

RTU Controls



- Home
- News
- Tim's Page
- Tim's Page 2
- Tec Services
- Alex's page
- Jon's Page
- Mom's Page
- Dad's Page

Whassup Y'all?



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entries

2698

0059

The time is: 8:10:52 AM on August 19, 2014

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| August - 2014 | | | | | | |
|---------------|----|----|----|----|----|----|
| S | M | T | W | T | F | S |
| | | | | | 1 | 2 |
| 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 31 | | | | | | |

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Trane Model

Precedent™



3-10

Voyager™



12.5-25

Voyager™ III



27.5 50

IntelliPak™



20

130

IntelliPak™ II

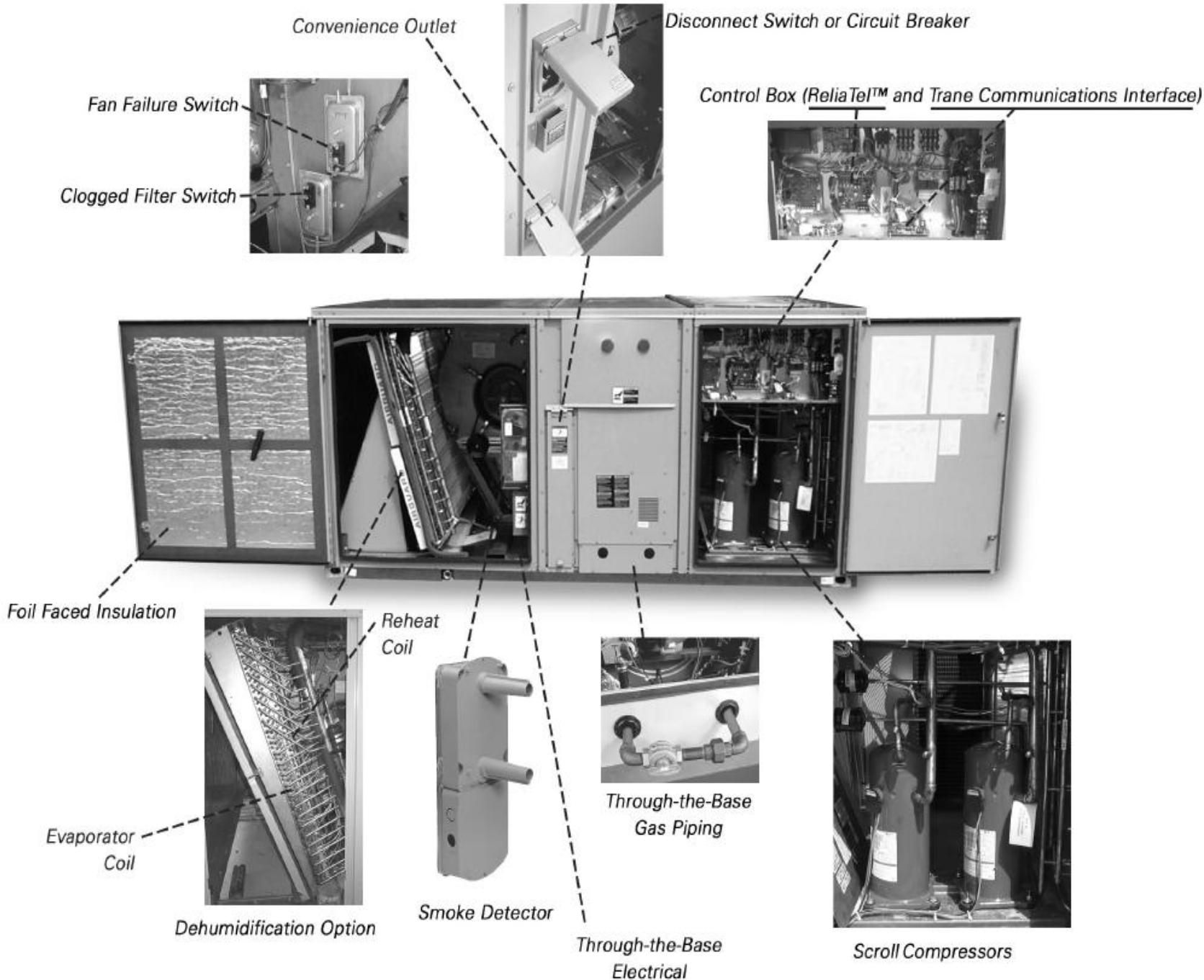


90

150







The Modules

- RTRM (Refrigeration)
- RTVM (VAV)
- RTOM (Options)
- RTDM (Dehumidification)
- DFM (Defrost)
- ECA or RTEM (Economizer)
- Communication (Trane, LonTalk, BacNet)

Sequence

Sequence

Electric/Electric Units

| Step | Mode | IDM | Econ | CPR1 | CPR2 | HT1 | HT2 | ODM1 | ODM2 |
|------|--------|-----|------|------|------|-----|-----|------|------|
| 1 | Fan On | On | Min | Off | Off | Off | Off | Off | Off |
| 2* | Econ. | On | Open | Off | Off | Off | Off | Off | Off |
| 3 | Cool 1 | On | Min | On | Off | Off | Off | On | ** |
| 4 | Cool 2 | On | Min | On | On | Off | Off | On | ** |
| 5* | Reheat | On | MIn | On | On | Off | Off | On | ** |
| 6* | Heat 1 | On | Min | Off | Off | On | Off | Off | Off |
| 7* | Heat 2 | On | Min | Off | Off | On | On | Off | Off |

* With Optional Accessory

** "Off" If temperature falls below 60° ($\pm 2^\circ$)F, "On" if temperature rises above 65° ($\pm 2^\circ$)F.

Heat Pump Units

| Step | Mode | IDM | Econ | CPR1 | CPR2 | HT1 | HT2 | SOV | ODM1 | ODM2 |
|------|---------|-----|------|------|------|-----|-----|-----|------|------|
| 1 | Fan On | On | Min | Off | Off | Off | Off | Off | Off | Off |
| 2* | Econ. | On | Open | Off | Off | Off | Off | Off | Off | Off |
| 3 | Cool 1 | On | Min | On | Off | Off | Off | On | On | ** |
| 4 | Cool 2 | On | Min | On | On | Off | Off | On | On | ** |
| 5 | Heat 1 | On | Min | On | On | Off | Off | Off | On | On |
| 6* | Heat 2 | On | Min | On | On | On | Off | Off | On | On |
| 7* | Heat 3 | On | Min | On | On | On | On | Off | On | On |
| 8*** | Defrost | On | Min | On | On | On | On | On | Off | Off |
| 9 | Em Heat | On | Min | Off | Off | On | On | Off | Off | Off |

* With Optional Accessory

** "Off" If temperature falls below 60° ($\pm 2^\circ$)F, "On" if temperature rises above 65° ($\pm 2^\circ$)F.

*** defrost cycle in test mode runs for at least 1 minute, up to 10 minutes, depending on outdoor ambient and outdoor coil temperature

Gas/Electric Units

| Step | Mode | IDM | Econ | CPR1 | CPR2 | HT1 | HT2 | ODM1 | ODM2 |
|------|--------|-----|------|------|------|-----|-----|------|------|
| 1 | Fan On | On | Min | Off | Off | Off | Off | Off | Off |
| 2 * | Econ. | On | Open | Off | Off | Off | Off | Off | Off |
| 3 | Cool 1 | On | Min | On | Off | Off | Off | On | ** |
| 4 | Cool 2 | On | Min | On | On | Off | Off | On | ** |
| 5 * | Reheat | On | MIn | On | On | Off | Off | On | ** |
| 6 | Heat 1 | On | Min | Off | Off | On | Off | Off | Off |
| 7 | Heat 2 | On | Min | Off | Off | On | On | Off | Off |

* With Optional Accessory

** "Off" If temperature falls below 60° ($\pm 2^\circ$)F, "On" if temperature rises above 65° ($\pm 2^\circ$)F.

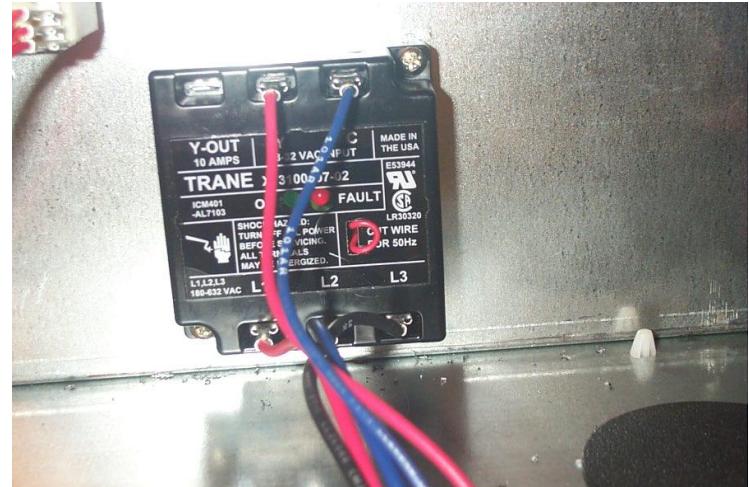
Unit Controls



- ReliaTel™ Microprocessor
 - Second generation design
 - Intelligent communicating boards
 - Standard safety features
 - Trane ICS compatible

Phase Monitor

- Phase monitor provides 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator.

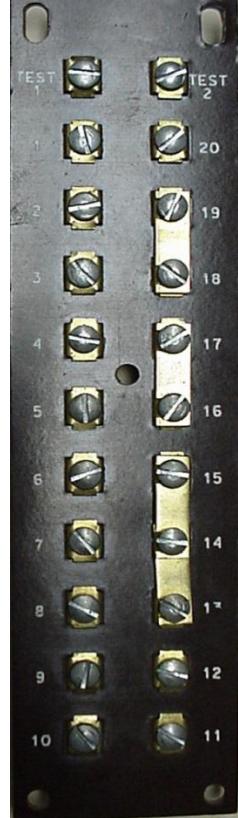


ReliaTel Standard Features

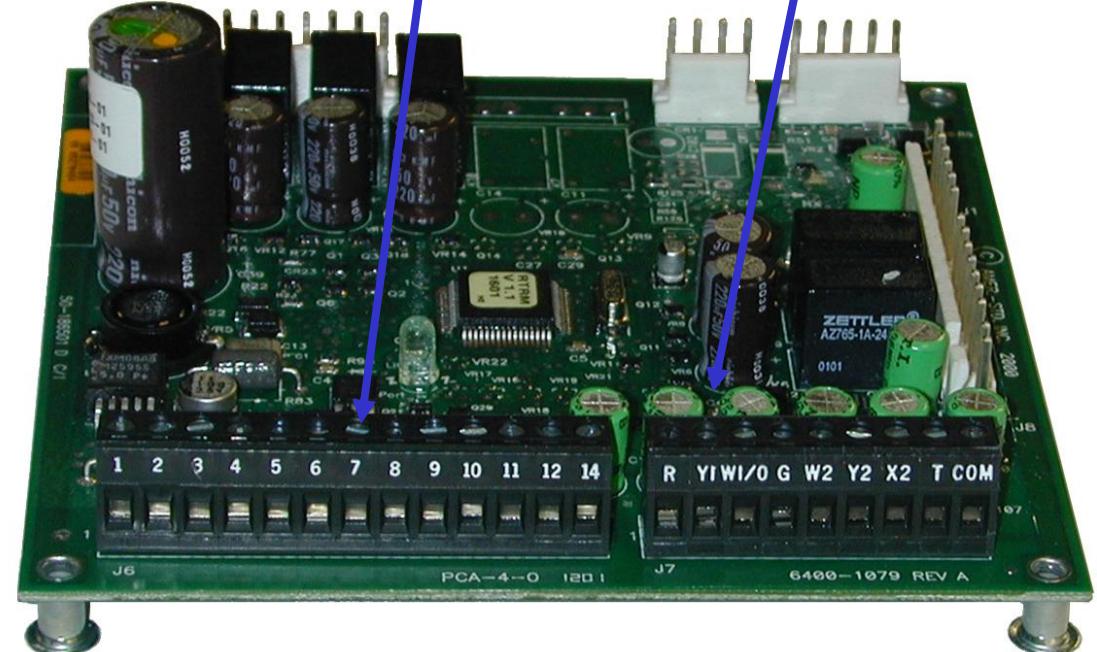
- **Diagnostics for trouble-shooting**
- **CO₂ management**
- **Anti-short cycle timers**
- **Compressors and fans staging**
- **Compressor minimum on/off time**
- **Alternating compressor lead/lag**
- **Low ambient cooling down to 0°F**
- **Outdoor Air Temperature**
- **Emergency Stop Input**
- **Dehumidification Option**
- **Ventilation Override**
- **Adjustable Powered Exhaust Set-point**
- **Built-In Test Mode**
- **Built-In Conventional Thermostat Interface**

Thermostats and Sensors

*All Precedent and Voyager
Reliatel*

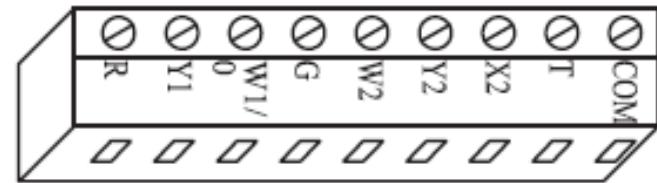
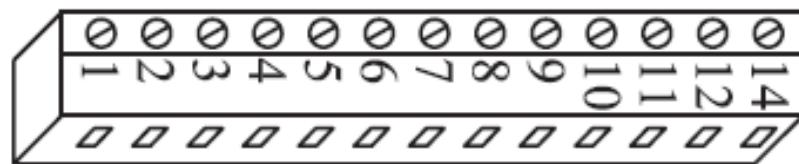
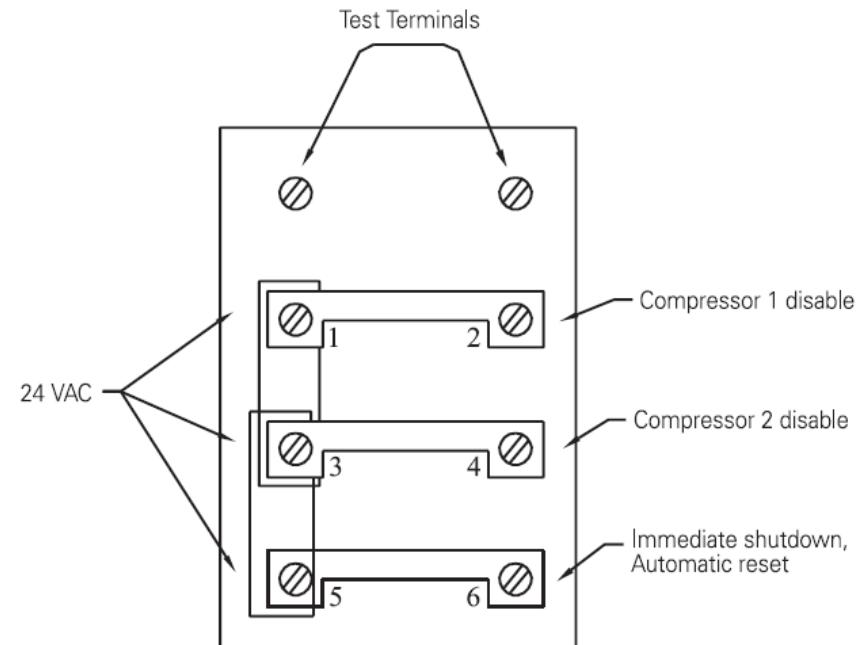
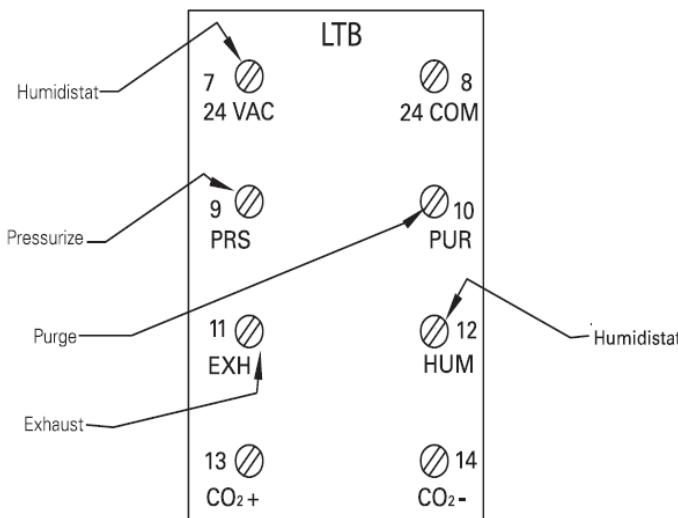


Older Voyager



Sensors

Thermostat



Zone Sensor

(or)

Thermostat



24

Control Inputs/Outputs

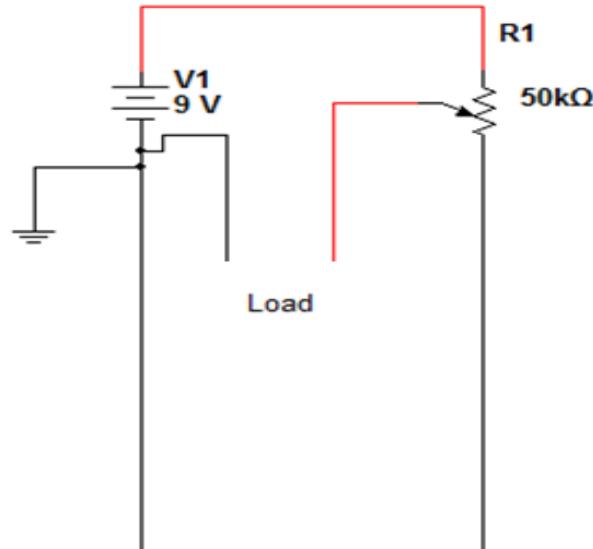
- Analog Inputs
- Analog Outputs
- Binary Inputs
- Binary Outputs
- Communicating system interfaces

Inputs & Outputs

- BIP
 - 0-28 VAC (CC status, LPC, Etc).
- BOP
 - 0-28 VAC (CC, FC, ODF, SOV, Etc.)
- AIP
 - 0-5 VDC (Temp Sensors)
 - 4-20 MA (Humidity sensor)
- AOP
 - 0-5 VDC
 - 0-10 VDC (CO₂)
 - .75-30 VDC (Status)

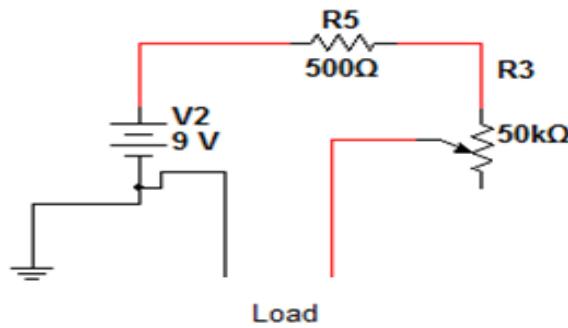
Control Testing

0-10 VDC test ckt

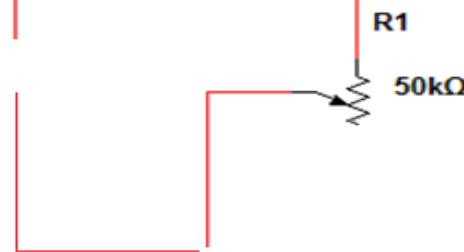


0-20 ma VDC test ckt

Load Limit Resistor

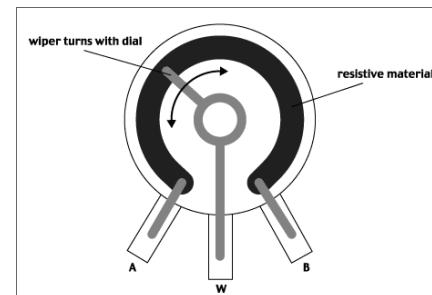
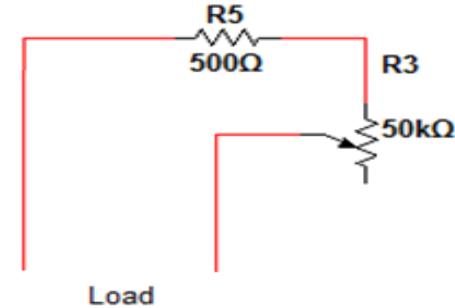


