



# Quick Response Controller

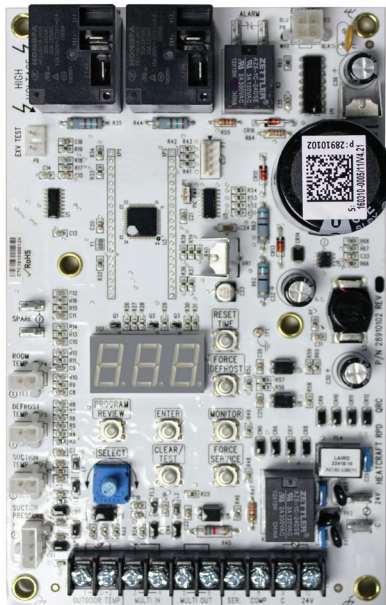
H-IM-QRC

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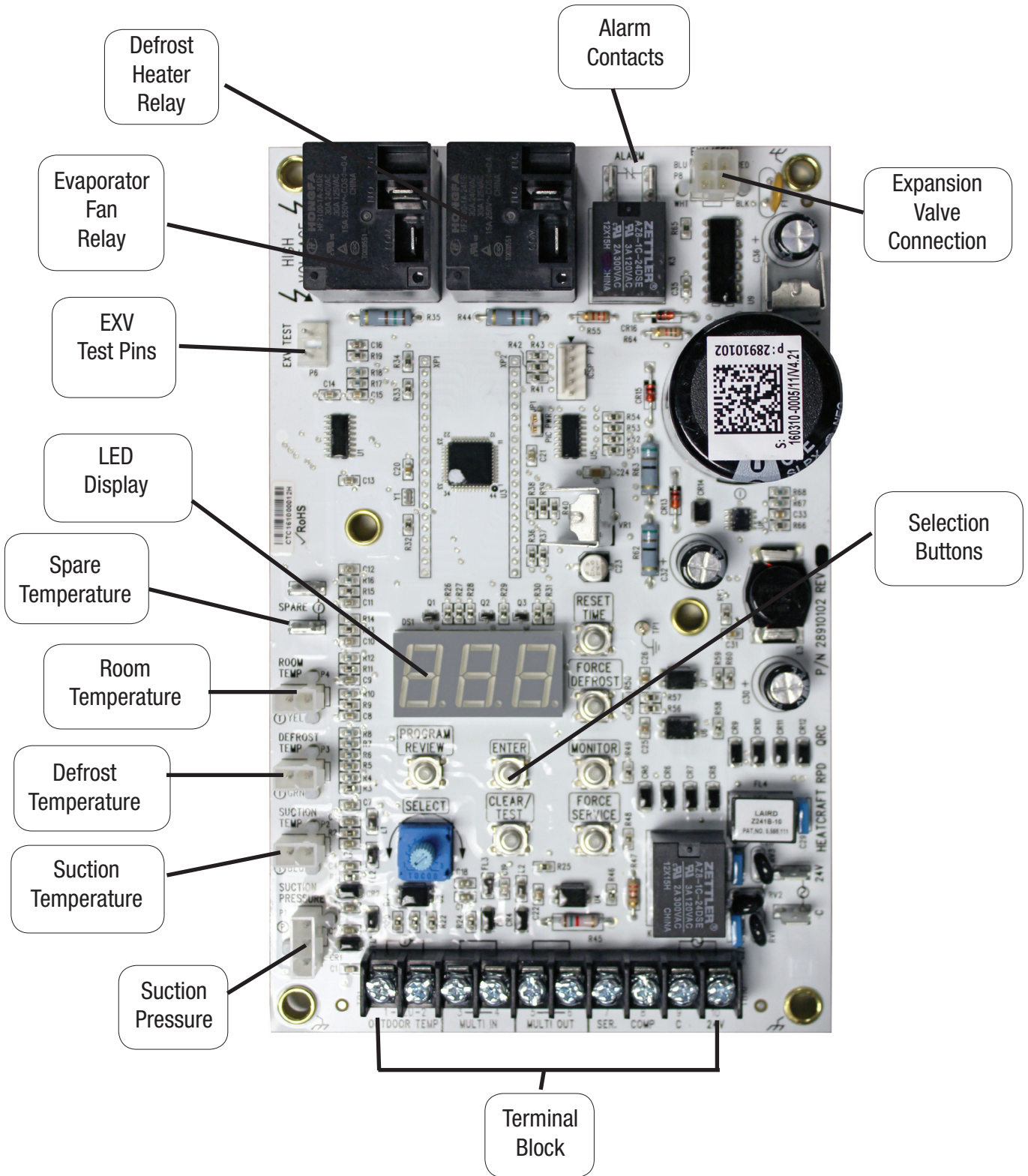
## Installation and Operation Manual



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## Heatcraft Quick Response Controller Board



## Installation Tips

- Use a minimum 18 gauge wire for all low voltage connections.
- The Heatcraft Quick Response Controller board gets its 24 VAC power supply from a transformer mounted in the electrical end of each evaporator. On 208-240 volt systems, the multi-tap transformer is shipped from our factory wired for 240 volts. If your supply voltage is 208 volt, you must change to the 208 volt tap on the transformer.

**NOTE:** On multiple evaporators, since a transformer is in each evaporator, the voltage tap must be set on each evaporator.

- Refer to wiring schematic shipped on units for unit wiring. Schematics in this Installation & Operation Manual are typical wiring schematics only.
- Program ALL slave evaporators as SLAVES.
- Evaporators are shipped from our factory with a preset box setpoint temperature of 35°F for air defrost and -10°F for electric defrost. If your box setpoint temperature requirements are different, this must be set using directions outlined under “Room Temperature Control”.
- 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 has cooled. Insulate when finished.
- If electrical power will be connected prior to evacuation and charging of system, unplug electric expansion valve from board until system is ready to be evacuated, leak tested and charged.
- There are built-in ground connections on the Heatcraft Quick Response Controller’s four corner brass spacers. Use four sheet-metal screws to mount the board on the evaporator for common-mode noise filtering. Make sure that the evaporator ground terminal is earth grounded.

- Some systems may require the crankcase heater be energized 24 hours prior to start-up. The Heatcraft Quick Response Controller should be de-energized for this period by placing it in the SERVICE MODE. This is done by pressing the FORCE SERVICE button twice. To start the system cooling, press the CLEAR button.
- Room sensors may be left connected on ALL evaporators. Room sensor must be connected on the Master Coil.
- A pressure transducer is installed on the evaporator. Do not leak test system above 150 PSI or damage to transducer could occur. If leak testing must be greater than 150 psig, disconnect the transducer from the suction header and reconnect after testing is complete.

## Condensing Unit

Condensing units do not require a Defrost Timer and should be disconnected if installed. A head pressure control is highly recommended to be installed in condensing unit.

Condensing unit must be installed using proper refrigeration practices and codes. Make sure there is sufficient clearances around unit for adequate air flow and access.

Typical condensing unit wiring is shown on page 31. The wiring diagram on page 32 shows how to convert a conventional condensing unit to use Heatcraft Quick Response Controller with the system.

## Evaporator Unit

The evaporator contains the Heatcraft Quick Response Controller board, electric expansion valve, pressure transducer, distributor, orifice, transformer and three sensors. These components are all factory mounted and wired. The three sensors are factory mounted and provide input to the controller from the following: defrost temperature, suction temperature, room temperature

Each evaporator unit must be installed using proper refrigeration practices and codes. Make sure the piping is correctly sized and properly routed. It is highly recommended that the liquid and suction lines be insulated. There must also be good clearance around unit. See H-IM-UC Installation and Operation manual for more details. (Available on website).

## Refrigerant Line Brazing (Caution)

The electric expansion valve 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 to protect the electric expansion valve when brazing the refrigerant line connections. THE SUCTION LINE SENSOR SHOULD BE REMOVED BEFORE BRAZING.**

## Power Supply

The Heatcraft Quick Response Controller board gets its 24 VAC power supply from a transformer mounted in the electrical end of each evaporator. On 208-240 volt systems, the multi-tap transformer is shipped from our factory wired for 240 volts. If your supply voltage is 208 volt, you must change to the 208 volt tap on the transformer.

**VERY IMPORTANT:** If the supply voltage to the evaporator is 208 volts, the primary tap of the transformer must be moved to the 208 volt tap.

**This must be done for all the evaporators on that system.**

If the 24 VAC power supply falls below 18 VAC, the system may power down and shut off. When the power supply is corrected to 24 VAC, the system will restart after the four minute hold-off period and resume normal operation.

On Heatcraft Quick Response Controller systems, the main power for the evaporator is supplied separately from the power supply of the condensing unit. All wiring, however, must comply with local electrical codes.

## Wiring

Wiring at the unit cooler(s) will be as follows (see wiring diagrams):

- High voltage - There may be high voltage on the defrost heater relay and the fan relay. The evaporator is connected to a separate power supply from the condensing unit. See unit cooler spec. plate for ampacity.
- Low voltage wiring must be 18 gauge minimum. For low voltage wiring, maximum distances are:

Between evaporators	500 ft.
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- Multiple units – The multi-in and multi-out are the communication connections. Connection sequence must follow the multi-out terminal to the multi-in terminal and the multi-out back to the multi-in terminal in a daisy chain loop.
- Alarm circuit - The onboard alarm is a dry set of NC contacts which closes to indicate an alarm or loss of power. The type and wiring for the alarm is customer specified. Note that the alarm circuit does not distinguish or indicate what has caused the alarm. These contacts can handle up to a 2 Amp load.
- All wiring must comply with all applicable codes and ordinances.

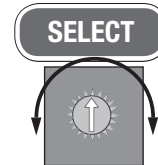
**CAUTION:** All 24v wiring must be run separate from the line voltage wiring. Wires/Leads must not touch other component connection points or power wires to avoid damage to the board or its components.

## Multiple Evaporator Configuration (Master/slave)

If there are multiple evaporators on a system, the program for each SLAVE evaporator must be changed to identify it as a SLAVE. To do so, press the “PROGRAM REVIEW” button repeatedly until “SLA” appears then use the “SELECT” knob to select “YES” and press “ENTER”. All Heatcraft Quick Response Controller boards are shipped with the factory default as a MASTER evaporator. Place all

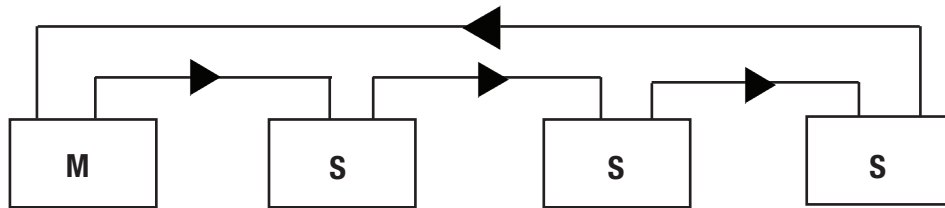
boards in the “SERVICE” mode while you program the setpoints to avoid errors and alarms which may cause troubles at startup.

**VERY IMPORTANT:** This must be done for each slave board, prior to starting the system.



Up to 4 evaporators can be connected as a master/slave configuration.

**DO NOT** remove the room sensor from any of the Heatcraft Quick Response Controller boards programmed as Master.



**M** = Master Evaporator    **S** = Slave Evaporator

Each Heatcraft Quick Response Controller board power is supplied by a transformer in the evaporator on which it is mounted. Do not run any 24 VAC wires between Heatcraft Quick Response Controller boards on the evaporators.

## Box Temperature Control Settings

- There is an on board **room thermostat** on the Heatcraft Quick Response Controller board which can be adjusted to the desired room temperature. The temperature differential is 2°F.

### Temperature Differential

When a system is in the cooling mode and the box setpoint is 35°F, the system will continue to cool until the box temperature gets to 34°F. At this point, the compressor will pumpdown and shut off. The system will restart cooling when the box temperature has risen to 36°F.

