INSTALLATION INSTRUCTIONS

Single Stage Heat Pump
Low Voltage Control Circuit Wiring

Heat Pump Models:

T24-60H1
T24-60H1D
W18-60H1
W18-60H1D
W18-60H2
W18-60H2D
S26-61H1
S38-61H1D
CH3-5S1

Ventilation Packages:

CRVS-3
CRVS-3A
CRVS-5
CRVS-5A
CHCRV-5
CHCRV-5A

CHEIFM-5

ERVF-A3
ERVF-C3
ERVF-A5
ERVF-C5

MFAD-3
MFAD-5

Bard®
SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual : 2100-516L
Supersedes: 2100-516K
Date: 1-28-22

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TABLE 1
Diagram to Use with Unit and Vents

System	Vent	None		EIFM Economizer		ECONWM*		CRVS-*, ERV, MFAD		CRVMWH-3, CHCRV-5		CRVS-3A, CRVS-5A		CHCRV-5A	
	Vent Code	X		E		T, W, S		R, M, V, P		C		V		C	
	Thermostat	Programmable		Programmable		Programmable		Programmable		Programmable		Programmable		Programmable	
	Model Series	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Heat Pump	T**H S**H W**H CH*S	1	1	N/A	5	N/A	12	3, 4	2, 3, 4	14	13, 14	16	15	16	15
Heat Pump with Dehumidification	T**H*D S**H*D W**H*D	7	6, 7	N/A	11	N/A	N/A	9, 10	8, 9, 10	N/A	13, 14	18	17	N/A	N/A

Low Voltage Wiring

230/208V 1 phase and 3 phase equipment use 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

Tap	Range
240V	253 – 216
208V	220 – 187

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).*

An 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown in Table 2.

Low Voltage Connection

These units use a grounded 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*.

"*B*" terminal is the *reversing valve input*. The reversing valve must be energized for heating mode.

"*R*" terminal is the *24 VAC hot*.

"*RT*" terminal is the *24 VAC hot from transformer* on T**H and T**H*D units (used with "R" for fire/smoke shutdown).

"*C*" terminal is the *24 VAC grounded*.

"*L*" terminal is *compressor lockout output*. This terminal is activated on a high or low pressure trip by the electronic heat pump control. This is a 24 VAC output.

"*W2*" terminal is *second stage heat* (if equipped).

"*O1*" terminal is the *ventilation input*. This terminal energizes any factory-installed ventilation option.

"*E*" terminal is the *emergency heat input*. This terminal energizes the emergency heat relay.

"*W3*" terminal is the *dehumidification input*. This terminal energizes compressor, blower and three-way valve. This applies only to models equipped for dehumidification sequence.

Low Voltage Connections for DDC Control

Fan Only	Energize G
Cooling Mode	Energize Y, G
Heat Pump Heating	Energize Y, G, B
2nd Stage Heating w/Heat Pump (if employed)	Energize G, W2, Y, B
Ventilation	Energize G, O1
Emergency Heat	Energize B, W2, E, G
Dehumidification	Energize W3

TABLE 3
Wall Thermostat

Part Number	Predominate Features
8403-058 (TH5220D1151) ***No Longer Available***	2 stage Cool, 2 stage Heat - Conventional 1 stage Cool, 2 stage Heat - Heat Pump Electronic Non-Programmable Auto or Manual changeover
8403-060 (1120-445)	3 stage Cool; 3 stage Heat HP or Conventional Auto or Manual changeover Dehumidification Output
8403-090 (T6 Pro) 8403-092 (T6 Pro w/Wi-Fi)	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

Part Number	Predominate Features
8403-038 (H600A1014)	SPDT switching, pilot duty 50VA @ 24V Humidity range 20-80% RH
8403-047 (H200-10-21-10)	Electronic dehumidistat SPST closes-on-rise Humidity range 10-90% with adjustable stops

