LOW VOLTAGE
CONTROL CIRCUIT WIRING

Models:

W**A1    W**L1
W**A1D    WL*S2
WA*S2     WL*S2
WA*S3
Contents

Installation Instructions
Wiring – Low Voltage Wiring .................................. 3
Operating Voltage Range ........................................ 3
Low Voltage Connection ......................................... 3

Tables
Table 1 Diagram to Use w/Unit & Vents .................. 3
Table 2 Operating Voltage Range ......................... 3
Table 3 Wall Thermostat ....................................... 4
Table 4 Humidity Controls .................................... 4
Table 5 CO₂ Controller ...................................... 4
Table 6 Thermostat Wire Size .............................. 4

Figures
Figure 1 Basic A/C with Optional Electric Heat No
Economizer or Vent Packages .......................... 5
Figure 2 Opt. MFAD, CRV or ERV Vent. Pkg. w/
Programmable T-Stat ......................................... 6
Figure 3 Opt. MFAD, CRV or ERV Vent. Pkg. w/
Thermostat .................................................... 7
Figure 4 A/C with Economizer .............................. 8
Figure 5 A/C w/Dehumidification Sequence &
No Vent Pkg. ............................................... 9
Figure 6 A/C w/Dehumidification Sequence &
No Vent Pkg. Using Sep. Controls .................. 10
Figure 7 A/C w/Dehumidification Sequence w/Vent
Pkg. Using Combination Controller ............. 11
Figure 8 A/C w/Dehumidification Sequence w/Vent
Pkg. Using Thermostat & Separate ......... 12
Figure 9 A/C w/Dehumidification Sequence &
Economizer w/Thermostat and
Humidistat ................................................. 13
Figure 10 A/C w/Dehumidification Sequence &
Economizer w/Combination Temperature
& Humidity Control ..................................... 14
Figure 11 2-Stage A/C with Optional Electric Heat –
No Economizer or Vent Pkgs .................... 15
Figure 12 2-Stage A/C Opt. MFAD or ERV Vent.
Pkg. w/Thermostat .................................. 16
Figure 13 2-Stage A/C Opt. MFAD or ERV Vent.
Pkg. w/Programmable T-Stat .................... 17
Figure 14 2-Stage A/C with Economizer .............. 18
Figure 15 2-Stage A/C w/Opt. CRVMP Low Voltage
Wiring ...................................................... 19
Figure 16 1-Stage A/C w/Opt. Elec. Heat w/
ECONWM* Style Economizer .................... 20
Figure 17 2-Stage A/C w/Opt. Elec. Heat w/
ECONWM* Style Economizer .................... 21
### TABLE 1 — DIAGRAM TO USE WITH UNIT AND VENTS

<table>
<thead>
<tr>
<th>Vent Code</th>
<th>Vent</th>
<th>CRV, ERV, MFAD</th>
<th>CRVMP</th>
<th>Economizer</th>
<th>ECONWM*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermostat</td>
<td>Programmerable</td>
<td>Programmerable</td>
<td>ALL</td>
<td>Programmbale</td>
<td>ALL</td>
</tr>
<tr>
<td>System Type</td>
<td>Model Series</td>
<td>X</td>
<td>R, M, V, P</td>
<td>C</td>
<td>E</td>
</tr>
<tr>
<td>Air Conditioner</td>
<td></td>
<td>W<strong>A, W</strong>L</td>
<td>1</td>
<td>1</td>
<td>3, 2, 3</td>
</tr>
<tr>
<td>Air Conditioner w/Dehumidification Sequence</td>
<td>W**A*D</td>
<td>6</td>
<td>5, 6</td>
<td>8</td>
<td>7, 8</td>
</tr>
<tr>
<td>2-Stage Air Conditioner</td>
<td>WA<em>S</em> WL<em>S</em></td>
<td>11</td>
<td>11</td>
<td>12</td>
<td>12, 13</td>
</tr>
</tbody>
</table>

### WIRING – LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase are equipped with dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240V and 208V taps are:

### TABLE 2 – OPERATING VOLTAGE RANGE

<table>
<thead>
<tr>
<th>TAP</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>240V</td>
<td>253 - 216</td>
</tr>
<tr>
<td>208V</td>
<td>220 - 187</td>
</tr>
</tbody>
</table>

**NOTE:** The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

### Low Voltage Connection

These units use a 24-volt AC low voltage circuit. The “R” terminal is the hot terminal and the “C” terminal is grounded. “G” terminal is the fan input.

“Y” terminal is the compressor input for cooling — 1-Stage units only or 2-Stage units with ECONWM*.

“Pink Wire” is 2nd Stage cooling — 2-Stage units only with ECONWM*.

