

Ice Qube Inc

Hazardous Location Air Conditioners

Operation and Installation Manual

****IMPORTANT**** *For safe and satisfactory operation, please read this manual and follow the instructions for installation and operation of this system. Keep this manual for future reference. Some information may not apply to your system.*

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Introduction

Ice Qube computer and electronics enclosure cooling systems have been designed to provide a safe environment for your equipment by cooling and dehumidifying the enclosure which houses your equipment in an efficient, modern, aesthetically pleasing package requiring minimal maintenance. Our closed-loop circulation design also protects your equipment from air-borne dust and contaminants, which may hinder your equipment operations and cause unnecessary downtime. Ice Qube offers models of hazardous duty cooling systems ranging in cooling capacity from 2,200 to 20,000 BTU per hour to provide air conditioning systems for many of your environmental needs. Ice Qube also offers select models in enclosure top and side mount packages.

Basic Unit Operation

The Ice Qube Thermal Management System, TMS, is actually a combination of many systems, which function simultaneously to maintain environmentally friendly conditions for your equipment within the enclosure. The major thermal related systems are the closed-loop cold air supply stream, the heat rejection air stream, and the vapor-compression refrigeration system.

The closed-loop cold air supply stream circulates cold air from the Ice Qube TMS to the electronics enclosure. This air then returns to the Ice Qube TMS bringing with it unwanted heat and humidity from inside the enclosure. This heat and humidity is removed by a heat exchanger within the Ice Qube TMS. This heat exchanger is part of the vapor-compression refrigeration system.

At the heart of the vapor-compression refrigeration's system is a quiet, energy efficient rotary compressor, which circulates NON-CFC refrigerant to transfer heat from the heat exchanger (evaporator) located within the closed-loop air stream to a heat exchanger (condenser) located in the heat rejection air system. In the heat rejection air stream, air is circulated from the ambient surrounding the enclosure, through a filter, and across the warm heat exchanger. Here, heat from the enclosure is transferred from the warm heat exchanger to the heat rejection air stream and dissipated to the ambient.

Models with an 'H' in the serial number will have an additional heat output terminal block located on the rear of the unit. This provides a power output for an optional resistance heater. **WARNING : ONLY CONNECT HEATERS THAT ARE CERTIFIED FOR USE IN CLASS I, DIVISION 2, GROUP B,C, AND D HAZARDOUS LOCATION. HEATERS RATED AT 120 VOLT MUST BE 1400 WATTS OR LESS. HEATERS RATED FOR 230 VOLTS MUST BE 2700 WATTS OR LESS.**

Unpacking Inspection

What to look for :

1. Shipping container is banded to the pallet and arrows on the shipping container are pointing in the proper (upward) direction. The Ice Qube system is position sensitive. Ice Qube recommends the unit to remain in the proper upright position, as indicated on the shipping container, for a minimum of 24 hours before initial operation to ensure the oil has returned to the compressor. Operation before the 24-hour time may cause compressor damage and shorten the life of the system. Operation before this 24-hour period will *void all warranties*.

2. Damage to the shipping container. If the shipping container has been damaged or marred in any way, carefully inspect the Ice Qube system for damage, which may have occurred during shipping. Check for scratches, dents, or rattles indicating loose components, presence of oil, or any other irregularities. Any evidence of damage should be recorded on the freight bill. The freight carrier's claim procedure should be followed. ***Ice Qube Inc. cannot accept responsibility for damages, which occur during shipping.***

Pre-Installation Test

Before installing the Ice Qube system on your enclosure, it is a good idea to operate the unit for a few minutes to ensure it is functioning properly. Although the Ice Qube system has been fully tested at the factory, internal damage may have occurred during shipping which may have not been apparent during the unpacking inspection. This procedure will also help to familiarize you with the Ice Qube system.

1. Place the system on a solid base such as a workbench or table. Be sure to allow for adequate space for airflow. There are two air streams, which must not be restricted, the cold air stream and the warm air stream. Top mount units must be elevated to provide adequate airflow for the cold air stream located on bottom of system. Check the Model # to determine whether it is a Top or Side mount air conditioner. **Model numbers containing the letter 'V' should only be mounted of flat vertical surfaces. Model numbers containing the letter 'T' should only be mounted on flat horizontal surfaces.**

2. Check that the warm air system filter is in place. (Location varies with model type)
**Models with the optional rain or wash down hood do not have this filter and require regular condenser maintenance*

3. Check the data tag for proper electrical requirements. The data tag will give the voltage and amperage requirements of the system. The data tag will also provide the Minimum Circuit Ampacity and the Maximum Overcurrent Protection required. Be sure the electrical outlet where the system will be connected has the proper capacity. The data tag will also designate the Class, Division and Groups for which the cooling system is approved. (See Serial Number) Serial number which include XP2 have been manufactured for safe operation in Class I, Division 2, Group B, C and D classified areas. *Model numbers which have an "H" included in the serial number will have an option heat output.*

**** If any unusual noise or vibration is present during the testing procedure, immediately disconnect the power cord and inspect the unit for the cause of the noise or vibration and contact Ice Qube immediately.**

4. Ice Qube hazardous location cooling systems are not supplied with a power cord. On the rear of the air conditioner you will find a terminal block for 'hard wiring' of your cooling system. This terminal block is located under a protective cover which is approximately 3" x 4" x 1.375 deep. *Model numbers which have an "H" included in the serial number will have an additional terminal block for the 'hard wiring' of a heating system.* WARNING : ONLY CONNECT HEATERS THAT ARE CERTIFIED FOR USE IN CLASS I, DIVISION 2, GROUP B,C, AND D HAZARDOUS LOCATION. HEATERS RATED AT 120 VOLT MUST BE 1400 WATTS OR LESS. HEATERS RATED FOR 230 VOLTS MUST BE 2700 WATTS OR LESS.

Under the protective covers, you will see terminal blocks with green, black and a white wire attached. The black and white wires are the power wires. The green is the equipment ground. Field wiring should be made to this terminal block by a qualified technician.