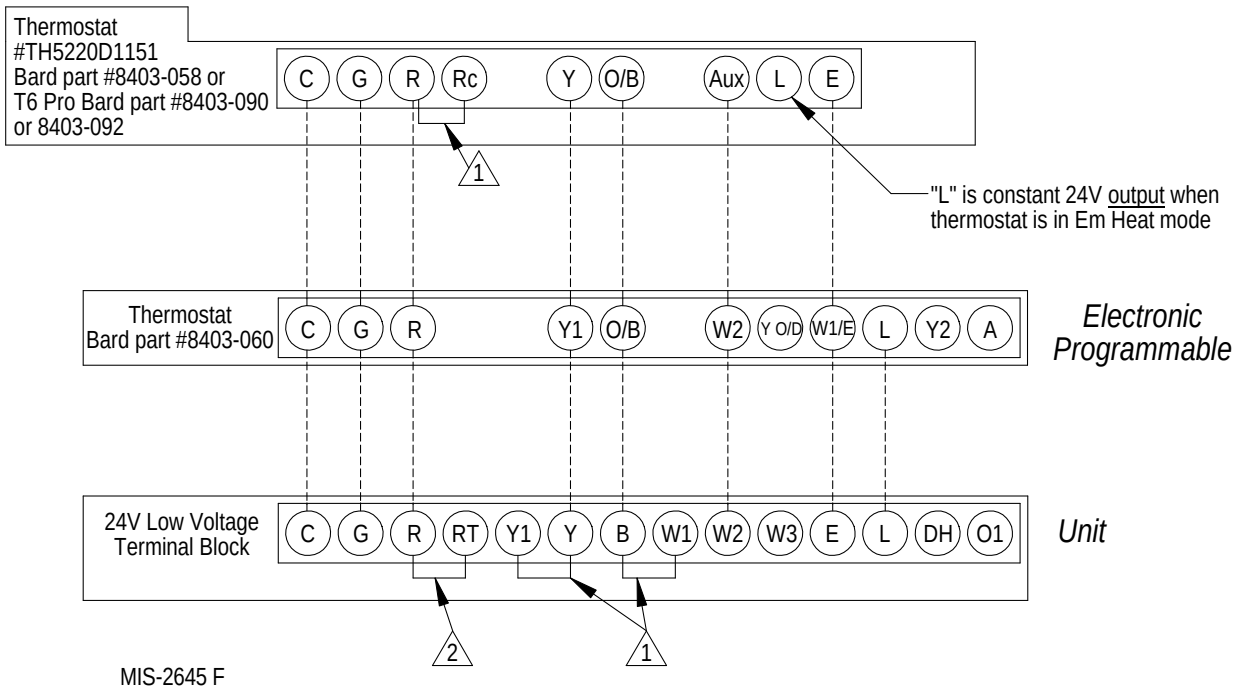
TABLE 5
CO_2 Controller

Part Number	Predominate Features
8403-067 ***No Longer Available***	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
8403-096	Normally Open SPST relay closes-on-rise 24V dual wave length sensor with 0-10V output. Default relay setting 1000ppm, adjustable to 0-2000/5000ppm. Default relay-off setting 950ppm, adjustable to 0-2000/5000ppm can be calibrated. 0-10V low-output range set to 0ppm, adjustable to 0-2000/5000ppm. 0-10V high-output range set to 2000/5000ppm, adjustable to 0-2000/5000ppm.

TABLE 6
Thermostat Wire Size

Transformer VA	FLA	Wire Gauge	Maximum Distance in Feet
55	2.3	18 gauge 16 gauge 14 gauge 12 gauge	60 100 160 250

FIGURE 1
Low Voltage Wiring Diagram:
Heat Pump with Optional Electric Heat
No Economizer or Ventilation Packages

