

# ***HEATCRAFT***<sup>®</sup>

***Refrigeration Products***

02/01  
Part Number 25001501

## **INSTALLATION & OPERATING INSTRUCTIONS FOR**



# BEACON CONTROLLER

## QUICK GUIDE

### Installation, Start-Up, Operation, Troubleshooting Installation

- Use 18 gauge wire for 24-volt connections between evaporators and condensing unit.
- Remove suction line sensor before brazing; reinstall suction sensor after brazing is completed and suction line has cooled; insulate with insulation provided.
- If an electric defrost evaporator is being applied in a medium temperature application, have the nozzle size checked for proper sizing.

#### Condensing Unit

- Set transformer primary connection for correct supply voltage (208V or 230V).
- Check low pressure switch time delay relay for correct adjustment to 2 minutes.
- Check low pressure switch for correct adjustment to 0 psig cut-out / 10 psig cut-in.

#### Evaporator

- Check black jumpers for system settings; change to match your application requirements.
- Board are shipped from factory set for 35°F medium temperature or -10°F low temperature; change resistor for set-point temperature to match application requirements.
- Check sensor connections on board; confirm that sensors are plugged onto correct terminals.
- Check expansion valve (EXV) connections on board; confirm that wires are plugged onto correct terminals.
- If system has multiple evaporators, check master/slave wiring: Wire multi-out from master to multi-in on slave, then from multi-out of slave to multi-in of master.

#### **Start-Up**

- After system evacuation add correct refrigerant. It may be necessary to adjust time delay relay (TDR) to 10 minutes, temporarily, to allow system charging. Readjust TDR back to 2 minutes when done.
- In ambient above 75°F, charge unit to a clear sight-glass. In colder ambients, raise discharge to 105°F condensing and charge to a clear sight-glass.
- At initial start-up, system may cycle off on low superheat. Let system cycle. It may take 4 to 5 cycles for system to settle out.
- If Smart Controller is used, make sure "Defrost End Temp." on the Beacon board is set to 50°F.
- If multiple evaporators are connected to a condensing unit, the room sensor must be connected to the master evaporator only. Disconnect the room sensor from all the other boards.

#### **Sequence of Operation**

#### Cooling

- The Beacon system has a built-in 4 minutes hold on / 4 minutes hold off cycle. The system will "run" in cooling a minimum of 4 minutes and stay "off" a minimum of 4 minutes.
- When power is first applied, the system will not start for 4 minutes.
- After 4 minutes, the expansion valve opens and the compressor contactor circuit is energized shortly after the valve opens.
- When the system is cooling, the expansion valve is adjusted at 2 minutes intervals to obtain the set superheat. If the superheat falls too low, the expansion valve is adjusted at a much faster rate to bring the superheat up.
- When the room temperature is obtained, the expansion valve is closed and the system is pumped down until the low pressure switch opens or 2 minutes have elapsed.

# BEACON CONTROLLER

## QUICK GUIDE (cont'd.)

### Defrost

- The actual defrost time is determined when power is first applied to the system as well as the number of defrosts per day. If a Smart Controller is used, the actual defrost times are programmed into the Smart Controller.
- At defrost the expansion valve closes, then the system pumps down until the low pressure switch opens or 2 minutes have elapsed. The compressor is now off.
- The fan motors are shut off and the heater contactor on the Beacon board is energized. On systems with higher than 30 amps, the heater contactor on the board is used to energize a larger amperage contactor.
- Defrost is terminated when the evaporator coil sensor reaches the defrost termination temperature. The heaters are turned off and the system goes through a short drain-down period.
- At the end of the drain-down period, the expansion valve opens and the compressor starts shortly after. The fans do not run during this re-freeze period.
- At the end of the re-freeze, the fan motors start and the system is back in the cooling mode.

### **Trouble-Shooting**

- System flashes “low pressure, high pressure, oil pressure fault”
  - Check system for refrigerant leak
  - Check oil level in compressor
  - Check system for non-condensable
  - Check low pressure switch for correct adjustment to 0 psig cut-out / 10 psig cut-in
  - If ambient is below 50°F, may need to add pressure fan cycling switch
- System flashes “superheat sensor shorted or open”
  - Change evap-in and evap-out sensors
- System flashes “room temp sensor, discharge sensor, defrost termination temp sensor shorted or open”
  - Change sensor as indicated
- System flashes “superheat low”
  - Check evaporator coil circuits for uneven feeding; if circuits are not feeding evenly 1) check nozzle sizing for the application, and 2) expansion valve may be defective
  - Check if evap-in and evap-out sensors are plugged into correct terminals on the board
  - Check if system is overcharged
- System cooling, but box temperature not met
  - If a low temp evaporator is being used in medium temp application, check nozzle size
  - Check if transformer is on the correct voltage tap
  - Check for low refrigerant charge
  - Check pump-down switch for incorrect wiring
  - Check if discharge temperature is above 225°F; remove discharge line sensor from discharge line
  - Disconnect evaporator coil sensor from the board
  - Check value of room temperature pot setting; if value is correct, pot may be defective. Add fixed resistor
- System “off” and will not run
  - Check if room sensor is connected on the board
  - Check if system has a “pump-down” switch; put switch in “normal” position
- If system has a Smart Controller
  - Check to make sure room sensor is connected only to Smart Controller
  - Check wiring of multi-in and multi-out to be per wiring in Installation & Operation manual
  - Check program in Smart Controller; range must be on “lo” for low temp applications and “hi” for medium temp applications

# BEACON CONTROLLER

## INSTALLATION INSTRUCTIONS

### Before Installing or Starting Unit:

- Use a minimum 18 gauge wire for low voltage connections to cooler, condensing unit and Smart Controller.
- Transformer is shipped wired for 240V primary; if your supply voltage is 208V, change to the 208V tap.
- Refer to wiring schematic shipped on units for wiring; schematics in the Installation & Operation Manual are typical schematics.
- If desired box temperature is different from preset factory temperatures (35°F air defrost, -10°F electric defrost), see "Room Temperature Control", Page 5 for options.
- Check Beacon board jumper settings to ensure that they match the application requirements; factory jumper settings are shown on Table 3, Page 14.
- The low pressure switch time delay relay, located in the condensing unit, must be set at 2 minutes.
- Make sure all wiring connections are correct and tight.
- The suction line temperature sensor **MUST** be removed from the suction line before brazing the suction tubing; the sensor **MUST** then be reinstalled on the suction line after brazing is completed and the tubing is cooled.
- The Beacon timing for evaporator defrost is based on when power is first applied to the Beacon board (i.e. if 4 defrosts per day will occur at 9:00 p.m. and every 6 hours thereafter) the system will perform a defrost.
- Some systems may require the crankcase heater to be energized 24 hours prior to start-up; the Beacon should be de-energized for this period by disconnecting the 24V lead to the condensing unit terminal block. To start the system, this 24V lead must be re-attached.

### CONDENSING UNIT

The condensing unit control panel will contain the relays, contactors, transformer and terminal block appropriately marked to match the wiring connections to be made.

### UNIT COOLER(S)

Each unit cooler(s) will contain the Beacon controller, an electric expansion valve, a distributor, orifice, and four thermistor sensors. These components are all factory mounted. The 4 sensors provide input to the controller from the following: evap-in, evap-coil, evap-out and entering room air temperatures.

### MASTER/SLAVE CONNECTION

The Beacon Controller allows multiple unit coolers to be connected in a master/slave configuration. Up to 6 Low Profile evaporators or up to 3 Medium Profile evaporators can be connected in a master/slave configuration when using the standard factory shipped transformer. When connected in a master/slave configuration, **the entering room sensors must be disconnected from each of the slave units.** When connected to the Optional Smart Controller, the Optional Smart Controller controls the master and all the slaves. (See Master/Slave wiring connections on typical wiring diagrams.)

During master/slave operation, there could be a delay in the reaction time of each slave to the master of up to 1 minute. The length of time is dependent on how many slaves are connected to the system.

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# BEACON CONTROLLER

## REFRIGERANT LINE BRAZING (CAUTION)

The electric expansion valve on the liquid line and the suction temperature sensor on the suction line are factory installed. Care must be taken when brazing these lines at the evaporator. **Too high a temperature may destroy these components. Heat absorbing compounds or "wet rags" must be used when brazing the refrigerant line connections and the suction line sensor removed per above instructions.**

## WIRING

Wiring between the condensing unit and unit cooler(s) will be as follows (see attached wiring diagrams):

- High voltage - To the defrost heaters (if present) and/or fan motors. See unit cooler spec plate for ampacity. The evaporator may also be connected to a separate power supply.
- Low voltage - 24V (18 to 30) VAC Class II control circuit. A total of 5 low voltage leads are required to connect the condensing unit to the evaporator. Two of these leads are for connecting the compressor discharge sensor. The other 3 leads are for connecting the compressor relay and the 24V transformer. **All 24 volt wiring must be separated from the line voltage wiring.**
- Compressor discharge line sensor - Use 18 gauge wire. Must be run separate from other high voltage power wiring.
- Smart Controller (Optional) - Use 18 gauge wire. For extra long runs, 16 gauge wire may be required. Low voltage wiring must be run separate from other high voltage power wiring.
- Slave unit(s) (if used) - Connect the *multi-out* terminal on the master unit to the *multi-in* terminal on slave unit and the 24V (18 to 30) VAC from the master unit to the slave unit. (See wiring diagram.)
- Alarm circuit - The onboard alarm is a dry set of NC contacts which closes to indicate an alarm. Type and wiring for the alarm is customer specified. Note that the alarm circuit does not distinguish or indicate what has caused the alarm. (See "ALARMS".)

Note: All wiring must comply with all applicable codes and ordinances.

## ROOM TEMPERATURE CONTROL

Three methods are available:

- Each Beacon board is shipped with a fixed resistor (attached) that controls the room temperature set-point. Air defrost boards are set for 35°F with a 15K ohms resistor. Electric defrost boards are set for -10°F with a 100K ohms resistor.
- In the packet are additional resistors which can be used for other room temperature set-points. These resistors are color coded. The table below shows the settings.

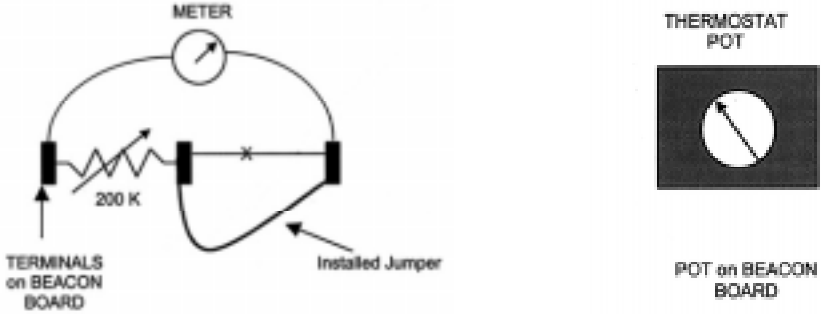
Resistor Color Tape	Resistor Value Ohms	Set-point Temperature
Black	100K	-10°F
Green	70K	0°F
White	30K	20°F
Blue	20K	30°F
Yellow	15K	35°F
Red	10K	40°F

- To change the room set-point, remove the resistor attached to the Beacon board and attach the resistor value required for your set-point temperature. If you need a value not shipped in the packet, you may purchase a 1/8W to 1/2W resistor from an electronics store (i.e. RadioShack), for the ohm values shown.
- These resistors will control the room temperature at the approximate temperatures shown. These values are also to be used for setting the Beacon board thermostat pot.

# BEACON CONTROLLER

## ROOM TEMPERATURE CONTROL (Cont'd.)

- Another method of setting the room set-point is to use the Beacon board thermostat pot. If a value other than that available by using a fixed resistor is required, the pot on the Beacon board can be used. First, you must discard the fixed resistor. Then, using a digital ohmmeter, measure the resistance between the "X" and "200K" as indicated in the illustration below. Use a screwdriver to turn the thermostat pot until the resistance value is obtained for the desired room temperature (according to Table 1). Install the jumper (supplied in the bag) across the terminal marked "X" when finished.



- The **Beacon Smart Controller**. See Beacon Smart Controller Installation & Operating Instructions (Part #25004101) for more details.

**TABLE 1**

Carbon Film Fixed Resistor selections that will control the room temperature at the approximate temperatures shown. These values are also to be used for setting the **Beacon board thermostat**.

Application	Temperature °F	*Ohms
Low Temperature Electric Defrost	-25	182K
	-20	150K
	-15	120K
	-10	100K
	-5	85K
	0	70K
Medium Temperature Electric Defrost	20	30K
	25	25K
	30	20K
Medium Temperature Air Defrost	35	15K
	40	10K
	45	8K
	50	5K
	55	2K
	60	0K

# BEACON CONTROLLER

## BEACON MICROPROCESSOR SETTINGS (See Table 3 for more details.)

Selections to be made by applying movable jumpers:

**Defrost cycles or time** - Controlled by the board in master unit only. Selection must be either “elapsed” time or “run” time. If “elapsed” time is selected, the number of defrost must be set at either 1, 2, 4 or 6 per day. If no selection is made, default is 4 defrosts per day. If “run” time is selected, the compressor run time must be set at either 2, 3, 6, or 12 hours. If no selection is made, default is 3 hours compressor run time.

