400	60 - 35	240 - 400	35	10 - 17	14	208/230-60-3
CCM1848W3 1	R-404a	37	60 - 53	250	38	11 - 13	14	208/230-60-3
CCM1848R3 1	R-404a	272	71 - 63	240 - 400	38	13 - 15	14	208/230-60-3
CCM2148W2	R-404a	37	60 - 35	250	35	9 - 14	14	208/230-60-1
CCM2148R2	R-404a	400	60 - 37	240 - 400	37	9 - 14	14	208/230-60-1

Electrical and Mechanical Specifications, "CCM/CCU" Series

Model	Ref. Type	Charge Ounces	Back Press. Approx.	Head Press. Approx.	Timer Initiate Setting	Cycle Time Approx. Minutes 70/50-90/70	Batch Weight Pounds	Volt. Cycle Phase
CCM2148W2 1	R-404a	44	48 - 46	250	34	11 - 12	14	208/230-60-1
CCM2148R2 1	R-404a	272	62 - 56	240 - 400	37	12 - 13	14	208/230-60-1
CCM2148W3	R-404a	37	60 - 35	250	35	9 - 13	14	208/230-60-3
CCM2148R3	R-404a	400	60 - 35	240 - 400	35	9 - 14	14	208/230-60-3
CCM2148W3 1	R-404a	44	49 - 47	250	34	12 - 13	14	208/230-60-3
CCM2148R3 1	R-404a	272	64 - 58	240 - 400	37	12 - 14	14	208/230-60-3

Model	Ref. Type	Charge Ounces	Back Press. Approx.	Head Press. Approx.	Timer Initiate Setting	Cycle Time Approx. Minutes 70/50-90/80	Batch Weight Pounds	Volt. Phase Cycle
CCU0220A5	R-404a	12	60 - 35	175 - 400	45	22 - 32	3	220-240/50/1
CCU0220W5	R-404a	9	60 - 35	250	46	21 - 25	3	220-240/50/1
CCU0330A5	R-404a	14	51 - 30	218 - 400	33	15 - 20	3	220-240/50/1
CCU0330W5	R-404a	13	60 - 27	250	33	13 - 18	3	220-240/50/1
CCM0330A5	R-404a	23	60 - 53	200 - 400	32	12 - 16	3	220-240/50/1
CCM0330W5	R-404a	12	48 - 47	250	31	12 - 15	3	220-240/50/1
CCM0322A5	R-404a	22	60 - 35	175 - 400	35	13 - 20	3	220-240/50/1
CCM0430A5	R-404a	23	56 - 31	207-400	38	16 - 22	5.5	220-240/50/1
CCM0430W5	R-404a	13	57 - 34	250	41	14 - 17	5.5	220-240/50/1
CCM0522A5	R-404a	21	55 - 38	200 - 400	46	13 - 18	5.5	220-240/50/1
CCM0630A5	R-404a	22	50 - 40	200 - 400	35	13 - 18	5.5	220-240/50/1
CCM0630W5	R-404a	14	47 - 45	250	32	14 - 16	5.5	220-240/50/1
CCM0630R5	R-404a	132	45 - 43	240 - 400	35	15 - 18	5.5	220-240/50/1
CCM0830A5	R-404a	24	60 - 35	250	35	10 - 14	7	220-240/50/1
CCM0830W5	R-404a	240	60 - 35	240 - 400	35	10 - 17	7	220-240/50/1
CCM0830R5	R-404a	176	60 - 35	240 - 400	35	10 - 17	7	220-240/50/1
CCM1030A5	R-404a	33	60 - 35	175 - 400	35	10 - 17	7	220-240/50/1
CCM1030W5	R-404a	24	60 - 36	250	36	9 - 14	7	220-240/50/1
CCM1030R5	R-404a	176	60 - 35	240 - 400	35	9 - 15	7	220-240/50/1
CCM1448A5	R-404a	104	60 - 35	175 - 400	35	13 - 21	11	220-240/50/1
CCM1448W5	R-404a	25	60 - 35	250	35	12 - 18	11	220-240/50/1
CCM1448R5	R-404a	240	60 - 35	192 - 400	35	14 - 19	11	220-240/50/1
CCM1448A5 1	R-404a	60	60 - 35	200- 400	36	12 - 16	11.6	220-240/50/1
CCM1448W5 1	R-404a	25	60 - 35	250	36	12 - 14	11.6	220-240/50/1
CCM1448R5 1	R-404a	240	60 - 35	240 - 400	39	12 - 15	11.6	220-240/50/1

Installation Guidelines

Note: Installation should be performed by a Cornelius trained Service Technician.
For proper operation of the Cornelius ice machine, the following installation guidelines must be followed. Failure to do so may result in loss of production capacity, premature part failures, and may void all warranties.

Ambient Operating Temperatures
Minimum Operating Temperature: 50°F (10°C)
Maximum Operating Temperature 100°F (38°C), 110°F (43°C) on 50 Hz. Models.
Note: Cornelius products are not designed for outdoor installation.

Incoming Water Supply (See Plumbing Diagram for line sizing Page A7-A12)
Minimum incoming water temperature: 40°F (4.5°C)
Maximum incoming water temperature: 100°F (38°C)
Minimum incoming water pressure: 20 psi (1.4 bar)
Maximum incoming water pressure: 60 psi (4.1 bar)
Note: If water pressure exceeds 60 psi (4.1 bar), a water pressure regulator must be installed.

Drains: All drain lines must be installed per local codes. Flexible tubing is not recommended. Route bin drain, purge drain and water condenser drain individually to a floor drain. The use of condensate pumps for draining water is not recommended by Cornelius. Cornelius assumes no responsibility for improperly installed equipment.

Water Filtration: A water filter system should be installed with the ice machine.

Clearance Requirements: Self contained air cooled ice machines must have a minimum of 6 inches (15cm) of clearance at the rear, top, and sides of the ice machine for proper air circulation.

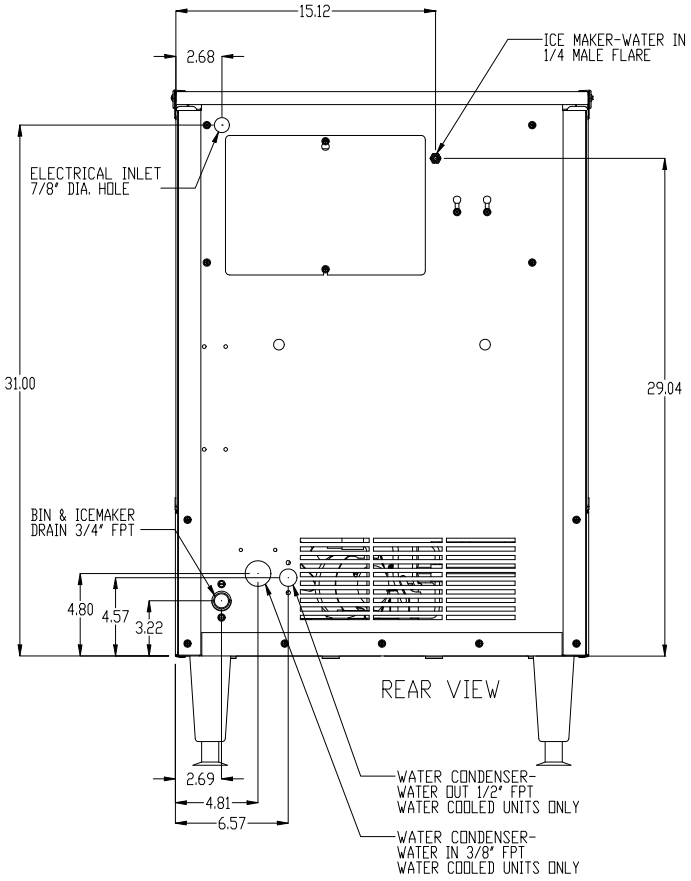
Stacking: If the ice machines are to be stacked, refer to the instructions in the stacking kit. Cornelius does not endorse stacking air-cooled ice machines.

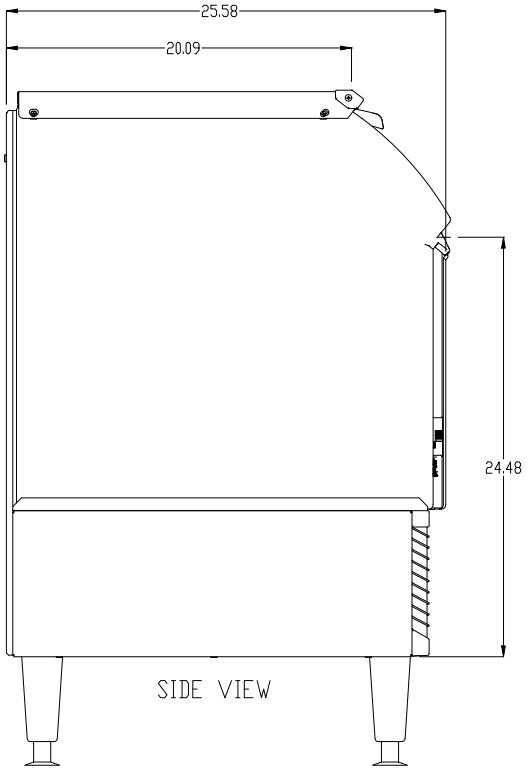
Dispenser Application: A thermostatic bin control kit must be installed if the CCM series ice machine is placed on a dispenser. A bin top may or may not be required. **(Exception is the CHD22/CHD30 Dispenser**)

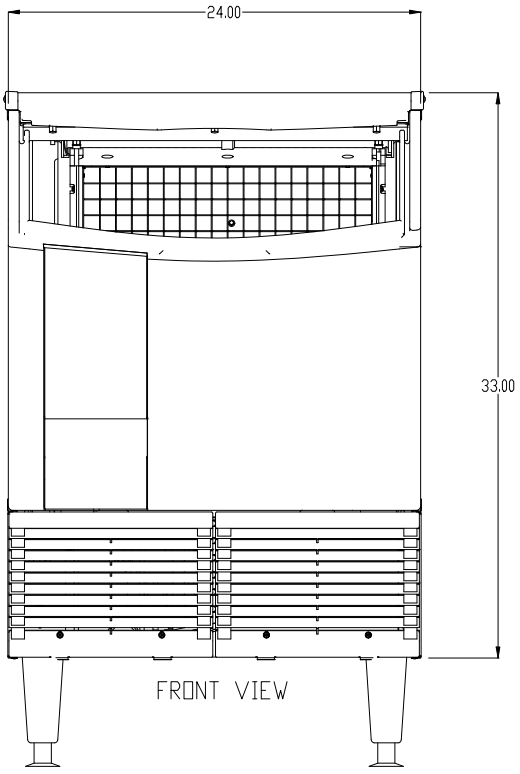
Electrical Specifications: Refer to the serial plate at the rear of the ice machine or the charts on page **A4 and A5**.

Adjustments
Level the machine within 1/8 inch in all directions.
Check the bin control for proper adjustment, Page F9
Check the water in the water trough for proper level, Page D1
Check the ice bridge for proper thickness, Page F4
Check the cam switch adjustment. Page F8
Check the water regulating valve adjustment if water cooled, Page E2

Electrical and Plumbing Requirements: CCU0150 and CCU0220



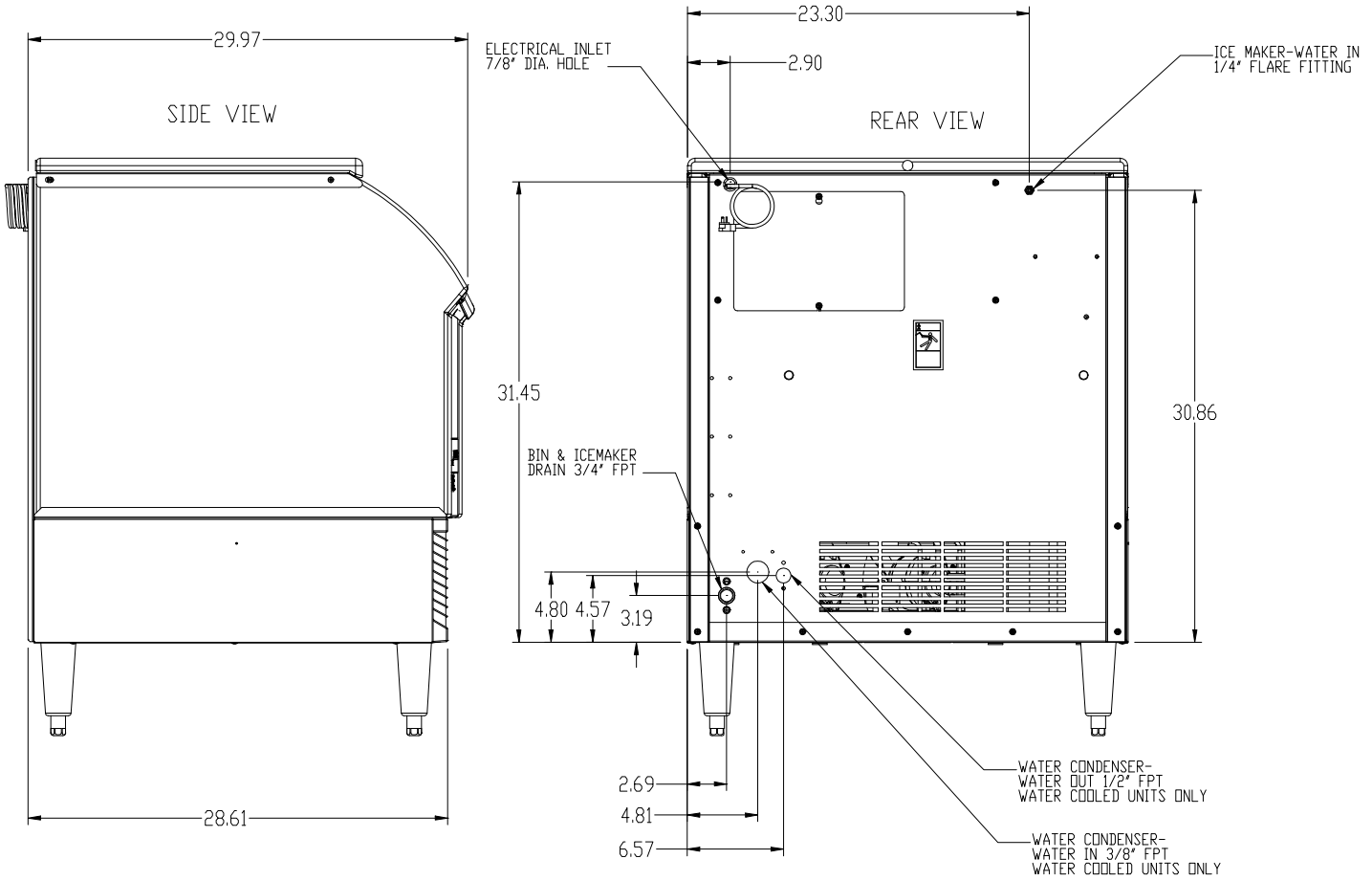


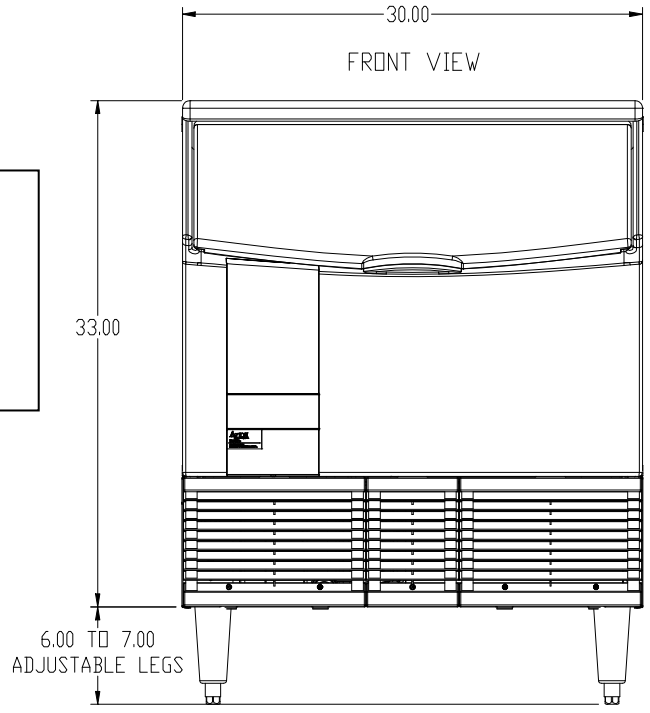


Note: The CCU0150 and CCU0220 do not have a splash curtain.

These models utilize a thermostatic bin control in place of a mechanical bin switch.

Electrical and Plumbing Requirements: CCU0300

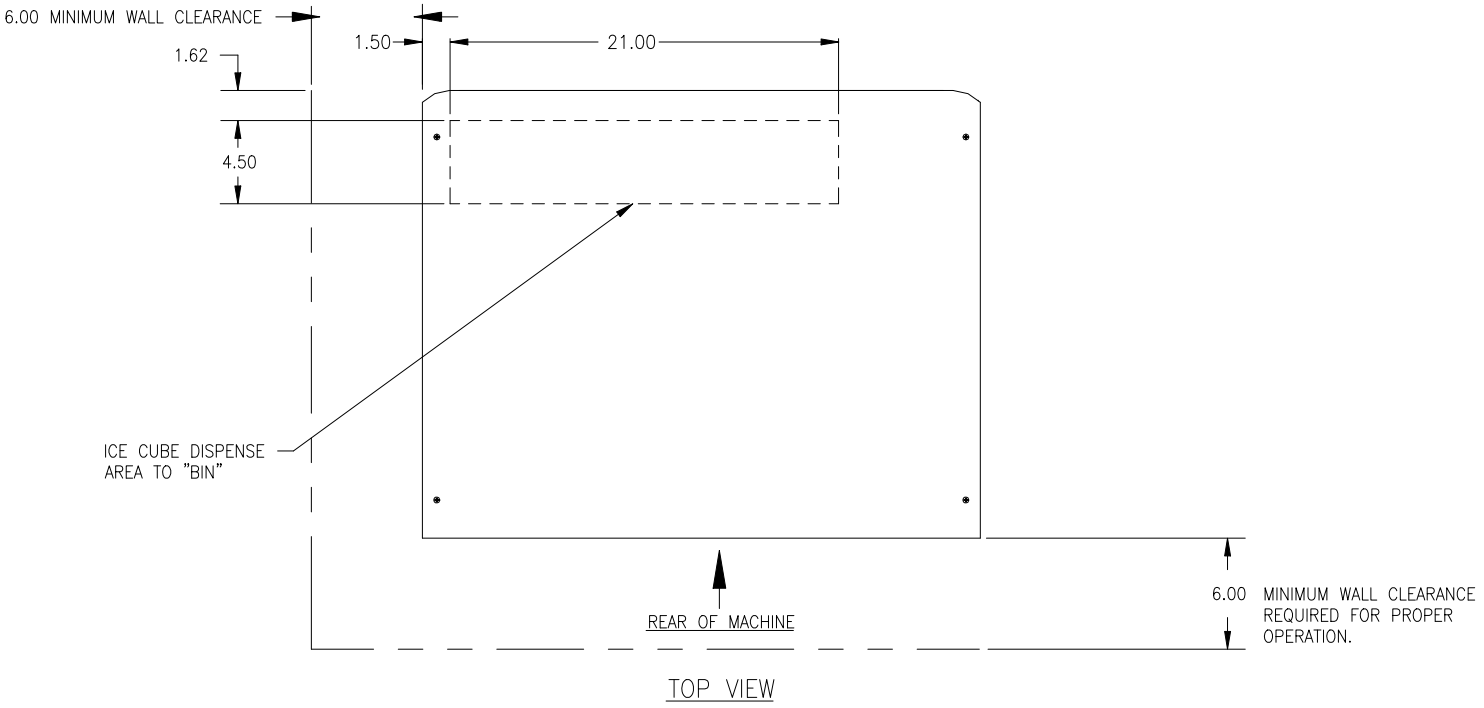


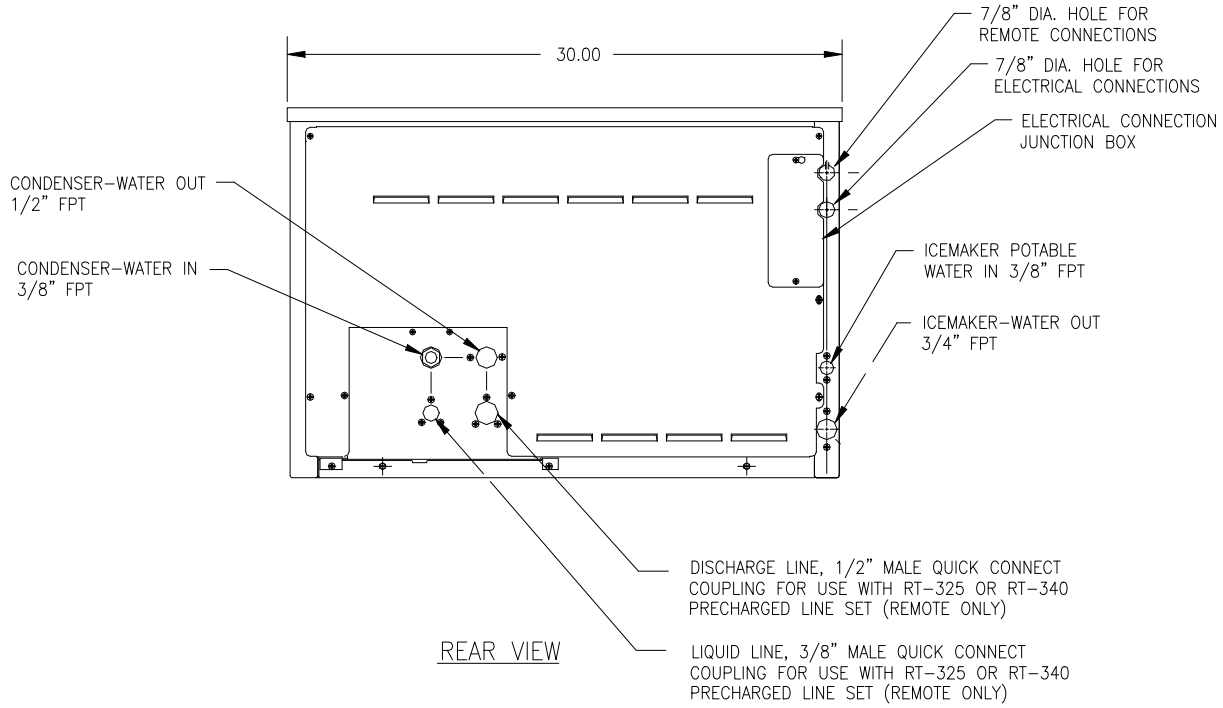


Note: The CCU0300 does not have a splash curtain.

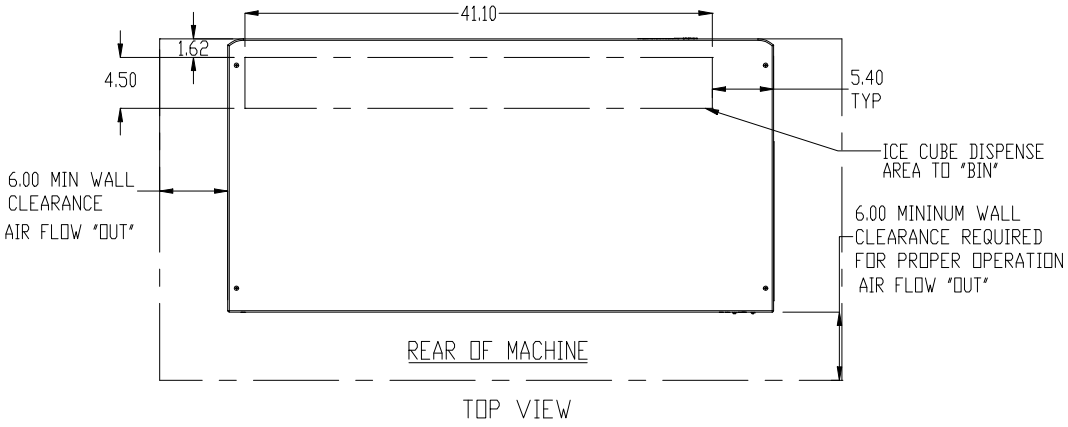
This model utilize a thermostatic bin control in place of a mechanical bin switch.

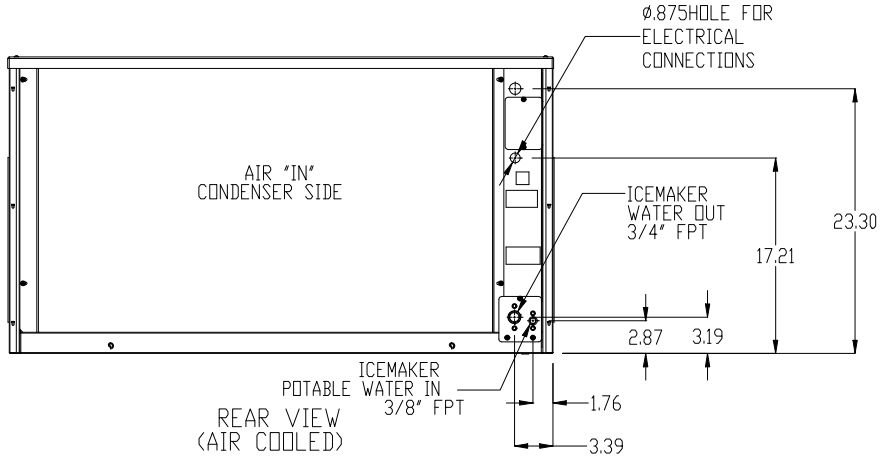
Electrical and Plumbing Requirements: CCM0330, CCM0430, CCM0530, CCM0630, CCM0830 and CCM1030 (30 Inch Wide Cubers)

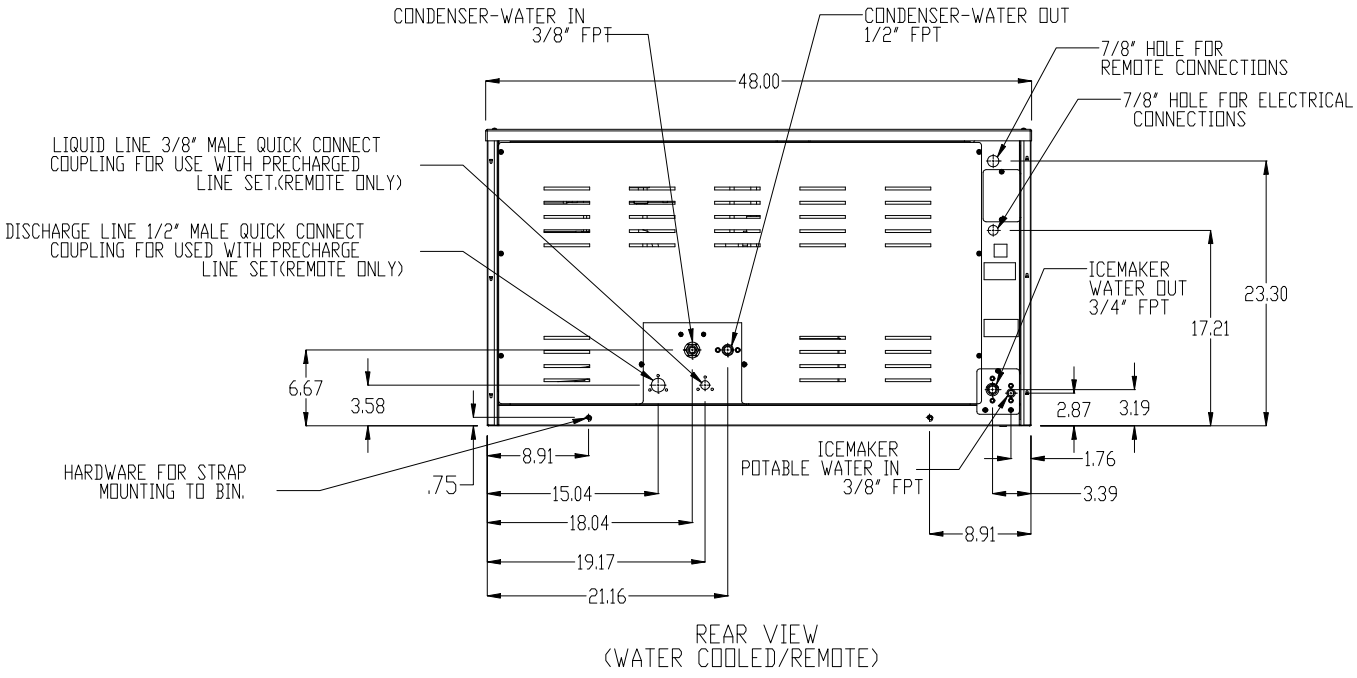




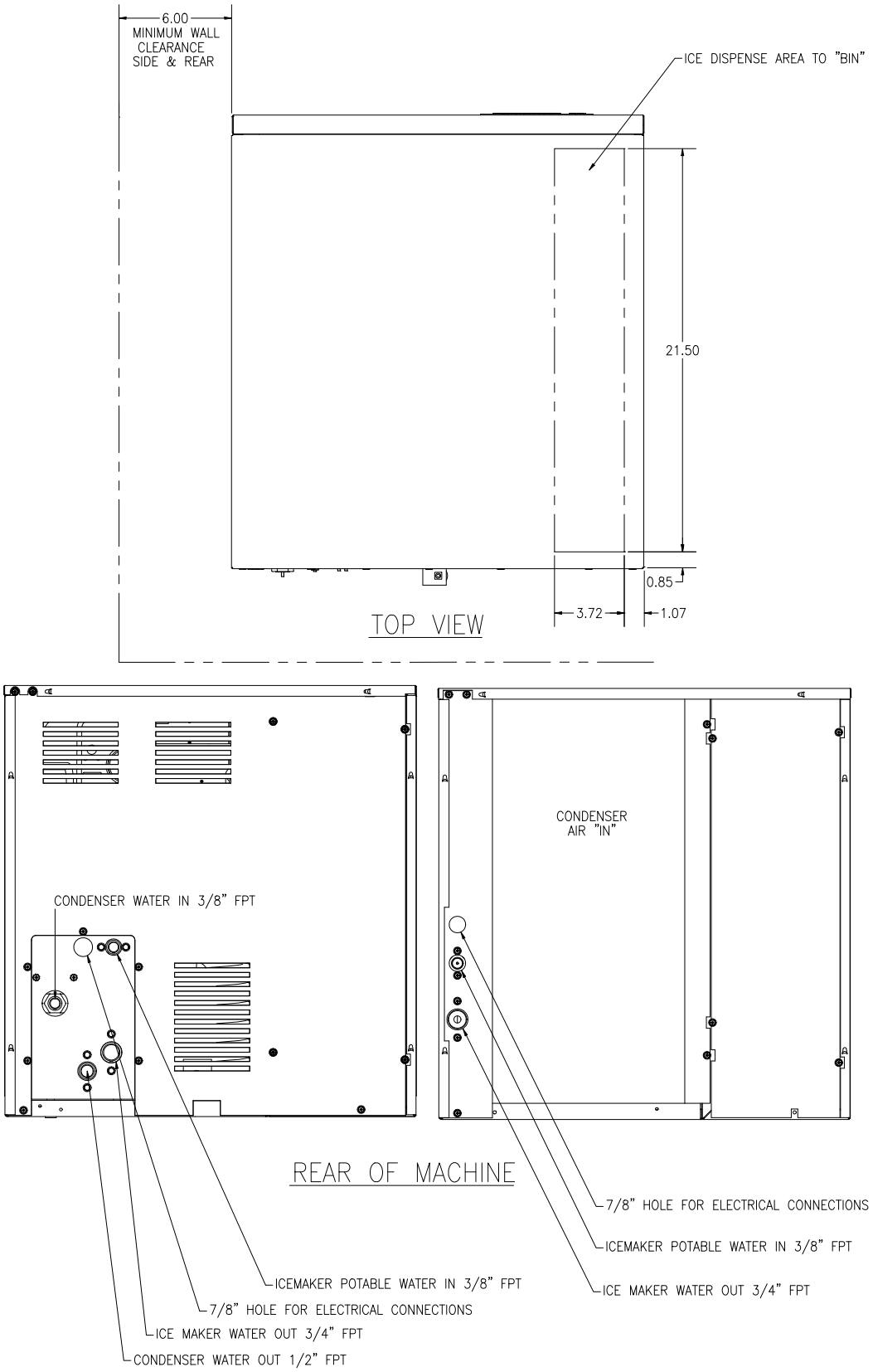
Electrical and Plumbing Requirements: CCM1448**1, CCM1848**1, CCM2148**1 (48 Inch Wide Cubers)



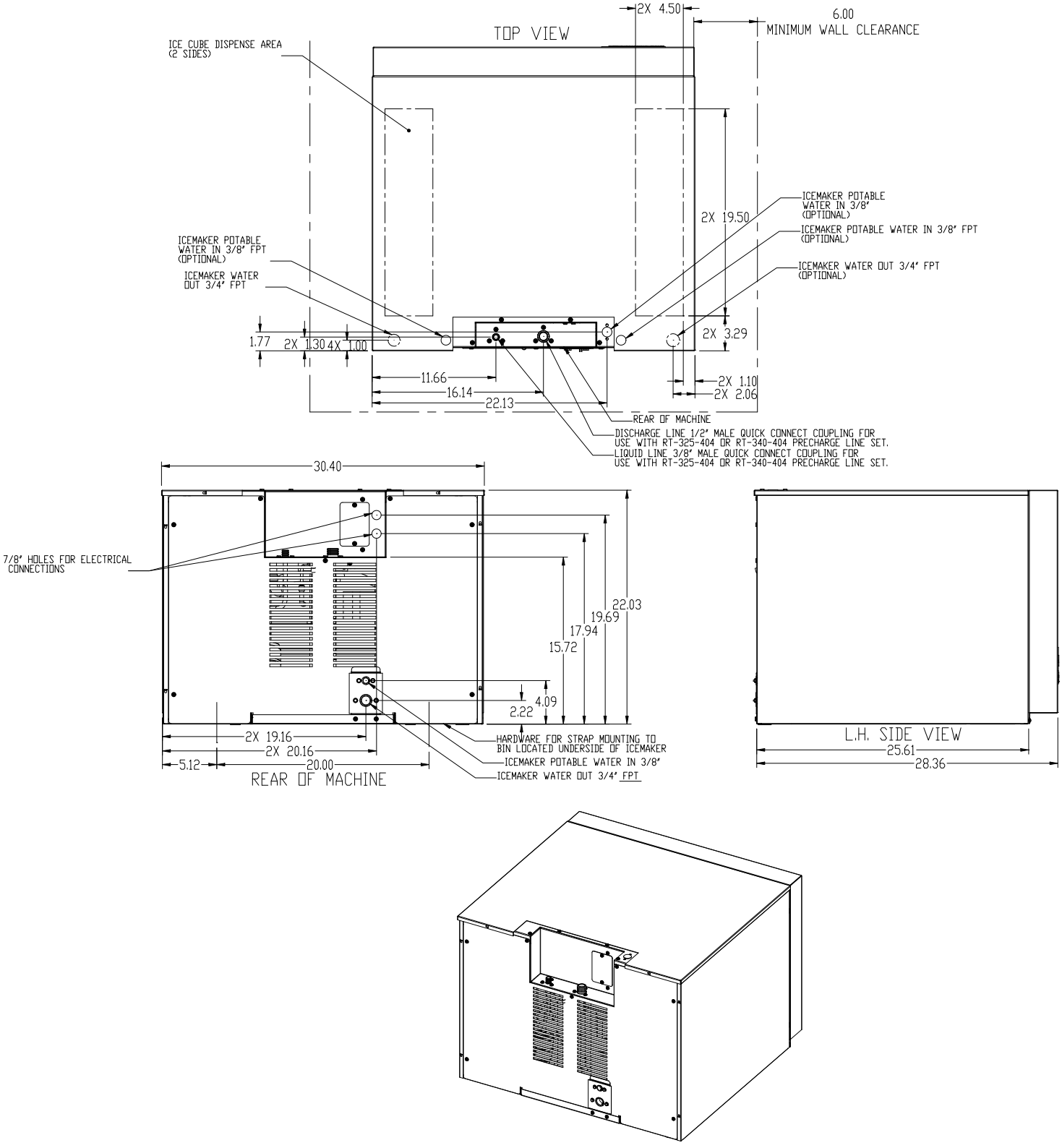




Electrical and Plumbing Requirements: CCM0322 and CCM0522 (22 Inch Wide Cubers)



Electrical and Plumbing Requirements: CCM1530 Remote



Remote Condenser Installation

For proper operation of the Cornelius ice machine, the following installation guidelines must be followed. Failure to do so may result in loss of production capacity, premature part failure, and may void all warranties.

Use the following for planning the placement of the remote condenser relative to the ice machine.
Location Limits: Remote condenser location must not exceed ANY of the following:
- Maximum rise from the ice machine to the remote condenser is 35 physical feet.
- Maximum drop from the ice machine to the remote condenser is 15 physical feet.
- Physical line set maximum length is 75 feet.
- Calculated line set length maximum is 100 feet.
- Ambient operating temperatures: -20°F (-28.9°C) to 120°F (48.9°C)

Calculation Formula
- Drop = dd x 6.6 (dd = distance in feet)
- Rise = rd x 1.7 (rd = distance in feet)
- Horizontal Run = hd x 1 (hd = distance in feet)
- Calculation: Drop(s) + Rise(s) + Horizontal Run = dd+rd+hd=Calculated Line Length

Configurations that do NOT meet these requirements must receive written authorization from Cornelius. This includes multipass or rack system remote condensers.

Do NOT:
- Route a line set that rises, then falls, then rises.
- Route a line set that falls, then rises, then falls.

Remote Condenser Location:
Limited to a 25, 40, 45, 60 or a 75 foot length of precharged refrigerant tubing connecting the ice machine to the remote condenser. The remote condenser must be above or level with the ice machine. Select the best available location, protecting the remote condenser from extremes of dirt, dust and sun. Meet all applicable building codes. Usually the services of a licensed electrician are required.

Roof Attachment:
1. Install and attach the remote condenser to the roof of the building, using the methods and practices of construction that conform to the local building codes, including having a roofing contractor secure the remote condenser to the roof.
2. Have an electrician connect the remote condenser fan motor wires to the ice machine, using the junction box at the back of the ice machine.

Precharged Line Set Routing
CAUTION: Do not connect the precharged tubing until all routing and forming of the tubing is complete. See the coupling instructions for connecting information.

1. Each set of precharged tubing refrigerant lines consists of a 3/8 diameter liquid line and a 1/2 inch diameter discharge line. Both ends of each line have quick connect couplings, one end has a Schrader valve connection which goes to the condenser.

Note: The openings in the building ceiling or wall, listed in the next step, are the minimum sizes recommended for passing the refrigerant lines through.

2. Have the roofing contractor cut a minimum hole for the refrigerant lines of 2.50 inch. Check local codes, a separate hole may be required for the electrical power to the condenser.

CAUTION: DO NOT KINK OR CRIMP REFRIGERANT TUBING WHEN INSTALLING IT.

3. Route the refrigerant lines through the roof opening. Follow straight line routing whenever possible. Any excess tubing MUST remain within the building.
4. Spiral the excess length of precharged tubing inside the building. Use a horizontal spiral to avoid any traps in the lines.
5. Have the roofing contractor seal the holes in the roof per local codes.

CAUTION: The couplings on the sets of precharged lines are self sealing when installed properly. Carefully follow the instructions in the RC manual.

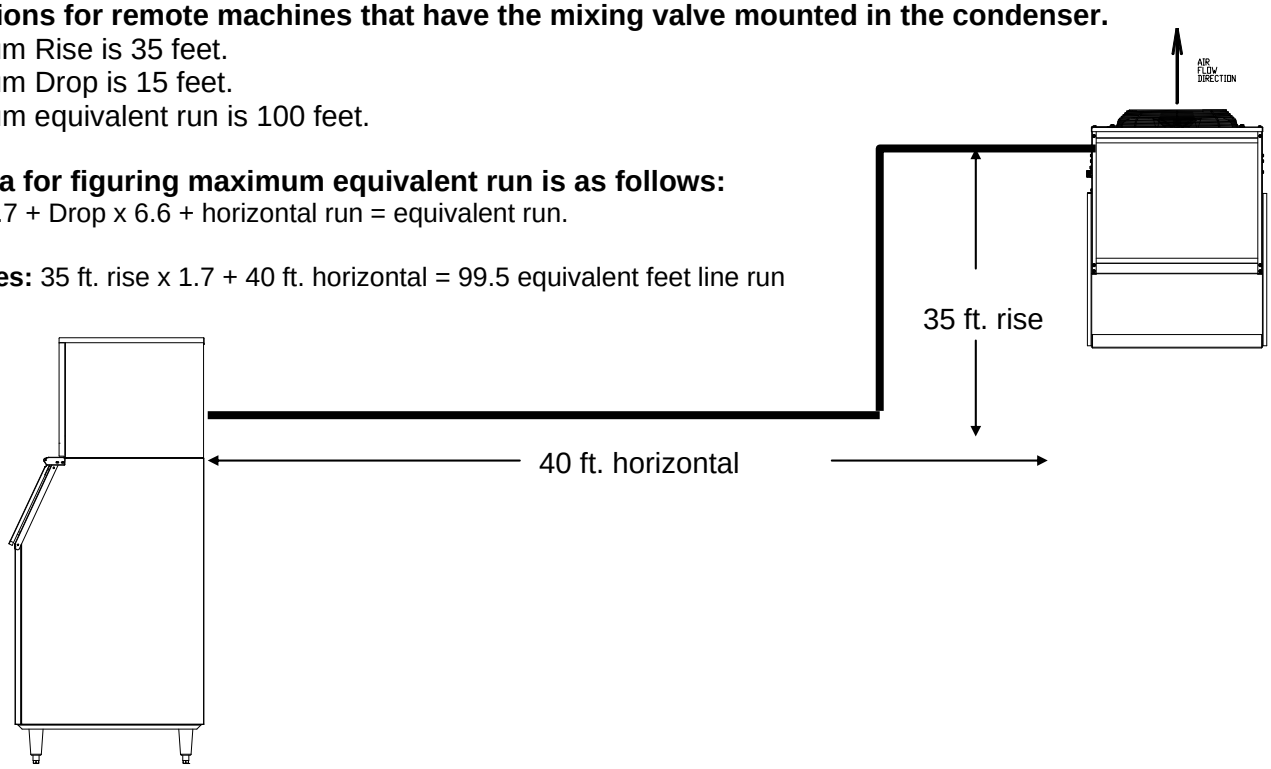
The following remote ice makers incorporate the mixing valve in the condenser. This configuration allows up to a 100 foot calculated remote line set run. Reference the diagram below to calculate the maximum 100 foot line set run.

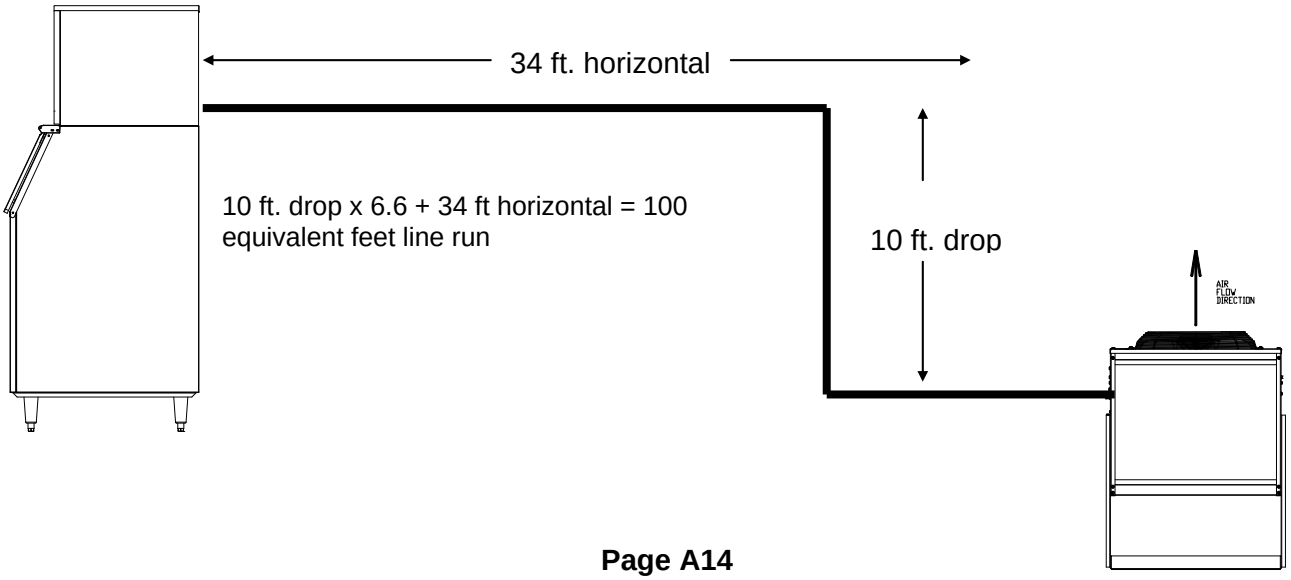
Ice Machine Model Number	Remote Condenser Model Number
CCM2148R*1	RC21002C
CCM1848R*1	RC21002C
CCM1448R*1	RC14002C
CCM1530R*1	RC14002C
CCM1030R	RC08002
CCM0830R	RC08002
CCM0630R	RC06002
CCM0530R	RC05001

Limitations for remote machines that have the mixing valve mounted in the condenser.
Maximum Rise is 35 feet.
Maximum Drop is 15 feet.
Maximum equivalent run is 100 feet.

Formula for figuring maximum equivalent run is as follows:
Rise x 1.7 + Drop x 6.6 + horizontal run = equivalent run.

Examples: 35 ft. rise x 1.7 + 40 ft. horizontal = 99.5 equivalent feet line run





How the CCM/CCU ice machine works

A general description of how the **CMM/CCU** series cubers work is given below. The remainder of the manual provides more detail about the components and systems.

With the ICE/OFF/WASH switch in the ICE position, the compressor, water pump and condenser fan motor (when applicable) will energize starting the freeze cycle.

During the freeze cycle, water is circulated over the evaporator(s) where the ice cubes are formed. When the suction pressure has pulled down to the proper cut-in pressure of the timer initiate (pressure control), the contacts will close and energize the time delay module (timer). See Page **A4-A5** for proper cut-in pressures. At this time the cubes will close to completion.

The remaining portion of the freeze cycle is determined by the timer setting. The timer is pre-set at the factory to achieve the proper ice bridge thickness but may need to be adjusted upon initial start-up, see Page **F4** for initial timer settings.

Once the amount of time on the timer has passed, the control relay will be energized and the machine will enter harvest. Power is now supplied to the water purge valve, hot gas valve, and the harvest motor. The water purge valve opens, and allows the water pump to purge the water remaining in the water, removing impurities and sediment. This allows the machine to produce clear ice cubes and keep mineral build up at a minimum. The hot gas solenoid opens allowing hot gas to go directly to the evaporator, heating the evaporator and breaking the bond between the evaporator and the ice slab.

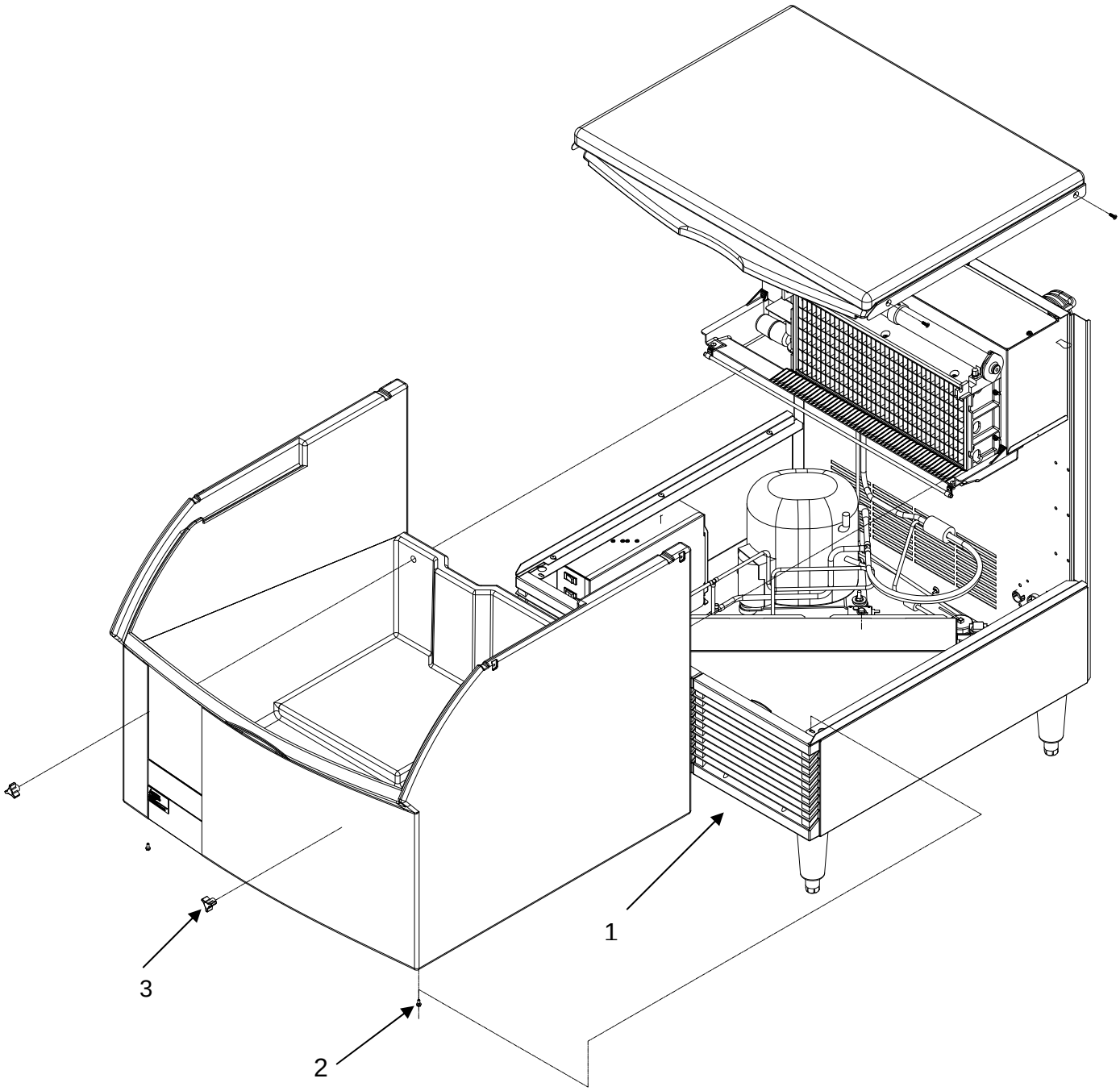
The harvest assist motor, which is also energized during harvest, turns a slip clutch, which pushes a probe against the back of the ice slab. Once the evaporator has reached approximately 40°F (4.5°F) in temperature, the slip clutch overcomes the bonding of the ice to the evaporator and pushes the slab of ice off of the evaporator and into the storage bin. The clutch also actuates a switch that rides on the outer edge of the clutch. When the clutch completes one revolution, the switch is tripped and the machine enters the next freeze cycle.

When ice drops into a full bin during harvest, the splash curtain is held open which activates a bin switch shutting the machine off. When ice is removed from the bin, the splash curtain will close and the machine will come back on.