COOLING ONLY MODELS

On the rear or bottom of the cooling system, you will also see the thermostat. When power is supplied to the system, the cooling system will begin operation when the temperature sensed by the thermostat is at the set point of the thermostat. At this temperature, the cold and warm air blowers along with the compressor will begin operation. (For more information see the section on the cooling thermostat).

COOLING SYSTEMS WITH HEAT OUTPUT

On the rear of the cooling system, you will also see the thermostat. The thermostat dial setting is the heat on temperature. If ambient temperature is below this setting, the heat output terminals will be energized. If ambient temperature is approximately 10 deg. F above the setting, the cooling system will begin operation. (For more information see the section on the heating / cooling thermostat).

Also on the cooling system, you will notice an explosion proof housing. In this housing are mounted components which may produce sparks or electrical arcing. **This cover should only be removed by a technician experienced with hazardous location equipment.**

5. When the temperature is sufficiently above the thermostat set point, the compressor and both blowers will begin to operate. Allow the unit to operate for 20 to 30 minutes. This will provide sufficient time for the vapor compression system to achieve operating balance. Measure the cold air outlet temperature with an accurate thermometer. This temperature should be at least 10 deg. F colder than the inlet air temperature if the room temperature is warmer than 70 deg. F. In areas where the humidity is high, the temperature difference may be less than 10 deg. F.

6. After completing these few simple checks, you are ready to prepare the electrical enclosure for installation of the Ice Qube system.

Preparing the Enclosure

Ice Qube air conditioning systems have been designed to be lighter in weight for easy installation. Our wall mount units have been designed with a simple "two stud" alignment feature to make initial fastening to the enclosure quick and easy. A few modifications must be made to your enclosure to provide proper air flow, maintain enclosure integrity and assure secure installation. Required modifications will vary with air conditioner model.

1. Determine the location of the Ice Qube system on your enclosure.

****Caution****

Check to be sure be sure the weight of the air conditioning system will not cause the enclosure to become unbalanced causing bodily harm or equipment damage. For units mounted on enclosure doors, be sure the hinges will support the weight of the Ice Qube system. Refer to system specifications for model weights.

2. Upon deciding the location of the Ice Qube system on the enclosure, use the cut-out drawing that has been packaged with your system to modify the enclosure surface to accommodate mounting of the air conditioner. Be sure that the Ice Qube system will be mounted level and that the inlet and outlet of the cold air stream will not be restricted by equipment or shelving within the enclosure. Also check that the air flow of the warm air stream will not be affected or restricted by surroundings. Be sure to protect any equipment located within the enclosure from debris produced during the installation procedure.

3. Slide the mounting studs through the matching holes in the enclosure and check to see that all openings are aligned. (Top mount units do not have mounting studs.)

4. After checking that all opening and bolt holes are in alignment, apply the gasket material (provided with your system) to the Ice Qube air cooling system cabinet to ensure an air tight NEMA integrity (see Gasket Drawing).

***Caution* Be careful while removing the backing on the gasket material. The material may stretch and the holes will not align. *Note* If the enclosure is not air tight or the air conditioning system operates with the enclosure door(s) open, a great deal of moisture will condense inside of the air conditioning system and possibly overflow the condensate management system.**

5. After all gasket material has been installed, mount the Ice Qube system onto the enclosure and fasten it using the nuts and bolts provided with your system. Check to be sure all fasteners have been tightened securely and the gasket material is in place to maintain enclosure integrity. You are now ready to operate your Ice Qube system.

****Note****

Near the bottom or on the side of the Ice Qube system cabinet, you will find a nipple which is for condensate overflow. Although all side mounted Ice Qube systems have a built-in condensate management systems, you may find it necessary to attach a hose to this nipple on enclosures which are located in extremely humid conditions, when enclosure doors are left open or the door seals are leaking. Top mount models *do not* have a built in condensate evaporation system. In order for the drainage system to operate properly, the factory supplied drain kit with the "Tee" must be installed per factory instructions. Ice Qube cannot be held responsible for improper installation.

Operating Your System

After installing the Ice Qube cooling system onto your enclosure and supplying power from a properly grounded electrical outlet with adequate voltage and current supply, you are ready to begin operation of the system. As soon as electrical power is supplied to the Ice Qube cooling system and the temperature is sufficiently above the thermostat cooling on set point, you should notice the cold air stream blower, the condenser air blower and the compressor begin operation. After a few minutes of operation, you should notice warm air being exhausted at the condenser air outlet and cold air being delivered to the enclosure. When the temperature inside of the enclosure reaches the thermostat set point, the cold air stream blower, condenser air blower and compressor should stop operation.

**Note*

If unit is equipped with optional heating control, the field installed heaters may begin operation if the temperature is below the heating on set point.

Operating the Cooling Thermostat

The purpose of the thermostat (T675A) is to cycle the cooling system as required by the heat produced by the equipment within your enclosure thus preventing over heating and extending the life of your electronic equipment.

On the face of the controller, you will see an adjustment knob within a temperature range of 0 to 100 deg. F. To adjust the operating temperature of the thermostat, turn the knob until the pointer is aligned with the desired temperature of the enclosure. This is the temperature at which the cooling system will begin cooling.

The thermostat has a factory set differential of 5 deg. F. The unit will stop cooling when the enclosure temperature is 5 deg. F below the cooling on setting, indicated by the pointer. The unit will automatically begin to cool again when the internal temperature of the enclosure reaches the cooling on set point.

Ex: Set Point 80 deg. F (26.7 deg. C) Cooling on temperature
75 deg. F (23.8 deg. C) Cooling off temperature

Note - It is NOT recommended to set the controller at a set point below 70 deg. F. Settings below this temperature may cause the evaporator coil to freeze unless the cooling system is equipped with a hot gas bypass valve. Consult factory for further information.

Operating the Heating / Cooling Thermostat (Optional)

The heating / cooling thermostat (T678A) provides control for the cooling system and the field wired heating system.