It is important to note that Heatcraft Quick Response Controller has a minimum 2 minute “**ON**” time and a minimum 4 minute “**OFF**” time. This means that the system will run in the cooling mode a minimum of 2 minutes even if the setpoint temperature is met. In applications where the system is grossly oversized, the box temperature could go below the differential temperature before the system cycles off.

In the “**OFF**” cycle the system will be off for a minimum of 4 minutes even if the box temperature goes above the differential temperature, before cooling will be restarted.

- The on board **room thermostat** is factory set at 35°F for Air Defrost systems and -10°F for electric defrost system.

## Leak Testing

After all lines are connected, the entire system must be leak tested. The complete system should be pressurized to not more than 150 psig with refrigerant and dry nitrogen. The use of an electronic type leak detector is highly recommended because of its greater sensitivity to small leaks. As a further check, it is recommended that this pressure be held for a minimum of 12 hours and then rechecked. For a satisfactory installation, the system must be leak tight.

## Recommended Low Pressure Control Settings for Outdoor Air Cooled Condensing Units

*Minimum Temp. °F	R-404A/R-407A/R-448A		R-407C	
	Cut-In PSI	Cut-Out PSI	Cut-In PSI	Cut-Out PSI
50	90	35	70	40
40	70	35	55	25
30	55	35	40	20
10	45	25	30	10
0	25	7	15	0
-10	20	2	15	0
-20	12	1	10	0
-30	8	0	6	0

\* Minimum ambient or box temperature anticipated

\* The standard preset low pressure switch used for pumpdown is set for 15 PSI cut in / 4 PSI cut out and is a good setting for most pumpdown systems

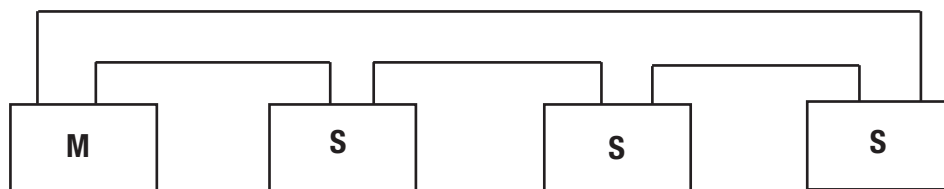
## Start-Up Operation

### Single System With 1 Evaporator

- Check all wiring connections to be sure they are correct and tight.
- On the condensing unit
  - Check the adjustable low pressure switch setting on freezer units. Refer to H-IM-CU (Available on website). On some condensing units, the low pressure switch has a fixed setting and cannot be adjusted.
- Turn power on
- On the evaporator
  - Use the “**PROGRAM REVIEW**” button to scroll through settings.
  - Check “*rEF*” (Refrigerant Type). Factory defaults are: Air Defrost R-404A, Electric Defrost R-404A. Change to the refrigerant being used.
  - Check “*boxT*” (Box Temperature). Factory defaults are: air defrost 35°F and electric defrost -10°F. Change to the desired temperature.
  - Review and change other settings if necessary
  - See procedures on page 10 for how to change settings.

### Single System With Multiple Evaporators

- Check all wiring connections to be sure they are correct and tight.
- On the condensing unit
  - Check the low pressure switch setting on freezer units. Refer to H-IM-CU (Available on website). On some condensing units, the low pressure switch has a fixed setting and cannot be adjusted.
- Turn power on.
- On the MASTER evaporator
  - DO NOT REMOVE the room sensor.
  - Use the “**PROGRAM REVIEW**” button to scroll through settings.
  - Check “*rEF*” (Refrigerant Type). Factory defaults are: air defrost R-404A, electric defrost R-404A. Change to the refrigerant being used.
  - Check “*boxT*” (Box Temperature). Factory defaults are: air defrost 35°F and electric defrost -10°F. Change to the desired temperature.
  - Review and change other setting if necessary.
  - See procedures on page 10 on how to change settings.
- On the SLAVE evaporators.
  - Each SLAVE Evaporator must be changed to identify it as a SLAVE. Use the “**PROGRAM REVIEW**” button to scroll until “**SLA**” appears, then use the “**SELECT**” knob to select “**YES**” then press “**ENTER.**”
  - DO NOT NEED TO REMOVE the Room Sensor on any evaporator.



**M** = Master Evaporator **S** = Slave Evaporator

## Initial Power On

At the initial application of power to the system, the EEV will be in a 4 minute hold-off cycle and will not start immediately. The evaporator fans will turn on immediately if fan stir cycling is turned off. If fan stir cycling is turned on the fans will stay off for 5 minutes or until there is a call for cooling. When there is a call for **COOLING**, the expansion valve (EEV) opens. The system will then run for a minimum of 2 minutes in the "hold-on" cycle. (This means that the system will run for a minimum of 2 minutes before shutting off even if the box temperature is met).

The LED alternately displays **BOX TEMPERATURE** and **MODE** of operation. On a call for cooling, *dLY* will show while the expansion valve is opening. After the compressor starts the LED will alternately display **BOX TEMPERATURE** and *COO*.

On multiple evaporator systems, the MASTER evaporator will display **BOX TEMPERATURE** and *COO*. The SLAVE evaporators will display *COO* only.

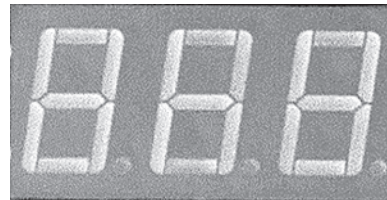
When the room thermostat setting is satisfied, and if the system ran for at least 2 minutes, the EEV will close and the system will pumpdown and shut off. The evaporator fans will continue to run based on fan stir cycle parameter. The LED will alternately display *OFF* and **BOX TEMPERATURE**.

When the room sensor detects a rise in temperature of approximately 2°F, and the system has been off for at least 4 minutes, the EEV will open to its last position and the system will start. The valve is then adjusted as necessary to obtain the setpoint superheat setting. During this time, the system will run for a minimum 2 minutes "hold-on" cycle.

The four minute "**HOLD-OFF**" can be bypassed and the system started immediately by pressing the "**RESET**" button on the Heatcraft Quick Response Controller board.

## Operating Mode Display

<i>OFF</i>	- Off
<i>COO</i>	- Cooling
<i>Pdn</i>	- Pumpdown
<i>dEF</i>	- Defrost
<i>drn</i>	- Draining
<i>dLY</i>	- Delay
<i>tSt</i>	- Test
<i>SEr</i>	- Service



### IMPORTANT NOTE:

When a board is installed and power is applied to the system, the following initialization steps should be taken for EACH BOARD in system:

1. Press and Hold the "**ENTER**" button
2. While continuing to hold the "**ENTER**" button, press and hold the "**CLEAR/TEST**" button. "*BBB*" will display on the LED display.
3. Continue to hold both "**ENTER**" and "**CLEAR/TEST**" until "*EEP*" displays on the LED.
4. Once "*EEP*" displays, immediately release and then press the "**ENTER**" again.
5. The board will now re-initialize and return to the normal display.

If "*rch*" is displayed, then the board did not properly initialize and the steps 1-5 should be re-taken.



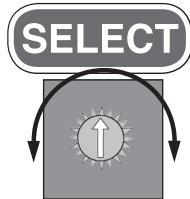
## Programming And Reviewing Settings/Changes

The **PROGRAM REVIEW** button is used to program, review and change all program settings for the system.

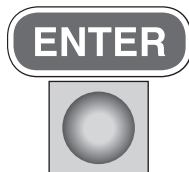
Press "**PROGRAM REVIEW**" button. The setpoint item will appear on the LED. After a few seconds delay, the Setpoint value will display. Each time the button is pressed a different setpoint item is displayed.



Next, use the "**SELECT**" knob to change value of setpoint item.



Next, when the desired value is selected, press the "**ENTER**" button to place it in program memory. If the "**ENTER**" button is not pressed, the value will not be stored in the memory and thus will not be changed.



### "PROGRAM REVIEW" ITEMS

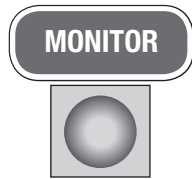
<i>A-E</i>	- Set Defrost type (Air or ELE)
<i>rEF</i>	- Set Refrigerant type (R-22, R-404A, R-507, R-407A, R-407C, R-407F, R-448A or R-449A)
<i>bot</i>	- Set Box temperature (-30°F to +70°F)
<i>SUP</i>	- Set Superheat (4°F to 20°F)
<i>SLA</i>	- Set Board as a Slave (Yes or No)
<i>ddf</i>	- Demand defrost enable (Yes or No)
<i>dFn</i>	- Set Number of defrosts per day (1, 2, 3, 4, 5, 6, 8, 10 or 12 per day)
<i>dFF</i>	- Set Defrost Fail-safe time (10 to 200 minutes)
<i>dFt</i>	- Set Defrost End temperature (40°F to 100°F)
<i>dFS</i>	- Set Defrost Delay Start Time (0.5 Hours to 23.5 Hours)
<i>ALH</i>	- Set Alarm High temperature (-40°F to 90°F)
<i>ALL</i>	- Set Alarm Low temperature (-40°F to 90°F)
<i>ALt</i>	- Set Alarm time (2 to 120 minutes)
<i>F-C</i>	- Set Fahrenheit / Celsius temperature units (°F/°C)
<i>FnS</i>	- Off cycle fan stir cycle enable (On or OFF)

## Programming And Reviewing Settings/Changes (cont'd.)

Use the “PROGRAM REVIEW” button to select these items:

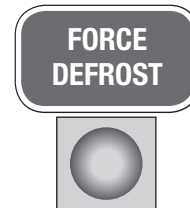


- Defrost Type – “*A-E*” - Selection is made for air defrost or electric defrost coil. This will automatically set the system factory defaults for air defrost and electric defrost. (See default settings.)
- Refrigerant Type - “*EF*” - Selection for type of refrigerant R-22 (22), R-404A (404), R-507 (507), R-407A (47A), R-407C (47C), R-407F (47F), R448A (48A), R449A (49A).
- Box Temperature - “*box*” - Select box temperature setpoint. Selection range is -30°F to +70° F. Defaults: Electric defrost -10°F and air defrost +35°F.
- Superheat - “*SLP*” - Evaporator superheat is controlled by the board on each evaporator. Each board measures the evaporator saturation suction temperature and the suction pressure to determine the superheat. The superheat value at the evaporator can be changed to ensure a 20°F to 30°F superheat at the Compressor.  
Default: 7°F.
- Evaporator Board: Slave? - “*SLA*” - On multiple evaporator systems, each evaporator board has to be programmed to be a Master or a Slave. Each board is shipped from our factory set as a Master. You must make this change to each Slave evaporator. A selection of “YES” is made for this setting.  
  