Undercounter Bin Removal-CCU0300 Series

The storage bin can be removed by:

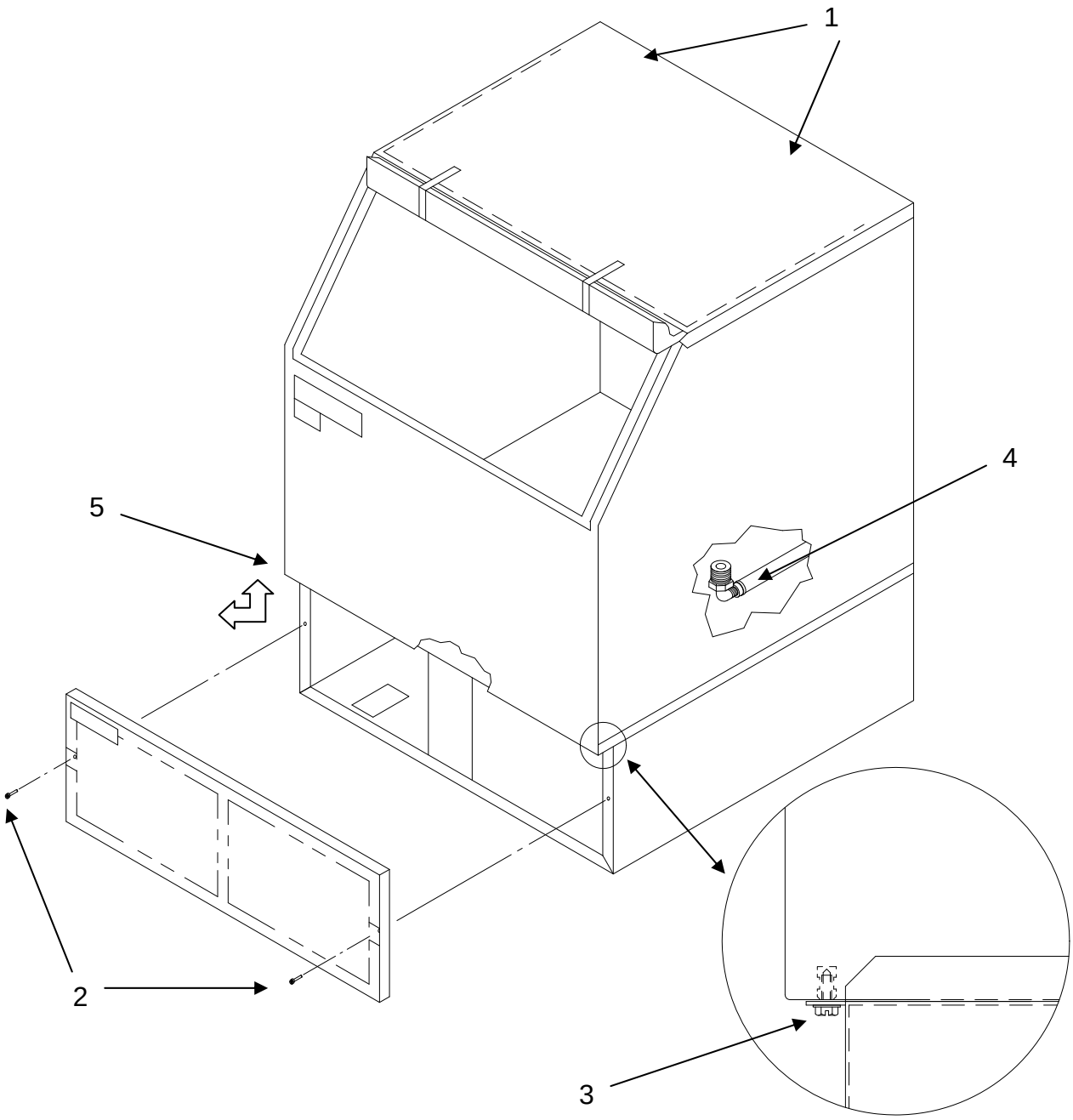
1 Remove the lower grill.
2. Remove two screws securing bin to cabinet base.
3. Remove the thumbscrews from the back wall of the bin.
4. Disconnect bin drain.
5. Lift front of bin slightly and pull bin forward to remove.



Undercounter Bin Removal-CCU0150/0220 Series

The storage bin can be removed by:

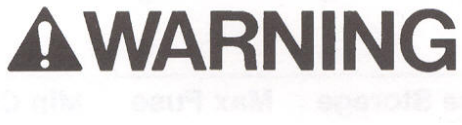
1. Remove the two screws at the rear of the top panel.
2. Remove the two screws from the front panel.
3. Remove two screws securing bin to cabinet base.
4. Disconnect bin drain.
5. Lift front of bin slightly and pull bin forward to remove.



Maintenance

Note: Maintenance should be performed by a Cornelius trained Service Technician.

Electrical shock and/or injury from moving parts inside this machine can cause serious injury. Disconnect electrical supply to machine prior to performing any adjustments or repairs.



Failure to perform the required maintenance at the frequency specified will void warranty coverage in the event of a related failure. To insure economical, trouble free operation of the machine, the following maintenance is required every 6 months.

Maintenance Procedure

1. Clean the ice-making section per the instructions below. Cleaning should be performed a minimum of every 6 months. Local water conditions may require that cleaning be performed more often.

2. Check ice bridge thickness. See page **F4** for proper thickness and adjustment procedure.

3. Check water level in trough. See page **D1** for proper water level and adjustment.

4. Clean the condenser (air-cooled machines) to insure unobstructed air flow.

5. Check for leaks of any kind: Water, Refrigerant, Oil, Etc.

6. Check the bin switch for proper adjustment. See page **F9** for bin switch adjustment.

7. Check the cam switch adjustment. See page **F8** for cam switch adjustment.

8. Check the water valve (water-cooled machines) for proper adjustment. See page **E2**.

9. Check all electrical connection.

10. Oil the fan motor if the motor has an oil fitting. (Self contained air-cooled models only)

Cleaning and Sanitizing

1. Harvest problems may occur if the following procedures are not performed every 6 months.

2. Remove the ice machine front panel.

3. Make sure that all the ice is off of the evaporator. If ice is being made, wait for cycle completion, then turn the machine “OFF” at the ICE/OFF/WASH selector switch.

4. Remove or melt all ice in the storage bin.

Cleaning and Sanitizing (continued)

5. Add recommended amount of approved **Nickel Safe** ice machine cleaner to the water trough according to label instructions on the container.

6. Initiate the wash cycle at the **ICE/OFF/WASH** switch by placing the switch in the **"WASH"** position. Allow the cleaner to circulate for approximately 15 minutes to remove mineral deposits.

7. Depress the purge switch and hold until the ice machine cleaner has been flushed down the drain and diluted by fresh incoming water.

8. Terminate the wash cycle at the **ICE/OFF/WASH** switch by placing the switch in the **"OFF"** position. Remove the splash curtain and inspect the evaporator and water spillway to assure all mineral residue has been removed.

9. If necessary, wipe the evaporator, spillway and other water transport surfaces with a clean soft cloth to remove any remaining residue. If necessary, remove the water distribution tube, disassemble and clean with a bottlebrush, see page **D2**. Reassemble all components and repeat steps 4 through 7 as required to remove residue.

10. Turn **OFF** ice machine water supply and clean the water trough thoroughly to remove all scale or slime build-up. If necessary, remove the water trough to reach all splash areas and float.

11. Prepare 1½ to 2 gallons (5.7 to 7.5 liters) of approved (EPA/FDA) sodium hypochloride food equipment sanitizer to form a solution with 100 to 200 ppm free chlorine yield.

12. Add enough sanitizing solution to fill the water trough to overflowing and place the **ICE/OFF/WASH** switch to the **"WASH"** position and allow circulation to occur for 10 minutes and inspect all disassembled fittings for leaks. During this time, wipe down all other ice machine splash areas, plus the interior surfaces of the bin, deflector and door with the remaining sanitizing solution. Inspect to insure that all functional parts, fasteners, thermostat bulbs (if used), etc. are in place.

13. Depress the purge switch and hold until sanitizer has been flushed down the drain. Turn **ON** the ice machine water supply and continue to purge to the diluted sanitizing solution for another 1 to 2 minutes.

14. Place the **ICE/OFF/WASH** switch to the **"ICE"** position and replace the front panel.

15. Discard the first two ice harvests.

Winterizing Procedures

Important!
Whenever the ice machine is taken out of operation during the winter months, the procedure below must be performed. Failure to do so may cause serious damage.

1. Turn off water to machine.

2. Make sure all ice is off of the evaporator(s). If ice is being made, initiate harvest or wait for cycle completion.

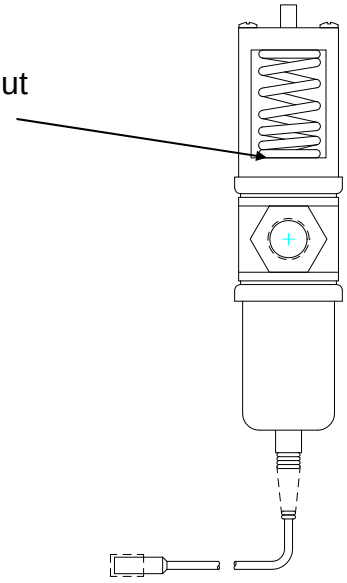
3. Place the ICE/OFF/WASH switch to the **"OFF"** position.

4. Disconnect the tubing between the water pump discharge and water distribution tube.

5. Drain the water system completely.

6. On water cooled machines, hold the water regulating valve open by prying upward on the water valve spring with a screwdriver while using compressed air to blow all the water out of the condenser.

7. Remove all of the ice in the storage bin and discard.



Cleaning stainless steel

Commercial grades of stainless steel are susceptible to rusting. It is important that you properly care for the stainless steel surfaces of your ice machine and bin to avoid the possibility of rust or corrosion. Use the following recommended guidelines for keeping your stainless steel looking like new:

1. Clean the stainless steel thoroughly once a week. Clean frequently to avoid build-up of hard, stubborn stains. Also, hard water stains left to sit can weaken the steel's corrosion resistance and lead to rust. Use a nonabrasive cloth or sponge, working with, not across, the grain.

2. Don't use abrasive tools to clean the steel surface. Do not use steel wool, abrasive sponge pads, wire brushes or scrapers to clean the steel. Such tools can break through the "passivation" layer - the thin layer on the surface of stainless steel that protects it from corrosion.

3. Don't use cleaners that use chlorine or chlorides. Don't use chlorine bleach or products like Comet to clean the steel. Chlorides break down the passivation layer and can cause rusting.

4. Rinse with clean water. If chlorinated cleansers are used, you must thoroughly rinse the surface with clean water and wipe dry immediately.

5. Use the right cleaning agent. The table below lists the recommended cleaning agents for common stainless steel cleaning problems:

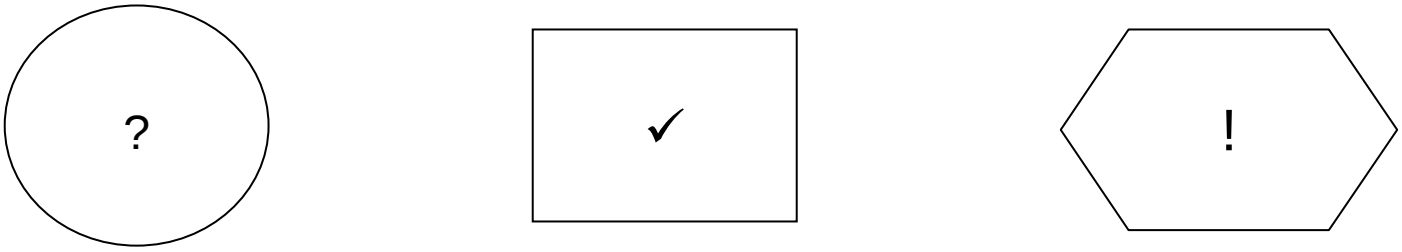
Cleaning Activity	Cleaning Agent	Method of Application
Routine cleaning	Soap, Ammonia, Windex, or detergent with water. Fantastik, 409 Spic'nSpan Liquid are also approve for Stainless Steel.	Apply with a clean cloth or sponge. Rinse with clean water and wipe dry.
Removing grease or fatty acids	Easy-Off or similar oven cleaners.	Apply generously, allow to stand for 15-20 minutes. Rinse with clean water. Repeat as required.
Removing hard water spots and scale.	Vinegar	Swab or wipe with clean cloth. Rinse with clean water and dry.

How To Use The Troubleshooting Trees

The troubleshooting trees were developed to be used in conjunction with the service information in the sections that follow. If used together as intended, these two parts of the manual will allow the ice machine service technician to quickly diagnose many of the problems encountered with the ice machines. When used as designed, the troubleshooting trees can lead you from a general symptom to the most likely component to suspect as the cause of the problem. The trees are not designed to be "parts changer guides": please do not use them as such.

Components returned to the factory for warranty are tested by the factory and will not be covered under the warranty policy if they are not defective.

The troubleshooting trees are made of three types of boxes:



QUESTION boxes (Circle) ask a yes/no question and the answer will lead to either another question box, a check box or a solution box.

CHECK boxes (Rectangle) will suggest a point to check for proper operation, and will often refer you to a page in the service information sections of this manual. The result of the check may lead to another box, or a solution box.

SOLUTION boxes (Hexagon) suggest the most likely component to cause the malfunction described in the heading of the tree. When reaching a solution box, **DO NOT** immediately assume the component is defective. The final step is to verify that the component is indeed defective, by using the service information in the sections that follow.

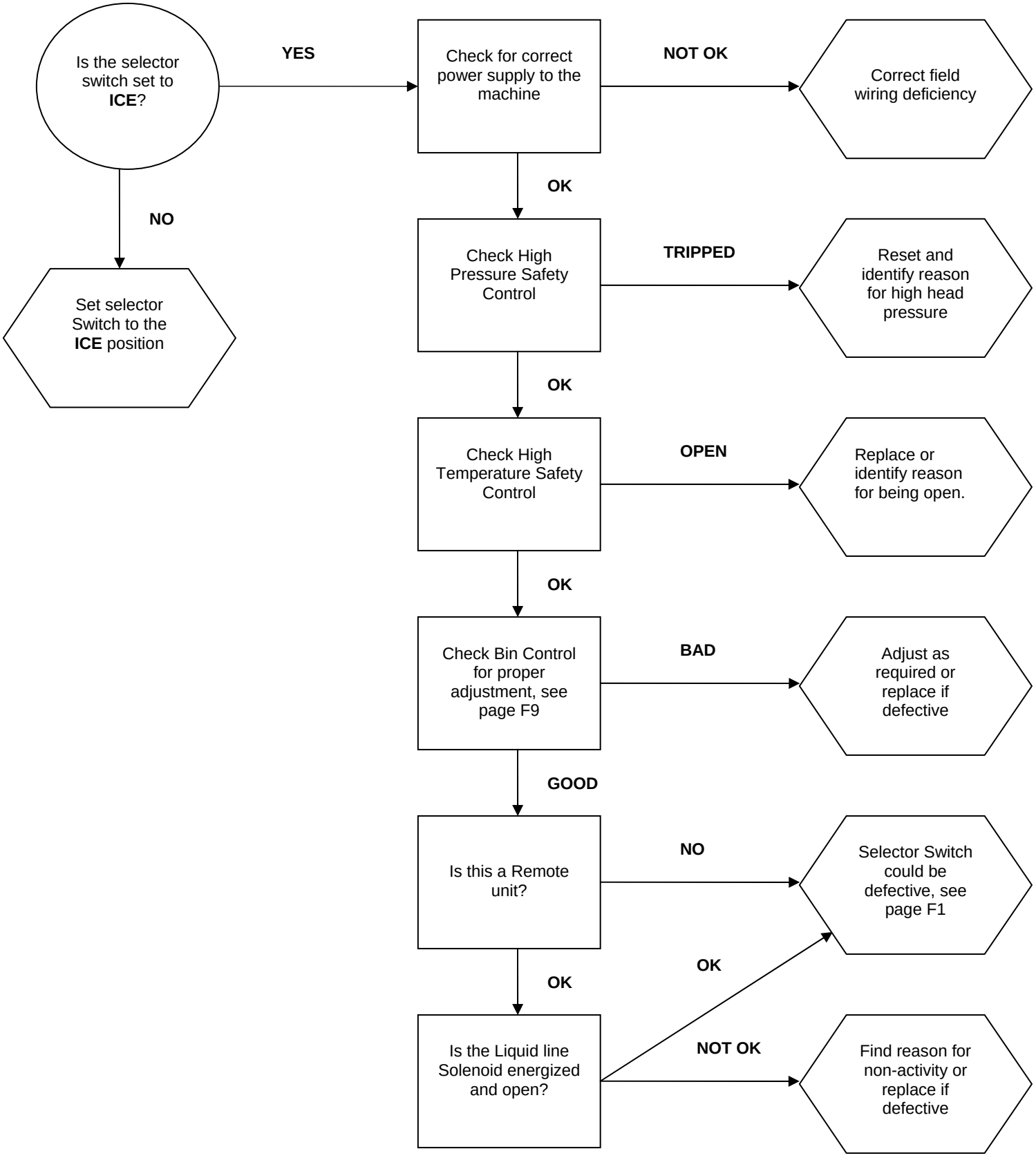
To use the troubleshooting trees, first find the page with the heading describing the type of problem occurring. Begin at the top of the page and follow the tree, step-by-step. When a check box is reached, it may be necessary to refer to another section in the manual.

Once a solution box is reached, refer to the appropriate section to verify that the component in the solution box is, indeed, the problem. Adjust, repair or replace the component as necessary.

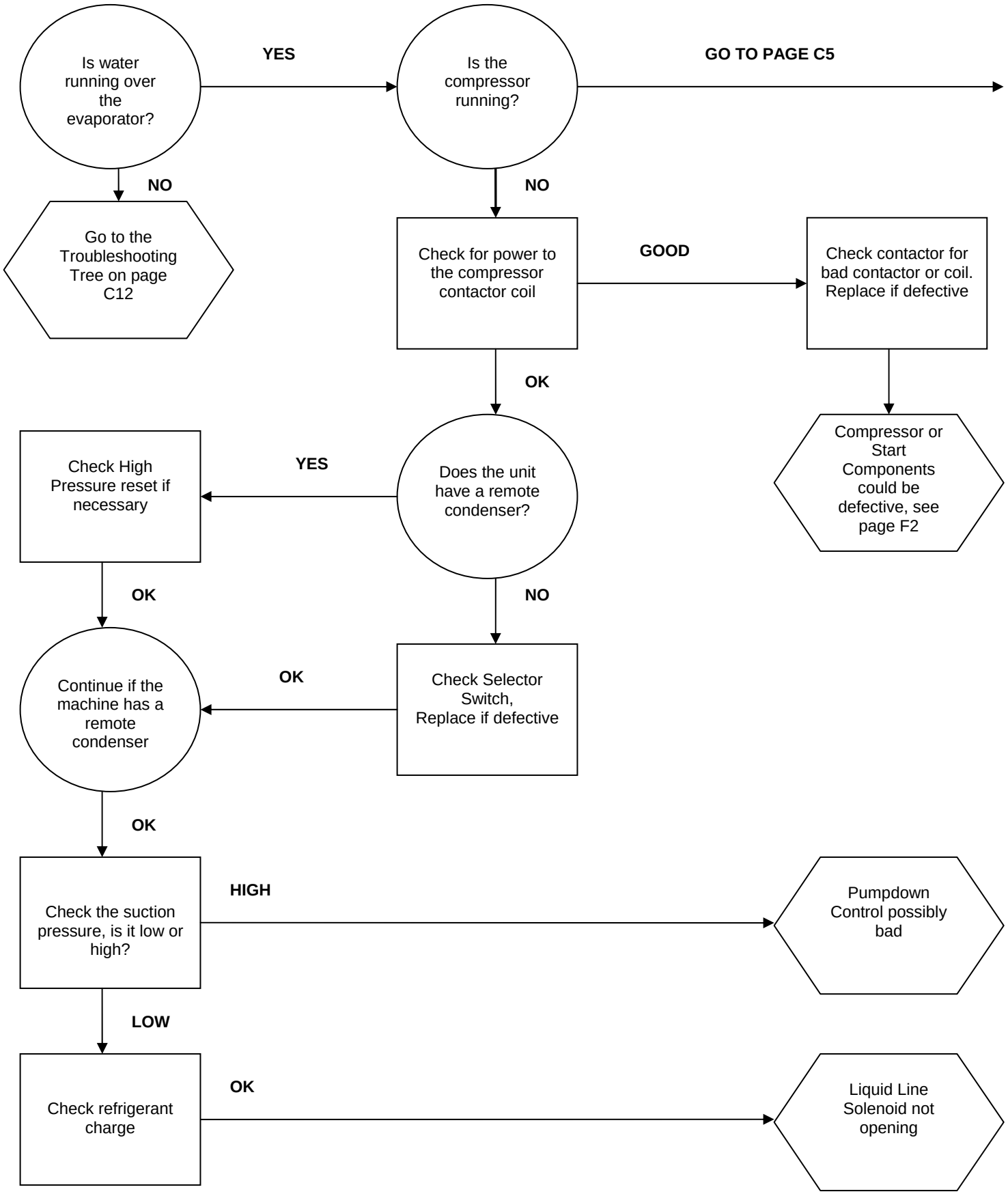
Troubleshooting Trees Table Of Contents

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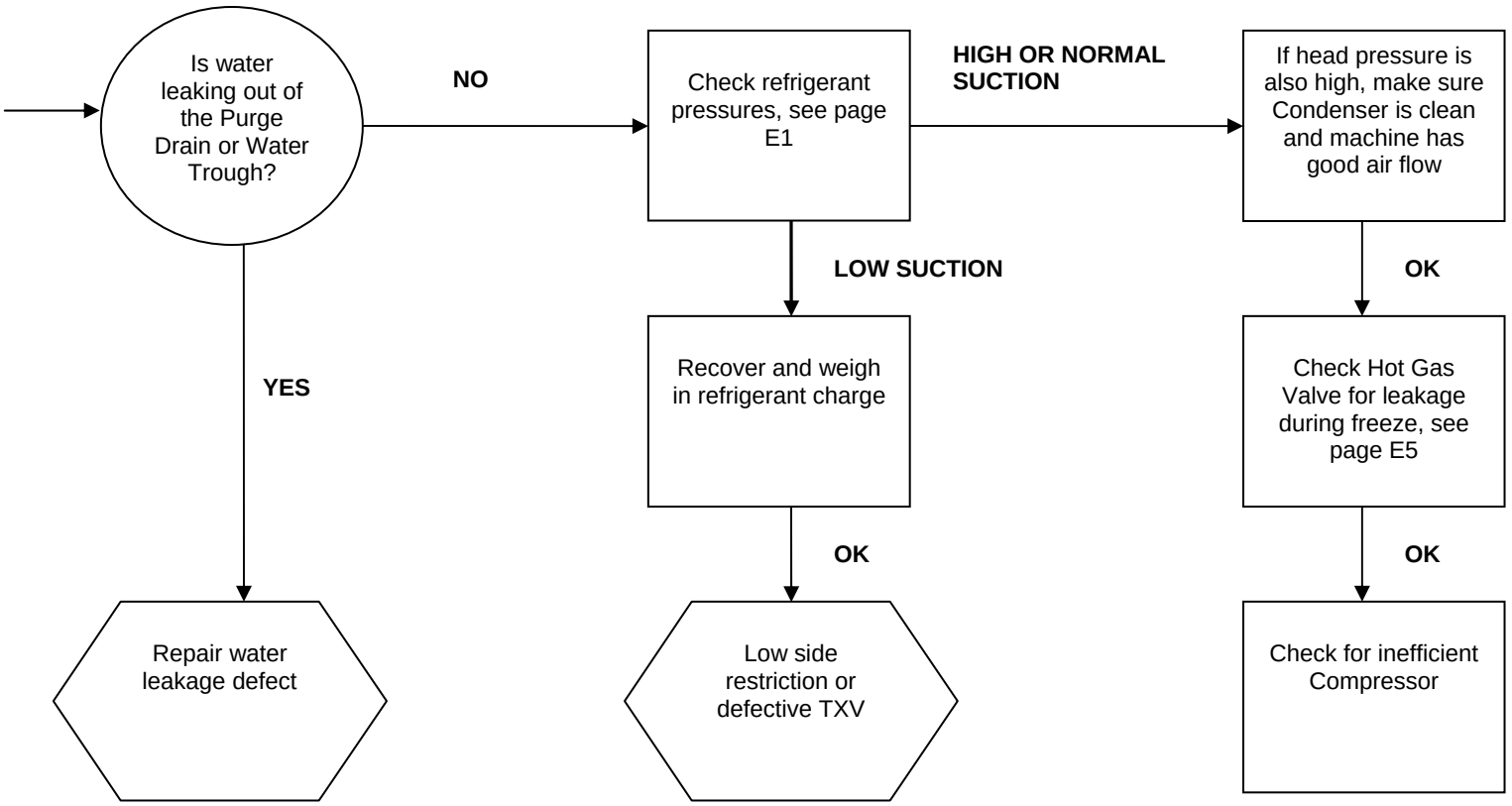
Machine Does Not Run



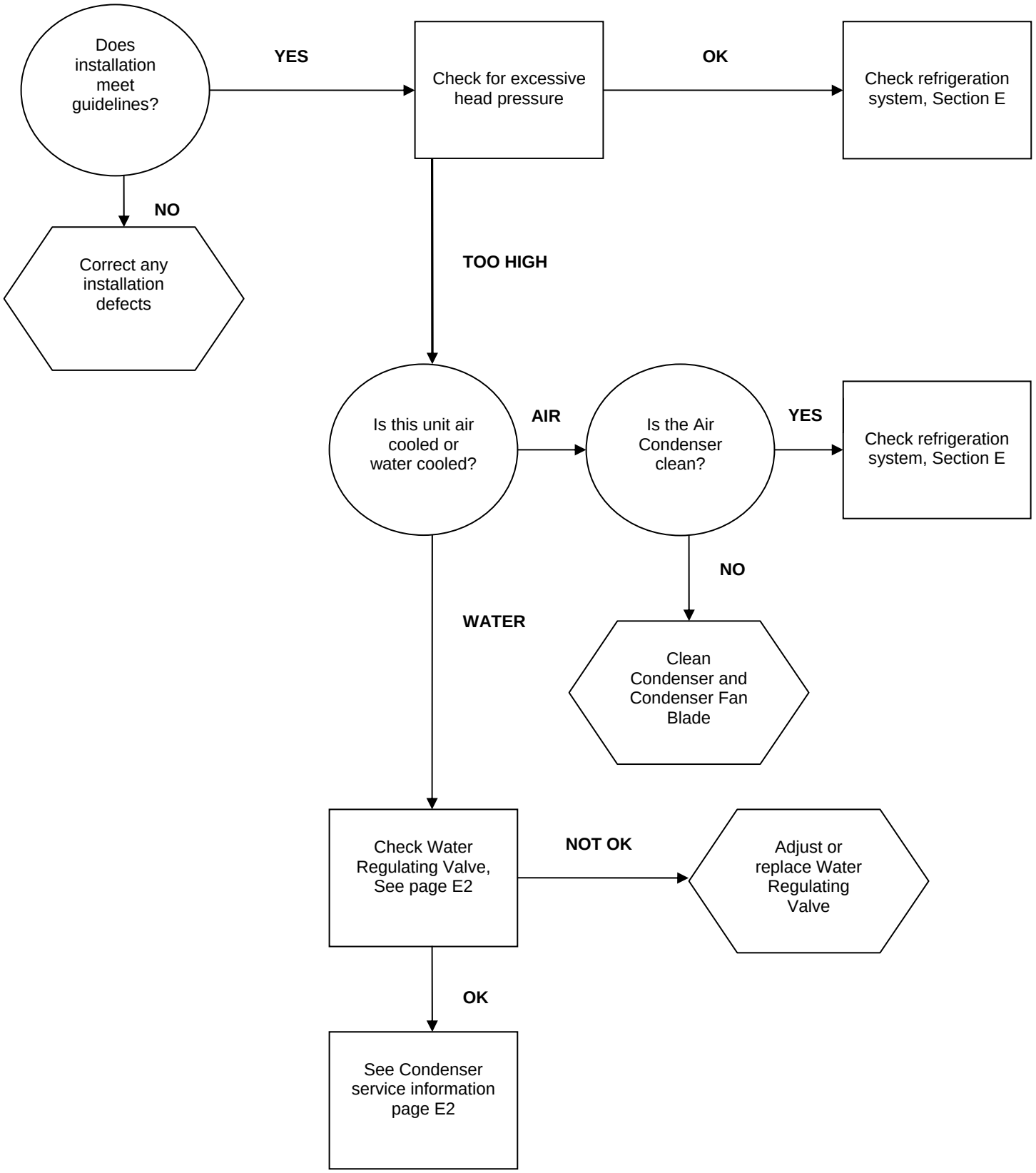
Machine Runs, Does Not Make Ice



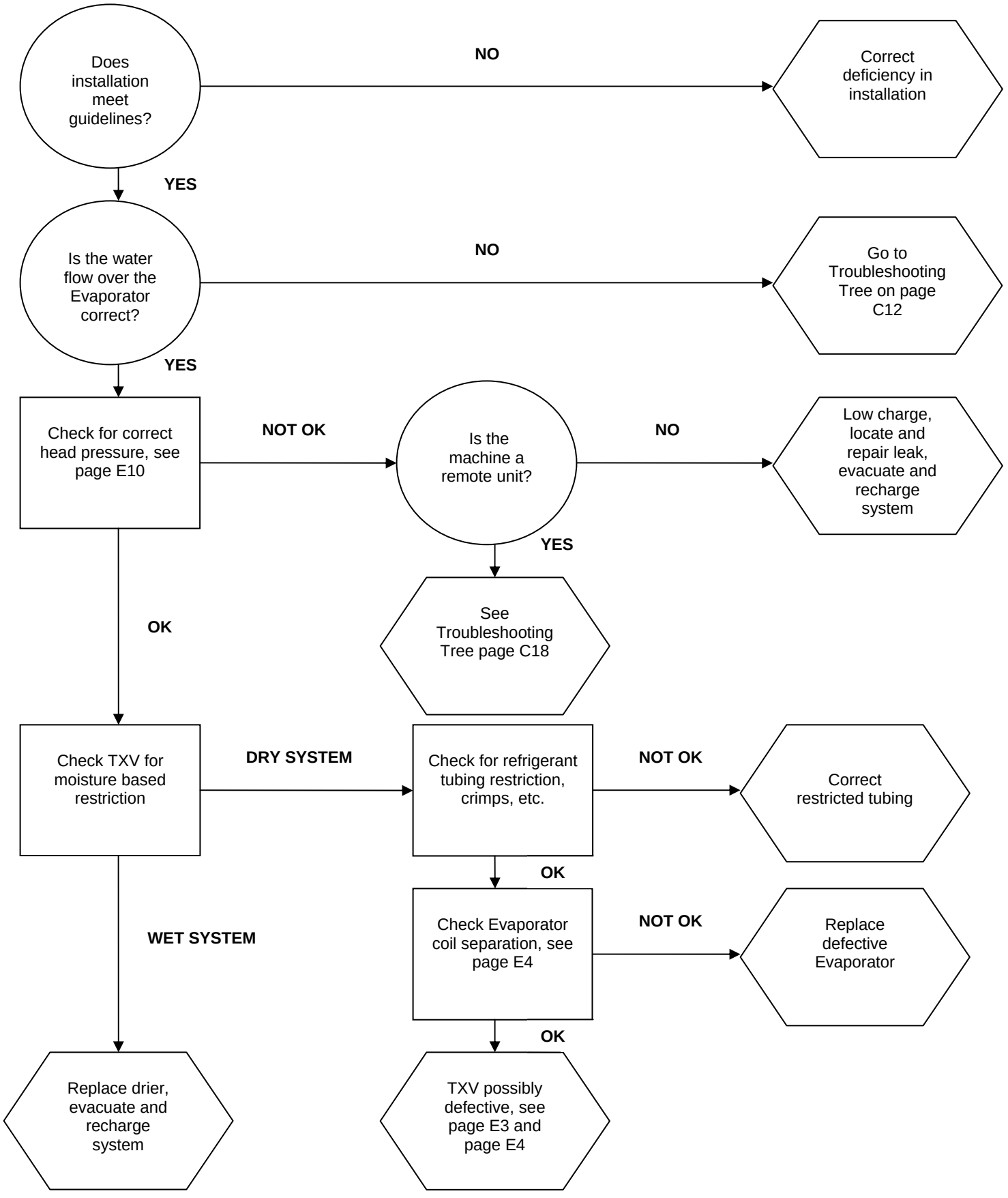
Machine Runs, Does Not Make Ice (continued)



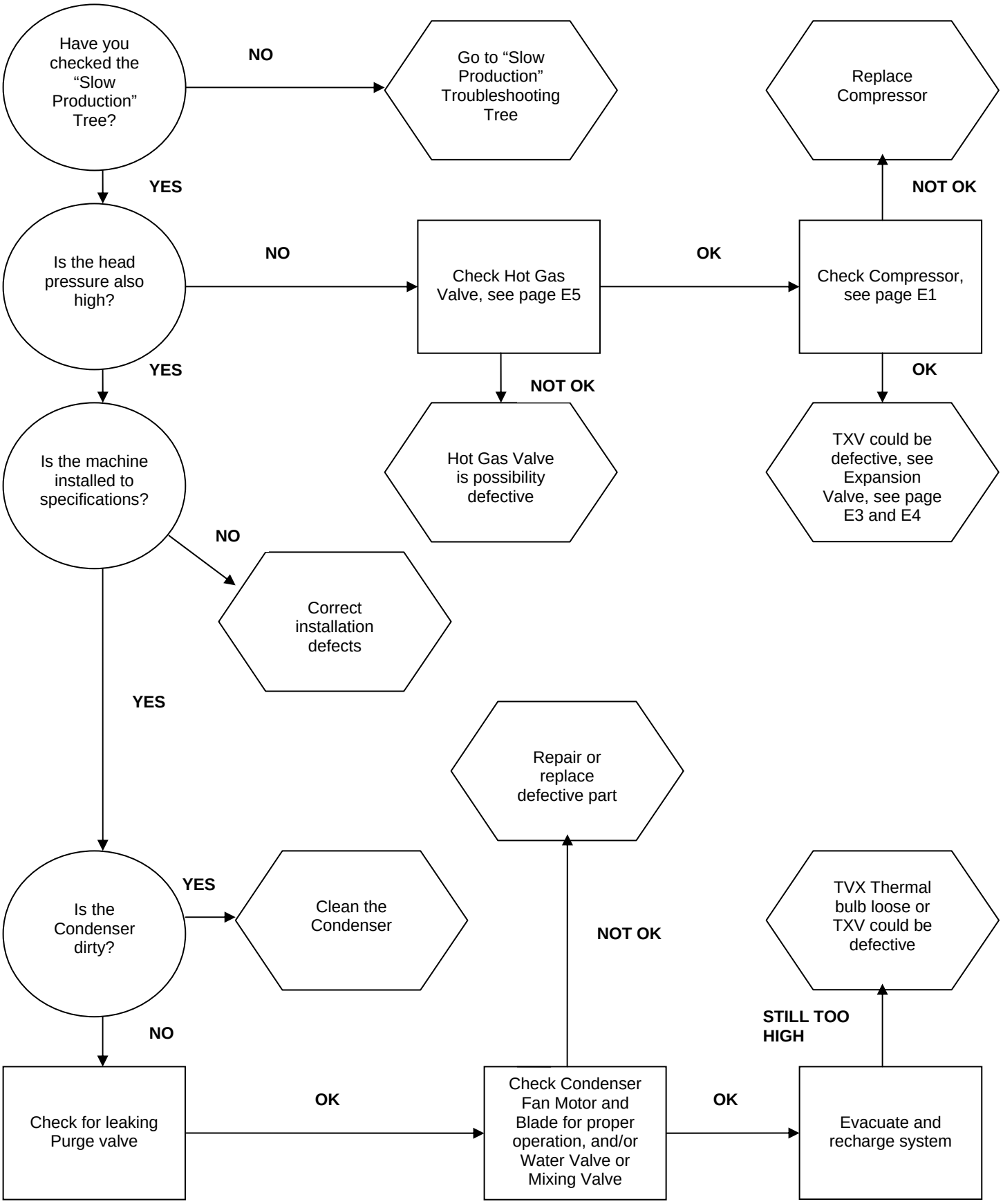
Slow Production (Cube Formation Good)



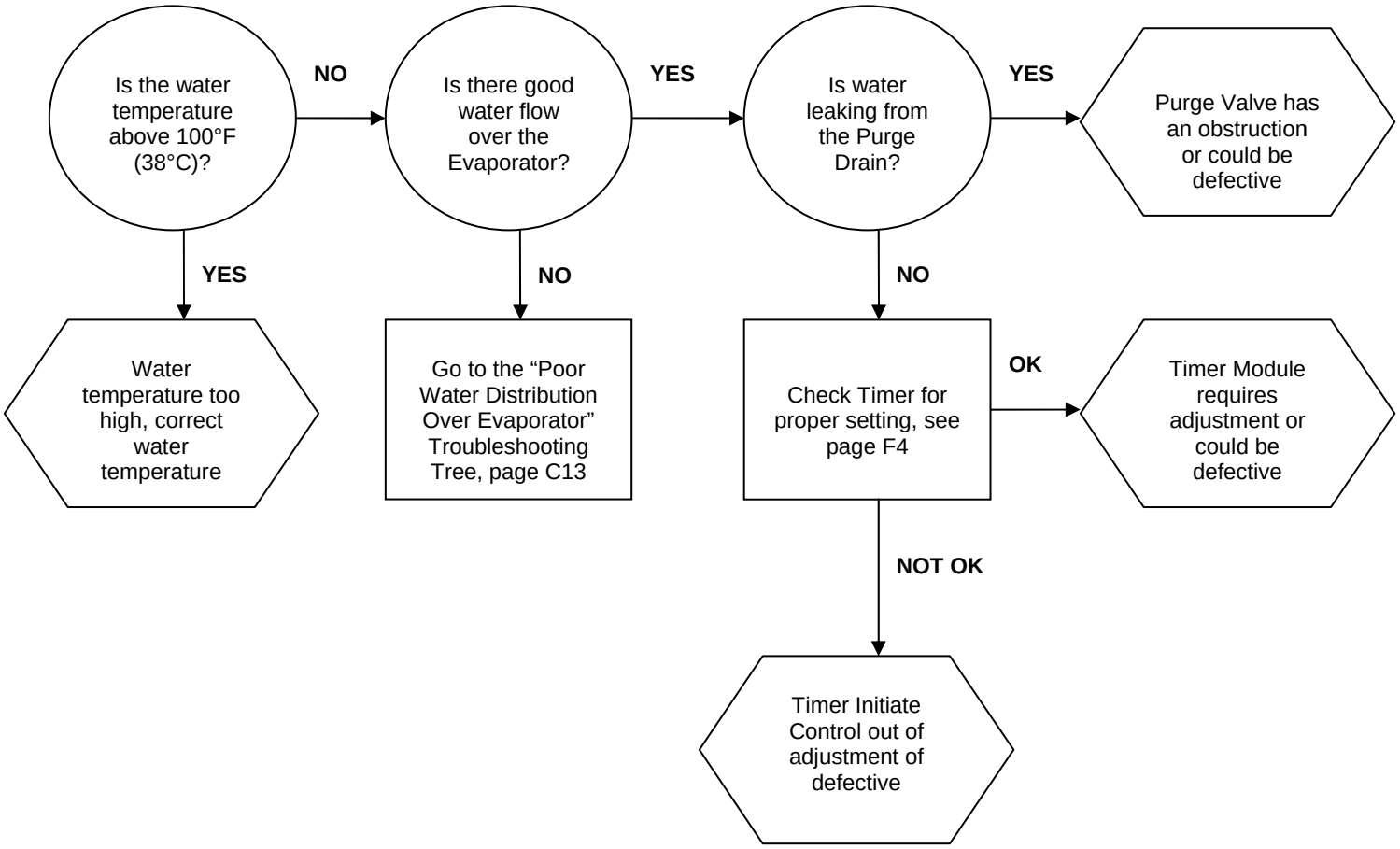
Low Suction Pressure



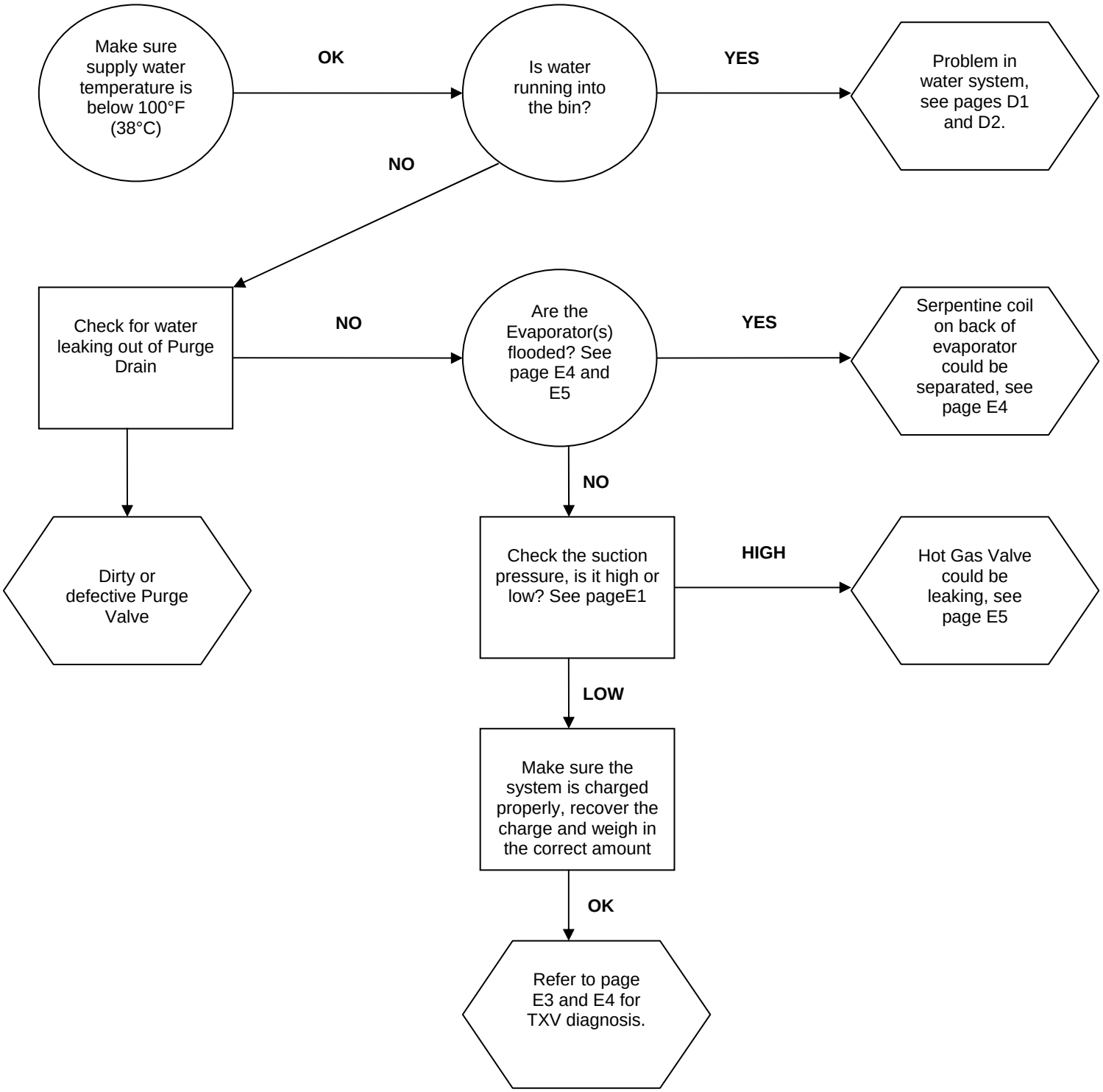
High Suction Pressure



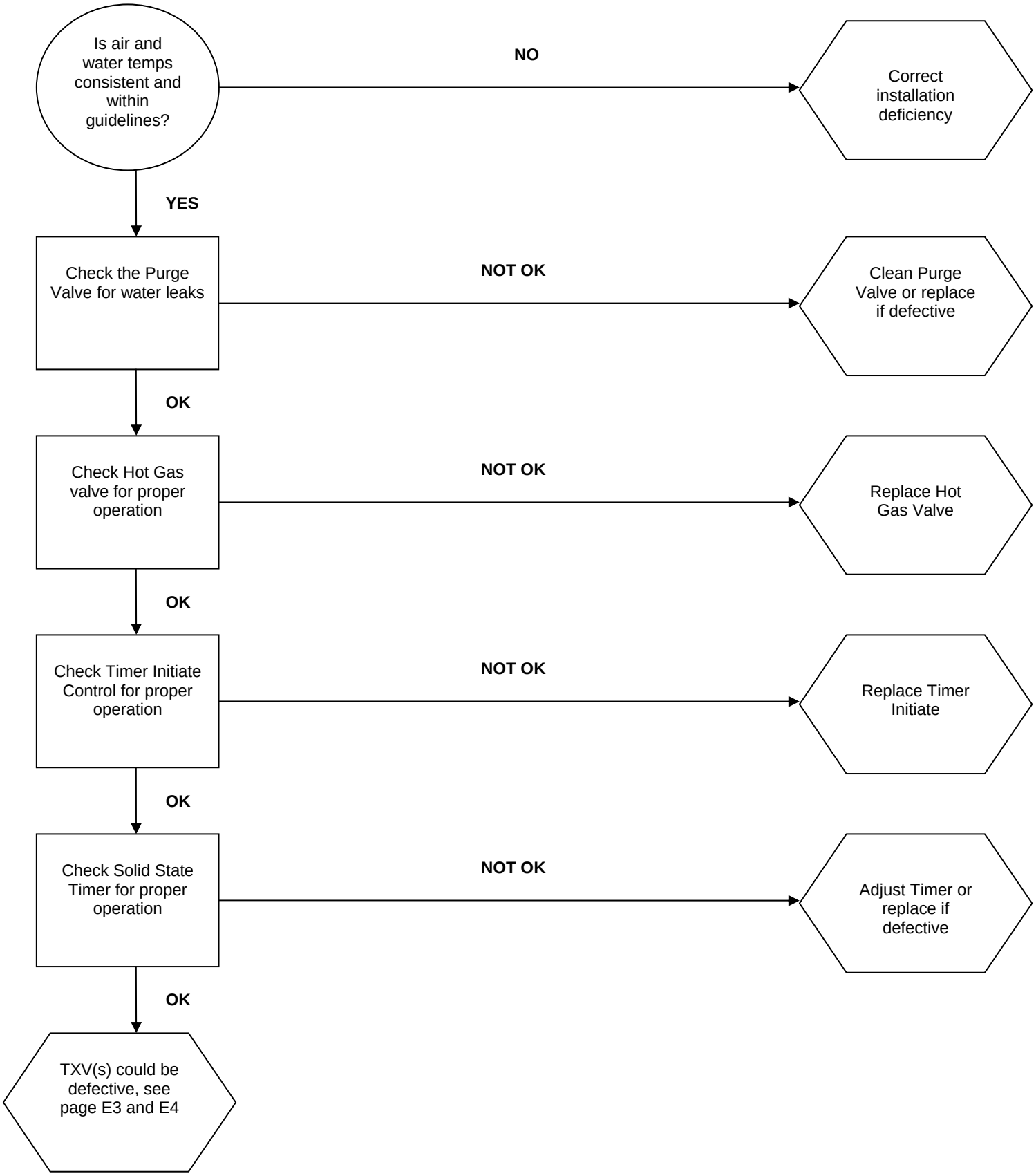
Cubes Are Hollow



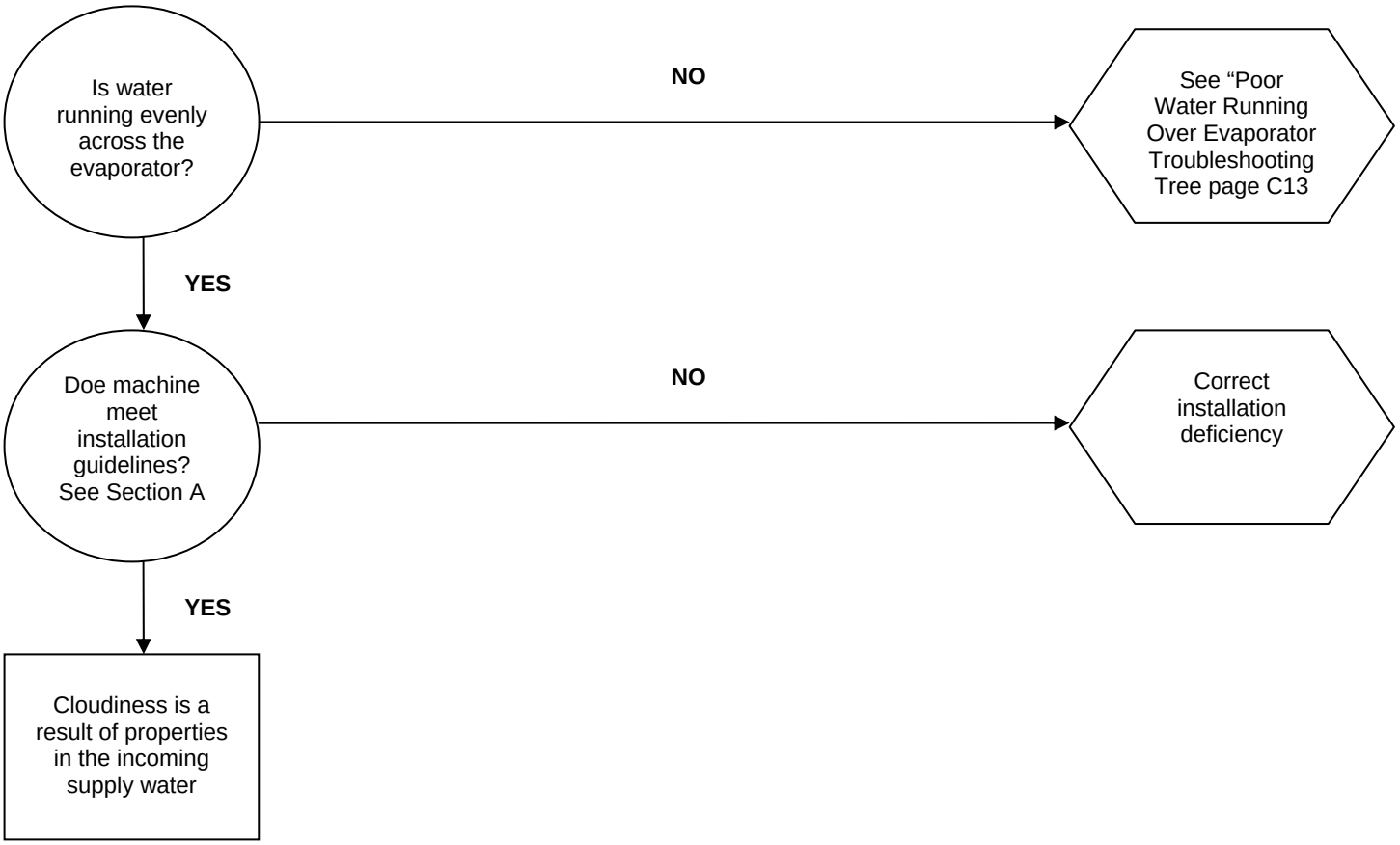
Uneven Bridge Thickness



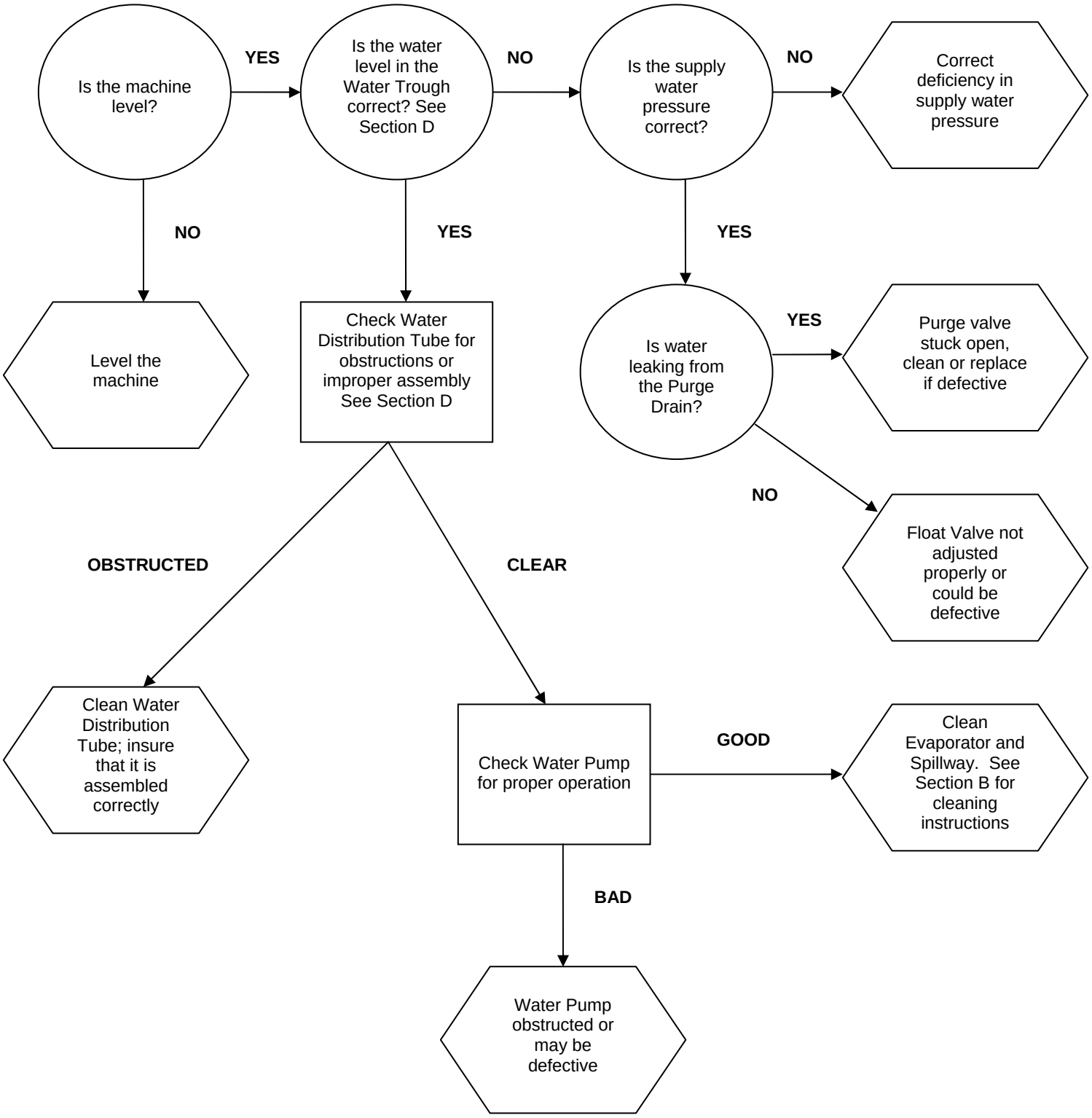
Ice bridge Thickness Varies Cycle To Cycle