**Superheat** - Controlled by each board in each evaporator. Selection must be either 6, 8, or 12° F. Close coupled systems will require the higher superheat selections. If no selection is made (no movable jumper applied) the preprogrammed default is 8° F superheat.

**Defrost fail-safe** - Controlled by board in master unit. Each board should have the same setting on multi-evap systems. Must be either 10, 20, 30, 40, or 60 minutes . If no selection is made, default is 30 minutes.

**Medium or low temperature** - All evaporators must have the same settings for the application. For example, on a master/slave application, all the units must have the same setting. (i.e. for medium temperature they must all be set at medium).

**Test or normal** - Factory set at normal. Test is also used to check board for proper function.

**Type 2 or type 1** - Are not used. *Do not select.*

**Reset time or normal** - Resets all internal timers back to zero as though the unit was just powered up. Keep jumper on normal except for momentary move to reset position. If jumper is left on RESET position, the four minute off time will be set to zero on power up.

**Forced defrost or normal** - Forced defrost is used momentarily to force an extra defrost. It will not reset the regularly scheduled defrost. Select the normal position. Note that, when initiated, the four minute. “Hold off” and “Hold on” cycles will be in effect.

**Defrost end temperature** - Select either 50, 70, or 90° F. If no selection is made, preprogrammed default is 50° F.

## REFRIGERANT CHARGING

Be aware that the Beacon system does not normally require a condenser flooding valve and is capable of operating at lower than normal condensing temperature. The condensing pressure will be raised by fan cycling only when needed to lower evaporator superheat to the selected value.

**The system does not require a winter charge.** If the ambient is above 75° F, charge just until the sight-glass clears. When charging in colder ambients, it will be necessary to reduce the amount of air going through the condenser with the fans still running. Simply reduce the effective face area to raise the discharge pressure above the equivalent 105° F. condensing temperature and then proceed to charge to clear the sight-glass. Return to full condenser face area and allow the system to balance.

# BEACON CONTROLLER

## OPERATING INSTRUCTIONS

### REFRIGERATION MODE

#### **START UP**

1. Check all wiring connections to be sure they are correct and tight.
2. Check voltage taps on transformer. The transformer is shipped wired for 240. If your supply voltage is 208 volt systems, change to 208 voltage tap.
3. Check setting of time delay relay in condensing unit. It should be set at two minutes (the third marker).
4. Check the low pressure switch setting. It must be set to 0 PSIG cut out, 10 PSIG cut in, to allow start and operation, especially in cold ambients.
5. At initial start-up, the system may cycle off at 4 minutes and display a low superheat error, then restart itself. This cycle may be repeated a few times. Do not shut the system off. Let the system run, as it may take a few cycles for the electric expansion valve to attain the correct setting for the desired superheat.
6. Liquid line should always be insulated.

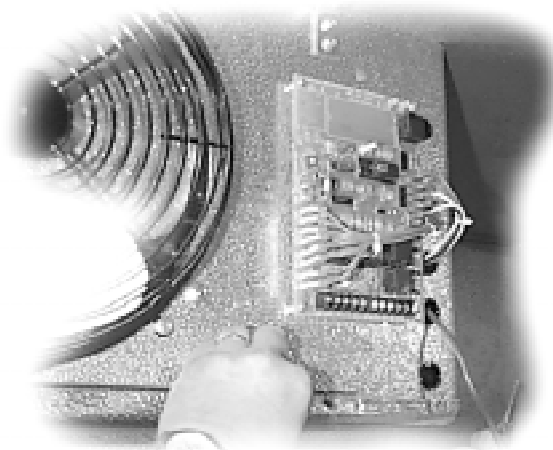
#### **Ambients above 50° F**

At the initial application of power to the system, the compressor and the evaporator fans will be in a four minute hold-off cycle and will not start immediately. When there is a call for cooling, the compressor starts and the electric expansion valve (EEV) stays closed for 12 seconds. After 12 seconds, the EEV goes to approximately half open and the compressor is put in a four minute "hold-on" cycle. (This means that the compressor will run for a minimum of four minutes before shutting off.)

When the room thermostat setting becomes satisfied and if the compressor ran for at least four minutes, the EEV will close and the compressor will pumpdown, then shut off. The evaporator fans will continue to run.

When the room sensor detects a rise in temperature of approximately 2°F, and the compressor has been off for at least four minutes, the EEV opens to its last position 15 seconds before the compressor starts. Superheat adjustments at two minute intervals will then follow. During this time, the compressor will be on a minimum four minute "hold-on" cycle. If the superheat drops to +2°F at anytime, the valve will be adjusted at 45 second intervals.

If the compressor discharge line sensor reaches 225° F for four minutes, the superheat will be lowered temporarily, overriding the normal superheat routine to effectively keep the compressor discharge line temperature from going any higher. "Discharge high" fault will be displayed and the system will continue to operate. A service person should check system to determine cause for high discharge temperature.





# BEACON CONTROLLER

## Ambients below 50° F and above 10° F

At the initial application of power to the system, the compressor and the evaporator fans will be in a four minute hold-off cycle and will not start immediately. When there is a call for cooling, the compressor starts and the electric expansion valve (EEV) stays closed for 12 seconds. After 12 seconds the EEV goes to 7/8 open and the compressor is put in a four minute “hold-on” cycle. Superheat adjustments at two minute intervals will then follow.

When the room thermostat setting becomes satisfied and if the compressor ran for at least four minutes, the EEV will close and the compressor will pump-down and shut off. The evaporator fans will continue to run.

When the room sensor detects a rise in temperature of approximately 2°F and the compressor has been off for at least four minutes, the EEV will open to it's last position, 30 seconds before the compressor is started.

## Ambients below 10° F

At the initial application of power to the system, the compressor and the evaporator fans, will be in a four minute hold-off cycle and will not start immediately. When there is a call for cooling, the compressor starts and the electric expansion valve (EEV) stays closed for 12 seconds. After 12 seconds the EEV goes to full open, and the compressor is put in a four minute “hold-on” cycle.

When the room thermostat setting becomes satisfied and if the compressor ran for at least four minutes, the EEV will close and the compressor will pump-down until the low pressure switch trips or one minutes has elapsed. The evaporator fans will continue to run.

When the room sensor detects a rise in temperature of approximately 2°F and the compressor has been off for at least four minutes, the EEV will open to it's last position, 30 seconds before the compressor starts.



## **CONDENSER FAN CYCLING**

Beacon condensing units will have pressure fan cycling and ambient fan cycling as standard. On one fan condensing units, pressure fan cycling, with a setting of 150 psig cut-out and 200 psig cut-in is used. On two fan condensing units, one fan will be controlled by an ambient switch, set at 50°F cut-out, and the other fan will be controlled by the pressure fan cycling switch.

# BEACON CONTROLLER

## PUMP-DOWN

At the end of each cooling cycle, when the box temperature is met, the system will pumpdown and shut off.

To pumpdown, the EEV closes and the compressor pumps down until the low pressure switch trips the unit off, or two minutes have elapsed. While in the off cycle the system will initiate a short pump-down at four minute intervals, if the low pressure switch is closed, to ensure that any refrigerant leakage, will not cause a problem.

### To Manually Pump-Down System

The system can be pumped down for service by closing the liquid line service valve in the condensing unit, then closing the suction line service valve when the system trips on the low pressure switch.

or

Install a switch that will interrupt the circuit to one wire of the room sensor to the Beacon board. This will cause the system to pump down and shut off. The system will not restart until the switch has re-made the circuit to the room sensor.

### Systems with Optional Pump-Down Switch on the Condensing Unit

The low pressure switch time delay relay will have to be adjusted from the factory set 2 minutes to 0 minutes before flipping the pump-down switch. **After normal operation of the system is restored, the low pressure switch time delay relay must be adjusted back to the 2 minute setting.**

## CHECKING OPERATION OF EXPANSION VALVE (EEV)

The expansion valve position is indicated by a 0 to 5 volts DC signal. At 0 Volt the valve is closed and at 5 volts the valve is fully open. At values between 0 and 5 Volt, the valve will be opened proportionately. By using a volt meter to measure the DC volts across the pins marked "EXV TEST" (bare pins near LED) on the Beacon board, a determination can be made if the valve is open or closed. This must be measured while the unit is cooling.

## ELECTRIC DEFROST MODE

If elapsed time has been selected (this works just like a time clock), the number of defrosts per day will depend on the number selected on the controller (i.e. 1, 2, 4 or 6). If run time has been selected, the number of defrosts per day will vary depending on the compressor run time (i.e. 2, 3, 6 or 12 hr.).

When a defrost is initiated, the EEV valve closes, the compressor is allowed to pump-down (see pump-down description), the evaporator fans are cycled off and the defrost heaters are energized. The master and all slave controllers must terminate their defrost, either on temperature or time, before the master controller will end the defrost cycle. There is a 60 second condensate drain-down time before the compressor is started, followed by a 60 second evaporator fan hold-off time (fan delay). After this sequence, the controller(s) are back in the refrigerating mode and the EEV(s) open to the position prior to defrost.

## AIR DEFROST MODE

Usually the cycling on the thermostat will suffice to defrost the coil(s) when operating at room temps between 35° & 45°F. However, it will be necessary to set certain parameters. Recommended values when operating near the 35° F range are as follows: select elapsed time, 2 defrost per day, 40 min. fail-safe & 50° F defrost end temp. When operating near the 45° F range, it is advisable to minimize the effect of the defrost by changing to a 10 min. fail-safe & 50° F defrost end temp. Note: These are only recommended settings. Other settings are available on the Beacon board.

# BEACON CONTROLLER

## STATUS INDICATOR

There is a red status indicator light on the Beacon board. This light has a controlled blink sequence to indicate modes such as cooling, superheat, off, defrost, or error. (See status light blink sequence chart.)

- COOLING/SUPERHEAT:** During the cooling mode, the light will blink off for two seconds, on for two seconds, off for two seconds followed by a rapid sequence of blinks that if counted will indicate superheat.
- OFF CYCLE:** During the thermostat off cycle, the light will blink off for seven seconds and on for one second, which will then repeat.
- DEFROST:** During defrost, the light will blink off for one second and on for one second, which will then repeat.

## ALARMS

**Beacon provides a set of dry contacts that are normally closed, for use in controlling an alarm. These contacts can be connected to a light, a buzzer or a bell., which will be activated when an alarm condition occurs.**

**When the Beacon is energized, the alarm contacts are OPENED. When an alarm condition is detected, the contacts are CLOSED.**

Conditions under which the alarm contacts will close are:

- Power failure on or to a Beacon board.
- Room temperature of 16° F or more above thermostat set-point or 4° F below thermostat set-point, for more than 1 hour (master controller only), when not in defrost. System will pump-down and shut off. It will restart after four minutes.

## ERROR INDICATOR & STATUS LIGHT

At initial power up, each Beacon board checks for system errors. The system error check involves checking the various temperature sensors to determine whether any of these sensors are shorted or open.

The system will pump-down and cycle off and will not restart until the fault is cleared or the circuit breaker reset, for the following conditions:

- Superheat sensor shorted or open
- Room temperature sensor shorted or jumper not installed

The system will pump-down, cycle off and try to restart, after the four minute “hold off” period, for the following fault conditions:

- Superheat too low
- High pressure, oil pressure or low pressure cut-out



# BEACON CONTROLLER

## STATUS INDICATOR LIGHT BLINK SEQUENCE

Mode	Blink Time	Off Time	Action
<b>Cooling</b>	2 sec.	2 sec.	Faster blinks for superheat count, then repeat
<b>Off</b>	1 sec.	7 sec.	Repeat
<b>Defrost</b>	1 sec.	1 sec.	Repeat
<b>Error</b>	8 fast	2 sec.	Slower blinks for error code, then repeat

### Error Codes

- One blink — Superheat sensor shorted or open
- Two blinks — Room temperature sensor shorted or jumper not installed
- Three blinks — Compressor discharge temperature sensor shorted
- Four blinks — High compressor discharge temperature
- Five blinks — Superheat too low
- Six blinks — High pressure, oil pressure or low pressure cut-out
- Seven blinks — Defrost Termination sensor shorted.

**Note:** See Table 2 for thermistor sensor resistance values at selected temperatures. To check a sensor, place it in an ice bath (a cup with ice and water) and stir. The resistance should be 32,650 ohms at the 32° F bath temperature.

**TABLE 2**

Resistance of thermistor sensors at various temperatures.