On the face of the controller, you will see an adjustment knob which controls the set point indicator in a range of 0 to 100 deg. F. The set point indicator shows the temperature where the heating system will begin operation. The heating system will continue operation until the sensed temperature rises 3 deg. F. If the temperature in the enclosure should rise 7 deg. F (3.9 deg. C) above the heating off temperature, the cooling cycle will begin. The cooling cycle will continue until the sensed temperature decreases 3 deg. F (1.7 deg.C).

Ex: Set point 80 deg. F (26.7 deg. C) Heating on temperature
83 deg. F (28.4 deg. C) Heating off temperature
90 deg. F (32.2 deg. C) Cooling on temperature
87 deg. F (30.5 deg. C) Cooling off temperature

*interstage differential = 7 deg. F (90 –83)

Note - It is NOT recommended to set the controller at a set point below 58 deg. F. Settings below this temperature may cause the evaporator coil to freeze unless the cooling system is equipped with a hot gas bypass valve. Consult factory for further information.

Maintenance

The Ice Qube air conditioning system should provide many years of trouble-free operation with a minimal amount of maintenance. Primary maintenance consists of checking the condition of the ambient air filter and condensate management system.

1. Ambient Air Filter - It is recommended that the ambient air filter be checked and cleaned regularly, at least every 30 days, or more frequently depending on ambient conditions. In order to check the condition of the air filter, it is recommended to first remove electrical power from the Ice Qube cooling system. Next, locate the filter cover and filter. (Location varies with model) Next, remove the filter by grasping the pull tab and sliding from the filter rack. Clean the filter by soaking it in warm soapy water and then rinsing in clean water. Use a shop-vac to remove excess water from the filter before returning it to the system. Replace the filter if it is showing signs of deterioration.

It is recommended to have a spare clean filter in stock in order to prevent prolonged cooling system downtime. The dirty filter may be cleaned at a more convenient time.

****Note****

If rain or wash down hoods are installed on your system, no filter is supplied with your system and no filter maintenance is required. Systems equipped with rain or wash down hoods will require regular condensing section maintenance.

2. Condensate Management System - The condensate management system should be checked periodically for scale, sludge and debris which may cause the system to fail. On open type enclosures, and in areas where the enclosure door is opened frequently in dirty or industrial environments, maintenance should be performed on a regular basis, at least every 30 days. On sealed enclosures, clean environments and where the door is not opened frequently, maintenance may be performed bi-annually. *Your environment will determine frequency of required maintenance.*

Maintenance of the condensate management system will require removal of electrical power from the Ice Qube system and removal of the cover. To remove the cover, use a screw driver to loosen the screws which attach the cover to the base. *Caution: Electrical wires are connected from the cover to the base.*

Upon removing the cover, you will see the primary condensate management pan located below the evaporator. Inspect the condensate pan and drain nipple for signs of scale, sludge or debris which may prevent water flow through the nipple. To clean the debris from the pan, use a clean absorbent cloth or a shop-vac. Nipples may be cleaned using a 1/4 inch tubing brush and then flushing with clean water.

Also inspect the neoprene tubing which is attached to the nipples on the condensate management system. If the tubing appears to have internal build up or is brittle, it should be replaced. It is recommended to replace the tubing at least every two years, pending your environmental conditions. *Note: If your system has a secondary condensate management pan, maintenance should be performed in the same manner as above.*

After all debris has been removed from the system, replace the cover onto the unit being careful not to pinch or damage the wiring connecting the cover to the base.