“Y1” terminal is the 1st Stage compressor input for cooling — 2-Stage units only — No ECONWM*.

“Y2” terminal is the 2nd Stage compressor input for cooling — 2-Stage units only — No ECONWM*.

“W1” terminal is the 1st stage electric heat.

“W2” terminal is the 2nd stage heat (if equipped).

“A” terminal is the ventilation input. This terminal energizes any factory installed ventilation option.

“3” terminal is the dehumidification input. If installed, this terminal energizes any factory installed dehumidification option.

**NOTE:** On models with “J” or “M” Control Module, “3” terminal is used along with “1” and “2” for the alarm relay. “J” or “M” modules are not used with conjunction with dehumidification units.
### TABLE 3  
**WALL THERMOSTAT**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Predominate Features</th>
</tr>
</thead>
</table>
| 8403-057 (TH3110D1040) | 1 stage Cool, 1 stage Heat  
Electronic Non-Programmable  
Auto or Manual changeover |
| 8403-058 (TH5220D1151) | 2 stage Cool, 2 stage Heat  
Electronic Non-Programmable  
HP or Conventional  
Auto or Manual changeover |
| 8403-060 (1120-445) | 3 stage Cool; 3 stage Heat  
Programmable/Non-Programmable Electronic  
HP or Conventional  
Auto or Manual changeover  
Dehumidification Output |
| 8403-089 (T4 Pro) | 1 stage Cool, 1 stage Heat - Conventional  
1 stage Cool, 1 stage Heat - Heat Pump  
Programmable/Non-Programmable Electronic  
Auto or Manual changeover |
| 8403-090 (T6 Pro) | 2 stage Cool, 2 stage Heat - Conventional  
2 stage Cool, 3 stage Heat - Heat Pump  
Programmable/Non-Programmable Electronic  
Auto or Manual changeover |

### TABLE 4  
**HUMIDITY CONTROLS**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Predominate Features</th>
</tr>
</thead>
</table>
| 8403-038 (H600A1014) | SPDT switching, pilot duty 50VA @ 24V  
Humidity range 20-80% RH |
| 8403-047 (H200-10-21-10) | Electronic dehumidstat SPST closes-on-rise  
Humidity range 10-90% with adjustable stops |

### TABLE 5  
**CO₂ CONTROLLER**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Predominate Features</th>
</tr>
</thead>
</table>
| 8403-067 | Normally Open SPST relay closes-on-rise  
24V dual wave length sensor. Default setting 950ppm, adjustable to 0-2000ppm  
Default off setting 1000ppm, adjustable to 0-200 ppm can be calibrated |

### TABLE 6  
**THERMOSTAT WIRE SIZE**

<table>
<thead>
<tr>
<th>Transformer VA</th>
<th>FLA</th>
<th>Wire Gauge</th>
<th>Maximum Distance In Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>55</td>
<td>2.3</td>
<td>20 gauge</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 gauge</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16 gauge</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 gauge</td>
<td>160</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12 gauge</td>
<td>250</td>
</tr>
</tbody>
</table>
FIGURE 1
BASIC A/C with OPTIONAL ELECTRIC HEAT
NO ECONOMIZER or VENTILATION PACKAGES

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. FACTORY INSTALLED JUMPER

3. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).

4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL.

MIS-2478 B
FIGURE 2
OPTIONAL MFAD, CRV or ERV VENTILATION PACKAGES
with PROGRAMMABLE THERMOSTAT (RECOMMENDED)

Low Voltage Wiring
AC with Programmable Thermostat

1. Remove jumper for 2-stage electric heat on units with 15 or more kW.
2. Do not connect "A1" from 8403-060 if optional CO2 controller is used.
3. Connect orange wire to "G" only if optional CO2 controller is used.
4. Change model configuration from heat pump to heat cool.
   Must be configured to programmable and fan set to programmed
   fan for the "L" output to function during scheduled occupied periods.
FIGURE 3
OPTIONAL MFAD, CRV or ERV VENTILATION PACKAGES
with THERMOSTAT

LOW VOLTAGE WIRING
AC WITH NON-PROGRAMMABLE THERMOSTAT

1. REMOVE JUMPER FOR 2-STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. OPTIONAL VENT OPTION SUGGESTED HOOKUP
3. FACTORY INSTALLED JUMPER
4. ADD JUMPER IF OPTIONAL CO2 CONTROLLER IS NOT USED. VENT WILL RUN WHILE BLOWER IS ENERGIZED. DO NOT INSTALL JUMPER IF OPTIONAL CO2 CONTROLLER INSTALLED, AND SEE NOTE 6.
5. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/1 COOL, HEAT PUMP) TO 6 (2 HEAT/2 COOL, CONVENTIONAL).
6. CONNECT ORANGE WIRE TO "6" ONLY IF OPTIONAL CO2 CONTROLLER IS INSTALLED.
FIGURE 4
A/C with ECONOMIZER

OPTIONAL ECONOMIZER LOW VOLTAGE WIRING

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. FACTORY INSTALLED JUMPER

3. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).