Temperature° F	Ohms	Temperature° F	Ohms
104	5,320	32	32,650
86	8,060	23	42,330
77	10,000	14	55,330
68	12,490	5	72,950
59	15,710	-4	97,070
50	19,900	-13	130,410
41	25,400	-22	176,960

### EVAPORATOR FANS SHUT-DOWN BY OPERATORS

In some installations, a switch is provided which allows an operator to de-energize the evaporator fans while loading the freezer or cooler box. This may cause the evaporator coil to freeze-up. The compressor can be de-energized when the evaporator fan is de-energized, by wiring a 24V AC coil, double pole single throw (DPST), relay into the fan circuit. This relay, R3, and the wiring is shown on the **TYPICAL WIRING SCHEMATICS**, in the back of this installation manual. For multiple evaporators, additional relays wired in parallel to R3, to break the other fans, will be needed.

# BEACON CONTROLLER

## OPTIONAL SMART CONTROLLER

The Beacon Smart Controller performs all the standard Beacon functions with the additional benefit of remote mounting for easy access. From the Smart Controller, the refrigeration system can be monitored and the program parameters changed, without the user going into the Cooler or Freezer Box. The Smart Controller allows the following:

### **Monitoring**

- Superheat of each evaporator
- The expansion valve setting (No. of steps open or closed)
- The entering evaporator temperature
- Compressor discharge temperature
- Outdoor temperature
- Compressor run time
- Number of compressor cycles
- Maximum compressor discharge temperature
- Length of last defrost

### **Programming**

- Box temperature
- The defrost start times - up to eight settings
- Defrost fail-safe time
- Defrost termination temperature
- Demand - Smart Defrost
- Evaporator superheat
- High and low temperature limits for alarm
- Alarm conditions time limits
- Medium temperature or low temperature system
- °F or °C
- Set the clock
- Run a quick test of the system



Other features of the Smart Controller are:

- The Smart Controller has a liquid crystal display (LCD) display which shows: current time, actual box temperature, box temperature set-point and if there is an alarm or fault condition
- Can be placed far away from the system being controlled. (500 - 1000 ft)
- Locking feature to prevent unauthorized access to program settings
- Each Smart Controller can control multiple evaporators on a system( up to 6 evaporators)
- A RS232 port is provided which allows connection to a IBM compatible computer, for monitoring the system remotely and changing of the box temperature.
- Back-up battery will maintain the clock settings for 10 years
- Double E Prom Chip will maintain program settings indefinitely
- Large, easy to read LCD screen
- Smart Defrost - the ability to defrost only when needed

**For more detailed information, see the Smart Controller Installation and Operation manual.**

# BEACON CONTROLLER

TABLE 3

The **initial factory** settings for the BEACON MICROPROCESSOR BOARD are indicated on the following chart.

## ELECTRIC DEFROST FACTORY SETTINGS

### DEFROST CYCLES OR TIME

6 PER DAY/ 2 HRS	<input type="checkbox"/>
4 PER DAY/ 3 HRS	<input checked="" type="checkbox"/>
2 PER DAY/ 6 HRS	<input type="checkbox"/>
1 PER DAY/ 12 HRS	<input type="checkbox"/>

ELAPSED

RUN TIME

### SUPERHEAT

6°F	<input type="checkbox"/>
8°F	<input checked="" type="checkbox"/>
12°F	<input type="checkbox"/>

### DEFROST FAIL-SAFE

10 MIN	<input type="checkbox"/>
20 MIN	<input type="checkbox"/>
30 MIN	<input checked="" type="checkbox"/>
40 MIN	<input type="checkbox"/>
60 MIN	<input type="checkbox"/>

MEDIUM

LOW

TEST

NORM

TYPE 1

TYPE 2

RESET TIME

NORM

FORCED DEFROST

NORM

### DEFROST END TEMP

50°F	<input type="checkbox"/>
70°F	<input checked="" type="checkbox"/>
90°F	<input type="checkbox"/>

## AIR DEFROST FACTORY SETTINGS

### DEFROST CYCLES OR TIME

6 PER DAY/ 2 HRS	<input type="checkbox"/>
4 PER DAY/ 3 HRS	<input type="checkbox"/>
2 PER DAY/ 6 HRS	<input checked="" type="checkbox"/>
1 PER DAY/ 12 HRS	<input type="checkbox"/>

ELAPSED

RUN TIME

### SUPERHEAT

6°F	<input type="checkbox"/>
8°F	<input checked="" type="checkbox"/>
12°F	<input type="checkbox"/>

### DEFROST FAIL-SAFE

10 MIN	<input type="checkbox"/>
20 MIN	<input type="checkbox"/>
30 MIN	<input type="checkbox"/>
40 MIN	<input checked="" type="checkbox"/>
60 MIN	<input type="checkbox"/>

MEDIUM

LOW

TEST

NORM

TYPE 1

TYPE 2

RESET TIME

NORM

FORCED DEFROST

NORM

### DEFROST END TEMP

50°F	<input checked="" type="checkbox"/>
70°F	<input type="checkbox"/>
90°F	<input type="checkbox"/>

NOTE: When using the Beacon Smart Controller, the Defrost End Temperature for each Beacon board must be set at 50° F. It is recommended that the room temperature pot for all the slave units be adjusted to the maximum temperature 60°F when connected in a master/slave configuration.

# BEACON CONTROLLER

PARTS LIST (Parts Dept. 800-686-7278)		
PART DESCRIPTION		HRPD PART NUMBER
Temperature Sensor		28900101
Transformer 208/240 - 24 volt - 40 VA		22522301
Transformer 208/240 - 24 volt - 75 VA (10HP + up)		22538401
Relay for condenser Fan or Crankcase Heater		22511401
Contactor for Compressor 40 amp with 24 volt Coil		2252440
Control Board for Electric Defrost		28910001
Control Board for Air Defrost		28910002
Terminal Block		2251266
Low Pressure Switch Time Delay Relay		22536801
Electric Expansion Valve		
ESV 1 - 24 volt	} uni-polar valves	29310001
ESV 2 - 24 volt		29310002
ESV 4 - 24 volt		29310003
ESV 6 - 24 volt		29310004
ESV-8 - 24 volt		29310005
ESV-10 - 24 volt		29310006
ESV-25- 24 volt - bi-polar valve		29320001
Expansion Valve Molded Connector		29310007
Optional Pump-Down Switch		22510901
Beacon Smart Controller		89704401
Optional Smart Controller Software Package		89704501
Bi-polar adapter board (only used with 29320001 expansion valve)		28920001

To test the Beacon board place the test jumper to the "TEST" position. The board will then cycle through each output for 10 seconds. It will energize and de-energize the fan motor, electric heater, expansion valve and compressor for 10 seconds. When in the TEST mode the status light flashes quickly. If a sensor is bad it will flash per the error chart. **AT THE END OF THE TEST RETURN THE JUMPER TO THE NORMAL POSITION.**

BEACON OPERATIONAL LIMITS	
Box set point tolerance .....	+/-2°F
Down to -20°F outdoor ambient .....	Allows start-up & operation
Below -20°F outdoor ambient .....	Requires head pressure control valve & pressure fan cycling switch
Controlling box temp. range .....	-25°F to 60°F
Voltage range at the board .....	18 VAC min / 30 VAC max
Surge protection at the board.....	up to 50 VAC

# BEACON CONTROLLER

<b>BEACON TROUBLE-SHOOTING GUIDE</b>	
<b>FAULT OR PROBLEM</b>	<b>THINGS TO CHECK</b>
System runs 4 minutes then cycles off, then repeats	<ol style="list-style-type: none"> <li>1. Check if sensors are connected correctly; if evaporator in/out are switched, this will cause low superheat</li> <li>2. Check if system is piped properly</li> <li>3. System will cycle off if discharge line gets above 225°F</li> <li>4. Check evaporator coil circuits if they are feeding evenly; uneven feeding will cause flood-back</li> <li>5. Check if expansion valve is correctly wired on Beacon board</li> <li>6. Evap Coil temp too high; disconnect Evap Coil sensor to allow system to run &amp; lower temp; <b>reconnect when temp lowered</b></li> <li>7. Is the system wired properly between master &amp; condensing unit</li> <li>8. Check charge at 105°F; condensing sight glass should be full</li> <li>9. Check fan cycling operation</li> </ol>
System runs continuously	<ol style="list-style-type: none"> <li>1. Check evaporator coil circuits if they are feeding evenly; uneven feeding means coil is not being used fully</li> <li>2. Check if red jumper wire (next to blue pot) is connected; also check if terminals on red jumper wire are tight</li> <li>3. Check if room sensor is connected</li> <li>4. Check if system is properly charged with refrigerant</li> <li>5. Is the system sized properly</li> <li>6. Check system charge at 105°F condensing for full sight glass</li> </ol>
System runs erratically	<ol style="list-style-type: none"> <li>1. Check for low voltage condition; system will not operate properly below 18 VAC</li> <li>2. Check for high voltage condition; system will not operate properly above 30 VAC</li> <li>3. Check if expansion valve is correctly wired on Beacon board</li> <li>4. Check "EVAP IN" &amp; "EVAP OUT" sensors for proper operation</li> <li>5. Is EEV wired properly</li> <li>6. Is system charged properly</li> <li>7. Check fan cycling operation</li> </ol>
Sensor was changed but fault signal still appears	<ol style="list-style-type: none"> <li>1. If a sensor is changed out, system power must be reset to clear fault</li> </ol>
System flashes low superheat fault	<ol style="list-style-type: none"> <li>1. Check if "EVAP IN" &amp; "EVAP OUT" sensors are correctly installed on board &amp; on copper tubing</li> <li>2. Check evaporator coil circuits if they are feeding evenly; uneven feeding will cause flood-back or sensors won't sense proper superheat</li> <li>3. Check if system is piped correctly; incorrectly piped system will cause system flood-back</li> <li>4. Check if expansion valve is correctly wired on Beacon board</li> <li>5. Expansion valve may be defective; check by running through test mode</li> <li>6. Check for proper charge at 105° condensing for full sight glass</li> </ol>
System flashes low pressure, high pressure or oil pressure fault	<ol style="list-style-type: none"> <li>1. If outdoor temperature is below 50°F, check to make sure time delay is set at 2 minutes</li> <li>2. If pumpdown switch is installed, check to make sure it is wired correctly in the circuit</li> <li>3. Check to make sure system is charged properly with refrigerant</li> <li>4. Check if expansion valve is operating properly</li> <li>5. Check if expansion valve is correctly wired on Beacon board</li> <li>6. Expansion valve may be defective</li> <li>7. Check for flood back to the compressor</li> <li>8. Check for proper piping &amp; oil return</li> <li>9. Possible bad low pressure, high pressure or oil pressure switch</li> <li>10. Possible bad time delay or mis-wired</li> </ol>



# BEACON CONTROLLER

## BEACON TROUBLE-SHOOTING GUIDE (cont'd.)

<p>System will not run</p>	<ol style="list-style-type: none"><li>1. Check if red jumper wire (next to blue pot) is correctly connected across "X" terminals</li><li>2. Check red jumper wire terminals to make sure they are connected to the wire, not the insulation</li><li>3. Check to make sure system is correctly wired</li><li>4. Check system for low voltage or high voltage conditions; system must have voltage between 18-30 VAC for proper operation</li><li>5. Check if "EVAP IN" &amp; "EVAP OUT" sensors are correctly installed on the board &amp; on copper tubing</li><li>6. If system has Smart Controller, check "MULTI IN" &amp; "MULTI OUT" connection at board &amp; at Smart Controller to make sure wires are not reversed</li><li>7. Check if "ROOM" sensor is connected on Beacon board</li><li>8. Check that room sensor is good by resistance check</li><li>9. Check refrigerant charge</li><li>10. If voltage is too high (above 30 volts) or too low (below 18 volts), unit will not run</li></ol>
<p>Coil frost pattern is uneven</p>	<ol style="list-style-type: none"><li>1. Check evaporator coil circuits if they are feeding properly; uneven feeding will cause uneven icing</li><li>2. If liquid line runs through cooled space, may need to be insulated or nozzle reselected for conditions</li><li>3. If electric defrost coil for medium temperature applications, medium temperature nozzle must be installed</li></ol>

# BEACON CONTROLLER

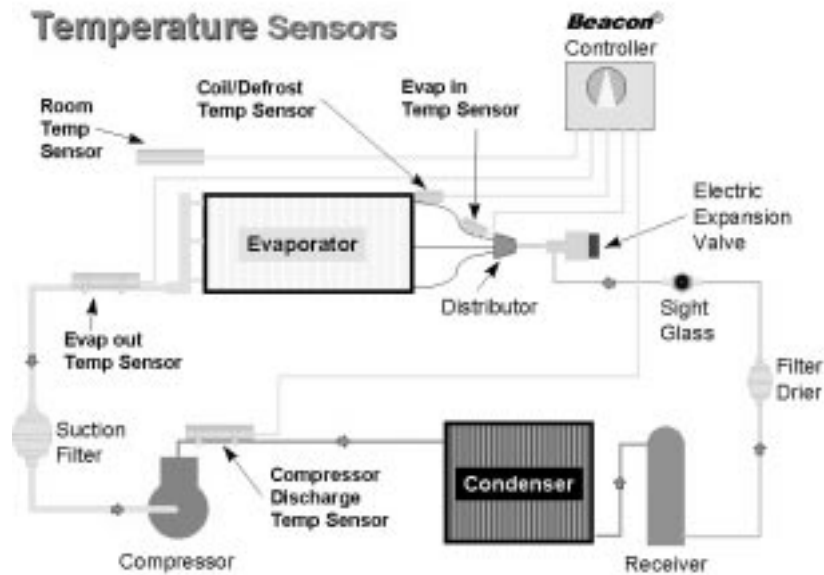
## BEACON UNI-POLAR EXPANSION VALVE TEST VOLTAGES