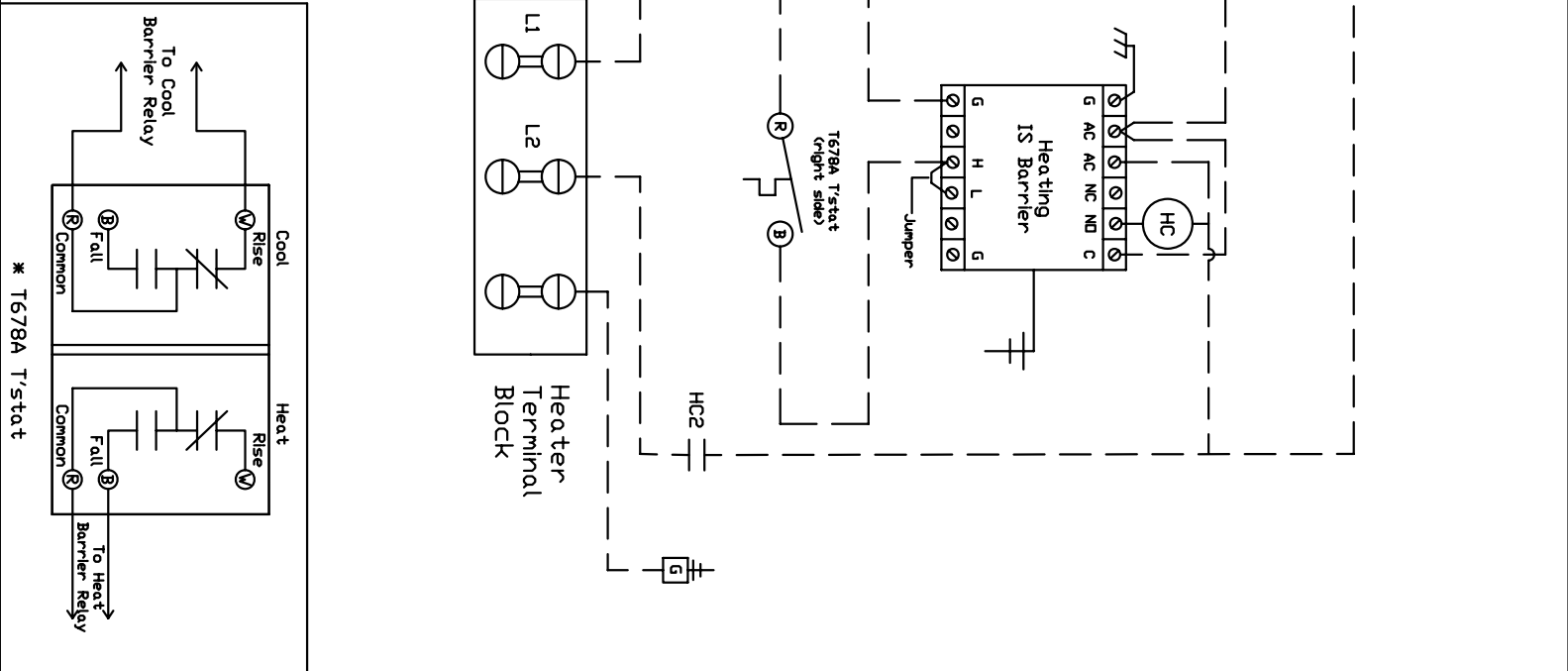
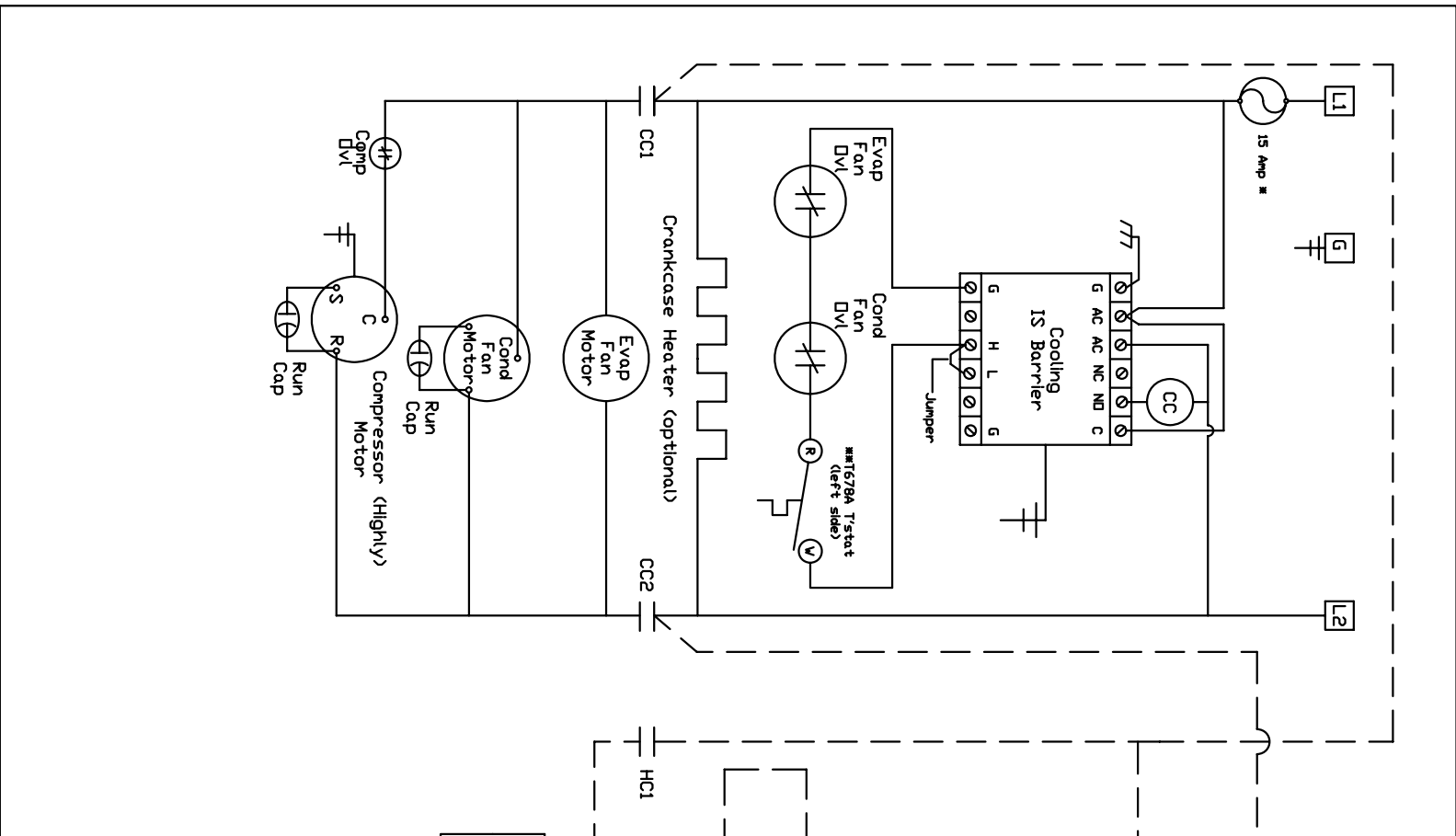
Another part of the system which may need cleaned occasionally is the cooling system cabinet. To clean the system cabinet, simply wipe it with a damp, lint free cloth. A mild soap solution may be used if necessary.

Trouble Shooting

If your Ice Qube air conditioning system should fail to operate satisfactorily during the first year of operation, do not remove the cover without first notifying the factory. Removal of the cover will immediately void your warranty. If an operating problem should occur, please make the following simple checks before contacting Ice Qube Inc.

- * Is electrical power available at the outlet ?
- * Is the controller set point at the proper temperature setting ?
- * Is the evaporator (cold air stream) blower operating ?
- * Is the compressor and condenser (warm air stream) blower operating ?
- * Is the enclosure door closed tightly ?
- * Are all gaskets in place ?
- * Are there any unusual ambient conditions ?
- * Has the warm air filter been cleaned or changed recently ?
- * Is the system mounted level on the enclosure ?
- * Is there adequate space within the enclosure for air flow ?
- * Is there adequate space around the enclosure for air flow ?
- * Have you recently added electronic equipment to the enclosure ?

If you are still experiencing operating difficulties after making these checks, please contact **Ice Qube** at **888-867-8234**.