4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL, AND MUST BE CONFIGURED FOR ECONOMIZER FOR YD/O OUTPUT TO BE ACTIVE AS FIRST STAGE COOLING.

MIS-24816
FIGURE 5
A/C with DEHUMIDIFICATION SEQUENCE
& NO VENTILATION PACKAGE USING
8403-060 COMBINATION TEMPERATURE and HUMIDITY CONTROLLER

LOW VOLTAGE WIRING

\[ \text{Diagram showing wiring connections} \]

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/Cool, AND MUST BE CONFIGURED FOR "NO ECONOMIZER" TO MAKE V/O OUTPUT ACTIVE FOR HUMIDITY CONTROL

MIS-2482 A
FIGURE 6
A/C with DEHUMIDIFICATION SEQUENCE & NO VENTILATION PACKAGE USING SEPARATE TEMPERATURE and HUMIDITY CONTROLS

LOW VOLTAGE WIRING

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. JUMPER NEEDS TO BE ADDED
3. FACTORY INSTALLED JUMPER
4. CHANGE *SYSTEM TYPE*, SET UP FUNCTION 1, FROM 5 (2 HEAT/1 COOL HEAT PUMP) TO 6 (2 HEAT/2 COOL CONVENTIONAL).

MIS-2483 B
FIGURE 7
A/C with DEHUMIDIFICATION SEQUENCE
with VENTILATION PACKAGE USING
8403-060 COMBINATION TEMPERATURE & HUMIDITY CONTROLLER
and 8403-067 CO₂ CONTROLLER

1. FEMALE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS
   WITH 15 OR MORE 1 / 2

2. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL, AND
   SET TO 100 ECONOMIZER TO HAVE "A" OUTPUT ACTIVE FOR HUMIDITY
   CONTROL. MUST BE CONFIGURED TO PROGRAMMABLE AND FAN SET TO
   PROGRAMMED F/M FOR THE "A" OUTPUT TO FUNCTION DURING SCHEDULED
   OCCUPIED PERIODS.

3. DO NOT CONNECT "A" FROM 8403-060 IF
   OPTIONAL CO₂ CONTROLLER IS USED.

4. CONNECT ORANGE WIRE TO "G" ONLY IF
   OPTIONAL CO₂ CONTROLLER IS USED.
FIGURE 8
A/C with DEHUMIDIFICATION SEQUENCE
with VENTILATION PACKAGE USING
THERMOSTAT and SEPARATE HUMIDITY CONTROLLER

1. Remove jumper for 2 stage electric heat on units with 15 or more kw
2. Jumper needs to be added
3. Factory installed jumper
4. Add jumper if optional CO2 controller is not used. Vent will run while blower is energized. If CO2 controller is installed, do not add jumper and see note 6.
5. Change "System Type", set up function 1, from 5 (2 heat/1 cool heat pump) to 6 (2 heat/2 cool conventional).
6. Connect orange wire to "G" only if optional CO2 controller is installed.
FIGURE 9
A/C with DEHUMIDIFICATION SEQUENCE & ECONOMIZER with 8403-058 or 8403-090 THERMOSTAT and 8403-038 or 8403-047 HUMIDISTAT

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. JUMPER NEEDS TO BE ADDED
3. FACTORY INSTALLED JUMPER
4. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/1 COOL HEAT PUMP) TO 6 (2 HEAT/2 COOL CONVENTIONAL).
FIGURE 10
A/C with DEHUMIDIFICATION SEQUENCE & ECONOMIZER with 8403-060
COMBINATION TEMPERATURE and HUMIDITY CONTROL

LOW VOLTAGE WIRING

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

2. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT-COOL, AND MUST BE CONFIGURED FOR NO ECONOMIZER AND MULTI-STAGE FOR Y1 OUTPUT TO BE ACTIVE AS FIRST STAGE COOLING AND Y0/0 TO BE ACTIVE FOR HUMIDITY CONTROL.