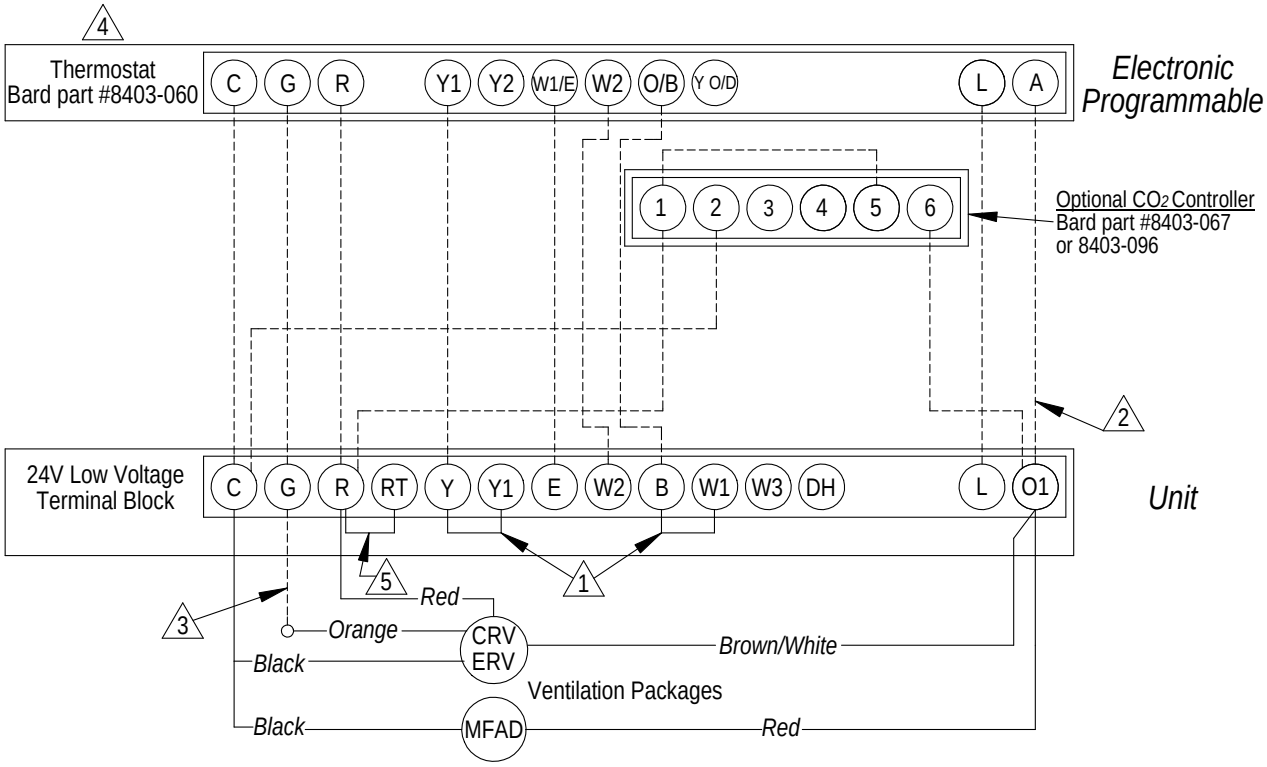


1 *Factory Jumper Installed*

2 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 2
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package
with Programmable Thermostat (Recommended)

*For CRVS-*A information, refer to Figure 15 on page 19.*



1 *Factory Jumper Installed*

MIS-2633 E

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

3 *Connect orange wire to "G" only if optional CO_2 controller is used.*

4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 3
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package with Thermostat (No Occupied Signal)