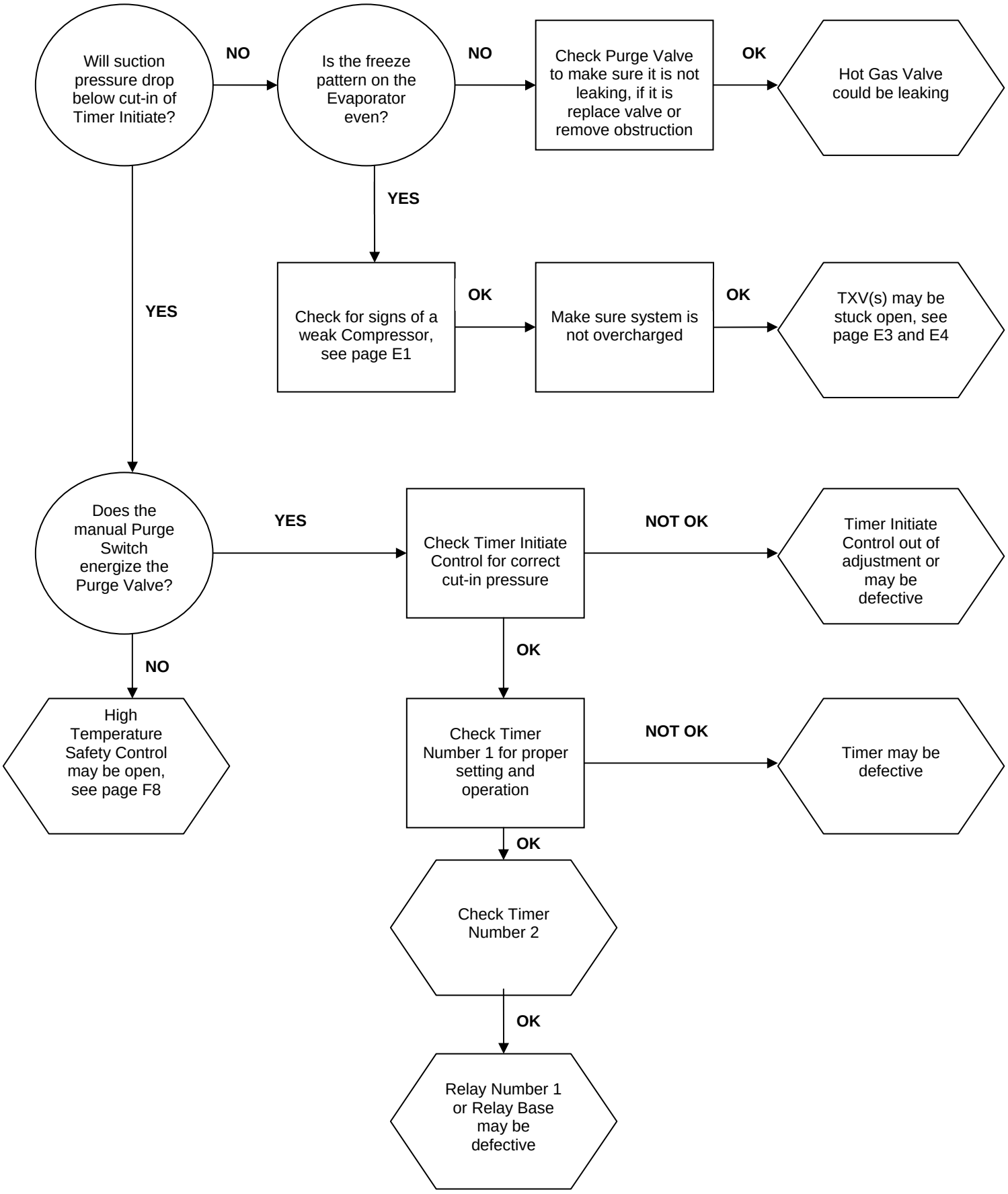
Machine Produces Cloudy Ice



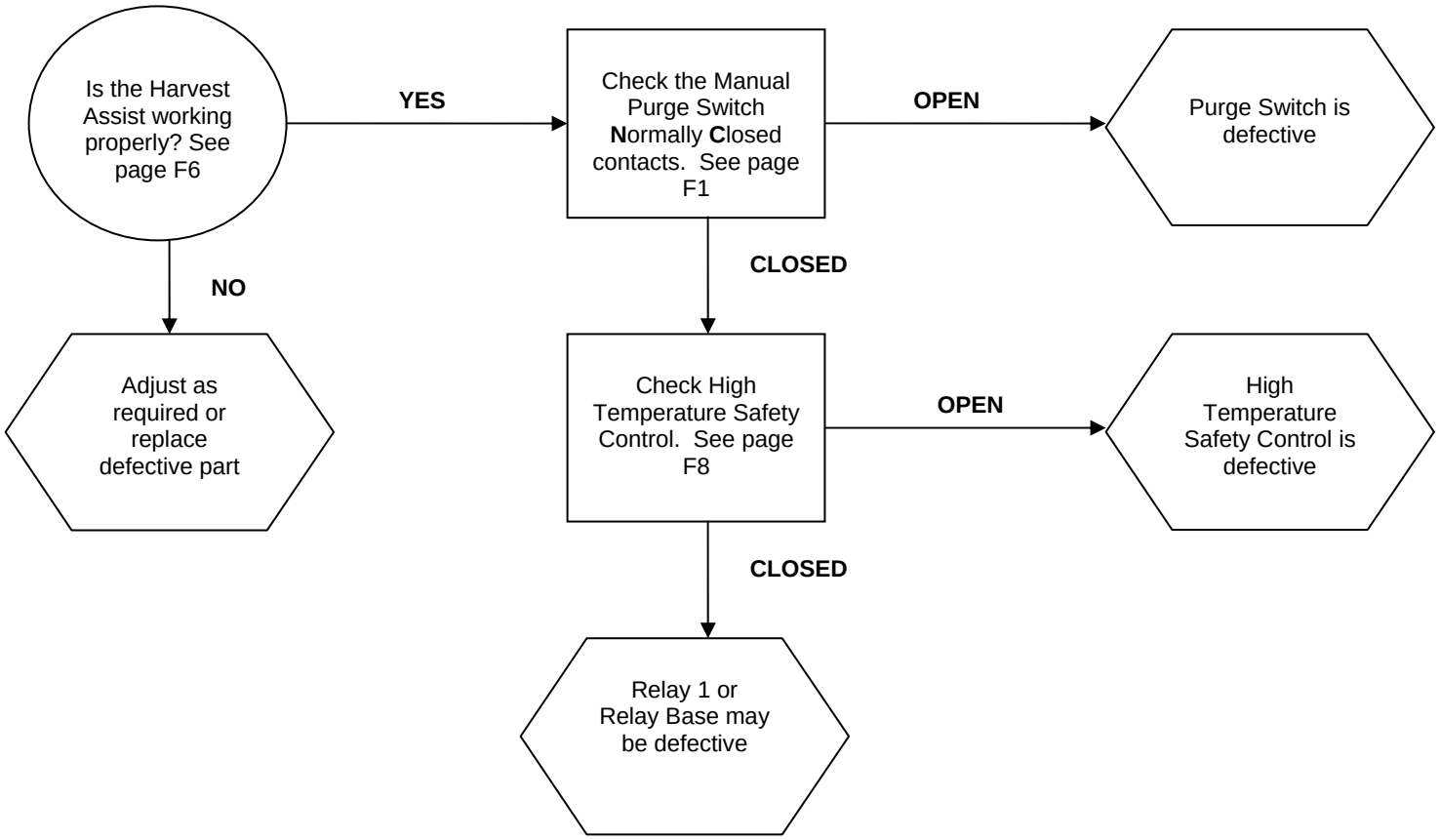
Poor Water Distribution Over The Evaporator



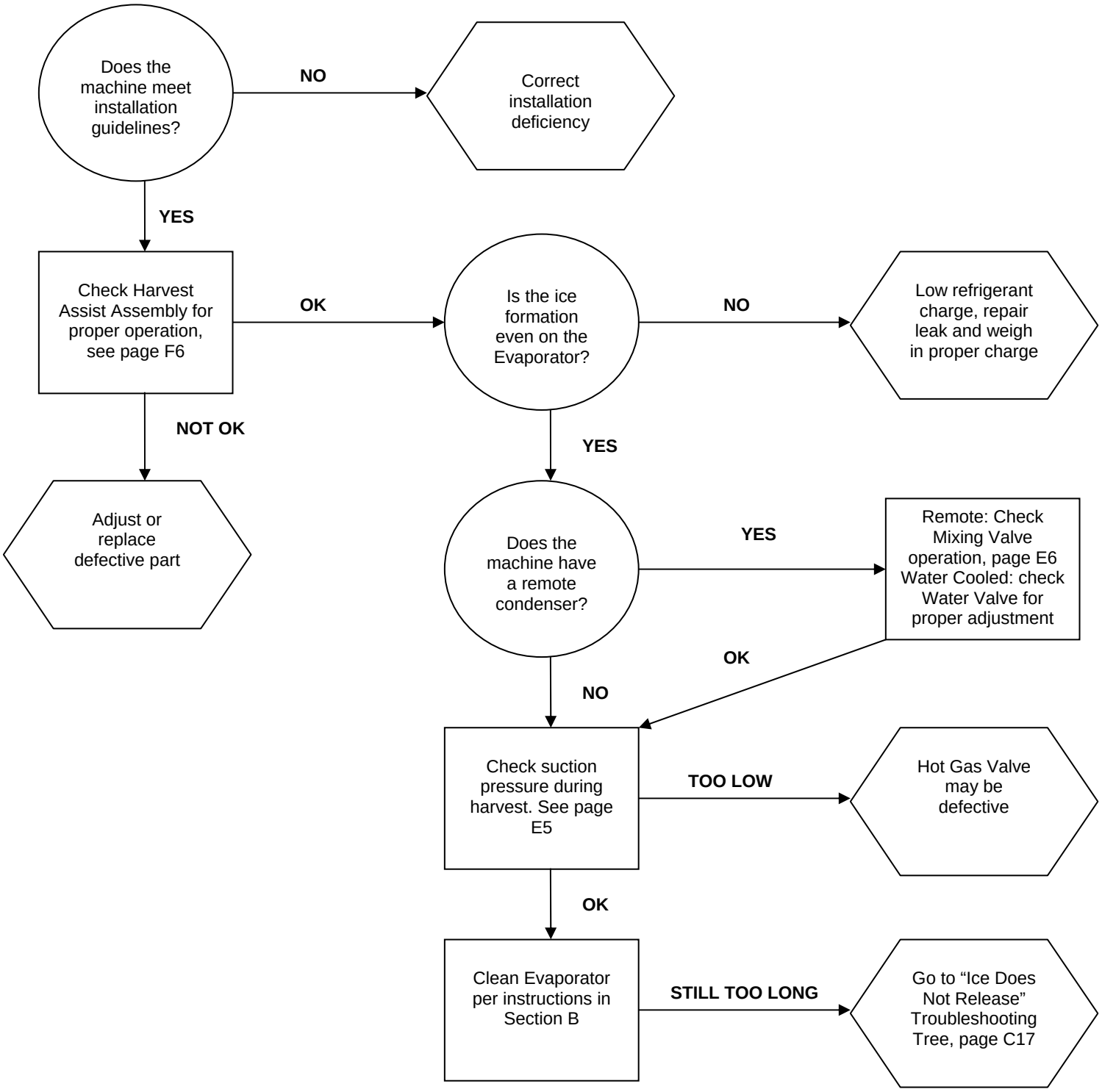
Machine Does Not Enter Harvest



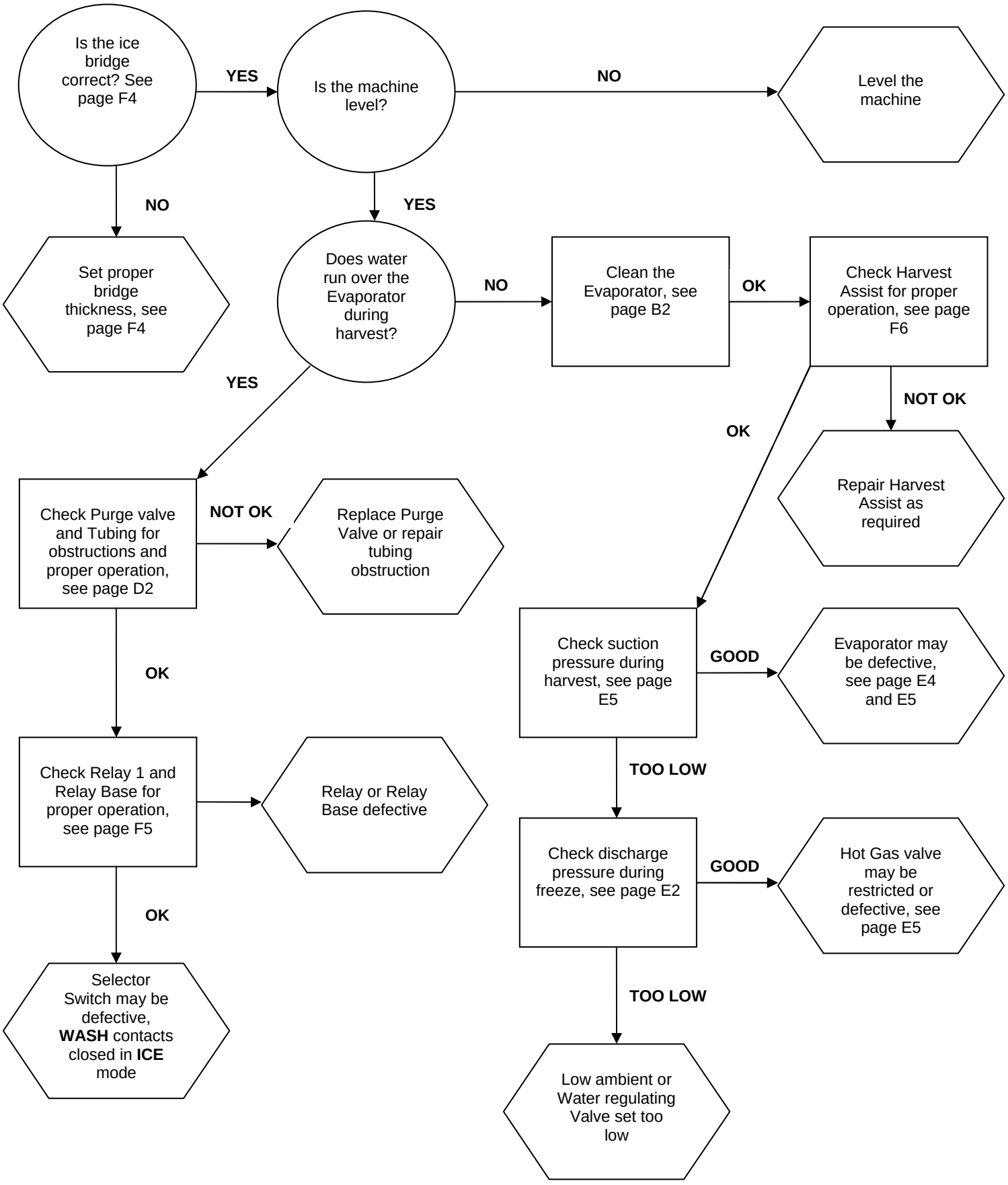
Machine Enters Harvest, Then Returns To Freeze Prematurely



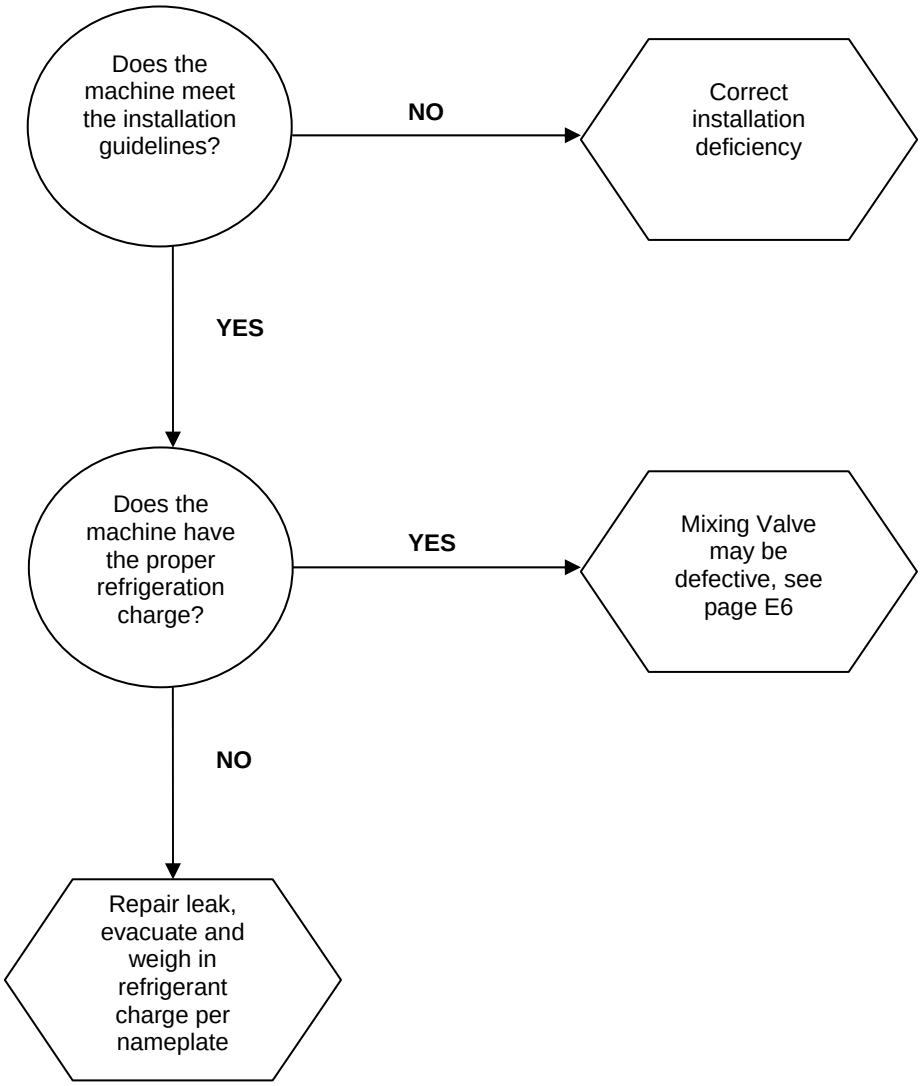
Length Of Harvest Excessive

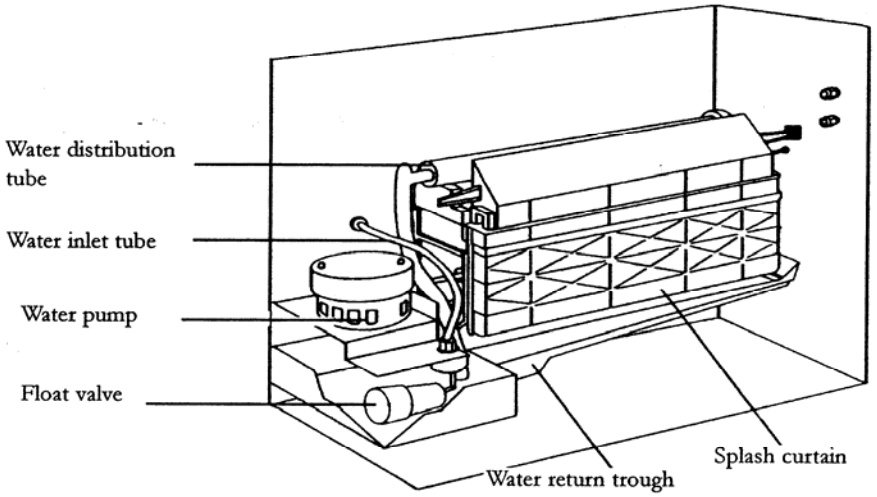


Ice Does Not Release From Evaporator



Hot Evaporator, Low Suction And Discharge Pressure (Remote Only)





Water Distribution and Components
Water enters the machine through the **float valve** located in the **water trough**. The water trough holds water used for ice making. The float valve is used to maintain the proper water level in the water trough. During the freeze cycle water is continuously circulated over the evaporator by the **water pump**. When the machine enters harvest, the **purge valve** (not shown) opens and mineral laden water is pumped out of the water trough to the drain. After water is purged from the trough, the water pump and purge valve are de-energized and the trough refills.

Float Valve
The water level can be adjusted by carefully bending the arm of the float. The water level should be ½ inch (13mm) above the top of the water pump impeller housing during the freeze cycle.

If the float valve does not allow water into the trough or water flow is slow, the float valve may be restricted. Remove and disassemble the float valve and clean the orifice. If the water flow is still slow, check the water pressure to be sure it is at least 20 PSI (1.4 bar).

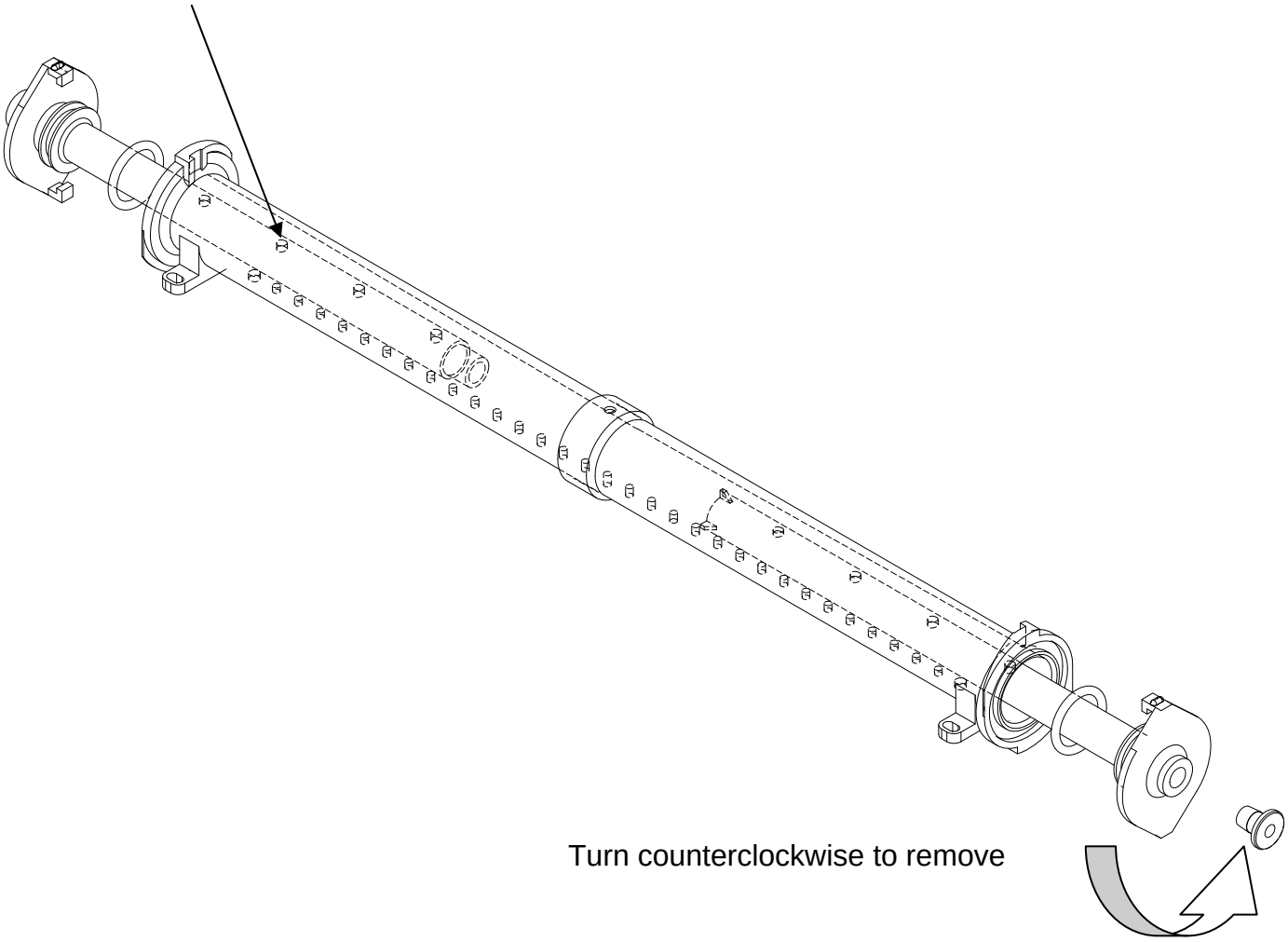
If the float valve does not stop the water flow, make sure the water pressure to the machine does not exceed 60 PSI (4.1 Bar). Install a water pressure regulator if the pressure is too high. If the water pressure is not the problem, the float plunger or the entire float valve assembly may need to be cleaned or replaced.

Water Distribution Tube
Water is pumped to a distribution tube located at the top of the evaporator and is used to distribute water evenly over the evaporator. The distribution tube can be removed and dissembled for cleaning if the hole becomes plugged or if there is excessive mineral build-up in the water system. The water distribution tube is a tube within a tube. Water enters and fills the inner tube and exits through a series of holes along the top of the inner tube. Water then fills the outer tube and exits through a series of holes along the bottom of the outer tube. For proper water flow over the evaporator, it is important that the tube be assembled correctly after cleaning. The tube can be checked for proper assembly by checking the “bump” on the flanges at the tube ends, the “bump” should be at the top.

Water Distribution Disassembly

Remove 2 screws holding the distribution tube to the evaporator spillway. Remove the clamp holding the water tube to the distribution tube. Twist the end caps of the distribution tube counterclockwise and pull to remove the inner tube halves from the outer tube. To reassemble, push the inner tube halves into the outer tube with the holes facing the same direction. Make sure the inner tube halves seat together completely. Twist the end caps clockwise ½ turn to lock the inner tubes in place. The holes in the tubes will now be facing in the opposite directions.

Important! For proper water flow over the evaporator, the inner tube holes must face up.



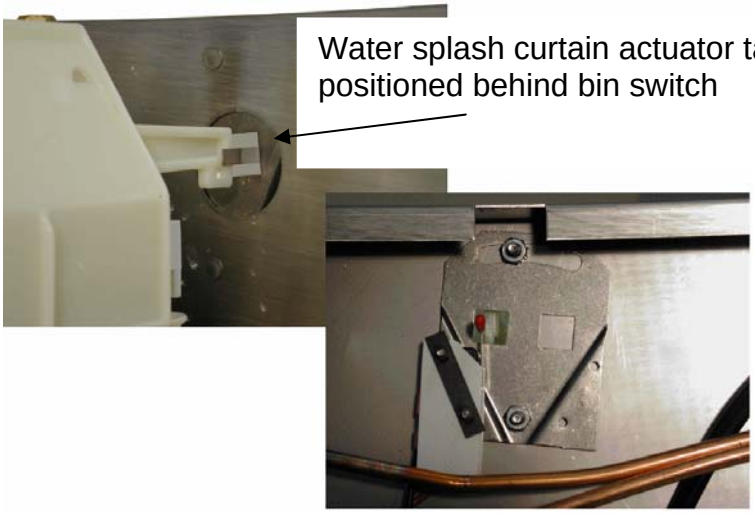
Water Splash Curtain

The water splash curtain covers the evaporator to prevent water from splashing into the bin and is also used to actuate the bin switch. When the bin becomes full of ice, the splash curtain is held open when the ice drops off of the evaporator. The actuator tab or wire bale on the splash curtain will release pressure on the bin switch and the machine shuts off. See bin control on page **F9**.

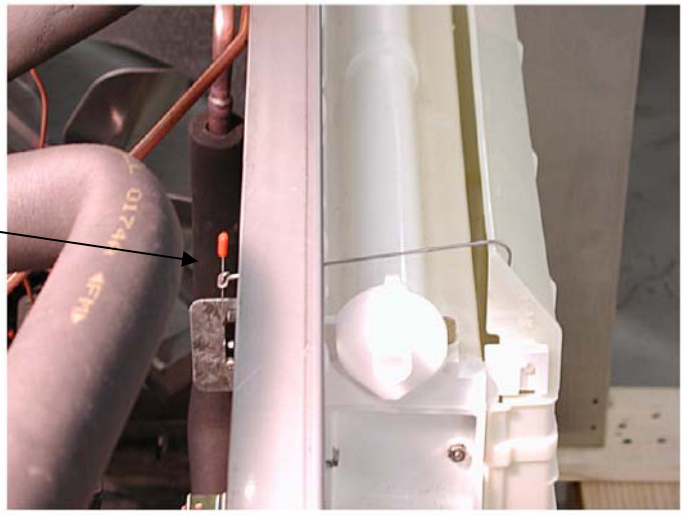
On single evaporator units, the splash curtain can be opened or removed during the freeze cycle and the machine will continue to run until the ice drops from the evaporator. On dual evaporator units, if the curtain is opened or removed during the untimed freeze cycle, or during defrost, the machine will shut down. If the curtain is opened or removed during the timed freeze cycle, the unit will continue to operate.

The splash curtain can be removed by swinging the bottom of the curtain away from the evaporator and lifting the right side of the curtain up and out of the hinge pin slot. To reinstall the curtain, position the left side pin into the slot first, then insert the right hand side with the actuator tab of the curtain behind the bin switch.

Note: The CCM3030 utilizes a curtain-retaining clip. The **CCU Undercounter Series** ice machines **do not** utilize a splash curtain.



Proper position of wire bale switch actuator



Water Purge Valve

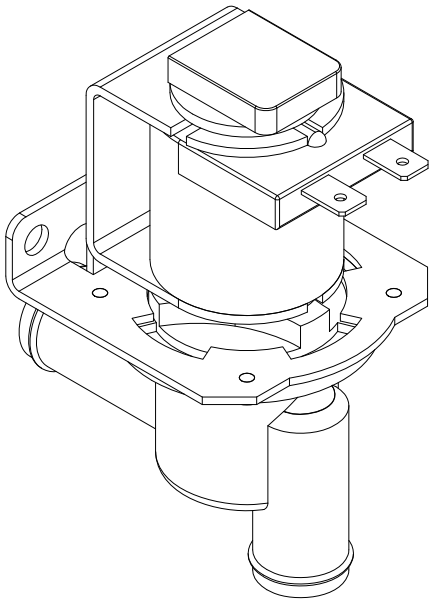
When the machine enters the harvest cycle, the water pump continues to run and the purge valve opens. This allows mineral laden water to be pumped from the water trough to the drain. This helps keep the water system clean. The water pump and purge valve de-energizes once the water is flushed from the water trough. The cam switch controls the length of time that the water pump and purge valve remains energized see page **F7**. The purge valve can also be energized manually by pushing the purge switch. The purge switch is used when cleaning the water system to flush cleaning solution down the drain. See page **B1** for cleaning instructions.

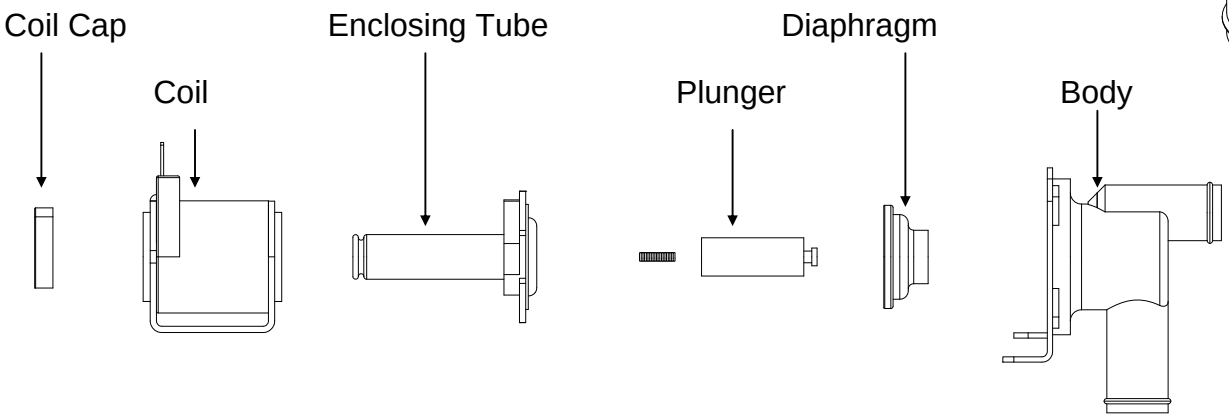
The purge valve must be completely closed during the freeze cycle. If water leaks through the purge valve during the freeze cycle, the freeze cycle will be extended due to the float allowing warm water into the trough and poor ice formation will result. The purge valve may be defective or need cleaning.

The purge valve can be disassembled for cleaning by:

1. Disconnect electrical power form the ice machine.
2. Lift and remove the coil retainer cap.
3. Leave the coil wires attached to the coil and lift coil from the valve body. (Note coil orientation)
4. Rotate the enclosing tube ¼ turn counterclockwise to remove.
5. Remove the enclosing tube, plunger and diaphragm from the valve body
6. Reverse procedure to reassemble.

The purge valve can be easily cleaned or rebuilt without removing the entire valve body. Dirty or clogged purge valves are not considered a warranty repair.



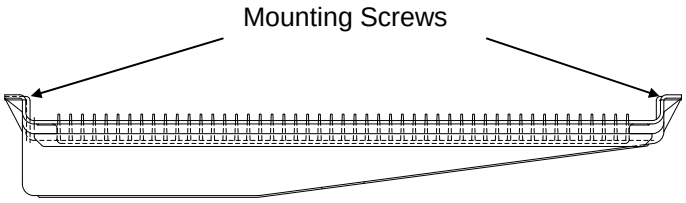


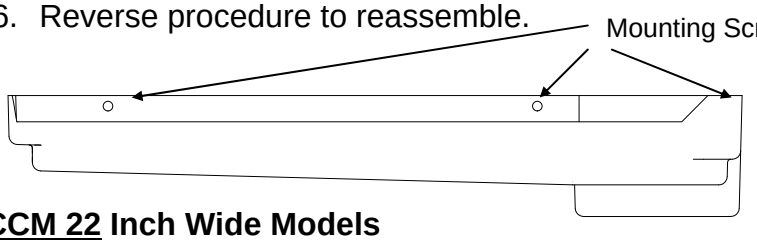
Water Trough

The water trough can be easily removed by the following procedures:

1. Disconnect power to the ice machine.
2. Shut the water supply off to the ice machine.
3. Remove water splash curtains when applicable.
4. Remove water trough mounting screws.
5. Carefully remove water trough from the ice machine.
6. Reverse procedure to reassemble.

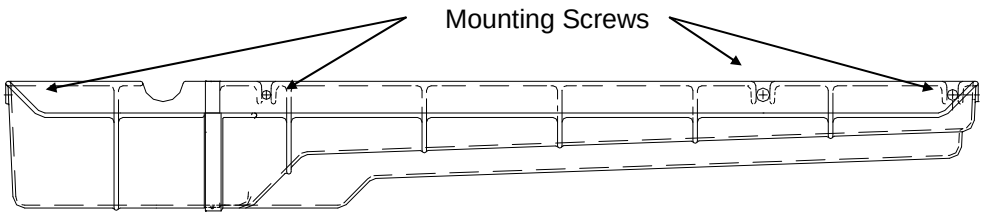
<u>CCU0150/0220</u> Models



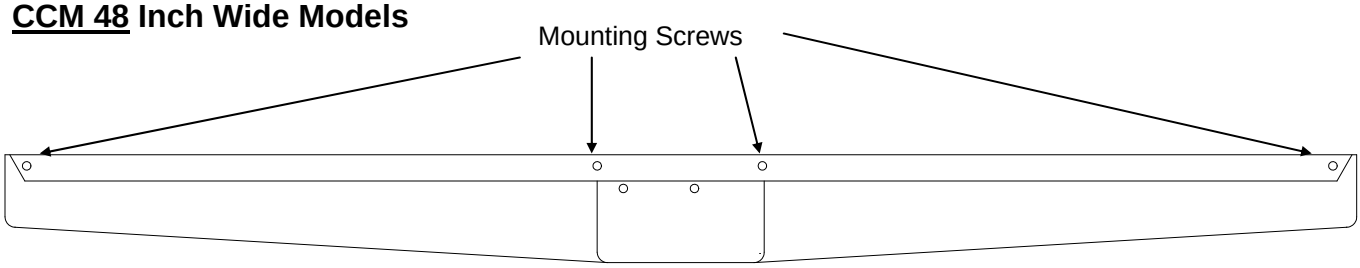


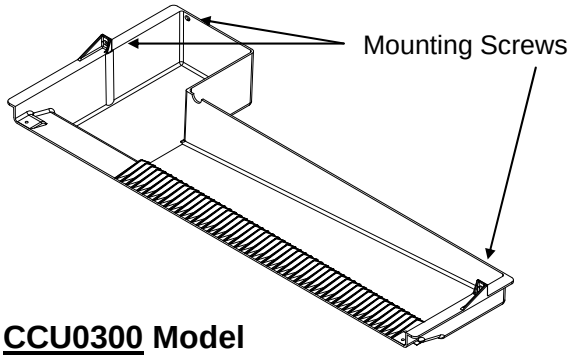
<u>CCM 22</u> Inch Wide Models

<u>CCM 30</u> Inch Wide

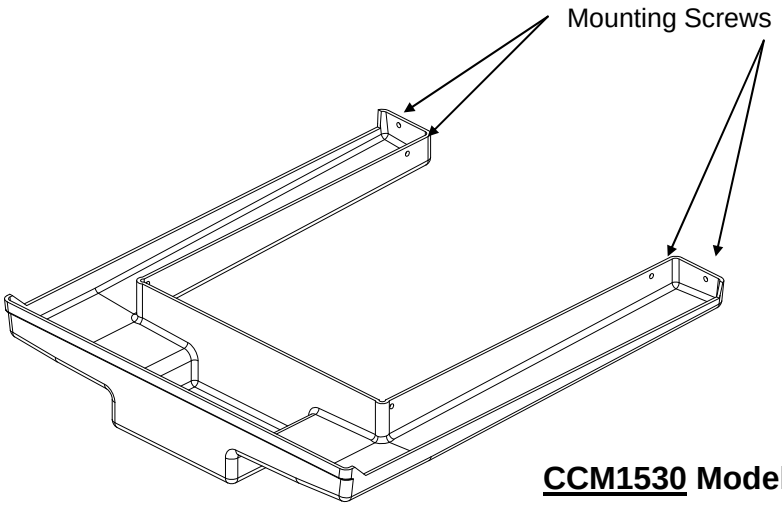


<u>CCM 48</u> Inch Wide Models





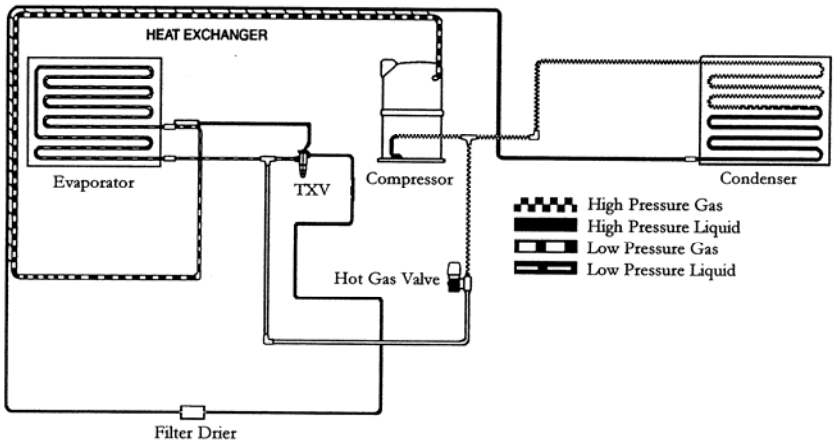
<u>CCU0300</u> Model



<u>CCM1530</u> Model

Refrigerant Cycle and Components

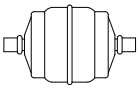
Before diagnosing the refrigeration system, it is very important that the refrigerant charge be correct. Whenever the refrigeration system has been opened, the filter-drier must be replaced and the proper refrigerant charge must be weighed in. See refrigerant charge data on page **A5–A8**.



Refrigerant Pressures

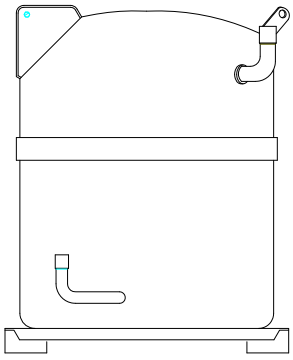
The suction pressure at the beginning of the freeze cycle can vary +/- 10 psi (.7 bar) depending on operating conditions. Reference Chart on **page E10-E13**. Pressures less than this may indicate an undercharge. The discharge pressure on water-cooled units should be 250 psi (17.01 bar) for R404a units. The discharge pressure on air cooled units will vary with ambient conditions but will typically run higher than water cooled units. Remote condensers located in ambient temperatures below 70°F (21°C) will typically run a lower discharge pressure. See **Mixing Valve** later in this section.

Refrigerant in a gas state is pumped throughout the refrigeration system by a hermetic **compressor** to the **condenser**. Heat is removed from the refrigerant either by forced air movement through an air-cooled condenser or transferring heat from the refrigerant to water through a water-cooled condenser. The refrigerant changes to a liquid when cooled.



The refrigerant in a liquid state passes through a **filter drier**. The filter drier traps small amounts of moisture and foreign particles from the system. The filter drier **must be** replaced whenever the refrigeration system is opened or if the refrigerant charge has been completely lost.

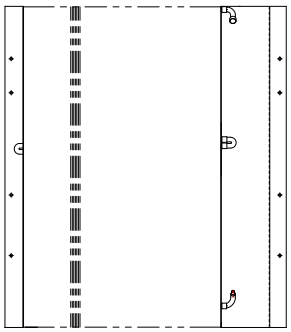
Compressor



The compressor runs during the entire cycle. If the valves in the compressor are damaged, the compressor will be unable to pump refrigerant efficiently. Damaged valves are usually the result of another problem in the refrigeration system such as liquid refrigerant returning to the compressor, oil slugging or high head pressure. When a compressor is replaced it is important that the refrigerant charge be weighed in and the system checked for proper operation to prevent a repeat failure.

An inefficient compressor will usually have a higher than normal suction pressure at the end of the cycle. The freeze cycle will be longer than normal and/or the harvest cycle may be excessively long. Check the compressor amperage draw 5 minutes into the freeze cycle. If the compressor amp draw (Reference data plate on ice machine back panel) is less than 70% of rated full load amps, the compressor may be inefficient. These symptoms may also be caused by other problems, therefore it is important to use the troubleshooting trees when diagnosing a problem. See Electrical System for more information on the compressor and compressor start components.

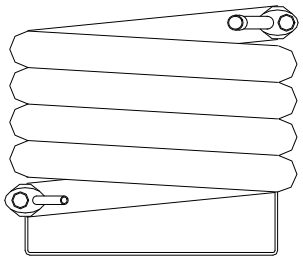
Air Cooled Condenser (Self Contained)



The air condenser is located in the back of the cabinet. Air is pulled through the condenser by a fan motor and discharged through the right hand side panel. The **CCM1448** has 2 fan motors and discharges through the right side and left side panels. The **CCU Undercounter** air intake and discharge is through the front panel.

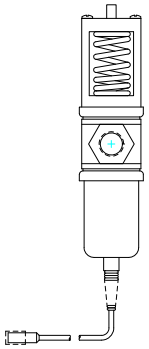
Do not block airflow as it will cause premature failure of the machine and will void the warranty.

Water Cooled Condenser



If the machine has been properly installed, the water flow through the condenser will be in a direction opposite the refrigerant flow. The water condenser supply pressure must be between 20 psi (1.4 bar) and 60 psi (4.1 bar). A water-regulating valve is used to control the flow of water into the condenser. In areas that have poor water quality, the condenser may eventually become coated with mineral deposits. This will decrease the efficiency of the condenser resulting in high head pressure. Water cooled condensers replaced due to excessive mineral build up or freezing will not be covered under warranty.

Water Regulating Valve

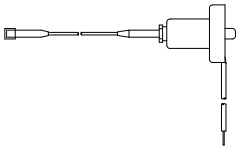


The water-regulating valve controls the head pressure by regulating the amount of water flow through the condenser. The bellows of the regulating valve are connected to the high-pressure side of the refrigeration system. As the head pressure rises, the bellows expand increasing the water flow through the water condenser. Adjusting the spring pressure screw on top of the water valve can vary the rate of water flow. The valve should be adjusted to maintain a discharge pressure of 250 psi (17.01 bar) on R404a units. Water exiting the condenser should be between 100°F (38°C) and 110°F (43°C). When the machine is off, the water valve will close completely, stopping the flow of water through the condenser. If the water flow does not stop when the machine is off, the valve may need cleaning or replaced.

Air Cooled Condenser (Remote)

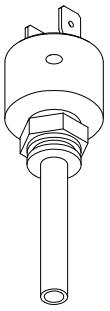
See Pages **E5** and **E7**

High Pressure Safety Control (Manual Reset)

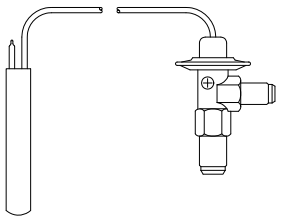


If the discharge pressure becomes excessive, the high-pressure safety control will open and shut the machine off. The high-pressure safety control opens at 450 psi (30.62 bar) on R404a units. The high-pressure safety control is used on all water-cooled and remote units and select air-cooled units.

High Pressure Safety Control (Automatic Reset)



The automatic reset high pressure control opens at 450 psi (30.62 bar) and closes at 338 psi (23.00 bar). The high-pressure safety control is used on all water-cooled and remote units and select air-cooled units.



Thermostatic Expansion Valve (TXV)

The thermostatic expansion valve meters the flow of refrigerant into the evaporator changing its state from a high-pressure liquid to a low-pressure liquid. This drop in pressure causes the refrigerant to cool. The cooled refrigerant absorbs heat from the water circulating over the evaporator. As the evaporator fills with liquid refrigerant, the evaporator becomes colder.

The flow of refrigerant into the evaporator is controlled by the temperature at the outlet of the evaporator. The expansion valve bulb, mounted to the top of the suction line, senses the evaporator outlet temperature causing the expansion valve to open or close. As ice forms on the evaporator, the temperature drops and the flow of refrigerant into the evaporator decreases, resulting in a drop in suction pressure.

The evaporator should become completely flooded (filled with liquid refrigerant) during the freeze cycle. A completely flooded evaporator will have a uniform freeze pattern (ice formation across the evaporator). A starved evaporator (not enough liquid refrigerant) will have poor or no ice formation at the top of the evaporator, and the tube(s) exiting the evaporator will not frost. All tubes should be within 10 degrees of each other and frosted approximately 5 minutes from the start of the freeze cycle.

An expansion valve that is restricted or not opening properly will starve the evaporator resulting in lower than normal suction pressure. A low refrigerant charge will also starve the evaporator and cause low suction and discharge pressures. If not sure of the amount of charge in the system, the refrigerant should be recovered and the correct charge be weighed in before a defective valve can be diagnosed.

If the evaporator is starved but the suction pressure is higher than normal, the TXV is not the problem; refer to the troubleshooting tree in section C. If the TXV sticks open or if the thermal bulb is not making good contact with the suction line, the flow of refrigerant into the evaporator will be too great and liquid refrigerant will flood the compressor. The suction pressure will remain higher than normal and the machine will remain in an extended freeze cycle. Ice will build evenly but will be very thick.