MIS-2466 A
FIGURE 11
2-STAGE A/C with OPTIONAL ELECTRIC HEAT
NO ECONOMIZER or VENTILATION PACKAGES

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. FACTORY INSTALLED JUMPER
3. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/1 COOL HEAT PUMP) TO 6 (2 HEAT/2 COOL CONVENTIONAL).
4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/Cool

MIS-2868 B
FIGURE 12
2-STAGE A/C with OPTIONAL MFAD OR ERV VENTILATION PACKAGES with THERMOSTAT

LOW VOLTAGE WIRING

UNIT 24V TERMINAL BLOCK

C R G Y1 W1 W2 Y2 Y 1 2 3 4 5 6

ERV

MFAD

OPTIONAL VENT PACKAGES

BROWN/WHITE

ORANGE

RED

BLACK

OPTIONAL 8403-067 CO2 CONTROLLER

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. OPTIONAL VENT OPTION SUGGESTED HOOK UP
3. FACTORY INSTALLED JUMPER
4. ADD JUMPER IF OPTIONAL CO2 CONTROLLER IS NOT USED, VENT WILL RUN WHILE BLOWER IS ENERGIZED. DO NOT INSTALL JUMPER IF OPTIONAL CO2 CONTROLLER INSTALLED, AND SEE NOTE 6.
5. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/1 COOL HEAT PUMP) TO 6 (2 HEAT/2 COOL CONVENTIONAL).
6. CONNECT ORANGE WIRE TO "G" ONLY IF OPTIONAL CO2 CONTROLLER IS INSTALLED. MIS-2867 E
FIGURE 13
2-STAGE A/C with OPTIONAL MFAD OR ERV VENTILATION PACKAGES
with PROGRAMMABLE THERMOSTAT (RECOMMENDED)

LOW VOLTAGE Wiring

1. REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
2. DO NOT CONNECT "A" FROM 8403-060 IF OPTIONAL CO2 CONTROLLER IS USED
3. CONNECT ORANGE WIRE TO "G" ONLY IF OPTIONAL CO2 CONTROLLER IS USED
4. CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL. MUST BE CONFIGURED TO PROGRAMMABLE AND FAN SET TO PROGRAMMED FAN FOR THE "A" OUTPUT TO FUNCTION DURING SCHEDULED OCCUPIED PERIODS.

MIS-2866 D
FIGURE 14
2-STAGE A/C with ECONOMIZER

OPTIONAL ECONOMIZER LOW VOLTAGE WIRING

⚠️ Thermostat
Part #8403-060

ELECTRONIC PROGRAMMABLE

UNIT 24V TERMINAL BLOCK

⚠️ REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW

⚠️ CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL, AND MUST BE CONFIGURED FOR ECONOMIZER FOR YO/D OUTPUT TO BE ACTIVE AS FIRST STAGE COOLING.

MIS-2865 A
FIGURE 15
2-STAGE A/C with OPTIONAL CRVMP LOW VOLTAGE WIRING

INSTALL JUMPER WHEN USING THERMOSTAT PART #8403-058

FACTORY INSTALLED JUMPER

CHANGE MODEL CONFIGURATION FROM HEAT PUMP TO HEAT/COOL.
MUST BE CONFIGURED TO PROGRAMMABLE AND FAN SET TO PROGRAMMED
FAN FOR THE "A" OUTPUT TO FUNCTION DURING SCHEDULED OCCUPIED PERIODS.
**FIGURE 16**

**1-STAGE A/C with OPTIONAL ELECTRIC HEAT**
**WITH ECONWM* STYLE ECONOMIZER**

*ECONOMIZER - STYLE ECONOMIZER*

**Older units may not have Y1 and Y2 connections on 24v terminal block.**

- **Factory Jumper Installed.** Must be energized to enable minimum position. **NOTE:** Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.
- **Factory Jumper Installed.**
- **Change “system type”, set up function 1, from 5 (2 heat/1 cool heat pump) to 6 (2 heat/2 cool conventional).**
- **Change model configuration from heat pump to heat/cool, and must be configured for economizer for YO/D output to be active as first stage cooling.**
- **Older units may not have Y1 and Y2 connections on 24v terminal block. If not present wire nuts must be used.**

---

**Low Voltage Wiring Diagram**

- **Factory installed jumper. Remove for 2-stage operation on units with 15 or more kw.**

---

**MIS-2983 D**
FIGURE 17
2-STAGE A/C with OPTIONAL ELECTRIC HEAT
WITH ECONWM* STYLE ECONOMIZER

Low Voltage Wiring Diagram

1. Factory installed jumper. Remove for 2-stage operation on units with 15 or more kw.

2. Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

3. Factory Jumper Installed.

4. Change "system type", set up function 1, from 5 (2 heat/1 cool heat pump) to 6 (2 heat/2 cool conventional).

5. Change model configuration from heat pump to heat/cool, and must be configured for economizer for YO/D output to be active as first stage cooling.

MIS-2984 D