Schematic C
120 and 230 volt
MODELS

1Q2200V-S-XP2-H
1Q3000V-S-XP2-H
1Q2000V-XS-XP2-H
1Q2400V-XS-XP2-H
1Q2500V-XP2-H
1Q3500V-XP2-H
1Q1800TS-XP2-H
1Q2300TS-XP2-H
1Q2500TS-XP2-H
1Q4000TS-XP2-H
1Q2500T-XP2-H
1Q4000T-XP2-H

NOTES

* For - H models only
** Cooling only models use 1675A thermostat

LEGEND

fuse
 contactor cooling coil
 contactor heating coil
 overload
 normally open contact
 close on rise thermostat
 close on fall thermostat
 crankcase heater
 run capacitor
 wire ground
 chassis ground
 Indicates Models with heat output (- H)

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 GREENSBURG, PA 15601
 724-837-2204 * 1-888-867-8234
 FAX 724-837-3386

Schematic B
 120 and 230 volt
 MODELS
 IQ4000V-XP2
 IQ5000V-XP2
 IQ5000V16-XP2
 IQ6500V16-XP2
 IQ4000V16HA-XP2
 IQ3800VS-XP2
 IQ5000T-XP2
 IQ6000T-XP2

NOTES

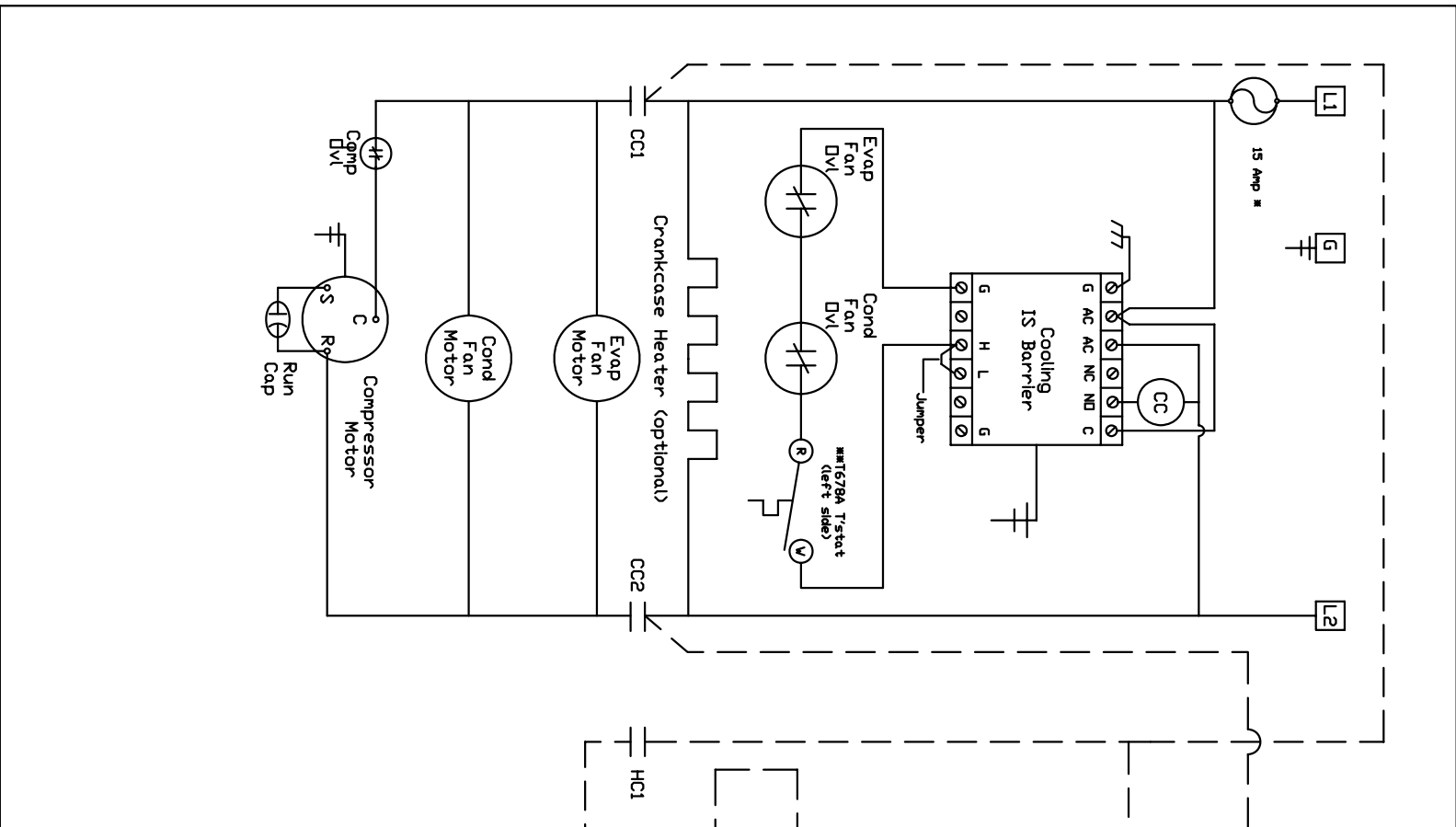
* For - H models only
 ** Cooling only models use T675A thermostat