The default for each board is a Master, so on Single Evaporator systems no change is required.
- Demand Defrost Enable –“*ddf*” – Demand defrost is available for electric defrost systems only. Selection is made to enable demand defrost by a selection of “Yes” or to not enable demand defrost by a selection of “No”. If this parameter is enabled then parameters *dfn* and *dfs* will no longer be displayed in the menu as they are no longer used.  
Default: electric defrost Yes
- Number. of Defrost per Day - “*dfn*” - A selection must be made for the number of defrosts cycles per day – 1,2,3,4,5,6,8,10 or 12 per day. If no selection is made, defaults: electric defrost 4 per day and air defrost 2 per day.
- Defrost fail-safe - “*dff*” - This is the maximum time allowed for a coil to remain in defrost. Defrost will be terminated if the defrost end temperature is not attained when this time has expired. On multiple evaporator systems, this is controlled by the Master unit. Each board should have the same setting.  
Defaults: electric defrost 30 minutes and air defrost 40 minutes.
- Defrost End Temperature - “*dft*” - This is the temperature at which the defrost will be terminated. Defaults: electric defrost +60°F and air Defrost +45°F.
- Defrost Delay Start Time - “*dfs*” - This allows the delay of the start of the first defrost. Default: 0.0 hours.
- Alarm High Temperature - “*ALH*” - Temperature at which a high box temperature alarm will be triggered. This does not apply during defrost. Defaults: electric defrost +5°F and air defrost +50°F.
- Alarm Low Temperature - “*ALL*” - Temperature at which a Low Box Temperature alarm will be triggered. Defaults: Electric Defrost -15°F and Air Defrost +30°F.
- Alarm Time - “*ALT*” - Time which High Temperature or Low Temperature condition must exceed before alarm is triggered. Default: 60 minutes.
- °F/°C - “*F-C*” - Select units to display temperature. Fahrenheit or Celsius. Default: Fahrenheit. When °C is selected, a red dot will appear in the right bottom corner of the LED display of the Heatcraft Quick Response Controller board.
- Off cycle fan stir cycle enable – “*fn5*” – This allows evaporator fan stir cycling in the off cycle utilizing a fixed stir cycle timing of 7 minutes on and 5 minutes off. Selection is made to enable off cycle stir cycling by a selection of “On” or to not enable off cycle stir cycling by a selection of “Off”. Defaults: electric defrost off and air defrost off

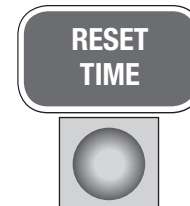


Use the "MONITOR" button to review these items:	
<i>SUP</i>	- Superheat (°F/°C)
<i>ESP</i>	- Expansion valve steps (0 to 255 steps)
<i>SCt</i>	- Suction temperature (°F/°C)
<i>SSt</i>	- Saturated Suction temperature (°F/°C)
<i>SCP</i>	- Suction pressure at Evaporator (PSIG/HG)
<i>Out</i>	- Outdoor temperature (°F/°C)
<i>dFt</i>	- Defrost sensor temperature (°F/°C)
<i>dFS</i>	- Time left until next defrost (hours) (on version 1.8 boards)
<i>dFE</i>	- Last Defrost Elapsed time (minutes)
<i>RC</i>	- Board Voltage
<i>SPT</i>	- Spare Temperature reading
<i>rEL</i>	- Software release program

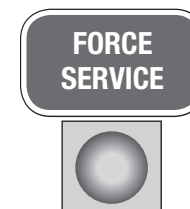
Use this button to "**FORCE DEFROST**". To force a defrost, press the "**FORCE DEFROST**" button. The system will pumpdown. The heaters are then turned on. The display will show "*dEF*" and room temp.



Use this button to "**RESET TIME**". Pressing this button will reset the time clock in the microprocessor to zero. At initial power up, pressing this button will bypass the "four minute" hold-off and the system will start immediately after the expansion valve opens. This display will show "*dLg*".



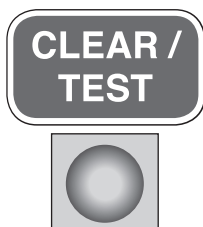
Use this button to "**FORCE SERVICE**". Pressing this button TWICE will cause the system to pumpdown. The system will remain off until the "**CLEAR**" button is pressed. While in the "**FORCE SERVICE**", the LED display will only show "*SEr*".



## Programming And Reviewing Settings/ Changes (Cont'd.)

Use this button to “CLEAR/TEST”. Pressing this button ONCE will return the LED display to the default display. With the system in the OFF mode, pressing and holding this button will start the “TEST” mode. In the “TEST” mode, it will cycle through each output for 10 seconds. The display will only show “tst” during “TEST” mode. Test mode will automatically terminate after 3 sequences.

## Locking The Heatcraft Quick Response



## Controller Board

The Heatcraft Quick Response Controller board is lockable to prevent programmed setting changes by unauthorized personnel. When locked, the program setpoints cannot be changed.

To **lock** the setting:

- Press “PROGRAM REVIEW” button.
- Press and hold “MONITOR” button.
- While holding “MONITOR” button, press “ENTER” button.
- The LED will display *LOC*.

This will prevent unauthorized personnel program changes. To **unlock**, repeat steps above. LED will display “UNL”.

### STATUS INDICATOR LED

A RED, three-digit, alphanumeric LED on the Heatcraft Quick Response Controller board indicates status, alarms and error codes.



<ul style="list-style-type: none"> <li>• <b>OFF</b> All Evaporators</li> </ul>	Box Temp / <i>OFF</i>	Box Temperature/ Mode is displayed
<ul style="list-style-type: none"> <li>• <b>COOLING</b> Single Evaporator- Multiple Evaporators</li> </ul>	Box Temp / <i>COO</i>	Box Temperature/ Mode is displayed
<ul style="list-style-type: none"> <li>• Master Evap - Slave Evaps -</li> </ul>	Box Temp / <i>COO</i> <i>COO</i>	Box Temperature/ Mode is displayed Operating Mode is displayed
<ul style="list-style-type: none"> <li>• <b>Pumpdown</b> All Evaporators</li> </ul>	<i>Pdn</i>	
<ul style="list-style-type: none"> <li>• <b>DEFROST</b> All Evaporators</li> </ul>	<i>dEF</i>	
<ul style="list-style-type: none"> <li>• <b>TEST</b> All Evaporators</li> </ul>	<i>tSt</i>	
<ul style="list-style-type: none"> <li>• <b>SERVICE</b> All Evaporators</li> </ul>	<i>SEr</i>	
<ul style="list-style-type: none"> <li>• <b>ALARMS</b></li> </ul>	<i>A 1</i> <i>A 2</i>  <i>A 4</i>	High Box Temp Low Box temp  Input Fault Box Temp., Suction Temp., Pressure Transducer open or not installed

STATUS INDICATOR LED	
<ul style="list-style-type: none"> <li><b>ERRORS</b></li> </ul>	<ul style="list-style-type: none"> <li><i>E 1</i> - Room temperature sensor shorted, open or not installed</li> <li><i>E 2</i> - Defrost temperature sensor shorted, open or not installed</li> <li><i>E 3</i> - Suction temperature sensor shorted, open or not installed</li> <li><i>E 4</i> - Suction pressure transducer shorted, open or not installed</li> <li><i>E 5</i> - Outdoor temperature sensor shorted</li> <li><i>E 6</i> - Low superheat during cooling</li> <li><i>E 9</i> - Multi-in/Multi-out wiring error</li> </ul>
<ul style="list-style-type: none"> <li><b>OTHERS</b></li> </ul>	<ul style="list-style-type: none"> <li><i>Loc</i> - Board is locked. Settings cannot be changed</li> <li><i>UnL</i> - Unlock the board settings</li> </ul>

## Pumpdown

At the end of each cooling cycle, when the box temperature is met, the Heatcraft Quick Response Controller system will pump down.

To pumpdown, the EEV closes and the board displays “*Pdn*” until one of the following occurs:

- The suction pressure at the evaporator is 4 psig
- A total of two minutes has elapsed

When any of these two conditions occurs, the system will turn off and not restart until there is a call for cooling or a periodic pumpdown.

## Periodic Pumpdown

While in the OFF cycle, if there isn't a call for cooling (Box setpoint temperature is met) but:

- The low pressure switch has closed

The system will initiate pumpdown.

## Service Mode

A remote **"SERVICE"** switch can be added to the Heatcraft Quick Response Controller board across the **"SER"** and **"C"** connections of the terminal block. Closing the **"SERVICE"** switch will cause the system to pumpdown and shut off. **"SER"** will be displayed on the Heatcraft Quick Response Controller board display. The evaporator fan and heaters will be de-energized in the Service Mode.

The system will not restart until the SPST switch is placed in the **"NORMAL"** or **"OFF"** position.

OR

The system can be pumped down by pressing the **"SERVICE"** button twice. To restart the system, press the **"CLEAR"** button.

OR

The system can be pumpdown 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.

## Defrost

### Defrost Timing

When power is first applied to the system, its timer starts counting time. If 4 defrost are programmed, it will initiate a defrost every 6 hours from when power was first applied. Heatcraft Quick Response Controller does not have a real time clock. Heatcraft Quick Response Controller does provide the ability to delay the starting of the first defrost.

### Defrost Delay Start Time

Example: The system is first powered up at 8:00 AM and is programmed for 4 defrost per day. The user would like the first defrost at 10:00 AM. To accomplish this, use the **"PROGRAM REVIEW"** button to scroll to dFS. Use the **"SELECTOR"** switch to select 2 hours delay start, then press **"ENTER."** The 1<sup>st</sup> defrost will now occur at 10:00 AM and then a defrost will occur every 6 hours thereafter.

### Time Remaining Until Next Defrost

To find out how much time is left until the next defrost is scheduled, use the **"MONITOR"** button to scroll to dFS. The time displayed will be how much time until the next scheduled defrost.

### Defrost Schedule In Memory

Heatcraft Quick Response Controller does not have a real time clock but it keeps track of the time that has elapsed in its memory. It also keeps in memory the number of defrosts scheduled and how much time has elapsed between defrosts. If a power failure occurs, when power is restored, Heatcraft Quick Response Controller remembers how many defrosts are scheduled and it remembers how much time was left until the next defrost. It will then defrost based on this timing. So, if the power failure lasted 15 minutes, the defrost schedule will be off by 15 minutes.

### Resetting Defrost Schedule

When a power interruption causes a severe lag in the defrost schedule, the defrost schedule can be reset in the following manner. First, press the reset time button on the board to zero out the internal counters. Then, program the appropriate defrost delay start time for the next desired defrost period. The defrost schedule will be correct until you have another power outage.

### Demand Defrost

If the system is electric defrost and demand defrost is enabled then defrost will occur only when the controller determines it is needed. The Quick Response Controller monitors the system performance to determine the need for defrosts. It uses a variety of data in its decision making process and will initiate defrost immediately upon determining the need for defrost to occur.

## Electric Defrost Mode

When a defrost is initiated, the EEV closes, the system is allowed to pumpdown and shut off. The evaporator fans are cycled off and the defrost heaters are energized.

On multiple evaporator systems, all controllers must terminate their defrost, either on temperature or fail-safe time, before the master controller will end the defrost cycle.

There is a 2 minute condensate drain-down period after which the system is started for a refreeze period. The evaporator fan stays off (fan delay). The refreeze period will last until the evaporator suction temperature is at 28°F or 3 minutes has elapsed. After this sequence, the system is back in the refrigerating mode and evaporators fans are now running.

## Air Defrost Mode

The sequence is the same as for electric defrost except that there are no heaters and the evaporator fans run continuously.

## Alarms

Heatcraft Quick Response Controller provides a set of dry contacts for use in signaling an alarm. These contacts can be connected to a light, a buzzer, a bell etc., which will be activated when an alarm condition occurs. When the Heatcraft Quick Response Controller 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:

- High Box Temperature – LED Display:  
*R 1* - Room temperature has exceeded the Alarm High *RLH* value for the Alarm time *RLt* programmed.
- Low Box Temperature - LED Display:  
*R 2* - Room temperature has dropped below the Alarm Low *RLl* value for the Alarm time *RLt* programmed

- Input Fault – LED Display: *R 4* - Box Temp., Suction Temp., Pressure Transducer open or not installed.
- Power failure – Loss of power to the Evaporator

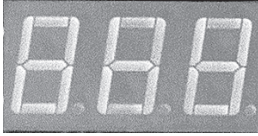
## Alarm Codes

<i>R 1</i>	<b>High Box Temp</b>
<i>R 2</i>	<b>Low Box Temp</b>
<i>R 4</i>	<b>Input Fault</b> Box Temp., Suction Temp., Pressure Transducer open or not installed
	<b>Power Failure</b>

## Clearing Alarms

Alarms *R 1* – High Box Temperature and *R 2* – Low Box Temperature will clear automatically if the Box Temperature decreases or increases to below or above the Alarm setpoint temperature. Replacing the Room Sensor, Suction Sensor or Pressure Transducer will clear the *R 4* Alarm.