RESISTANCE

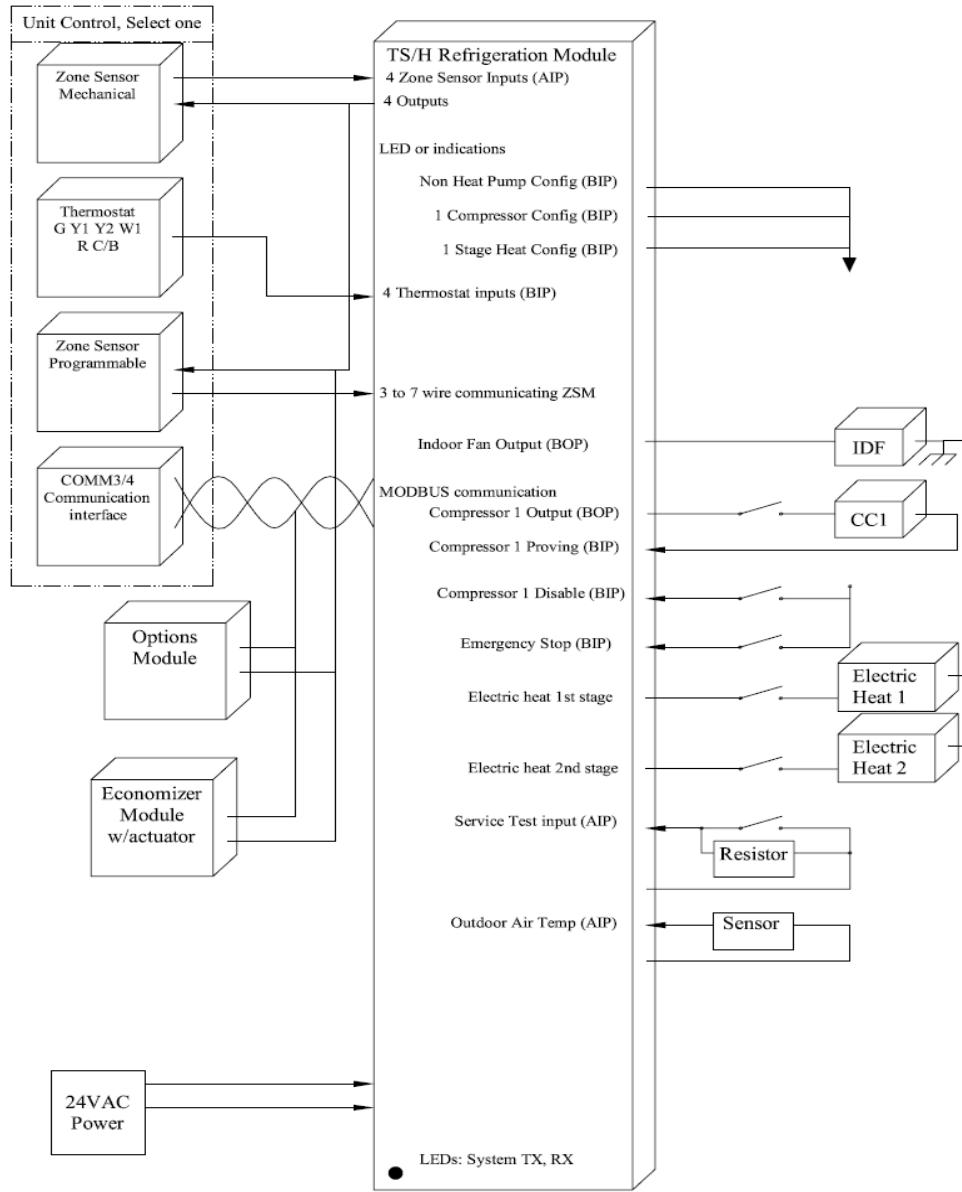


0-20 ma VDC test ckt

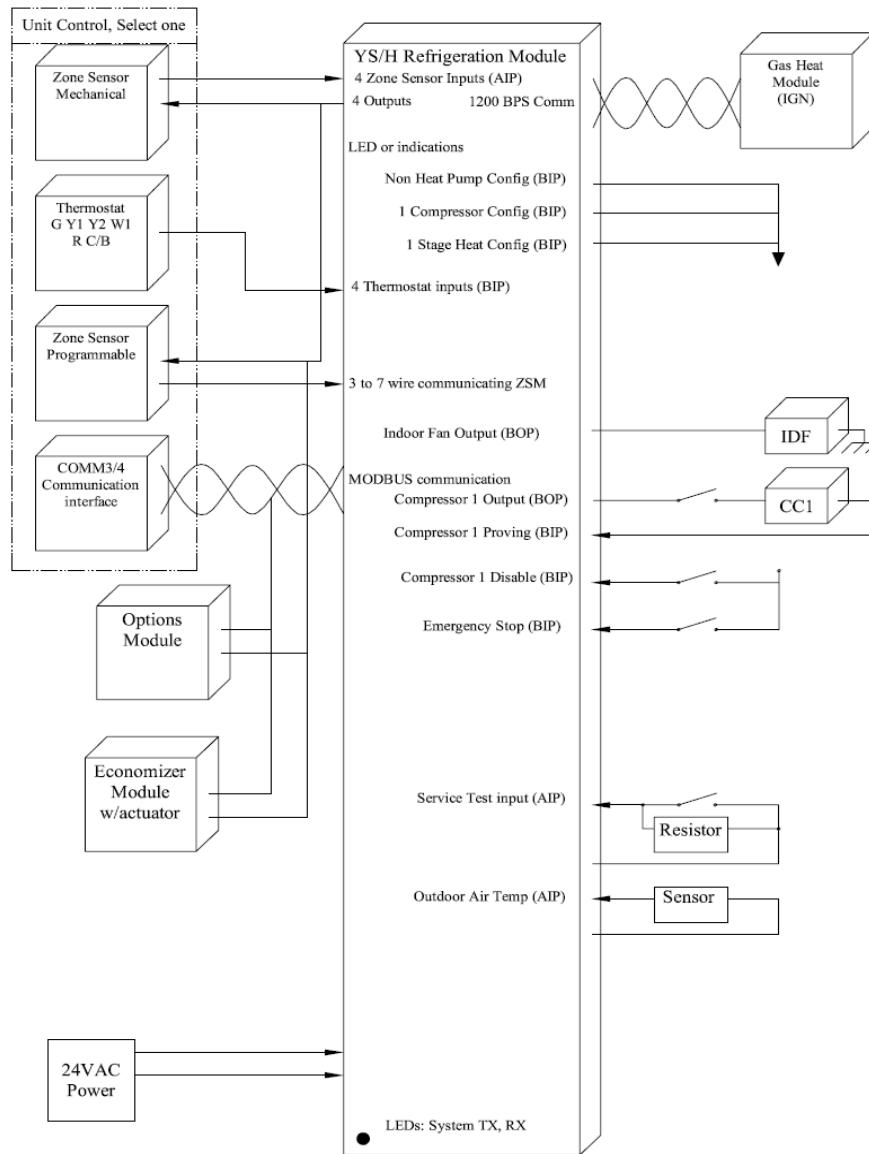
Load Limit Resistor



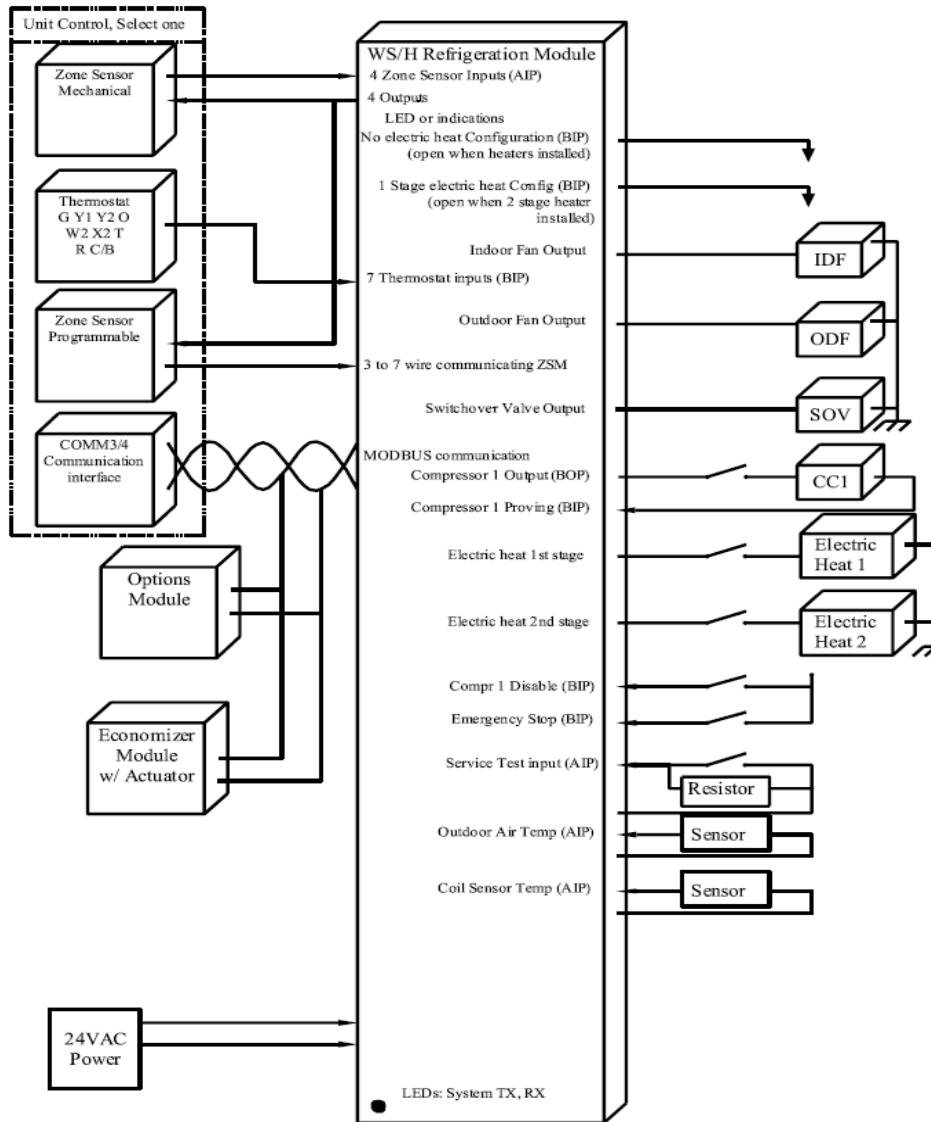
TS/H Refrigeration Module (RTRM) Electric Heat /No Heat



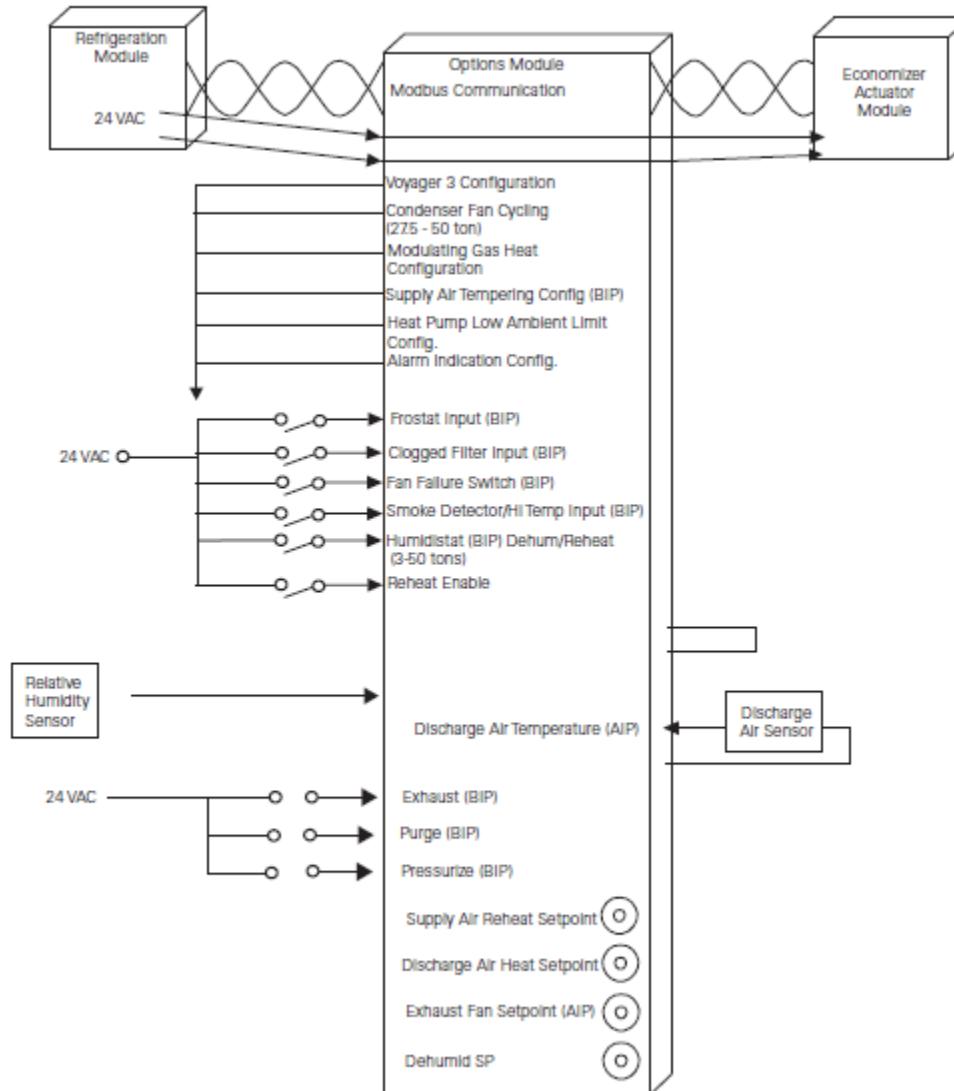
YS/H Refrigeration Module (RTRM) Gas Heating



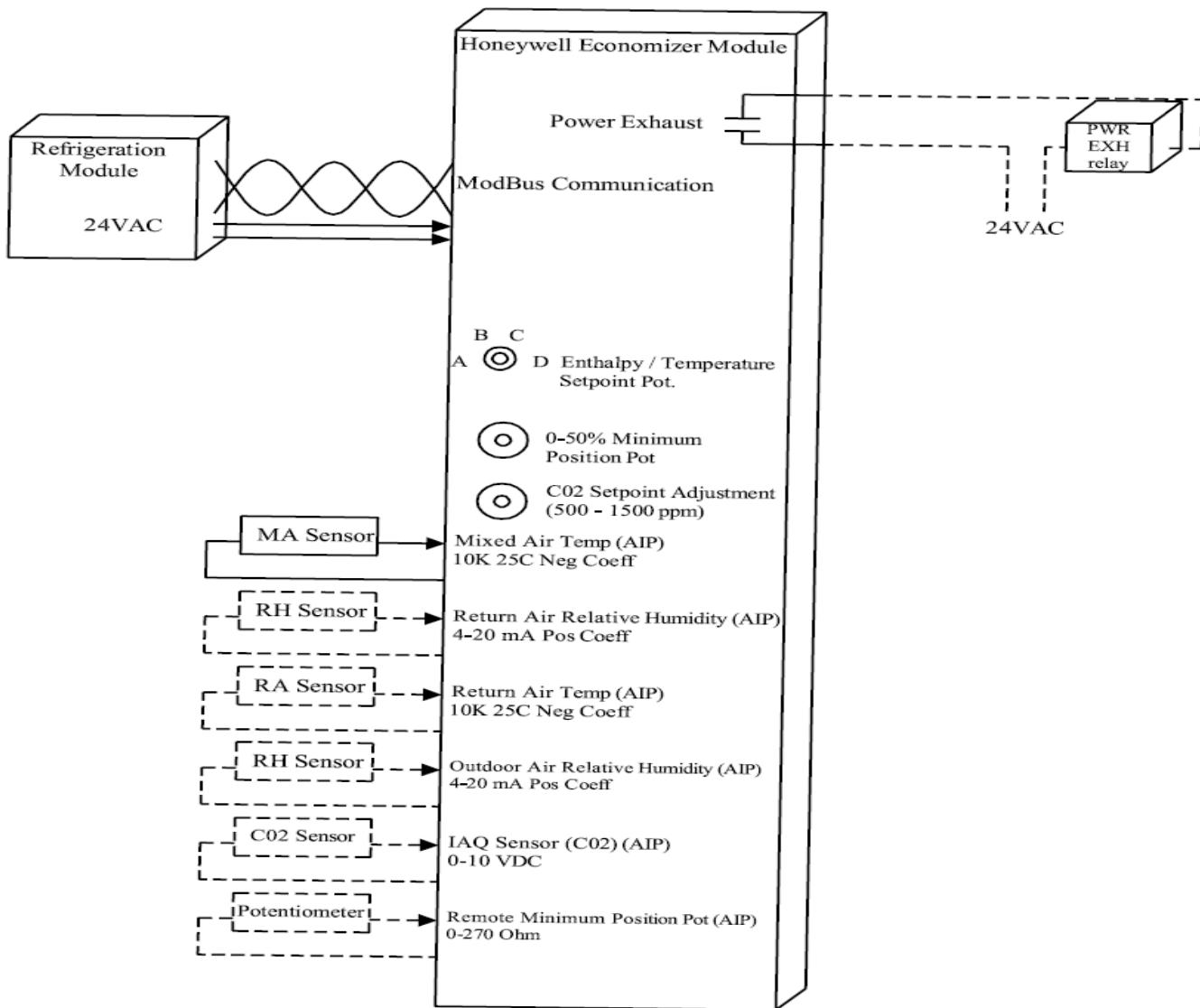
WS/H Refrigeration Module (RTRM) Heat Pump