*For CRVS-*A information, refer to Figure 16 on page 20.*

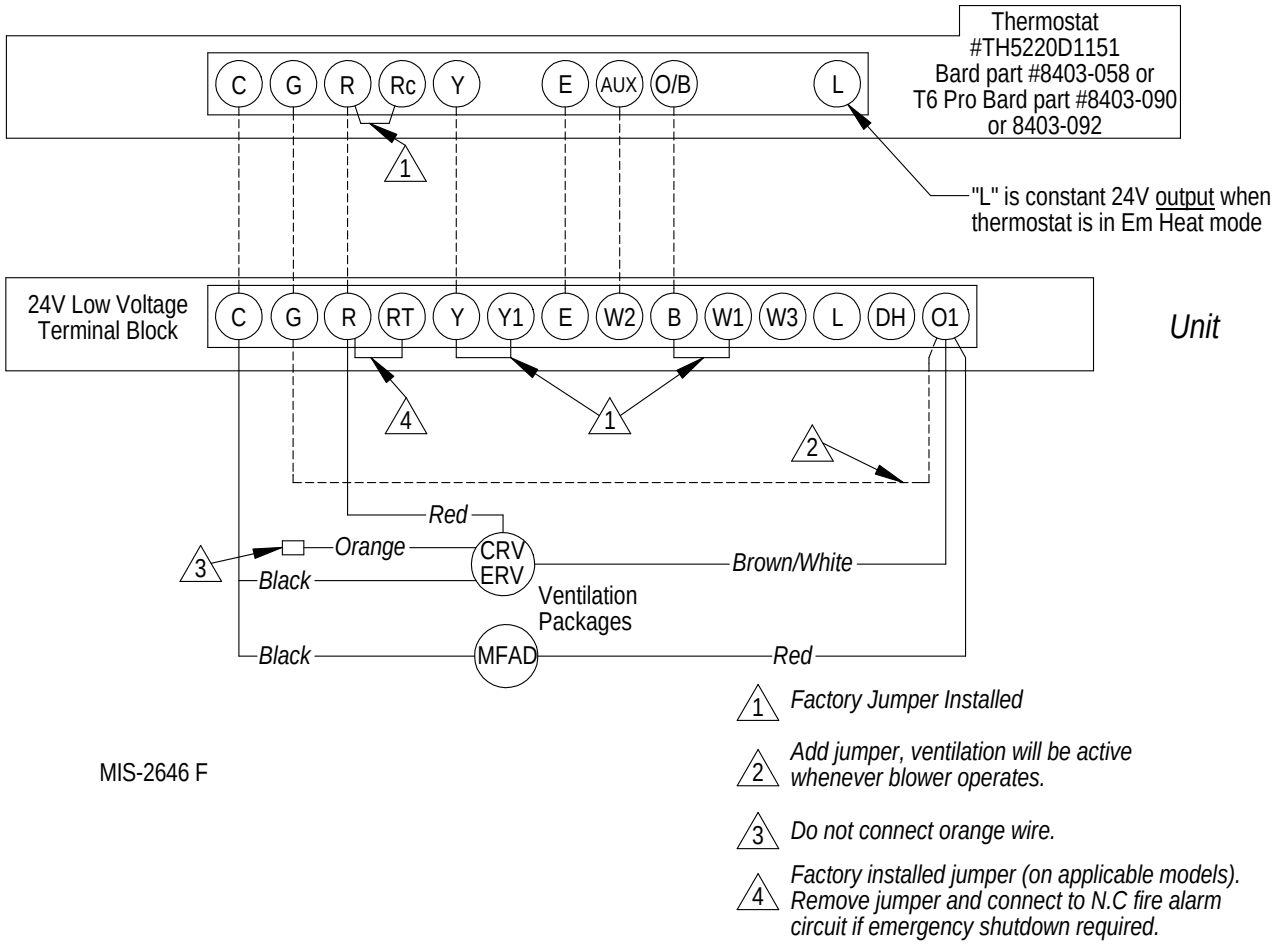


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FIGURE 4
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package with Thermostat with CO_2 Controller