## Error Indicator LED



At initial power up, each Heatcraft Quick Response Controller 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 pumpdown and cycle off and **will not restart** until the fault is cleared or the circuit breaker reset, for the following conditions:

- Suction sensor shorted, open or not installed
- Room temperature sensor shorted or not installed
- Pressure Transducer open or not installed

## Evaporator Fans Shut Off

In some installations, it is desirable to shut off the evaporator fans periodically. This is easily accomplished on Heatcraft Quick Response Controller by wiring a single pole, single throw switch (SPST) between the terminals marked “**SER**” and “**C**” on the Heatcraft Quick Response Controller board. Closing this switch will cause the system to pumpdown and shut off.

Air Defrost fan motors must be wired through the fan relay on the Heatcraft Quick Response Controller board for this to be effective on Air Defrost systems. The entire system will be shut off and remain off until the SPST switch is opened.

## ERROR CODES

<i>E1</i> - Room temperature sensor shorted, open or not installed
<i>E2</i> - Defrost temperature sensor shorted, open or not installed
<i>E3</i> - Suction temperature sensor shorted, open or not installed
<i>E4</i> - Suction pressure transducer shorted, open or not installed
<i>E5</i> - Outdoor temperature sensor shorted
<i>E6</i> - Low superheat
<i>E9</i> - Multi-in/multi-out wiring error



## Checking Operation Of Expansion Valve (EEV)

To check if the expansion valve is closing properly:

Install a pressure gauge-set to suction line at the condensing unit. With the system running, close the valve on the liquid line, at the condensing unit. The system should pumpdown and shut off on the low pressure switch (LPS). If the system does not pumpdown and trip on the LPS, then the compressor valves are weak and needs to be changed.

After the system pumps-down and trip on the LPS, put the system in the service mode. This will cause the expansion valve to close. Open the valve on the liquid line, at the condensing unit. The suction pressure reading on the gauge set should not increase. If the suction pressure increases then the expansion valve is leaking and should be changed.

The expansion valve position can be monitored from the LED display pressing the **"MONITOR"** button and scrolling to *ESP*. This will indicate the number of steps the valve is open.

This can also be checked by using the EXV test pins on the board. This is indicated by a 0 to 5 volts DC signal. At 0 volts the valve is closed and at 5 volts the valve is fully open. At values between 0 and 5 volts, the valve will be opened proportionately.

Use the **"MONITOR"** button to display *"SCP"* Evaporator Suction Pressure. Record the pressure displayed. Start the system and observe the pressure displayed. If the pressure does not increase, the expansion valve could be defective.

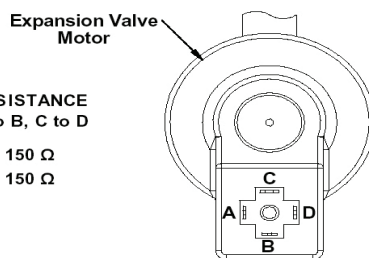
If the system is running, use the **"MONITOR"** button to display *"SCP"* Evaporator Suction Pressure. Record the pressure displayed. While the system is running, press the **"FORCE SERVICE"** button. Observe the pressure while the system is pumping down. The pressure should decrease. If it does not, this indicates a defective valve.

## Expansion Valve Motor Winding Resistance

If the expansion valve is suspected of not functioning properly, the motor windings resistance should be measured. This is a bipolar motor with two windings. Measure the resistance at the pins, on top of the valve, between locations A and B or C and D.

(Note that the pins are not labeled A, B, C, D. This labeling is just for reference).

VALVE P/N	VENDOR	RESISTANCE A to B, C to D
29326101	CAREL	150 Ω
29326201	CAREL	150 Ω



Resistance reading at 150 Ω at 75° F

"C" is largest spade

### CAREL VALVE

Measuring resistance between locations A and C or B and D will always show "Open" because these locations are between the motor windings.

When the valve is opening or closing, the voltage measured between A and B or C and D should be between 20 to 22 VAC.

Measuring the DC volt of the EXV TEST pins, on the board, will also

indicate if the expansion valve is open or close. 0 volts DC indicates the valve is closed. 5 volts DC indicates the valve is fully open. A value between 0 and 5 volts indicates how much the valve is open or close.

## Power Failures

In the event of a power failure, Heatcraft Quick Response Controller will automatically close the expansion valve to prevent refrigerant from migrating throughout the system. After power returns, with 24 VAC at the board, the system will restart in the cooling mode after the four-minute hold off period.

## Spare Sensor Terminals

Heatcraft Quick Response Controller provides a set of input terminals for customers who may want to monitor an additional temperature or items such as Product Temperature. This input terminal requires a signal from a thermistor which meets the temperature/resistance values in Table 1 on page 21.

If a product temperature simulator is used, it must meet the resistance/temperature specification listed in Table 1. The temperature range for this input is  $-30^{\circ}\text{F}$  to  $140^{\circ}\text{F}$ . Sensors on the Heatcraft Quick Response Controller system, as supplied, will not simulate product temperature.

This input can be monitored on the LED display by using the “**MONITOR**” button and scrolling to *SPT*. The values displayed will be the temperature of the spare sensor.

## Checking Sensors

**DO NOT REMOVE SENSORS FROM EVAPORATORS FOR CHECKING.**

Use the monitor button to display the value the sensors are reading on the LED (suction temperature *SCT*, defrost temperature *dFT*, or room temperature). Compare this value to the measured value with a thermometer at each of these points. If they do not match, change the sensor.

**OR**

The sensors can be checked for their proper operation by placing it in a cup of ice water. Stir the ice water and measure the resistance of the sensor. At  $32^{\circ}\text{F}$  the resistance should be 32,650 ohms. If it is higher or lower by 1,000 ohms approximately, the sensor should be replaced.

If a remote interface is needed, the Quick Response Controller can be used with a Remote Refrigeration Controller (RRC) via Smart Controller with the following limitations:

- Remote Refrigeration Controller (RRC) cannot directly turn off ON/OFF Demand Defrost. To set Demand Defrost remotely, set 'Smart Defrost' to ON and remove all set defrost times.
- Compressor runtime and compressor cycles will not be accurate.

**Wiring:**

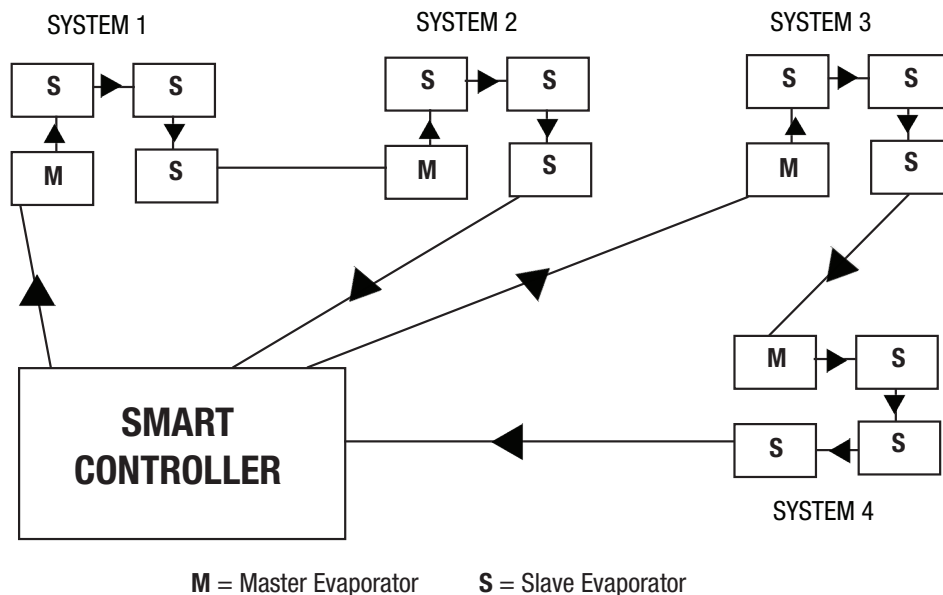
- Low voltage wiring must be 18 gauge minimum. For low voltage wiring, maximum distances from the Smart Controller to the Master evaporator Quick Response Controller board is 1000ft.

## Multiple Systems With Multiple Evaporators (Requires A Smart Controller)

- Check all wiring connections to be sure they are correct and tight.
- On the condensing units
  - Check the low pressure switch setting on freezer units. Refer to H-IM-CU (Available on website). On some condensing units, the low pressure switch has a fixed setting and cannot be adjusted
- Turn power on.
- On the MASTER evaporator
  - DO NOT REMOVE the room sensor.
- On the SLAVE evaporators. All Heatcraft Quick Response Controller boards are shipped with the factory default as a "MASTER" evaporator.
  - Each SLAVE evaporator must be changed to identify it as a SLAVE. Use the "PROGRAM REVIEW" button to scroll until "SLA" appears, then use the "SELECT" knob to select "YES" then press "ENTER."
- Use the Smart Controller to set system parameters. See Heatcraft Smart Controller installation instructions for more details.

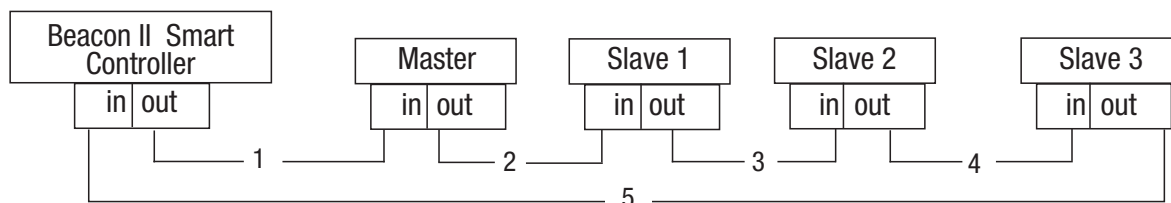
### MULTIPLE SYSTEM CONNECTION

(See Smart Controller instruction manual for more details)



## Troubleshooting Guide

PROBLEM	Step ACTION ITEM	IF OK	IF NOT OK
<b>E9</b> Multi-out to Multi-in Communication Wiring (only shows after initial successful connection)	1. Check for 24 volts power to the board		1. If no voltage, see "LED is not lit" above for low voltage, see "88888 LED display"
	2. Check for crossed communication wiring (multi-out not wired to multi-in terminals)	Go to next step	2. Correct wiring from "Master" unit Multi-out to Multi-in of "Slave" unit, etc. to all Slaves and return to Master. (See wiring diagrams)
	3. Check for broken communication wiring		3. Correct wiring between first Slave with error to previous board in the sequence.



Line #	SMART	Master	Slave1	Slave 2	Slave 3
①	+COMM+	E9	no error	no error	no error
②	+COMM+	no error	E9	E9	E9
③	+COMM+	no error	no error	E9	E9
④	+COMM+	no error	no error	no error	E9
⑤	+COMM+	no error	no error	no error	no error

### Service Mode

(SEr is displayed)

1. Use Remote Service Switch

1. Must terminate using same switch

2. Connection between "Ser" and "C" on board\*

2. Open connection between "Ser" and "C"

3. From program menu of BEACON II Smart Controller

3. From program menu of BEACON II Smart Controller

Change SERVICE setpoint to "On".

[all are wired in parallel; any/all will activate mode.]