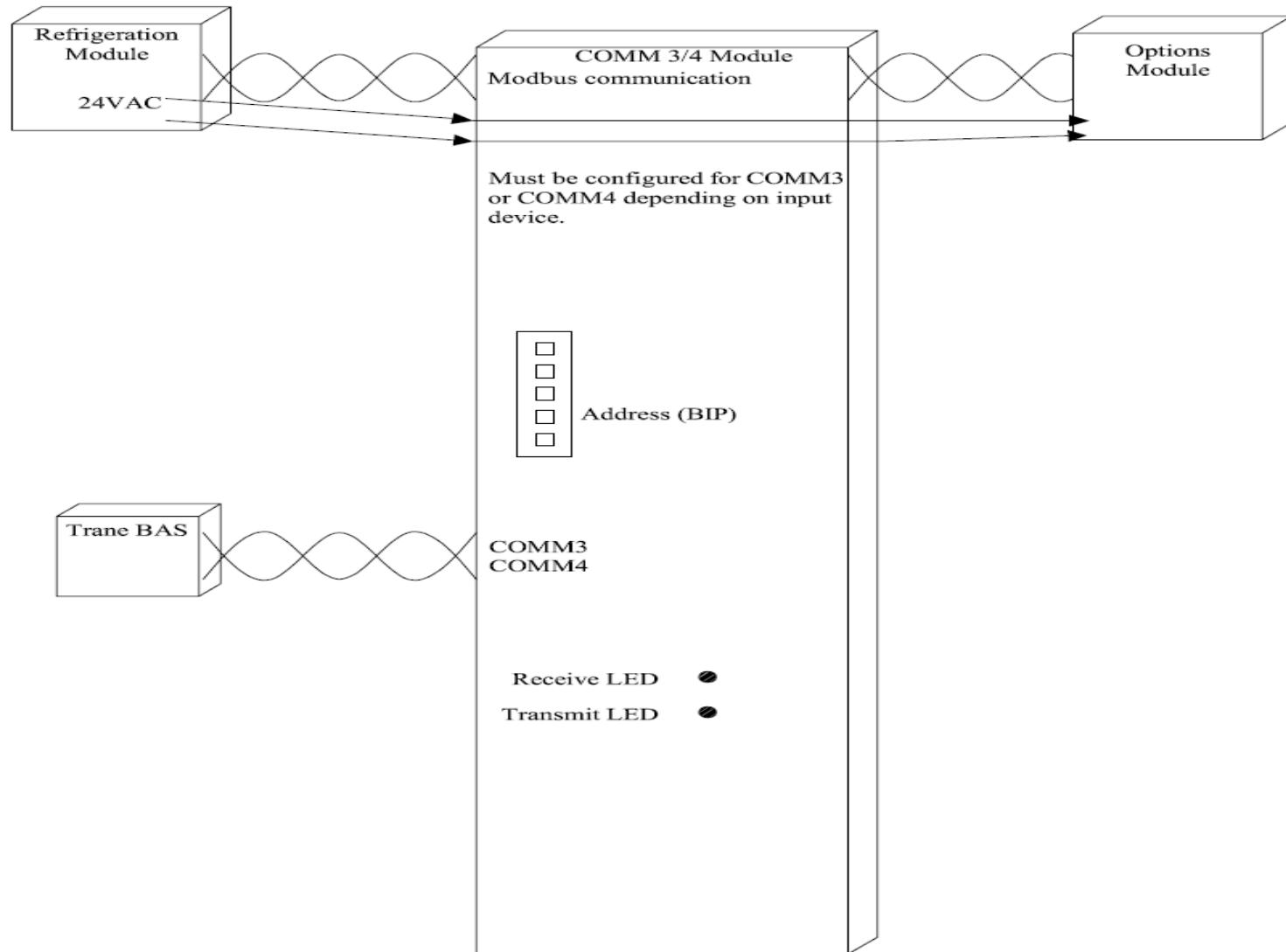
Options Module

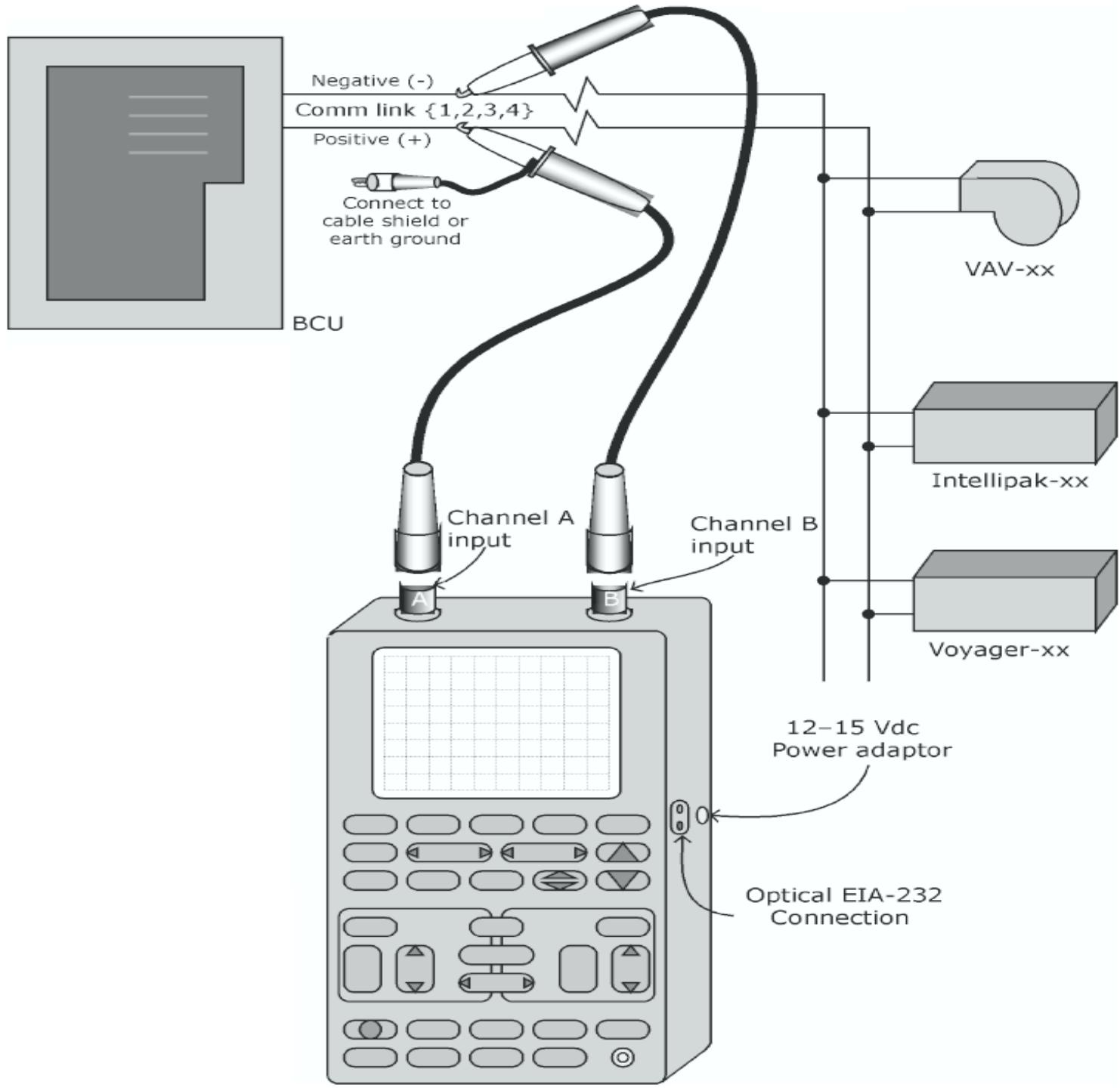


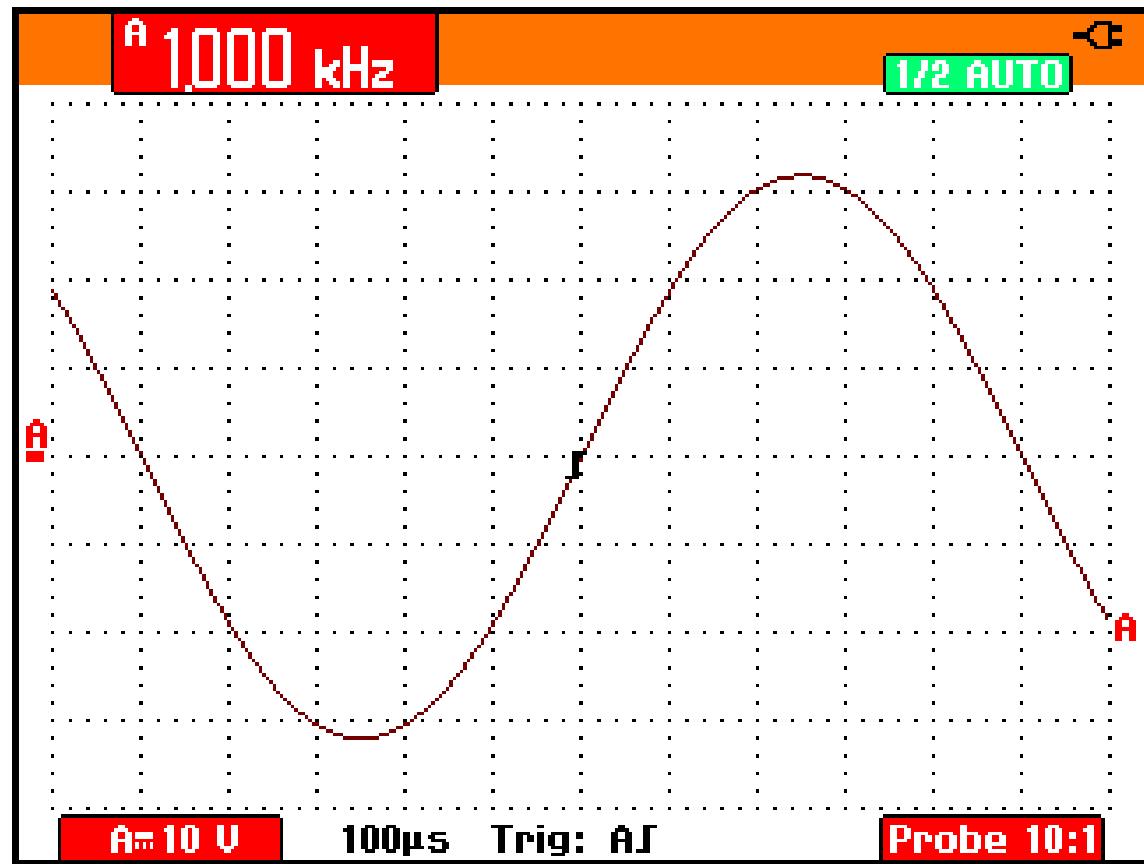
Economizer Module (ECA)

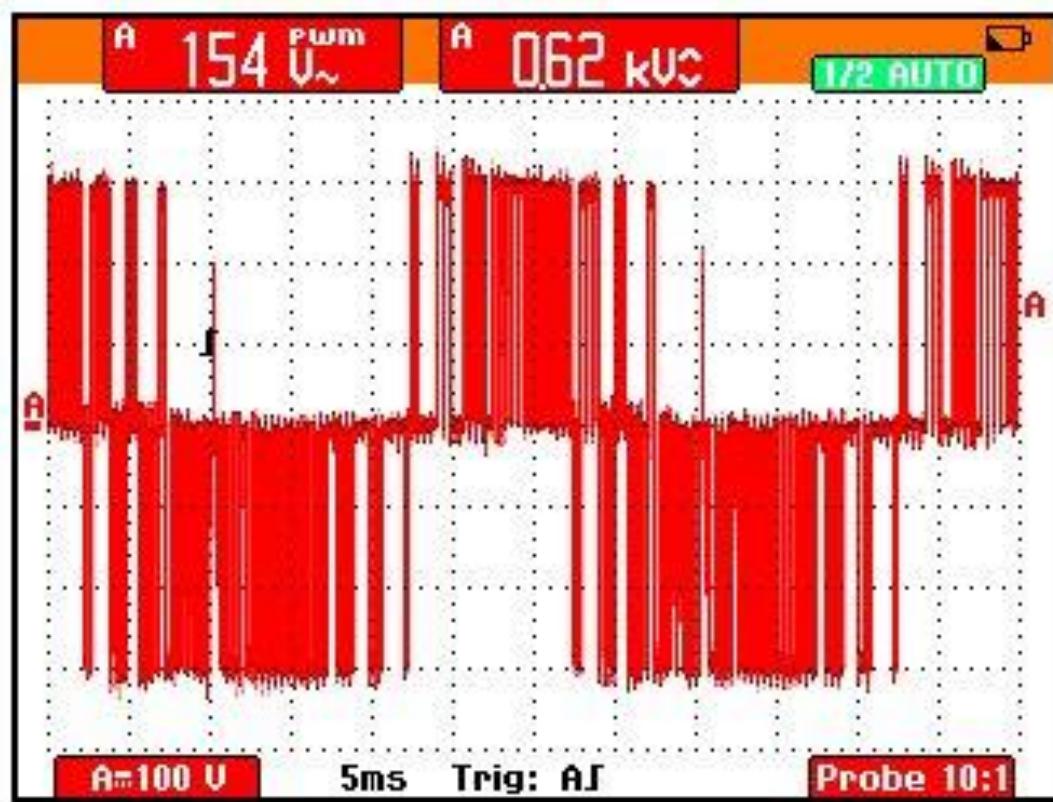


COMM3/4 Module for ICS Communication



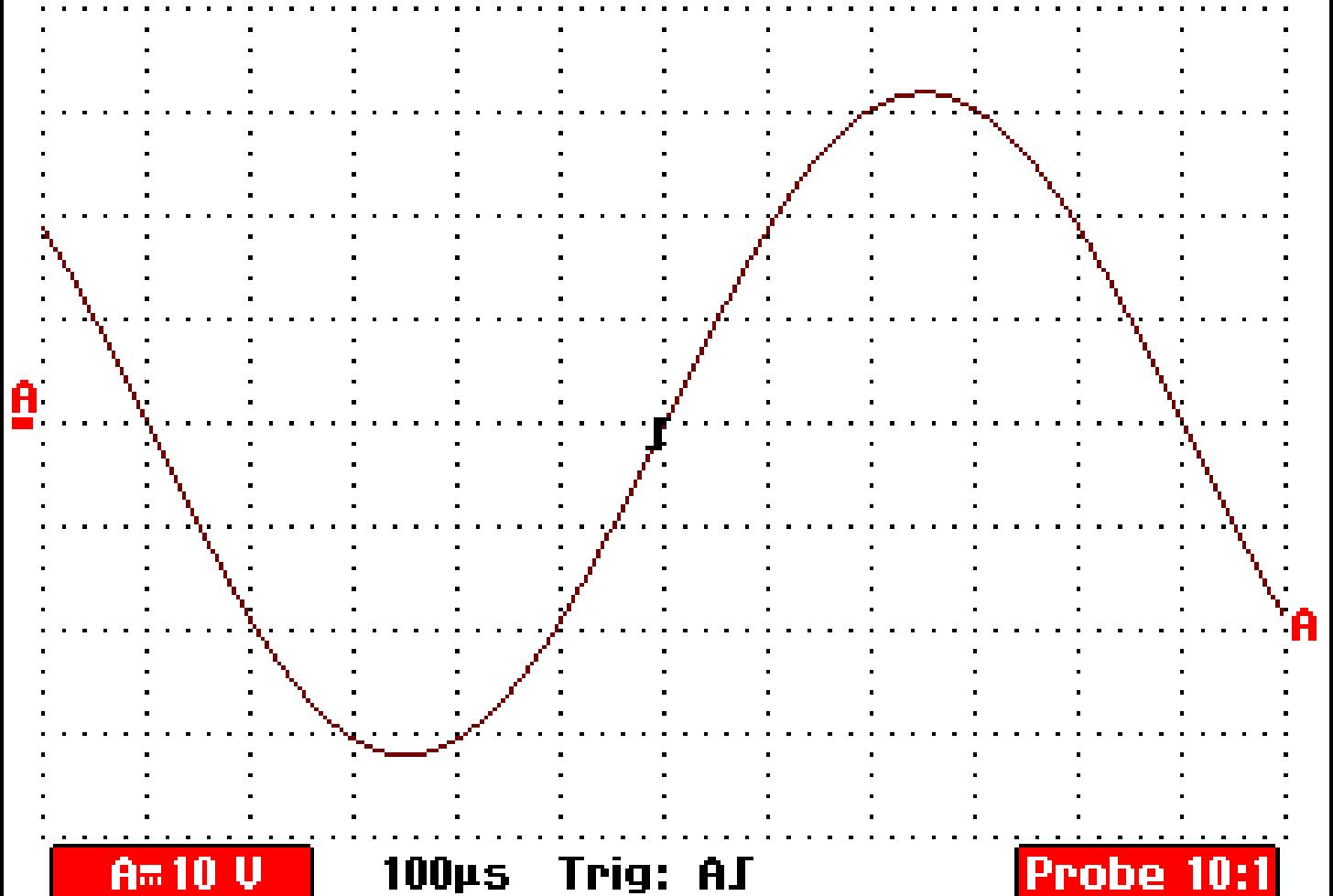




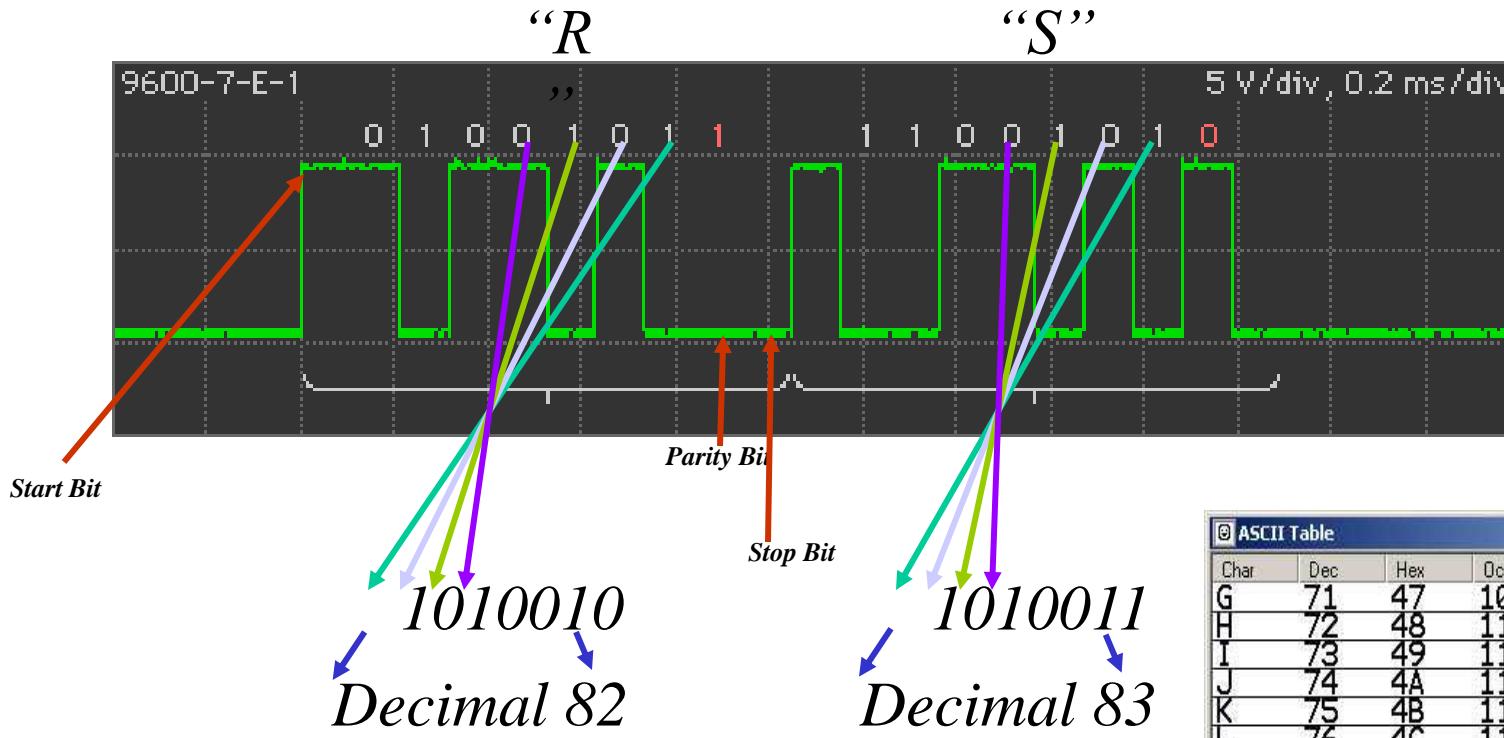


A 1,000 kHz

1/2 AUTO



Serial Communications

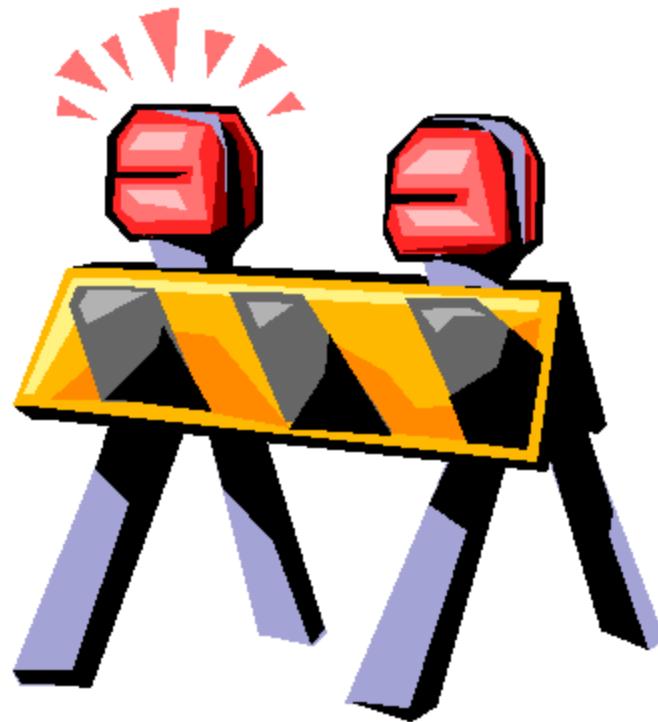


The ASCII equivalent of Decimal 82 is “R” and the ASCII equivalent of Decimal 83 is “S”. These two characters were sent together in one “packet”.

| Char | Dec | Hex | Oct | Alt + 4 | Name | Ctrl |
|------|-----|-----|-----|---------|------|------|
| G | 71 | 47 | 107 | 0071 | | |
| H | 72 | 48 | 110 | 0072 | | |
| I | 73 | 49 | 111 | 0073 | | |
| J | 74 | 4A | 112 | 0074 | | |
| K | 75 | 4B | 113 | 0075 | | |
| L | 76 | 4C | 114 | 0076 | | |
| M | 77 | 4D | 115 | 0077 | | |
| N | 78 | 4E | 116 | 0078 | | |
| O | 79 | 4F | 117 | 0079 | | |
| P | 80 | 50 | 120 | 0080 | | |
| Q | 81 | 51 | 121 | 0081 | | |
| R | 82 | 52 | 122 | 0082 | | |
| S | 83 | 53 | 123 | 0083 | | |
| T | 84 | 54 | 124 | 0084 | | |
| U | 85 | 55 | 125 | 0085 | | |
| V | 86 | 56 | 126 | 0086 | | |
| W | 87 | 57 | 127 | 0087 | | |
| X | 88 | 58 | 130 | 0088 | | |
| Y | 89 | 59 | 131 | 0089 | | |
| Z | 90 | 5A | 132 | 0090 | | |

Reverse
the
Bits.

Get to know the language of the Flashing Lights



ReliaTel™ LED Functions

ReliaTel™ Refrigeration Module (RTRM)

Green System LED

- On: Normal operation (slight flickering is normal)
- Off: No power, board failure
- One blink: Emergency stop open when attempting test mode.
- 2 flashes every two seconds indicates a diagnostic is present (V 4.0 or greater) [see p. 24 for a list of diagnostics]
- Continuous 1/4 second blink: Test Mode

Green Transmit LED

- Very fast flash: Normal operation, information being sent to other modules.
- Off: System failure

Yellow Receive LED

- Very fast flash .5 second, off 1.5 second:
- Normal communication
- 1/4 second wink every 2 seconds:
- Not communicating with any other module
- Off: Board failure

ReliaTel™ Options Module (RTOM)

Green system LED

- On: Normal communication with RTRM
- 1/4 second on, 2 seconds off: No communication
- Off: No power or board failure

ReliaTel™ Ventilation Module (RTVM)

Green system LED

- On: Normal communication with RTRM
- 1/4 second on, 2 seconds off: No communication
- Off: No power or board failure

ReliaTel™ Air Handling Module (RTAM)

Green system LED

- On: Normal communication with RTRM

- 1/4 second on, 2 seconds off: No communication
- Off: No power or board failure

ReliaTel™ Dehumidification Module (RTDM)

Green system LED

- NA - No Onboard LED

Economizer Actuator Module (ECA)

Green system LED

- On: OK to economize
- Slow flash: Not OK to economize
- Fast flash: Not communicating with RTRM
- OFF: No power or system failure
- 1/2 second on, 2 seconds off: no communication
- Error codes — 1/2 second on, 1/4 second off
- 1 flash – Actuator fault
- 2 flash – CO₂ sensor
- 3 flash – RA humidity sensor
- 4 flash – RA temp sensor
- 6 flash – OA humidity sensor
- 7 flash – No Communication with RTRM or OAT sensor has failed.
- 8 flash – MA temp sensor
- 9-11 flash – Internal fault

Ignition Control (IGN)

Note: See ignition control section for specific flash code schedule.

Green

- On: Normal no call for heat
- Slow flash: Active call for heat
- Fast flash: Not communicating with RTRM
- Error codes
- 2 flash – system lockout – failure to sense flame
- 3 flash – pressure switch failure to close when CBM stops or open when CBM starts (not applicable to 12½- through 50-tons)
- 4 flash – TCO circuit open
- 5 flash – Flame being sensed yet gas valve not energized

- 6 flash - Flame Rollout (FR) circuit open (Not applicable to 12½-through 50-tons)

TCI COMM3/4 Interface (Tracer™, VariTrac™)

Yellow RX (Receive) LED

- Flashing intermittently: ICS line activity
- Off: Communication down or no power

Green TX (Transmit) LED

- Flashing intermittently: Unit is communicating OK with ICS system
- Off yet RX light flashes – address wrong, COMM3/4 board in wrong position

LCI (LonTalk®)

LED1 Green MODBUS LED

- Flashing intermittently: Unit is communicating to RTRM
- Off: LCI-R not operating
- Flashing slow (1/4 second on and 2 seconds off): RTRM not responding

LED4 Green COMM 5 status LED

- Steady on: Normal operation.