LEGEND

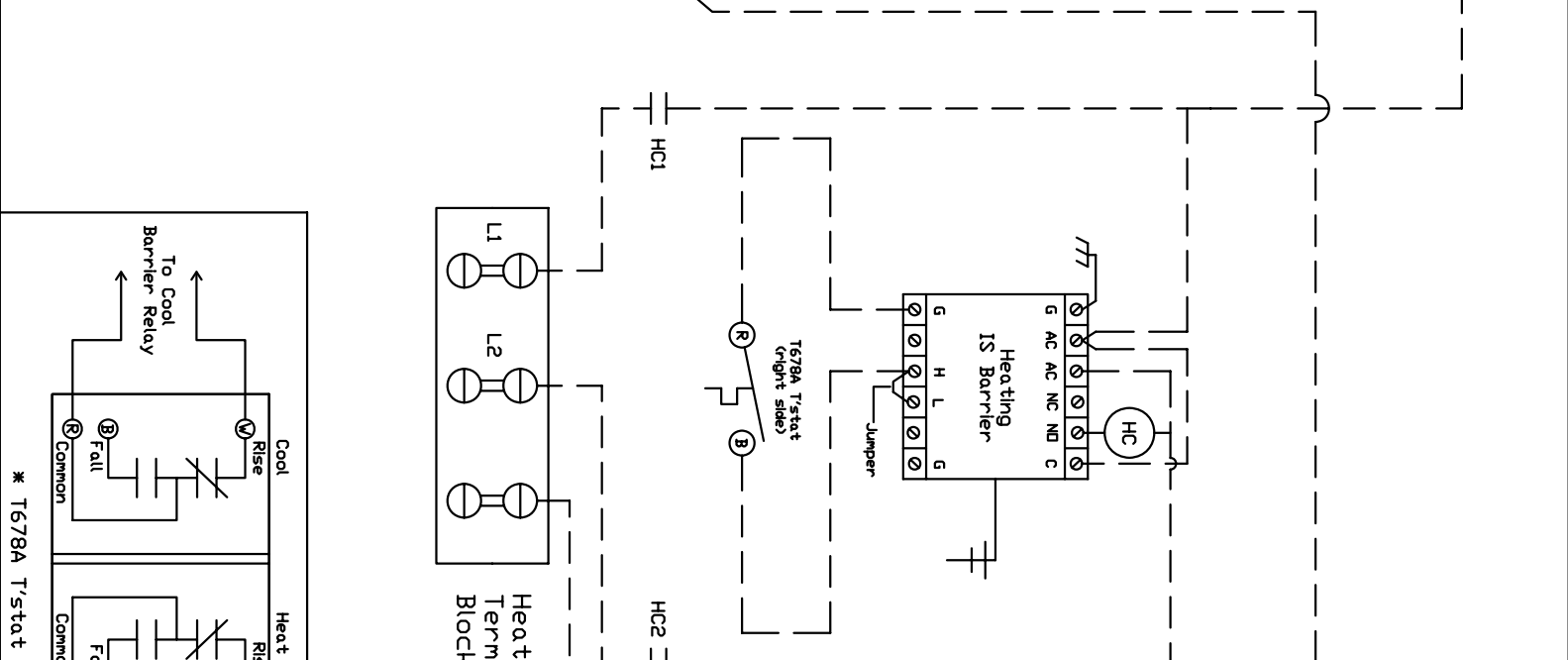
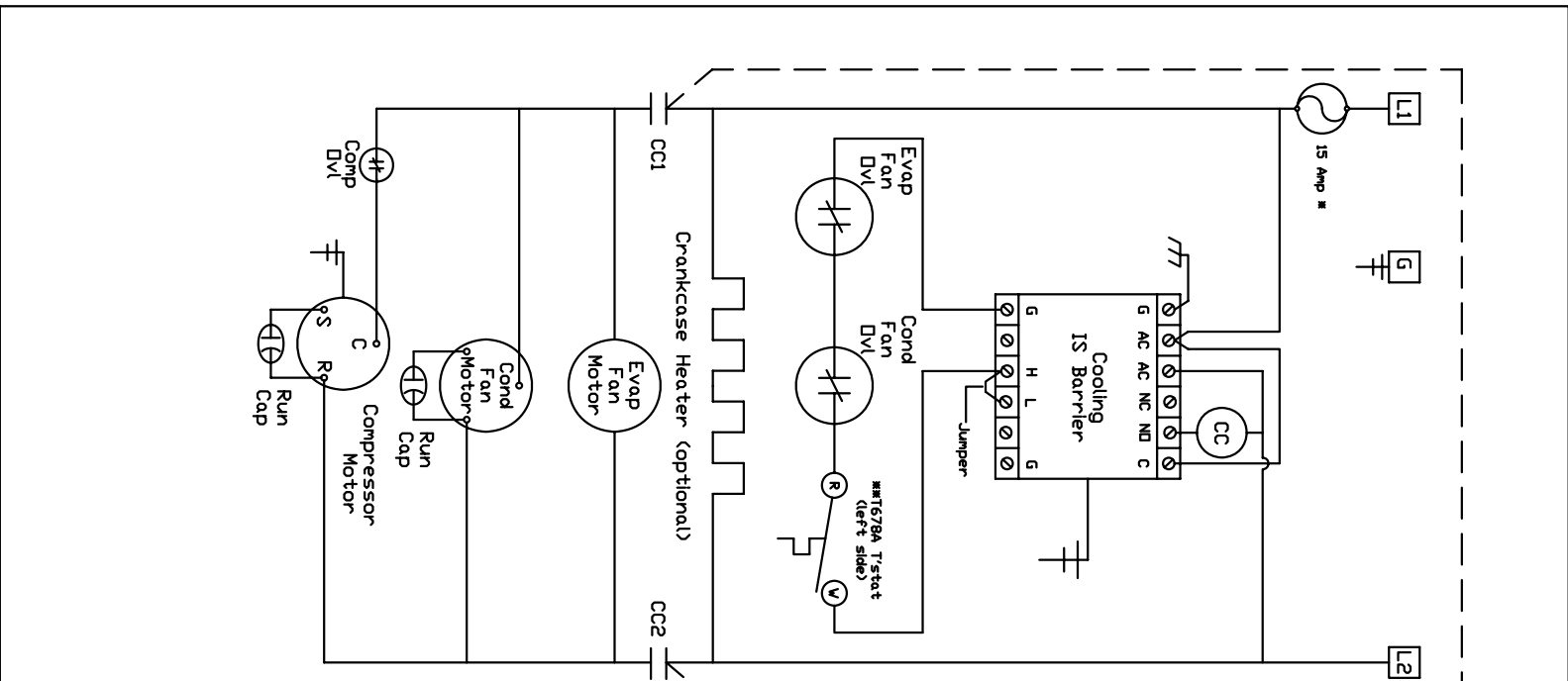
- fuse
- contactor
- cooling coil
- contactor
- heating coil
- overload
- normally open contact
- close on rise thermostat
- close on fall thermostat
- crankcase heater
- run capacitor
- wire ground
- chassis ground
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* T678A T-stat



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Schematic D
120 and 230 volt
MODELS
IQ5000V16HA-XP2-H
IQ6000V16HA-XP2-H
IQ8000V16-XP2-H
230 volt
MODELS
IQ8000VHA-XP2-H
IQ10000V-XP2-H
IQ12000V-XP2-H