	ESV TEST					
	(dc volts)	BLUE	RED	WHT	BLK	YEL
VALVE OPEN	4.4	15.6	15.6	15.7	15.6	Com 24 Vdc
VALVE CLOSED	0	15.3	15.3	15.4	15.5	

(Beacon Board connection)

### Notes:

1. All volts shown are measured while in the "TEST" mode and are DC
2. The volts shown for each step (BLUE, RED, WHT, BLK) are measured between the YEL-Com & the corresponding pin
3. The volts shown for each step is available only when the valve is activated. The voltage value will increase when the valve is activated, then will go to zero.
4. The "ESV TEST" volts will remain while the valve is open



# BEACON CONTROLLER

## SERVICE DIAGNOSIS CHART - *BEACON*

PROBLEM	POSSIBLE CAUSE	POSSIBLE CORRECTIVE ACTION
Compressor will not run	<ol style="list-style-type: none"> <li>1. 4 min. off cycle</li> <li>2. Box temp is below t'stat setting</li> <li>3. Loose wiring</li> <li>4. Bad sensor</li> <li>5. Discharge temp. too high</li> <li>6. Beacon board defective</li> <li>7. Low pressure switch open</li> <li>8. Supply voltage too low</li> <li>9. Evap coil temp too high</li> </ol>	<ol style="list-style-type: none"> <li>1. Wait 4 min.</li> <li>2. Lower t'stat setting</li> <li>3. Check all wire terminals; tighten if necessary.</li> <li>4. Check status light for problem sensor</li> <li>5. Check general diagnosis chart</li> <li>6. Check "Status" light; if out, replace board</li> <li>7. Check pressure switch setting.</li> <li>8. Change transformer primary to correct supply voltage tap. 208 or 240 volts.</li> <li>9. Temporarily disconnect "Evap Coil" sensor from board; <b>reconnect when coil temp is lowered</b></li> </ol>
Cannot get to box temp	<ol style="list-style-type: none"> <li>1. Wrong t'stat setting</li> <li>2. Wrong selection on board</li> <li>3. Comp. run time too short</li> <li>4. Bad expansion valve</li> <li>5. Wrong charge</li> <li>6. Box temp fluctuate</li> <li>7. Evap coil iced up</li> <li>8. Wrong nozzle</li> <li>9. Low pressure switch tripping compressor</li> </ol>	<ol style="list-style-type: none"> <li>1. Check and adjust t'stat</li> <li>2. For box temp of 20°F and above, select "MEDIUM"; for box temp below 20°F, select "LOW"</li> <li>3. a) Increase time between defrost. b) May need time delay across low pressure switch. (See "Compressor cycles off at startup" below.)</li> <li>4. Check if expansion valve is operating</li> <li>5. Check charging procedure</li> <li>6. Allow system to run longer</li> <li>7. Clear ice and check defrost setting</li> <li>8. Check if distributor tubes are sweating evenly; if not, have factory check nozzle selection for application.</li> <li>9. EXV closing down due to low superheat; check "EVAP IN" &amp; "EVAP OUT" sensors; check refrigerant charge.</li> </ol>
Superheat light indicates 1 deg then 8 deg	<ol style="list-style-type: none"> <li>1. Incorrect refrigerant charge</li> <li>2. Expansion valve oversized</li> <li>3. Superheat set too low</li> <li>4. System not stabilized</li> <li>5. Evap coil iced up</li> </ol>	<ol style="list-style-type: none"> <li>1. Check refrigerant charge</li> <li>2. Check expansion valve size</li> <li>3. Raise superheat setting</li> <li>4. Allow system to run longer</li> <li>5. Clear ice</li> </ol>
Freezer coil icing	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant.</li> <li>2. Wrong defrost termination setting</li> <li>3. Wrong defrost fail-safe setting</li> <li>4. Evap fan not running</li> <li>5. Defrost heater not working</li> <li>6. Faulty defrost termination sensor</li> <li>7. Not enough defrost for conditions or infiltration</li> <li>8. Undersized system</li> </ol>	<ol style="list-style-type: none"> <li>1. Check system for leaks; repair leaks &amp; add refrigerant</li> <li>2. Raise setting on the board</li> <li>3. Raise setting on the board</li> <li>4. Check fan circuit and board relay</li> <li>5. Check heater circuit and board relay</li> <li>6. Check sensor on evap coil</li> </ol>
Compressor Cycles off at startup w/o pumping down	<ol style="list-style-type: none"> <li>1. Low pressure switch setting too high</li> <li>2. Low pressure switch tripping compressor</li> <li>3. Compressor out on thermal overload protector</li> </ol>	<ol style="list-style-type: none"> <li>1. Change low pressure cutout to 0 PSIG and 10 PSIG cut-in</li> <li>2a. EXV closing down due to low superheat; check "EVAP IN" &amp; "EVAP OUT" sensors</li> <li>2b. Check refrigerant charge.</li> <li>2c. Check if sensors are connected to correct terminals on Beacon board.</li> </ol>
Unit Cycles on and off without 4 min. time delay	<ol style="list-style-type: none"> <li>1. Incorrect wiring</li> <li>2. Low pressure switch tripping compressor</li> <li>3. Time delay bad or not set for 2 minutes</li> </ol>	<ol style="list-style-type: none"> <li>1a. Check wiring</li> <li>1b. Bad Beacon board</li> <li>2a. EXV closing down due to low superheat; check "EVAP IN" &amp; "EVAP OUT" sensors</li> <li>2b. Check refrigerant charge.</li> <li>2c. Check if sensors are connected to correct terminals on Beacon board.</li> </ol>

# BEACON CONTROLLER

## SERVICE DIAGNOSIS CHART - *BEACON* (cont'd.)

PROBLEM	POSSIBLE CAUSE	POSSIBLE CORRECTIVE ACTION
Beacon Board Status Light Flashes Erratically	<ol style="list-style-type: none"> <li>1. Supply voltage too high</li> <li>2. Supply voltage too low</li> <li>3. Bad board</li> </ol>	<ol style="list-style-type: none"> <li>1. Check 24 volt supply; if above 30 volt correct immediately.</li> <li>2. Change transformer primary to correct supply voltage tap. 208 or 240 volts.</li> </ol>

## SERVICE DIAGNOSIS CHART - *GENERAL*

PROBLEM	POSSIBLE CAUSE	POSSIBLE CORRECTIVE ACTION
Compressor will not run	<ol style="list-style-type: none"> <li>1. Fused disconnect switch is open</li> <li>2. Blown Fuse</li> <li>3. Compressor motor protector open</li> <li>4. Defective compressor contactor or holding coil</li> <li>5. Open room air sensor (air into coil)</li> <li>6. Compressor discharge too hot</li> <li>7. Open low pressure, high pressure or oil safety control</li> <li>8. Motor problems</li> <li>9. Loose wiring</li> </ol>	<ol style="list-style-type: none"> <li>1. Close switch</li> <li>2. Check reason fuse is blown; replace fuse after problem is corrected.</li> <li>3. Motor protector is automatic reset; allow time for compressor to cool down so that protector will reset; check unit for reason when compressor restarts.</li> <li>4. Replace</li> <li>5. Check room air sensor; if open, replace. After reconnecting, wait 4 mins. for compressor to restart.</li> <li>6. Lower evaporator superheat to lower compressor suction gas temperature</li> <li>7. Check control settings</li> <li>8. Check motor for open circuit, short circuit, grounded windings or burn-out</li> <li>9. Check all wire terminals; tighten if necessary</li> </ol>
Compressor noisy or vibrating	<ol style="list-style-type: none"> <li>1. Flooding of liquid refrigerant into crankcase</li> <li>2. Compressor hold-down nuts too tight or too loose</li> <li>3. Worn compressor/bad valves</li> </ol>	<ol style="list-style-type: none"> <li>1. Check expansion valve superheat setting on control board</li> <li>2. Loosen compressor hold-down nuts until compressor floats freely on mounting springs</li> <li>3. Replace</li> </ol>
High head pressure	<ol style="list-style-type: none"> <li>1. Too much refrigerant</li> <li>2. Non-condensables in the system</li> <li>3. Dirty condenser coil</li> <li>4. Condenser fan not running</li> <li>5. Discharge valve partially closed</li> <li>6. System running beyond condensing temperatures due to heavy load or out of equipment design parameters</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove excess refrigerant</li> <li>2. Purge system of non-condensables</li> <li>3. Clean condenser coil</li> <li>4. Check electrical circuit, including fuses</li> <li>5. Open valve</li> </ol>
Low head pressure	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant</li> <li>2. Damaged valves in compressor</li> <li>3. Winter operation w/o head pressure valve</li> </ol>	<ol style="list-style-type: none"> <li>1. Check system for leaks; repair leaks &amp; add refrigerant</li> <li>2. Replace compressor</li> <li>3. Check refrigerant charge</li> </ol>
High suction pressure	<ol style="list-style-type: none"> <li>1. Expansion valve over-feeding</li> <li>2. High box temp. pull-down</li> <li>3. System undersized</li> </ol>	<ol style="list-style-type: none"> <li>1. Check expansion valve superheat setting on control board</li> <li>2. Wait for box temp. to drop</li> <li>3. Check load &amp; design criteria</li> </ol>