LED2 Red Service LED

- Steady on: Bad circuit board
- OFF: Normal
- Flashing 1 second on, 1 second off, LCI is in unconfigured state.

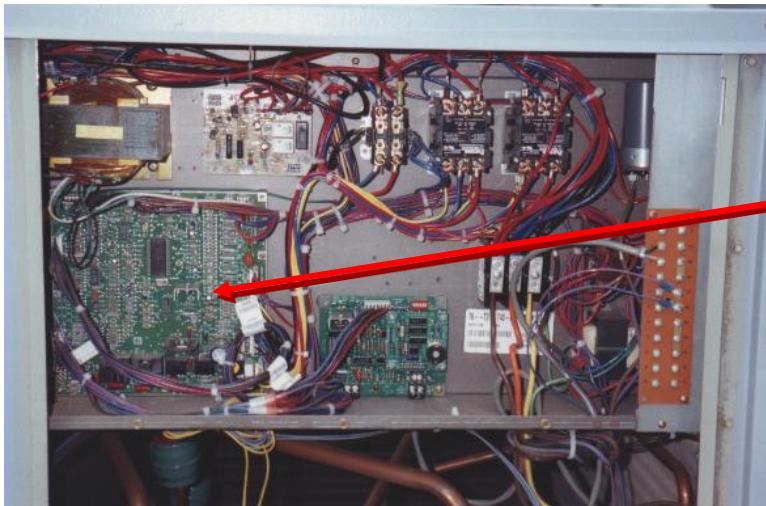
LED3 Yellow Comm RX

- Flashing intermittently: normal operation.

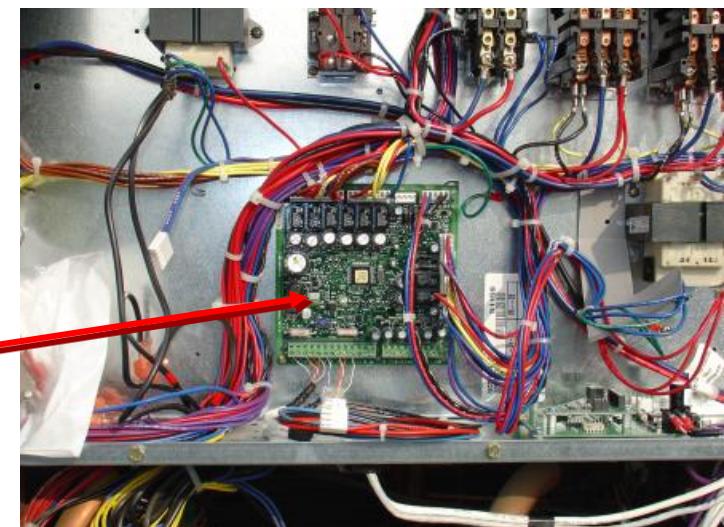
Not Covered in this Class !

* Trane Voyager Microcontrols

- Not a ReliaTel, older generation of unit controls
- Is being phased out and replaced by ReliaTel controls
- Same reliable control logic as Voyager Microcontrols
- Currently 2 to 15 Tons (???)



OLD
NEW

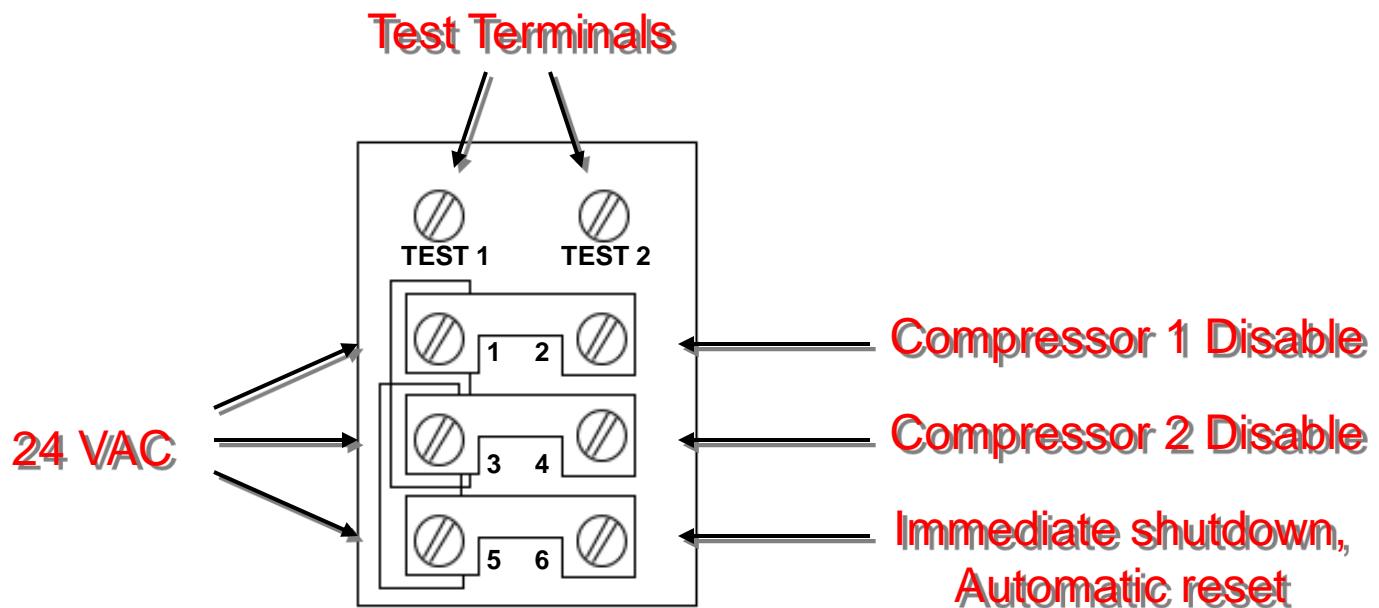


Unit Controls



- ReliaTel™ Microprocessor
 - Second generation design
 - Intelligent communicating boards
 - Standard safety features
 - Trane ICS compatible

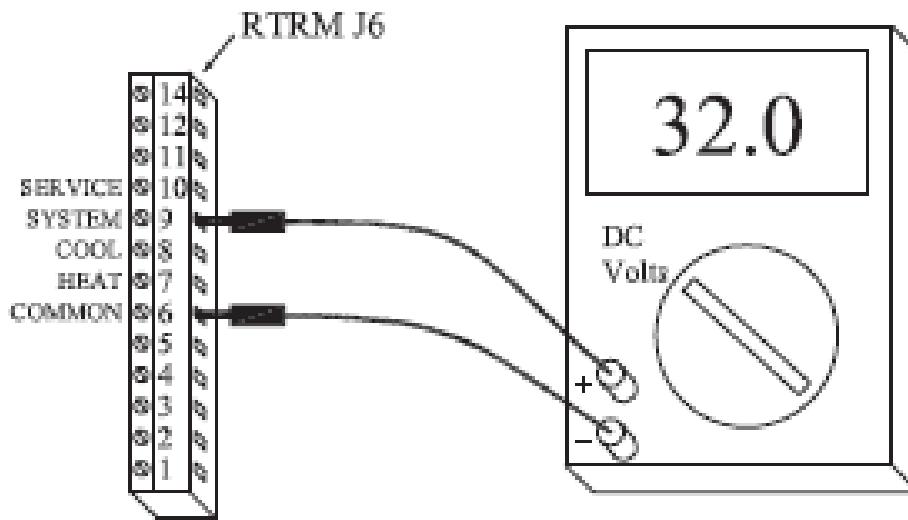
Low Voltage Terminal Strip



Test Mode Table

| Step | Mode | LED | OHMs x 1k |
|-------------|-------------------------------|------------|------------------|
| None | Normal Operation | On | N/A |
| 1 | Indoor Fan On | Blink | 2.2 |
| 2* | Economizer OPEN | Blink | 3.3 |
| 3 | Cool 1 (Econ. to Min.) | Blink | 4.7 |
| 4* | Cool 2 | Blink | 6.8 |
| 5 | Heat 1 | Blink | 10 |
| 6* | Heat 2 | Blink | 15 |
| 7* | Heat 3 | Blink | 22 |
| 8** | Defrost | Blink | 33 |
| 9** | Emergency Heat | Blink | 47 |

* Optional components



Remove J4 IF not working in test mode

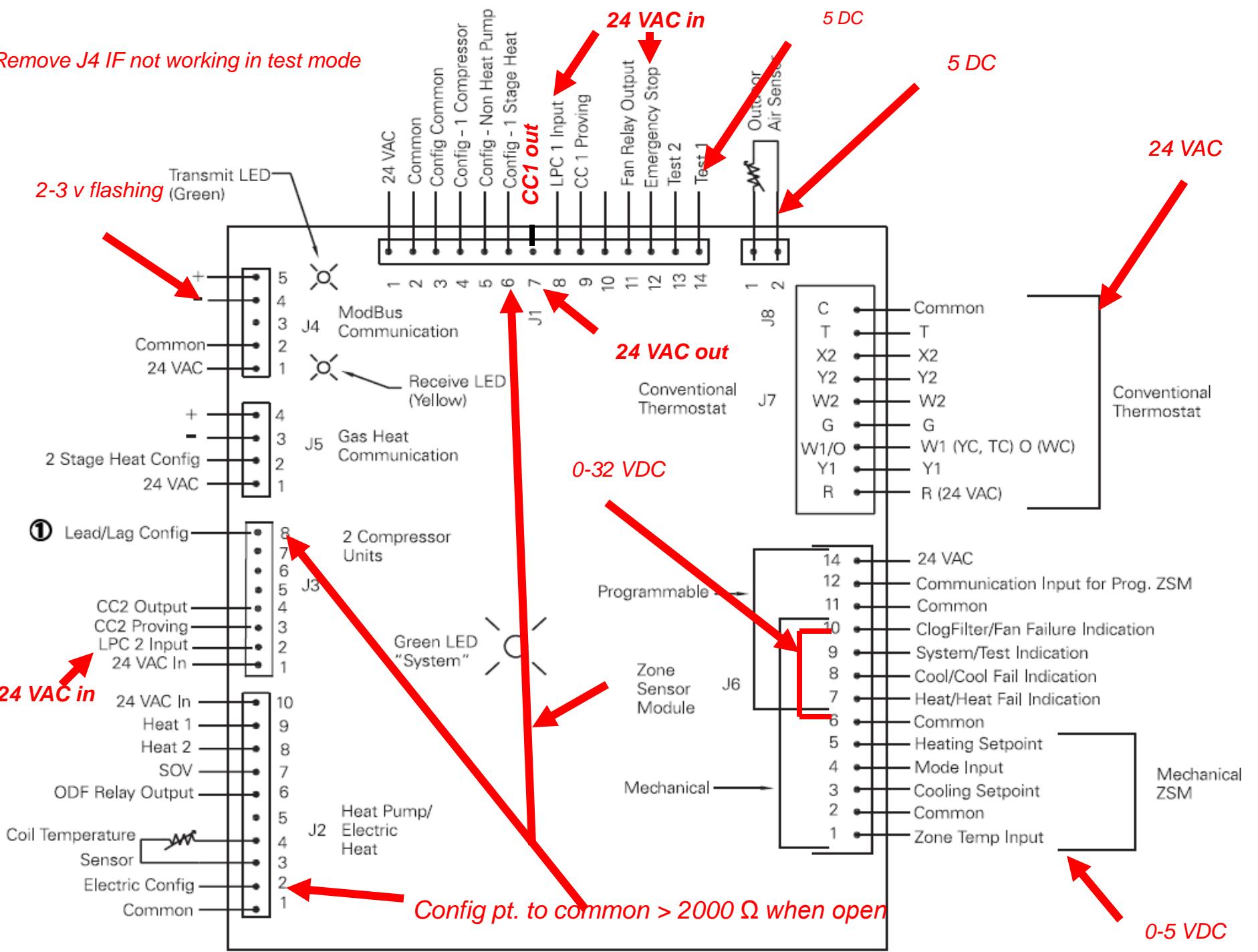


Table 22. Temperature Input (cont.)

| Temp °F | Resistance (K ohms) | DC Volts | Temp °F | Resistance (K ohms) | DC Volts |
|---------|---------------------|----------|---------|---------------------|----------|
| 49 | 20.396 | 3.353 | 95 | 6.497 | 1.969 |
| 50 | 19.854 | 3.324 | 96 | 6.35 | 1.942 |
| 51 | 19.33 | 3.294 | 97 | 6.207 | 1.915 |
| 52 | 18.821 | 3.264 | 98 | 6.067 | 1.888 |
| 53 | 18.327 | 3.233 | 99 | 5.931 | 1.861 |
| 54 | 17.847 | 3.203 | 100 | 5.798 | 1.835 |
| 55 | 17.382 | 3.173 | 101 | 5.668 | 1.809 |
| 56 | 16.93 | 3.142 | 102 | 5.543 | 1.783 |
| 57 | 16.491 | 3.111 | 103 | 5.42 | 1.757 |
| 58 | 16.066 | 3.08 | 104 | 5.3 | 1.732 |
| 59 | 15.654 | 3.05 | 105 | 5.184 | 1.707 |
| 60 | 15.253 | 3.019 | 106 | 5.07 | 1.682 |
| 61 | 14.864 | 2.988 | 107 | 4.959 | 1.658 |
| 62 | 14.486 | 2.957 | 108 | 4.851 | 1.633 |
| 63 | 14.119 | 2.926 | 109 | 4.745 | 1.609 |
| 64 | 13.762 | 2.895 | 110 | 4.642 | 1.585 |
| 65 | 13.416 | 2.864 | 111 | 4.542 | 1.562 |
| 66 | 13.078 | 2.832 | 112 | 4.444 | 1.539 |
| 67 | 12.752 | 2.801 | 113 | 4.349 | 1.516 |
| 68 | 12.435 | 2.77 | 114 | 4.256 | 1.493 |
| 69 | 12.126 | 2.739 | 115 | 4.165 | 1.47 |
| 70 | 11.827 | 2.708 | 116 | 4.076 | 1.448 |
| 71 | 11.535 | 2.677 | 117 | 3.99 | 1.426 |
| 72 | 11.252 | 2.646 | 118 | 3.906 | 1.405 |
| 73 | 10.977 | 2.616 | 119 | 3.824 | 1.383 |
| 74 | 10.709 | 2.585 | 120 | 3.743 | 1.362 |
| 75 | 10.448 | 2.554 | 121 | 3.665 | 1.341 |
| 76 | 10.194 | 2.523 | 122 | 3.589 | 1.321 |
| 77 | 9.949 | 2.493 | 123 | 3.514 | 1.301 |
| 78 | 9.71 | 2.462 | 124 | 3.442 | 1.281 |
| 79 | 9.477 | 2.432 | 125 | 3.371 | 1.261 |
| 80 | 9.25 | 2.402 | 126 | 3.302 | 1.241 |
| 81 | 9.03 | 2.372 | 127 | 3.234 | 1.222 |
| 82 | 8.815 | 2.342 | 128 | 3.169 | 1.204 |
| 83 | 8.607 | 2.312 | 129 | 3.104 | 1.185 |
| 84 | 8.404 | 2.283 | 130 | 3.041 | 1.166 |
| 85 | 8.206 | 2.253 | 131 | 2.98 | 1.148 |
| 86 | 8.014 | 2.224 | 132 | 2.919 | 1.13 |
| 87 | 7.827 | 2.195 | 133 | 2.861 | 1.113 |
| 88 | 7.645 | 2.166 | 134 | 2.804 | 1.095 |
| 89 | 7.468 | 2.137 | 135 | 2.748 | 1.078 |
| 90 | 7.295 | 2.109 | 136 | 2.693 | 1.061 |
| 91 | 7.127 | 2.08 | 137 | 2.64 | 1.045 |
| 92 | 6.963 | 2.052 | 138 | 2.587 | 1.028 |
| 93 | 6.803 | 2.024 | 139 | 2.536 | 1.012 |
| 94 | 6.648 | 1.996 | 140 | 2.486 | 0.996 |

Table 22. Temperature Input (cont.)

| Temp °F | Resistance (K ohms) | DC Volts | Temp °F | Resistance (K ohms) | DC Volts |
|---------|---------------------|----------|---------------------|---------------------|----------|
| 141 | 2.438 | 0.981 | 172 | 1.356 | 0.598 |
| 142 | 2.39 | 0.965 | 173 | 1.331 | 0.588 |
| 143 | 2.343 | 0.95 | 174 | 1.308 | 0.579 |
| 144 | 2.298 | 0.935 | 175 | 1.284 | 0.57 |
| 145 | 2.253 | 0.92 | 176 | 1.261 | 0.561 |
| 146 | 2.21 | 0.906 | 177 | 1.239 | 0.552 |
| 147 | 2.167 | 0.891 | 178 | 1.217 | 0.543 |
| 148 | 2.125 | 0.877 | 179 | 1.196 | 0.535 |
| 149 | 2.085 | 0.863 | 180 | 1.174 | 0.526 |
| 150 | 2.044 | 0.849 | 181 | 1.154 | 0.518 |
| 151 | 2.006 | 0.836 | 182 | 1.133 | 0.51 |
| 152 | 1.967 | 0.823 | 183 | 1.113 | 0.502 |
| 153 | 1.93 | 0.81 | 184 | 1.094 | 0.494 |
| 154 | 1.894 | 0.797 | 185 | 1.076 | 0.487 |
| 155 | 1.859 | 0.784 | 186 | 1.057 | 0.479 |
| 156 | 1.823 | 0.772 | 187 | 1.038 | 0.471 |
| 157 | 1.789 | 0.759 | 188 | 1.02 | 0.464 |
| 158 | 1.756 | 0.747 | 189 | 1.003 | 0.457 |
| 159 | 1.723 | 0.736 | 190 | 0.986 | 0.45 |
| 160 | 1.691 | 0.724 | 191 | 0.969 | 0.443 |
| 161 | 1.659 | 0.712 | 192 | 0.952 | 0.436 |
| 162 | 1.629 | 0.701 | 193 | 0.937 | 0.429 |
| 163 | 1.599 | 0.69 | 194 | 0.92 | 0.422 |
| 164 | 1.57 | 0.679 | 195 | 0.905 | 0.416 |
| 165 | 1.541 | 0.688 | 196 | 0.89 | 0.41 |
| 166 | 1.512 | 0.658 | 197 | 0.875 | 0.403 |
| 167 | 1.485 | | 198 | 0.86 | 0.397 |
| 168 | 1.458 | 0.637 | 199 | 0.846 | 0.391 |
| 169 | 1.432 | 0.627 | 200 | 0.831 | 0.385 |
| 170 | 1.406 | 0.617 | Shorted or no power | | |
| 171 | 1.38 | 0.607 | | | |

Zone Sensor Temp. Input

| Temp °F | Resistance (K ohms) | DC Volts | Temp °F | Resistance (K ohms) | DC Volts | Temp °F | Resistance (K ohms) | DC Volts | Temp °F | Resistance (K ohms) | DC Volts |
|---------|---------------------|----------|---------|---------------------|----------|---------|---------------------|----------|---------|---------------------|----------|
| 40 | 26.097 | 3.613 | 54 | 17.847 | 3.203 | 68 | 12.435 | 2.770 | 82 | 8.815 | 2.342 |
| 41 | 25.383 | 3.585 | 55 | 17.382 | 3.173 | 69 | 12.126 | 2.739 | 83 | 8.607 | 2.312 |
| 42 | 24.690 | 3.557 | 56 | 16.930 | 3.142 | 70 | 11.827 | 2.708 | 84 | 8.404 | 2.283 |
| 43 | 24.018 | 3.528 | 57 | 16.491 | 3.111 | 71 | 11.535 | 2.677 | 85 | 8.206 | 2.253 |
| 44 | 23.367 | 3.500 | 58 | 16.066 | 3.080 | 72 | 11.252 | 2.646 | 86 | 8.014 | 2.224 |
| 45 | 22.736 | 3.471 | 59 | 15.654 | 3.050 | 73 | 10.977 | 2.616 | 87 | 7.827 | 2.195 |
| 46 | 22.123 | 3.442 | 60 | 15.253 | 3.019 | 74 | 10.709 | 2.58 | 88 | 7.645 | 2.166 |
| 47 | 21.530 | 3.412 | 61 | 14.864 | 2.988 | 75 | 10.448 | 2.554 | 89 | 7.468 | 2.137 |
| 48 | 20.953 | 3.383 | 62 | 14.486 | 2.957 | 76 | 10.194 | 2.523 | 90 | 7.295 | 2.109 |
| 49 | 20.396 | 3.353 | 63 | 14.119 | 2.926 | 77 | 9.949 | 2.493 | 91 | 7.127 | 2.080 |
| 50 | 19.854 | 3.324 | 64 | 13.762 | 2.895 | 78 | 9.710 | 2.462 | 92 | 6.963 | 2.052 |
| 51 | 19.330 | 3.294 | 65 | 13.416 | 2.864 | 79 | 9.477 | 2.432 | 93 | 6.803 | 2.024 |
| 52 | 18.821 | 3.264 | 66 | 13.078 | 2.832 | 80 | 9.250 | 2.402 | 94 | 6.648 | 1.996 |
| 53 | 18.327 | 3.233 | 67 | 12.752 | 2.801 | 81 | 9.030 | 2.372 | 95 | 6.497 | 1.969 |

| System Switch | Fan switch | Ohms Rx1K | Volts DC +- 5% |
|--------------------------|-----------------------|----------------------|-------------------------------|
| Short to common | | 0 | 0.00 |
| OFF | AUTO | 2.32 | 0.94 |
| COOL | AUTO | 4.87 | 1.64 |
| AUTO | AUTO | 7.68 | 2.17 |
| OFF | ON | 10.77 | 2.59 |
| COOL | ON | 13.32 | 2.85 |
| AUTO | ON | 16.13 | 3.08 |
| HEAT | AUTO | 19.48 | 3.30 |
| HEAT | ON | 27.93 | 3.68 |
| EM HEAT | AUTO | 35.00 | 3.88 |
| EM HEAT | ON | 43.45 | 4.06 |
| Open circuit | | | 5.00 |