\*ONLY Master board on multiple evaporator systems

Change SERVICE setpoint to "Off"

[Note: If multiple switches were placed in Service

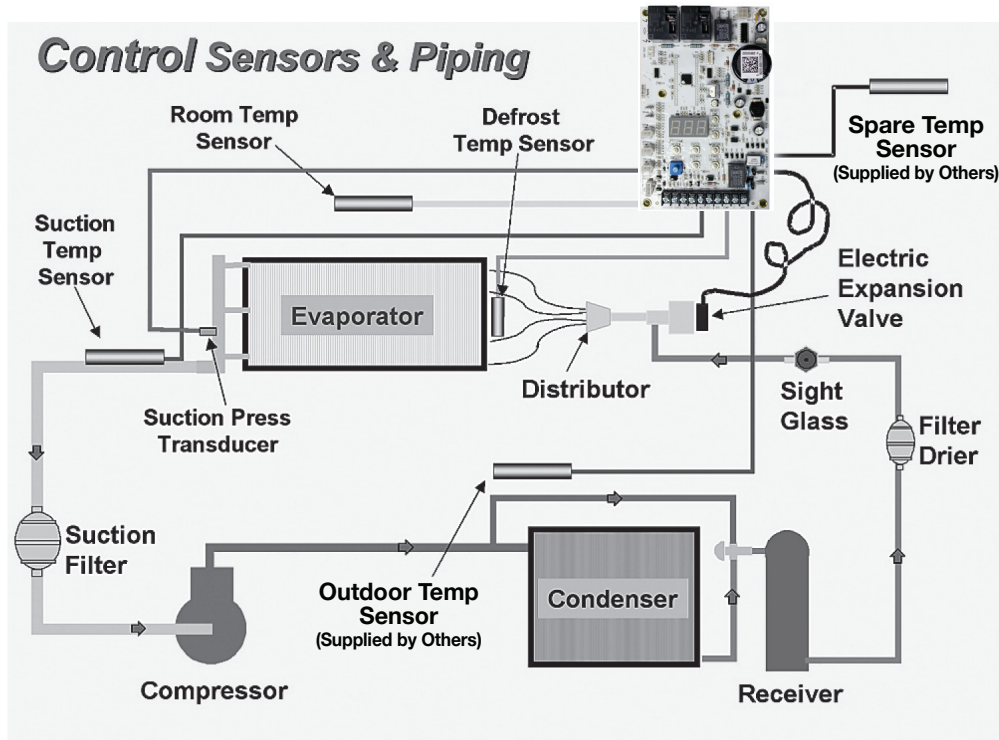
Mode, all must be "open" to terminate the mode.]

**Table 1. Resistance/Temperature Specification**

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

**Table 2. System Defaults**

PARAMETERS	CODE	AIR	ELECTRIC
Refrigerant	<i>rEF</i>	R-404A	R-404A
Box Temperature	<i>bat</i>	35°F	-10°F
Superheat	<i>SUP</i>	7°F	7°F
Slave Evaporator	<i>SLA</i>	No	No
Demand Defrost Enable	<i>ddf</i>	N/A	Yes
No. of Defrost per Day	<i>dFn</i>	2	4
Defrost Fail-safe time	<i>dFF</i>	40 min.	30 min.
Defrost End Temperature	<i>dFt</i>	45°F	60°F
Defrost Delay Start Time	<i>dFS</i>	0 hrs.	0 hrs.
Alarm High Temperature	<i>ALH</i>	50°F	5°F
Alarm Low Temperature	<i>ALL</i>	30°F	-15°F
Alarm Time	<i>ALt</i>	60 min.	60 min.
Temperature Units	<i>F-C</i>	°F	°F
Off Cycle Fan Stir Cycle Enable	<i>FnS</i>	OFF	OFF



In order to accommodate updates in technology and in industry, new QRC part numbers were created to handle a number of enhancements.

The “NEW” part numbers listed below will serve as service parts for any “OLD” part numbers in the event a replacement part is needed. The Table and notes below highlight key differences between the OLD and NEW parts.

	Supported Parameters:	
	OLD	NEW
Part Numbers:	28910102	28910104
Part Description:	QRC (White)	QRC (White)
R-22	✓	✓
R-404A	✓	✓
R-507	✓	✓
R-407A	–	✓
R-407C	–	✓
R-407F	–	✓
R-448A	–	✓
R-449A	–	✓
Demand Defrost	✓	✓
Evap Fan Cycling	✓	✓

## NOTES:

- 1) When using a new QRC Controller 28910103 with other boards in a system, the new QRC will poll each board in the system to identify all board firmware versions. Parameters will then only be displayed if the parameters are supported on ALL boards in that system. For example, if a new board (28910104) is set to be the Master with an old board (28910102) as Slave on the same system, then only refrigerants available on the old board will be selectable on the new board.

## Replacement Parts by

InterLink is your link to a complete line of dependable and certified commercial refrigeration parts, accessories and innovative electronic controls for all Heatcraft Refrigeration Products (HRP) brands - including Bohn, Larkin, Climate Control and Chandler. At InterLink, we provide our wholesalers with a comprehensive selection of product solutions and innovative technologies for the installed customer base. And every product is built to ensure the same high performance standards with which all HRP brands are built — backed by a dedicated team to serve every customer need, delivering at the best lead times in the industry.

Visit [www.interlinkparts.com](http://www.interlinkparts.com) or call (800) 686-7278 for more information.

**Table 3. InterLink Replacement Parts List**

PART DESCRIPTION	PART NUMBER
** Heatcraft Quick Response Controller Control Board	28910104
* Temperature Sensor kit – White Leads	89904902
Transformers:	
120/24 volt – 40 VA	22529601
240/24 volt – 40 VA	22529602
Electric Expansion Valve	
E2V11BWAE0 – 3/8" x 3/8" Conn	29326101
E2V24BWAE0 – 3/8" x 3/8" Conn	29326201
E2V24BSME0 – 5/8" x 5/8" Conn	29326401
E3V45BSME0 – 7/8" x 1-3/8" Conn	29326501
E2V11BWAE0 – 7/8" x 1-3/8" Conn	29326601
Expansion Valve molded connector - 40" Conn (Bipolar Valves)	22592101
Pressure Transducer	28911201
Pressure Transducer Harness	22515101

\*\* 28910104 serves as a replacement part for 28910102

\* Only the sensor with white leads is shipped as a service replacement part

**Table 4. Operational Limits**

OPERATIONAL LIMITS	
Voltage Range	18 VAC to 30 VAC
Controlling Box Temp. Range	-30°F to 70°F
Temperature Differential	2°F
Cold Ambient Limits	Start & operate to -20°F

**Table 5. Evaporator Temperatures**

PART NUMBER	R-22 Evaporator Temperature (°F) 100 psi Pressure Drop				R-404A/R-507 Evaporator Temperature (°F) 100 psi Pressure Drop			
	+20		-20		+20		-20	
	TONS	BTUH	TONS	BTUH	TONS	BTUH	TONS	BTUH
29326101	0.44	5220	0.41	4920	0.73	8706	0.64	7692
29326201	4.25	51000	3.99	47900	3.11	37309	2.75	32966
29326401	7.52	90240	7.54	90480	4.66	55964	4.12	49449
29326501	15.4	181680	14.25	171000	10.89	130692	9.62	115480
29326601	22.18	266160	20.87	250440	16.08	192985	14.21	170521

PART NUMBER	R-407A Evaporator Temperature (°F) 100 psi Pressure Drop				R-407C Evaporator Temperature (°F) 100 psi Pressure Drop			
	+20		-20		+20		-20	
	TONS	BTUH	TONS	BTUH	TONS	BTUH	TONS	BTUH
29326101	0.99	11831	0.90	10808	1.07	12898	0.99	11862
29326201	4.23	50704	3.86	4632	4.61	55278	4.24	50839
29326401	6.34	76056	5.79	69481	6.91	82918	6.35	76258
29326501	14.80	177615	13.52	162259	16.14	193641	14.84	178087
29326601	21.86	262273	19.97	239597	23.83	285937	21.91	262970

PART NUMBER	R-407F Evaporator Temperature (°F) 100 psi Pressure Drop				R-448A Evaporator Temperature (°F) 100 psi Pressure Drop			
	+20		-20		+20		-20	
	TONS	BTUH	TONS	BTUH	TONS	BTUH	TONS	BTUH
29326101	1.09	13067	1.01	12093	1.51	18106	1.38	16568
29326201	4.67	56000	4.32	51831	6.47	77599	5.92	71005
29326401	7.00	84000	6.48	77746	9.70	116398	8.88	106508
29326501	16.35	196168	15.13	181562	22.65	271829	20.73	248731
29326601	24.14	289669	22.34	268100	33.45	401392	30.61	367286

PART NUMBER	R-449A Evaporator Temperature (°F) 100 psi Pressure Drop			
	+20		-20	
	TONS	BTUH	TONS	BTUH
29326101	1.01	12124	0.92	11082
29326201	4.33	51965	3.96	47499
29326401	6.50	77946	5.94	71249
29326501	15.17	182030	13.87	166388
29326601	22.40	268793	20.47	245695



## Heatcraft Quick Response Controller Troubleshooting Guide

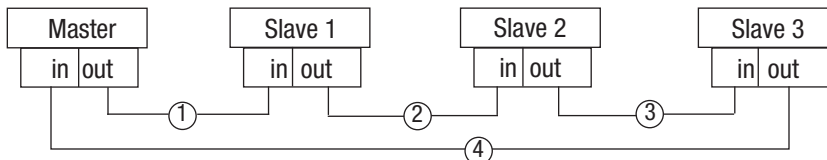
PROBLEM	Step	ACTION ITEM	IF OK	IF NOT OK
LED is not lit.	1. 2. 3. 4. 5.	1. Check Primary Power Supply Disconnect 2. Check Voltage to Evaporator Transformer 3. Check Transformer Secondary Output Volts 4. Check Voltage at Control Board (24V and C) 5. Replace Control Board	Go to next step	1. Check fuses and circuit breakers 2. Check field wiring for breaks 3. Replace if necessary 4. Check factory wiring and connections
LED shows Cool, but compressor will not run.	1. 2. 3.	1. Check Compressor internal overloads  2. Check Compressor Contactor Coil Voltage 3. Check Compressor Contactor "pulled in"	Go to next step	1. Wait for reset  2. Check internal condensing unit wiring 3.. Replace as needed
<b>ERROR CODES:</b> E1 Room Sensor E2 Defrost Sensor E3 Suction Sensor E4 Suction Transducer E5 Outdoor Sensor		Check Sensor and Board Connection Check Sensor and Board Connection Check Sensor and Board Connection Check Transducer and Board Connection Check Sensor, wiring and Board Connection		Replace as needed Replace as needed Replace as needed Replace as needed Replace or remove
E6 Low Superheat During Cooling (0°F for 2 minutes)	1. 2. 3. 4. 5. 6. 7.	1. Check Refrigerant Type 2. Check coil for ice  3. Check Control Board step position from board LED 4. Check Electric Expansion Valve Closure  5. Compressor Not Operating 6. Check Suction Temperature Sensor  7. Check Suction Pressure Transducer	Go to next step	1. Compare board setpoint and refrigerant 2. Defrost coil and check defrost cycle settings/ setpoints, defrost sensor and heater amps. 3. Replace board if EEV steps not at 2. 4. Pumpdown system see if LPS opens or if it times out (EEV is bad or LPS is set incorrectly, if times out) – See Pumpdown. 5. Check overloads and contactor. 6. Compare board sensor reading against actual suction line temperature. 7. Compare pressure reading against gauges.

## Heatcraft Quick Response Controller Troubleshooting Guide (continued)

PROBLEM	Step	ACTION ITEM	IF OK	IF NOT OK
E9 Multi-out to Multi-in Communication Wiring (only shows after initial successful connection)	1.	Check for 24 volts power to the board		1. If no voltage, see "LED is not lit" on Page 24 for low voltage, see "888 LED display"
	2.	Check for crossed communication wiring (multi-out not wired to multi-in terminals)	Go to next step	2. Correct wiring from "Master" unit Multi-out to Multi-in of "Slave" unit, etc. to all Slaves and return to Master. (See wiring diagrams)
	3.	Check for broken communication wiring		3. Correct wiring between first Slave with error to previous board in the sequence.