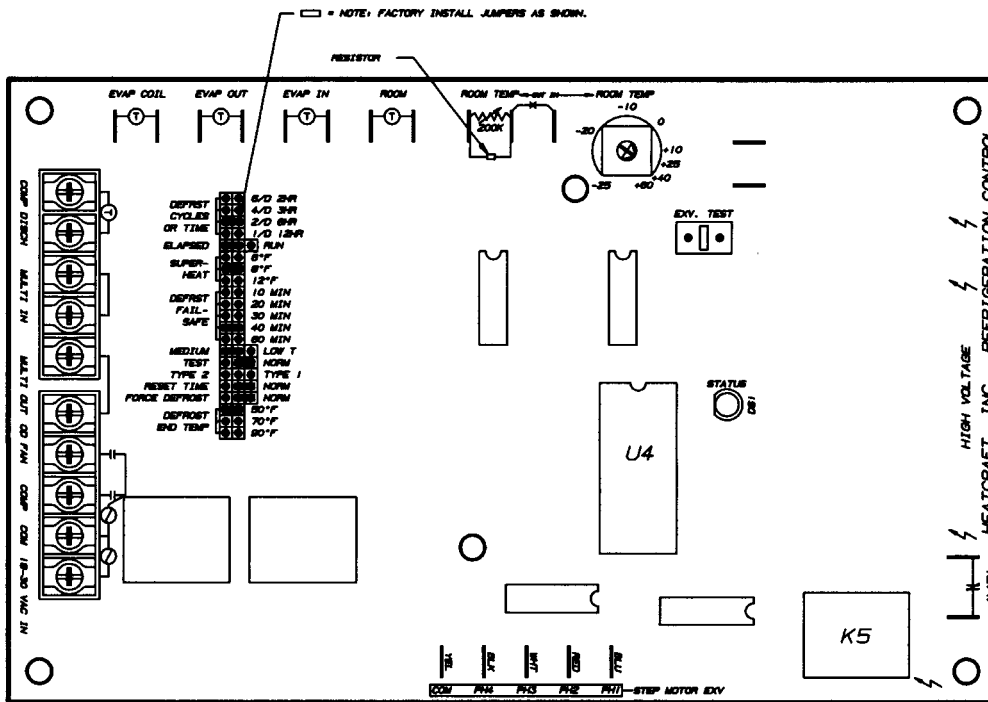
# BEACON CONTROLLER

## SERVICE DIAGNOSIS CHART - GENERAL

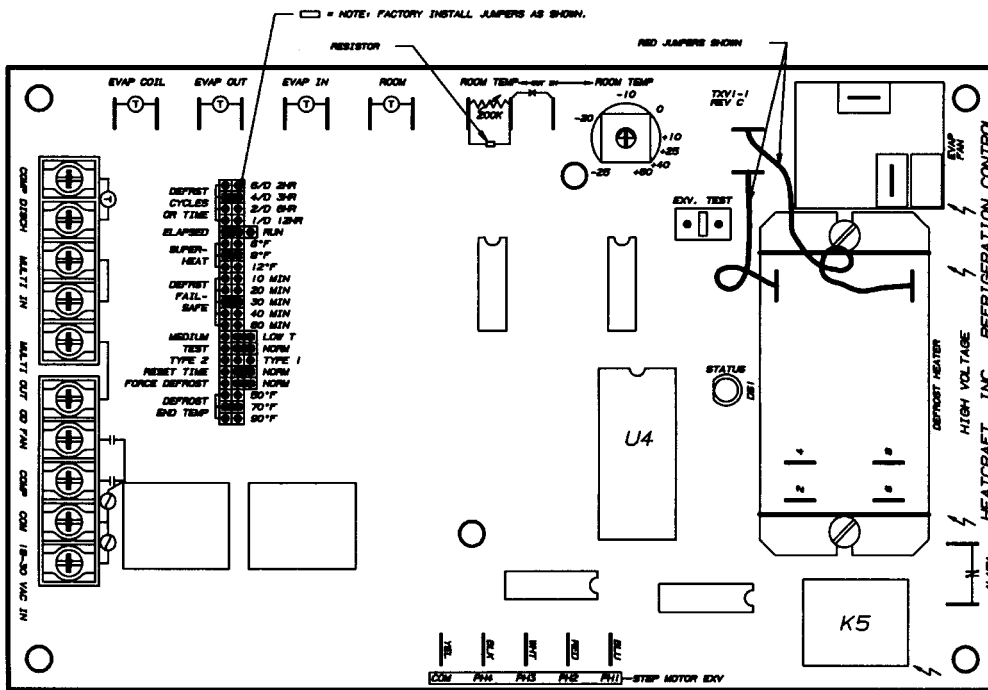
PROBLEM	POSSIBLE CAUSE	POSSIBLE CORRECTIVE ACTION
Low suction pressure	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant</li> <li>2. Freezer coil iced up</li> <li>3. Plugged liquid line filter drier</li> <li>4. Plugged suction filter</li> <li>5. Expansion valve starving coil</li> </ol>	<ol style="list-style-type: none"> <li>1. Check system for leaks; repair leaks &amp; add refrigerant</li> <li>2. Check defrost system operation &amp; correct fault condition</li> <li>3. Replace filter drier</li> <li>4. Replace suction filter</li> <li>5. Check expansion valve superheat setting on control board; check expansion valve screen</li> </ol>
Loss of oil or loss of oil pressure	<ol style="list-style-type: none"> <li>1. Insufficient oil in the system</li> <li>2. Compressor short cycling</li> <li>3. Excessive liquid refrigerant in compressor crankcase</li> <li>4. Worn bearings</li> </ol>	<ol style="list-style-type: none"> <li>1. Add oil until sight-glass is 1/2 full</li> <li>2. Check low pressure control settings</li> <li>3. Check crankcase heater; check expansion valve superheat setting on control board; check for internal rupture of heat exchanger</li> <li>4. Replace compressor</li> </ol>
Freezer coil icing	<ol style="list-style-type: none"> <li>1. Insufficient refrigerant</li> <li>2. Wrong defrost end temp setting</li> <li>3. Wrong defrost fail-safe setting</li> <li>4. Not enough defrost for application</li> <li>5. Coil not feeding properly</li> <li>6. System undersized</li> </ol>	<ol style="list-style-type: none"> <li>1. Check system for leaks; repair leaks &amp; add refrigerant.</li> <li>2. Check unit cooler instructions. Raise setting.</li> <li>3. Check unit cooler instructions. Raise setting.</li> <li>4. Check for subcooled liquid, incorrect nozzle selection, insulate liquid line, restricted coil</li> <li>5. Do heat load &amp; check sizing</li> </ol>

# BEACON CONTROLLER

## AIR DEFROST CONTROLLER



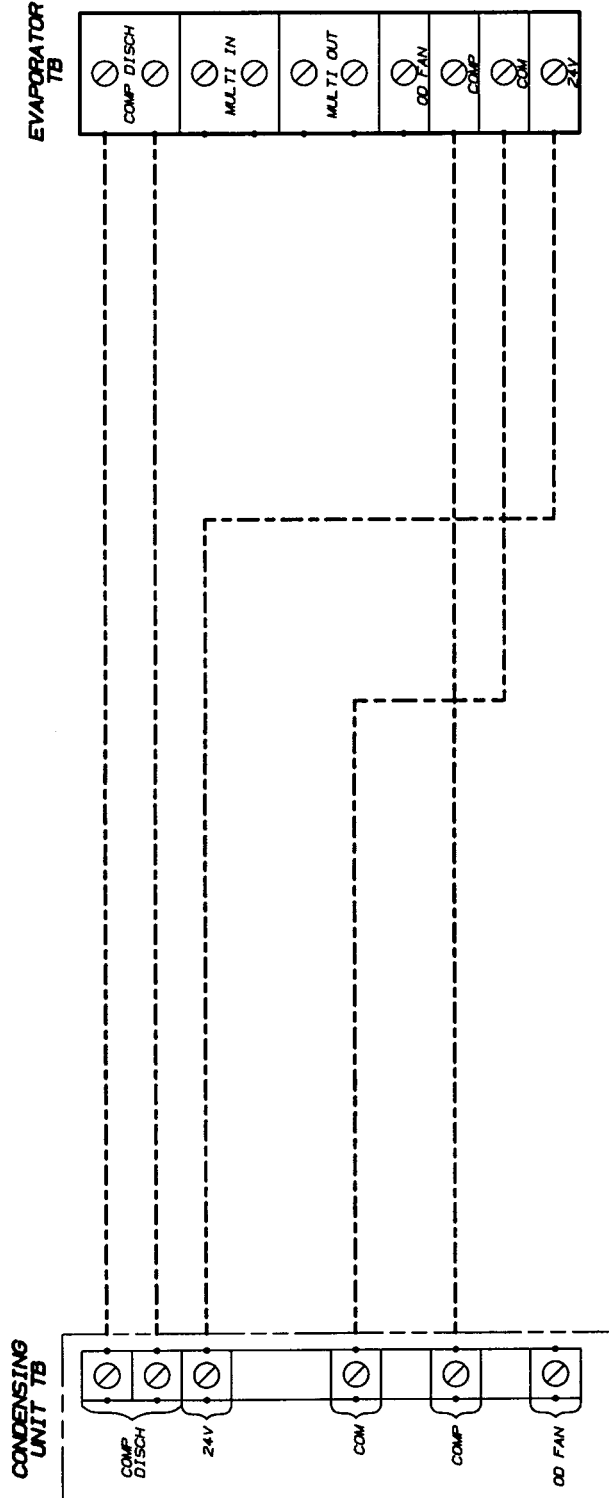
## ELECTRIC DEFROST CONTROLLER



B9905001 REV. A

# BEACON CONTROLLER

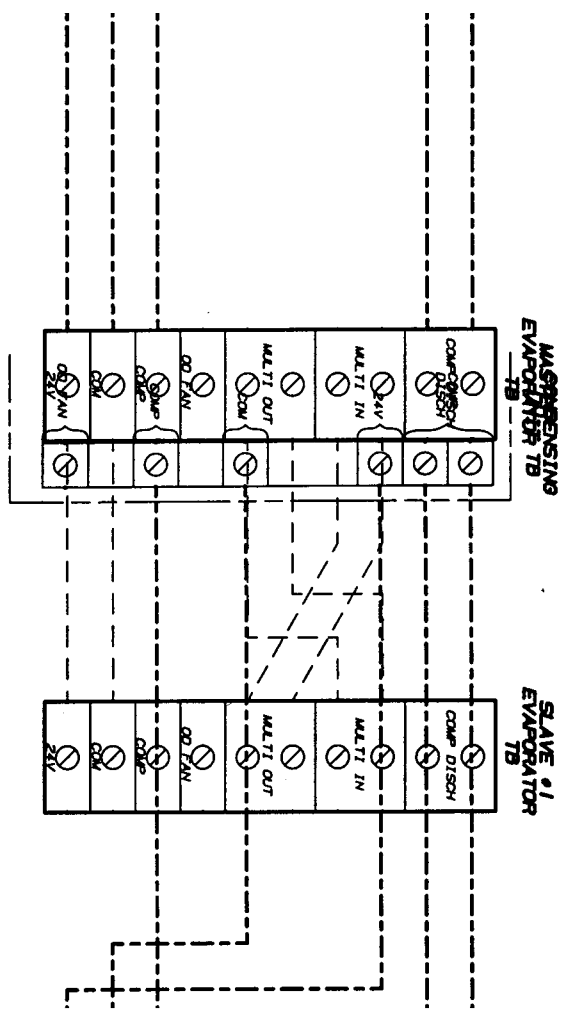
## 24 VOLT CONNECTION WIRING (CONDENSING UNIT WITH ONE EVAPORATOR)



HEATCRAFT PART NO. 29660501 REV. A

# BEACON CONTROLLER

INJECTION WIRING 24 VOLT CC  
 (ONE SLAVE CONNECTION WITH TWO EVAPORATORS)  
 MASTER W/T1 (CONDENSING L)



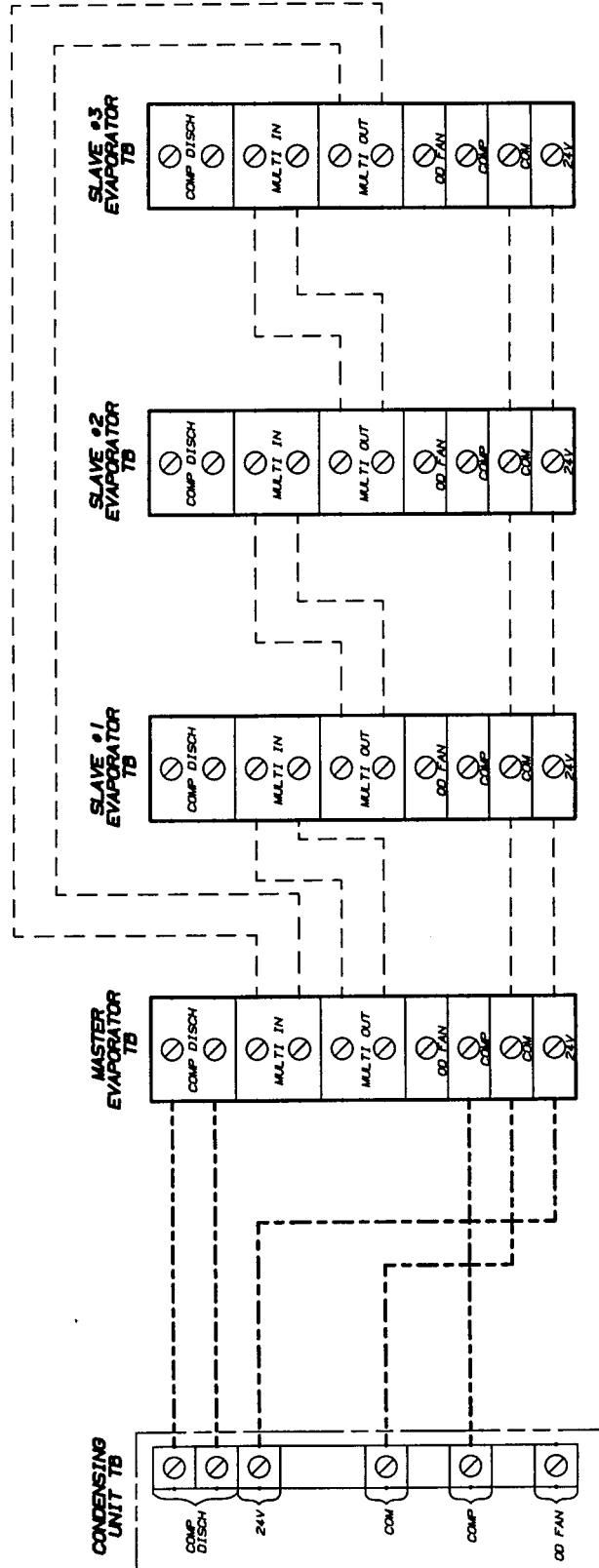
- NOTE:
1. WHEN THE BEACON SYSTEM IS APPLIED IN THIS CONFIGURATION, THE ROOM SENSOR MUST BE CONNECTED ON THE MASTER EVAPORATOR ONLY. REMOVED THE ROOM SENSOR FROM ALL OTHER EVAPORATORS.
  2. HEATCRAFT PART NO. 29660601 REV. A



# BEACON CONTROLLER

## 24 VOLT CONNECTION WIRING

MASTER WITH THREE SLAVE CONNECTION  
(CONDENSING UNIT WITH FOUR EVAPORATORS)