Sequence

| | | | | | | | | | | | | | | | | | | | |
|------------|--------------|-----|---------------|--------------|--|---------------|--------------|-----|---------------|--------------|----|---------------|----|----|----|----|----|----|----|
| Compressor | \leftarrow | OFF | \rightarrow | \leftarrow | ON (10 minutes accumulated compressor run time) | \rightarrow | \leftarrow | OFF | \rightarrow | \leftarrow | ON | \rightarrow | | | | | | | |
| Indoor Fan | \leftarrow | OFF | \rightarrow | \leftarrow | ON (Continues to run during 3 min. Defrost time) | | | | | | | \rightarrow | | | | | | | |
| Minutes | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

Table 16. Voyager™ Commercial VAV service test with reheat and Statitrac™ (continued)

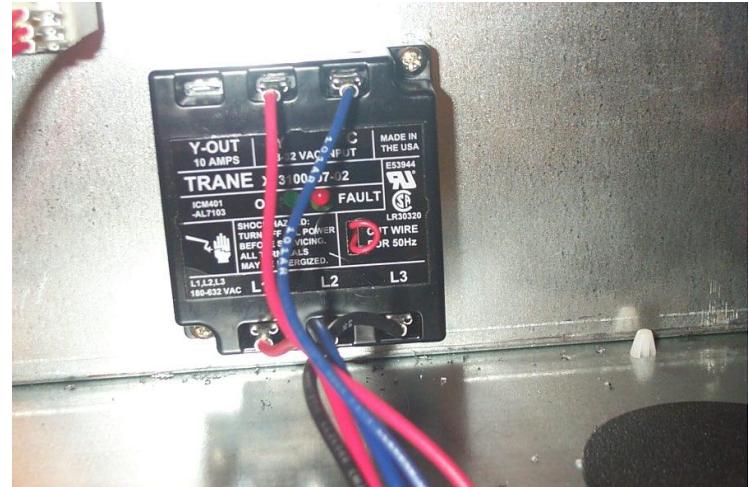
The Sequence

Table 47. Condenser fan/compressor sequence

| Unit Size (Tons) | Compressor Staging Sequence | | | Condenser Fan Output | | O/A Temp. (°F) Fans "Off" | |
|---------------------|-----------------------------|-------------|-------------|----------------------|-----------|------------------------------|--|
| | Step 1 | Step 2 | Step 3 | Output A | Output B | | |
| 27.5 - 30 | CPR 1* | CPR 1, 2 | N/A | Fan #2 | Fan #3 | 70 | |
| | | | | Fan #2 | Fan #3 | 90 | |
| | CPR 1* | CPR 1, 2 | | Fan #2 | Fan #3 | -10 | |
| | | | | Fan #2 | Fan #3 | 60 | |
| 35 | CPR 1* | CPR 1, 2 | N/A | Fan #2 | Fan #3 | 65 | |
| | | | | Fan #2 | Fan #3 | 85 | |
| | CPR 1* | CPR 1, 2 | | Fan #2 | Fan #3 | -20 | |
| | | | | Fan #2 | Fan #3 | 55 | |
| 40 | CPR 1 ** | CPR 2, 3*** | CPR 1, 2, 3 | Fan #2 | Fan #3, 4 | 50 | |
| | | | | Fan #2 | Fan #3, 4 | 70 | |
| | | | | Fan #2 | Fan #3, 4 | 20 | |
| | CPR 1 ** | CPR 2, 3*** | | Fan #2 | Fan #3, 4 | 60 | |
| | | | | Fan #2 | Fan #3, 4 | -30 | |
| | | | | Fan #2 | Fan #3, 4 | 50 | |
| 50 | CPR 1 ** | CPR 2, 3*** | CPR 1, 2, 3 | Fan #2 | Fan #3, 4 | 20 | |
| | | | | Fan #2 | Fan #3, 4 | 60 | |
| | | | | Fan #2 | Fan #3, 4 | -10 | |
| | CPR 1 ** | CPR 2, 3*** | | Fan #2 | Fan #3, 4 | 55 | |
| | | | | Fan #2 | Fan #3, 4 | -30 | |
| | | | | Fan #2 | Fan #3, 4 | -303.3.3.3(a) | |

Phase Monitor

- Phase monitor provides 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator.

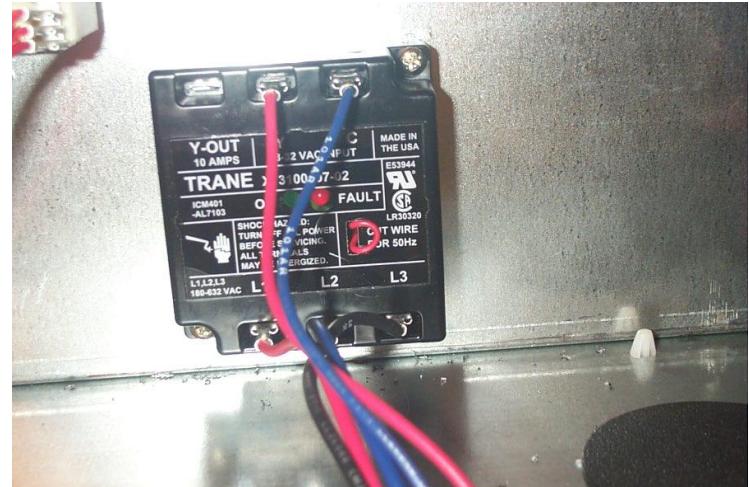


ReliaTel Standard Features

- **Diagnostics for trouble-shooting**
- **CO₂ management**
- **Anti-short cycle timers**
- **Compressors and fans staging**
- **Compressor minimum on/off time**
- **Alternating compressor lead/lag**
- **Low ambient cooling down to 0°F**
- **Outdoor Air Temperature**
- **Emergency Stop Input**
- **Dehumidification Option**
- **Ventilation Override**
- **Adjustable Powered Exhaust Set-point**
- **Built-In Test Mode**
- **Built-In Conventional Thermostat Interface**

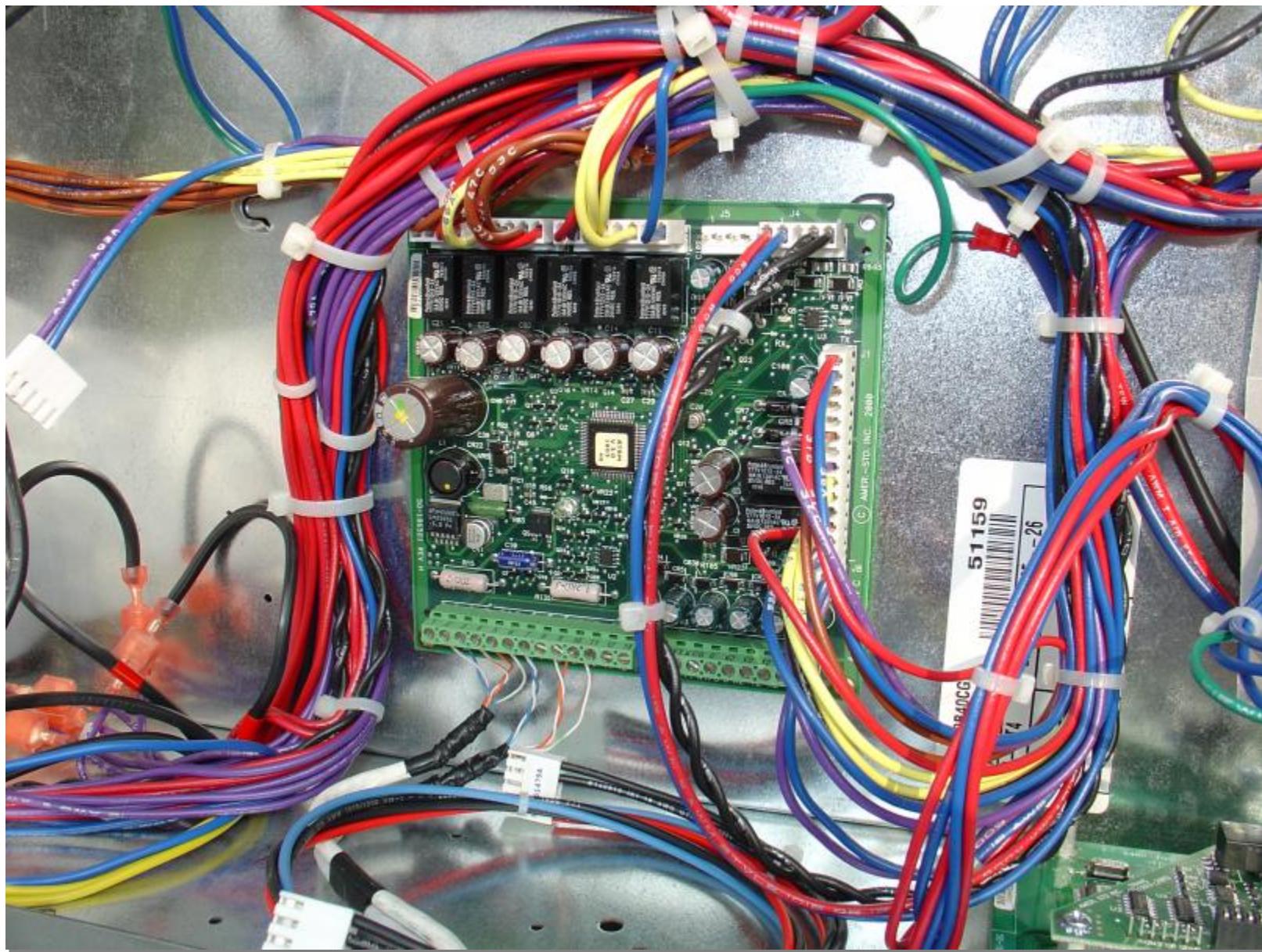
Phase Monitor

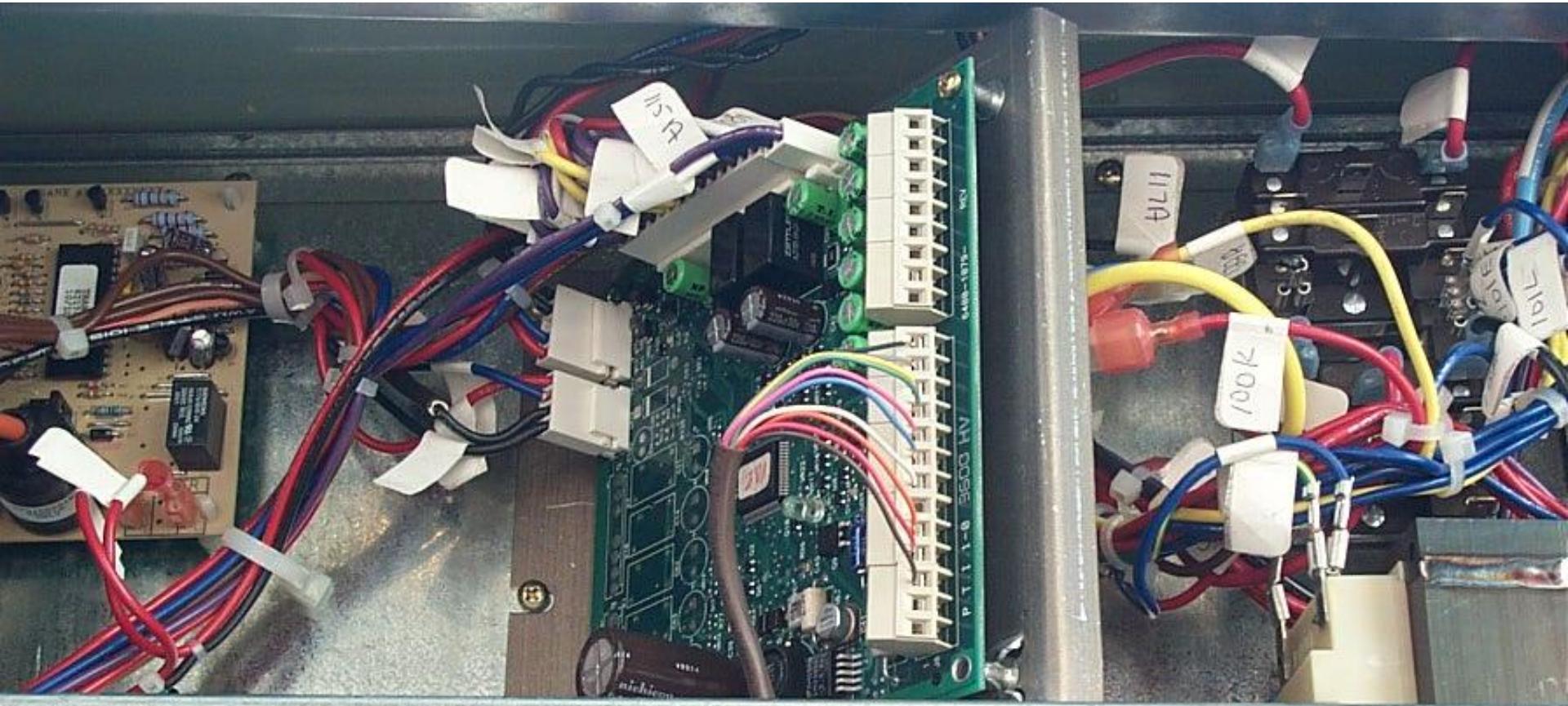
- Phase monitor provides 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor is equipped with an LED that provides an ON or FAULT indicator.



ReliaTel Refrigeration Module (RTM)

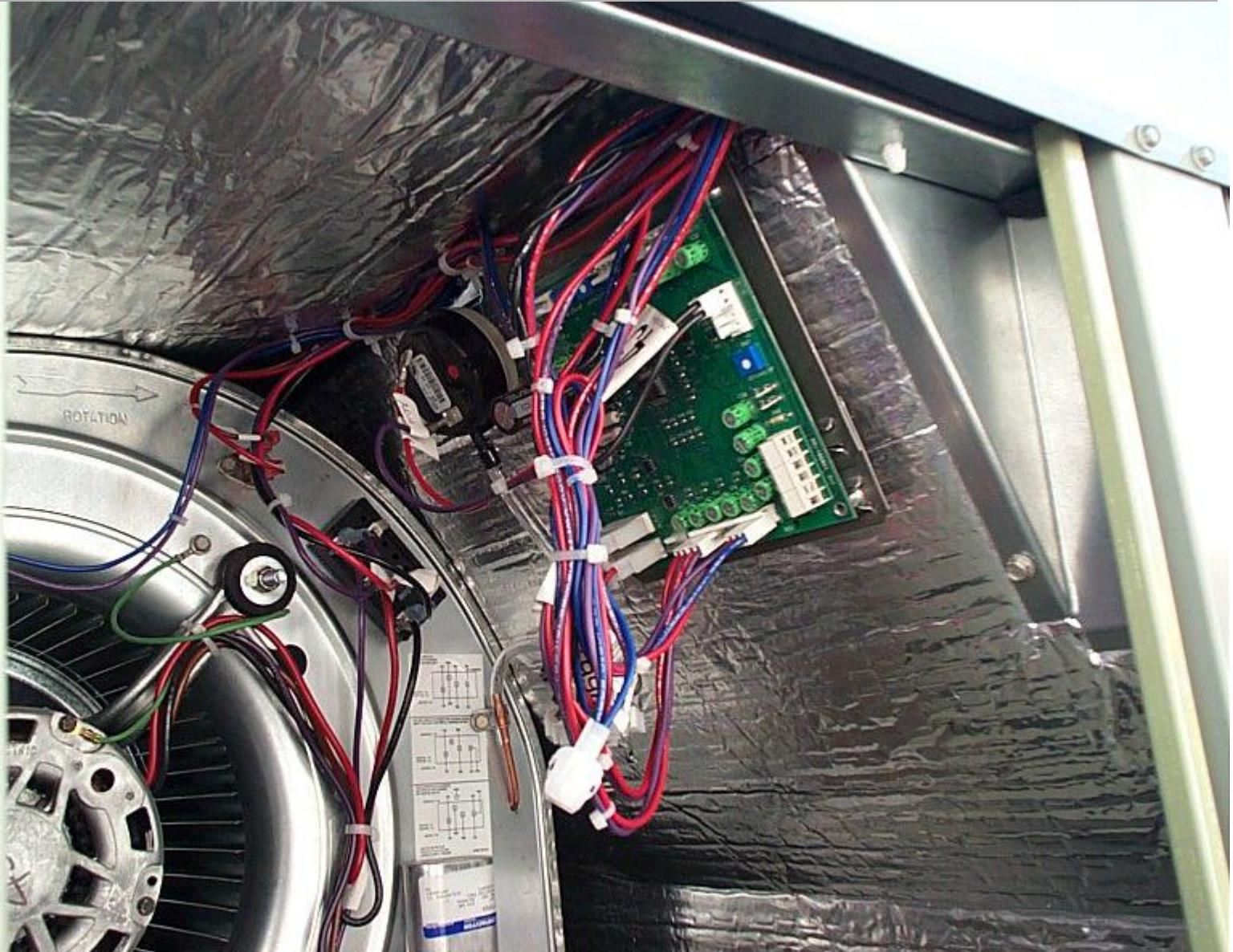
- The main microprocessor control in the unit
- Primary unit control for heating and cooling
- Controls staging, minimum run times, short cycle timing, heat pump defrost control, diagnostics and more
- Same module is used on gas/electric, cooling only with electric heat, and heat pumps

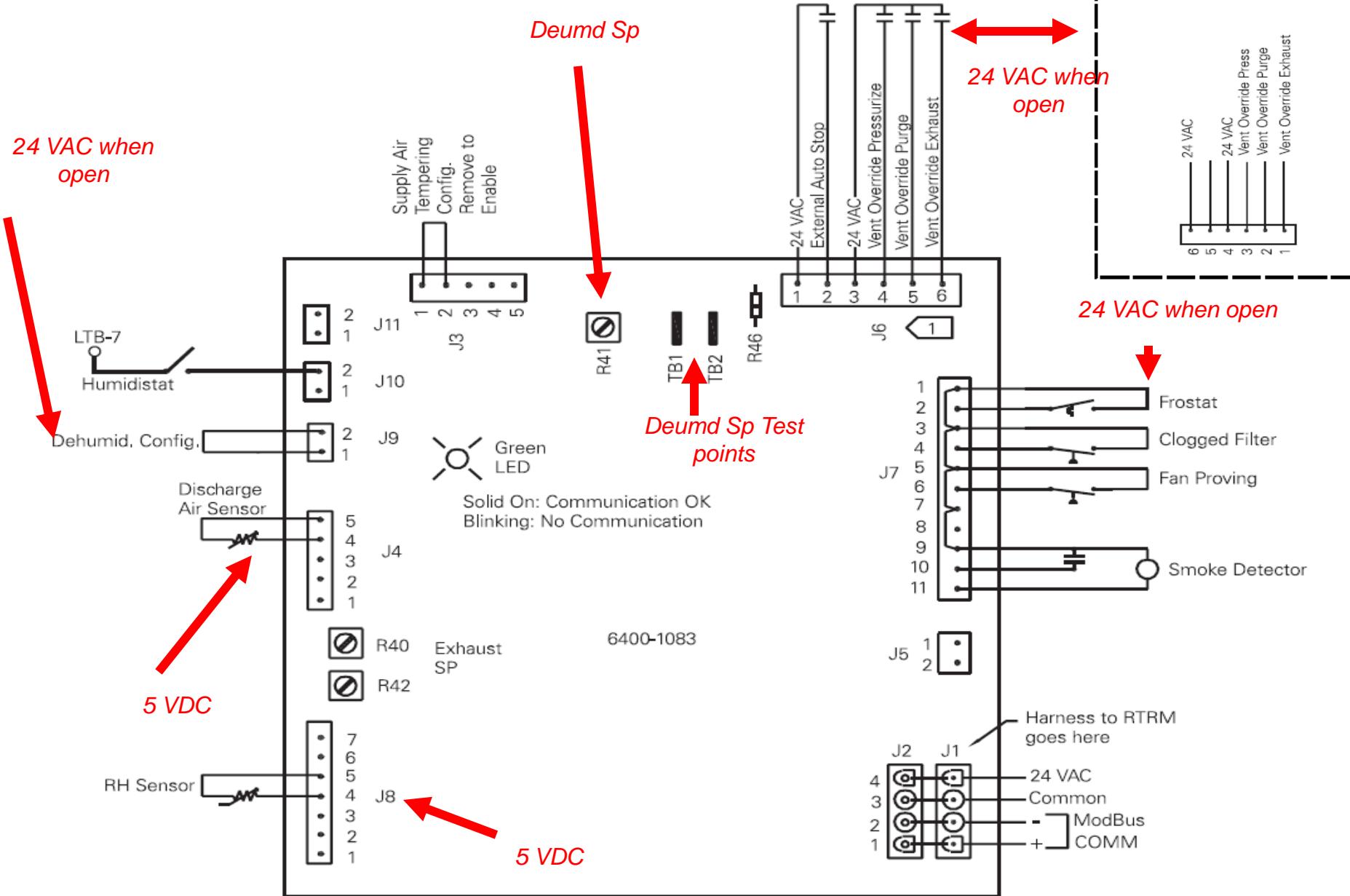




ReliaTel Options Module *(RTOM)*

- Gets power from and communicates with the RTRM
- Module is required for:
 - Frostat
 - Clogged Filter Switch
 - Fan Failure Switch
 - Discharge Air Sensor
 - Smoke Detector, Factory Installed