NOTES

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- ** Cooling only models use T675A thermostat

LEGEND

- fuse
- cooling coil
- contactor
- heating coil
- overload
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- close on rise thermostat
- close on fall thermostat
- crankcase heater
- run capacitor
- wire ground
- chassis ground
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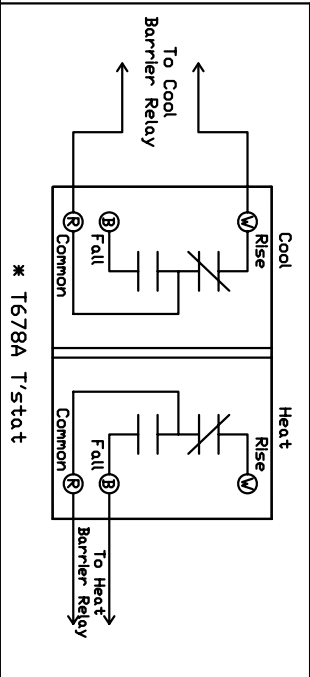
Schematic A
230 volt
MODELS
1Q14000V-XP2
1Q17000V-XP2
1Q20000V-XP2

NOTES

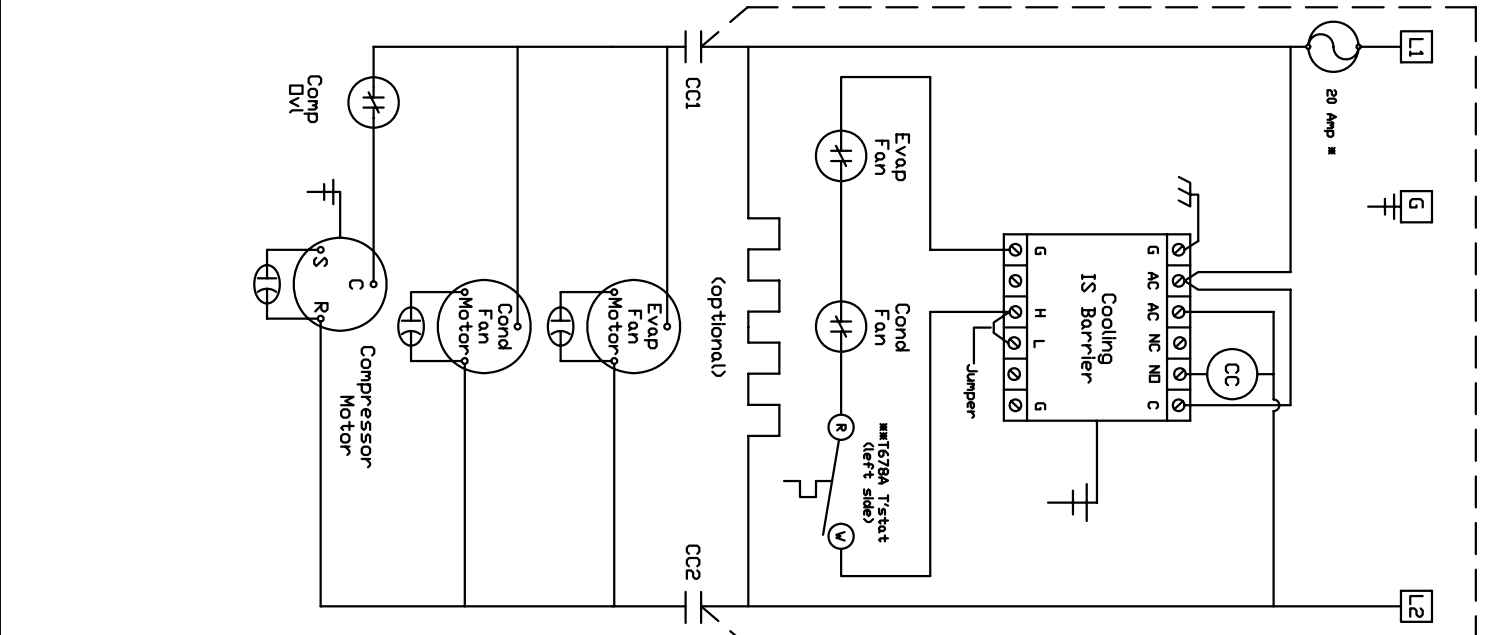
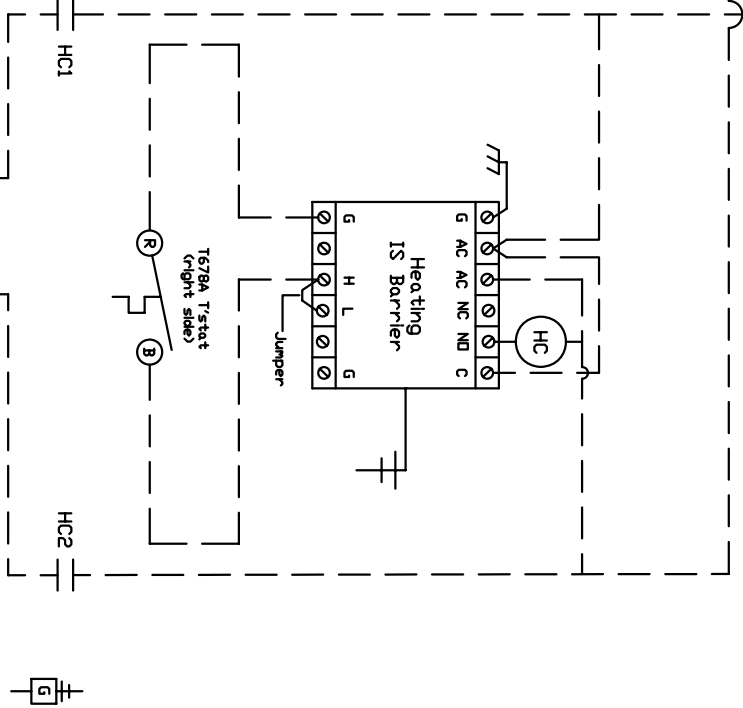
* For - H models only
** Cooling only models use T675A thermostat