**Communication Error Occurrence:**

Break in the designated lines will cause errors as follows:



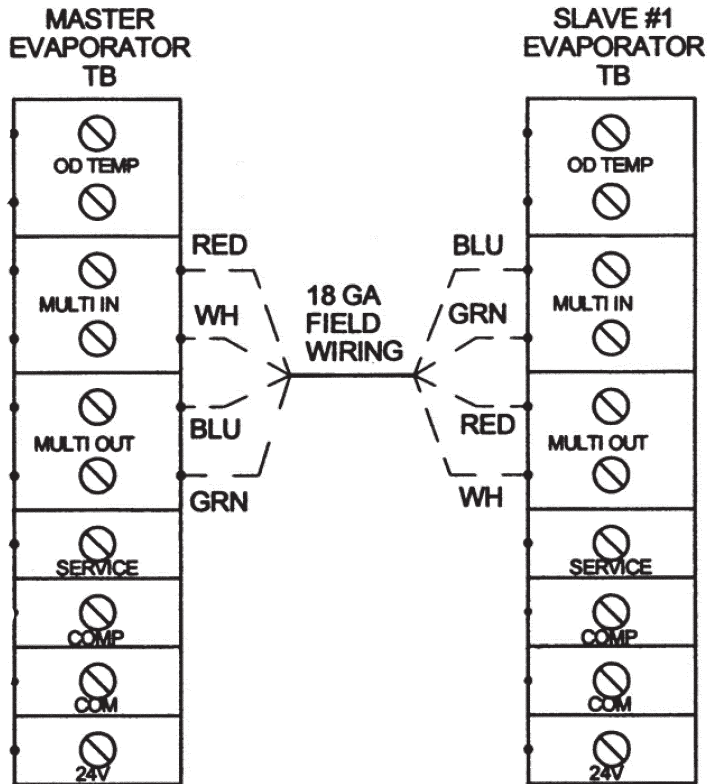
Line #	Master	Slave1	Slave 2	Slave 3
①	E9	E9	E9	E9
②	E9	no error	E9	E9
③	E9	no error	no error	E9
④	E9	no error	no error	no error

PROBLEM	Step	ACTION ITEM	IF OK	IF NOT OK
888 LED display (power is below 18V and appears at initial power)	1.	Check board for proper ground on mounting screws		1. Replace/tighten screws
	2.	Check Voltage to Evaporator Transformer	Go to next step	2. Check field wiring for breaks or shorts
	3.	Check Transformer Secondary Output Volts		3. Replace if necessary
	4.	Check Voltage at Control Board (24 and C)		4. Check factory wiring and connections
LED displays dLY then OFF with not displayed errors	1.	Check board for proper grounding on mounting screws		1. Replace/tighten screws
	2.	Check for low voltage	Go to next step	2. Check all steps for "888 LED display" Voltage could drop off too fast to show.

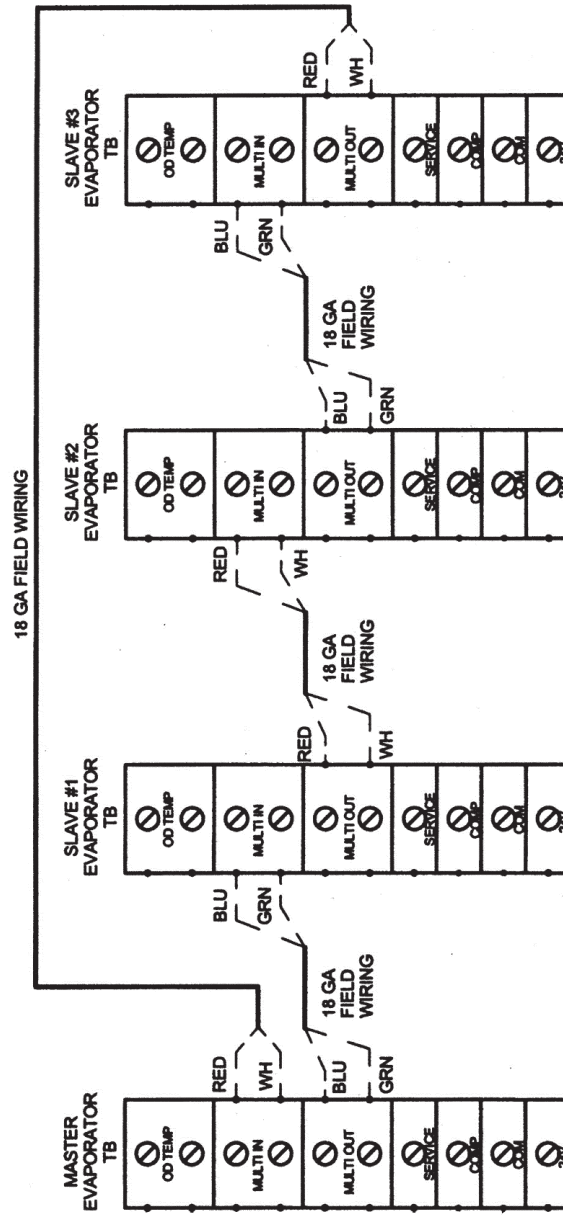
## Heatcraft Quick Response Controller Troubleshooting Guide (continued)

PROBLEM	Step	ACTION ITEM	IF OK	IF NOT OK
<b>Cannot get to box temperature</b>	1.	Check system operation: Is it running?		1. Check power to condensing unit Check position of Service Mode switches Check compressor overloads and contactor
	2.	Check system charge		2. Add or remove refrigerant to proper charge
	3.	Check for proper operating superheat		3. Check EEV operation Check control board EEV signal Check suction sensor and transducer
	4.	Check for high superheat and EEV wide open		4. Check EEV inlet screen and restrictions Check liquid line sizing Check head pressure controls
	5.	Check Low Pressure Safety Switch		5. Correctly set or replace if bad
	6.	Compare equipment capacity with requirements		6. Add or replace with more/larger equipment
	7.	Check box temperature setpoint		7. Correct setpoint to proper value
	8.	Check compressor performance		8. Check compressor application limitations Check integrity of compressor operation (impaired, worn or damaged components)
	9.	Check condenser coil for dirt/debris		9. Clean condenser coil
	10.	Check condenser for non-condensables		10. Remove all non-condensables
	11.	Check condenser fan operation		11. Replace/repair fan blade, motor, cycling switch or make corrective adjustments.
	12.	Check for correct refrigerant type		12. Compare board setpoint and refrigerant
	13.	Check for iced evaporator coil		13. Defrost coil and check defrost cycle (see E2) settings/setpoints and defrost sensor
	14.	Check defrost parameters		14. Correct defrost setpoints in program (frequency and termination of defrosts)
	15.	Check superheat setpoint (too high?)		15. Correct setpoint for more cooling surface
	16.	Check display values (°F or °C)		16. Correct setpoint for proper display values
<b>Service Mode (SEr is displayed)</b>	<b>Placing system into SERVICE MODE (MASTER BOARDS ONLY)</b>		<b>Terminating SERVICE MODE (MASTER BOARDS ONLY)</b>	
	1.	Use Remote Service Switch in condensing unit	1.	Must terminate using same switch
	2.	Pressing "Force Service" button board* twice	2.	Press "Clear" button on board
	3.	Connection between "Ser" and "C" on board* (all are wired in parallel; all will activate mode) *ONLY Master board on multiple evaporator systems	3.	Open connection between "Ser" and "C"  (Note: If multiple switches were placed in Service Mode, all must be "open" to terminate the mode.)

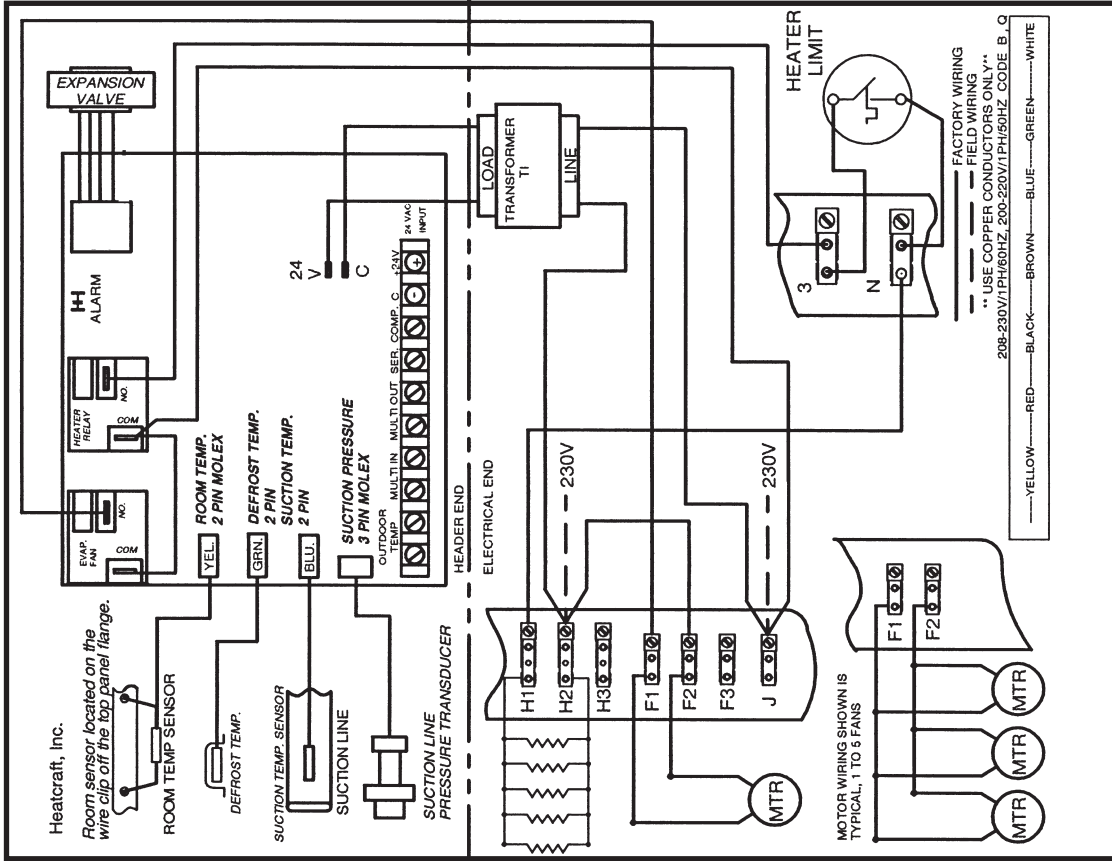
## 24 VOLT CONNECTION WIRING- HEATCRAFT QUICK RESPONSE CONTROLLER MASTER WITH ONE SLAVE CONNECTION



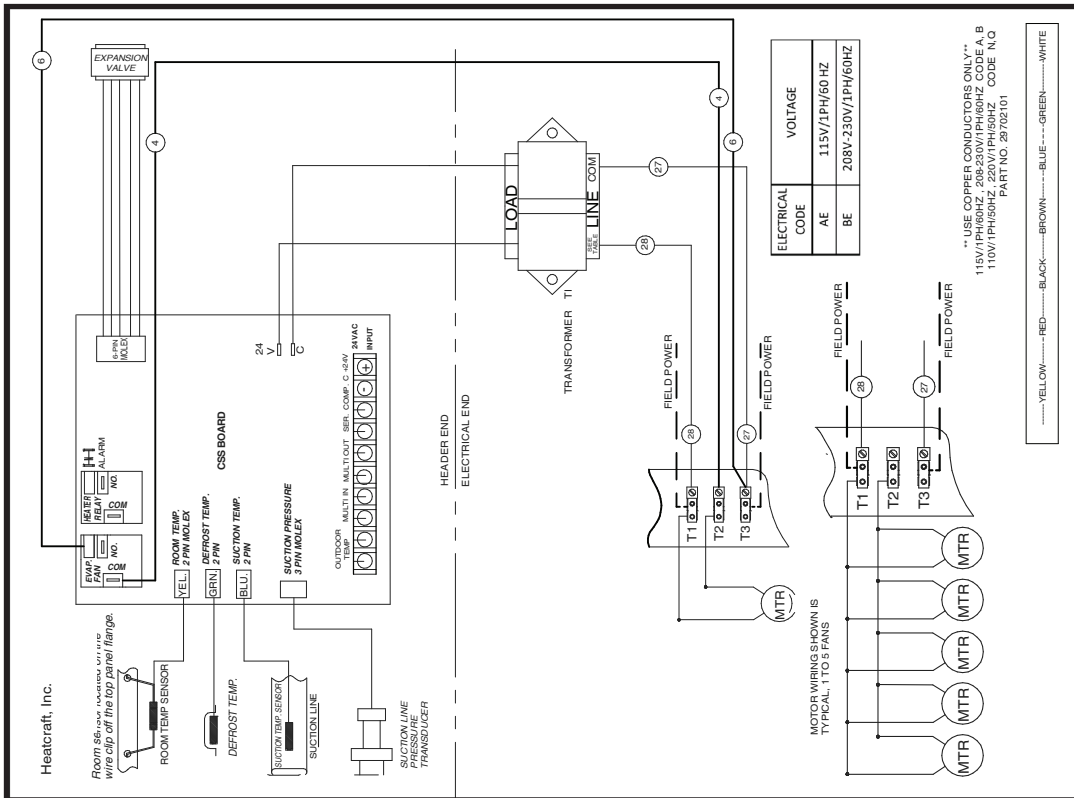
24 VOLT CONNECTION WIRING- HEATCRAFT QUICK RESPONSE CONTROLLER  
MASTER WITH THREE SLAVE CONNECTION