Symptom	**Problem**	**Possible Remedy**
Evaporator flooded but suction pressure not dropping. Compressor has been checked and appears to be good. Suction line at compressor may be colder than normal	1 TXV thermal bulb not making good contact with suction line or uninsulated	1 Tighten bulb clamp and insulate bulb.
	2 TXV bulb installed incorrect	2 Locate bulb on top of suction line
	3 System overcharged	3 Recharge system
	4 TXV stuck open	4 Replace TXV
Evaporator starved, no frost on line(s) exiting evaporator. Suction pressure is low. See Evap. Diagram Pg.**E4**	1 Machine low on charge	1 Recover refrigerant and weigh in proper charge
	2 TXV restricted or stuck closed	2 Replace TXV and drier

Continued Page E4

Thermostatic Expansion Valve (Continued)
A dual evaporator machine will have one TXV for each evaporator. If one TXV sticks open and the other is operating normally, the suction pressure will be higher than normal and both evaporators will build thick ice. It is recommended that both valves be replace if one sticks open.

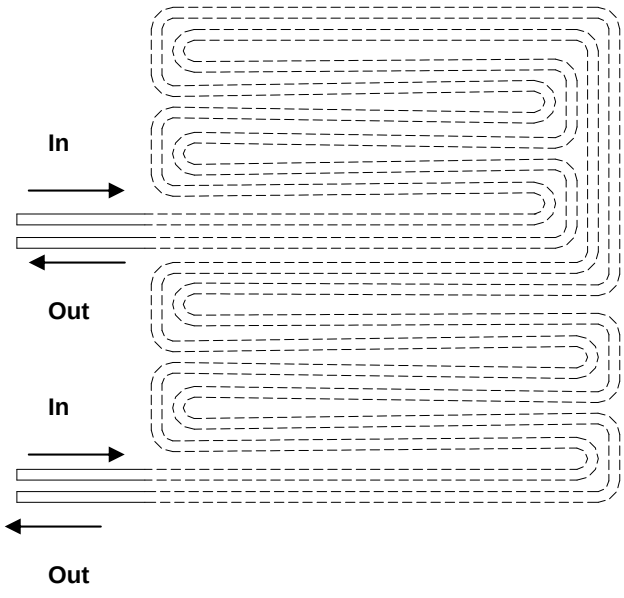
If one TXV sticks closed and one is operating normally, the suction pressure will be normal or low but the evaporator with the defective valve will be starved (thick ice at the bottom and thin ice at the top).

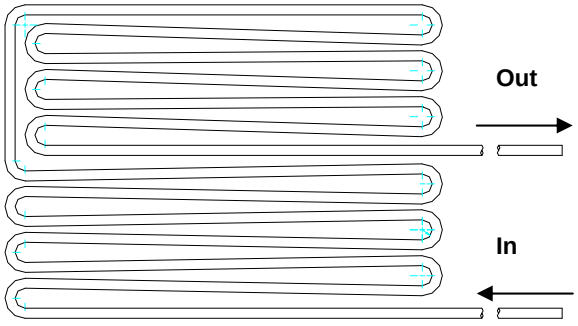
Evaporator
As water is circulated over the front of the evaporator, liquid refrigerant is circulated through the tubing attached to the back of the evaporator. As the liquid refrigerant in the tubing vaporizes, it absorbs heat from the water causing the water to freeze. The evaporator should be completely flooded throughout most of the freeze cycle. A flooded evaporator will build ice evenly across the evaporator. A starved evaporator will have uneven ice formation. Most problems with ice formation or harvesting are not related to a defective evaporator, use the Troubleshooting Trees in section C for additional help.

Refrigerant enters the evaporator through the bottom tube and exits through the top tube. On models CCM0830, CCM1030, CCM1848 and CCM2148, the refrigerant line at the TXV outlet splits into two feeder tubes. This split occurs at the distributor, which is a fitting that is soldered to the TXV. One feeder tube from the distributor feeds the top of the evaporator; the other tube feeds the bottom of the evaporator. The evaporator tubes run parallel, in opposite directions, along the back of the evaporator creating a dual pass.

If the evaporator is flooded but not building ice evenly, it is possible the evaporator has coil separation. Evaporator coil separation is the separation of the refrigerant tubing from the back of the evaporator plate. This is very rare but occasionally occurs.

To confirm coil separation, remove and check the back of the evaporator. If the coil is separated, the evaporator must be replaced. If the outlet(s) of the evaporator is not frosted, the problem is not with coil separation (Refer to the troubleshooting trees, section C).



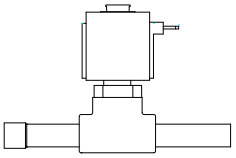


Note: Permanent discoloration of the evaporator plating is normal and will cause no problems with harvesting the ice or sanitary conditions. Before condemning the evaporator for plating problems, be certain it is not just discoloration. If the spillway (plastic evaporator top) becomes damaged, it can be replaced. It is not necessary to replace the entire evaporator.

As liquid refrigerant leaves the evaporator, it changes to a low-pressure gas before returning to the compressor. Liquid refrigerant must not return to the compressor or damage will result. Frost on the suction line at the inlet of the compressor indicates liquid returning to the compressor. Check for frost at the end of the freeze cycle. If liquid is returning to the compressor, the problem must be located and corrected. See Refrigerant Charge, Thermostatic Valve and Evaporator.

Harvest Cycle
Once the freeze cycle is complete, the machine enters the harvest cycle. The **hot gas valve** opens to allow hot discharge gas to enter the evaporator.

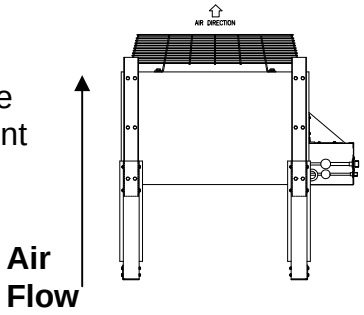
Hot Gas Valve
When the machine enters harvest the hot gas valve coil is energized opening the hot gas valve. Discharge gas is pumped through the hot gas valve directly into the evaporator. The evaporator temperature will reach approximately 40°F (4.5°C). The suction pressure during harvest should be a minimum of 70 psi (4.8 bar) for R404a units. The discharge pressure will drop during harvest.



If the hot gas valve does not completely open during harvest, there will not be enough hot gas in the evaporator to defrost the ice. If there is not enough hot gas entering the evaporator, the suction pressure will be lower than the above stated pressures. It is important when making this check that the machine has the proper refrigerant charge, normal head pressure and the compressor is functioning properly. If the hot gas valve leaks during the freeze cycle, ice will not form on the top of the evaporator and suction pressure will be higher than normal. To check if the hot gas valve is leaking, let the machine run in the freeze cycle for approximately 5 minutes. Now feel the temperature between the inlet and outlet of the valve. A definite temperature difference should be felt. If the lines are the same temperature and the suction pressure is higher than normal; the valve is leaking and should be replaced. Use Troubleshooting Trees in section C.

Remote System
Machines that use remote condensers have several components that are not used in self contained machines. A **mixing valve** controls the head pressure when the ambient temperature at the condenser drops below 70°F (21°C). When the bin fills with ice or is turned off at the selector switch, the machine will pump all the refrigerant into the receiver before shutting off.

Remote Condenser
For proper operation, the remote condenser must be installed properly. Improper installation will void the warranty. See remote guidelines on page **A13**. The location of the remote condenser should be such that the ambient air temperature does not exceed 120°F (48.9°C). If ambient temperature exceeds 120°F (48.9°C) ice production will decrease until the ambient temperature decreases.

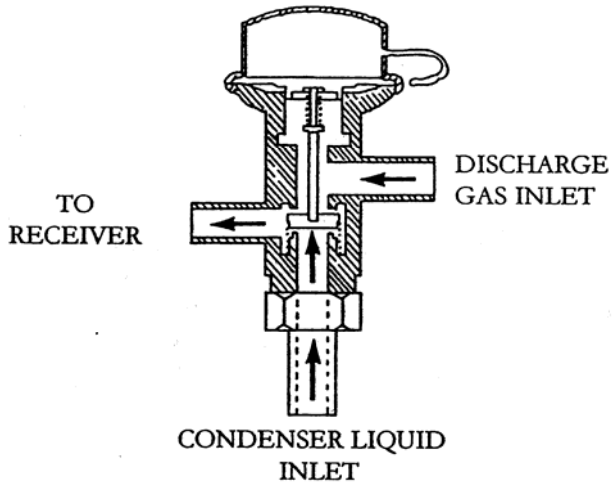


Remote Condenser (Continued)

If the airflow is restricted or the condenser is dirty, the head pressure will be excessively high, slow production will result and the compressor may overheat and eventually become damaged. The condenser coil and fan blades must be kept clean. The condenser can be cleaned with compressed air or by using a brush. If a brush is used, brush in the direction of the fins taking care not to bend the fins. If the condenser fins are bent, this will restrict the airflow through the condenser and the fins will need to be straightened with a fin comb. Problems related to a dirty condenser or poor airflow will not be covered under warranty. Note: The condenser fan motor runs continually, it will shut off when the icemaker shuts off.

Mixing Valve

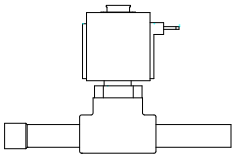
When the temperature at the condenser is above 70°F (21°C), the refrigerant flow from the compressor is directed by the mixing valve through the condenser and into the receiver. When the temperature at the condenser drops below 70°F (21°C), the pressure in the bellows of the mixing valve becomes greater than the pressure of the liquid refrigerant coming from the condenser. This change allows the valve to partially restrict the flow of refrigerant leaving the condenser and allows discharge gas to by-pass the condenser and flow directly into the receiver, mixing with the liquid refrigerant from the condenser. The amount of discharge gas that bypasses the condenser increases as the ambient temperature decreases. This action of the mixing valve allows the discharge pressure to be maintained at approximately 240 psi (16.5 bar) during low ambient conditions. If the refrigerant system is undercharged and the ambient temperature is below 70°F (21°C), the mixing valve will not work properly. The mixing valve will allow too much refrigerant to bypass the condenser.



Problem	Possible Cause	Remedy
1 Head pressure low, Line between valve and receiver cold. Ambient condenser temp. below 70°F (21°C)	A. Valve Defective, not allowing discharge gas into receiver	A. Replace valve
2 Head pressure low, Line between valve and receiver hot.	A. System low on charge. B. Valve defective, not allowing liquid into receiver.	A. Leak check. Recover refrigerant and weigh in proper charge. B. Replace valve
3. Head pressure low, Line returning from condenser is cool. Ambient condenser temperature is above 70°F (21°C)	A. Valve defective not allowing refrigerant to circulate through condenser.	A. Replace valve.

Pump Down System (Remote Only)
The pump down system prevents liquid refrigerant from migrating to the evaporator and compressor during the off cycle and prevents the compressor from slugging or starting under an excessive load.

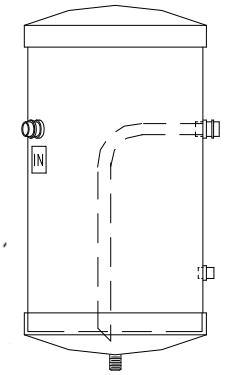
Liquid Line Solenoid
When a machine with a remote condenser shuts off, the liquid line solenoid valve, located at the outlet of the receiver, is de-energized causing the valve to close completely restricting the flow of refrigerant. The compressor will pump all of the refrigerant into the condenser and receiver.

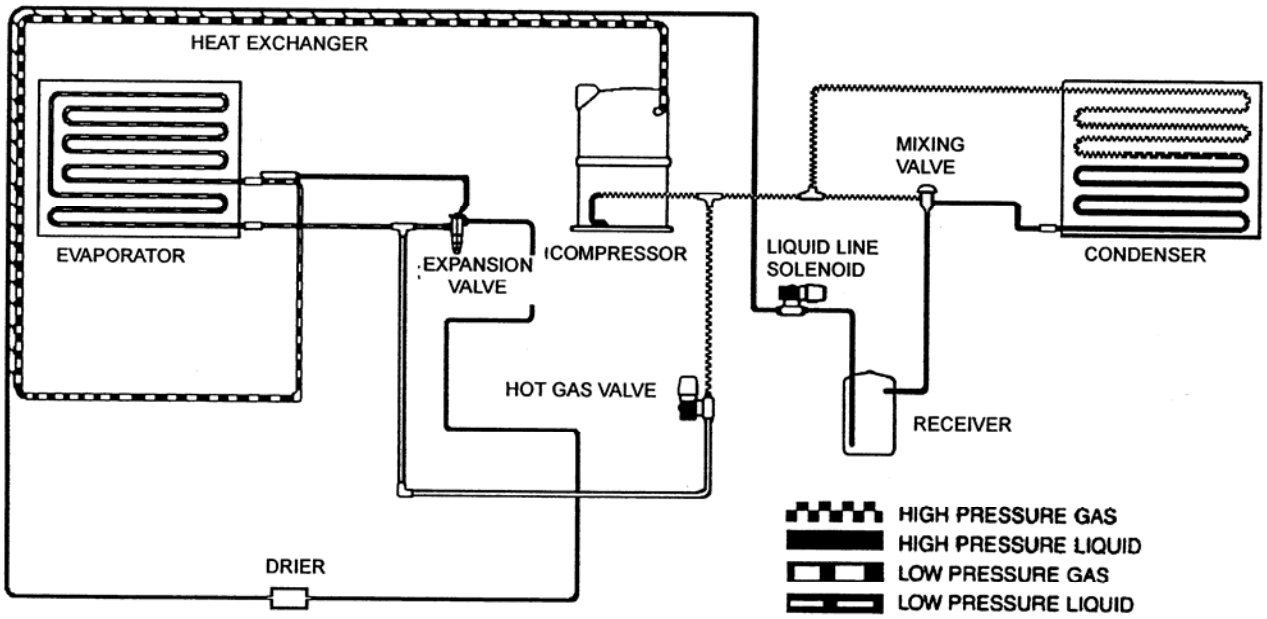


As the system pumps down, the pressure on the low side of the system drops. When the suction pressure drops to 10 psi (.68 bar), the pump down control opens and shuts the machine off. See page **F9** for pump down control operation. Liquid refrigerant is stored in the condenser and receiver while the machine is off. It is normal for the machine to pump down once or twice an hour as the pressures equalize.

When the machine comes back on (the bin switch closes or the selector switch placed to the ICE position), the liquid line solenoid valve opens and the refrigerant is released from the receiver. When the suction pressure rises to 35 psi (2.38 bar) the pump down control closes and the machine comes back on. If the machine will not pump down, the valve may not be closing all the way. A weak compressor will also prevent the machine from pumping down. Check for signs of a weak compressor before replacing the liquid line solenoid. Prior to replacing the valve, disassemble and check for obstructions that may not allow the valve to seat.

Receiver
If the system has a remote condenser, the refrigerant will enter a receiver before passing through the filter drier. The receiver holds reserve liquid refrigerant during the freeze cycle. The receiver also stores liquid refrigerant during the off cycle.





Refrigerant
Refrigerant in a high-pressure liquid form is fed to an expansion valve where the refrigerant is reduced to a low-pressure liquid. Under this low pressure, the liquid will absorb heat from the evaporator causing the liquid to change to a vapor. This vapor is the drawn into the compressor where the temperature and pressure of the vapor are increased. The high temperature, high pressure vapor flows to the condenser where the heat is removed, causing the vapor to return to the liquid form, making the refrigerant ready to flow back to the evaporator to pick up more heat.

Always check the serial number data plate for the proper type of refrigerant and the amount used in the machine you are servicing.

Important: When discharging refrigerant from an icemaker, recover as much of the refrigerant as possible with a recovery device or some other means to prevent the refrigerant from entering the atmosphere.

Method of Charging Refrigerant
In order to achieve a properly charged refrigeration system, the system must be completely evacuated.

To achieve a complete evacuation you will need a service gauge manifold with properly maintained hoses, and a vacuum pump capable of pulling a 50-micron vacuum. This will require a two-stage pump.

Connect the service gauge manifold to the high and low side service ports and vacuum pump. Make sure the valves on the gauge manifold are closed, then start the pump.

Note: Do not use a refrigeration compressor as a vacuum pump. Compressors are able to pull only a 50,000-micron vacuum.

After the vacuum pump has been started, open the valves on the gauge manifold. This will allow the refrigeration system to start being evacuated.

If there has not been an excessive amount of moisture in the system, allow the vacuum pump to pull the system down to about 200 microns or 29.9 inches or less. Once this has been achieved, allow the vacuum pump to operate for another 30 minutes. Then close the valves on the gauge manifold and stop the vacuum pump. Then watch your gauges. A rise to 500 microns in three (3) minutes or less indicates a dry system under a good vacuum.

If your gauge registers a more rapid rise, the system either has moisture remaining or there is a leak in the system, requiring a check for the leak, and repair and another complete evacuation.

Note: Seal the ends of the gauge manifold hose and pull them into a deep vacuum to determine if the leak is not in the hoses. The gauge manifold should be able to hold the vacuum for three (3) minutes.

If the refrigeration system is extremely wet, use radiant heat to raise the temperature of the system. This action will cause the moisture to vaporize at less of a vacuum.

The use of two (2) valves, one between the vacuum pump and gauge manifold and the other between the refrigerant cylinder and the gauge manifold allows you to evacuate and charge the system without disconnecting any hoses. If the hoses were disconnected, air or moisture will have the opportunity to enter the hoses and then the system.

A properly charged icemaker is a service technician's greatest ally. Proper charging will allow any concern with the icemaker to be accurately diagnosed.

The refrigerant charge must be weighed into the icemaker either by using a charging scale or with a dial-a-charge.

The amount of proper refrigerant required for the icemaker is printed on the serial data plate attached to the icemaker and is listed on the following pages. Never vary the amounts from those listed.

Remote models with sixty (60) foot lineset runs will need an additional fifteen (15) ounces of refrigerant added.

In some cases the complete refrigerant charge may not enter the refrigeration system. In those instances, close the gauge manifold high side valve and disconnect the manifold from the high side port.

When the icemaker is completely charged, secure the caps to the service ports and check to make sure the ports are not leaking refrigerant.

Reference Tables on Page **E10** and **E12**.

60 CYCLE and 3 PHASE

Model	Voltage Hz/Phase	24 Hour Capacity @ 90/70 Lbs.	Kg.	BTUH	Wires Including Ground	Max Fuse Size	Min. Circuit Amps	Comp. RLA	**Refrigerant Type	Oz.	Grams
CCU0150A1	115/60/1	112	51	3572	3	15	9.7	6.9	R404A	12	340
CCU0150W1	115/60/1	155	70	3732	3	15	7.9	5.9	R404A	9	284
CCU0220A1	115/60/1	175	80	4609	3	15	11.9	8.5	R404A	12	340
CCU0220W1	115/60/1	220	100	4642	3	15	8.9	6.7	R404A	9	256
CCU0220A2	230/60/1	168	76	4321	3	15	6.0	4.2	R404A	12	340
CCU0220W2	230/60/1	192	87	4263	3	15	4.4	3.2	R404A	9	256
CCU0300A1	115/60/1	228	104	5928	3	15	13.1	8.8	R404A	16	454
CCU0300W1	115/60/1	296	135	6097	3	15	11.1	8.5	R404A	13	369
CCM0330A1	115/60/1	253	115	6248	3	15	13.3	8.6	R404A	25	709
CCM0330W1	115/60/1	275	125	5855	3	15	10.8	8.2	R404A	13	369
CCM0322A1	115/60/1	214	97	5910	3	15	13.8	9.0	R404A	18	510
CCM0322W1	115/60/1	312	142	6195	3	15	13.1	10.1	R404A	11	312
CCM0430A1	115/60/1	368	167	7835	3	20	17.1	11.7	R404A	30	850
CCM0430W1	115/60/1	407	185	7563	3	20	12.9	9.9	R404A	14	397
CCM0430A2	208-230/60/1	385	175	7832	3	15	8.0	5.3	R404A	30	850
CCM0430W2	208-230/60/1	439	200	7770	3	15	6.4	4.8	R404A	14	397
CCM0530A1	115/60/1	458	208	9990	3	20	19.1	13.3	R404A	25	710
CCM0530W1	115/60/1	513	233	9777	3	20	14.3	11.0	R404A	15	425
CCM0530R1	115/60/1	455	207	10278	3	20	14.9	9.3	R404A	132	3742
CCM0522A1	115/60/1	370	168	7753	3	20	16.0	11.1	R404A	21	595
CCM0522W1	115/60/1	442	201	7852	3	15	13.1	9.0	R404A	12	340
CCM0630A2	208-230/60/1	506	230	10566	3	15	11.5	7.9	R404A	24	680
CCM0630W2	208-230/60/1	576	262	10767	3	15	8.7	6.6	R404A	17	482
CCM0630R2	208-230/60/1	502	228	10850	3	15	12.9	8.6	R404A	132	3742
CCM0830A2	208-230/60/1	698	317	15003	3	20	13.0	9.2	R404A	27	765
CCM0830W2	208-230/60/1	840	382	14458	3	20	9.8	7.4	R404A	24	680
CCM0830R2	208-230/60/1	826	375	16371	3	20	12.3	8.1	R404A	176	4990
CCM1030A2	208-230/60/1	811	369	16239	3	20	13.8	9.0	R404A	34	964
CCM1030W2	208-230/60/1	941	428	15986	3	20	9.0	6.8	R404A	24	680
CCM1030R2	208-230/60/1	921	419	18377	3	20	13.8	9.3	R404A	176	4990
CCM1030A3	208-230/60/3	767	349	15614	4	15	11.8	7.4	R404A	34	964
CCM1030W3	208-230/60/3	906	412	16487	4	15	7.1	5.3	R404A	24	680
CCM1030R3	208-230/60/3	844	384	17653	4	15	10.8	6.9	R404A	176	4990

60 CYCLE and 3 PHASE

Model	Voltage Hz/Phase	24 Hour Capacity @ 90/70 Lbs.	Kg.	BTUH	Wires Including Ground	Max Fuse Size	Min. Circuit Amps	Comp. RLA	**Refrigerant Type	Oz.	Grams
CCM1448A2	208-230/60/1	1122	510	22590	3	30	20.2	13.8	R404A	104	2948
CCM1448W2	208-230/60/1	1187	540	22529	3	20	15.6	11.7	R404A	25	709
CCM1448R2	208-230/60/1	1134	515	23085	3	25	23.3	16.5	R404A	240	6804
CCM1448A3	208-230/60/3	989	450	19765	4	25	15.1	9.7	R404A	104	2948
CCM1448W3	208-230/60/3	1093	497	19809	4	20	9.8	7.1	R404A	25	709
CCM1448R3	208-230/60/3	956	435	20173	4	25	14.0	9.1	R404A	240	6804
CCM1448A2 1	208-230/60/1	1109	504	21957	3	30	26.1	17.9	R404A	60	1701
CCM1448W2 1	208-230/60/1	1239	563	21994	3	20	17.8	13.5	R404A	30	850
CCM1448R2 1	208-230/60/1	1150	523	22126	3	30	22.2	15.7	R404A	240	6804
CCM1448A3 1	208-230/60/3	1131	514	21761	4	20	16.0	9.8	R404A	60	1701
CCM1448W3 1	208-230/60/3	1270	577	22308	4	20	14.7	7.8	R404A	30	851
CCM1448R3 1	208-230/60/3	1195	543	22547	4	20	14.7	9.7	R404A	240	6804
CCM15302	208-230/60/1	1202	559	24337	3	30	27.4	19.8	R404A	240	6804
CCM153021	208-230/60/1	1207	549	22999	3	30	24.5	17.5	R404A	240	6804
CCM1848W2	208-230/60/1	1461	664	25663	3	30	17.0	12.9	R404A	35	992
CCM1848R2	208-230/60/1	1468	667	27152	3	30	22.3	15.7	R404A	400	11340
CCM1848W2 1	208-230/60/1	1628	740	27687	3	30	22.0	16.9	R404A	37	1049
CCM1848R2 1	208-230/60/1	1461	664	28110	3	30	27.7	20.1	R404A	272	7711
CCM1848W3	208-230/60/3	1556	707	27146	4	15	10.7	7.8	R404A	35	992
CCM1848R3	208-230/60/3	1491	678	27966	4	15	15.5	10.3	R404A	400	11340
CCM1848W3 1	208-230/60/3	1603	729	27560	4	15	12.3	9.1	R404A	37	1049
CCM1848R3 1	208-230/60/3	1444	656	27514	4	20	17.1	11.6	R404A	272	7711
CCM2148W2	208-230/60/1	1855	843	33333	3	30	25.3	19.5	R404A	37	1049
CCM2148R2	208-230/60/1	1723	783	35369	3	50	33.7	23.5	R404A	400	11340
CCM2148W2 1	208-230/60/1	1692	769	29406	3	30	22.3	17.1	R404A	44	1247
CCM2148R2 1	208-230/60/1	1561	710	30325	3	30	26.9	18.1	R404A	272	7711
CCM2148W3	208-230/60/3	1853	842	32928	4	20	16.6	12.6	R404A	37	1049
CCM2148R3	208-230/60/3	1737	790	34714	4	25	23.2	15.1	R404A	400	11340
CCM2148W3 1	208-230/60/3	1650	750	28676	4	30	13.5	10.1	R404A	44	1247
CCM2148R3 1	208-230/60/3	1525	693	29342	4	25	21.2	21.2	R404A	272	7711

50 CYCLE

Model	Voltage Hz/Phase	24 Hour Capacity @ 90°/70° Lbs.	Kg.	BTUH	Wires Including Ground	Max Fuse Size	Min. Circuit Amps	Comp. RLA	**Refrigerant Type	Oz.	Grams
CCU0220A5	230/50/1	143	65	3774	3	15	4.9	3.3	R404A	12	340
CCM0220W5	230/50/1	174	79	3780	3	15	4.1	3.0	R404A	9	256
CCU0300A5	230/50/1	223	101	5392	3	15	6.4	4.2	R404A	14	397
CCU0300W5	230/50/1	267	121	5080	3	15	4.7	3.5	R404A	13	369
CCM0330A5	230/50/1	279	127	6689	3	16	8.4	5.8	R404A	23	650
CCM0330W5	230/50/1	296	135	6855	3	16	6.6	5.0	R404A	12	340
CCM0322A5	230/50/1	214	97	4990	3	16	6.6	4.4	R404A	22	624
CCM0430A5	230/50/1	366	166	7735	3	16	8.2	5.4	R404A	23	650
CCM0430W5	230/50/1	440	200	8213	3	16	6.2	4.4	R404A	13	369
CCM0522A5	230/50/1	404	184	8617	3	16	9.2	5.5	R404A	21	600
CCM0630A5	230/50/1	459	209	9523	3	16	8.7	6.7	R404A	22	680
CCM0630W5	230/50/1	523	238	9684	3	16	6.8	5.4	R404A	14	397
CCM0630R5	230/50/1	474	215	10138	3	16	9.9	6.3	R404A	132	4536
CCM0830A5	230/50/1	615	280	13321	3	15	12.0	10.9	R404A	27	765
CCM0830W5	230/50/1	855	389	14382	3	15	9.2	10.9	R404A	24	680
CCM0830R5	230/50/1	738	335	14474	3	15	13.0	10.9	R404A	176	4990
CCM1030A5	230/50/1	742	337	15699	3	15	13.3	12.5	R404A	33	936
CCM1030W5	230/50/1	917	417	16005	3	15	9.5	12.5	R404A	24	680
CCM1030R5	230/50/1	801	364	16127	3	15	15.1	12.5	R404A	176	4990
CCM1448A5	230/50/1	901	410	19348	3	25	20.8	15.4	R404A	104	2950
CCM1448W5	230/50/1	1107	503	20269	3	20	15.4	15.4	R404A	25	710
CCM1448R5	230/50/1	1002	455	21330	3	25	18.1	15.4	R404A	240	6804
CCM1448A5 1	230/50/1	1070	486	21185	3	30	21.7	15.5	R404A	60	1701
CCM1448W5 1	230/50/1	1185	539	21035	3	20	15.1	11.5	R404A	25	710
CCM1448R5 1	230/50/1	1139	518	22239	3	30	21.9	15.6	R404A	240	6804

NOTES:

CCU0150A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	167	150	59	35	83	93	125	153	43	24	18'11"	1'56"	20'07"
70/50	228	205	72	41	104	118	145	177	55	29	23'05"	1'10"	24'15"
90/70	305	262	89	43	126	150	165	201	68	35	37'32"	0'45"	38'17"
108/98	400	325	107	44	126	183	183	229	88	36	84'18"	0'51"	85'09"

CCU0150W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	250	250	65	42	98	109	157	195	53	34	21'33"	1'01"	22'34"
70/50	250	250	69	42	103	118	167	203	58	35	24'11"	1'06"	25'17"
90/70	250	250	80	41	108	130	169	207	66	34	29'19"	1'01"	30'20
110/100	288	254	95	42	112	137	178	217	82	37	39'52"	1'01"	40'53"

CCU0220A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	191	162	61	31	82	85	110	145	41	20	12'38"	2'04"	14'42"
70/50	260	216	71	34	102	112	125	170	55	22	17'31"	1'12"	18'43"
90/70	327	276	81	39	118	140	144	190	70	28	27'53"	0'55"	28'48"
109/95	428	350	94	39	154	181	174	231	87	28	53'07"	0'49"	53'56"

CCU0220W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	250	250	59	32	82	97	120	171	44	18	14'29"	1'36"	16'05"
70/50	250	250	63	37	98	104	127	176	51	22	15'29"	1'11"	16'40"
90/70	250	250	70	37	107	117	135	182	62	25	18'32"	1'10"	19'42"
110/100	290	266	77	39	118	132	145	196	77	29	25'41"	0'46"	26'27"

CCU0220A (230/60/1)													
Ambients	**Refrigeration Pressures PSIG**						**Compressor Temps °F**				**Cycle Times**		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	183	164	57	38	80	83	109	138	44	26	10'54"	1'40"	12'34"
70/50	265	225	69	35	102	111	127	171	58	31	19'50"	1'16"	21'06"
90/70	330	275	81	36	117	138	141	189	71	35	26'32"	1'04"	27'36"
110/100	435	363	92	43	145	169	169	223	88	47	53'17"	0'39"	53'56"

CCM0330A													
Ambients	**Refrigeration Pressures PSIG**						**Compressor Temps °F**				**Cycle Times**		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	193-263 cycling		75	28	122	128	114	158	51	37	9'14"	0'49"	10'03"
70/50	257	196	65	28	100	108	118	159	56	35	10'46"	0'59"	11'45"
90/70	296	241	93	31	146	146	138	184	76	54	15'09"	0'41"	15'50"
110/100	381	299	107	33	150	167	166	209	89	57	28'31"	0'44"	29'15"

CCM0330W													
Ambients	**Refrigeration Pressures PSIG**						**Compressor Temps °F**				**Cycle Times**		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
70/50	250	250	60	25	94	98	118	157	54	32	11'22"	1'05"	12'27"
90/70	250	250	67	25	112	117	127	169	61	37	13'13"	0'51"	14'04"
110/100	298	268	86	26	153	160	139	186	82	51	18'31"	0'41"	19'12"

CCM0322A													
Ambients	**Refrigeration Pressures PSIG**						**Compressor Temps °F**				**Cycle Times**		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
70/50	232	187	62	22	101	110	111	156	53	37	11'53"	1'01"	12'54"
90/70	312	247	81	27	136	144	132	184	72	50	16'31"	0'27"	16'58"
110/100	412	315	107	33	177	188	153	214	94	65	26'21"	0'41"	27'02"

CCM0322W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
70/50	252	244	63	25	94	99	121	165	44	30	10'57"	0'55"	11'53"
90/70	254	246	75	28	108	115	134	178	61	40	12'43"	0'50"	13'33"
110/100	325	268	101	30	151	173	130	201	83	57	17"51"	0'40"	18'31"

CCM0430A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	198-260 cycling		63	38	100	108	105	157	53	38	10'23"	1'03"	11'26"
70/50	263	200	67	37	99	111	105	157	54	37	12'14"	1'00"	13'14"
90/70	292	251	88	39	120	135	114	181	70	56	20'20"	0'48"	21'08"
110/100	383	302	110	41	140	170	126	206	90	62	44'06"	0'34"	44'40"

CCM0430W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	250	250	63	38	91	98	98	157	45	30	10'47"	1'10"	11'57"
70/50	250	250	73	41	100	106	105	170	57	41	13'18"	0'58"	14'16"
90/70	255	250	83	39	113	123	108	179	68	43	17'16"	0'55"	18'11"
110/100	275	251	96	38	140	154	114	192	83	45	24'42"	0'51"	25'33"

CCM0530A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	198-265 cycling		57	33	100	110	115	159	50	37	8'03"	0'52"	8'55"
70/50	265	217	59	31	92	95	127	179	55	41	10'42"	1'08"	11'50"
90/70	325	280	70	34	118	126	141	198	70	49	14'54"	0'45"	15'39"
110/100	435	350	84	36	150	163	165	225	88	60	24'46"	0'49"	25'35"

CCM0530W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	250	250	56	31	85	89	116	171	46	26	9'55"	1'19"	11'14"
70/50	250	250	61	31	90	95	121	177	52	28	11'17"	1'10"	12'27"
90/70	250	250	69	33	105	113	127	187	63	35	13'24"	0'57"	14'21"
110/100	314	277	82	33	145	152	136	212	86	43	20'26"	0'49"	21'15"

CCM0530R													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
-20/40	200	207	52	37	66	64	130	167	38	30	9'52"	2'07"	11'59"
70/50	240	240	52	33	65	65	146	180	53	28	11'52"	1'01"	12'53"
90/70	271	245	56	35	66	68	169	193	56	26	15'03"	0'51"	15'54"
110/100	390	340	56	33	66	68	182	233	60	46	29'59"	0'56"	30'55"

CCM0522A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	230	248	55	39	80	87	95	149	42	34	9'51"	1'25"	11'16"
70/50	262	254	67	39	95	103	102	154	54	39	12'28"	1'07"	13'35"
90/70	316	273	84	42	122	134	116	183	72	52	19'12"	0'41"	19'53"
110/100	403	335	105	42	140	168	130	207	95	62	33'26"	0'35"	34'01"

CCM0522W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	261	248	60	30	83	86	100	164	47	26	10'06"	1'23"	11'29"
70/50	252	247	59	30	92	95	121	177	52	28	11'14"	1'00"	12'14"
90/70	254	249	68	32	104	112	127	187	64	36	13'24"	0'55"	14'19"
120/100	314	277	82	33	145	152	135	212	86	42	20'27"	0'47"	21'14"

CCM0630A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	198-270 cycling		51	29	86	95	108	157	51	36	7'51"	0'48"	8'39"
70/50	270	205	51	27	80	86	107	159	51	37	9'48"	1'15"	11'03"
90/70	316	260	62	32	103	113	122	182	66	48	13'40"	0'42"	13'40"
110/100	415	319	80	34	132	143	132	206	88	59	26'37"	0'42"	27'19"

CCM0630W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	250	250	48	27	67	70	102	155	44	21	8'17"	2'19"	10'36"
70/50	250	250	50	27	66	72	104	162	44	23	8'40"	1'58"	10'38"
90/70	250	250	54	28	78	85	110	169	53	28	11'33"	1'28"	13'01"
110/100	360	301	74	30	117	135	133	206	81	40	23'43"	0'50"	24'33"

CCM0630R													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
-20/40	238	238	46	33	93	86	107	159	54	44	7'28"	0'46"	8'14"
70/50	280	270	53	33	108	111	118	181	65	50	11'12"	0'42"	11'54"
90/70	293	275	58	33	118	124	120	189	74	52	13'55"	0'43"	14'38"
120/100	410	332	82	32	161	176	140	221	96	62	30'27"	0'40"	31'07"

CCM0830A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	203	176	55	31	75	79	96	143	43	35	7'09"	2'12"	9'21"
70/50	245	222	61	35	90	96	103	160	53	41	9'21"	1'06"	10'27"
90/70	315	277	65	37	108	118	115	185	71	52	14'19"	1'00"	15'19"
110/100	392	331	76	39	125	144	120	210	89	62	25'11"	0'50"	26'01"

CCM0830W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
70/50	250	250	59	34	72	76	103	159	43	27	8'36"	2'01"	10'37"
90/70	250	250	61	34	79	88	105	165	49	32	10'52"	1'10"	12'02"
110/100	321	293	78	35	108	121	116	193	65	45	18'32"	0'55"	19'27"

CCM0830R													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
-20/40	240	240	61	29	100	108	100	160	51	41	9'46"	1'06"	10'52"
70/50	285	265	68	36	115	122	108	170	60	45	9'31"	1'00"	10'31"
90/70	294	272	72	35	118	125	111	177	63	46	11'12"	0'56"	12'08"
110/100	401	326	90	33	136	160	120	216	79	57	22'34"	0'50"	23'24"

CCM1030A													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
50/40	186	176	50	33	70	68	100	132	41	35	4'48"	1'56"	6'44"
70/50	233	210	56	30	78	82	104	152	46	32	8'00"	1'26"	9'26"
90/70	307	267	68	33	98	104	115	177	62	34	12"03"	1'01"	13'04"
110/100	374	325	68	33	115	130	127	205	84	53	23'25"	0'36"	24'01"

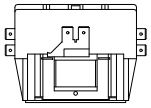
CCM1030W													
Ambients	Refrigeration Pressures PSIG						Compressor Temps °F				Cycle Times		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
70/50	249	244	58	27	69	66	108	163	44	23	8'34"	2'32"	11'06"
90/70	256	250	59	29	70	77	110	168	48	30	9'31"	1'39"	11'10"
110/100	320	289	75	28	98	110	117	192	68	42	15'55"	1'06"	17'01"

CCM1030R													
Ambients	**Refrigeration Pressures PSIG**						**Compressor Temps °F**				**Cycle Times**		
°F	Discharge		Suction				Discharge		Suction		Minutes' Seconds"		
Air/Water	Start	End	Start Freeze	End Freeze	Start Harv	End Harv	Start	End	Start	End	Freeze	Harvest	Complete
-20/40	240	240	61	33	94	101	104	159	53	38	6'44"	0'55"	7'39"
70/50	270	266	72	34	107	112	115	173	58	42	8'36"	0'55"	9'31"
90/70	287	272	77	33	111	117	118	182	60	43	10'21"	1'01"	11'22"
120/100	419	323	93	28	135	150	128	221	77	43	24'34"	0'55"	25'29"

Control Circuit
All machines in this manual are electro-mechanical controlled; however the control circuitry on the single evaporator units differs from the dual evaporator units and is detailed below.

Selector Switch
The selector switch is used to put the machine into the ICE making or WASH cycle or to turn the machine OFF. The WASH position allows only the water pump to run and is used during the cleaning process to circulate cleaning solution throughout the water system. When the selector switch is turned to the ICE position, the machine begins the freeze cycle.

Contactor
When the selector switch is in the ICE position, the contactor coil is energized and pulls in the contactor contacts. This energizes the compressor start components, which starts the compressor.



Purge Switch
The purge switch is a momentary switch used to manually energize the purge valve. It is used during the cleaning process to flush the cleaning solution from the water trough. The purge valve will remain energized as long as the purge switch is depressed.

Note: Single Evaporator Units. The normally closed contacts of the purge switch also create a circuit to relay 1. These contacts should remain closed unless the switch is depressed. If the switch is defective and the normally closed contacts are open when the machine enters harvest, the machine will return to freeze when the timer initiate control opens.

Compressor and Start Components
The compressor should run during the entire cycle. If the machine is in the ICE position but the compressor is not running, check the compressor contactor to see if it is engaged. If the contactor is not engaged, the problem is not with the compressor or the compressor start components. If the contactor is engaged and there is correct voltage through the contactor, there could be a problem with one of the starting components or the compressor. It is recommended that the compressor starting components be replaced when replacing a compressor.

Compressor Check

⚠WARNING **Disconnect power before servicing**

If the compressor uses an internal overload, be certain that the compressor has cooled and the overload has reset before diagnosing the compressor. If the compressor is cool and is still not running, check the compressor motor windings by first removing the wires at the compressor terminals. With an ohmmeter, check for continuity between all three terminals, if an open circuit exists between any of the terminals, the compressor may need to be replaced. Check for continuity from each terminal to the compressor body, if continuity is found from any terminal to the compressor body, the compressor windings are shorted to ground and the compressor will need to be replaced. If the compressor appears to be good at this point, it is advisable to use a compressor analyzer to isolate the compressor from the start components while checking for a locked rotor. If an analyzer is not available, the compressor starting components must be checked.

Compressor Check (Continued)
If all starting components are good, check the amperage draw from the common terminal of the compressor, making sure proper voltage is supplied to the compressor and all wiring is properly connected. If the compressor does not start and there is excessive amperage draw, (see locked rotor amps on compressor tag) the compressor has a locked rotor and should be replaced.

Overload (External)
If there is no amperage draw check the compressor overload. The compressor overload can be checked for continuity after removing it from the compressor and letting it cool to room temperature. If there is no continuity between the two terminals, replace the overload. If the overload is suspected of opening prematurely, it should be replaced with an overload, which is known to be good.

Capacitors
The start capacitor is an electrical storage device used to provide starting torque to the compressor. If a start capacitor is defective, the compressor will not start properly.

The run capacitor is an electrical storage device used to improve the running characteristics and efficiency of the compressor.

Before checking a capacitor, it should be discharged by shorting across the terminals. If a run or start capacitor is cracked, leaking or bulging it should be replaced. If a capacitor is suspected of being defective, it can easily be checked by replacing it with a capacitor of the correct size, which is known to be good. If the compressor starts and runs properly, replace the original capacitor. A capacitor tester can also be used.

Start Relay
The start relay breaks the electrical circuit to the start windings when the compressor motor speed increases. If the relay is defective, the compressor will not start or it may start but will run for a very short time.

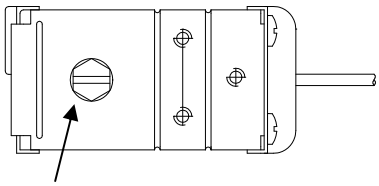
A compressor relay can be checked by removing the relay and checking the relay contacts for damage and check for continuity across the closed relay points. Check the relay coil with an ohmmeter. If no continuity is read, replace the relay.

Untimed Freeze Cycle
During the freeze cycle the compressor, water pump and condenser fan motor(s) (if used) are running. On remote systems the liquid line solenoid is also energized, see Refrigeration System. As ice forms on the evaporator, the suction pressure drops. The machine is in the untimed portion of the freeze cycle and will remain in untimed freeze until the suction pressure drops low enough to close the timer initiate control. See page **E10-12** for operating pressures.

Timer Initiate
The timer initiate is a low-pressure control that closes (cut in) on a drop in suction pressure. When the timer initiate control closes, the freeze timer is energized and the machine enters the timed portion of the freeze cycle. When the machine enters harvest, the suction pressure rises and opens the control. The timer initiate control should be adjusted per the chart on page **E10-12**.

The timer initiate is factory set and does not normally need to be adjusted. If the ice bridge thickness is incorrect, the freeze timer should be adjusted rather than the timer initiate. See page **F4** for freeze timer adjustment procedure. The timer initiate may need to be adjusted if excessive time (more than 7 minutes) is needed on the timer to achieve proper bridge thickness of if very little time (less than 1 minute) is needed on the timer to achieve proper bridge thickness.

If the timer initiate is suspected of being out of adjustment or not operating properly, check the control as follows. Make sure the high temperature safety control is not open, see page **F8**. Turn the machine off and disconnect incoming power by unplugging the machine or switching the circuit breaker OFF. Attach one lead of a voltmeter to terminal 1 and the other lead to terminal 2 of the timer initiate control. Reconnect incoming power and turn the machine to the ICE position. Connect a low pressure gauge to the machine. The volt meter should read line voltage until the timer initiate control closes at which point the voltmeter should read zero volts. Note the suction pressure at this point. Adjust the timer initiate if necessary. Turning the adjustment screw counter clockwise will lower the cut in pressure, turning the adjustment screw clockwise will raise the cut in pressure. The differential is preset and does not require adjustment. If the control cannot be adjusted to the correct pressure setting or if the cut in point is erratic the control must be replaced. If the suction pressure is not dropping properly, see the Troubleshooting Tree “Machine Does Not Enter Harvest” in Section C.


Adjustment Screw

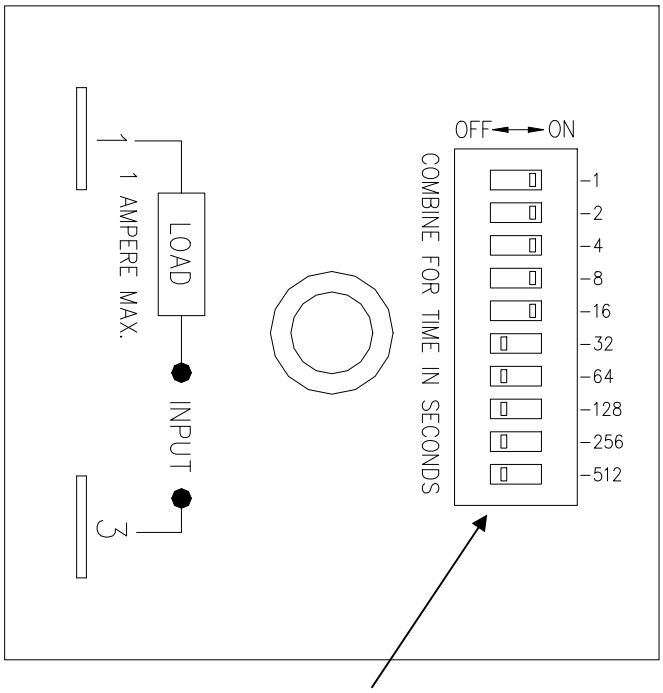
Relay 1
Relay 1 is used to energize the fan motor on air-cooled units. The fan is energized through the common and normally closed contacts.

Relay 2 (Note: Relay 2 is not used on Undercounter models)
On single evaporator machines, relay 2 is used only to bypass the bin control during the freeze cycle and the first part of the harvest cycle. Relay 2 is energized through the normally closed contacts of the cam switch at the beginning of the freeze cycle. When energized, Relay 2 will prevent the machine from shutting off if the bin switch opens. The relay will remain energized until the cam switch is lifted onto the high part of the cam during harvest. At this time the machine will shut off if the bin switch is open.

Relay 3 and Relay 4 (CCM1530 Applications) Relay 3 and Relay 4 bypass the bin switches to allow the curtains to open and close during the freeze cycle on an ice dispenser application. This will prevent the ice machine from shutting off during dispenser agitation.

Timed Freeze
When the freeze timer is energized, the machine is in the timed portion of the freeze cycle. The freeze timer will time out the remainder of the freeze cycle. Once the time has passed, the machine will enter the harvest cycle.

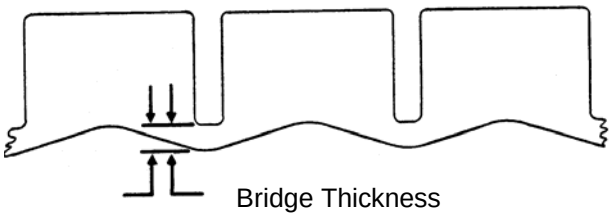
Freeze Timer
The freeze time is an adjustable timer used to control the ice bridge thickness. The freeze timer is factory set but may need to be adjusted upon initial start up of the machine. When time is added to the freeze timer, the length of the freeze cycle is increased, therefore the ice bridge thickness is increased. When time is removed from the timer, the freeze cycle is decreased and the ice bridge thickness is decreased.



Combine time in seconds

The freeze timer can be adjusted by sliding one or more switches to either the **ON** or **OFF** position to obtain the setting which will produce the proper bridge thickness. A timer setting of 128 and 256 switched **ON** will provide an initial timer setting.

The ice bridge thickness should be approximately 3/16" (5mm) on the CCU undercounter series, CCM0330 and CCU0300, and 1/8" (3 mm) on CCM0430 and larger units. If the bridge is too thick, remove enough time from the timer to achieve proper thickness. If the bridge is too thin, add enough time to the timer to achieve proper thickness.


Bridge Thickness

Check the freeze timer for proper operation as follows: Make sure that the high temperature safety control is not open, see page **F8**. Turn the machine OFF and disconnect the incoming power by unplugging the machine or switching the circuit breaker OFF. Attach one lead of a voltmeter to terminal 1 and the other lead to terminal 3 of the timer.

Reconnect incoming power and turn the machine to the ICE position. The volt meter should read zero volts until the timer initiate closes at which point the timer will energize and line voltage should be read.

When the timer counts out, the voltmeter will again read zero volts. The time it takes the freeze timer to time out, once it has been energized should match the timer adjustment. If it does not or if the timer never closes, the timer is defective.

Note: The hot gas delay timer utilized on the CCM1448, CCM1530, CCM1848 and CCM2148 series cubers should always be set at 4 seconds.

Harvest Cycle

Single Evaporator Machines

Once the freeze timer has timed out, power is sent to relay 1 and the machine enters the harvest cycle. Once in harvest motor, the purge valve, hot gas valve and harvest motor are energized. The water pump continues to run during the first part of the harvest cycle so that mineral laden water remaining in the water trough can be pumped through the purge valve to the drain. The harvest motor turns the clutch assembly to actuate the cam switch.

The cam switch is in the normally closed position during freeze and at the beginning of harvest. Once the clutch turns far enough to actuate the cam switch, the water pump and purge valve is de-energized. The harvest motor continues to turn the clutch. When the cam switch returns to the normally closed position, the machine returns to the freeze cycle.
If the bin switch is open when the cam switch is actuated by the high part of the cam, the machine will shut off. Remote units pump down before shutting off.

Relay 1
When relay 1 is energized, the normally open contacts (1-B) close sending power to the hot gas valve and harvest motor and (1-A) close sends power to the purge valve and the coil of relay 1 to keep the coil energized when the timer initiate opens. The fan motor on self contained air cooled model are wired through the NC contacts of relay 1, when the contacts open during harvest, the condenser fan motor is de-energized.

Relay 2 See Page **F4**.

Dual Evaporator Machines (Prior to January 2008)

Once the freeze timer has counter out, power is sent to: (A) harvest motor 1 and relay coil 1 through the normally closed contacts of cam switch 1, (B) to harvest motor 2 and relay coil 2 through the normally closed contacts of cam switch 2. The contacts of relay 1B and 2B closing, energizes the 4-second hot gas delay timer (Right Hand Timer)

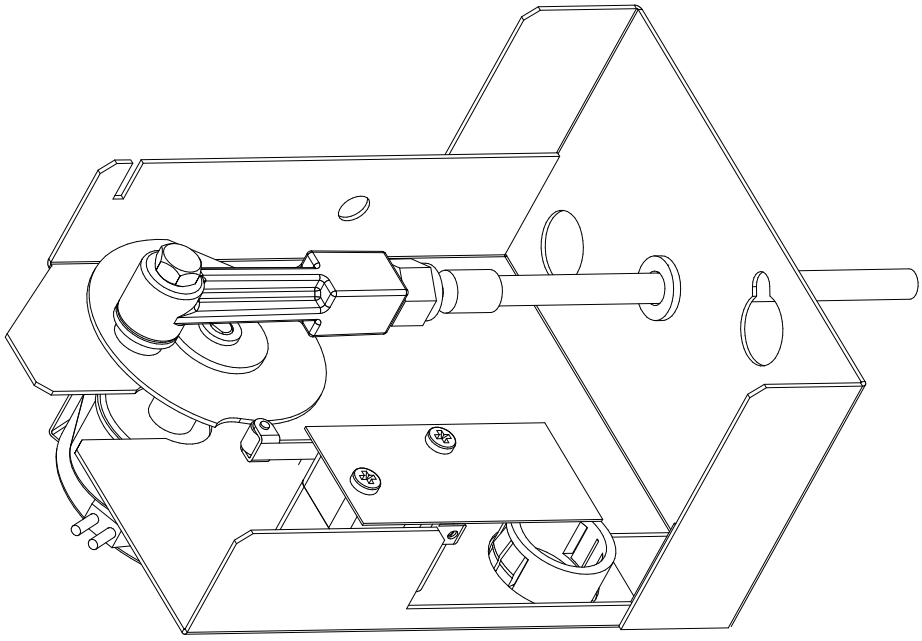
This 4-second delay will allow the harvest motors to rotate and allow the cam switches to switch to the normally open position before the low-pressure control opens during hot gas. The cam switches are now in the normally open position and will continue to energize the harvest motors and relays until the cam rotates and the switch returns to the normally closed position.