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* T678A T-stat



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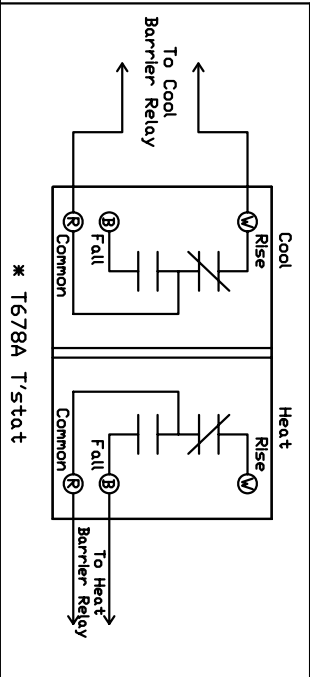
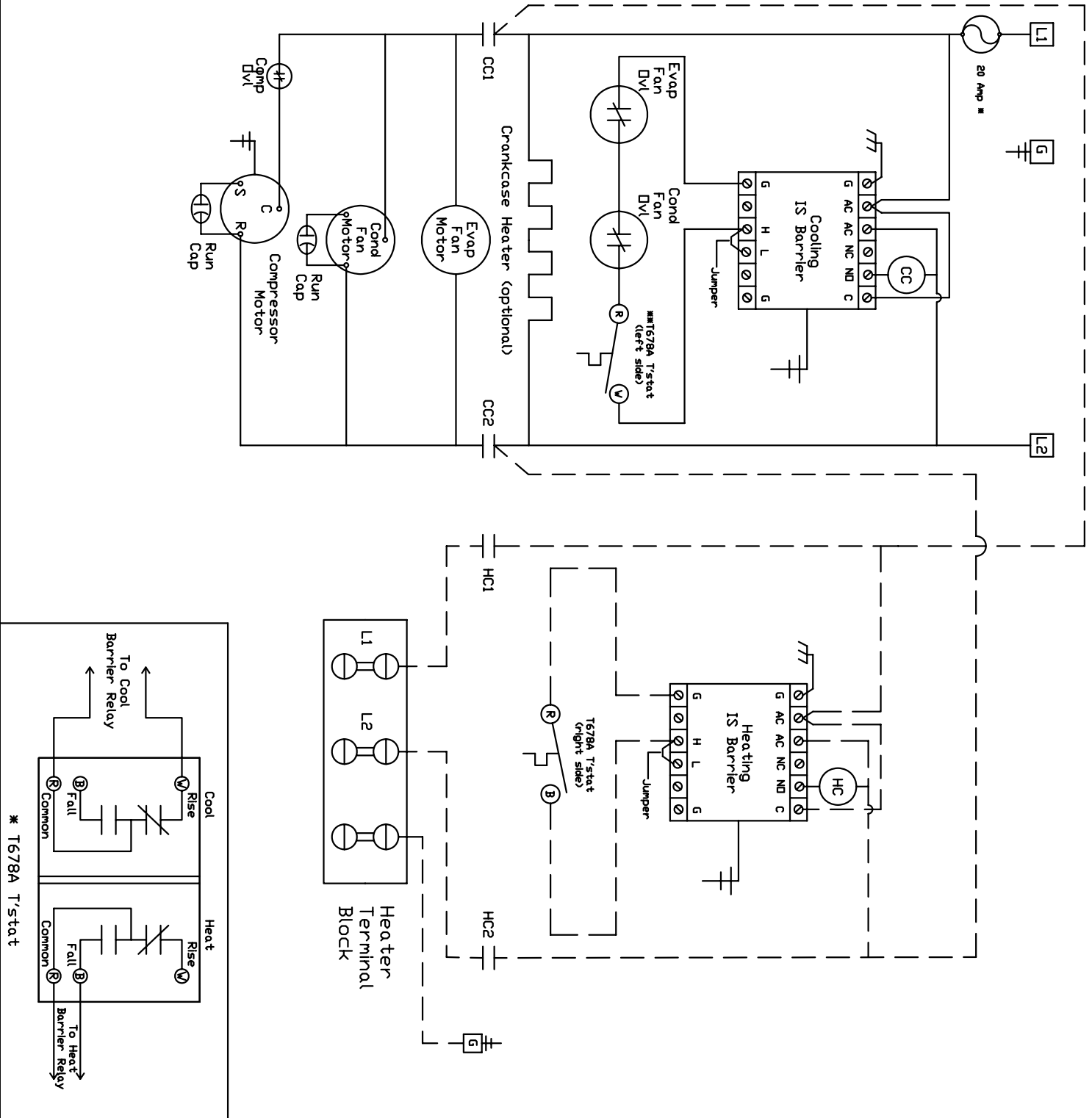
Schematic E
120 volt
MODELS
1Q8000 VHA-XP2-H
1Q10000 V-XP2-H
1Q12000 V-XP2-H

NOTES

* For - H models only
** Cooling only models use 1675A thermostat

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Warranty

The seller warrants to the original Buyer that the products manufactured by the seller are free from defects in material and workmanship. If the Buyer notifies the Seller within ONE YEAR of any such defects (the "Warranty Period"), and returns the products to Seller at Buyer's sole expense, Seller shall, at its option, repair the products, or replace them with products of comparable value. In either case, the Warranty Period for the repaired or replaced products shall extend after the date of repair or replacement for a time equal to the original warranty period. If the Buyer does not notify the seller of such defects, whether patent or latent, within the Warranty Period, Seller shall have no further liability or obligation to the Buyer. Therefore, in no event shall Seller's liability under this warranty exceed the original purchase price of the products which are the subject of a proper notice of defects.

Excluded from this transaction are all implied warranties, including without limitation, the implied warranties of merchantability and fitness for a particular purpose or use. The express warranties set forth above are the only warranties given by Seller in this transaction.

In no event will seller be liable for any incidental or consequential damages of the buyer. The foregoing remedies are the sole and exclusive remedy of buyer for any breach of warranty in this transaction.