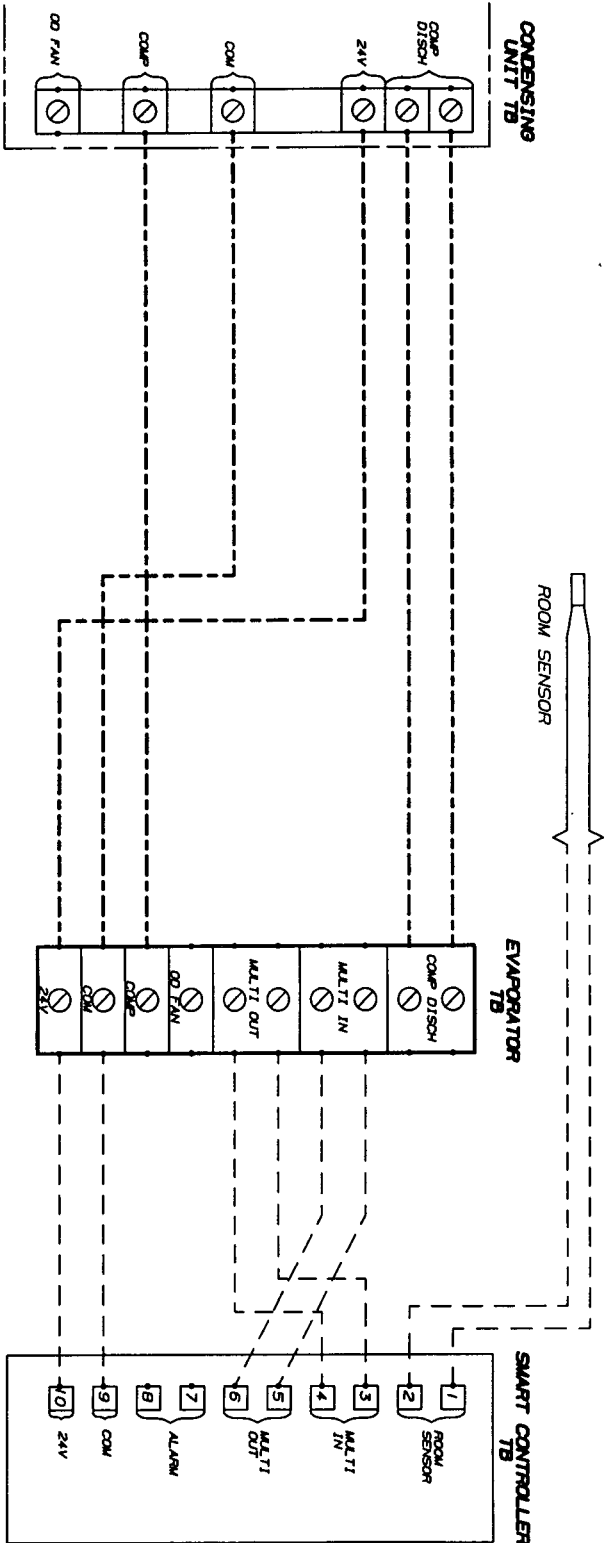


- NOTE: WHEN THE BEACON SYSTEM IS APPLIED IN THIS CONFIGURATION, THE ROOM SENSOR MUST BE CONNECTED ON THE MASTER EVAPORATOR ONLY. REMOVED THE ROOM SENSOR FROM ALL OTHER EVAPORATORS.
- 1.
  2. HEATCRAFT PART NO. 29660401 REV. A

# BEACON CONTROLLER

## 24 VOLT CONNECTION WIRING W/SMART CONTROLLER

CONNECTION DIAGRAM FOR SMART CONTROLLER  
(WITH ONE EVAPORATOR)

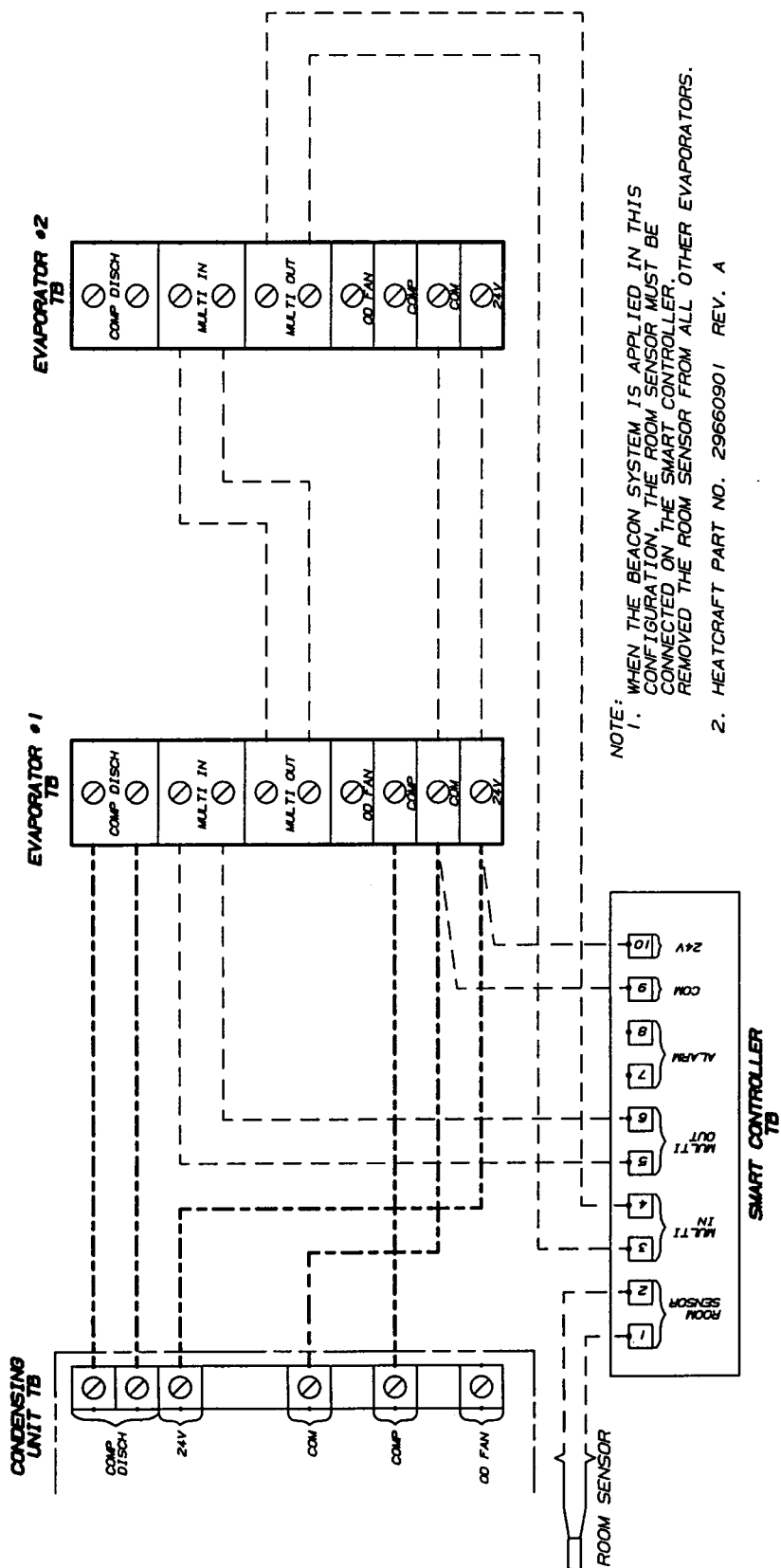


HEATDRAFT PART NO. 29660901 REV. A

# BEACON CONTROLLER

## 24 VOLT CONNECTION WIRING W/SMART CONTROLLER

CONNECTION DIAGRAM FOR SMART CONTROLLER  
(WITH TWO EVAPORATORS)



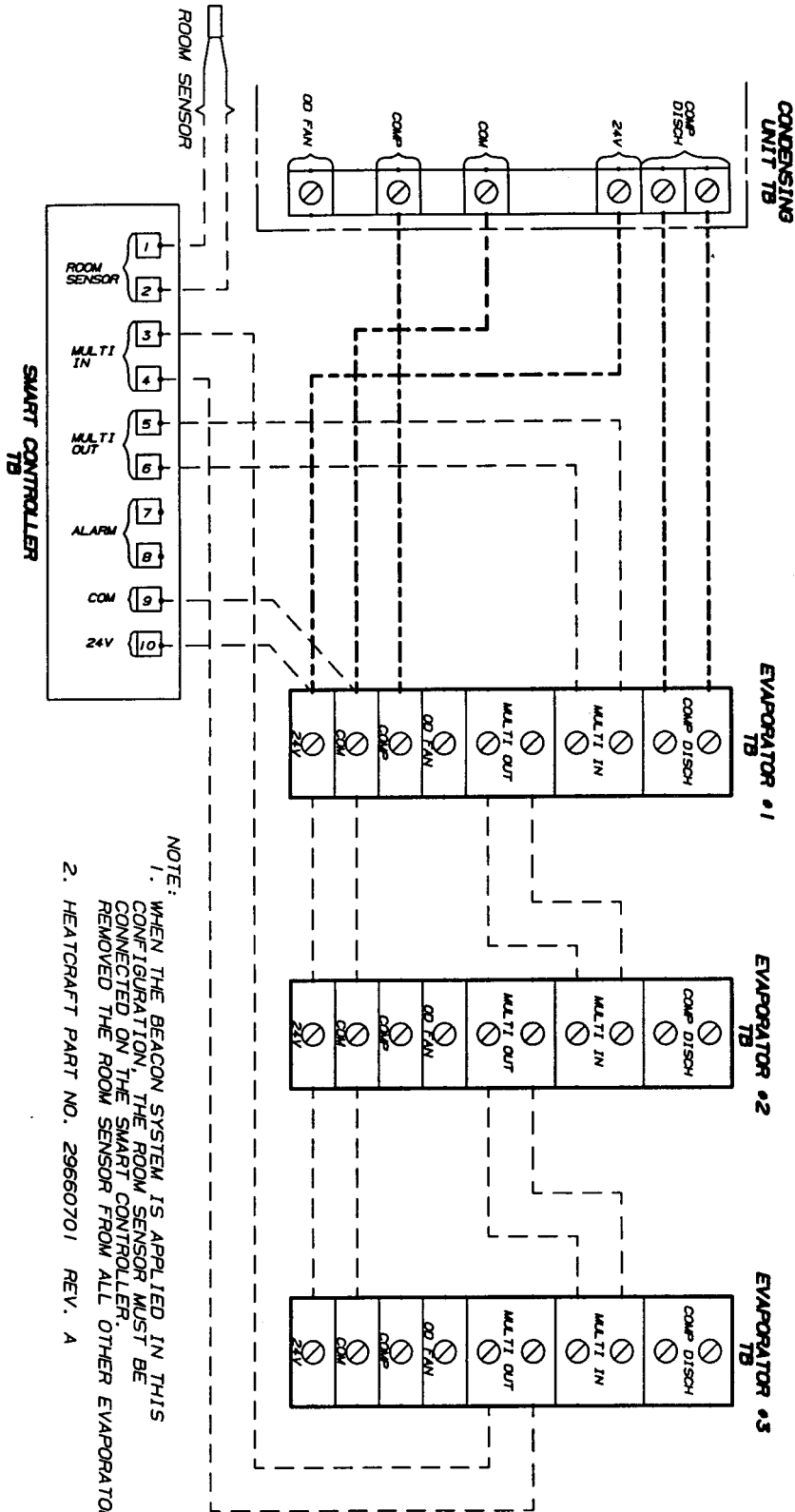
NOTE:

1. WHEN THE BEACON SYSTEM IS APPLIED IN THIS CONFIGURATION, THE ROOM SENSOR MUST BE CONNECTED ON THE SMART CONTROLLER. REMOVED THE ROOM SENSOR FROM ALL OTHER EVAPORATORS.
2. HEATCRAFT PART NO. 29660901 REV. A

# BEACON CONTROLLER

## 24 VOLT CONNECTION WIRING W/SMART CONTROLLER

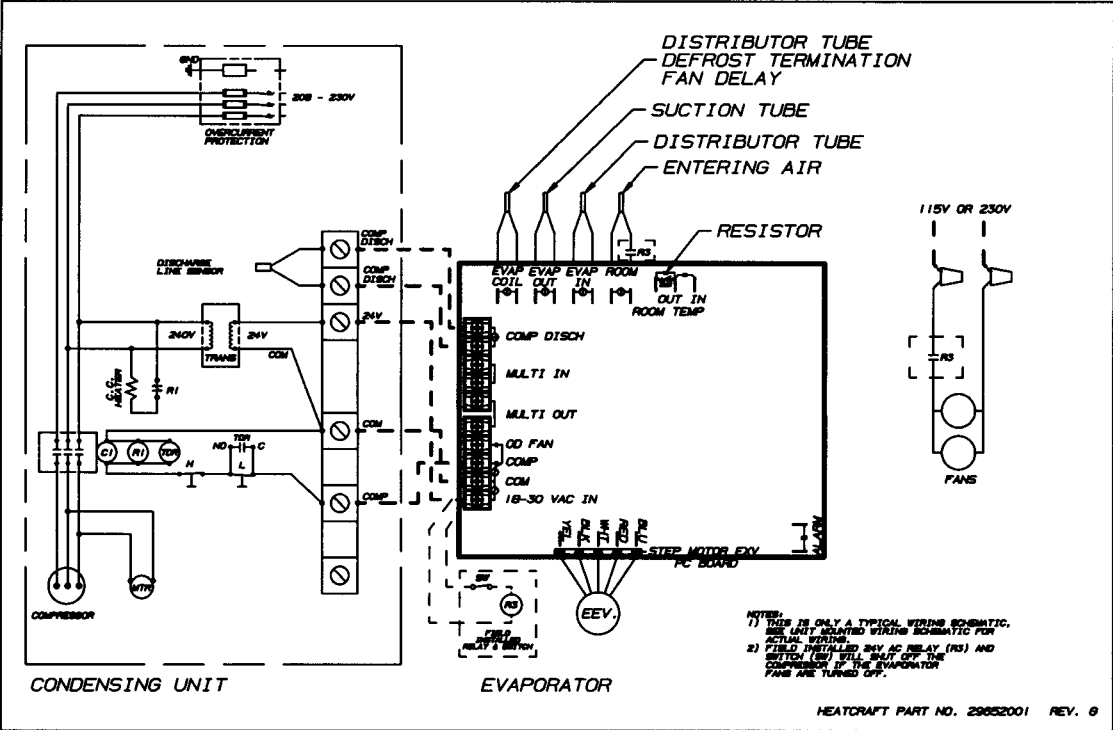
CONNECTION DIAGRAM FOR SMART CONTROLLER  
(WITH THREE EVAPORATORS)