Once the 4-second delay timer has timed out, the hot gas valves and purge valve will energize and allow hot gas into the evaporators. The bin control switches are by passed through the normally open contacts of relay 1A and 2A.

The bin switches are bypassed to allow the cam switch to return to the normally closed position prior to the machine shutting down if the curtain is open. Each harvest assist motor will only make one revolution prior to shutting down on full bin or advancing to the next freeze cycle.

Both hot gas valves and the water purge valve remain energized until both harvest assist motors complete one revolution. The water pump is energized throughout the harvest cycle. The unit will shut down if the curtains are open during the freeze cycle. Remote units pump down before shutting off. The fan motors on self contained air cooled model are wired through the NC contacts of relay 1B, when the contacts open during harvest, the condenser fan motors are de-energized.

Harvest Assist Assembly
The harvest assist assembly has several purposes: to assist in moving the ice off of the evaporator, to control the length of harvest and to terminate harvest. When the machine enters harvest, power is sent to the harvest motor which turns a slip clutch. A probe is attached to the rotating clutch and is pushed against the back of the ice slab. The clutch begins to slip when the probe applies approximately 25 ounces of pressure against the ice slab.



It takes approximately 1 minute for hot gas to heat the evaporator enough to loosen the ice from the evaporator plate. At this point the clutch pressure overcomes the capillary attraction of the ice to the evaporator plate and the ice begins to move off of the evaporator. As the ice is being pushed, the clutch stops slipping and begins to turn, extending the probe enough to push the ice completely off of the evaporator.

Harvest Motor
The harvest motor is energized at the beginning of harvest and will remain energized until the machine returns to the freeze cycle. A defective harvest motor will usually not run. The harvest motor rotates in a **clockwise** direction. It is possible for a defective motor to run backwards (counterclockwise). If this happens the motor must be replaced. It is also possible for a defective motor to "bump" backwards immediately when entering harvest. This will activate the cam switch and cause the machine to return to the freeze cycle immediately after entering harvest. If the machine is in harvest only for a split second, the harvest motor may be defective. Verify the motor is defective by watching the clutch closely when the machine enters harvest.

Clutch Assembly
The clutch assembly consists of a slip clutch and cam. A probe is attached to the clutch assembly and the harvest motor turns the clutch during harvest. As the harvest motor turns, the clutch will slip while the probe is pushed against the ice. The clutch will continue to slip as long as the pressure required to move the ice is greater than the 25 oz. Once the evaporator has heated enough to break the bond of ice to the evaporator, the pressure required to move the ice becomes less than the 25 oz. And the clutch begins to move.

The clutch assembly is not adjustable. If the clutch tension is weak (less than 25 oz.) a slow harvest or excessive ice meltage during harvest will result. If the clutch pressure becomes too tight, the force of the probe against the back of the ice may cause the slab to break and the ice may not fall off of the evaporator. If the clutch tension is suspected of being too tight or loose, turn the clutch by hand. The clutch should turn smoothly without "grabbing", but should offer some resistance. If in doubt as to whether or not the clutch is defective, compare the tension with one that is known to be good.

Probe Tip and Swivel
The probe tip is attached to the clutch and makes contact with the back of the ice slab during harvest. The swivel allows the probe tip to pivot as the clutch turns so that the probe is pushed straight through the evaporator probe guide.

The tip of the probe should be flush with the back of the evaporator or recessed up the 1/16 of an inch (.16cm). The probe tip must not extend into the freezing area of the evaporator during freeze. If the probe tip binds during operation it may cause the clutch to slip unnecessarily. This may occur if the harvest motor mounting bracket is not aligned properly or if the probe tip has excessive mineral deposits on it. Remove and clean the probe if necessary.

To check the probe tip for binding, remove the shoulder bolt holding the swivel to the clutch and simulate the movement of the swivel and probe by moving the swivel in a circular motion around the outer portion of the clutch. The swivel should also move freely. If any resistance is felt the bracket should be adjusted by loosening the bracket mounting screws and repositioning the bracket until the probe moves freely.

Cam Switch Operation-Single Evaporator Machines
The actuator arm of the cam switch rides on the edge of the clutch assembly and is actuated by the high and low portion of the cam. When the machine is in the freeze cycle the actuator arm of the cam switch is in the low part of the cam. During freeze, power is supplied to the water pump and relay 2, through the normally closed contacts of the cam switch. When the machine enters harvest, power is supplied to the water pump and purge valve through the normally closed contacts of the cam switch and through the normally open contacts of relay 1 (closed during harvest). The water pump, purge valve and relay 1 remain energized until the cam switch is lifted on to the high part of the cam. Relay 2 will also de-energize at this time allowing the machine to shut off if the bin switch opens. Undercounter machines will have the water pump run continually until the machine shuts down.

Cam Switch Operation-Dual Evaporator Machines (Prior to January 2008)
Once the freeze timer has counted out, power is sent to: (A) harvest motor 1 and relay coil 1 through the normally closed contacts of cam switch 1, (B) to harvest motor 2 and relay coil 2 through the normally closed contacts of cam switch 2.

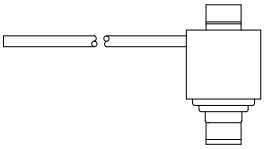
This **4-second** delay will allow the harvest motors to rotate and allow the cam switches to switch to the normally open position before the low-pressure control opens during hot gas. The cam switches are now in the normally open position and will continue to energize the harvest motors and relays until the cam rotates and the switch returns to the normally closed position.

The bin switches are bypassed to allow the cam switch to return to the normally closed position, prior to the machine shutting down if the curtain is open. Each harvest assist motor will only make one revolution prior to shutting down on full bin or advancing to the next freeze cycle.

Both hot gas valves and the water purge valve remain energized until both harvest assist motors complete one revolution. The water pump is energized throughout the harvest cycle. The unit will shut down if the curtains are open during the freeze cycle.

Cam Switch Adjustment
Check the cam switch for proper adjustment by slowing turning the clutch by hand in a counterclockwise direction while listening for the switch contacts to change. The switch should have an audible "click" as the roller reaches the high part of the cam. Now slowly turn the clutch in a clockwise direction and the switch should have an audible "click" as the roller reaches the low part of the cam. Adjust the switch by loosening the mounting screws and moving the position of the switch. If the cam switch is suspected of being defective it should be checked with an ohmmeter. **It should not be assumed that the switch is good because a "click" can be heard when moving the actuator arm.**

High Temperature Safety Control



The high temperature safety control is a thermal disc that protects the machine if the machine "sticks" in the harvest cycle. The high temperature safety is clamped to the suction line near the expansion valve thermal bulb. It opens when the suction line temperature reaches 120ºF (48.8ºC) and closes when the temperature drops to 80ºF (26.6ºC). If the high temperature safety opens during harvest, it will de-energize the harvest components. If the high temperature safety is defective and fails open during the freeze cycle, it will not allow the relay(s) to energize and the machine will not enter harvest. Remove the high temperature safety control and check it with an ohmmeter to verify that it is defective.

Note: On models where the high temperature safety control is mounted on the hot gas valve outlet tube, the specifications are open at 180ºF and close at 140 ºF. Additionally the high temperature safety control is wired in series with the contactor. If the high temperature safety control opens for any reason, the compressor will shut down. This is an automatic reset control. **Do not allow the machine to operate without the high temperature safety control. Damage to the machine may result.**

Bin Control Operation
The bin control is used to shut the machine off when the bin fills with ice. The bin control must be checked upon installation or initial start-up and when performing maintenance.

There is one bin switch for each evaporator. The actuator arm of the bin switch comes in contact with the splash curtain. When the bin is full of ice, the splash curtain is held open when ice drops off of the evaporator. This releases the pressure of the bin switch actuator arm allowing the switch to open.

Single evaporator machines: If the bin switch opens during freeze, or the first part of harvest, relay 2 bypasses the bin switch and the machine will continue running. If the bin switch is opened during harvest, when the cam switch is lifted onto the high part of the cam, the machine will shut off. When the bin switch closes again, the machine will restart.

Dual evaporator machines: If either bin switch opens during the freeze cycle, the machine will shut off. Relay 1 and relay 2 will bypass the bin switches during defrost. If either bin switch is open when the machine returns to the freeze cycle, the machine will shut off.

Undercounter machines: A thermostatic bin control is used on the undercounter models. The bin thermostat is located in the control box with a capillary tube, which is in a brass thermo-well mounted to the water trough. When ice comes in contact with the capillary tube thermo-well, the bin thermostat opens and the machine will shut off.

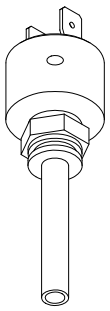
Bin Control Adjustment

All Models (Except Undercounter Models): Check the bin switch for proper adjustment by swinging the bottom of the curtain away from the evaporator. Slowly bring the curtain towards the evaporator. The switch should close when the bottom edge of the curtain is even with the outer edge of the water trough. Adjust the switch by loosening the screws the hold the switch in place. Move the switch to the proper position and retighten the screws. Recheck the adjustment.

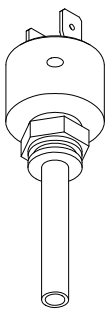
Undercounter Models
Turn the machine to the ICE or WASH position. Hold ice against the brass thermal-well mounted to the water trough making sure the ice is in contact with at least 6 inches (15 cm) of the thermal-well. The machine should shut off in approximately 1 minute, remove the ice, the machine should restart in approximately 3 minutes. If a major adjustment is required, turn the adjustment screw counterclockwise (warmer) until it stops then turn the adjustment screw clockwise (colder) 1/8 of a turn. This should put the control close to the proper adjustment, recheck and make a minor adjustment if needed. If a minor adjustment is required, turn the adjustment screw clockwise (colder) or counterclockwise (warmer).

Pump Down System (Remote Only)
If a remote machine is shut down by the selector switch or bin control, the liquid line solenoid valve is de-energized allowing the valve to close. This blocks the flow of refrigerant causing all the refrigerant to be pumped into the receiver and condenser. This is done to prevent liquid refrigerant from migrating into the compressor during the off cycle, which could damage the compressor on start-up. Also see Pump Down System in the Refrigeration Section on page **E7**. As the refrigerant is pumped into the receiver, the suction pressure begins to drop. Once the suction pressure reaches approximately 10 psi (.68 bar) the pump down control contacts open, which will de-energize the compressor contactor. When the machine is turned back on, power is supplied to the liquid line solenoid which opens the valve and allows the suction pressure to rise enough to close the pump down controls contacts.

Pump Down Control
The pump down control is a low pressure control that shuts the machine off when the suction pressure drops during the pump down phase. The control is factory set to open at 10 psi (.68 bar) and close at 30 psi (2.04 bar). The pump down control does not normally need to be adjusted, however an adjustment may be made by turning the adjustment screw. **Note**: Later model machines have a non adjustable pump down control.



Fan Control
On models utilizing a fan control, the fan will cycle on at 250 psi (17.01) and cycle off at 200 psi (13.61 bar).



Electrical Sequence for the CCM1448*1, CCM1848***1 and the CCM2148***1 Cubers. (Manufactured from January, 2008)**

CCM1448*A/W*1, CCM1848*W*1 and CCM2148*W1 Electrical Sequence (Includes 50 hz. And 3 Phase)**

1. Suction Pressure starts out at approx 60 psi and slowly drops to close the LP Control.
2. The LP Control energizes Relay Number 2 Coil.
3. Relay Number 2A contacts C and NO close to bypass the bin switches, Relay Number 2B contacts close and energize the timer.
4. The Timer times out and energizes Relay Number 1 Coil.
5. Relay Number 1A contacts C and NO close to send power to Cam Switch Number 2 contacts C and NC which energizes Harvest Motor 2, Hot Gas Valves and Relay Number 3 Coil.
6. Relay Number 1B contacts C and NO close to energize Harvest Motor 1 and Hot Gas 1.
7. Relay Number 1B contacts C and NC open to de-energize the fan motors.
8. When the LP Control opens during hot gas, the circuit is latched through the Purge Switch contacts C and NC.
9. Relay Number 3A contacts C and NO close to send power to the Selector Switch and Hot Gas Valves when the curtain is open.
10. Once Cam Switch 2 contacts C and NO close (High Side of the Cam) it will remain energized from the Selector Switch until contacts C and NC close. (Rotates 360 degrees)
11. Once Cam Switch 1 contacts C and NO close (High Side of the Cam) the Harvest Motor will be energized and the Water Pump and Purge Valve will be de-energized when contacts C and NC open.
12. With the bin switches open, Relay Number 3 Coil de-energized due to Cam Switch 2 contacts C and NC closing, the unit will shut off on full bin.

Notes:

- C=Common
- NC=Normally Closed
- NO-Normally Open
- Relay Number 9 & 12=Common
- Relay Number 1 & 4=Normally Closed
- Relay Number 5 & 8=Normally Open
- The Fan Control on the air cooled model cycles only one fan.
- Relay 1, Puts unit into defrosts.
- Relay 2, Bypasses the Bin Switches and initiates the Timer.
- Relay 3, Bypasses the Bin Switches during harvest when Relay 2 is de-energized from a rise in the suction pressure opening the Low Pressure Control.

Electrical Sequence for the CCM1448*1, CCM1848***1 and the CCM2148***1 Cubers. (Manufactured from January, 2008)**

CCM1448*R*1, CCM1848*R*1 and CCM2148*R*1 Electrical Sequence (Includes 50 hz. And 3 Phase)

This unit incorporates a timer upstream of the Low Pressure Control for Low Ambients.

1. Timer number 2 (Six Minutes) is energized from the Selector Switch through Relay Number 3B contacts C and NC.
2. Timer Number 2 (Six Minutes) times out and energizes Relay Number 2 Coil.
3. Relay Number 2B contacts C and NO close which energizes the Low Pressure Control.
4. The Low pressure Control closes and energizes the timer.
5. The Timer times out and energizes Relay Number 1 Coil.
6. Relay Number 1A contacts C and NO close to send power to Cam Switch Number 2 C and NC which energizes Harvest Motor 2, Hot Gas valves and Relay Number 3 Coil.
7. Relay Number 1B contacts close to energize Harvest Motor 1 and Hot Gas Valve 1.
8. When the Low Pressure Control opens during hot gas defrost, the circuit is latched through the Purge Switch contacts C and NC.
9. Relay Number 3A contacts C and NO close to send power to the Selector Switch and Hot Gas Valves when the curtain is open.
10. Once Cam Switch 2 contacts C and NO close (High side of the Cam) it will remain energized from the Selector Switch until contacts C and NC close. (Rotates 360 degrees)
11. Once Cam Switch 1 contacts C and NO close (High Side of the Cam) the Harvest Motor will be energized and the Water Pump and Purge Valve will be de-energized when contacts C and NC open.
12. With the bin switches open, Relay Number 3 Coil de-energized due to Cam Switch 2 contacts C and NC closing, the unit will shut off on full bin.

Notes:
- C=Common
- NC=Normally Closed
- NO-Normally Open
- Relay Number 9 & 12=Common
- Relay Number 1 & 4=Normally Closed
- Relay Number 5 & 8=Normally Open
- Relay 1, Puts unit into defrosts.
- Relay 2, Bypasses the Bin Switches and initiates the Low Pressure Control
- Relay 3, Bypasses the Bin Switches during harvest when Relay 2 is de-energized from a rise in the suction pressure opening the Low Pressure Control and energizes Timer Number2

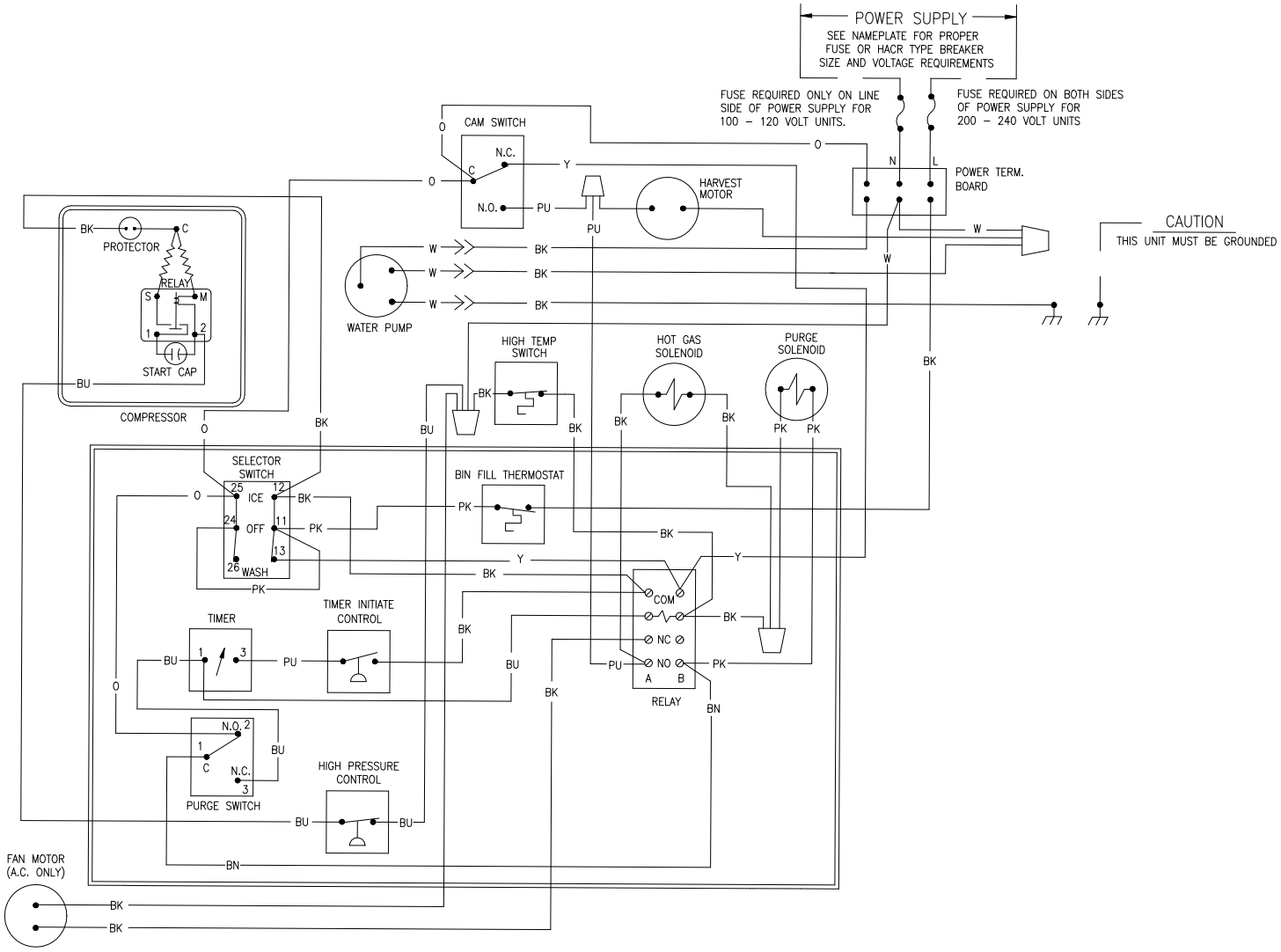
Electrical Sequence for the CCM1530*R21 (Manufactured from January, 2008)

This unit incorporates a timer upstream of the Low Pressure Control for Low Ambients.

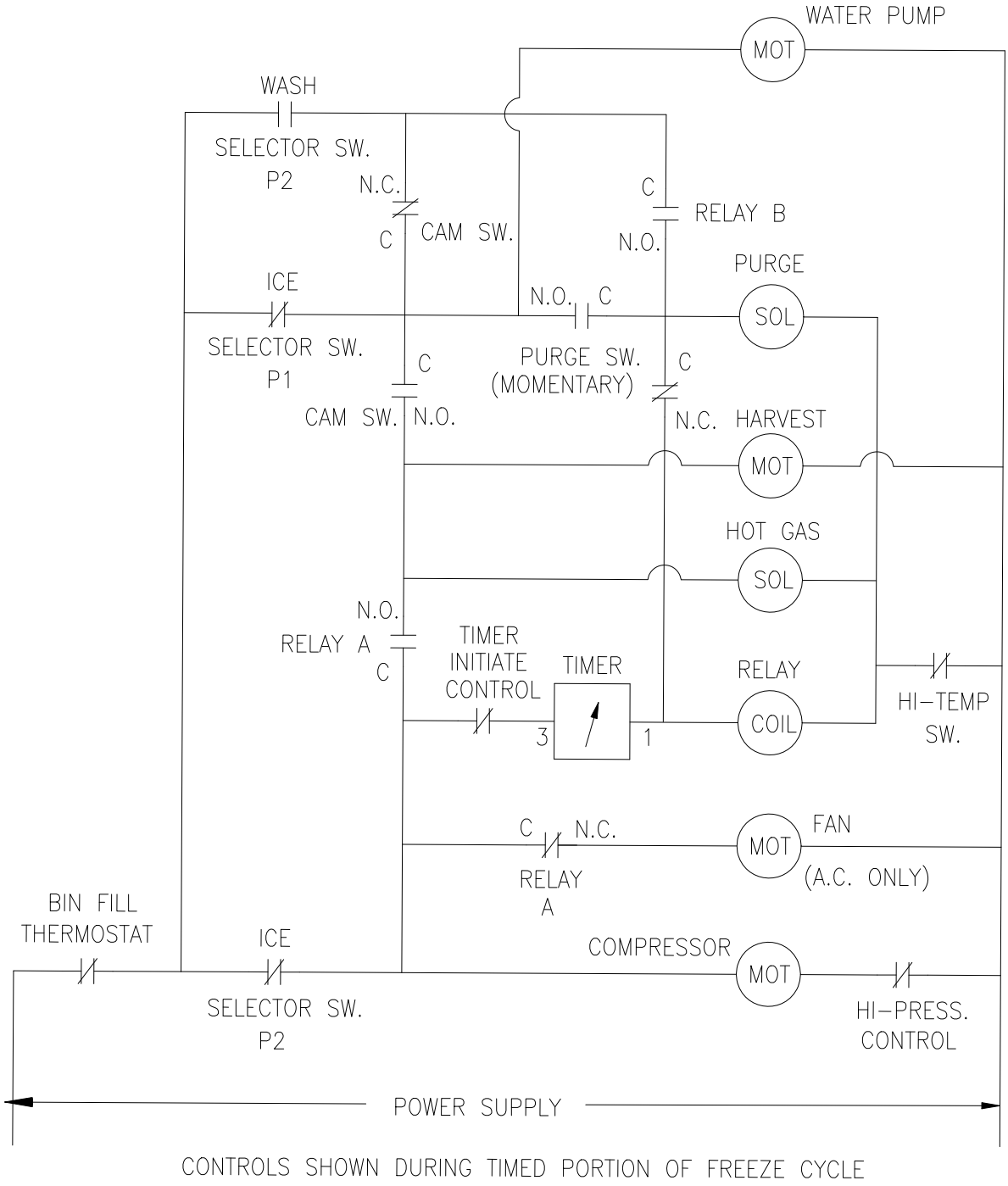
1. When the Selector Switch is set to ICE, Relay Number 2 Coil is energized through Cam Switch contacts C and NC (Bypasses the Bin Controls)
2. Relay Number 4B contacts C and NC energize Timer Number 2 (6 Minutes)
3. Timer number 2 times out and energizes Relay Number 3 Coil.
4. Relay Number 3B contacts C and NO close and energizes the Low Pressure Control.
5. The Low Pressure Control closes to energize Timer Number 1.
6. Timer Number 1 times out and energizes Relay Number 1 Coil
7. Relay Number 1A contacts C and NO close and send power Cam Switch Number 2 C and NC which energizes Harvest Motor 2, Hot Gas valves and Relay Number 4 Coil.
8. Relay Number 1B contacts C and NO close to energize Harvest Motor 1 and Hot Gas Valve 1.
9. When the Low Pressure Control opens during hot gas, the circuit is latched through the Purge Switch contacts C and NC.
10. Once Cam Switch 2 contacts C and NO close (High side of the Cam) it will remain energized from the Selector Switch until contacts C and NC close (Rotates 360 degrees)
11. Once Cam Switch 1 contacts C and NO close (High side of the Cam) the Harvest Motor will be energized and the Water Pump, Purge Valve and Relay Number 2 Coil will be de-energized when contacts C and NC open.
12. When Relay Number 2 Coil is de-energized and if the curtain switches or bin stat are open, the unit will pump down and shut off on full bin.

Notes:
- C=Common
- NC=Normally Closed
- NO-Normally Open
- Relay Number 9 & 12=Common
- Relay Number 1 & 4=Normally Closed
- Relay Number 5 & 8=Normally Open
- Relay 1, Puts unit into defrosts.
- Relay 2, Bypasses the Bin Switches.
- Relay 3,Energizes the Low Pressure Control
- Relay 4,Resets Timer Number 2

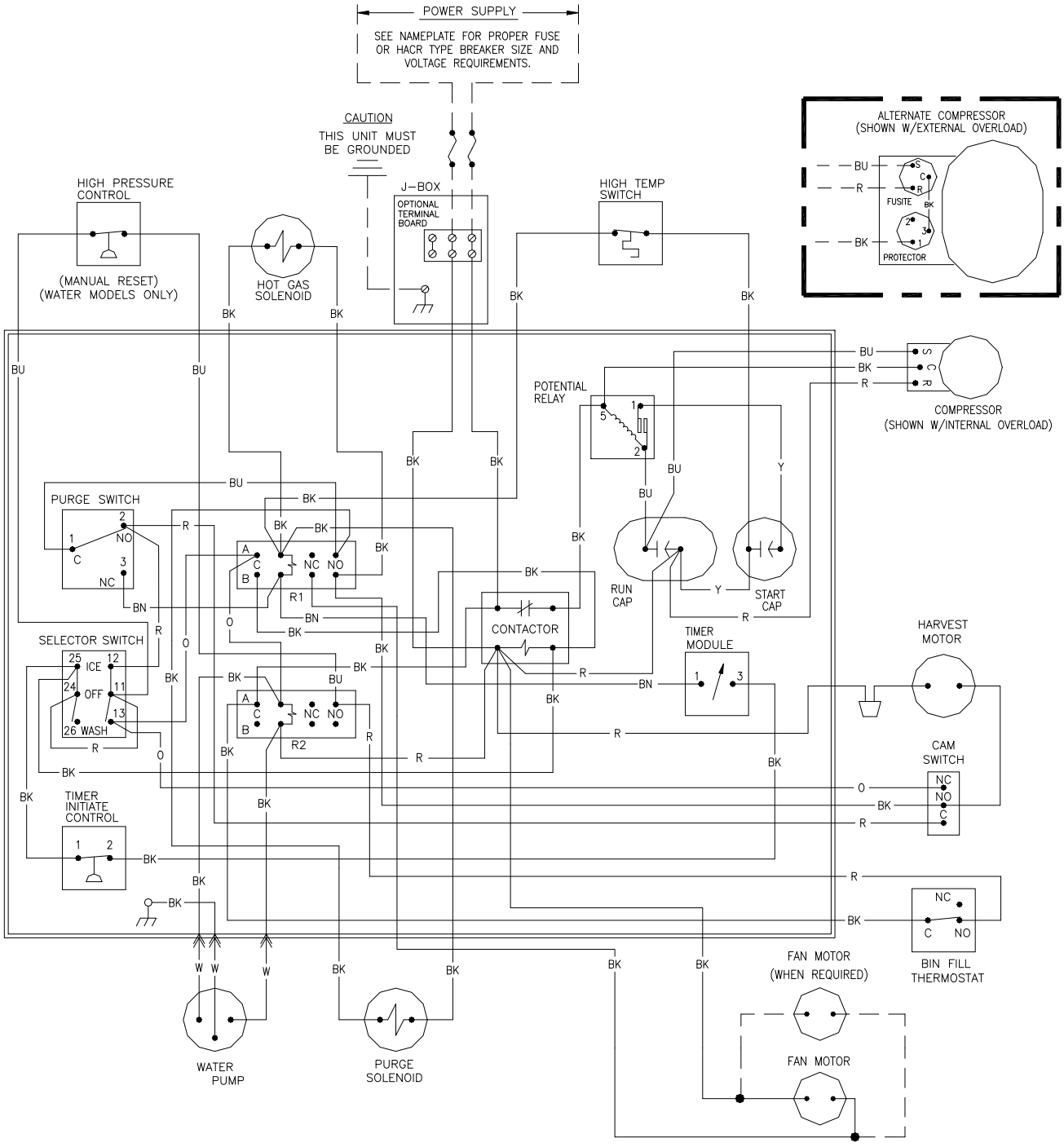
CCU0150/220 Air and Water Wiring Diagram includes 230 Volt and 50 Cycle



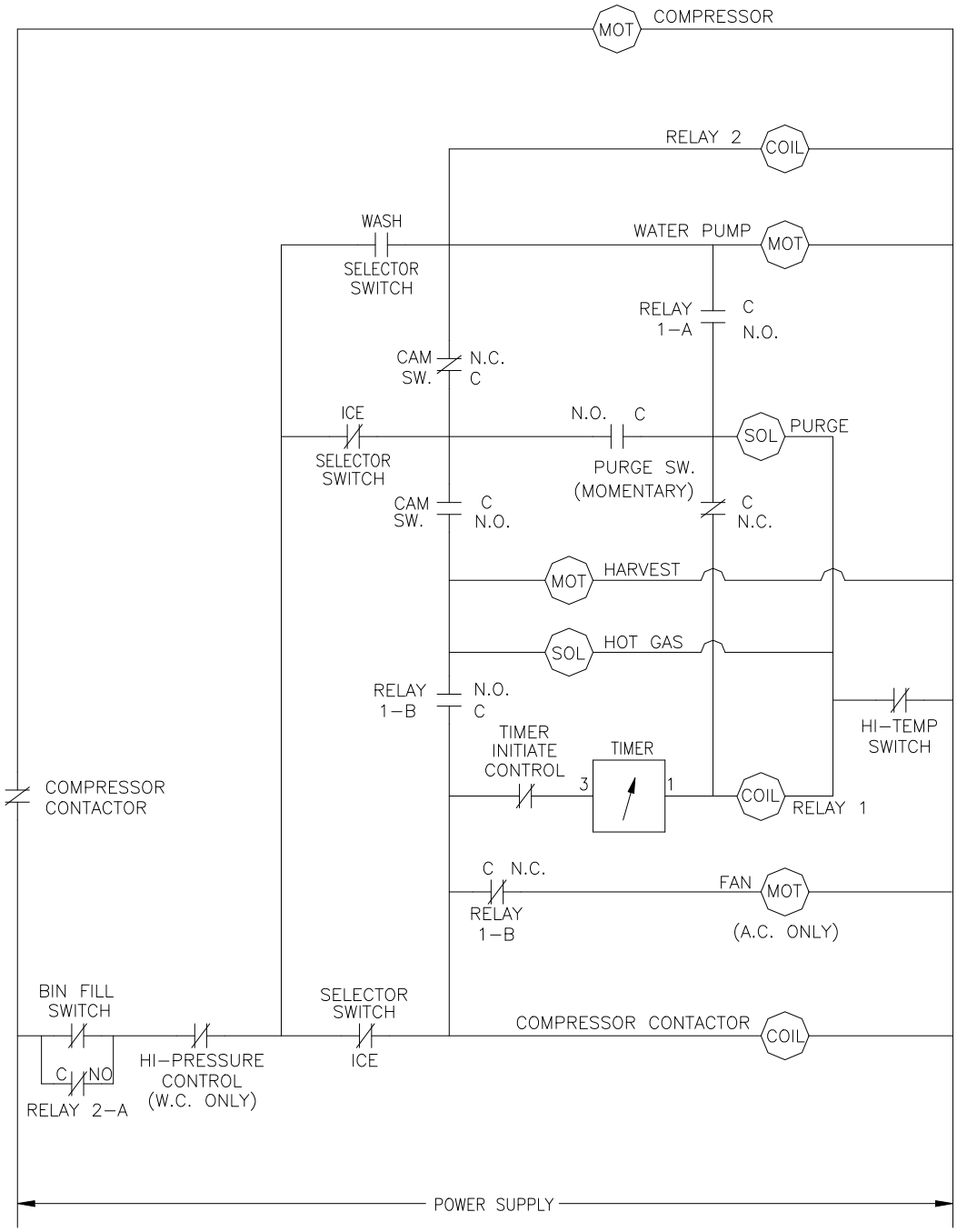
CCU0150/220 Air and Water Wiring Schematic
Includes 230 Volt and 50 Cycle



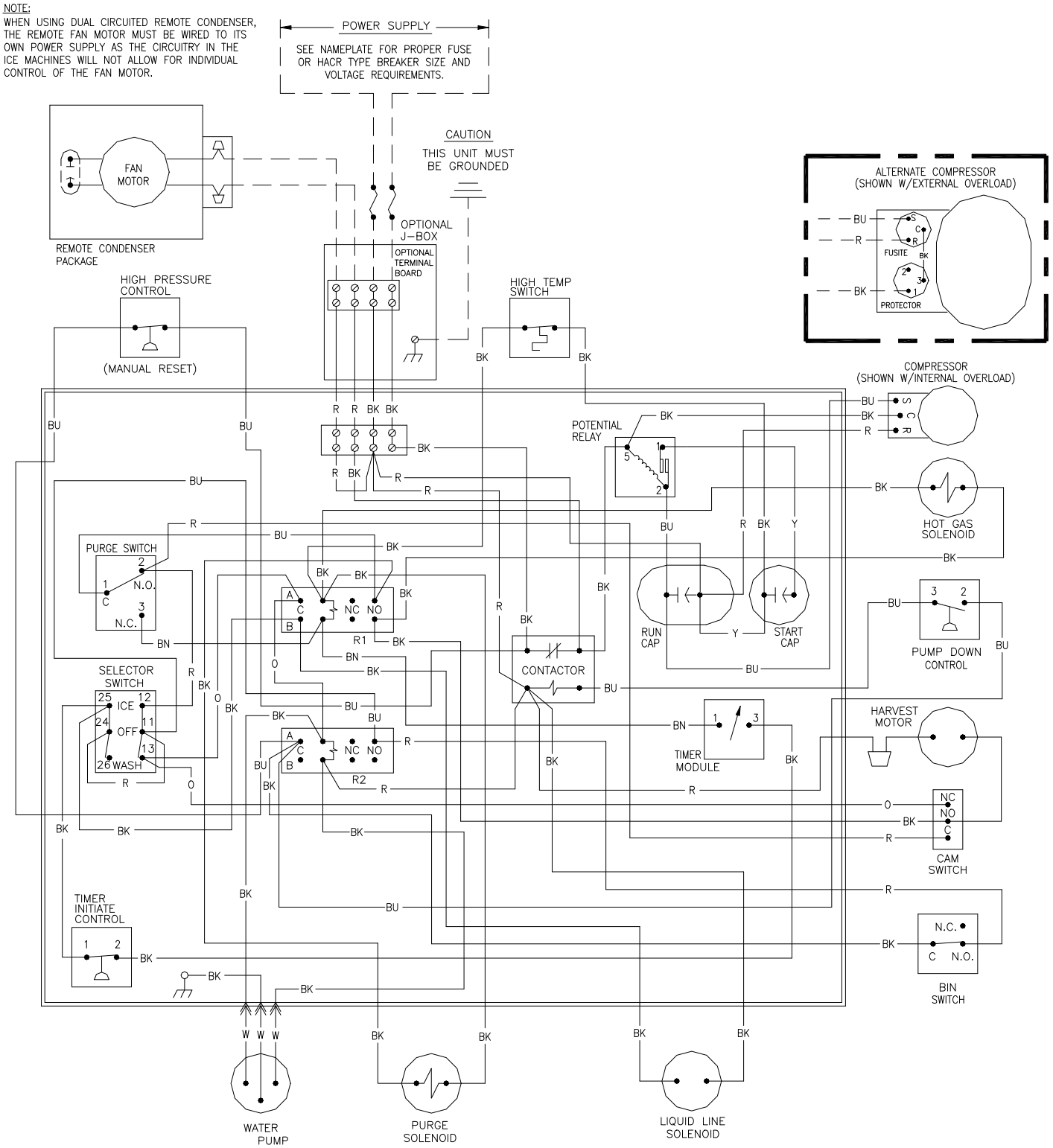
CCM0830/CCM1030 Air and Water Wiring Diagram
Includes 50 Cycle



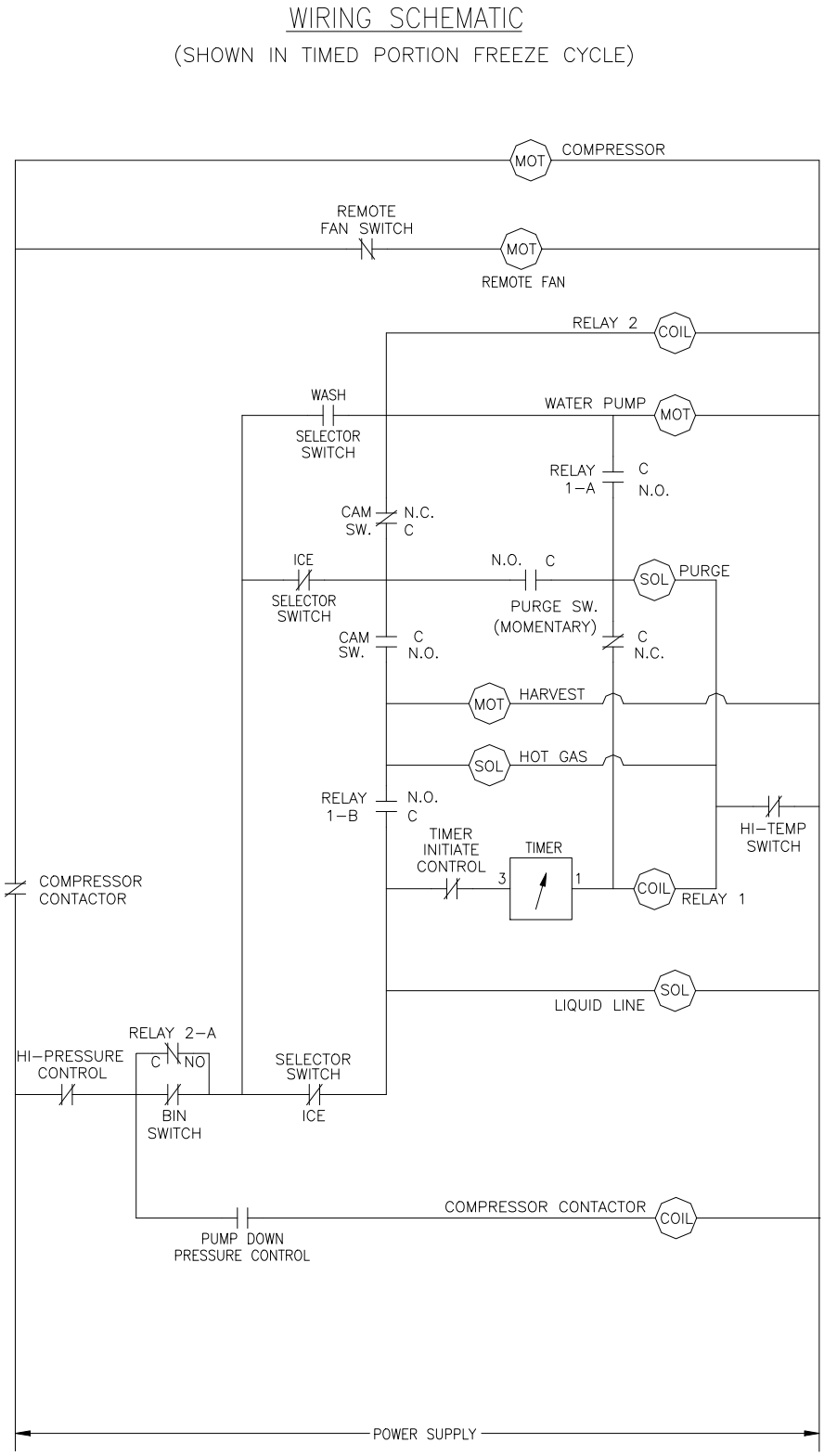
CCM0830/CCM1030 Air and Water Wiring Schematic
Includes 50 Cycle



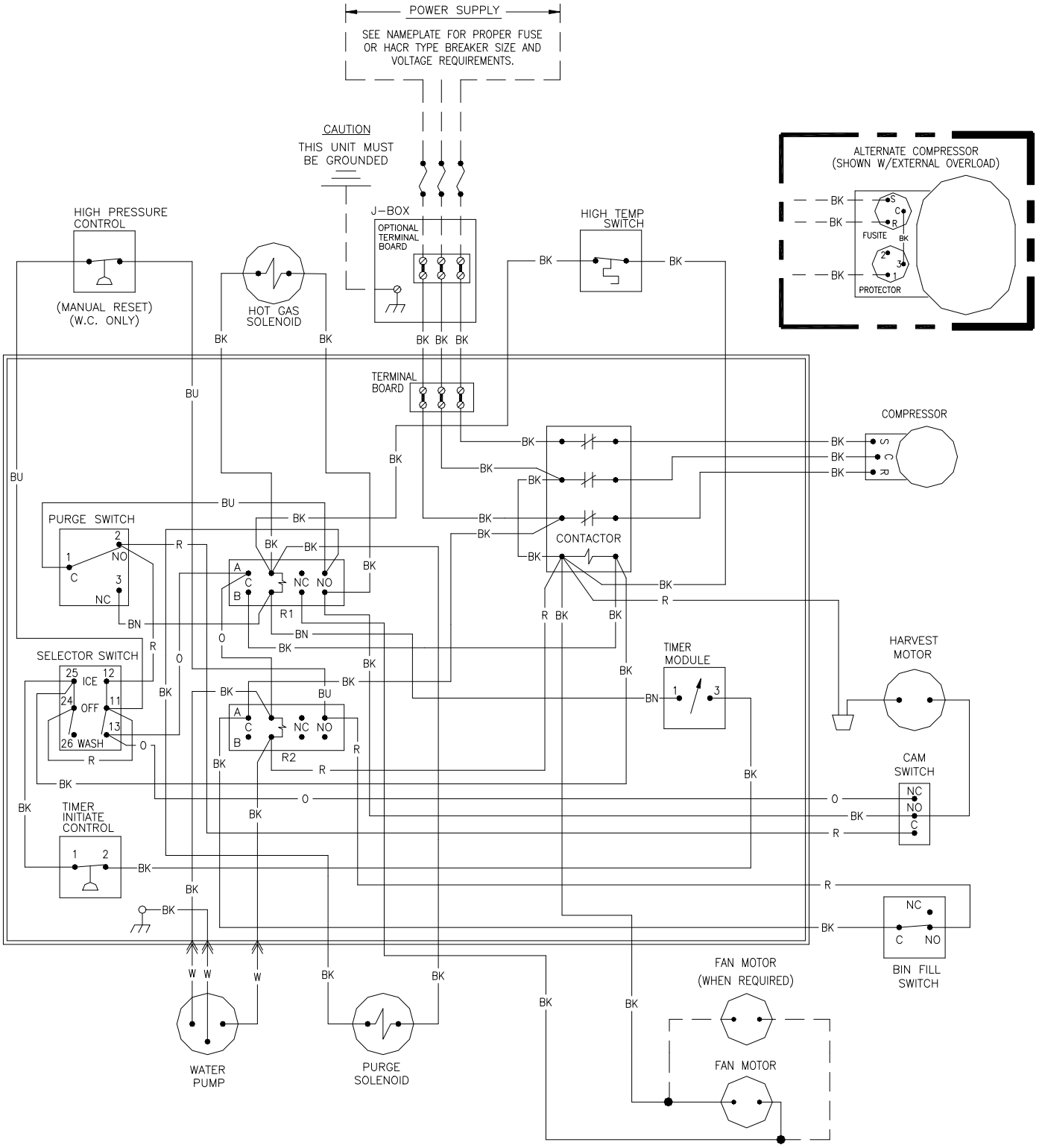
CCM0830/CCM1030 Remote Wiring Diagram
Includes 50 Cycle



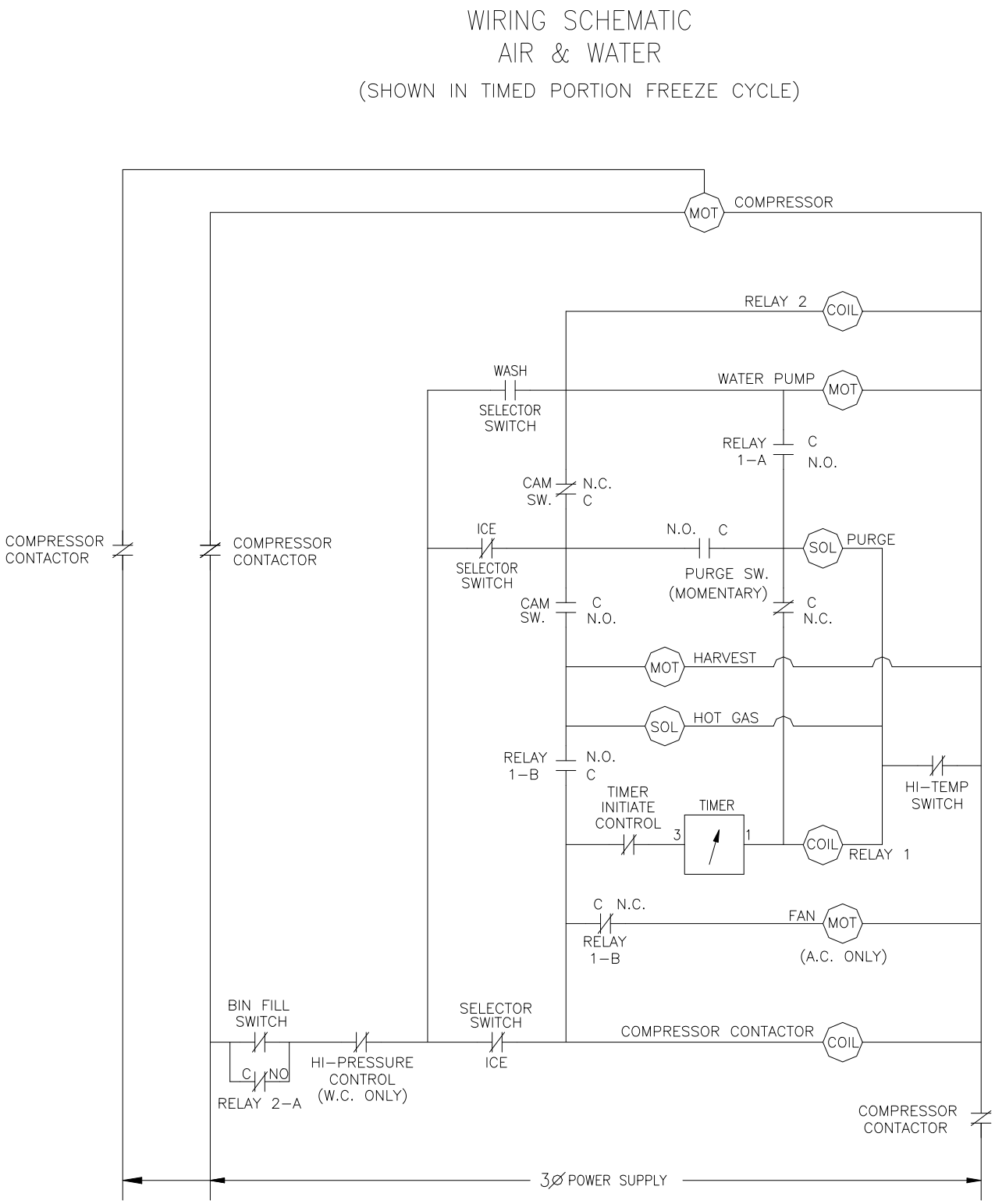
CCM0830/CCM1030 Remote Wiring Schematic
Includes 50 Cycle



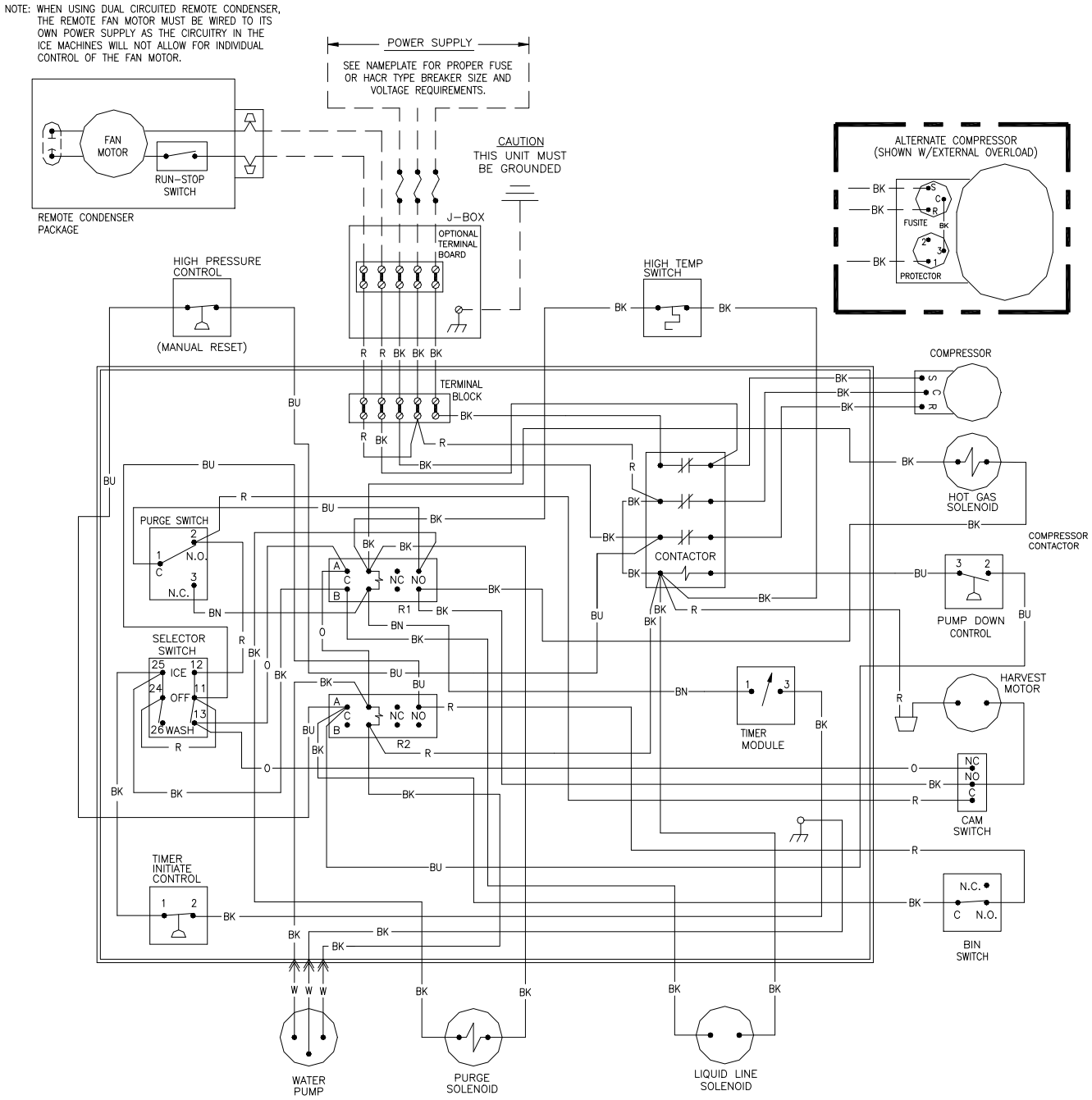
CCM1030, 3 Phase, Air and Water Wiring Diagram