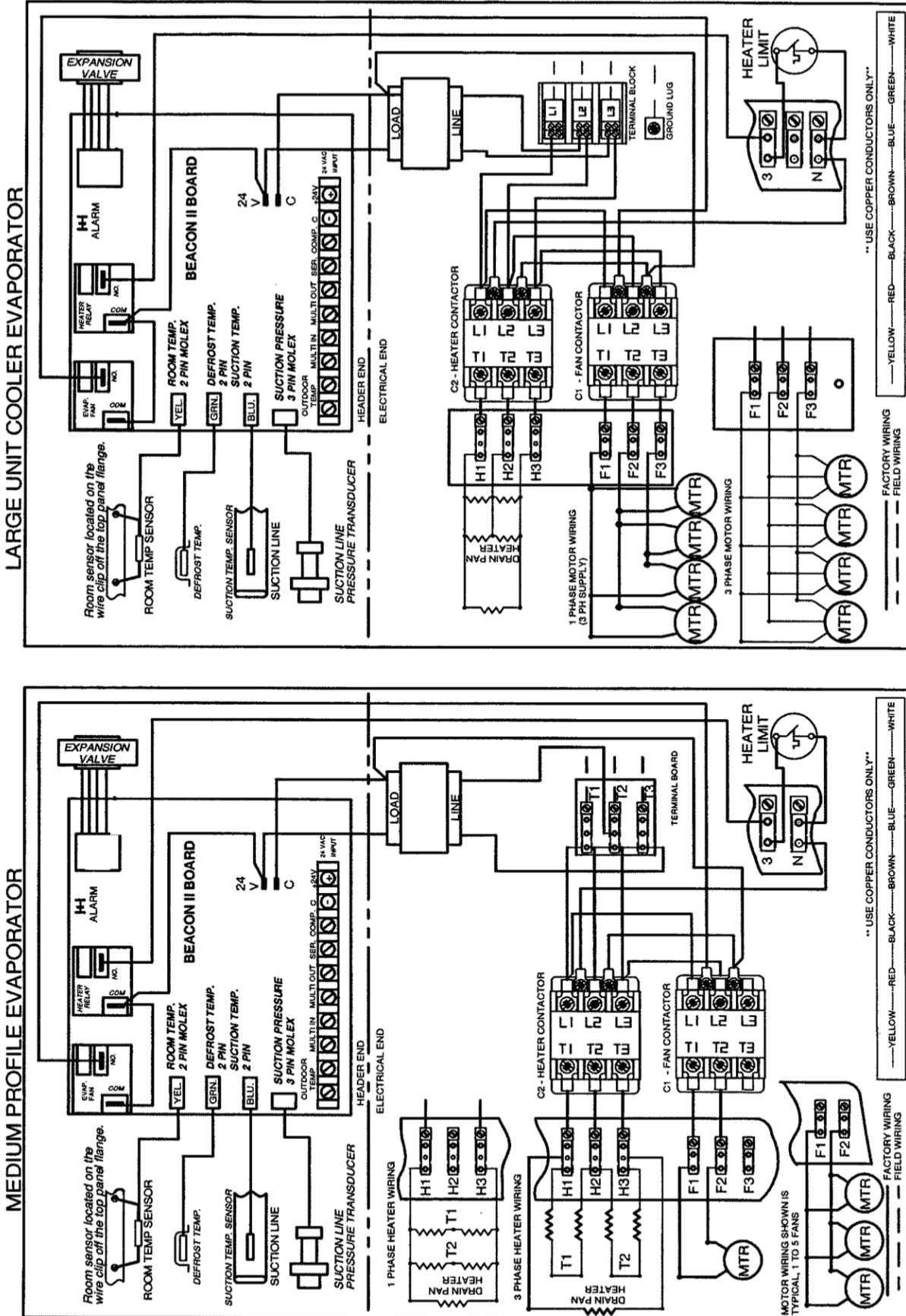
## ELECTRIC DEFROST EVAPORATOR WIRING



## AIR DEFROST EVAPORATOR WIRING

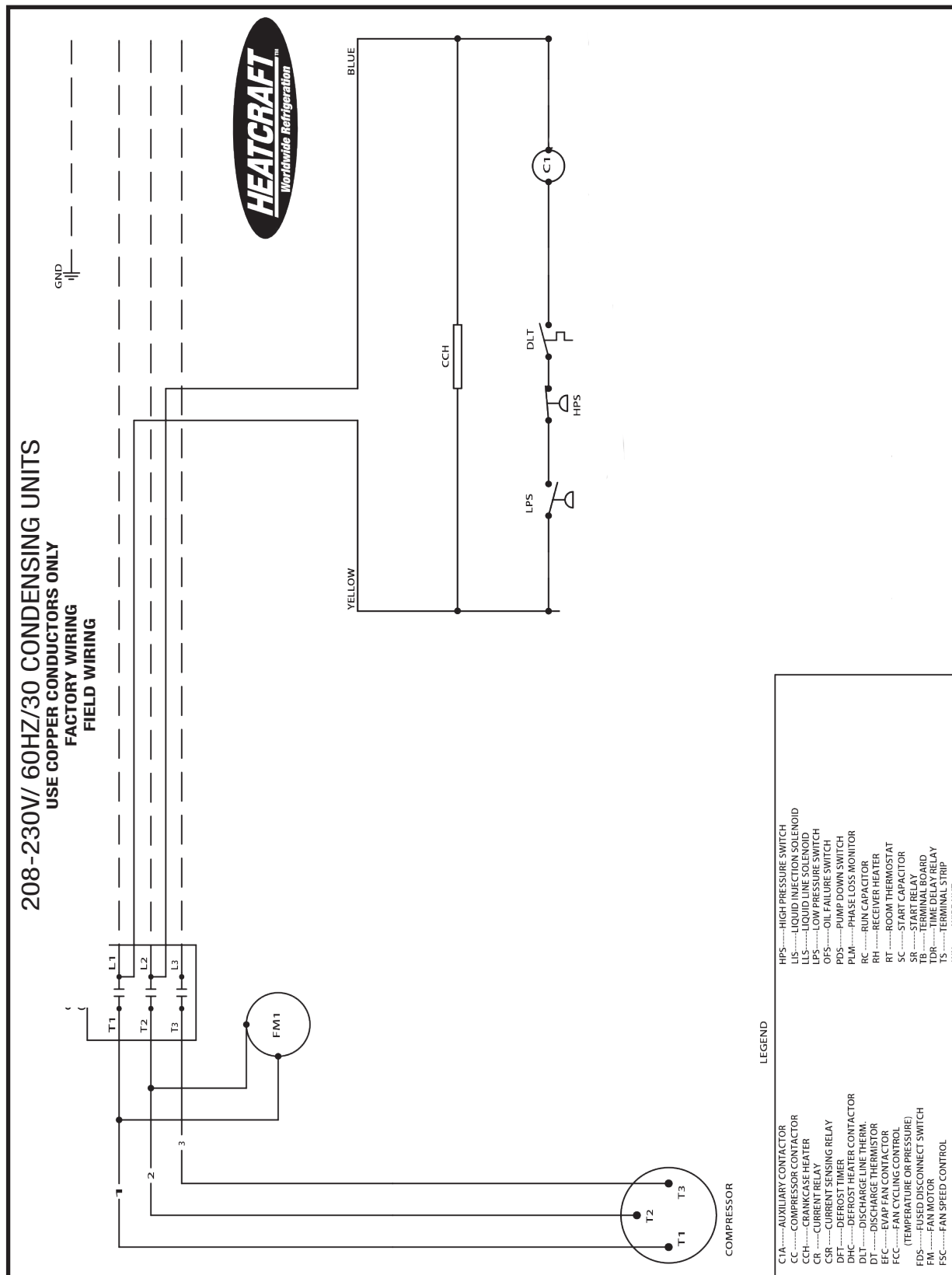


## TYPICAL ELECTRIC DEFROST WIRING DIAGRAM

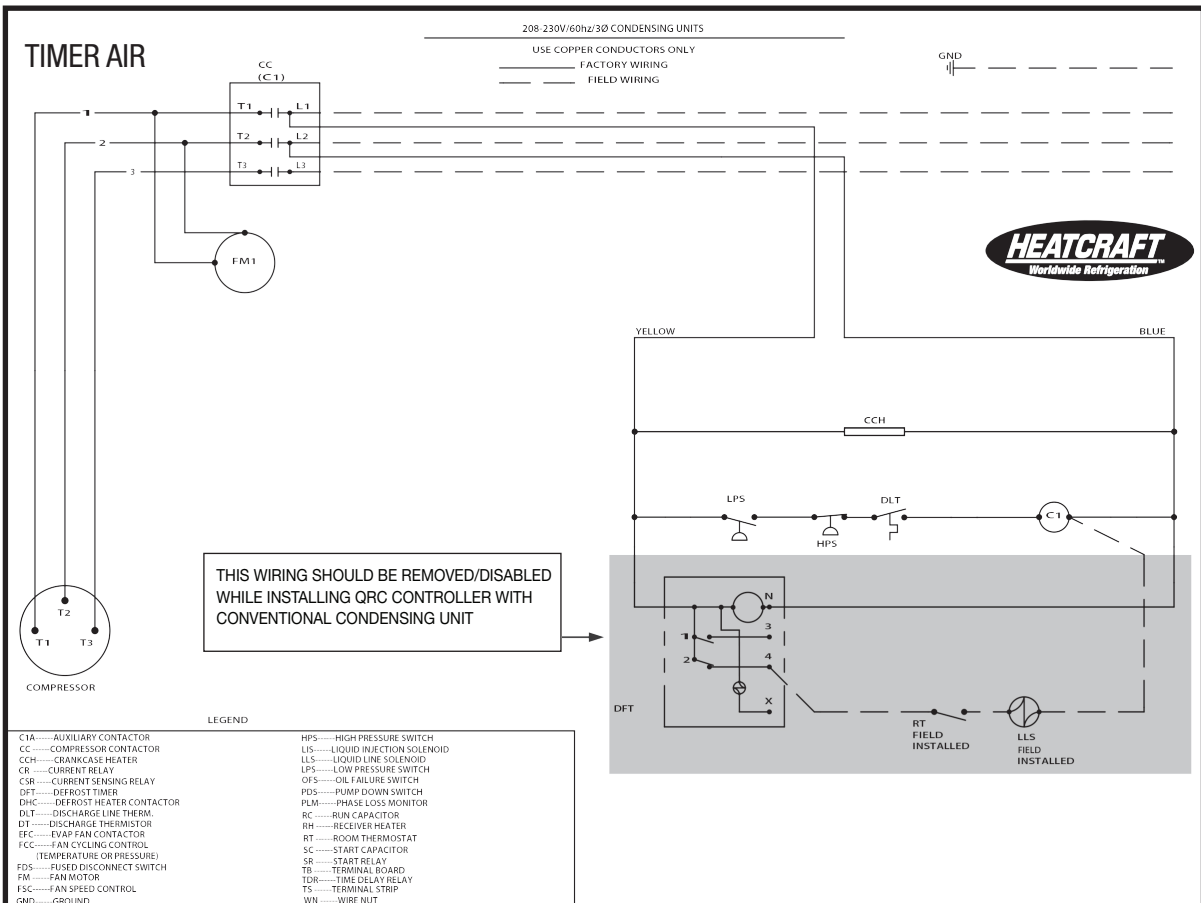
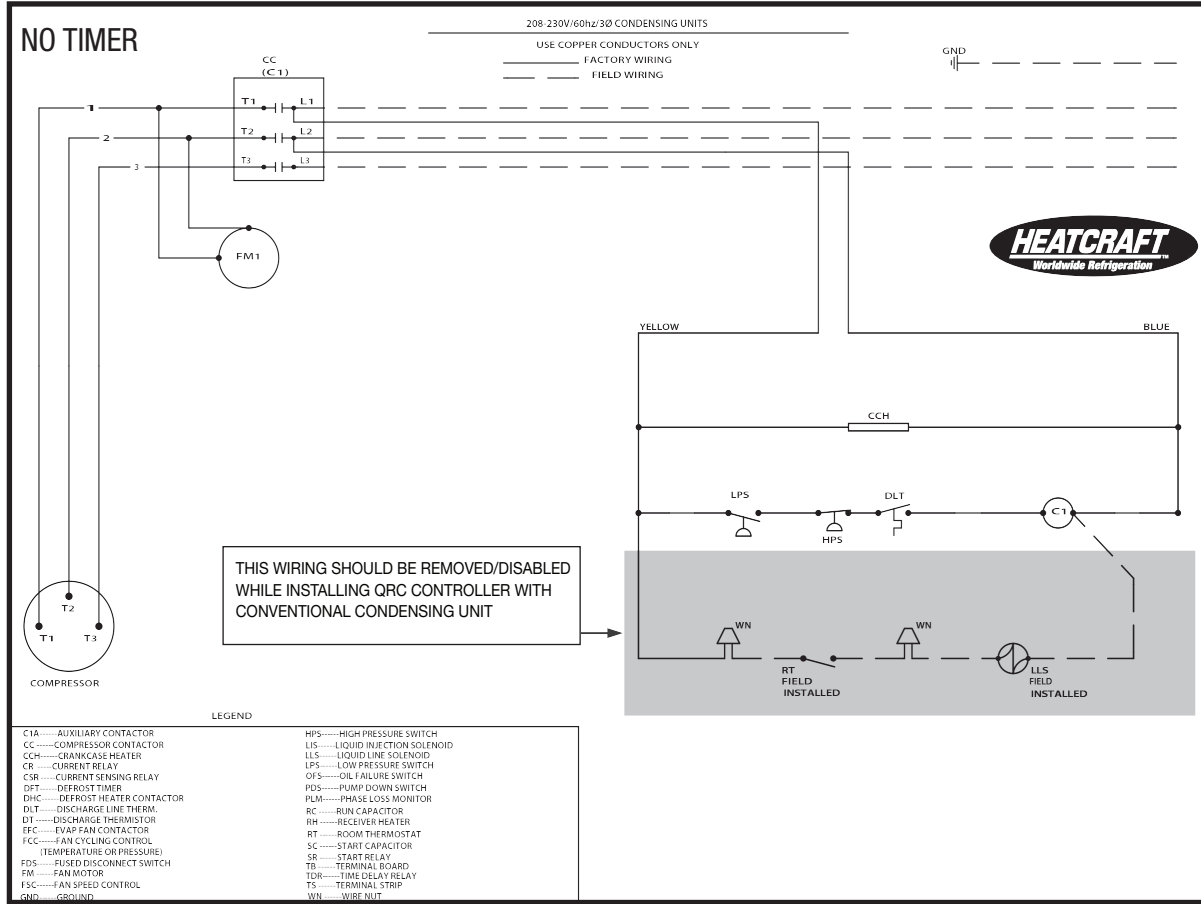


NOTE: THESE ARE TYPICAL EVAPORATOR WIRING DIAGRAMS. CONSULT WIRING DIAGRAM SHIPPED ON UNIT FOR ACTUAL UNIT WIRING.

## TYPICAL CONDENSING UNIT WIRING DIAGRAM







## EVAPORATORS

All evaporator units should be checked once a month or more often for proper defrosting because the amount and pattern of frosting can vary greatly. It is dependent on the coil temperature, the temperature of the room, the type of product being stored, how often new product is brought into the room and the percentage of time the door to the room is open. It may be necessary to periodically change the number of defrost cycles or adjust the duration of defrost.

## CONDENSING UNITS / EVAPORATORS

Under normal usage conditions, maintenance should cover the following items at least once every 6 months:

1. Check and tighten ALL electrical connections
2. Check all wiring and insulators
3. Check contactors for proper operation and for worn contact points
4. Check all fan motors. Tighten motor mount bolts and nuts and tighten fan set screws
5. Clean the condenser coil surface
6. Check the refrigerant and oil level in the system
7. Check the operation of the control system. Make certain all safety controls are operating properly
8. Check that all defrost controls are functioning properly
9. Clean the evaporator coil surface
10. Clean the drain pan and check the drain pan and drain line for proper drainage
11. Check the drain line heater for proper operation, cuts and abrasions
12. Check and tighten all flare connections

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## Check-Out & Start-Up

After the installation has been completed, the following points should be covered before the system is placed in operation:

- (a) Check all electrical and refrigerant connections. Be sure they are all correct and tight.
- (b) Check voltage taps on transformer at the evaporators. The transformer is shipped wired to 240 voltage tap/connection. If your supply voltage is 208 volt systems, change to 208 voltage tap.
- (c) Check high and low pressure controls, pressure regulating valves, oil pressure safety controls, and all other safety controls and adjust them, if necessary.
- (d) On freezers only, 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.
- (e) Liquid line should always be insulated.
- (f) Wiring diagrams, instruction bulletins, etc. attached to the condensing units should be read and filed for future reference.
- (g) All fan motors on air cooled condensers, evaporators, etc. should be checked for proper rotation. Fan motor mounts should be carefully checked for tightness and proper alignment.
- (h) Observe system pressures during charging and initial operation. Do not add oil while the system is short of refrigerant unless oil level is dangerously low.
- (i) Continue charging until system has sufficient refrigerant for proper operation. Do not overcharge. Remember that bubbles in a sight glass may be caused by a restriction as well as a shortage of refrigerant.
- (j) Do not leave unit unattended until the system has reached normal operating conditions and the oil charge has been properly adjusted to maintain the oil level at the center of the sight glass.
- (k) At initial start-up, the system may cycle off at 2 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.

**CAUTION:** Extreme care must be taken in starting compressors for the first time after system charging. At this time, all of the oil and most of the refrigerant might be in the compressor creating a condition which could cause compressor damage due to slugging. Activating the crankcase heater for 24 hours prior to start-up is recommended. If no crankcase heater is present, then directing a 500 watt heat lamp or other safe heat source on the lower shell of the compressor for approximately thirty minutes will be beneficial in eliminating this condition which might never reoccur.

**Date of Start-up** \_\_\_\_\_  
**Location Address** \_\_\_\_\_

### ELECTRICAL

- Check Primary Supply voltage at Evaporator If 208 V, change transformer wiring in the Cooler and Freezer to the 208 V tap  