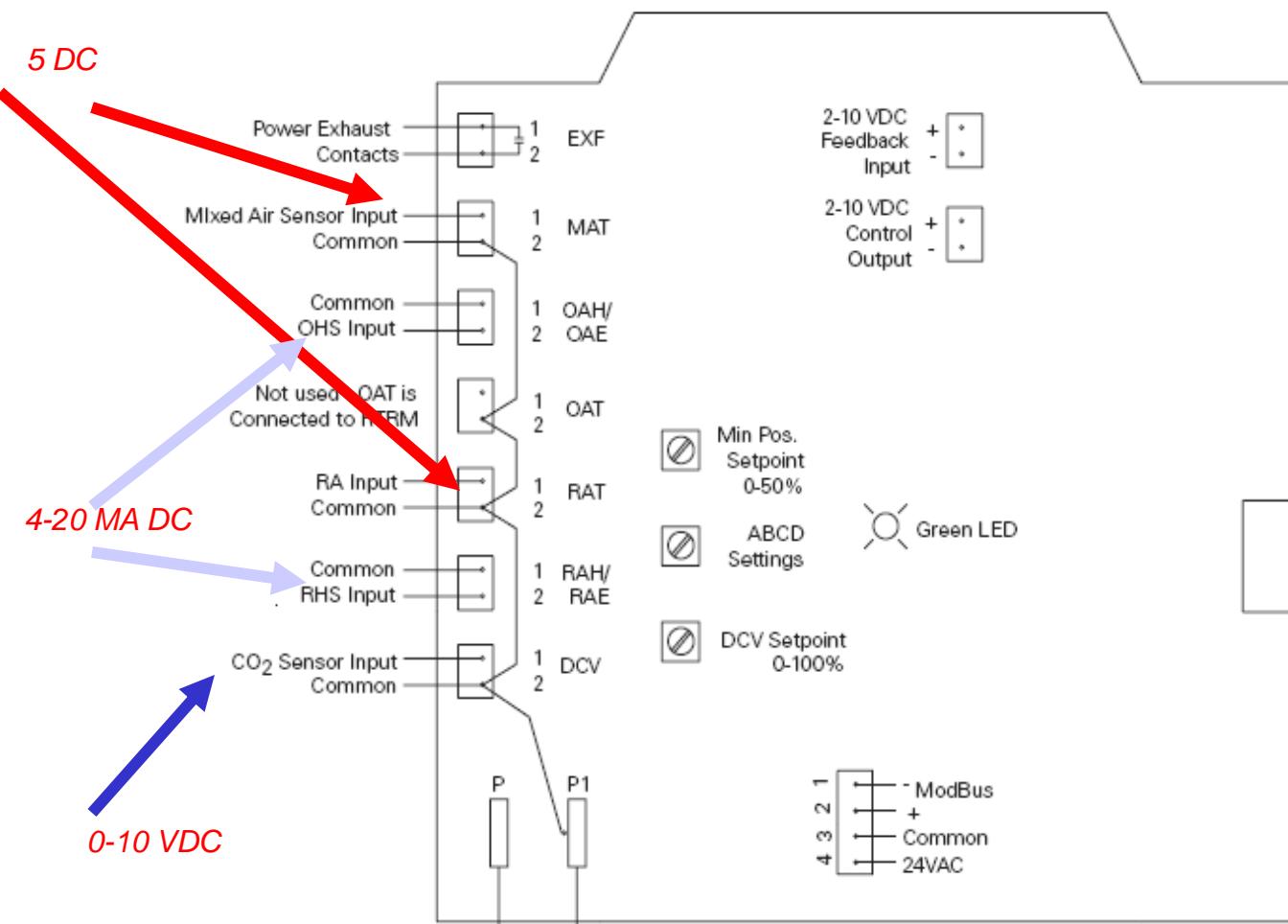


Economizer Actuator w/ Module (ECA, RTEM)

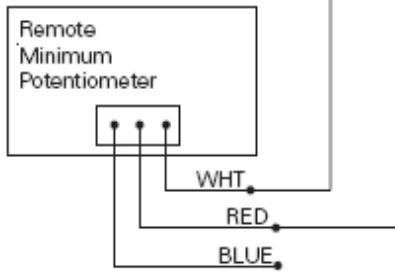
- Can be used with or without the RTOM
- Has a detachable communicating module
- Sensors connected:
 - Mixed Air Sensor
 - Return Air Sensor
 - OA/RA Humidity Sensors
 - CO2 Sensor





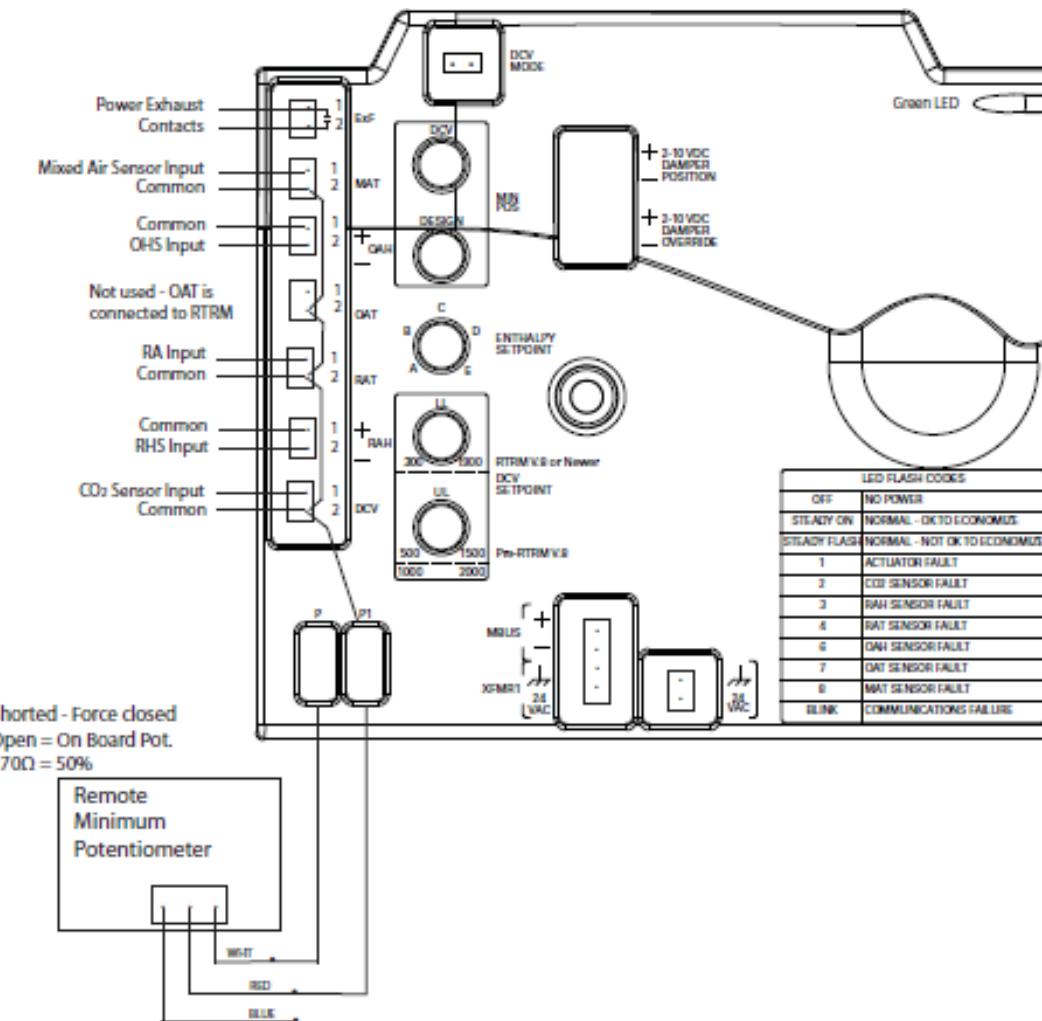


Shorted - Force Closed
Open = On Board Pot.
 $270\Omega = 50\%$



| | |
|---------------|------------------------------|
| OFF: | No Power or Failure |
| ON: | Normal, OK to Economize |
| Slow Flash: | Normal, Not OK to Economizer |
| Fast Flash: | Communications Failure |
| Pulse Flash: | Error Code: |
| 1 Flash: | Actuator Fault |
| 2 Flashes: | CO ₂ Sensor |
| 3 Flashes: | RA Humidity Sensor |
| 4 Flashes: | RA Temp Sensor |
| 6 Flashes: | OA Humidity Sensor |
| 7 Flashes: | No communication with RTRM |
| 8 Flashes: | MA Temp Sensor |
| 9-11 Flashes: | Internal Fault-Replace ECA |

RTEM





RANGE
EXC.
OUTPUT
PART NO. 888888888888
DANGER INSTRUMENTATION
MECHANICAL CONTROLS
CE

100

100

100

100

VOL

Economizer Change Over Modes

- Reference Dry Bulb
 - Reference Enthalpy
 - Comparative Enthalpy
- * *Is decided by which sensors are installed*

Reference Change Over Setting

- Dry Bulb/Reference Enthalpy Setpoint

| <i>Mode</i> | <i>Temp</i> | <i>Enthalpy</i> |
|-------------|-------------|-----------------|
| – A | 73 °F | 27 btu/lb |
| – B | 70 °F | 25 btu/lb |
| – C | 67 °F | 23 btu/lb |
| – D | 63 °F | 22 btu/lb |

Reference Dry Bulb

- Economizer control:
 - Enabled when the OA Temperature is less than the Reference setpoint
 - Disabled when the OA Temp is greater than the Reference setpoint (plus 5 °F)
- Requires MA Temp and OA Temp sensors

Reference Enthalpy

- Economizer control:
 - Enabled when OA Enthalpy is less than Reference setpoint (minus .5 btu.lb)
 - Disabled when OA Enthalpy is greater than Reference setpoint (plus .5 btu/lb)
- Requires OA Temp, OA Humidity and MA Temp sensors

Comparative Enthalpy

- Economizer control:
 - Enabled when OA Enthalpy is less than RA Enthalpy (minus 3 btu/lb)
 - Disabled when OA Enthalpy is greater than RA Enthalpy
- Requires RA Temp, RA Humidity, MA Temp, OA Temp and OA Humidity sensors

Economizer Calibration

- On units with the optional economizer the damper is driven open for 15-20 seconds, and then closed for approximately 90 seconds. This assures proper damper calibration.

DISABLE ECONOMIZER?

Disconnect

Mixed Air Sensor or Outdoor Air Sensor

% OUTSIDE AIR

$$\begin{aligned} & ((\text{RA-MA}) / (\text{RA-OA})) \times 100 \\ & = \% \text{ OA} \end{aligned}$$

EXAMPLE:

RA = 75

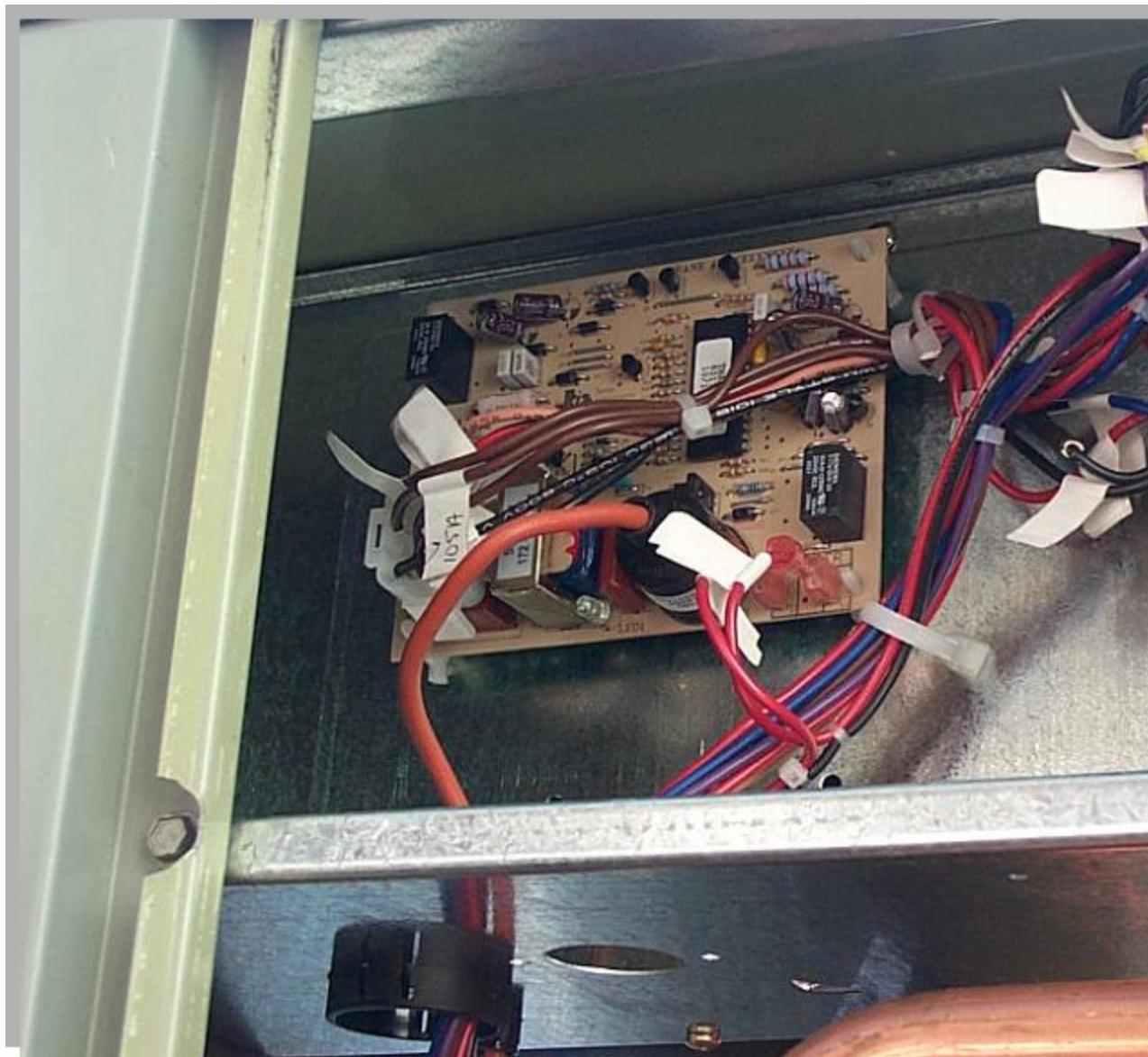
MA = 70

OA = 55

$$\begin{aligned} & ((75-70) / (75-55)) \times 100 \\ & = 25\% \text{ OA} \end{aligned}$$

Ignition Module (IGN)

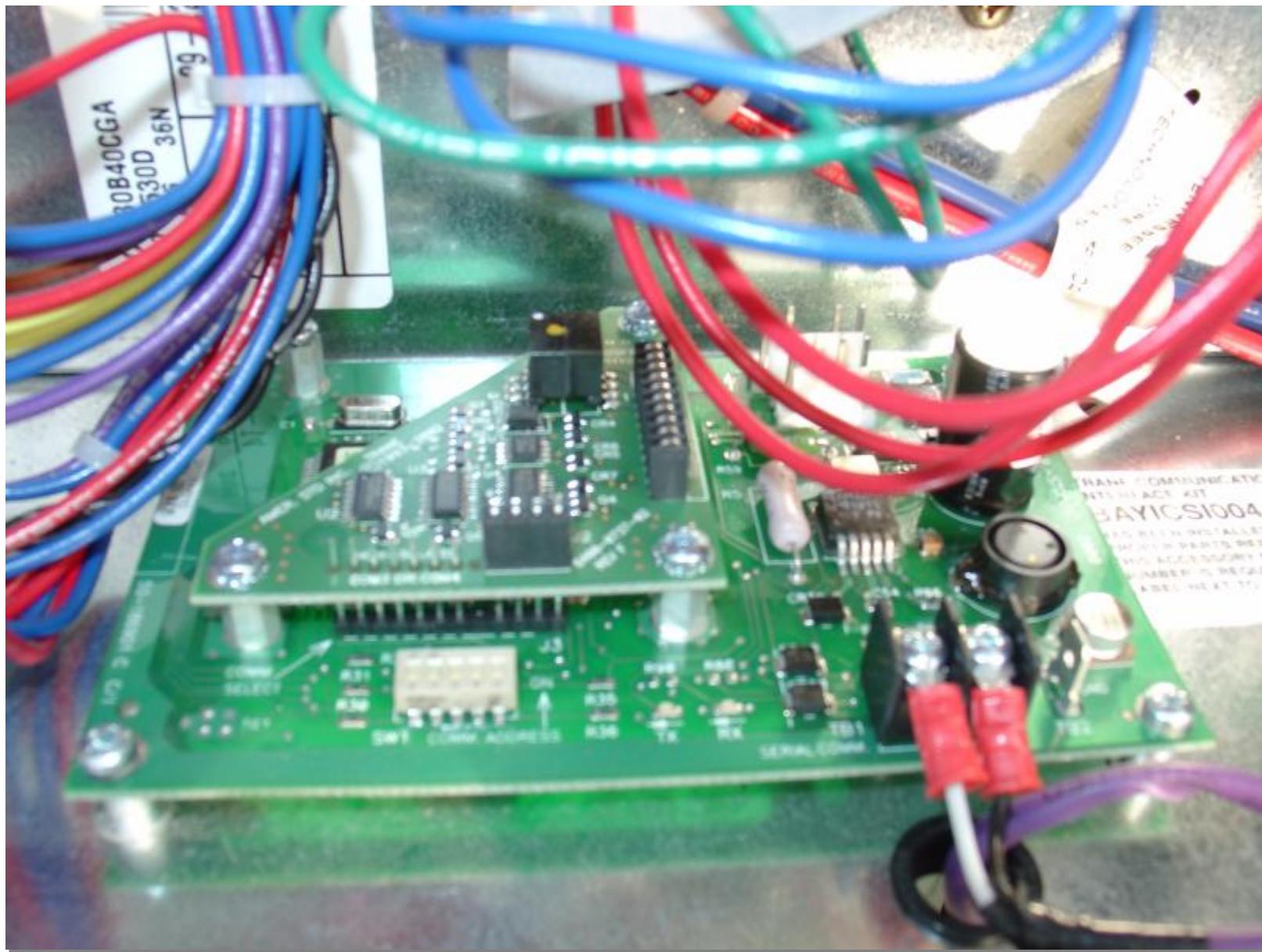
- Texas Instruments OEM board
- Direct Spark Ignition system
- Takes control of the ignition, timings related to the ignition cycle, and supervision of the gas components
- Diagnostics available through LED indicator
- Flame sensor signal is field measurable (μA)



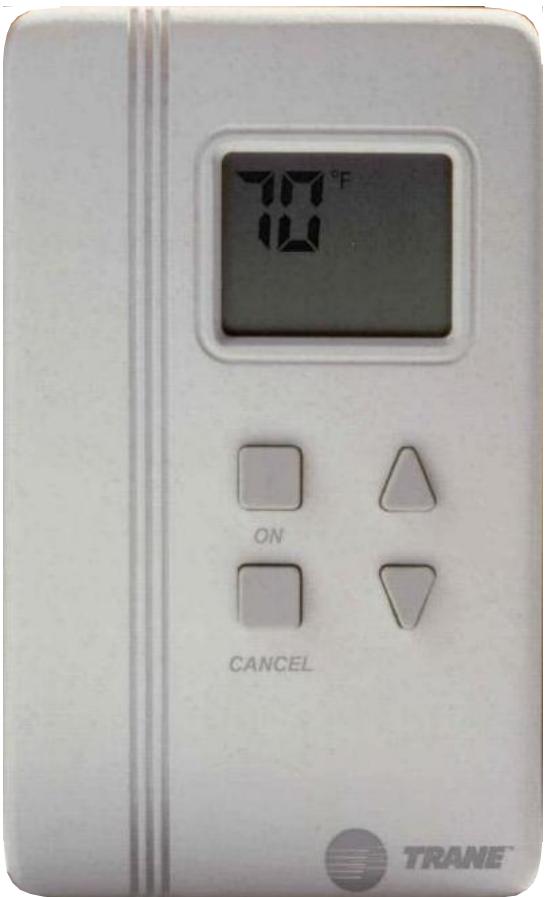
Multiple System Compatibility

- Constant Volume
- Changeover VAV with VariTrac®
- Stand-alone or Integrated Comfort™ Systems Controls





New!!!



Digital Zone Sensor

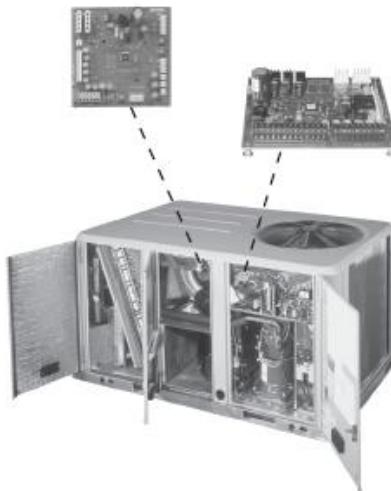
Introducing the Wireless Zone Sensor.