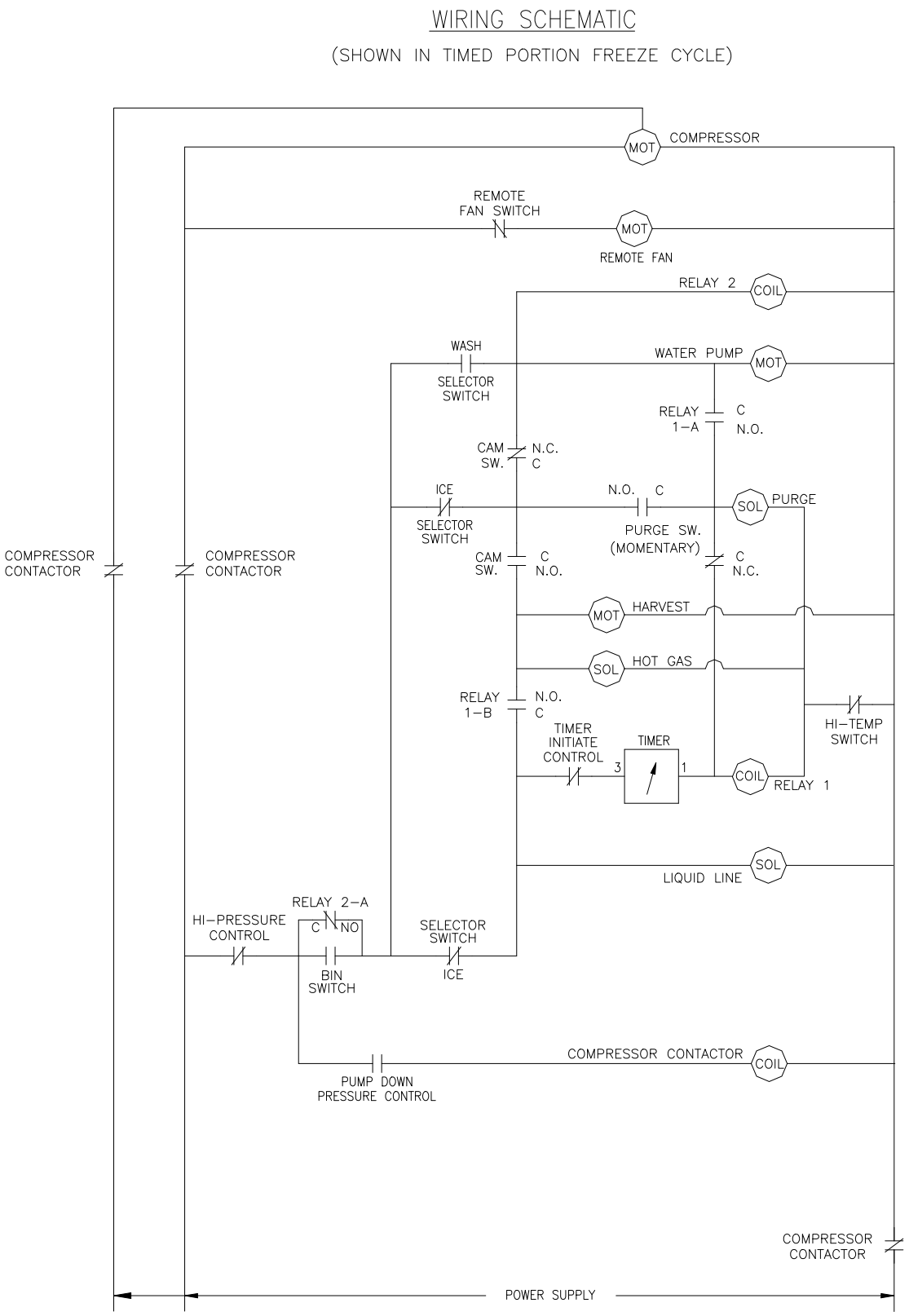
CCM1030, 3 Phase, Air and Water Wiring Schematic



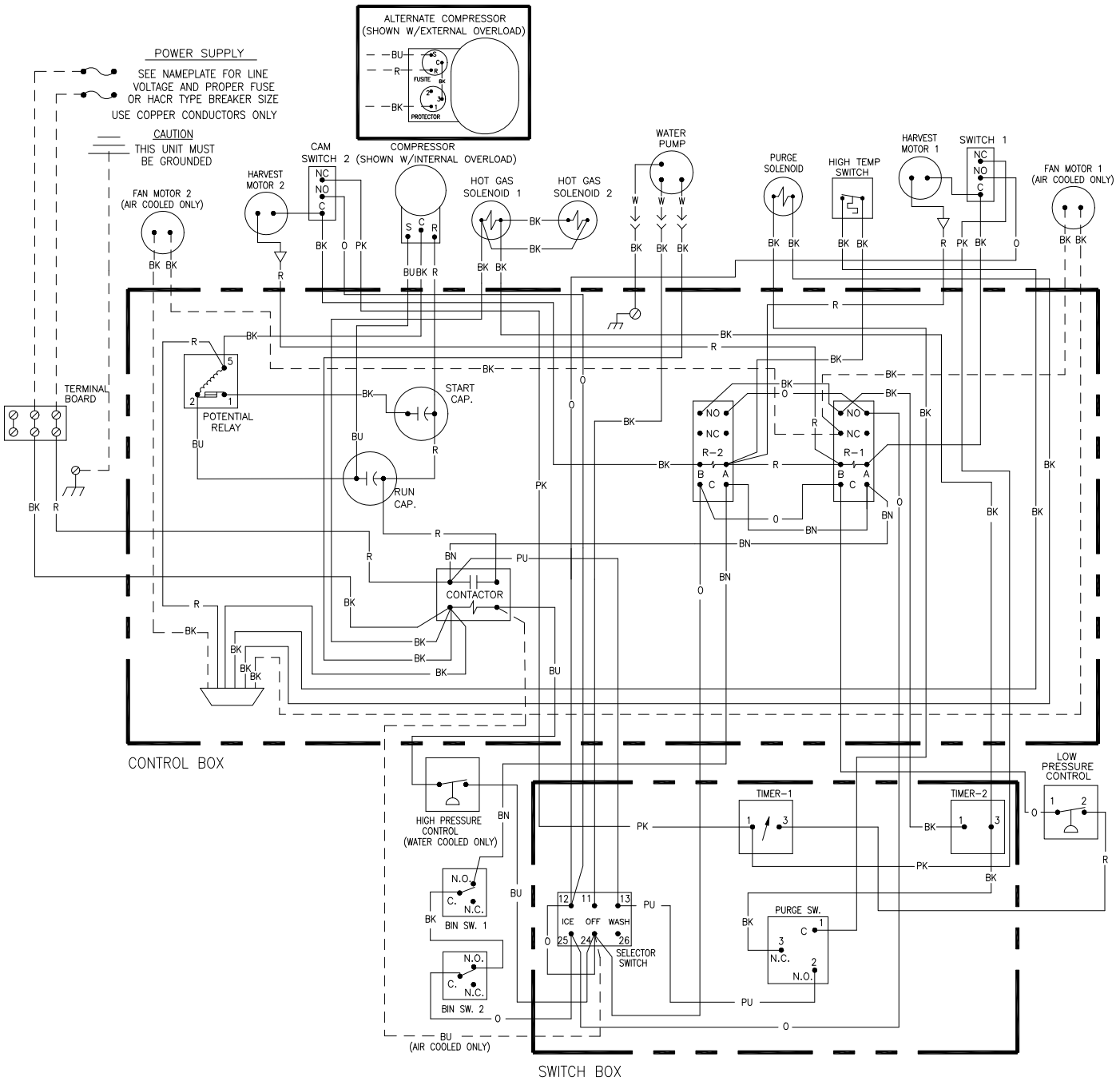
CCM1030, 3 Phase, Remote Wiring Diagram



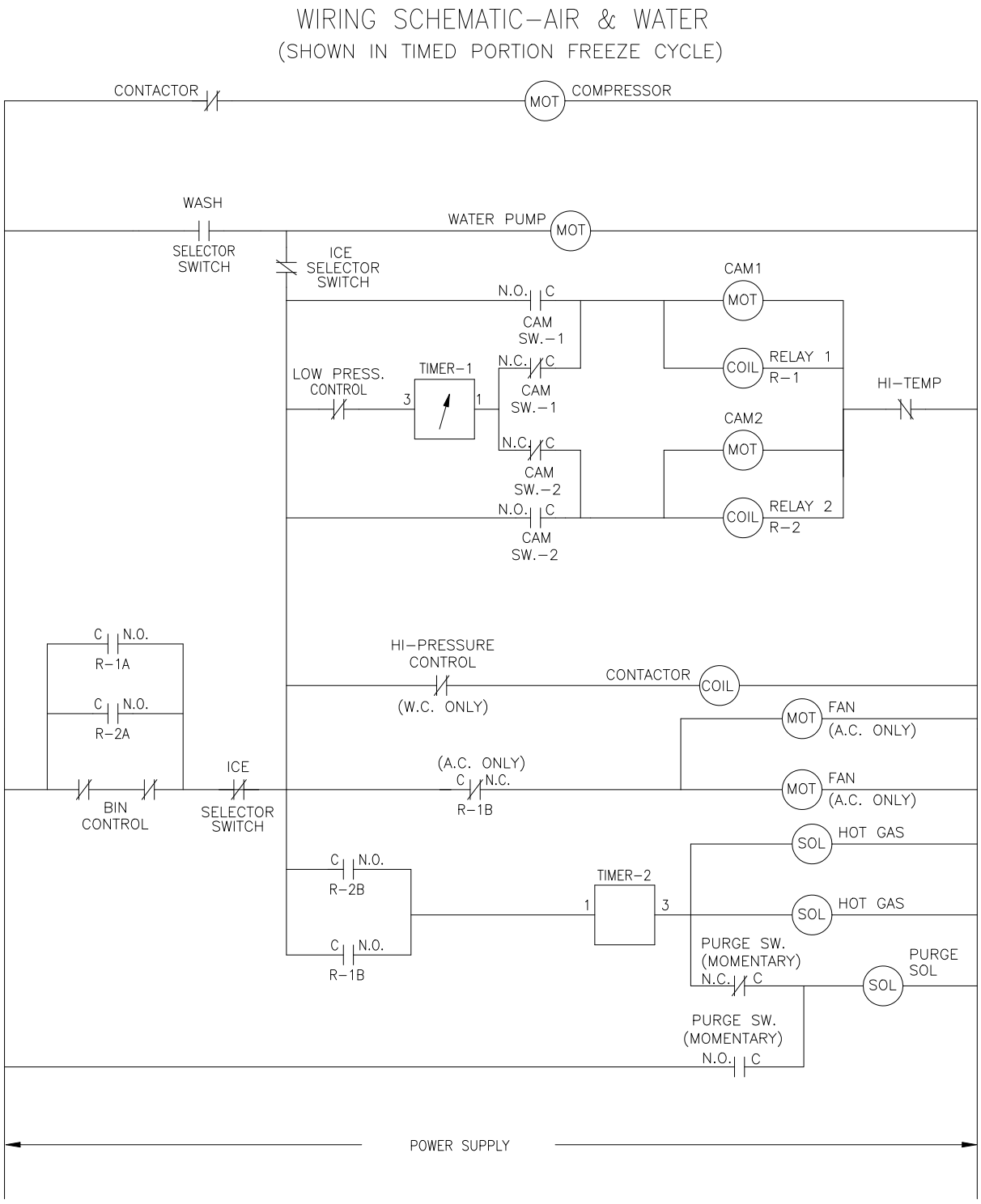
CCM1030, 3 Phase, Remote Wiring Schematic



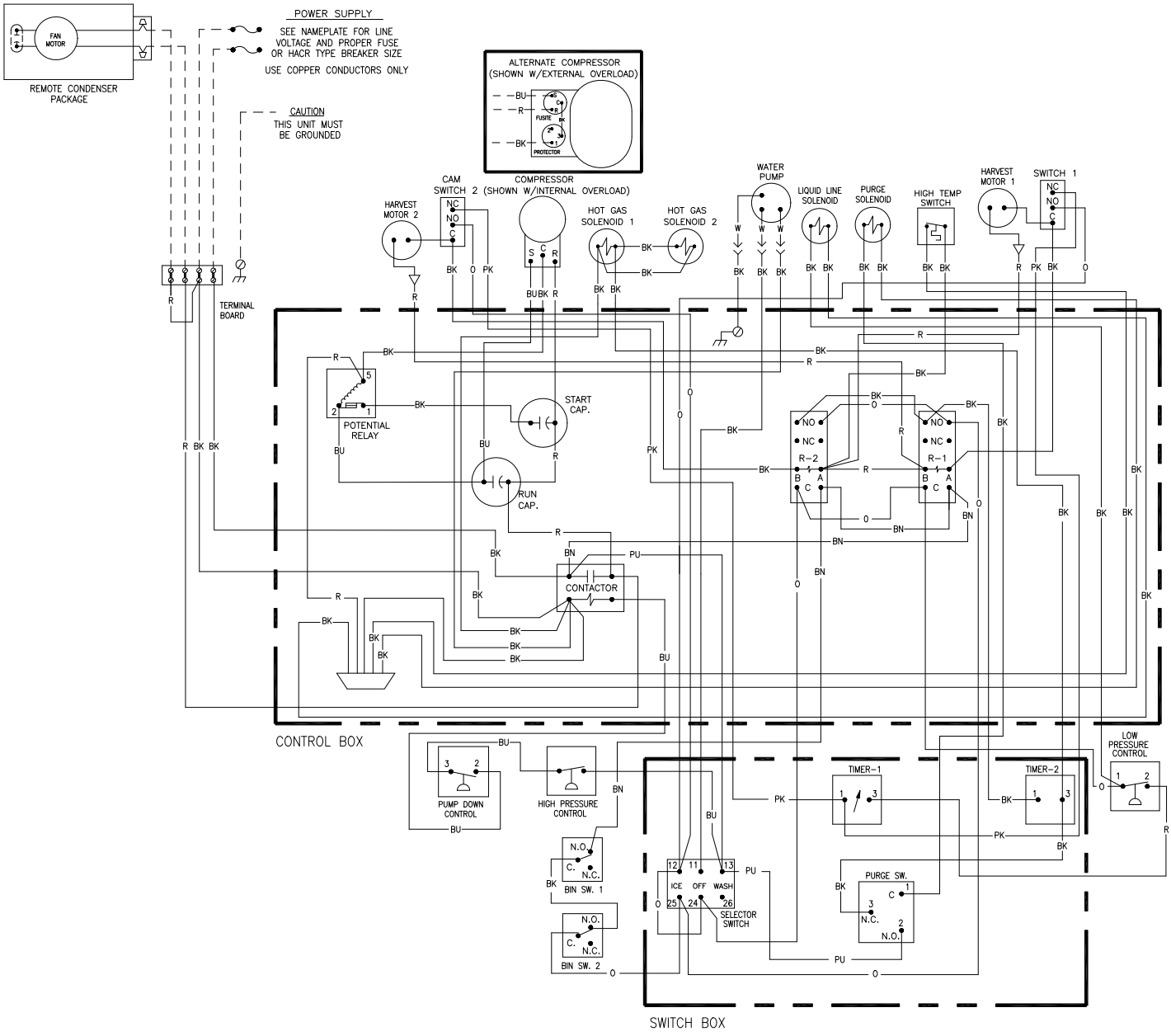
CCM1448/CCM1848/CCM2148 Air and Water Wiring Diagram
Includes 50 Cycle



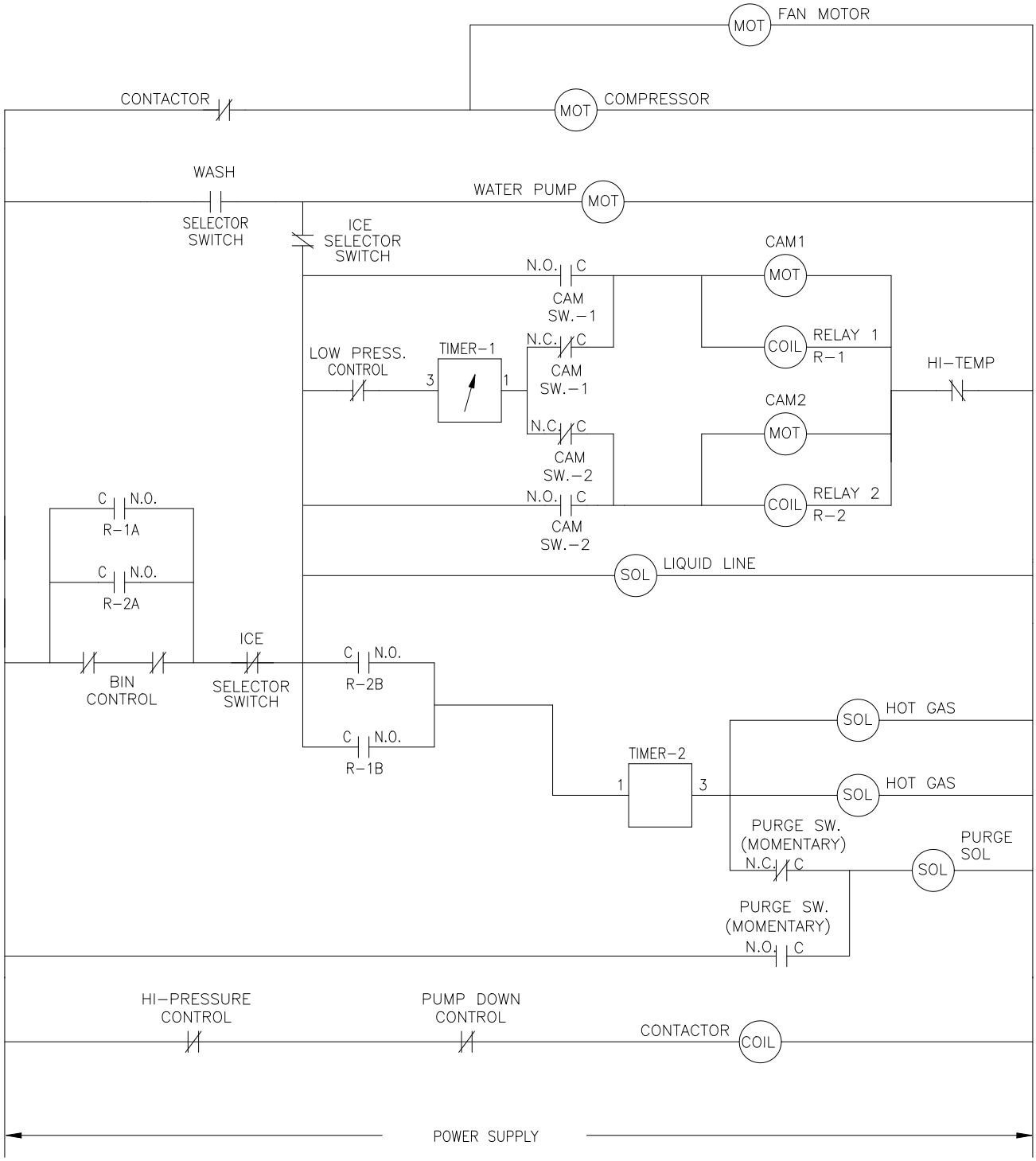
CCM1448/CCM1848/CCM2148 Air and Water Wiring Schematic Includes 50 Cycle



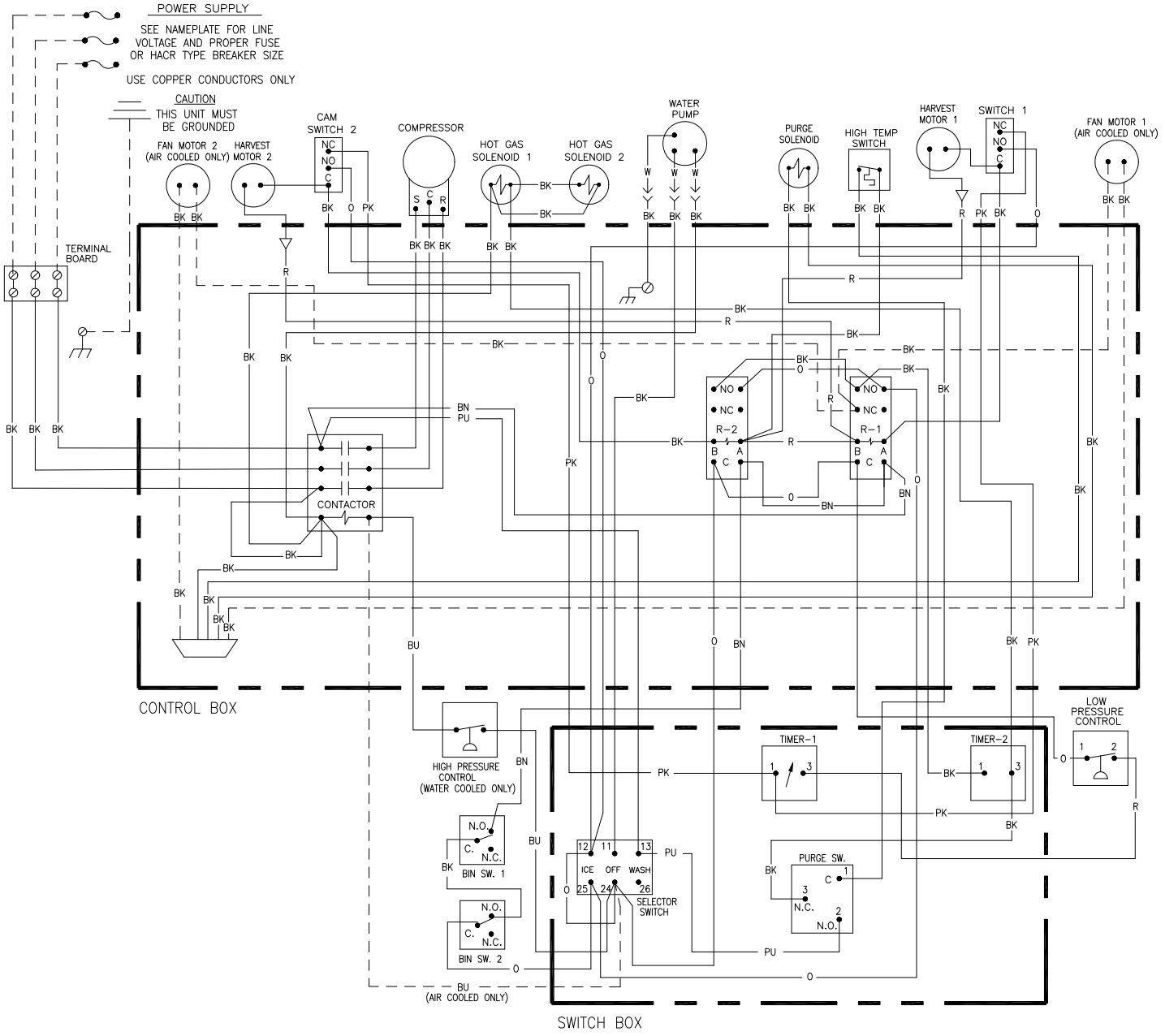
CCM1448/CCM1848/CCM2148 Remote Wiring Diagram
Includes 50 Cycle



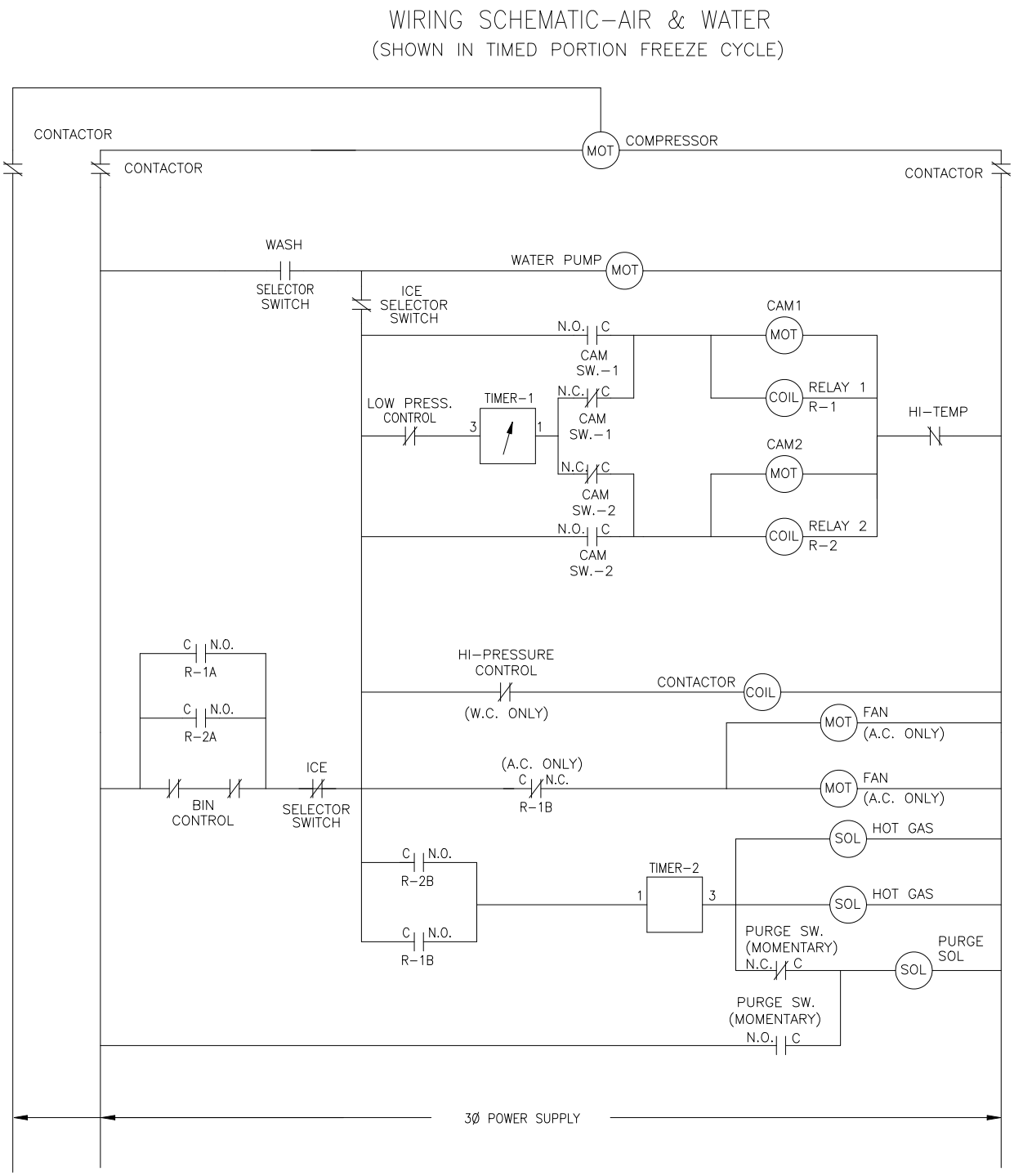
CCM1448/CCM1848/CCM2148 Remote Wiring Schematic
Includes 50 Cycle



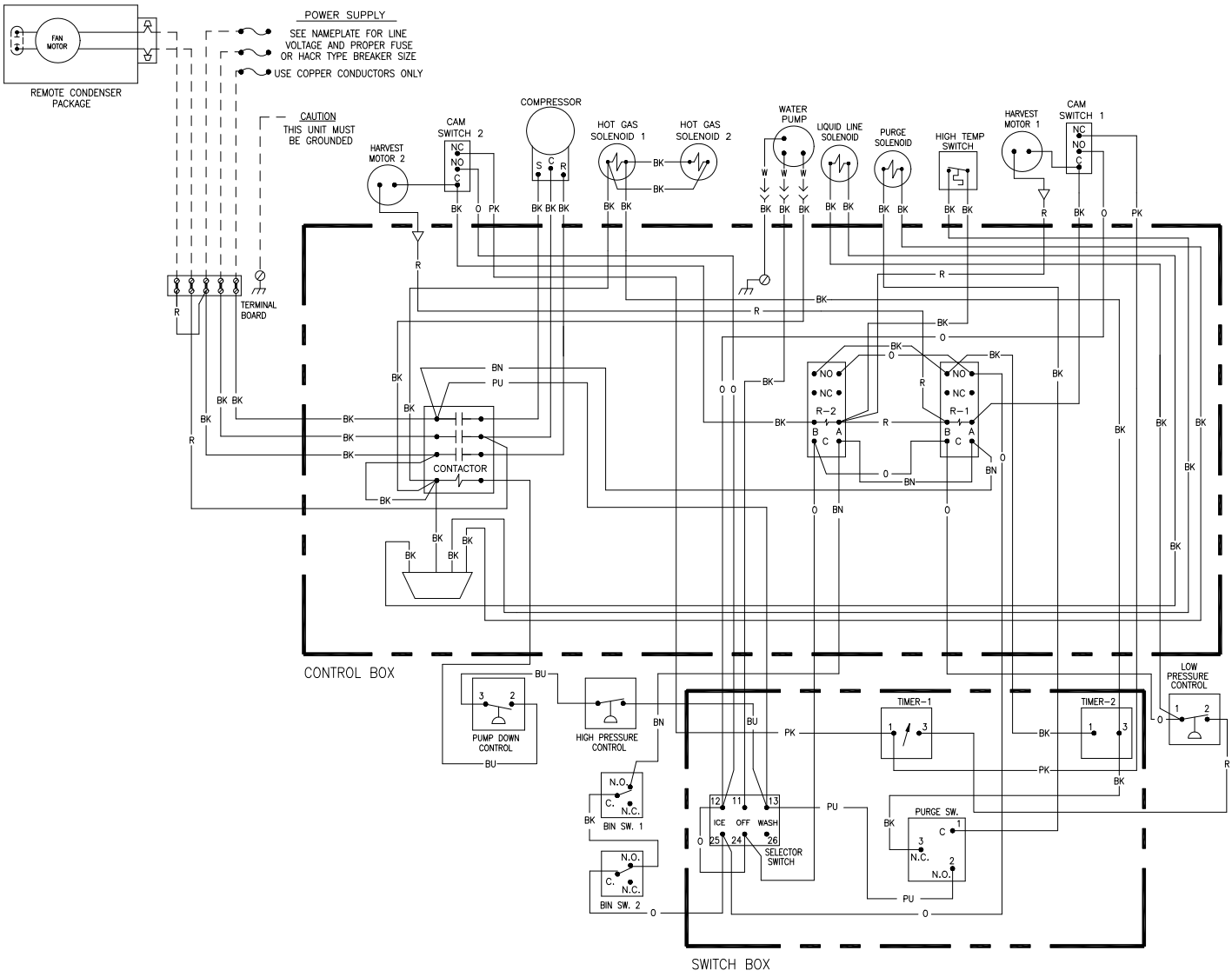
CCM1448/CCM1848/CCM2148, 3 Phase, Air and Water Wiring Diagram



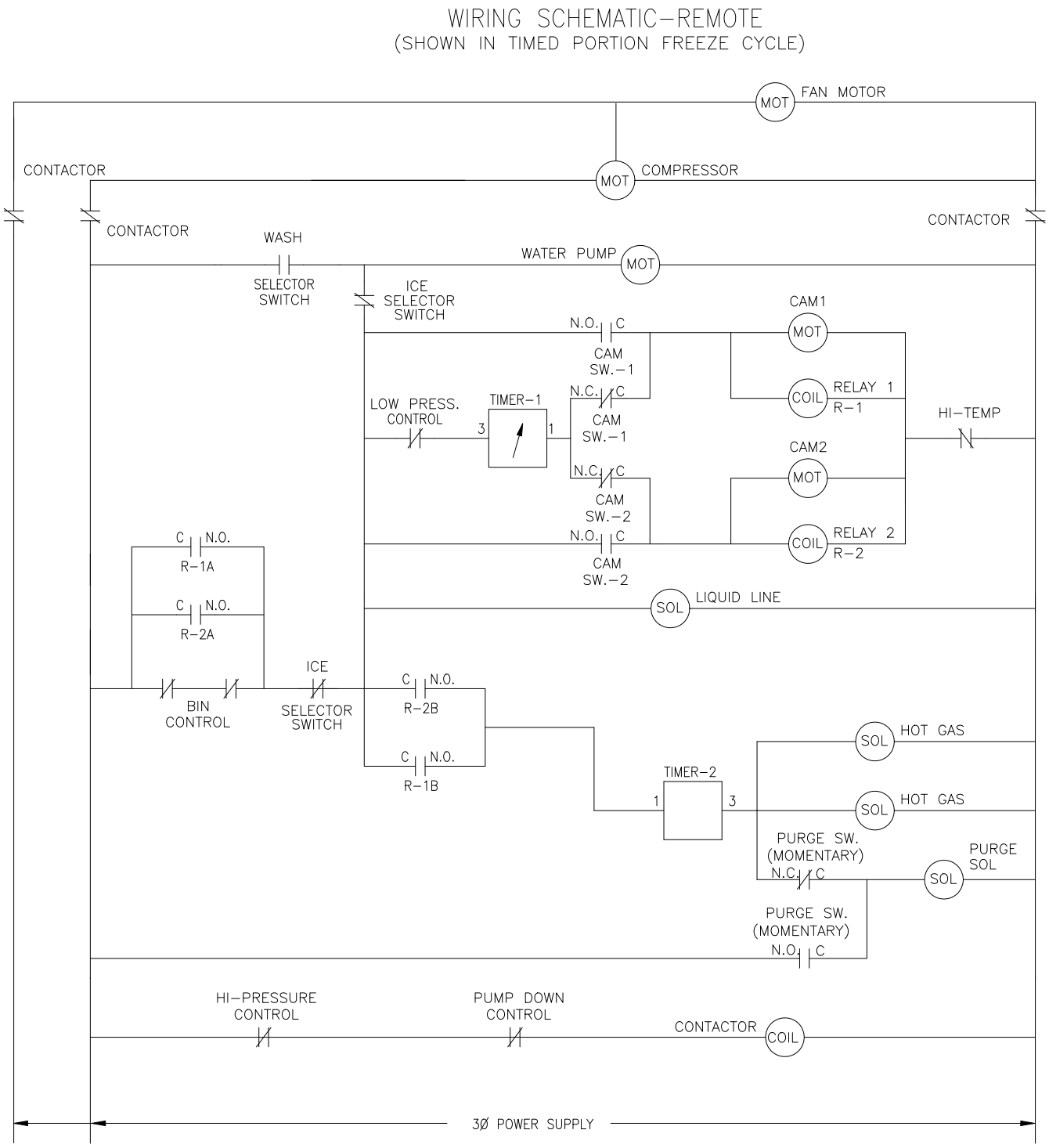
CCM1448/CCM1848/CCM2148, 3 Phase, Air and Water Wiring Schematic



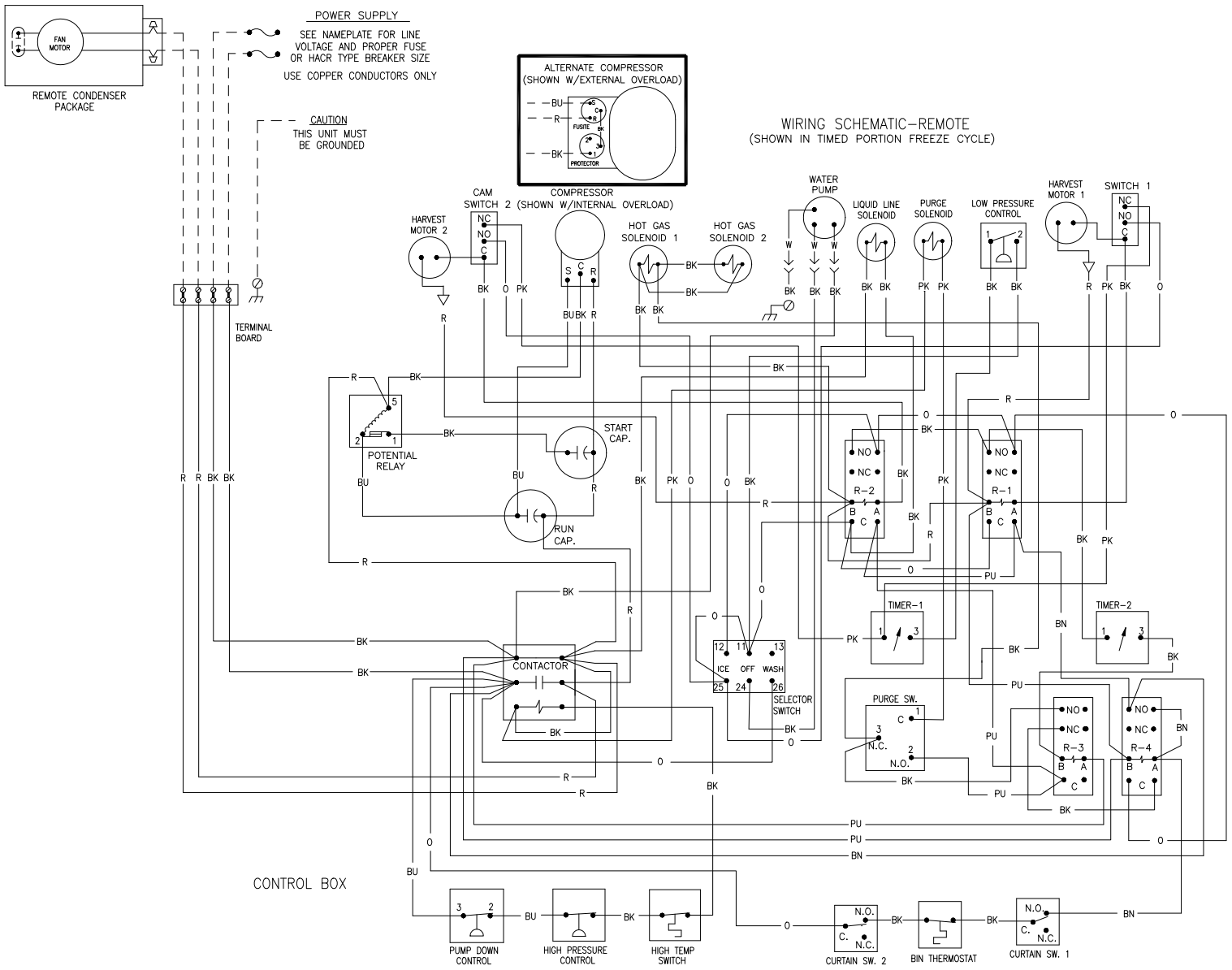
CCM1448/CCM1848/CCM2148, 3 Phase, Remote Wiring Diagram



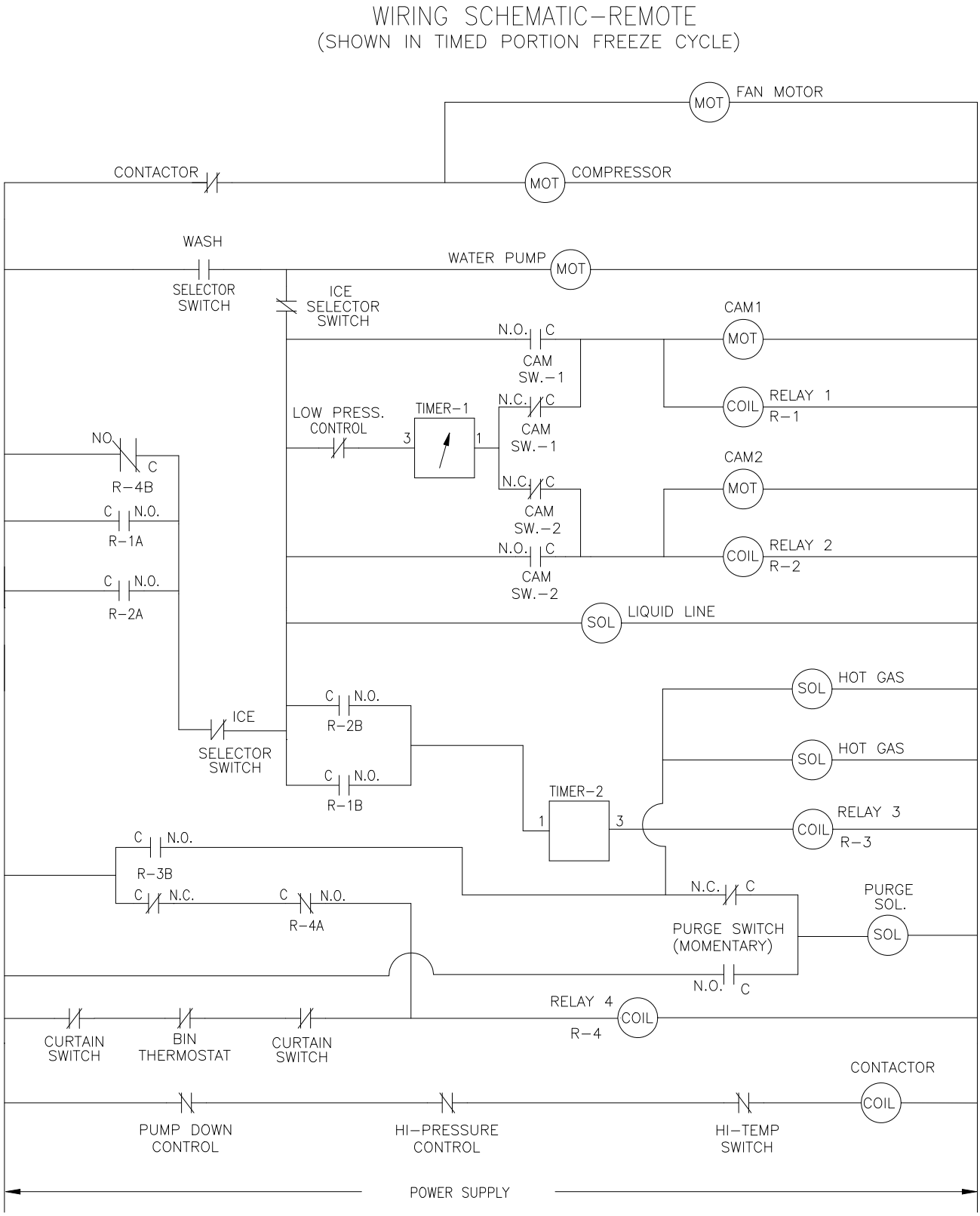
CCM1448/CCM1848/CCM2148, 3 Phase, Remote Wiring Schematic