 YES                      NO
- Check Compressor Amps for COOLER and FREEZER compressors. Should match nameplate.  
 YES                      NO

### PIPING

- Is suction line trapped at the Cooler?  
 YES                      NO
- Is suction line trapped at the Freezer?  
 YES                      NO

### DRAIN LINES

- Are drain lines sloped properly?  
 YES                      NO
- Is drain line trapped outside the Cooler?  
 YES                      NO
- Is drain line trapped outside the Freezer?  
 YES                      NO
- Is heat tape wrapped along entire length of the drain line in the Freezer?  
 YES                      NO
- Is heat tape plugged in and heating the drain line?  
 YES                      NO

### INSULATION

- Are Liquid lines fully insulated?  
 YES                      NO
- Are Suction lines fully insulated?  
 YES                      NO

### SETTINGS

- Check Heatcraft Quick Response Controller board settings for the following:

#### **FREEZER**

Refrigerant Type R404A  
 Box Setpoint Temp.      -10°F.  
 Superheat                      7°F.  
 No. of Defrost / Day      ddf=yes  
 Defrost End Temp.        65°F.

#### **COOLER**

Refrigerant Type R22  
 Box Setpoint Temp.        35°F.  
 Superheat                      7°F.  
 No. of Defrost/Day        2  
 Defrost End Temp.        50°F.

### CONDENSING UNIT

MODEL # \_\_\_\_\_

SERIAL # \_\_\_\_\_

### COOLER UNIT

MODEL # \_\_\_\_\_

SERIAL # \_\_\_\_\_

### FREEZER UNIT

MODEL # \_\_\_\_\_

SERIAL # \_\_\_\_\_

### SYSTEM CHECKS

- Check Compressor Superheat for the COOLER (Should be between 20°F. & 30°F.)  
 YES                      NO
- Check Compressor Superheat for the FREEZER (Should be between 20°F. & 30°F.)  
 YES                      NO
- Force unit into a Defrost. Check heater amps. Should match nameplate amps.  
 YES                      NO
- Check Low Pressure Switch on FREEZER. Should be set at 0 psig Cut-out/10 psig Cut-in.  
 YES                      NO
- Did FREEZER and COOLER cycle off on LPS at Setpoint Temperature?  
 YES                      NO
- Is the sight glass free of bubbles?  
 YES                      NO
- Are the COOLER and FREEZER fans at proper speeds?  
 YES                      NO
- Check system for refrigerant leaks. Are there any leaks on the COOLER, FREEZER, CONDENSING UNIT or INTERCONNECTING PIPING?  
 YES                      NO
- Check system piping for unusual vibration or noise. Is there any unusual vibration or noise on the COOLER, FREEZER, CONDENSING UNIT or INTERCONNECTING PIPING?  
 YES                      NO
- Start the FREEZER only. Does the compressor start and evaporator fans run for this FREEZER?  
 YES                      NO

## RECORD

OUTDOOR TEMPERATURE \_\_\_\_\_ °F

SYSTEM VOLTAGE \_\_\_\_\_ Volts      \_\_\_\_\_ PH      \_\_\_\_\_ Hz

Cooler compressor amps      \_\_\_\_\_ L1      \_\_\_\_\_ L2      \_\_\_\_\_ L3

Freezer compressor amps      \_\_\_\_\_ L1      \_\_\_\_\_ L2      \_\_\_\_\_ L3

Cooler discharge pressure      \_\_\_\_\_ PSIG

Freezer discharge pressure      \_\_\_\_\_ PSIG

Cooler suction pressure      \_\_\_\_\_ PSIG

Freezer suction pressure      \_\_\_\_\_ PSIG

Cooler suction temp.      \_\_\_\_\_ °F

Freezer suction temp.      \_\_\_\_\_ °F

Cooler refrigerant charge      \_\_\_\_\_ lbs.

Freezer refrigerant charge      \_\_\_\_\_ lbs.

Cooler compressor superheat      \_\_\_\_\_ °F

Freezer compressor superheat      \_\_\_\_\_ °F

Cooler evaporator superheat      \_\_\_\_\_ °F

Freezer evaporator superheat      \_\_\_\_\_ °F

Cooler discharge temp.      \_\_\_\_\_ °F

Freezer discharge temp.      \_\_\_\_\_ °F

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## Quick Response Controller

Notes

## Notes

Notes



Heatcraft Refrigeration Products, LLC  
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Customer Service and Technical Support

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(800) 321-1881

After Hours (after 5:00 PM EDT, weekends and holidays)  
(855) 883-1036

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