*For CRVS-*A information, refer to Figure 16 on page 20.*

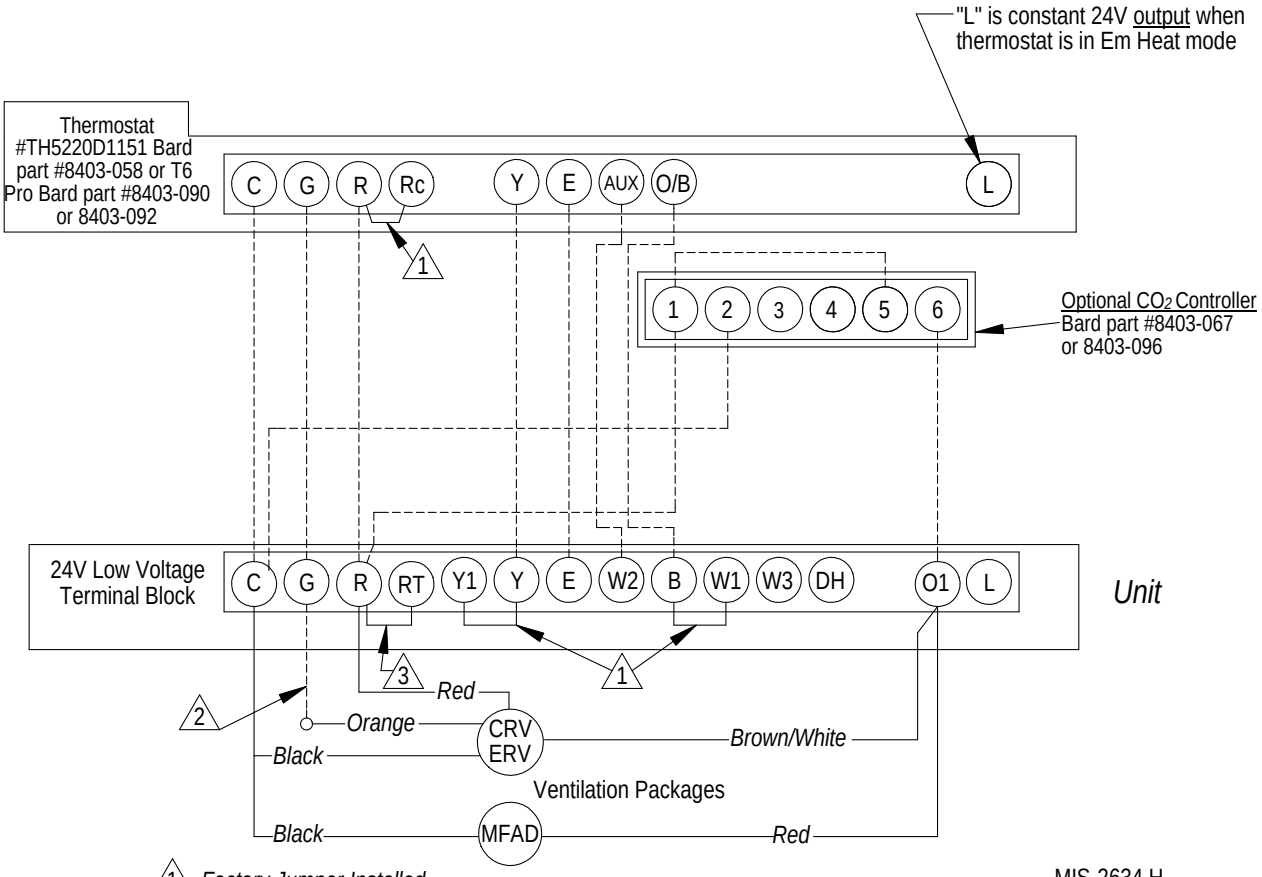
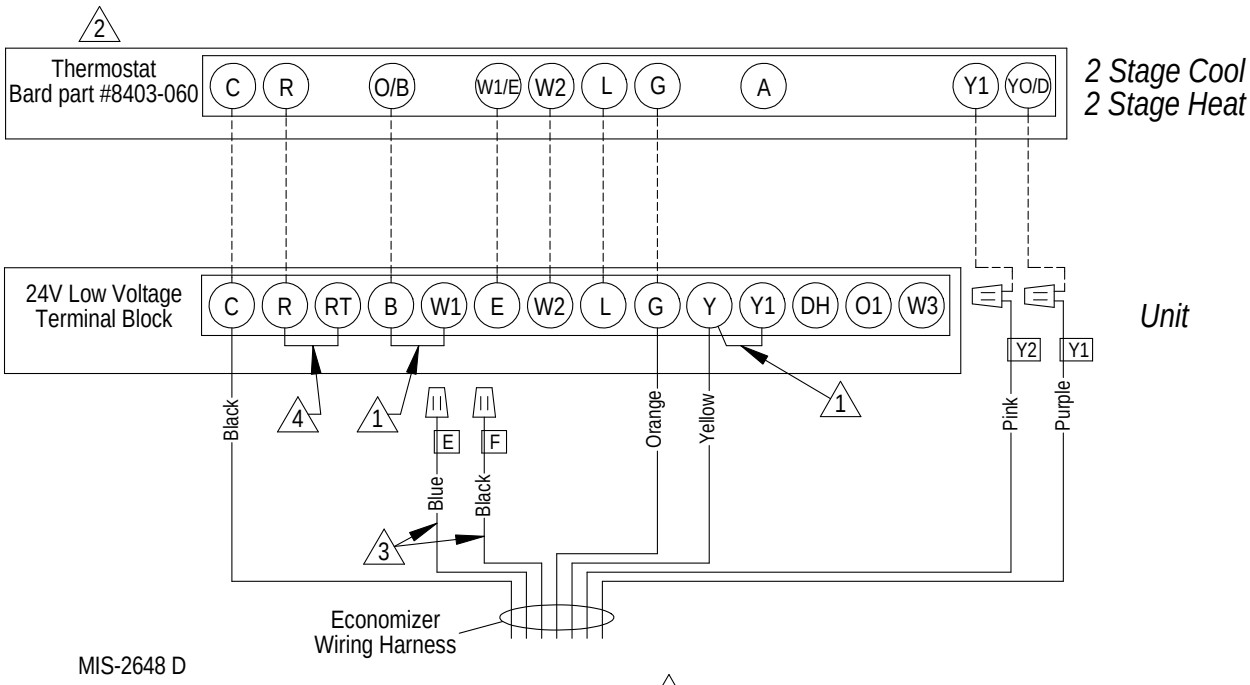