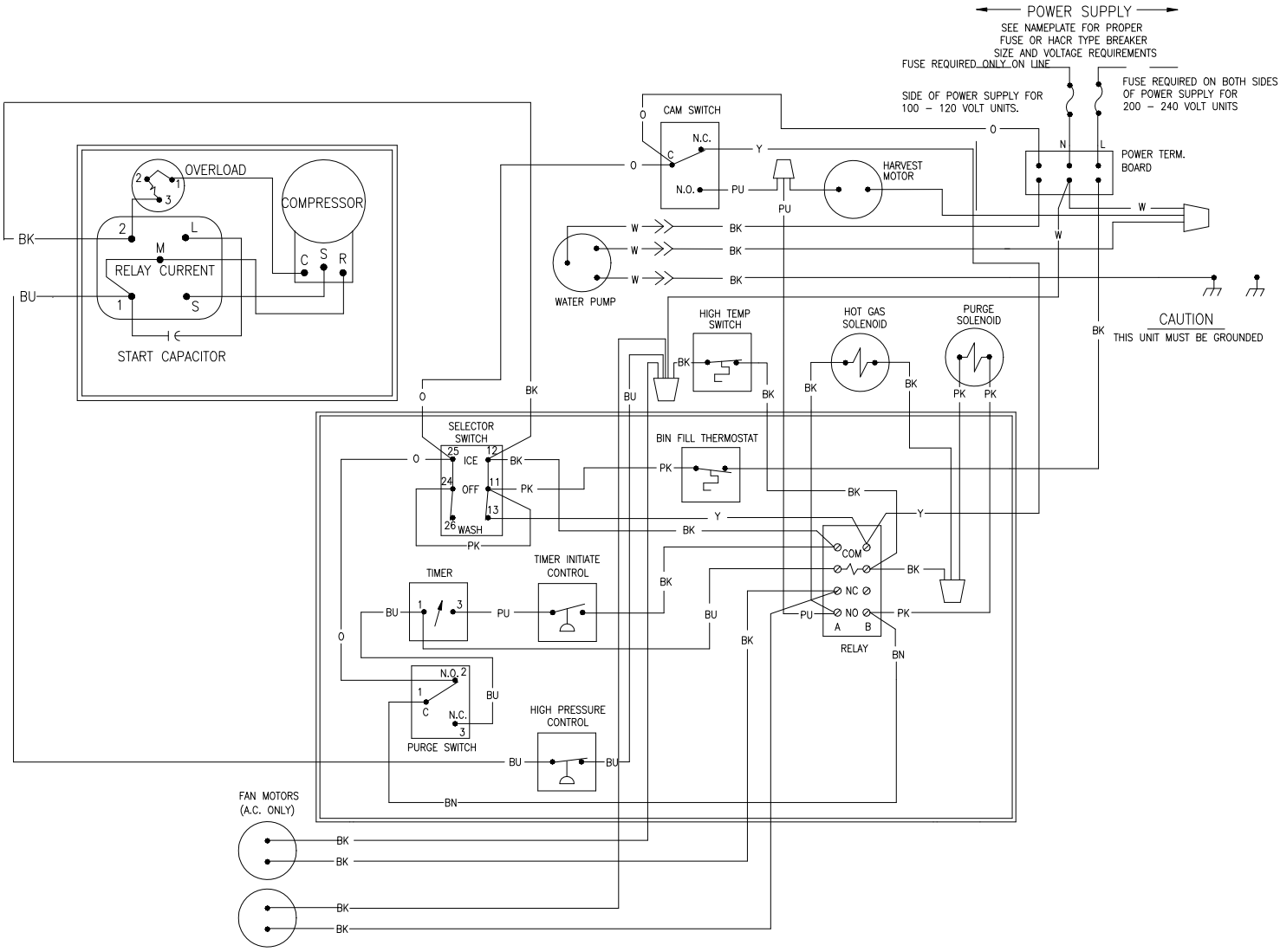
CCM1530 Remote Wiring Diagram



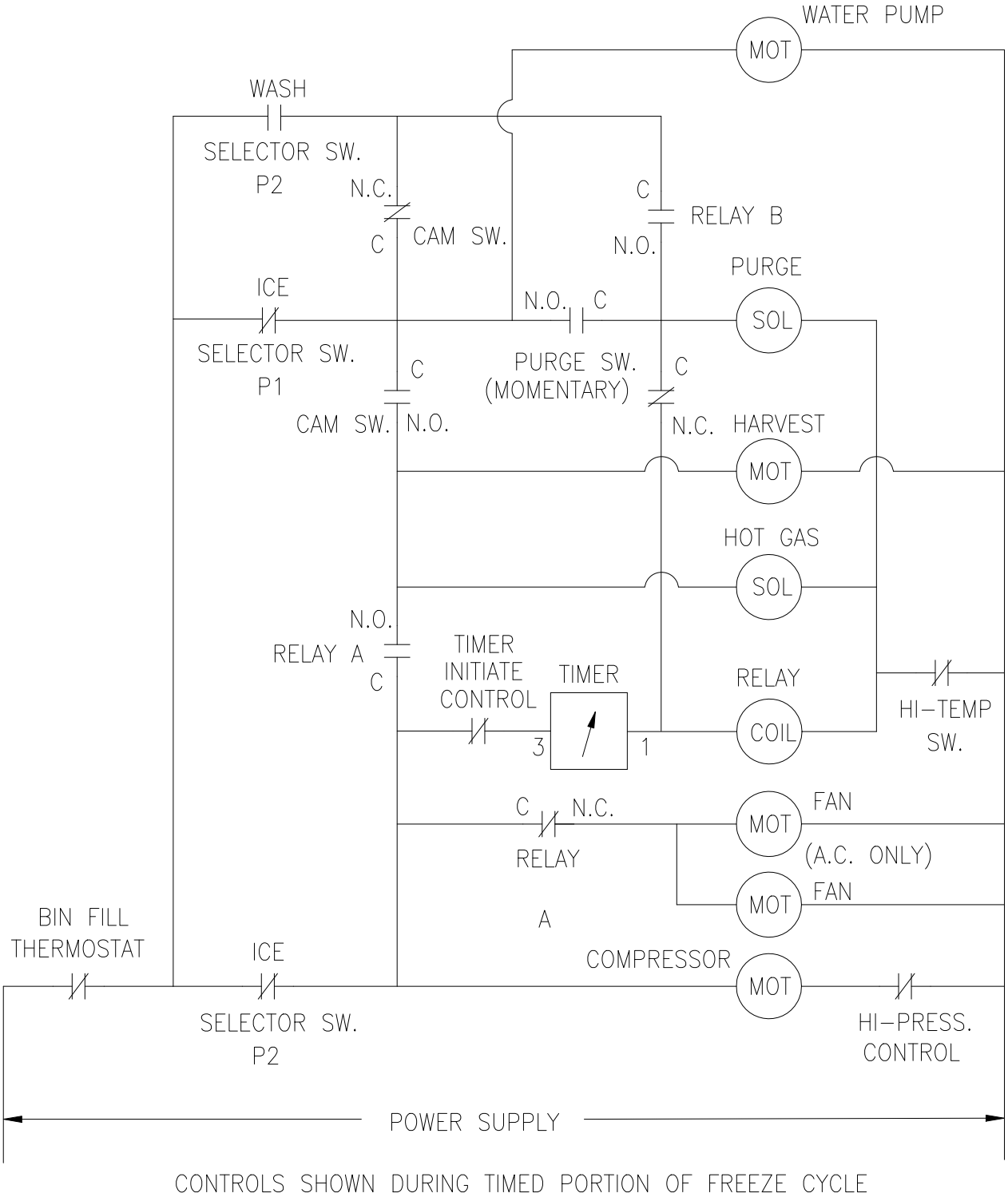
CCM1530 Remote Wiring Schematic



CCU0300, 115V, Air and Water Wiring Diagram

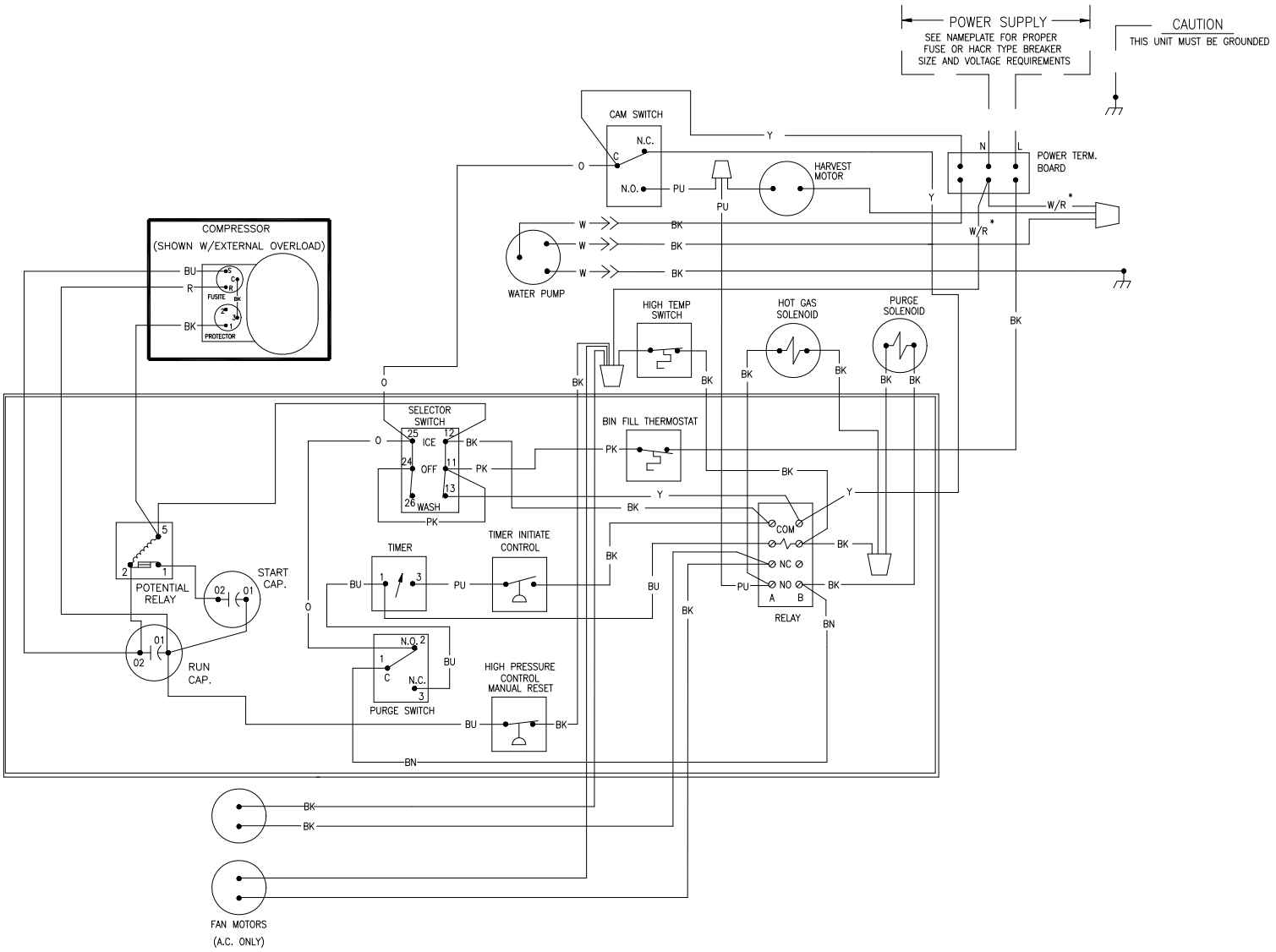


CCU0300, 115V, Air and Water Wiring Schematic

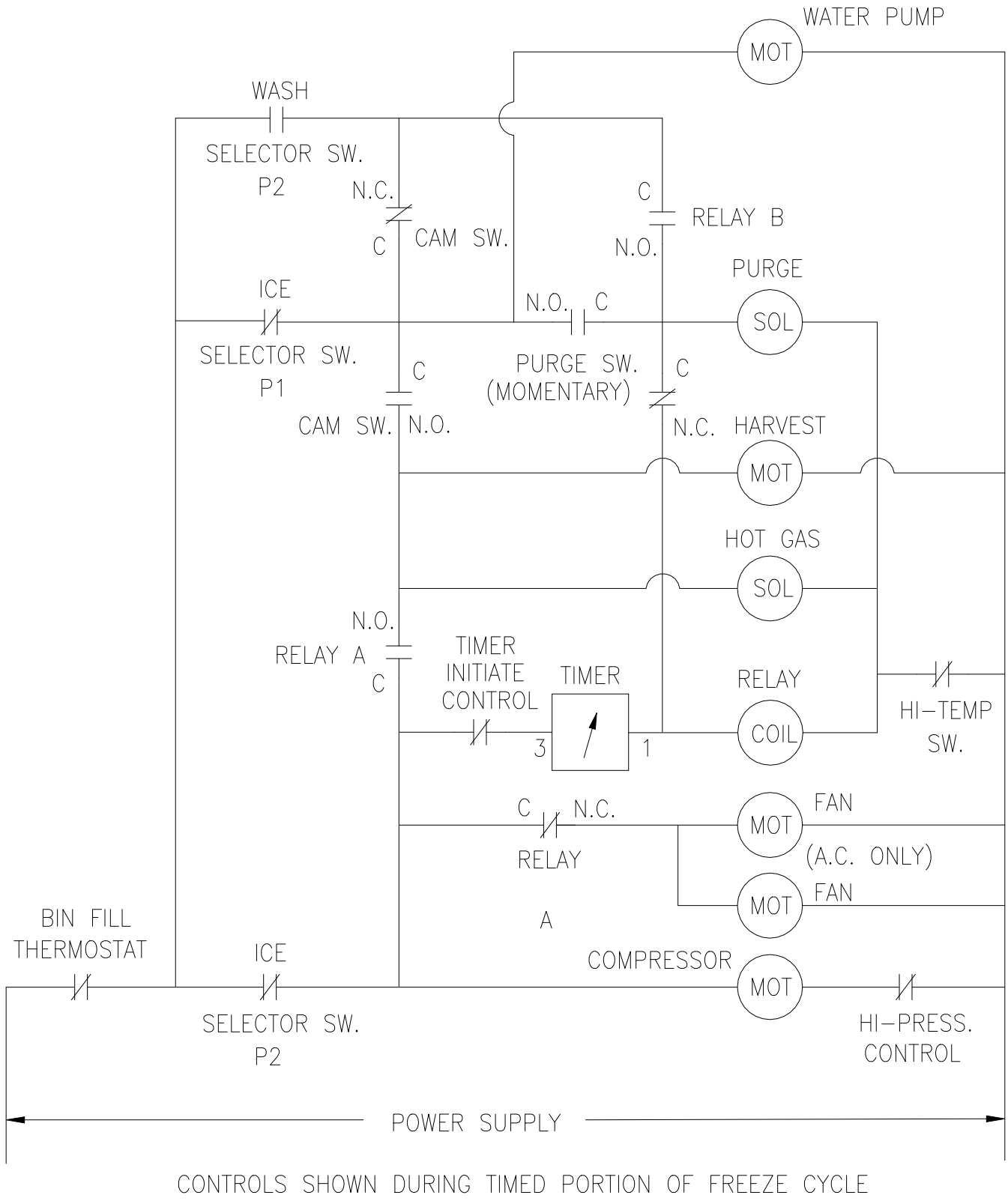


CONTROLS SHOWN DURING TIMED PORTION OF FREEZE CYCLE

CCU0300, 50 Cycle, Air and Water Wiring Diagram

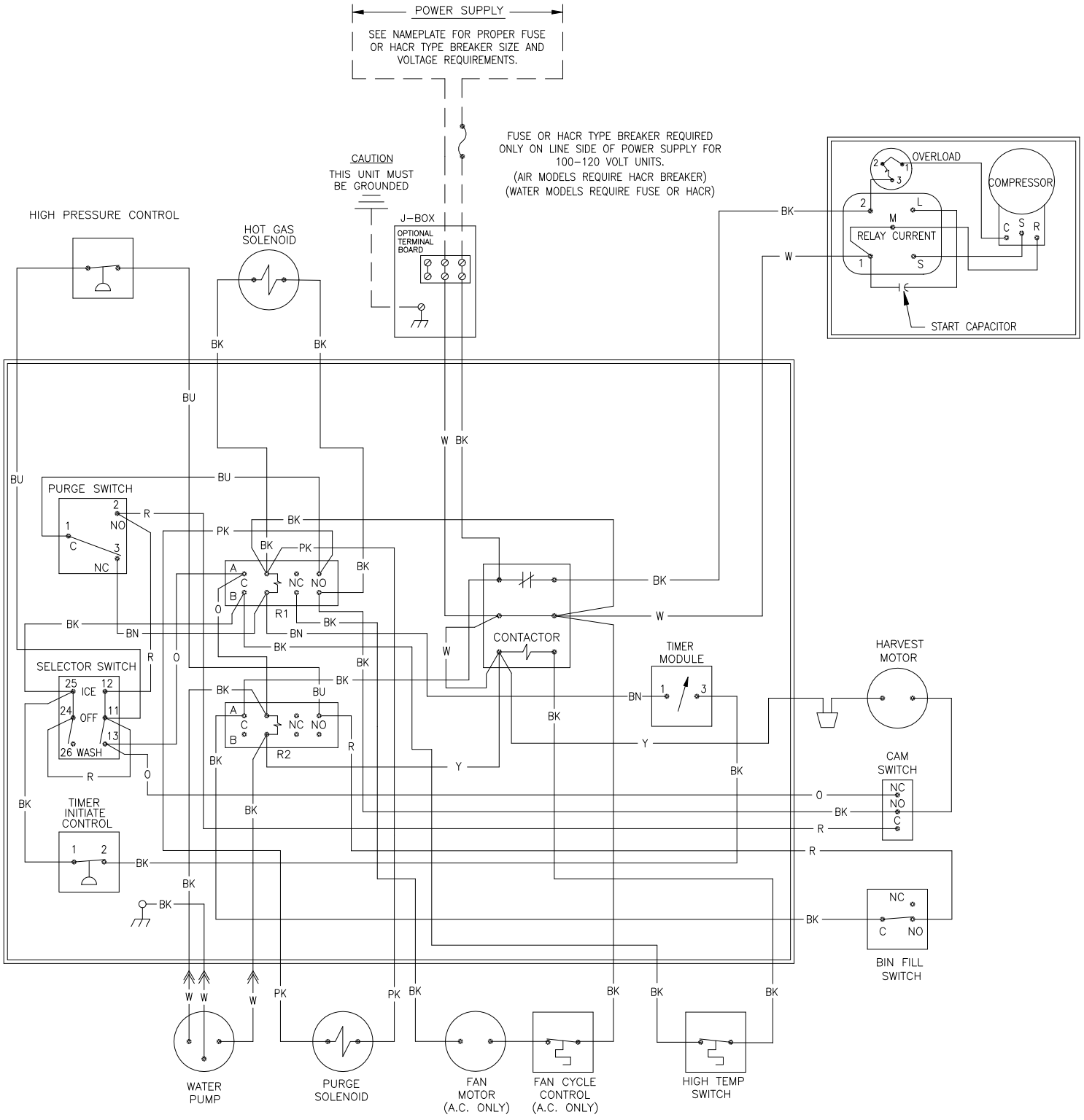


CCU0300, 50 Cycle, Air and Water Wiring Schematic

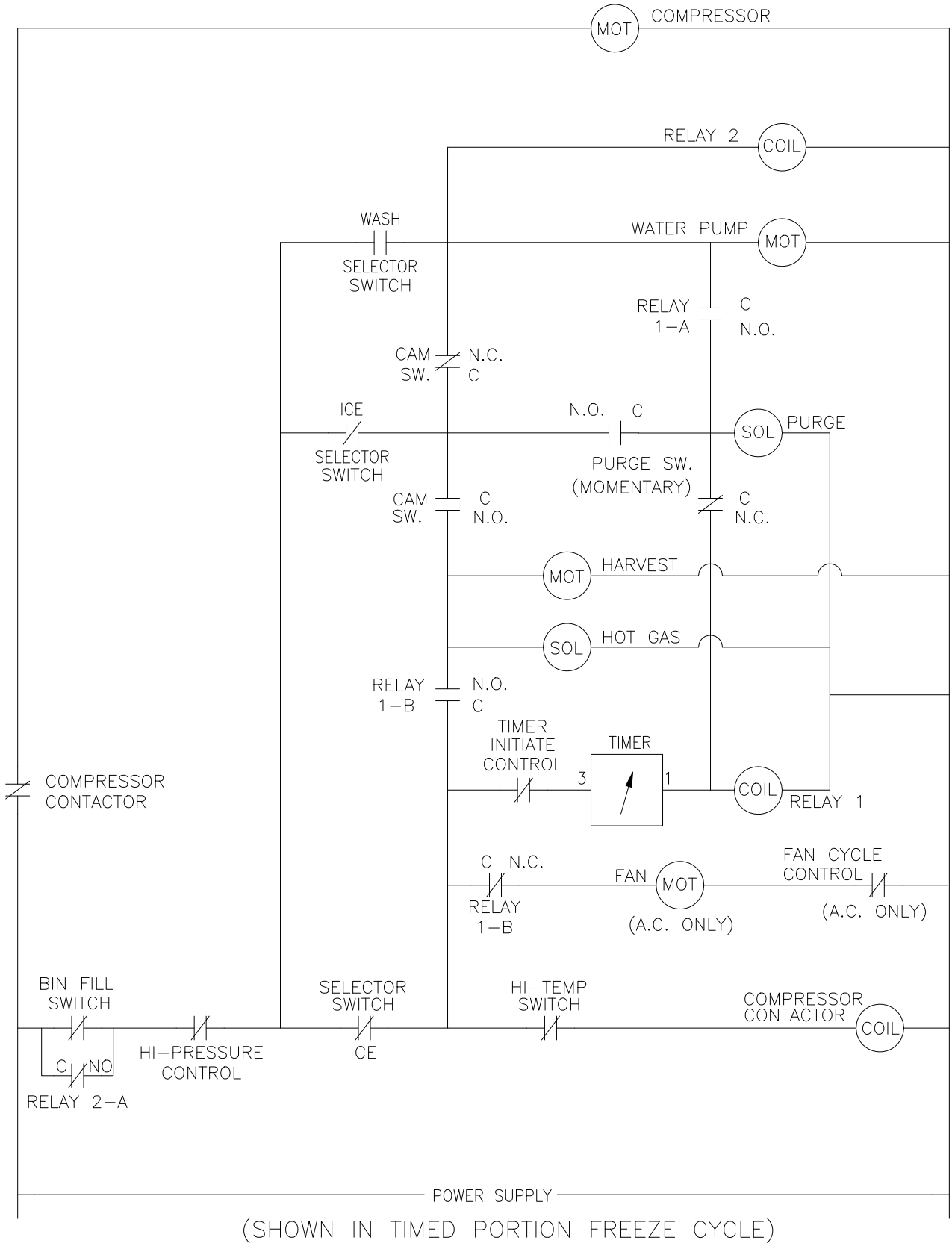


CONTROLS SHOWN DURING TIMED PORTION OF FREEZE CYCLE

CCM0330/CCM0430, 115V, Air and Water Wiring Diagram

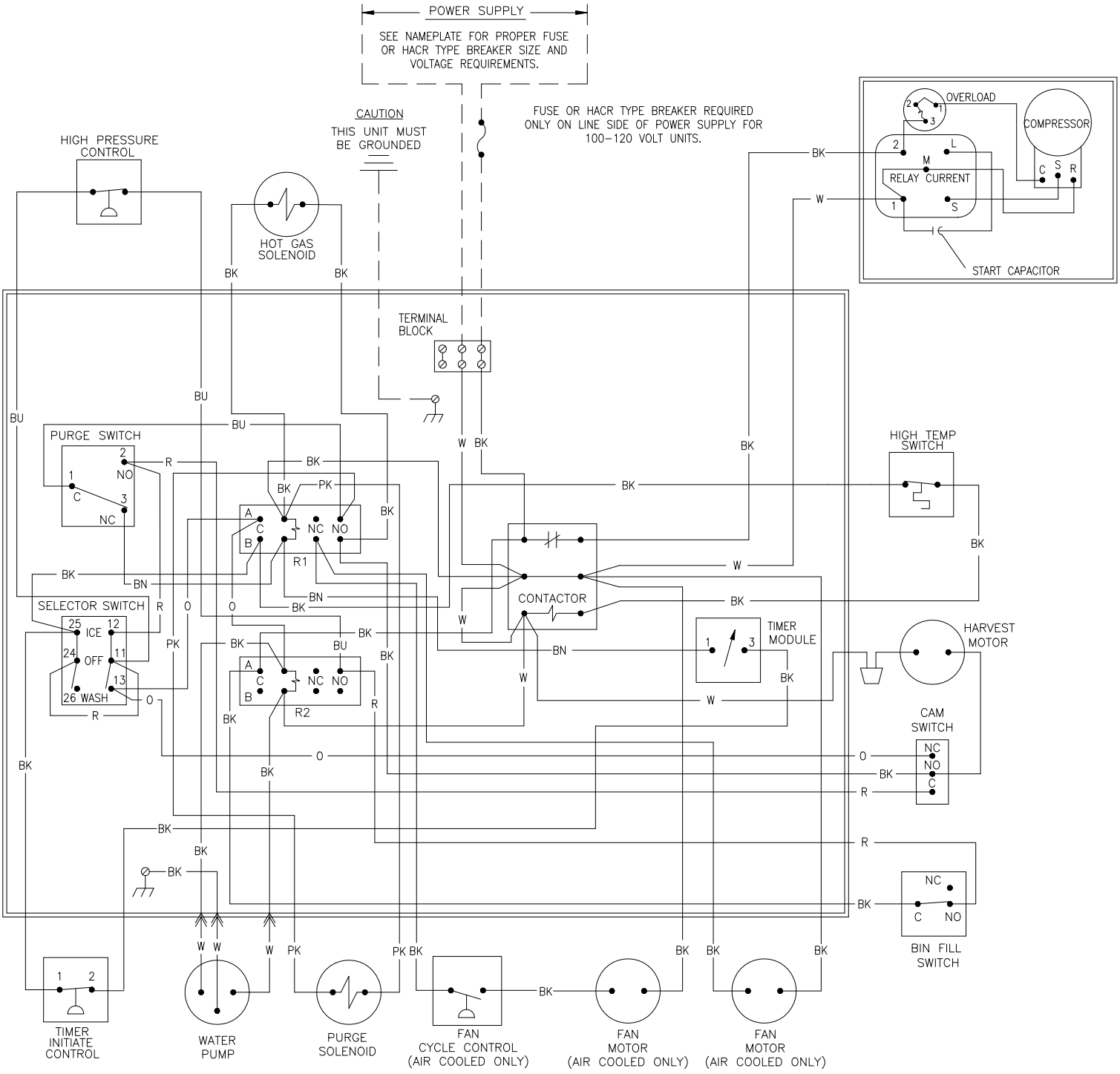


CCM0330/CCM0430, 115V, Air and Water Wiring Schematic

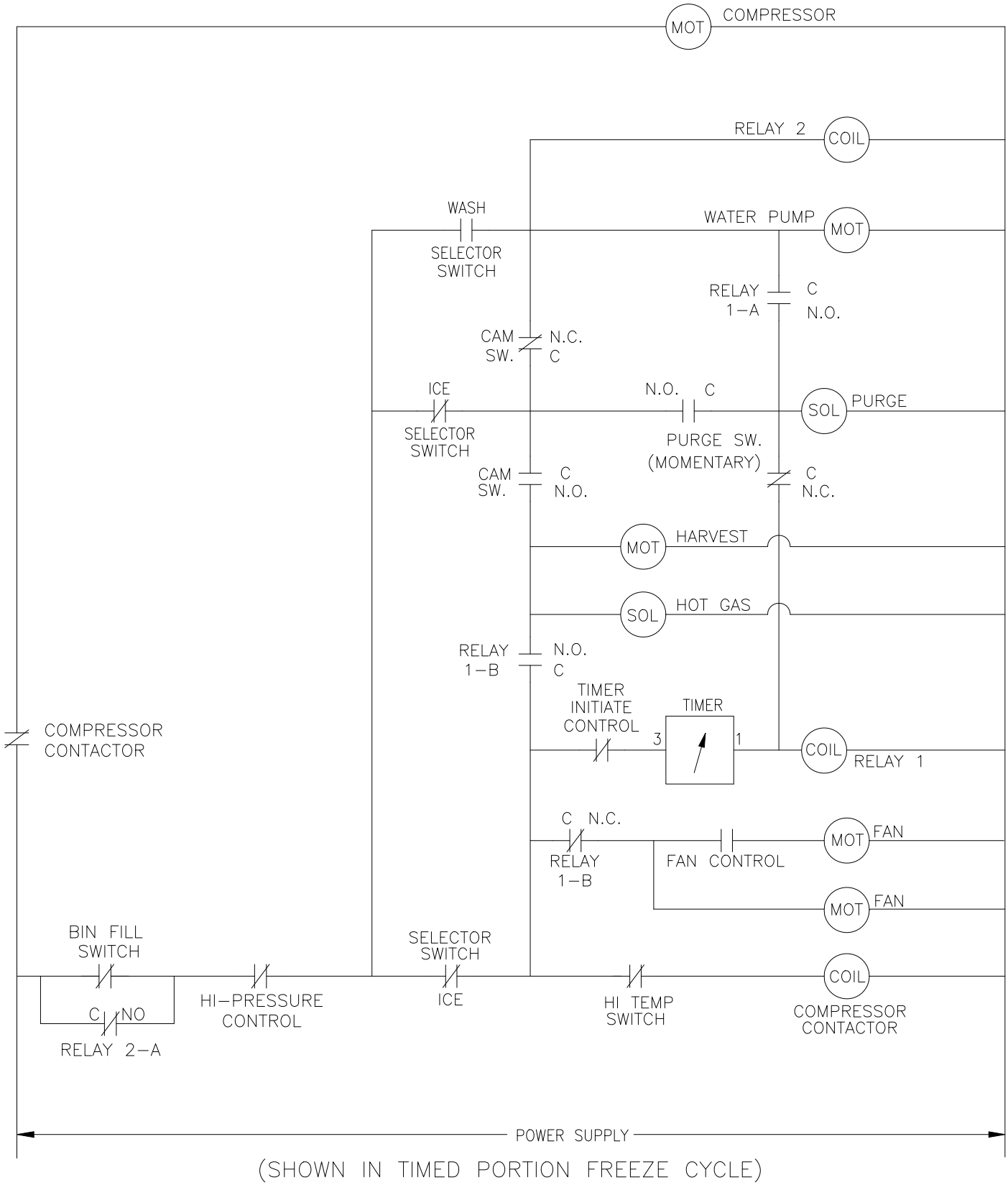


(SHOWN IN TIMED PORTION FREEZE CYCLE)

CCM0322/CCM0522, 115V, Air and Water Wiring Diagram

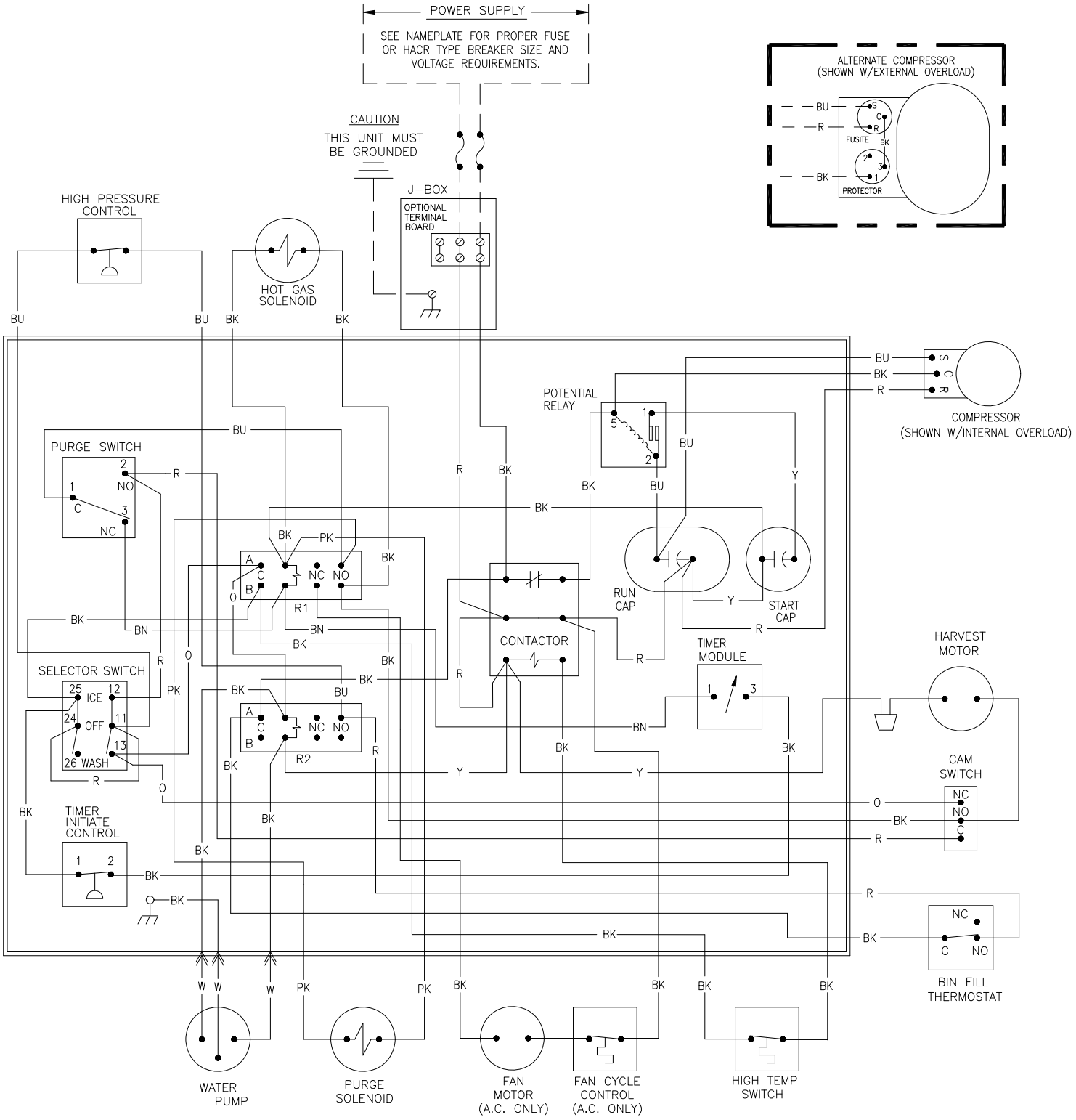


CCM0322/CCM0522, 115V, Air and Water Wiring Schematic

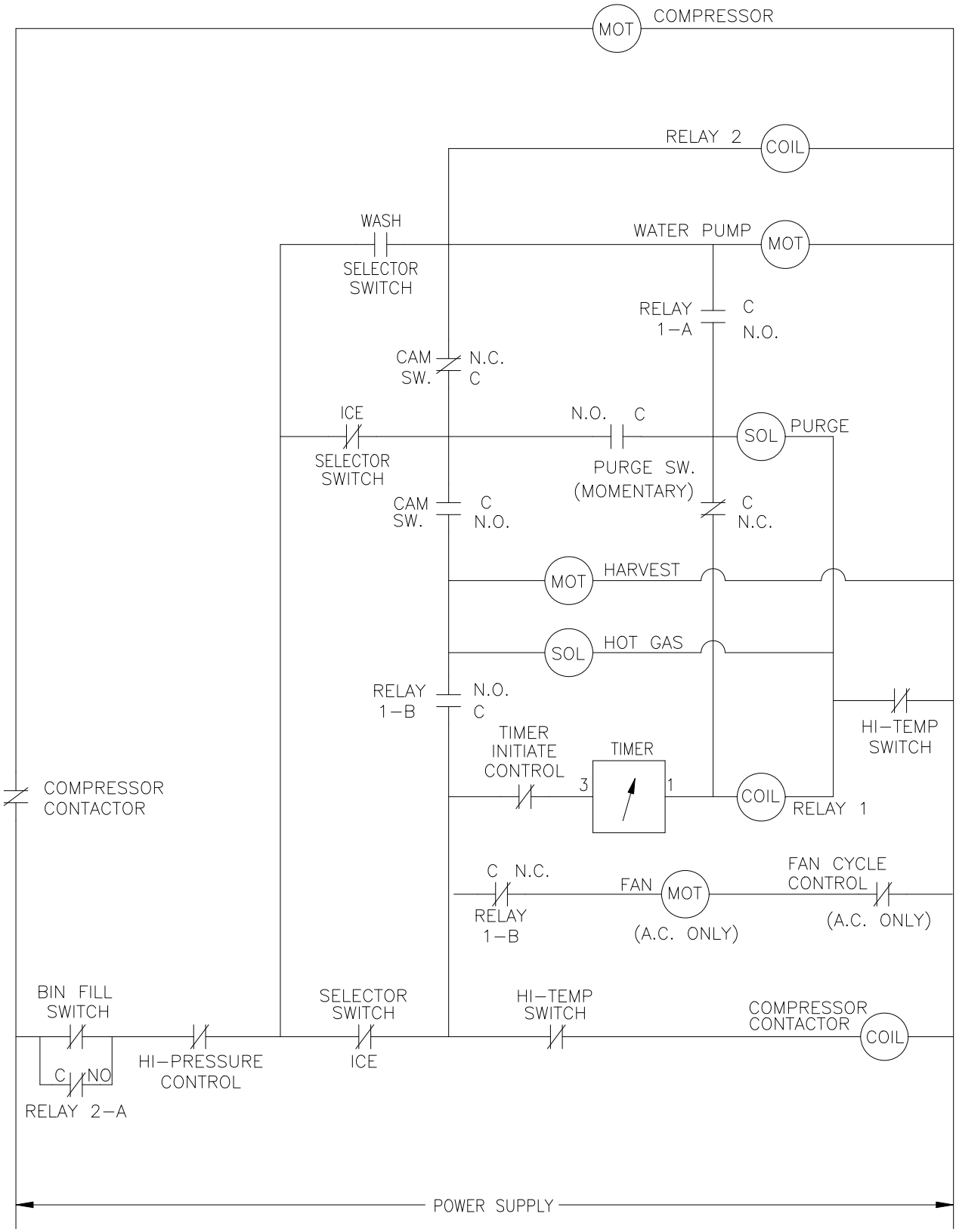


(SHOWN IN TIMED PORTION FREEZE CYCLE)

CCM0330/CCM0430 Air and Water Wiring Diagram
Includes 230/60/1 and 50 Cycle

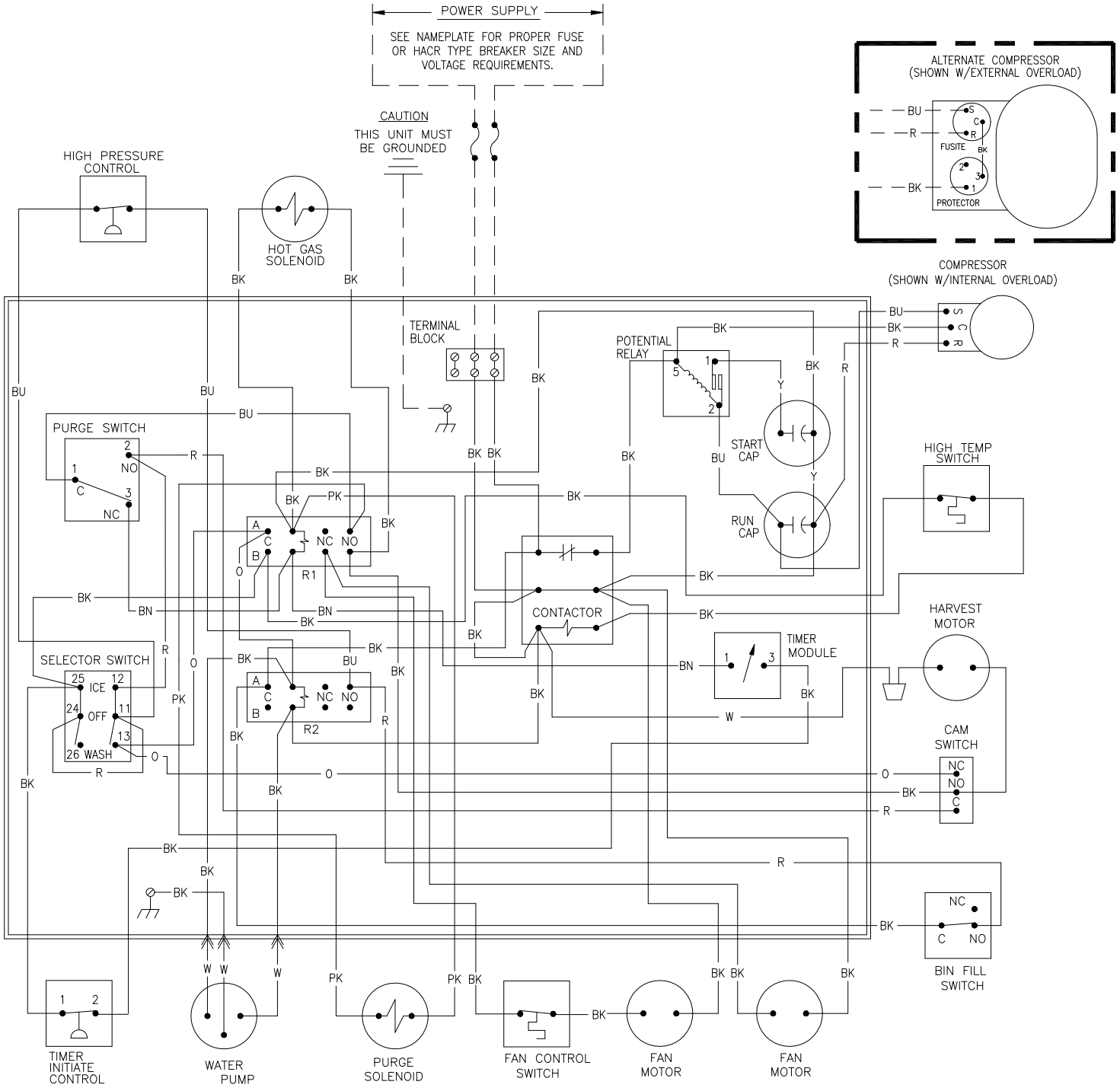


CCM0330/CCM0430 Air and Water Wiring Schematic
Includes 230/60/1 and 50 Cycle

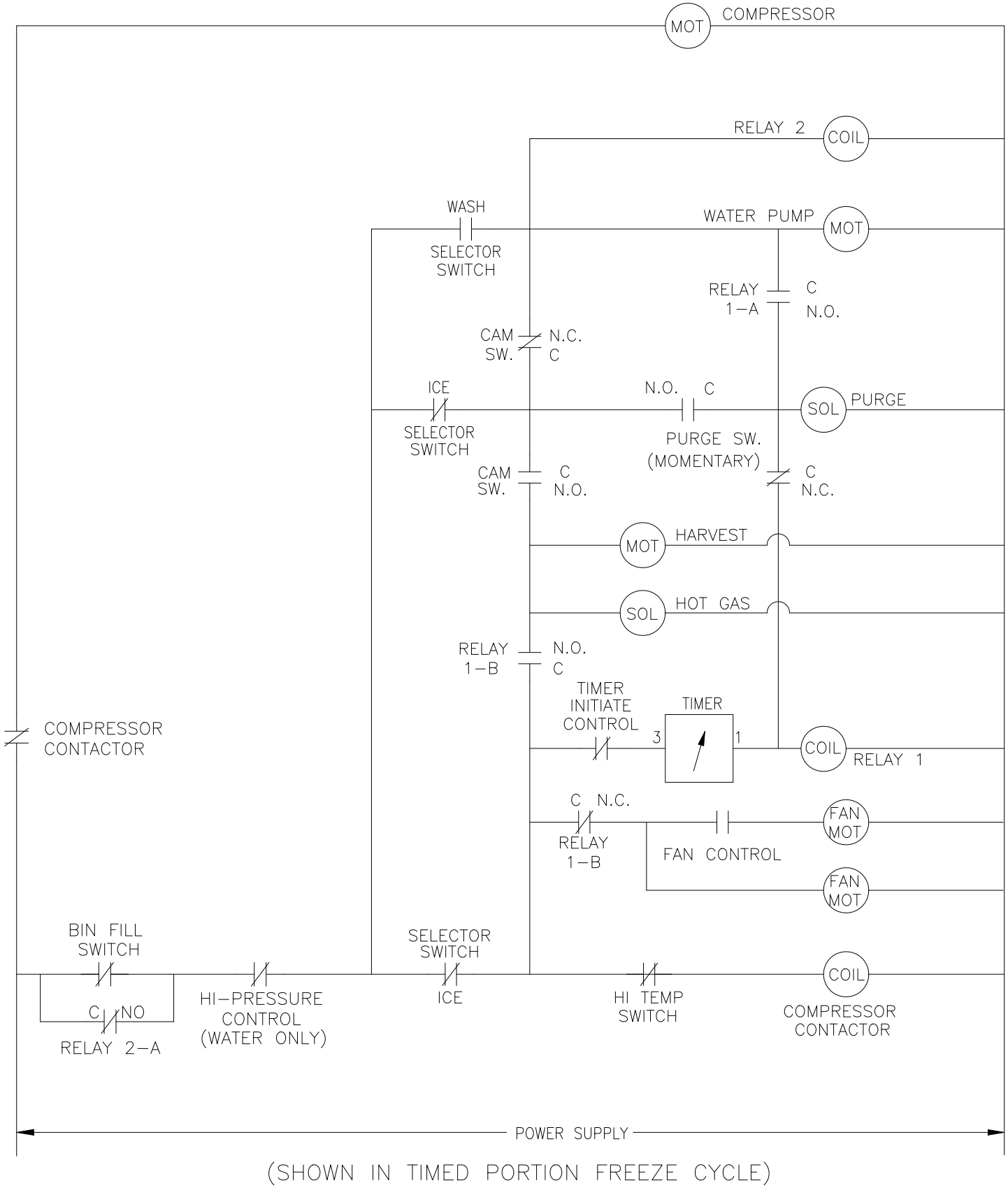


(SHOWN IN TIMED PORTION FREEZE CYCLE)

CCM0322/CCM0522, 50 Cycle, Air and Water Wiring Diagram

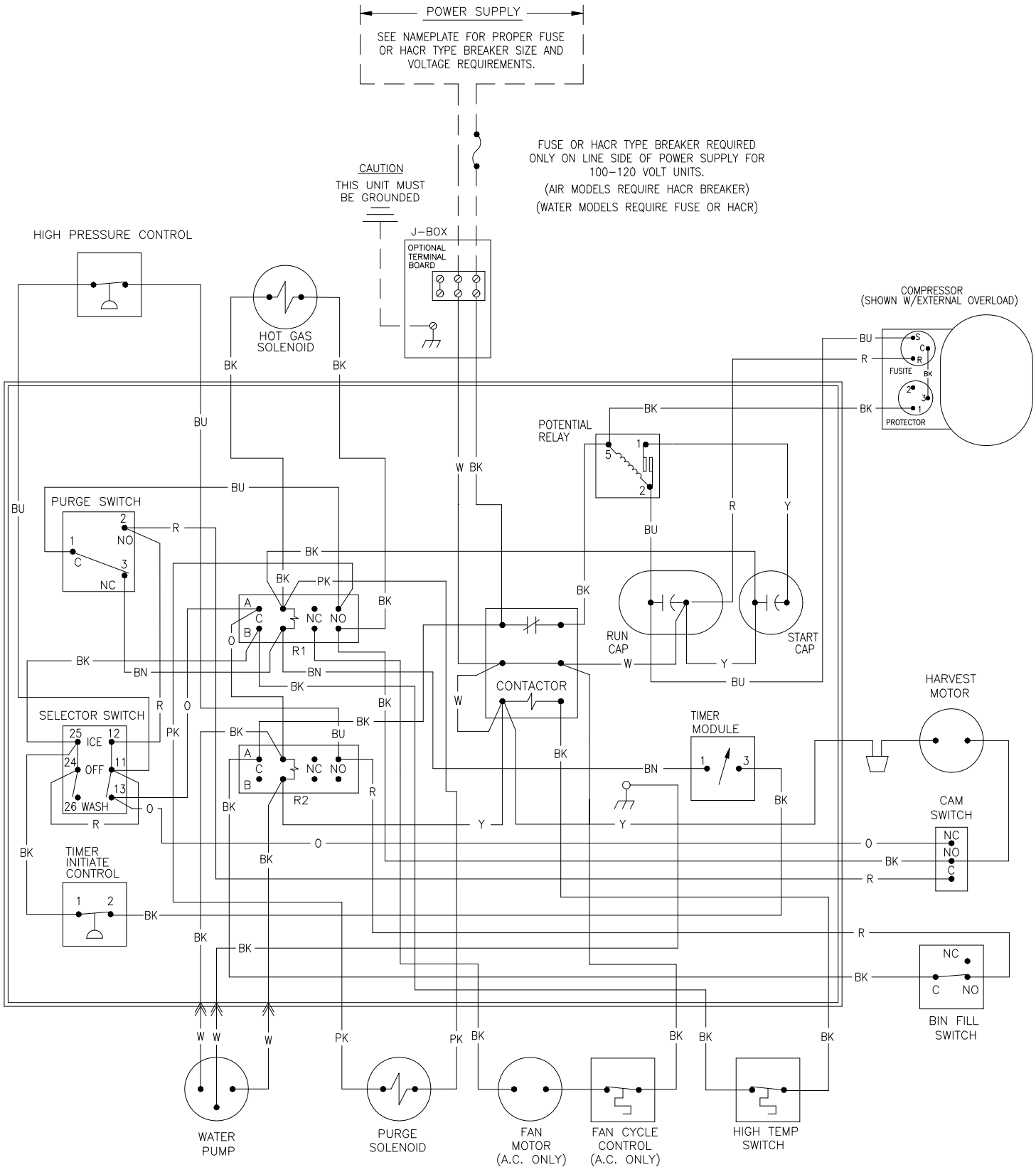


CCM0322/CCM0522, 50 Cycle, Air and Water Wiring Schematic

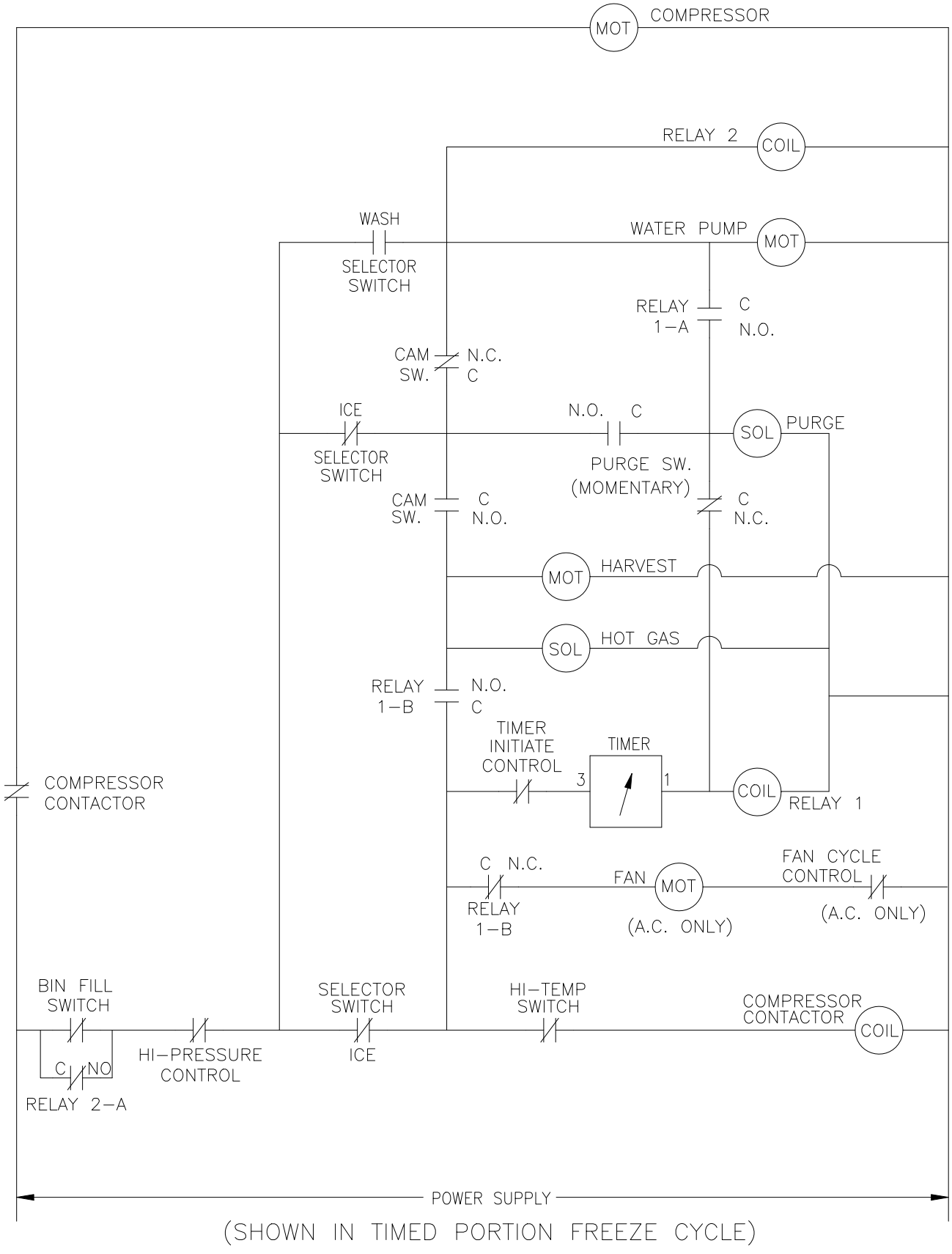


(SHOWN IN TIMED PORTION FREEZE CYCLE)