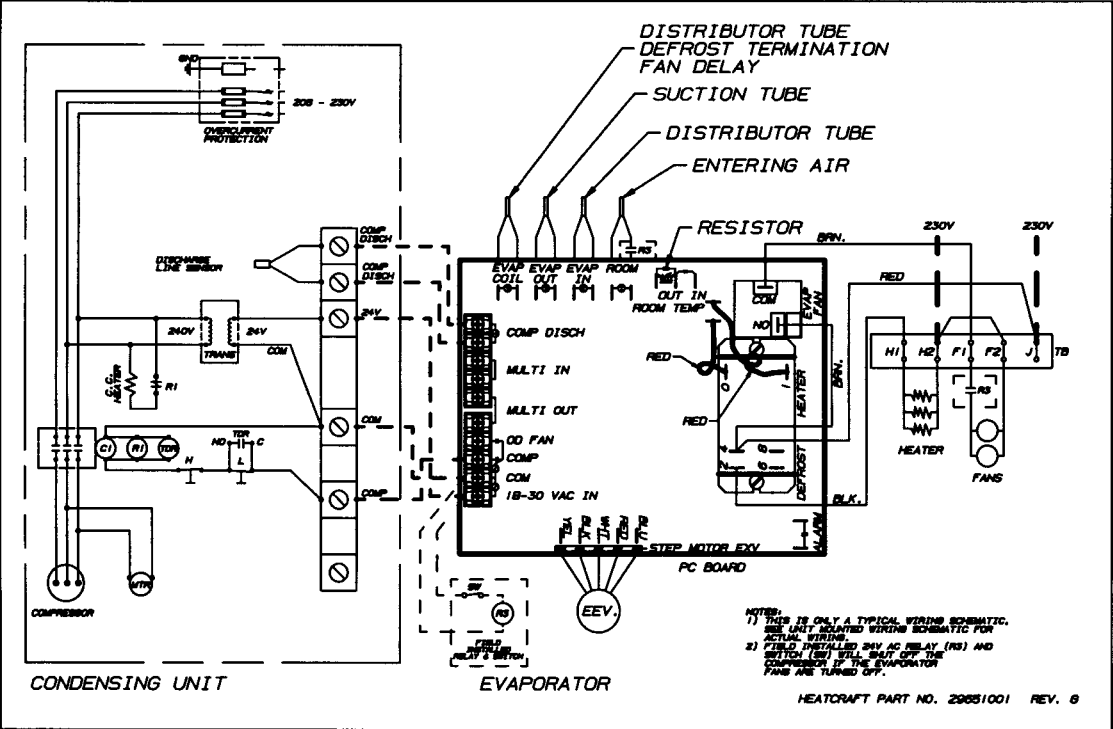
- NOTE:
1. WHEN THE BEACON SYSTEM IS APPLIED IN THIS CONFIGURATION, THE ROOM SENSOR MUST BE CONNECTED ON THE SMART CONTROLLER REMOVED THE ROOM SENSOR FROM ALL OTHER EVAPORATORS.
  2. HEATCRAFT PART NO. 29660701 REV. A

# BEACON CONTROLLER

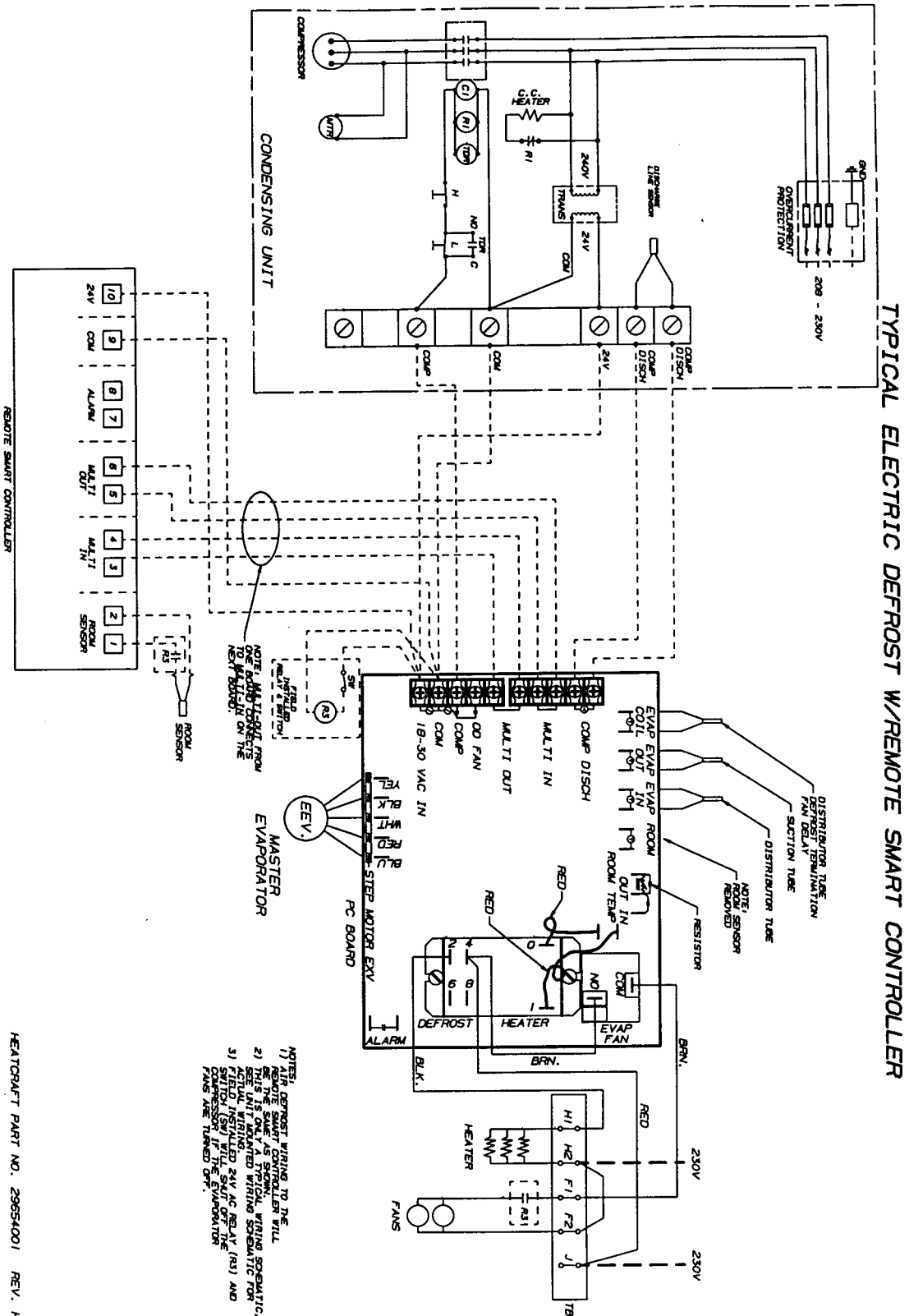
## TYPICAL AIR DEFROST



## TYPICAL ELECTRIC DEFROST



# BEACON CONTROLLER

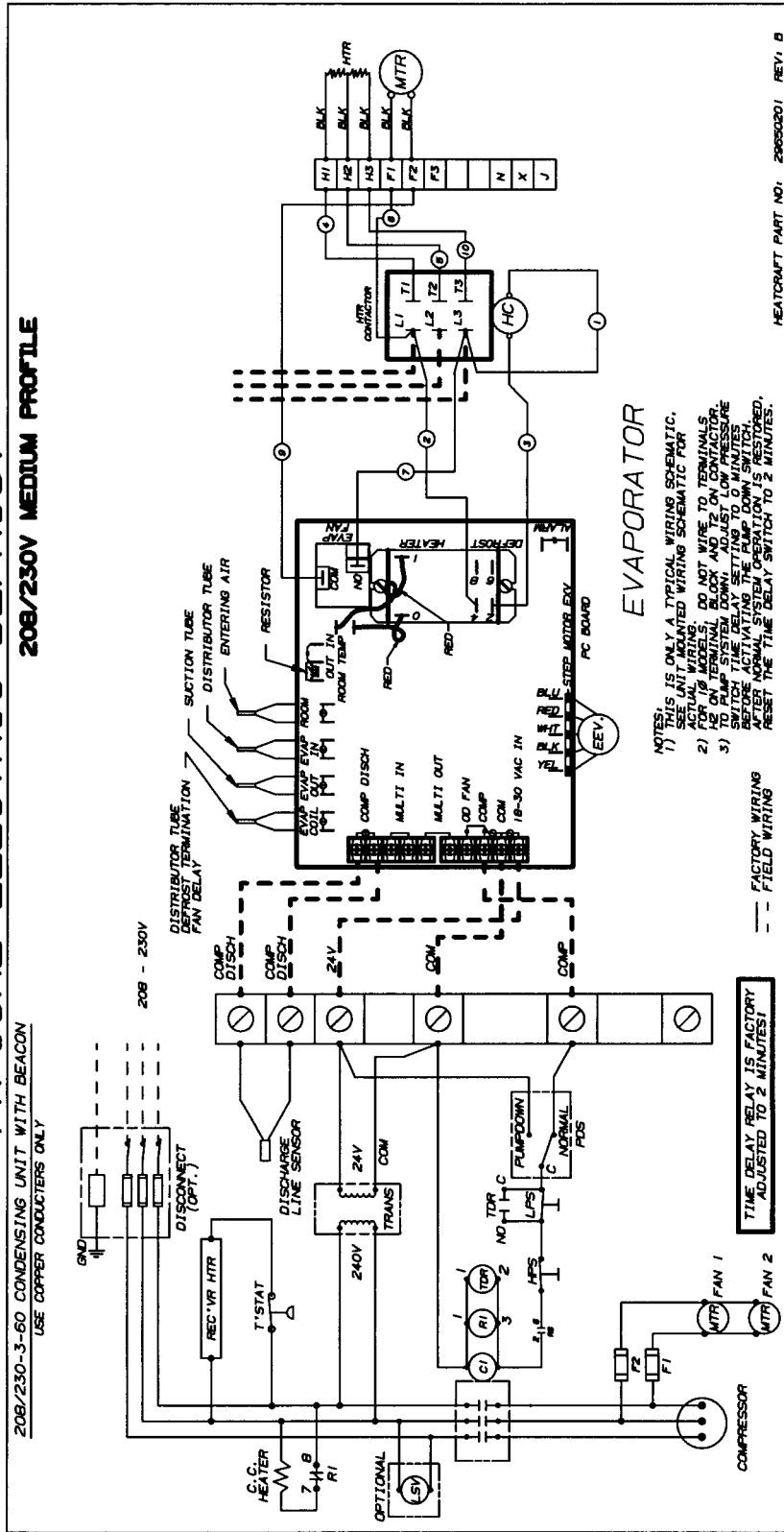


HEATCRAFT PART NO. 29654001 REV. H

# BEACON CONTROLLER

## TYPICAL ELECTRIC DEFROST 208/230V MEDIUM PROFILE

208/230-3-60 CONDENSING UNIT WITH BEACON  
USE COPPER CONDUCTORS ONLY



- NOTES:
- 1) THIS IS ONLY A TYPICAL WIRING SCHEMATIC. SEE UNIT MAINTENANCE SCHEMATIC FOR WIRING DETAILS.
  - 2) DO NOT WIRE TO TERMINALS T1, T2, T3 ON CONTACTOR.
  - 3) TO PUMP SYSTEM DOWN, ADJUST COMPRESSOR PRESSURE BEFORE ACTIVATING THE PUMP DOWN SWITCH. AFTER NORMAL SYSTEM OPERATION IS RESTORED, RESET THE TIME DELAY SWITCH TO 2 MINUTES.