You Must have the data!

Service Diagnostic

ReliaTel™ Microprocessor Controls

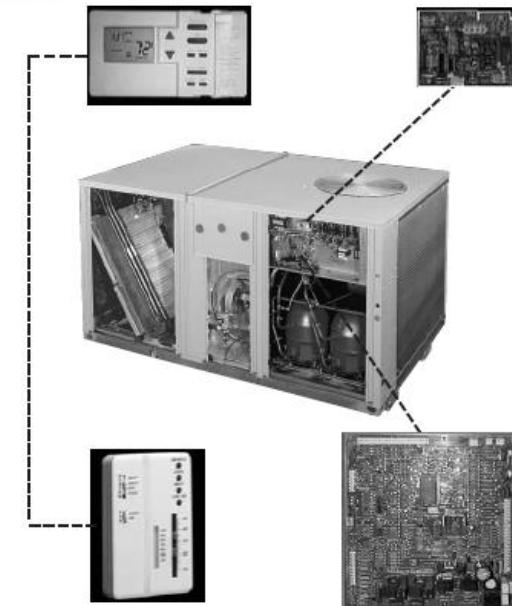


SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

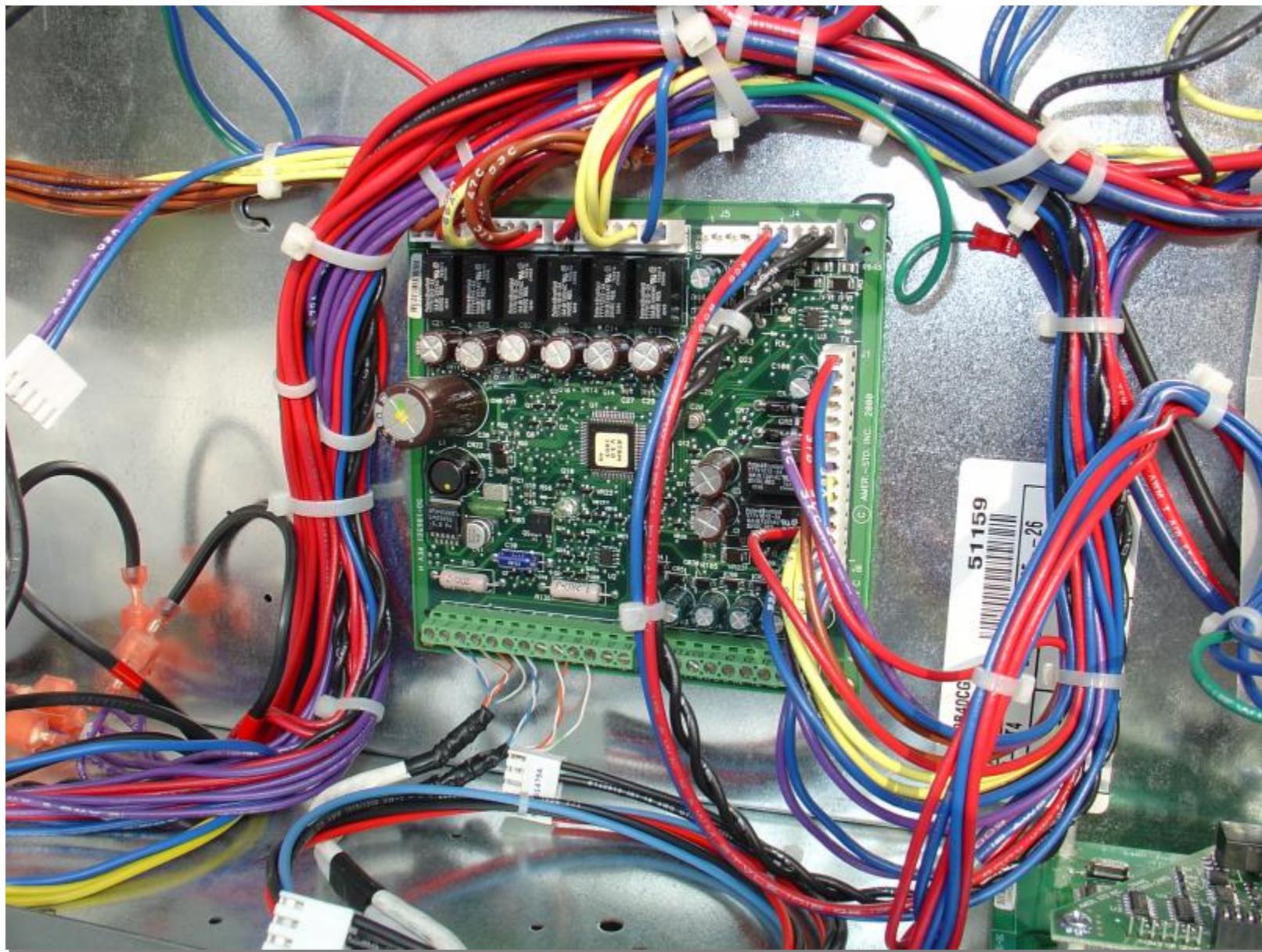


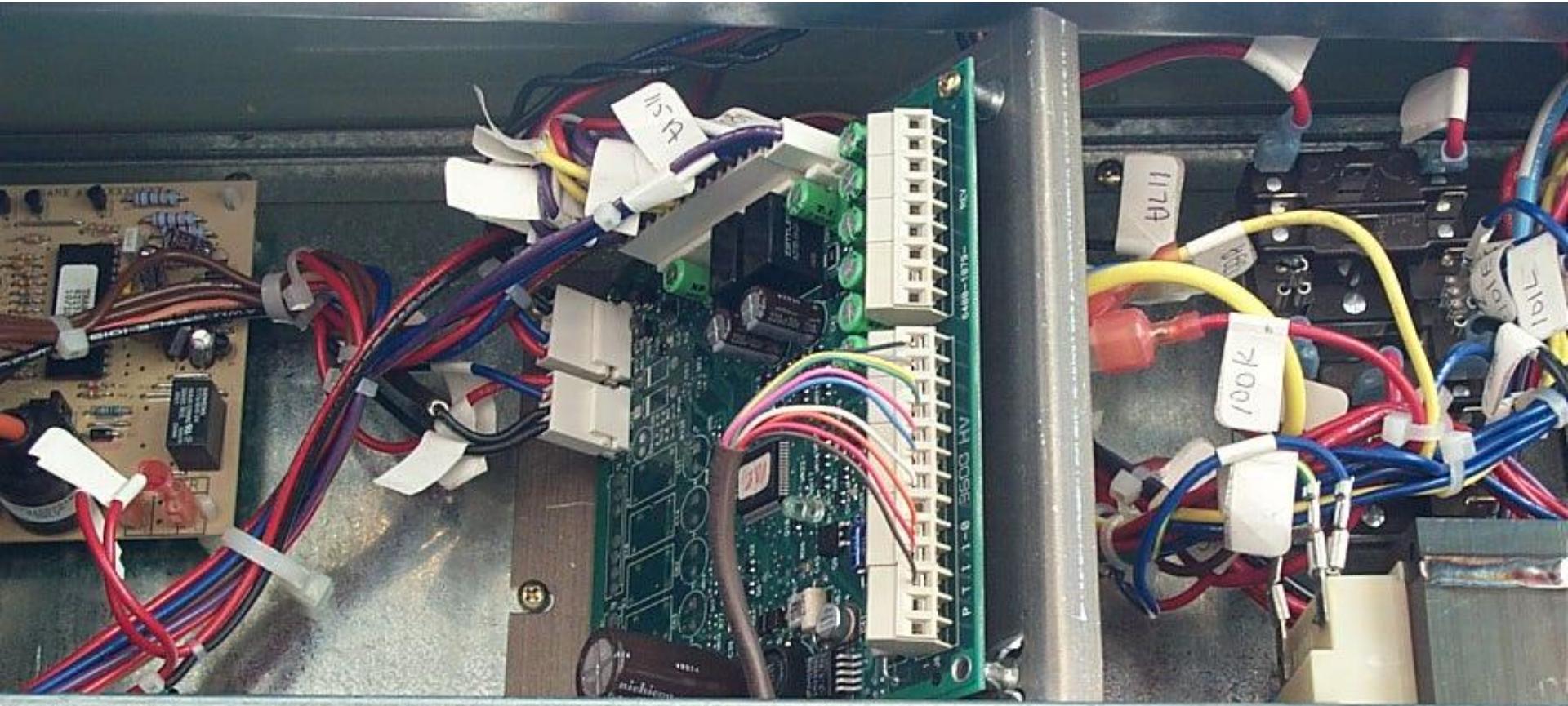
Voyager™ Microcontrols

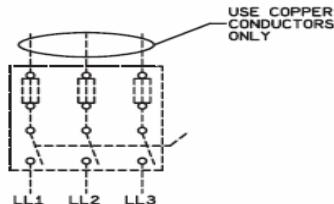


SAFETY WARNING

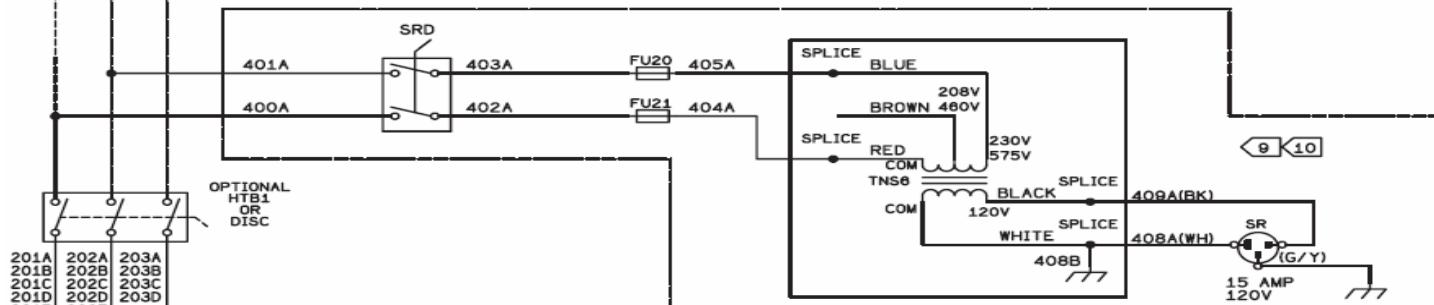
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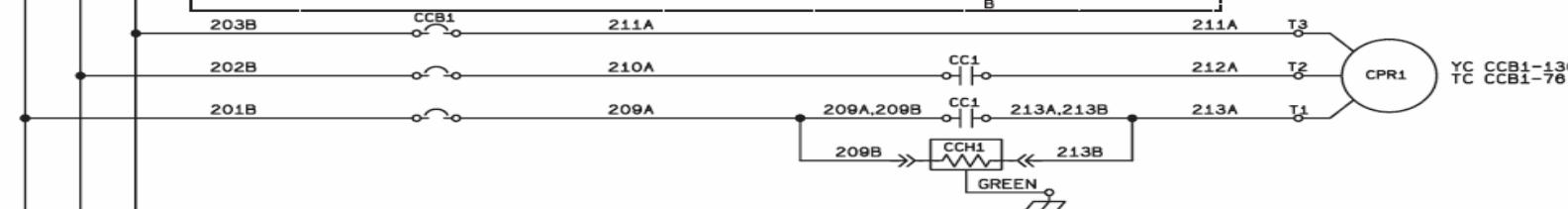
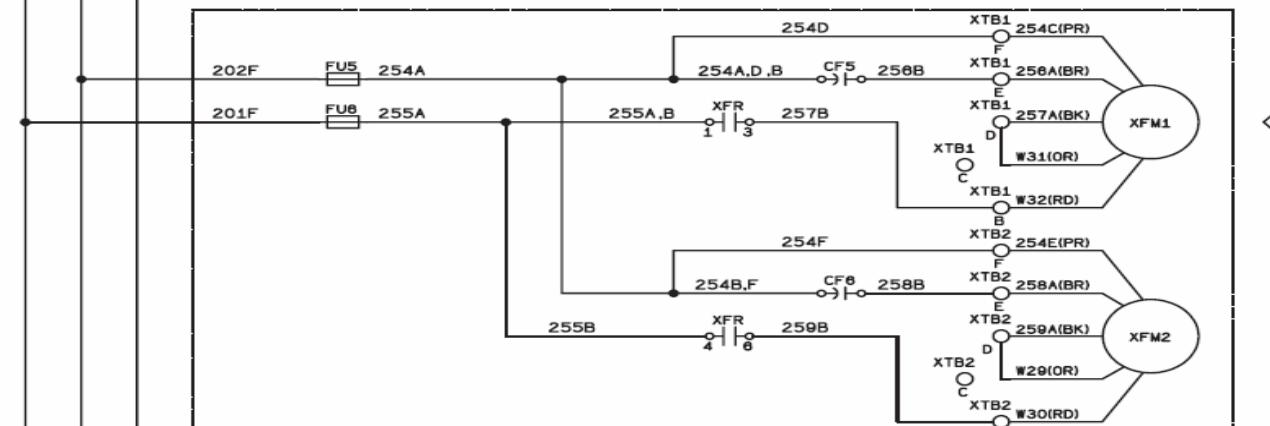
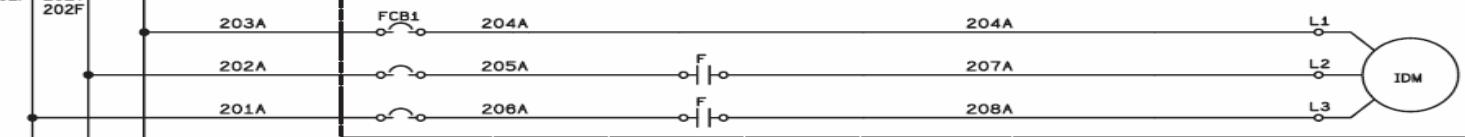


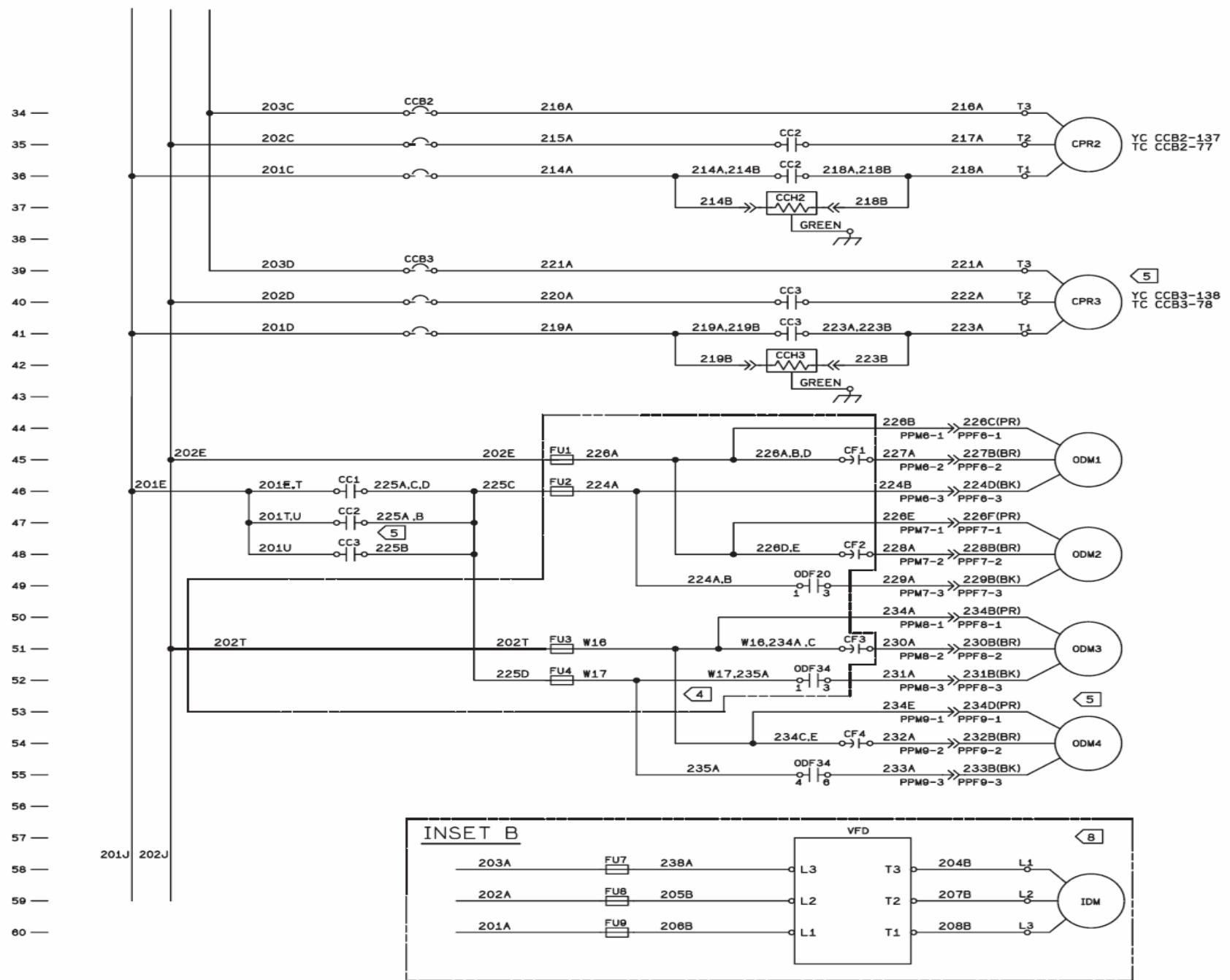


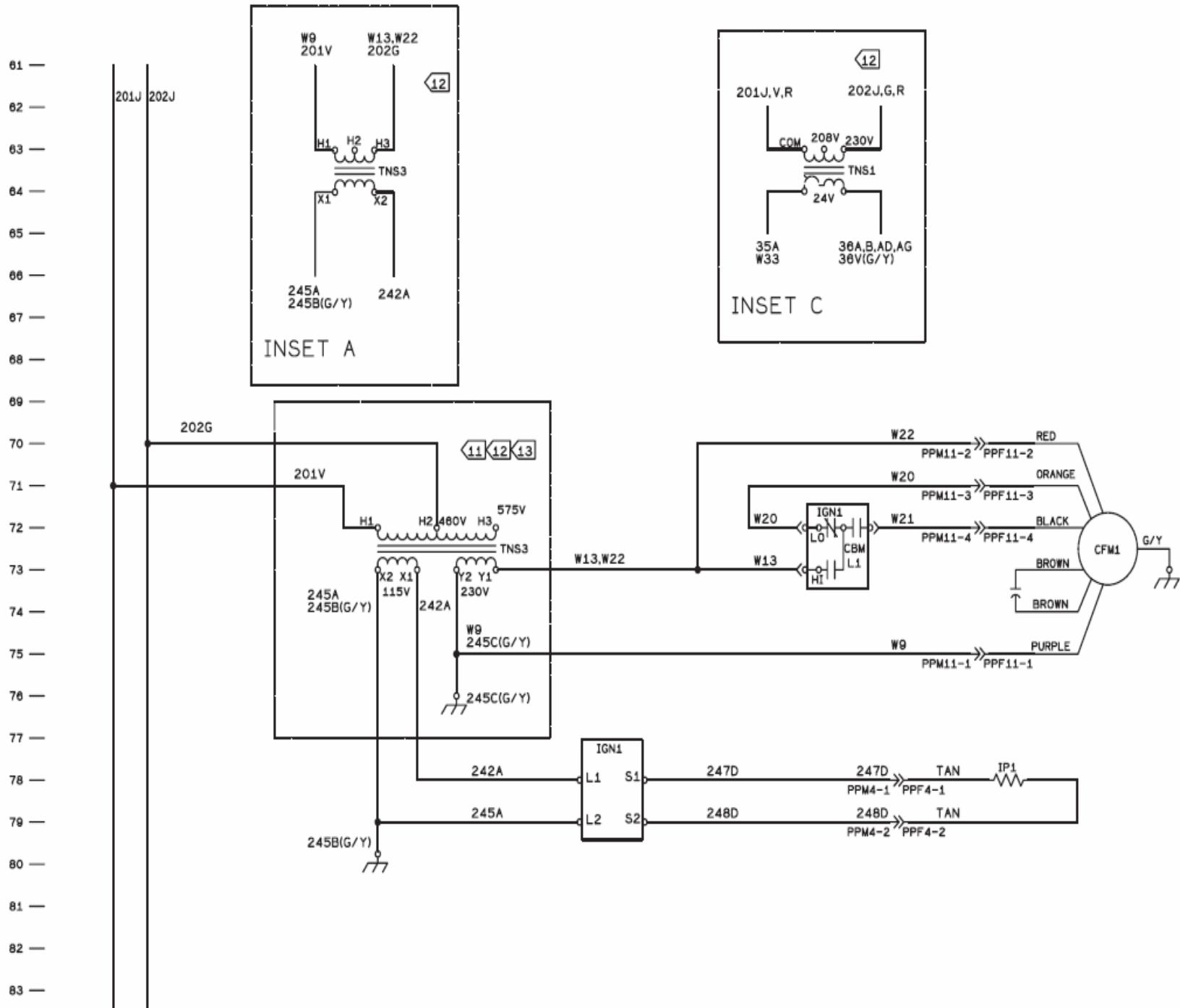
SEE NAMEPLATE FOR
LINE VOLTAGE AND
MAX. FUSE SIZE