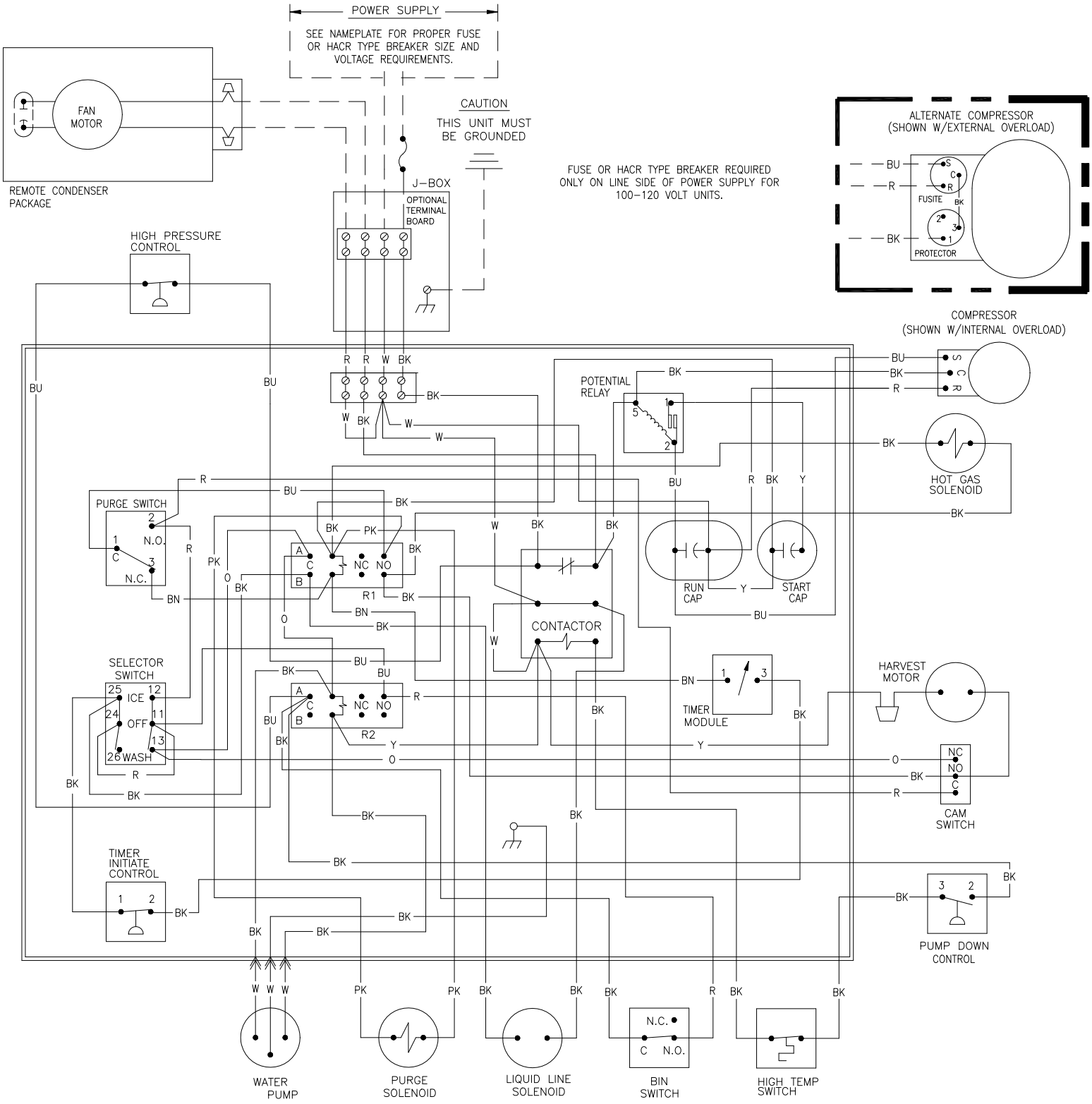
CCM0530 Air and Water Wiring Diagram



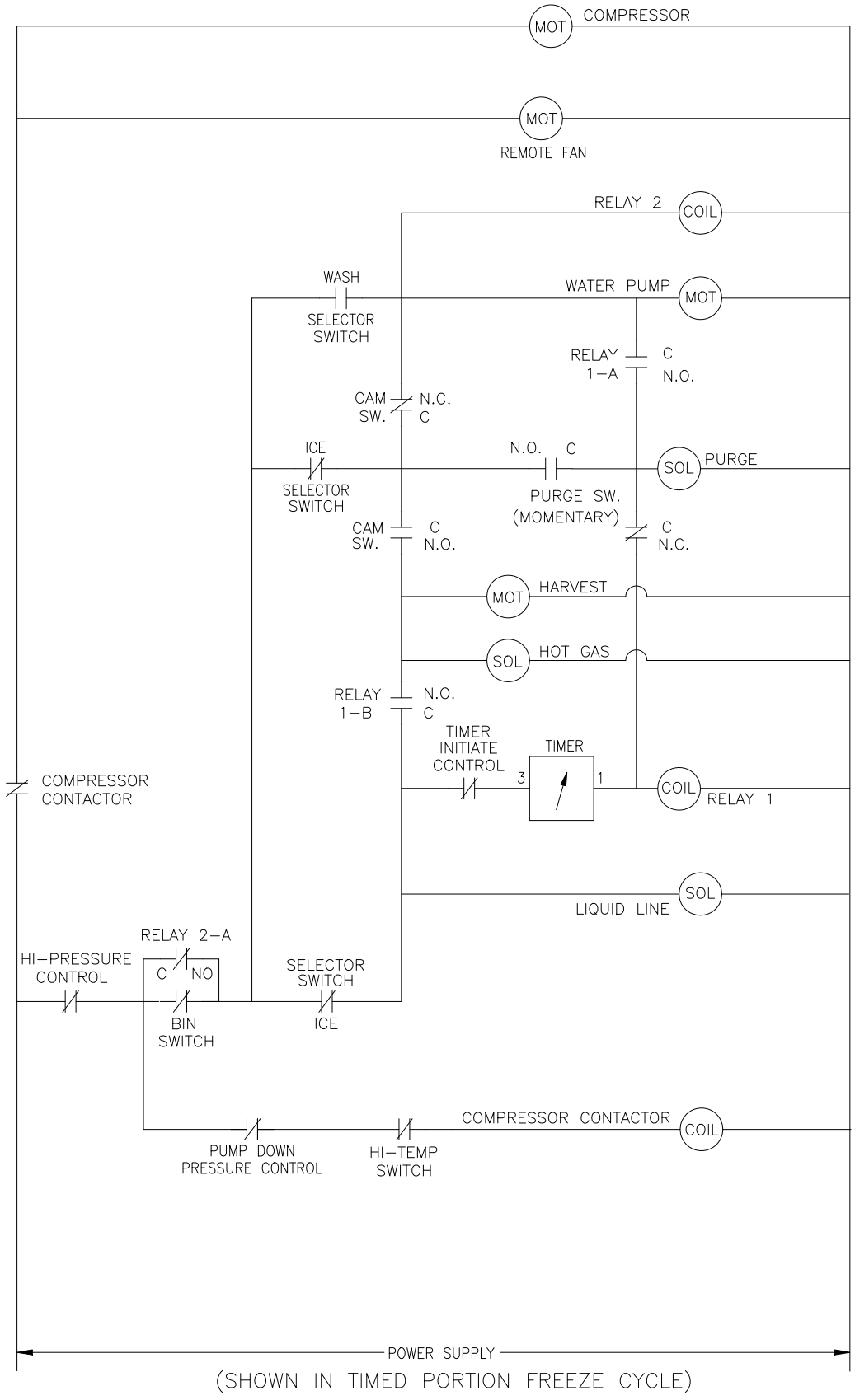
CCM0530 Air and Water Wiring Schematic



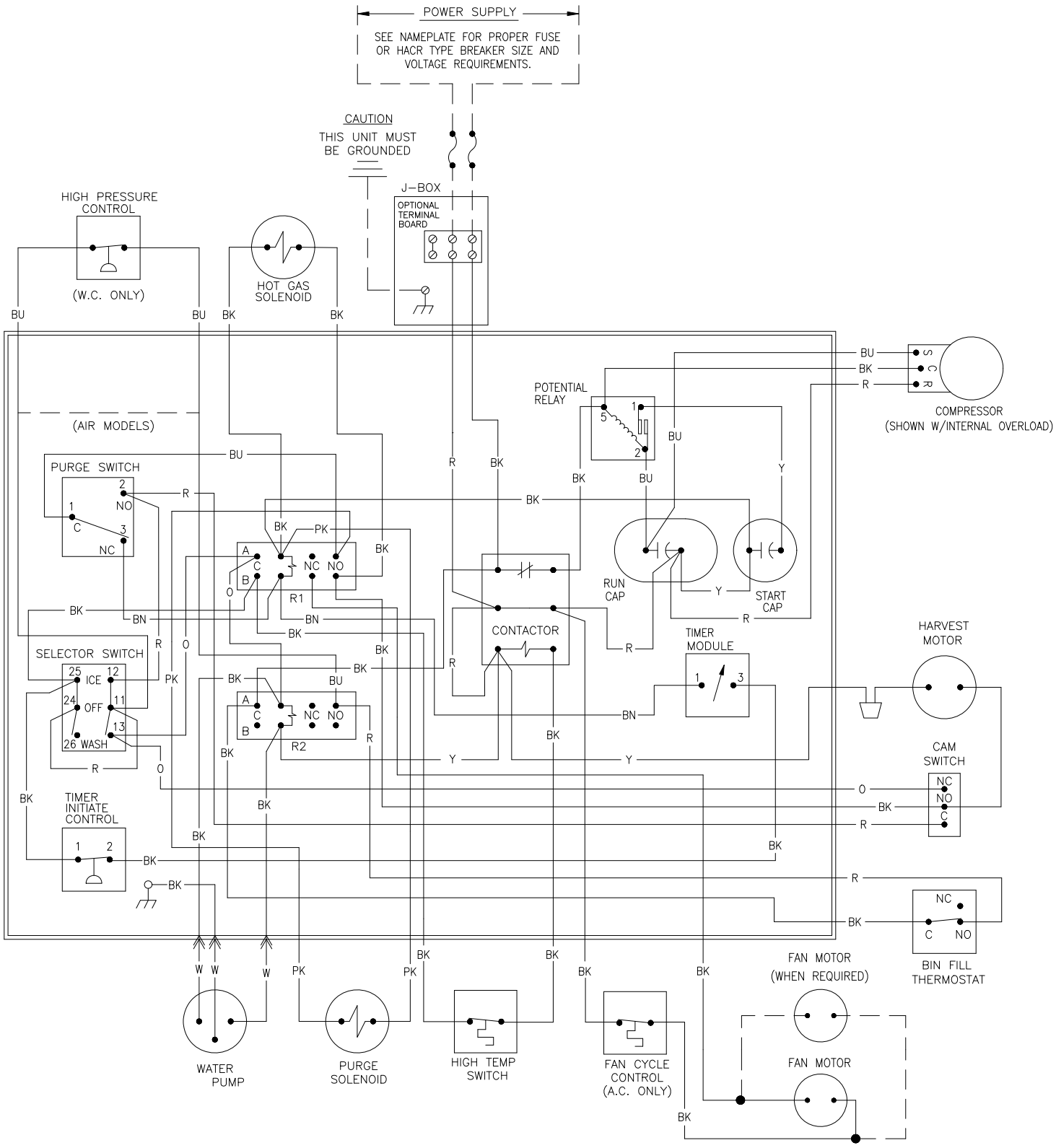
CCM0530 Remote Wiring Diagram



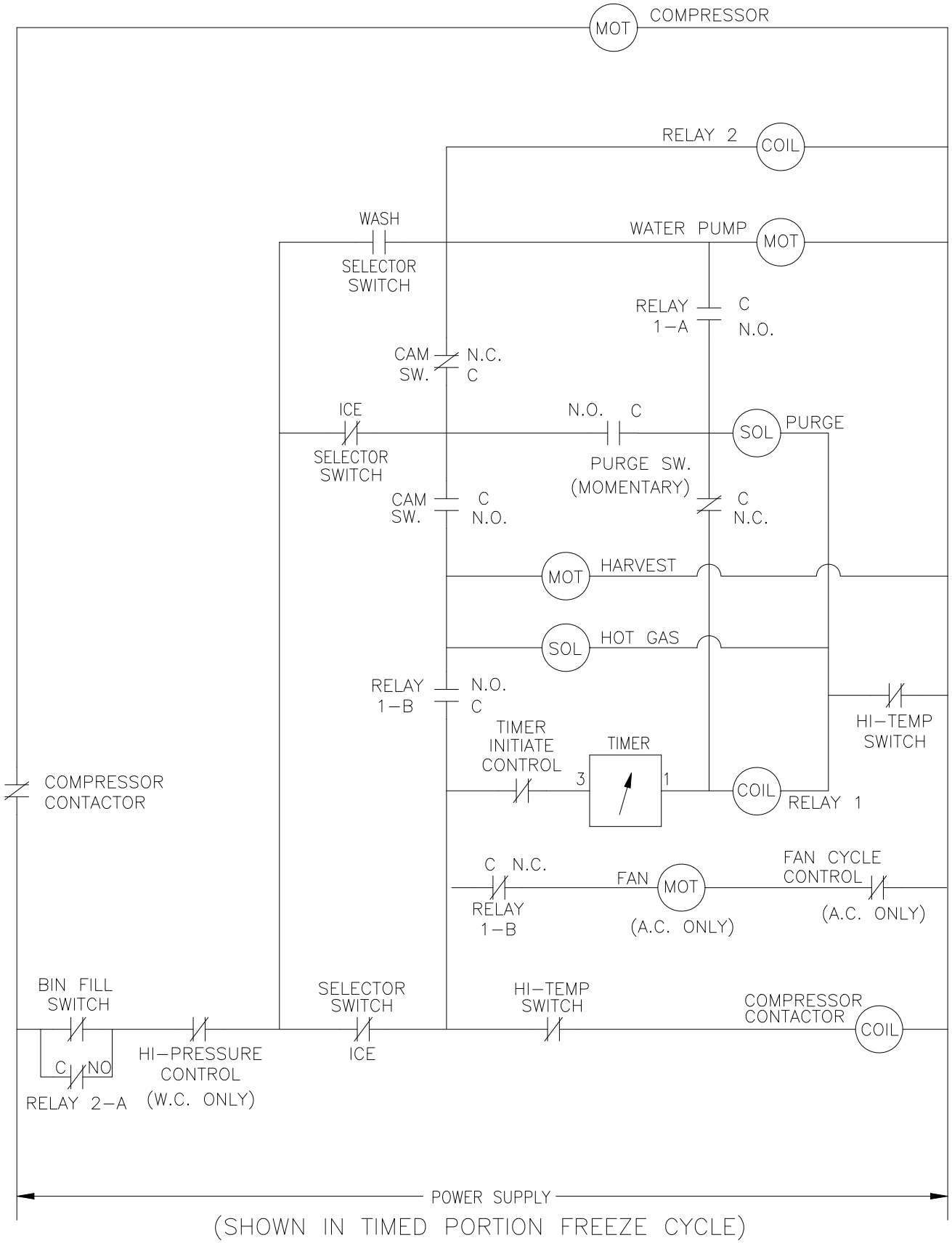
CCM0530 Remote Wiring Schematic



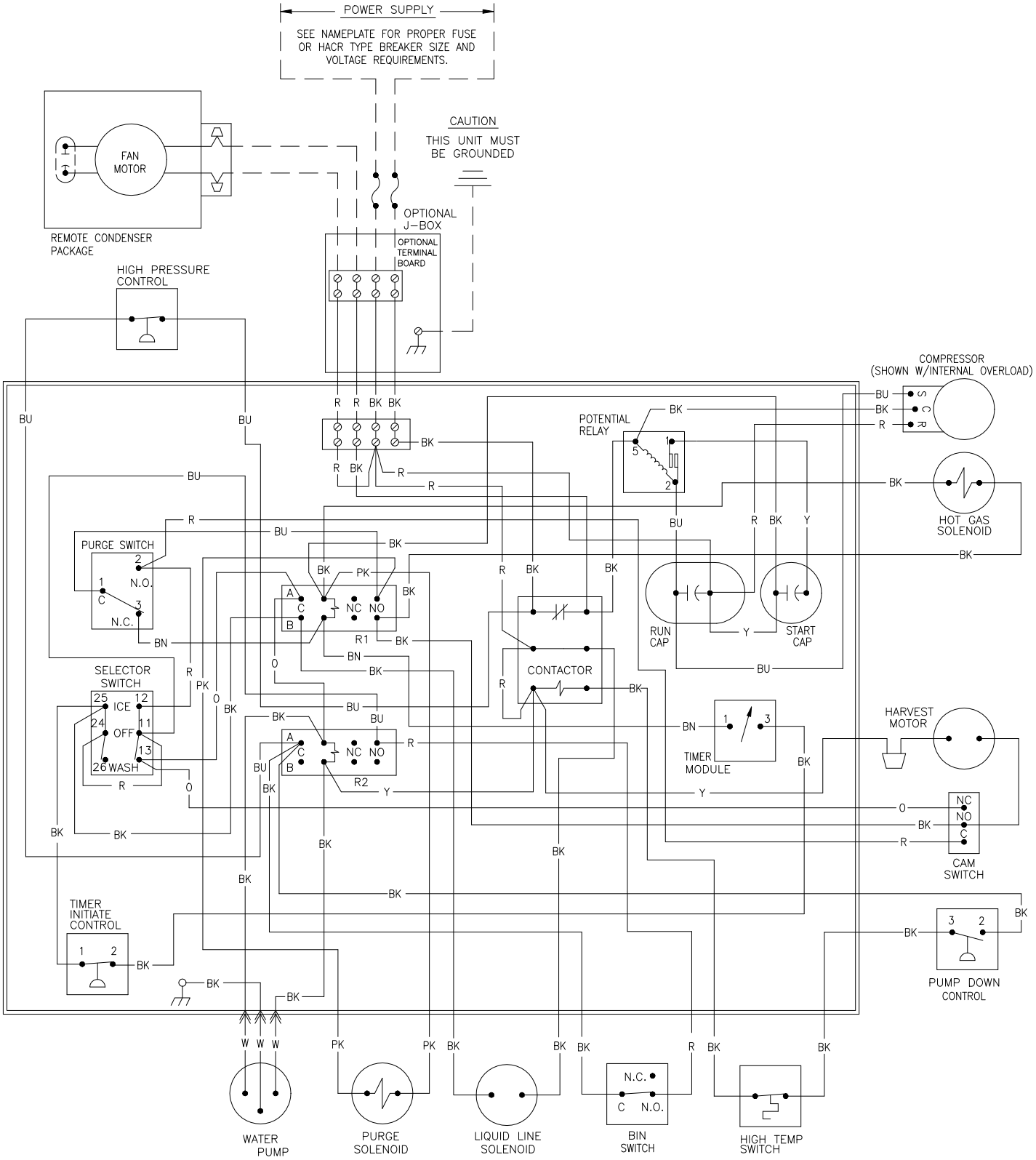
CCM0630 Air and Water Wiring Diagram
Includes 50 Cycle



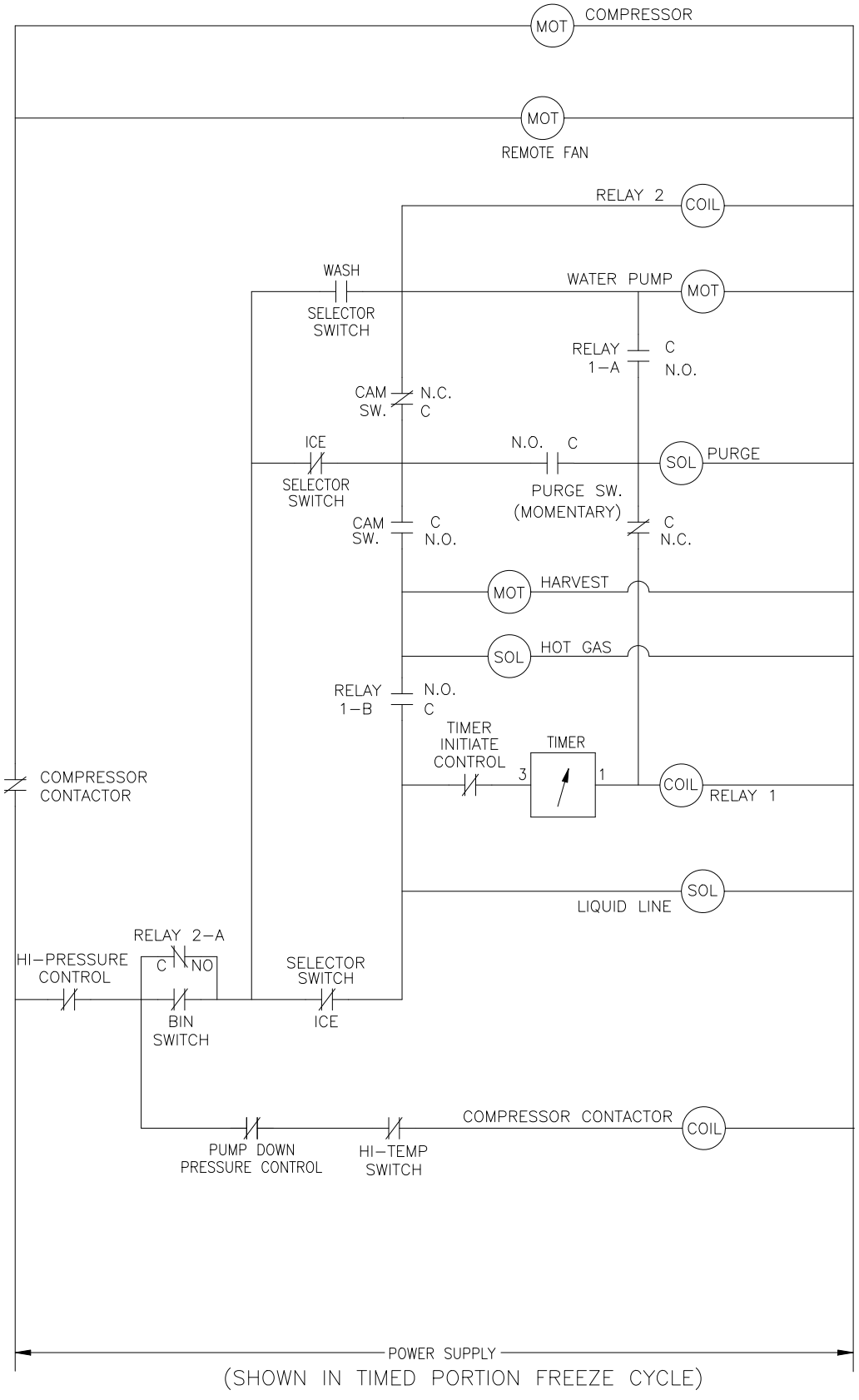
CCM0630 Air and Water Wiring Schematic
Includes 50 Cycle



CCM0630 Remote Wiring Diagram
Includes 50 Cycle

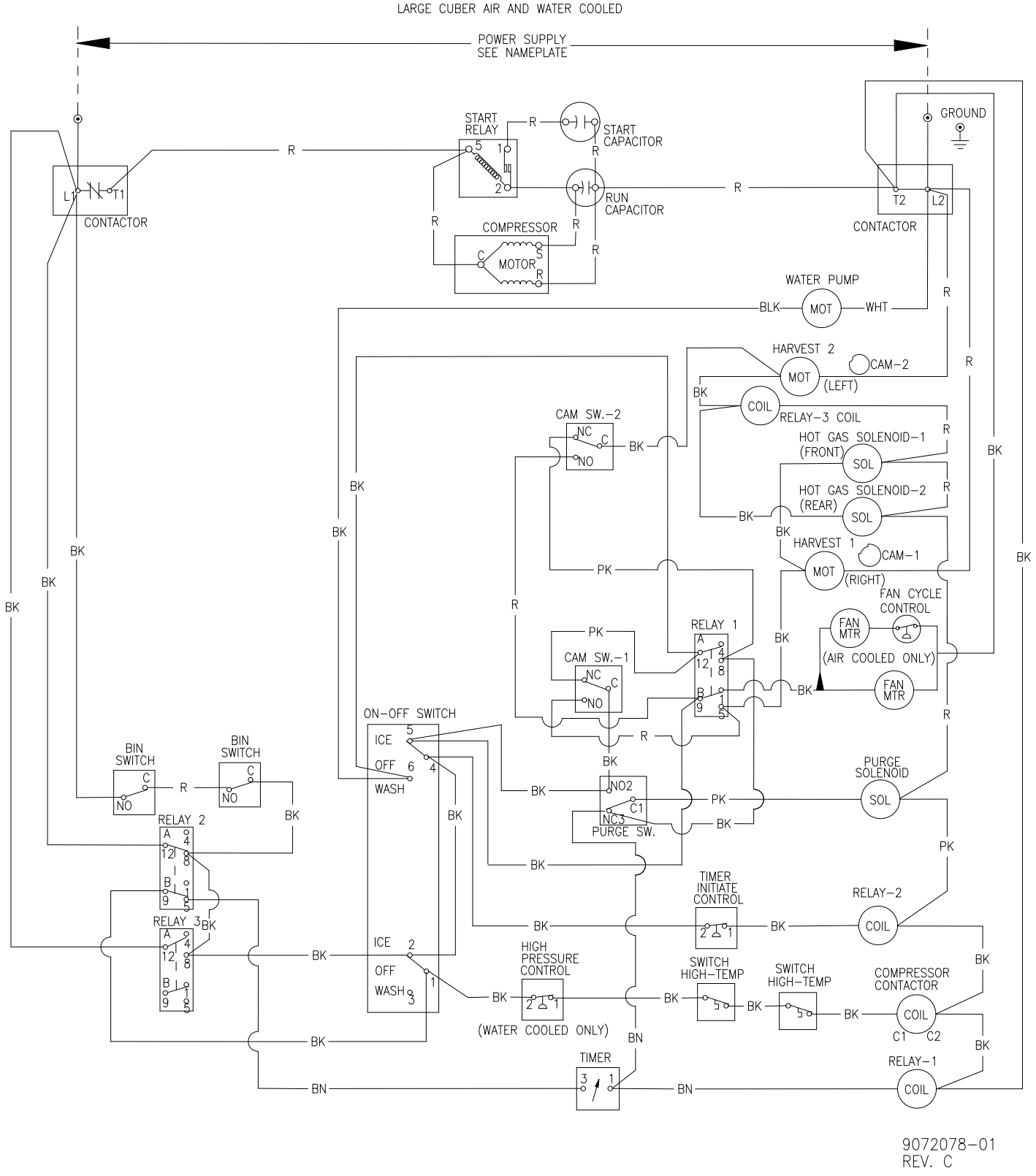


CCM0630 Remote Wiring Schematic
Includes 50 Cycle

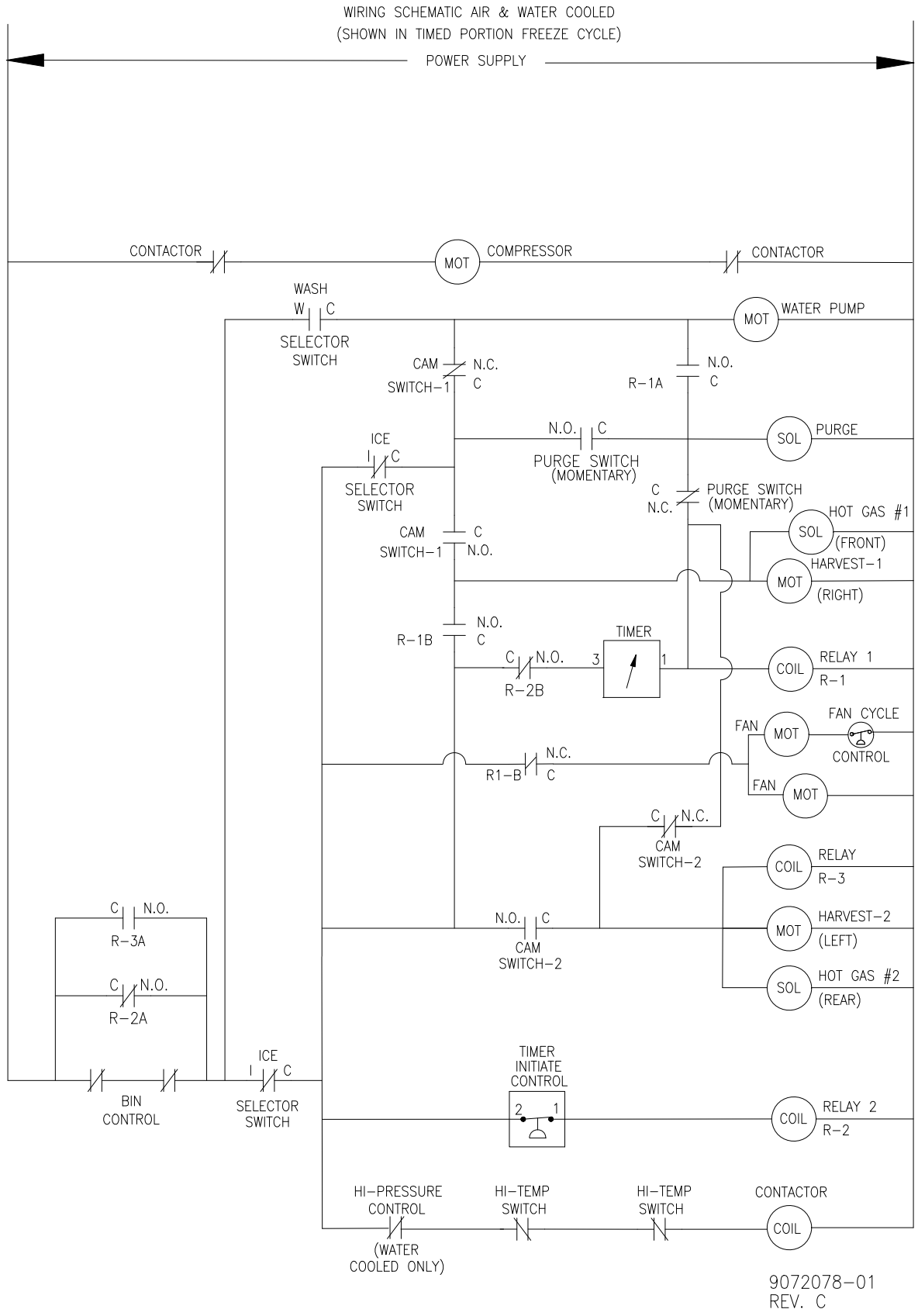


(SHOWN IN TIMED PORTION FREEZE CYCLE)

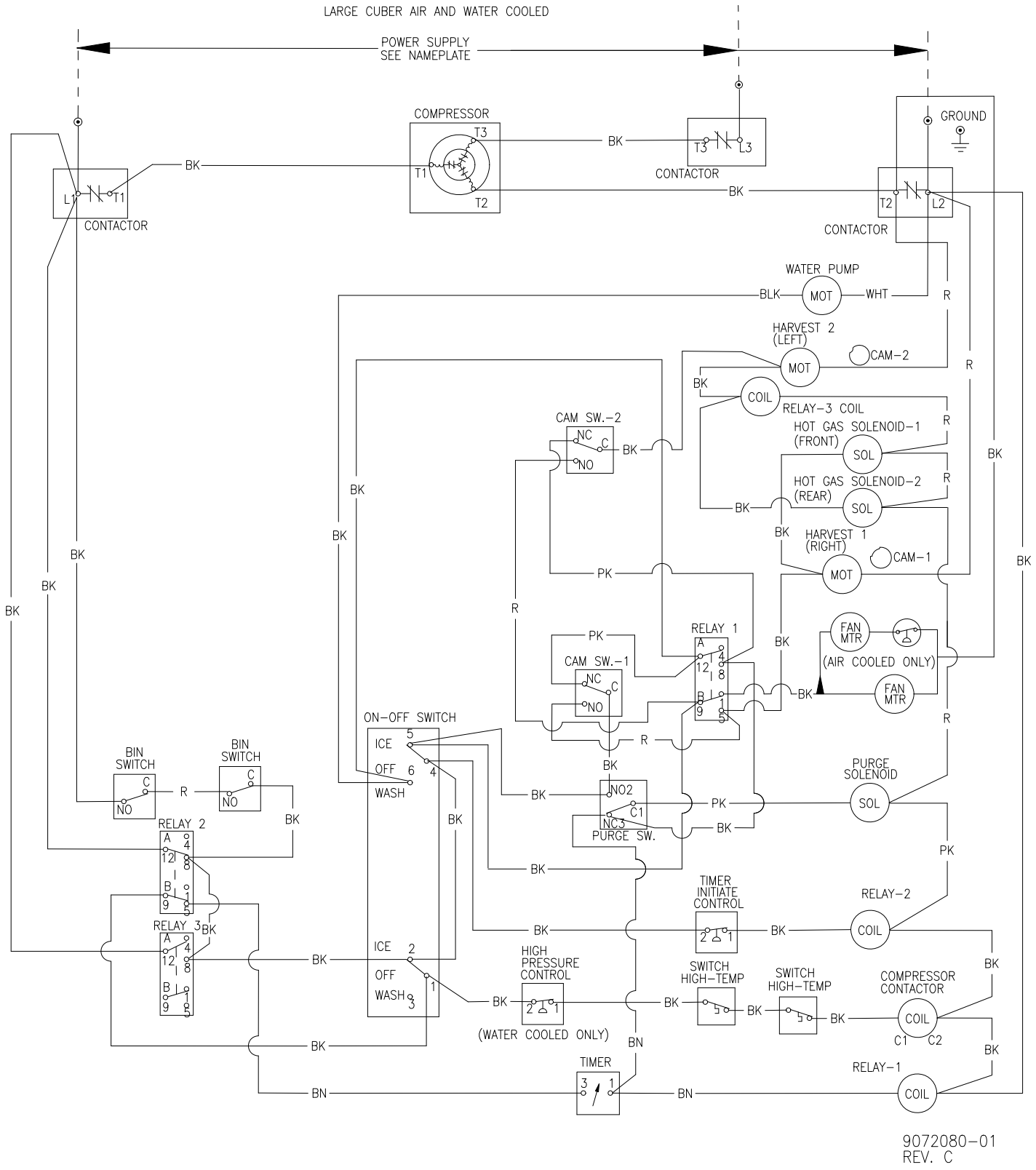
CCM1448 A/W 2/5 1, CCM1848 W 2 1 and CCM2148 W 2 1 Wiring Diagram (Jan 2008)



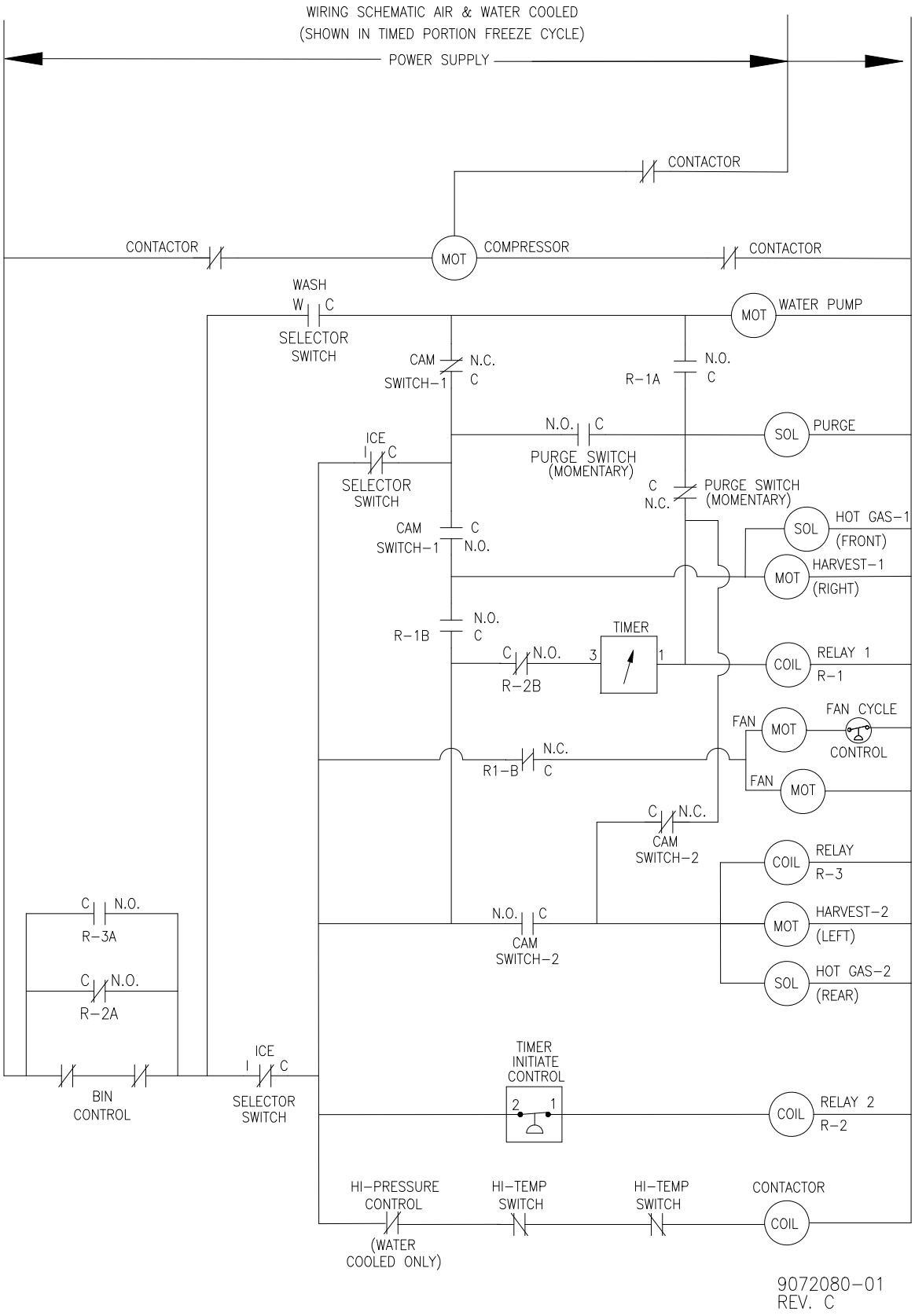
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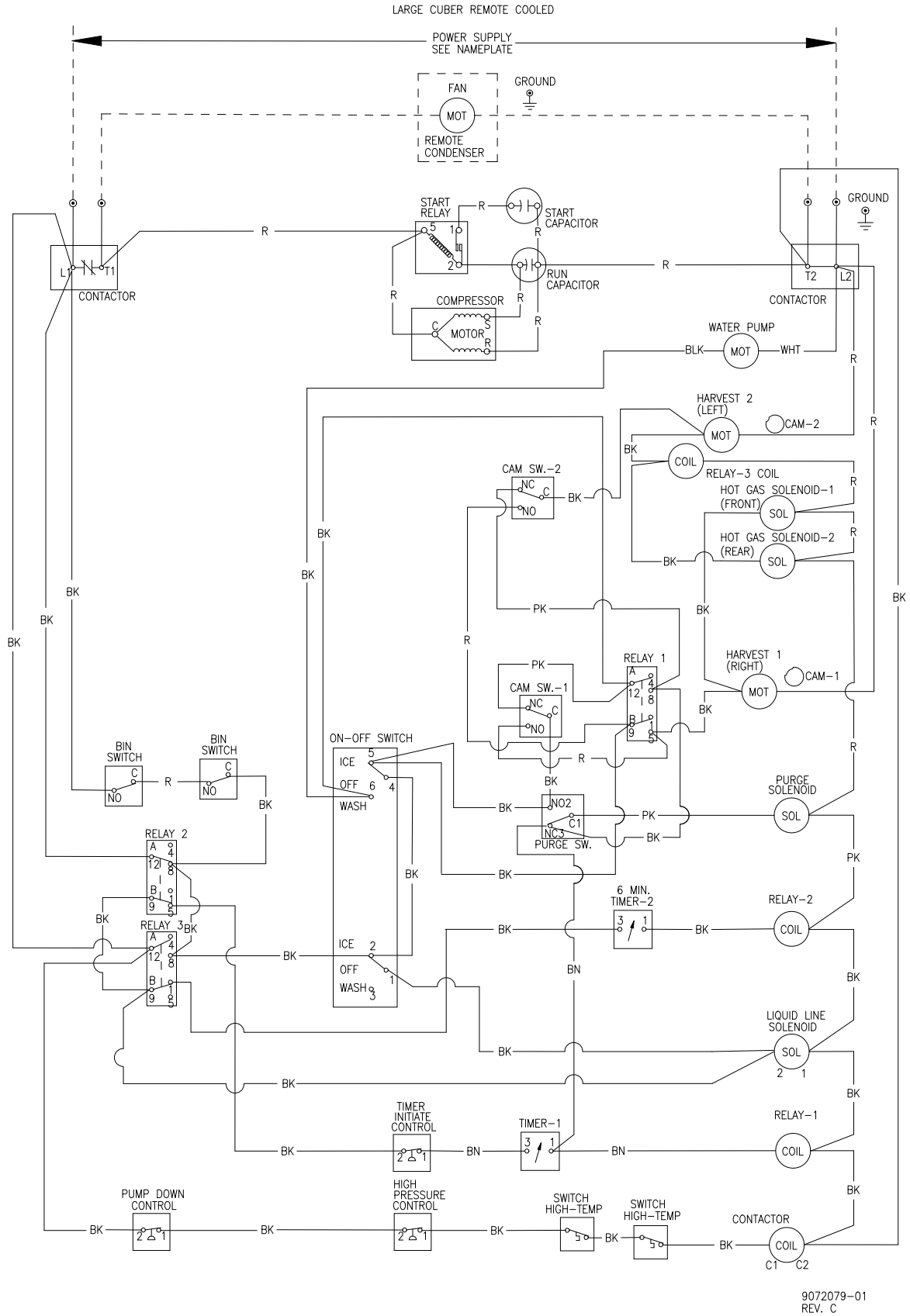
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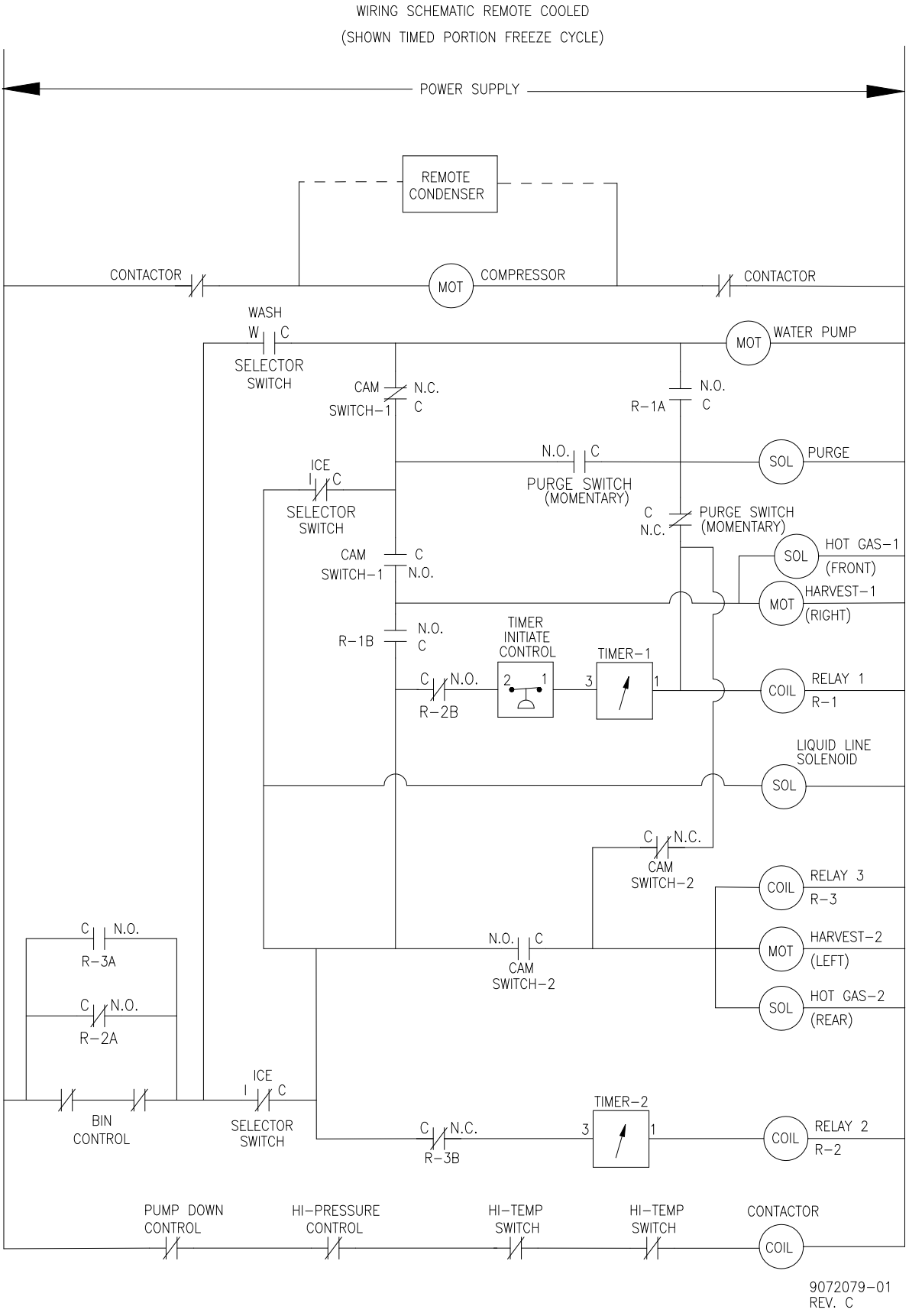
CCM1448 A/W 3 1, CCM1848 W 3 1 and CCM2148 3 W 1 Wiring Schematic (Jan 2008)



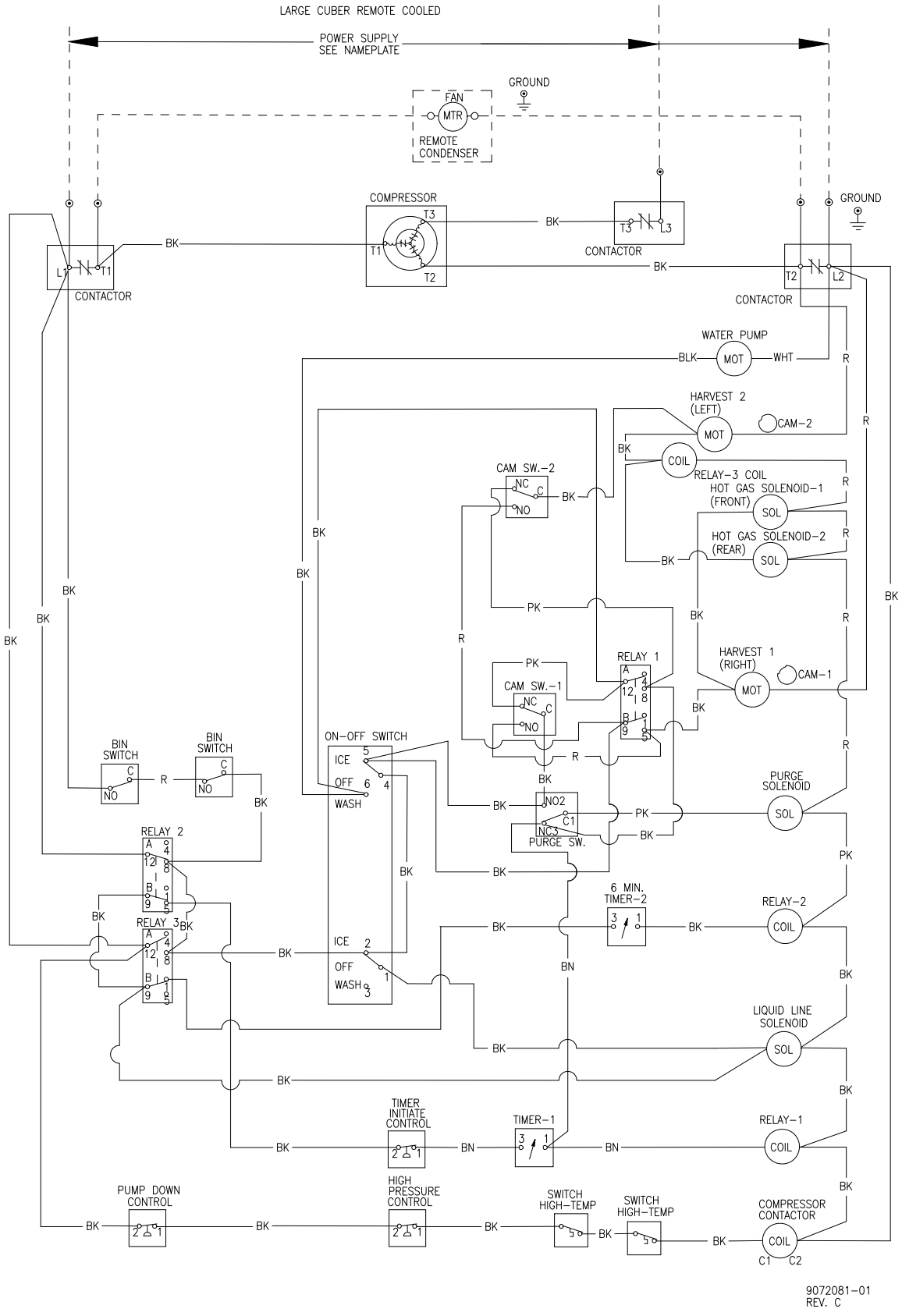
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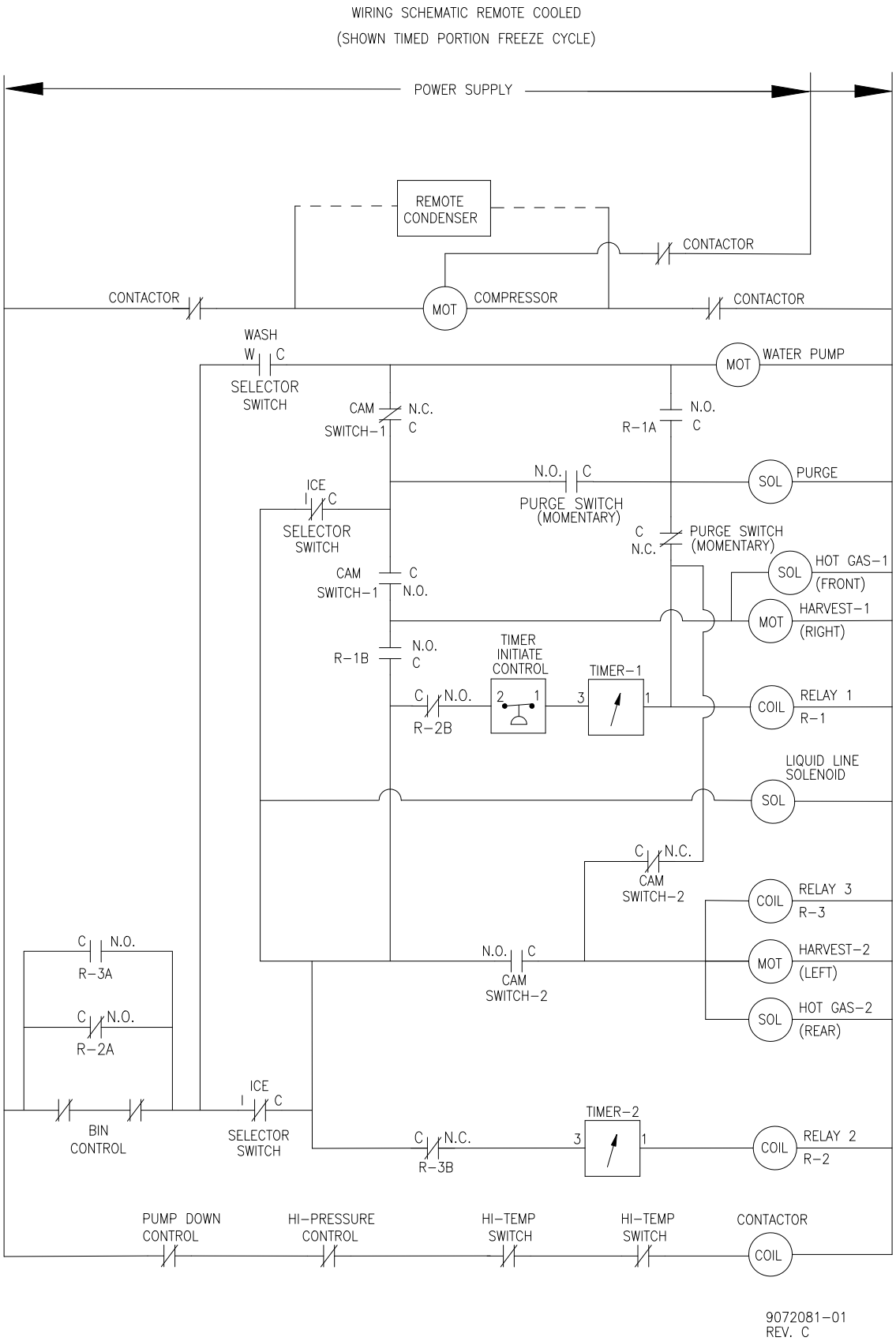
CCM1448 R 2/5 1, CCM1848 R 2 1 and CCM2148 R 2 1 Wiring Schematic (Jan 2008)



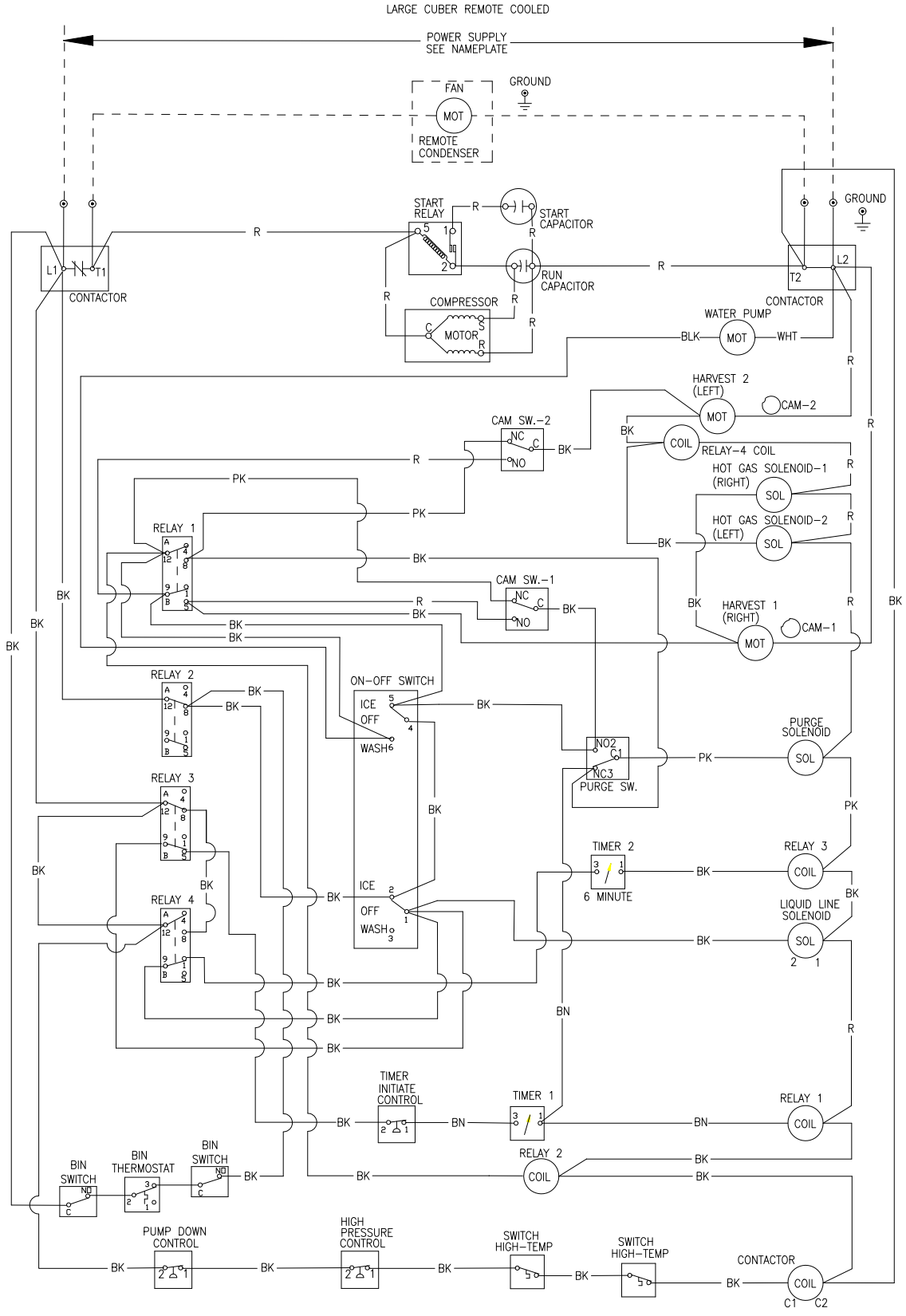
CCM1448 R 3 1, CCM1848 R 3 1 and CCM2148 R 3 1 Wiring Diagram (Jan 2008)



CCM1448 R 3 1, CCM1848 R 3 1 and CCM2148 R 3 1 Wiring Schematic (Jan 2008)



CCM1530 R 2 1 Wiring Diagram (Jan 2008)



CCM1530 R 2 1 Wiring Schematic (Jan 2008)