TIME DELAY RELAY IS FACTORY ADJUSTED TO 2 MINUTES

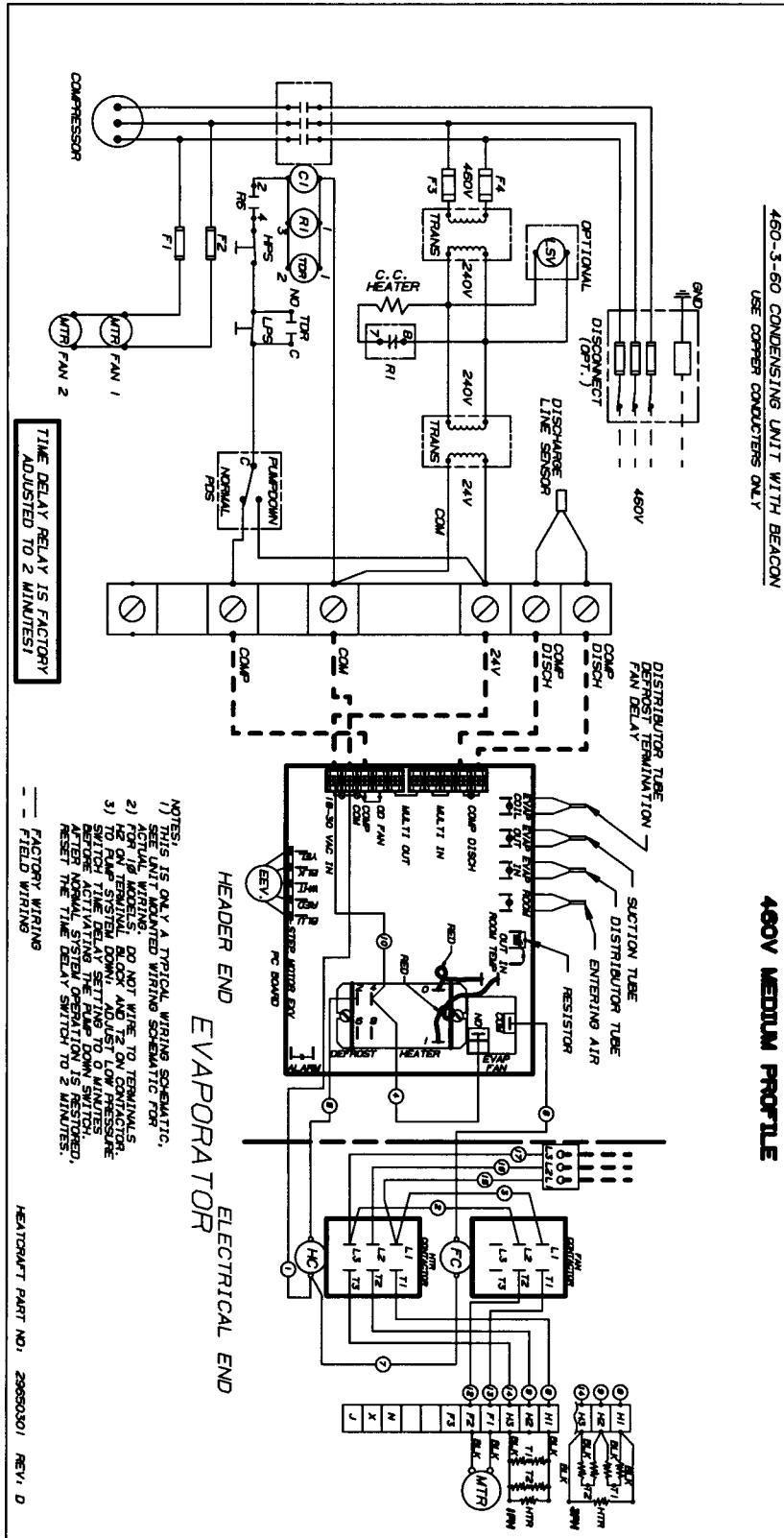
HEATCRAFT PART NO: 20850201 REV. B

# BEACON CONTROLLER

## TYPICAL ELECTRIC DEFROST

460-3-60 CONDENSING UNIT WITH BEACON  
USE COPPER CONDUCTORS ONLY

460V MEDIUM PROFILE



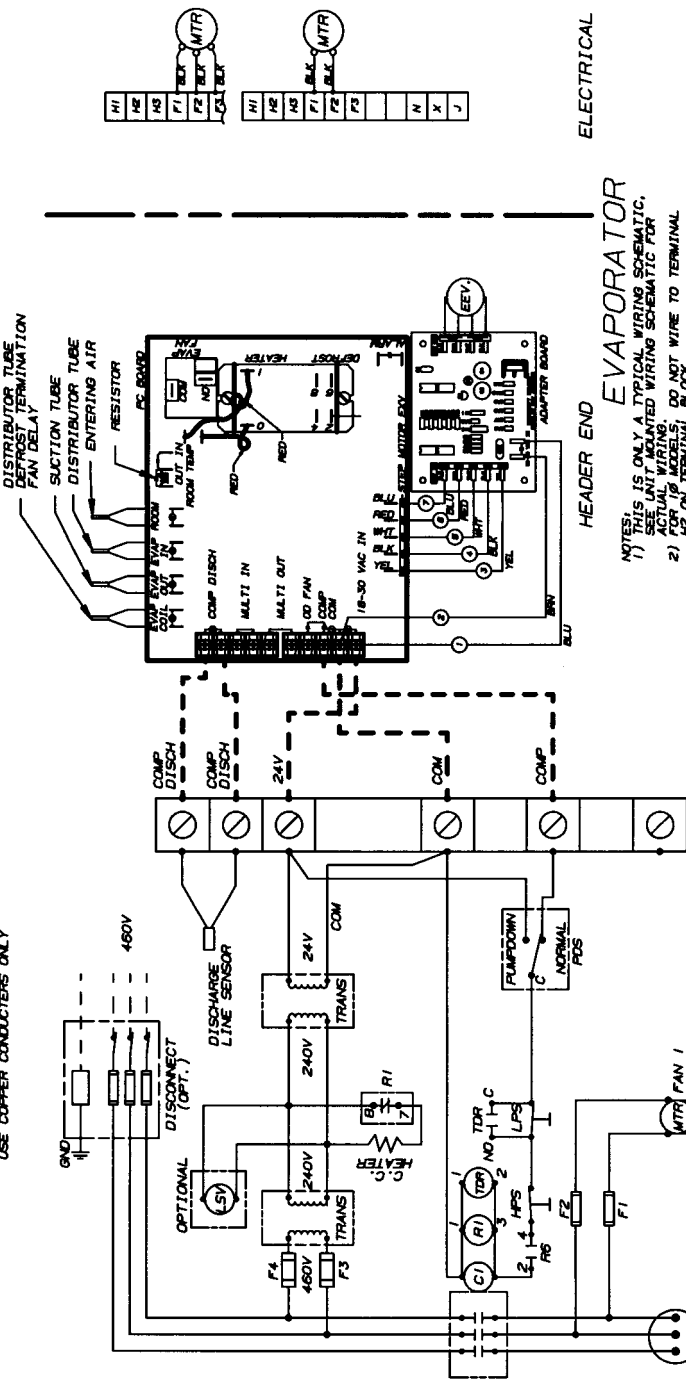


# BEACON CONTROLLER

## TYPICAL AIR DEFROST

### LARGE UNIT • COOLER

460-3-60 CONDENSING UNIT WITH BEACON  
USE COPPER CONDUCTORS ONLY



ELECTRICAL END

HEADER END

### EVAPORATOR

- NOTES:
- 1) THIS IS ONLY A TYPICAL WIRING SCHEMATIC. SEE UNIT MANUFACTURED WIRING SCHEMATIC FOR ALL WIRING DETAILS. DO NOT WIRE TO TERMINAL BLOCK.
  - 2) FOR 1/8" MODELS. ADJUST LOW PRESSURE SWITCH TIME DELAY SETTING TO 0 MINUTES BEFORE ACTIVATING THE FAN DOWN SWITCH. AFTER NORMAL SYSTEM OPERATION IS RESTORED, RESET THE TIME DELAY SWITCH TO 2 MINUTES.
  - 3) ON TERMINAL BLOCK. ADJUST LOW PRESSURE SWITCH TIME DELAY SETTING TO 0 MINUTES BEFORE ACTIVATING THE FAN DOWN SWITCH. AFTER NORMAL SYSTEM OPERATION IS RESTORED, RESET THE TIME DELAY SWITCH TO 2 MINUTES.

TIME DELAY RELAY IS FACTORY ADJUSTED TO 2 MINUTES!  
- - - FACTORY WIRING  
- - - FIELD WIRING

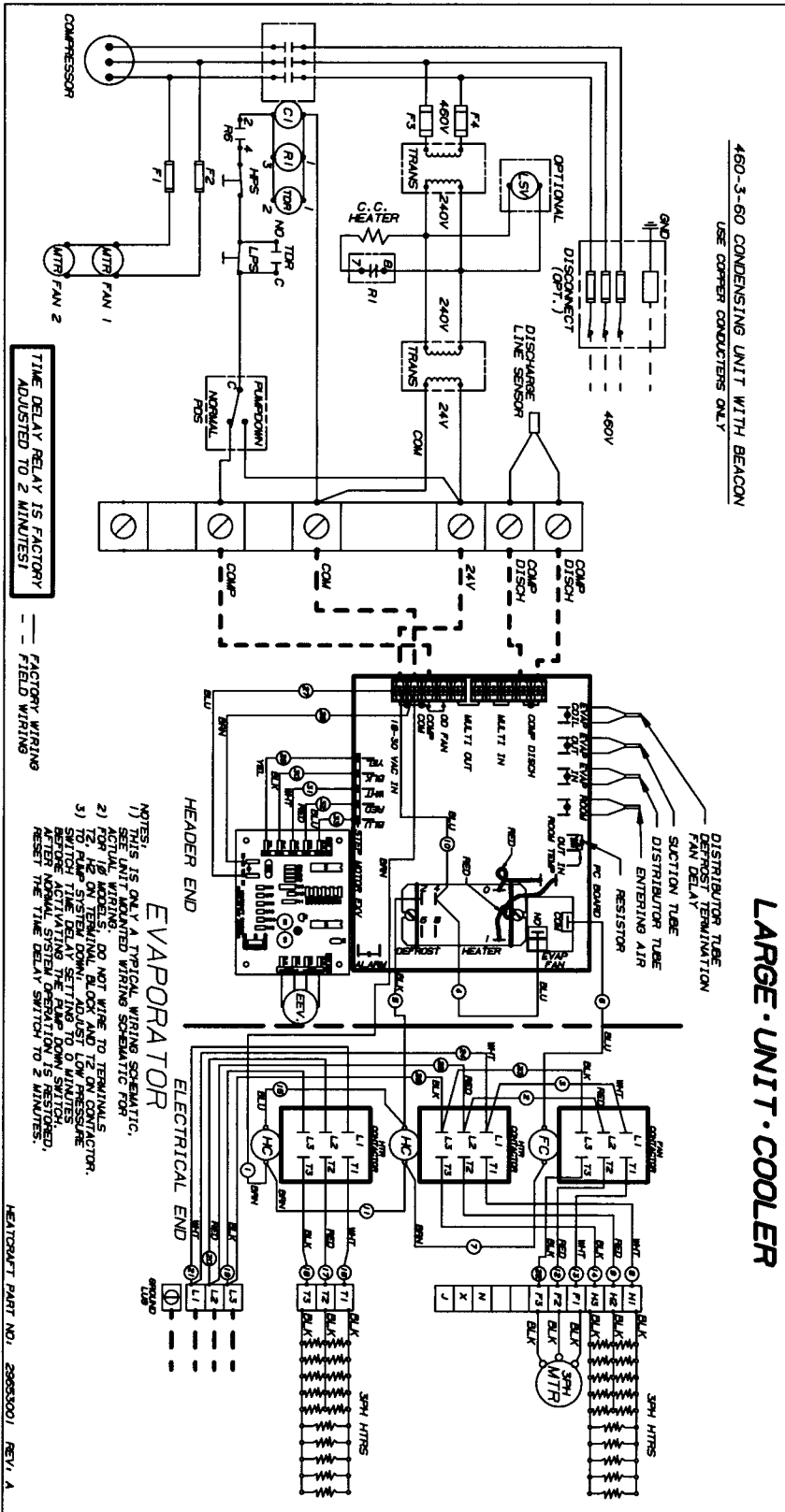
HEATORAFT PART NO. 29655301 REV. A

# BEACON CONTROLLER

## TYPICAL ELECTRIC DEFROST

### LARGE UNIT • COOLER

460-3-60 CONDENSING UNIT WITH BEACON  
USE COPPER CONDUITS ONLY



# BEACON CONTROLLER

## *Notes*



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*Since product improvement is a continuing effort at Heatcraft,  
we reserve the right to make changes in specifications without notice.*