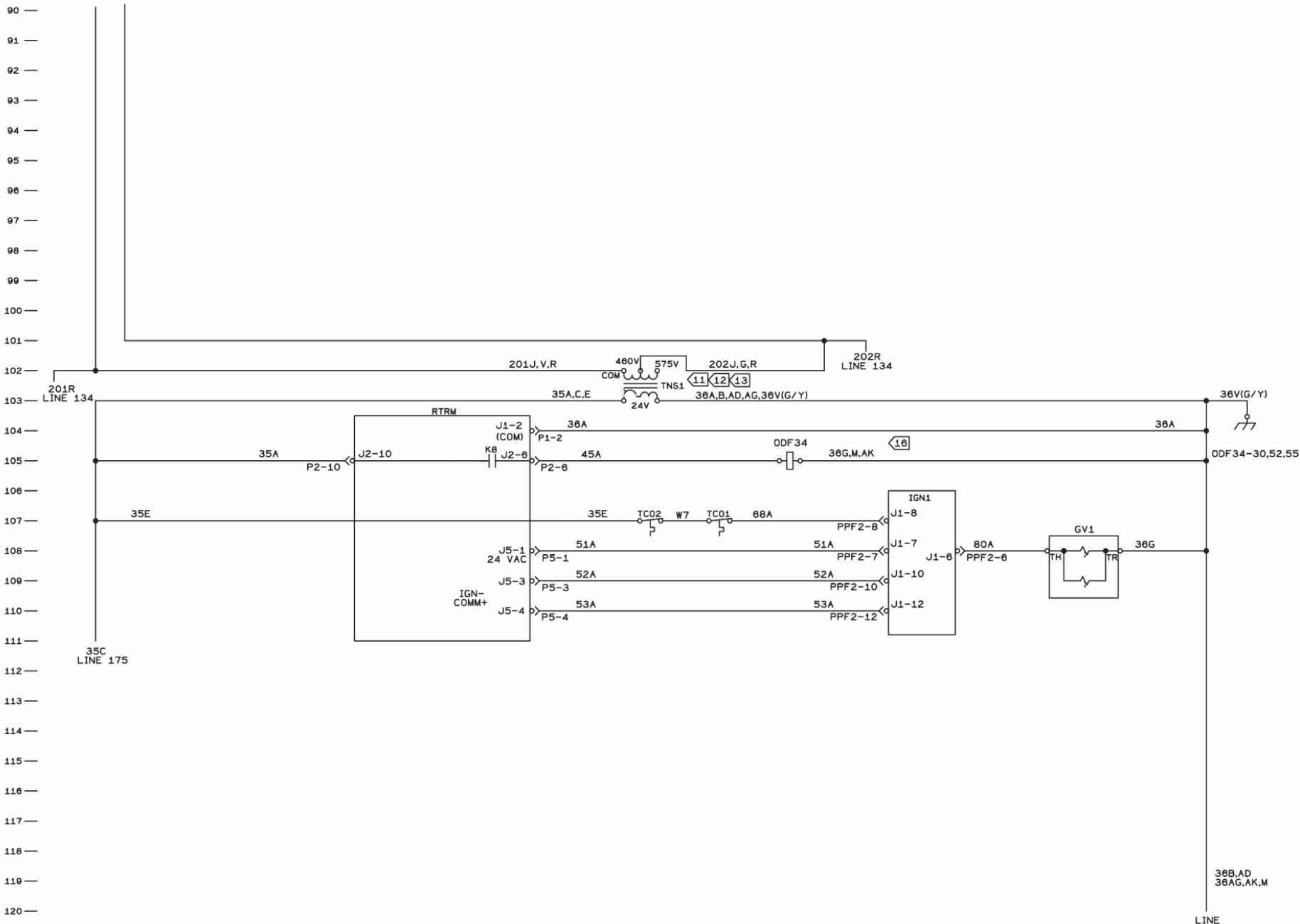


201A 202A 203A
201B 202B 203B
201C 202C 203C
201D 202D 203D
201E 202E
201F 202F

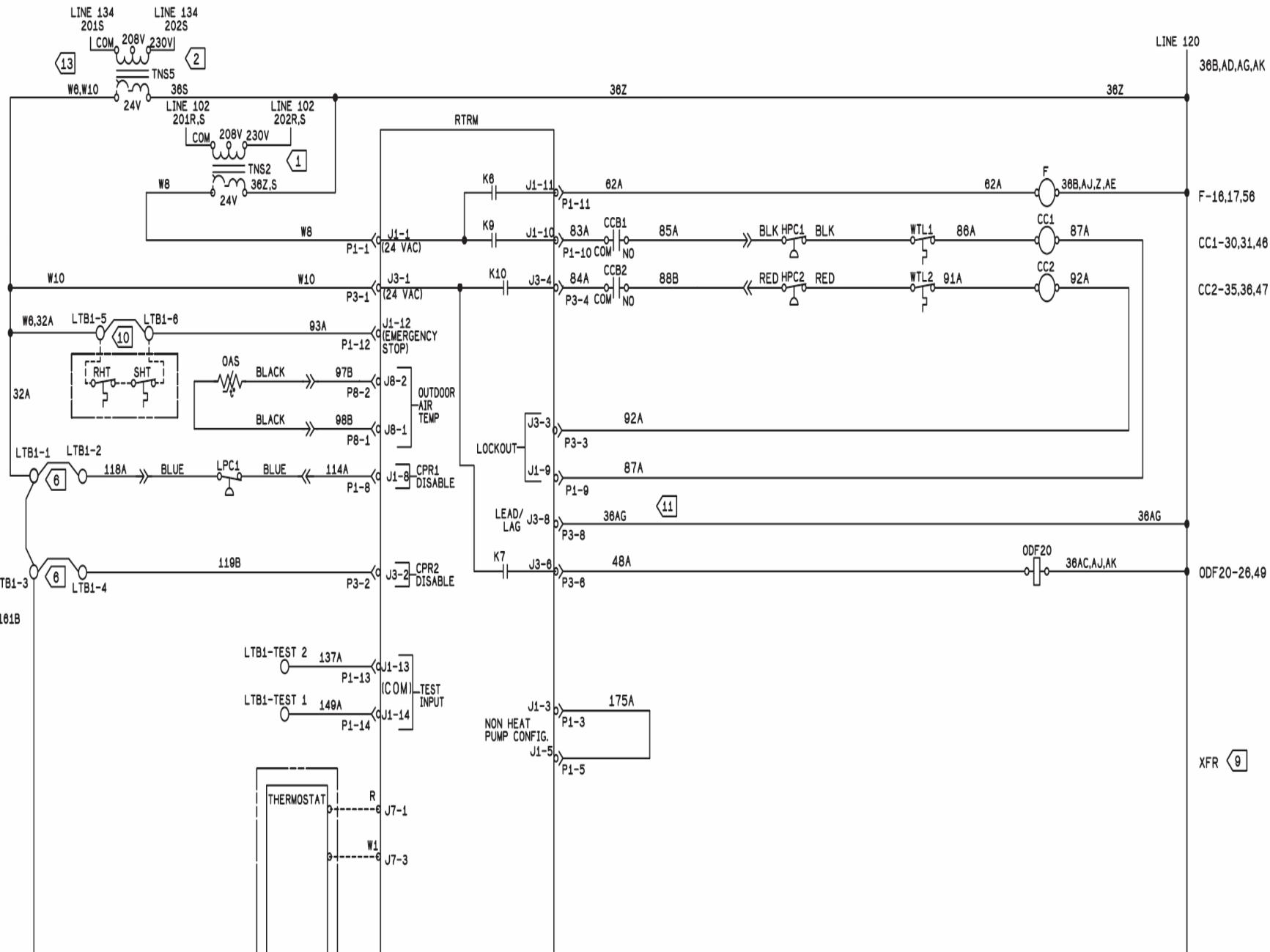


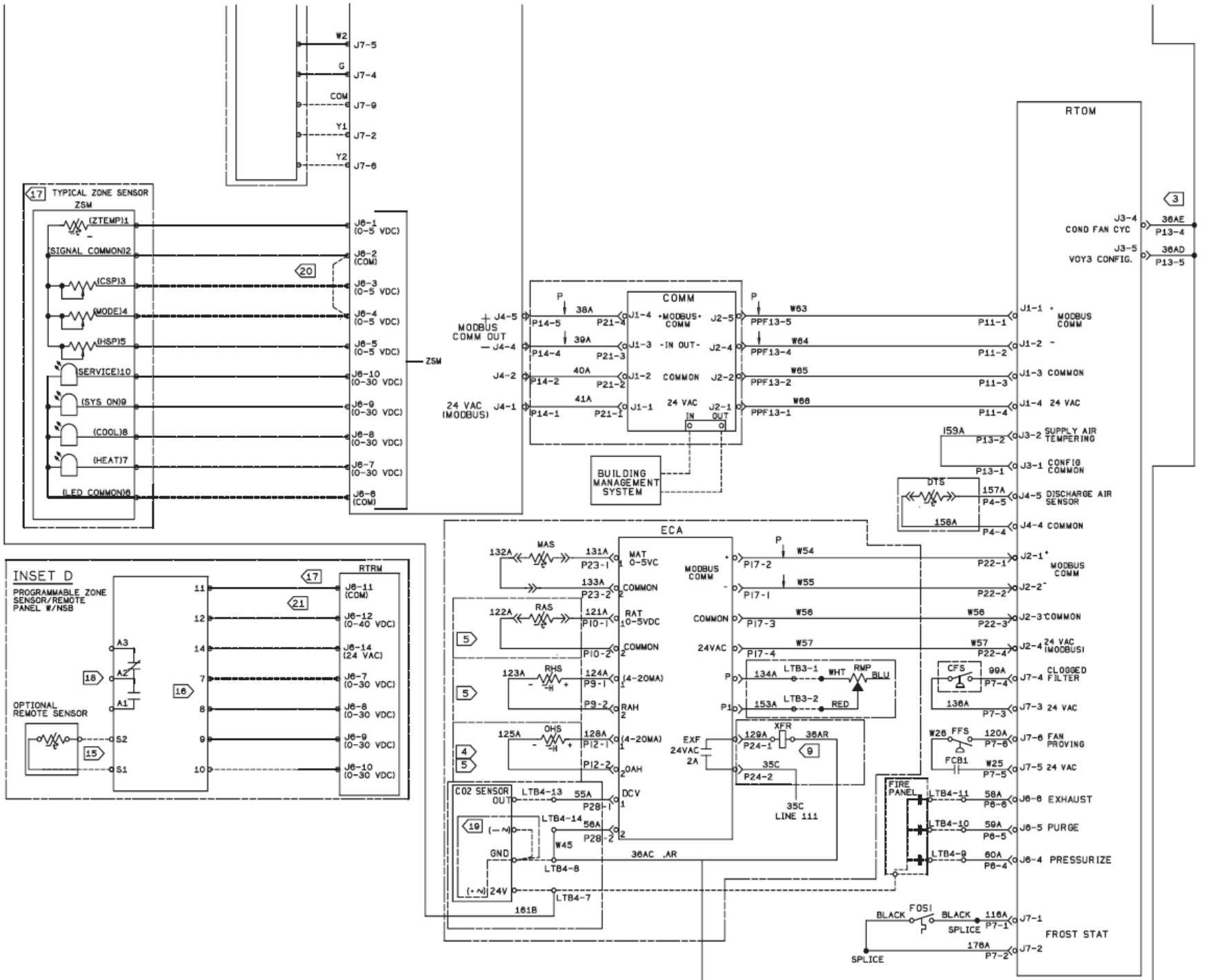


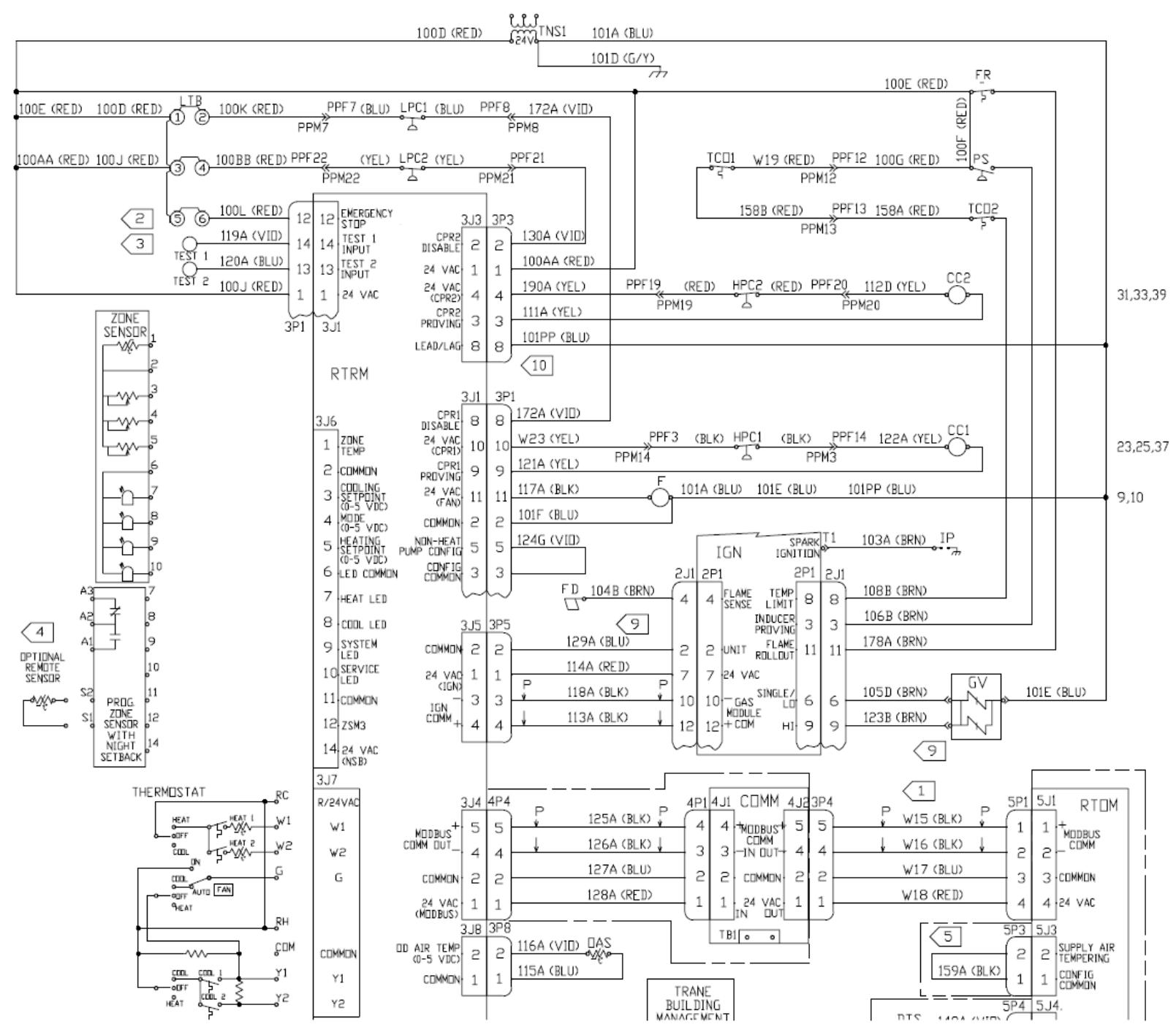


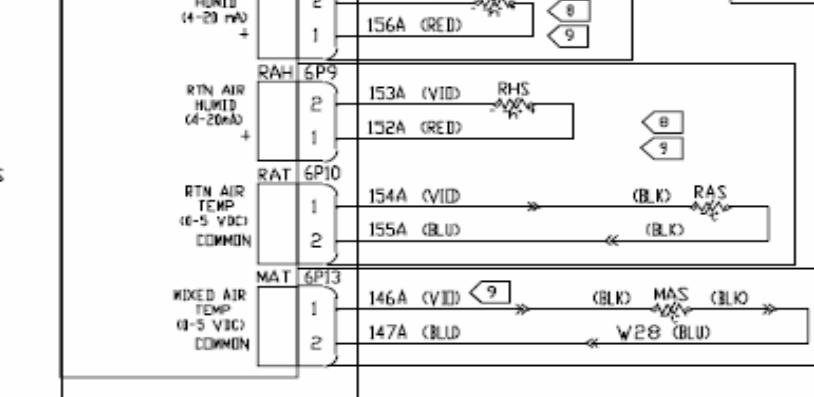
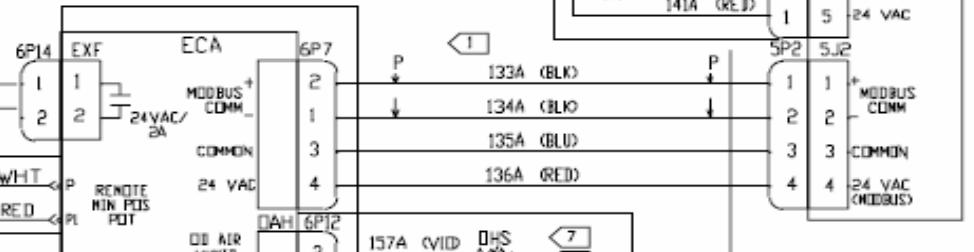
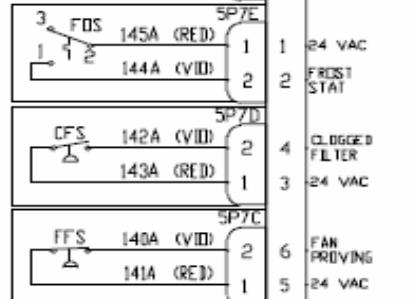
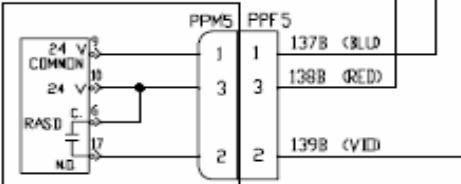
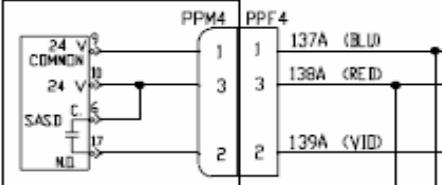
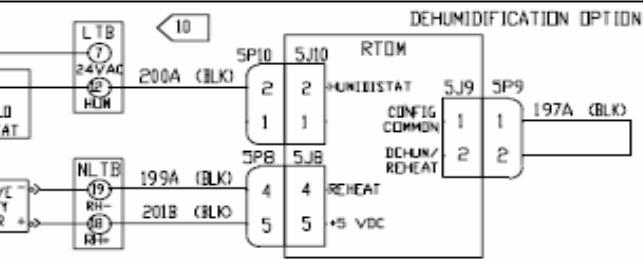
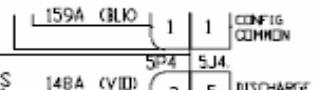
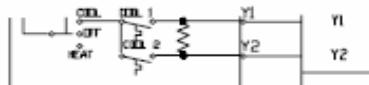


9 XFR CAN BE FOUND ON LINES 21,28 & 173.









- 1 ALL UNITS SHIP WITH AN OPTIONS HARNESS ROUTED FROM THE CONTROL BOX (SP1, SP2) TO THE INDOOR FAN SECTION (SP1, SP2) AND THE RETURN AIR SECTION (6P7). DO NOT CONNECT THE OPTIONS HARNESS TO THE RTRM IF NO OPTIONS ARE INSTALLED. REFER TO ACCOMPANYING LITERATURE FOR PROPER CONNECTION/ COMBINATION OF OPTIONAL COMPONENTS.
- 2 TO DISABLE COMPRESSORS, REMOVE LTB JUMPERS BETWEEN PINS 1 AND 2, AND PINS 3 AND 4, AND CONNECT FIELD SUPPLIED CONTROL DEVICE.
- 3 TO SHUT DOWN THE UNIT FOR EMERGENCY STOP, REMOVE LTB JUMPER BETWEEN PINS 5 AND 6, AND INSTALL FIELD SUPPLIED DEVICE OR INSTALL OPTIONAL FIRESTAT.
- 4 INSTALL OPTIONAL REMOTE SENSOR TO TERMINALS S1 AND S2 WHEN REQUIRED. SEE PROGRAMMABLE ZONE SENSOR/REMOTE PANEL W/NSB LITERATURE FOR CORRECT SETTINGS.
- 5 CONNECTIONS SHOWN INCLUDE OPTIONAL HPCI. IF HPCI NOT INSTALLED, CONNECT WIRE W23 TO WIRE 122A.
- 6 REMOVE JUMPER TO ENABLE SUPPLY AIR TEMPERING.
- 7 REQUIRED FOR OPTIONAL REFERENCE ENTHALPY CONTROL.
- 8 REQUIRED FOR OPTIONAL COMPARATIVE ENTHALPY CONTROL.
- 9 OPTIONAL MAS, RAS, RHS, DHS, AND ASSOCIATED WIRING NOT USED WITH MOTORIZED OUTSIDE AIR DAMPER.
- 10 SP2, 3P3, DDF2, RHV AND ASSOCIATED WIRING ARE PRESENT ONLY IF DEHUMIDIFICATION OPTION IS INSTALLED. FOR ADDITIONAL WIRING SEE CO2 SENSOR/VENTILATION OVERRIDE ACCESSORY DIAGRAM.
- CUT AND ISOLATE WIRE 124B IF DEHUMIDIFICATION OPTION IS INSTALLED.

12 CONNECTIONS SHOWN ARE FOR 2-STAGE GAS HEAT. WHEN 1-STAGE OPERATION IS REQUIRED, WIRE 123B IS NOT CONNECTED TO GV. WIRE 129A (IF PRESENT) IS CUT AND ISOLATED. WIRE 105D IS CONNECTED TO GV-M1 (60HZ ONLY), AND GV PINS 1 AND 3 ARE JUMPERED WITH WIRE W37 (50HZ ONLY).