FIGURE 5
Low Voltage Wiring Diagram:
Heat Pump with Optional EIFM Economizer "E" Vent Option



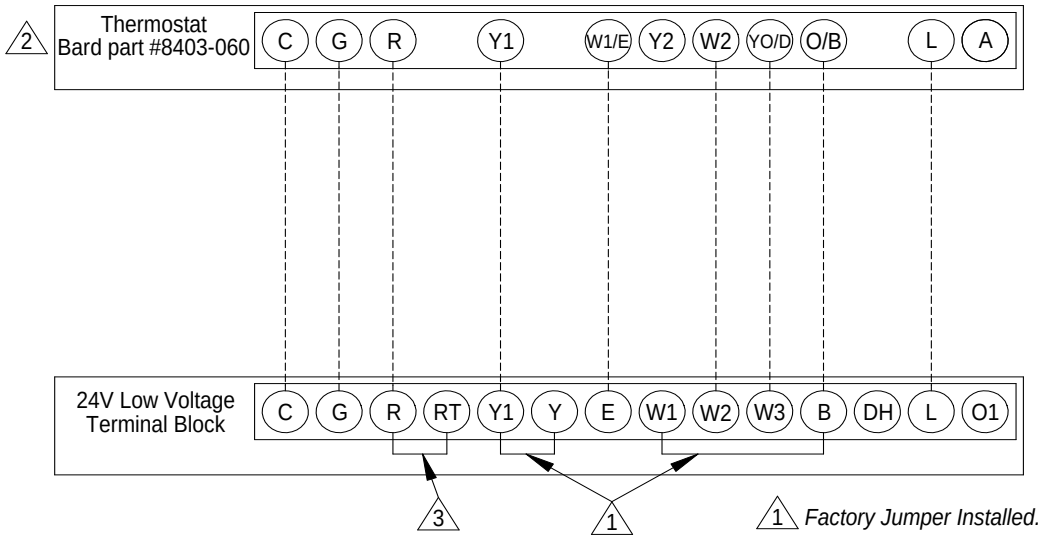
1 *Factory Jumper Installed.*

2 *Must be configured for economizer with YO/D output to be active as first stage cooling.*

3 *These wires are used in special control applications only.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 6
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and No Ventilation Package
Using Thermostat #8403-060 Combination Temperature and Humidity Control



1 *Factory Jumper Installed.*

2 *Must be configured for "No economizer" for YO/D to be active for humidity control*

3 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2636 B

FIGURE 7
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence

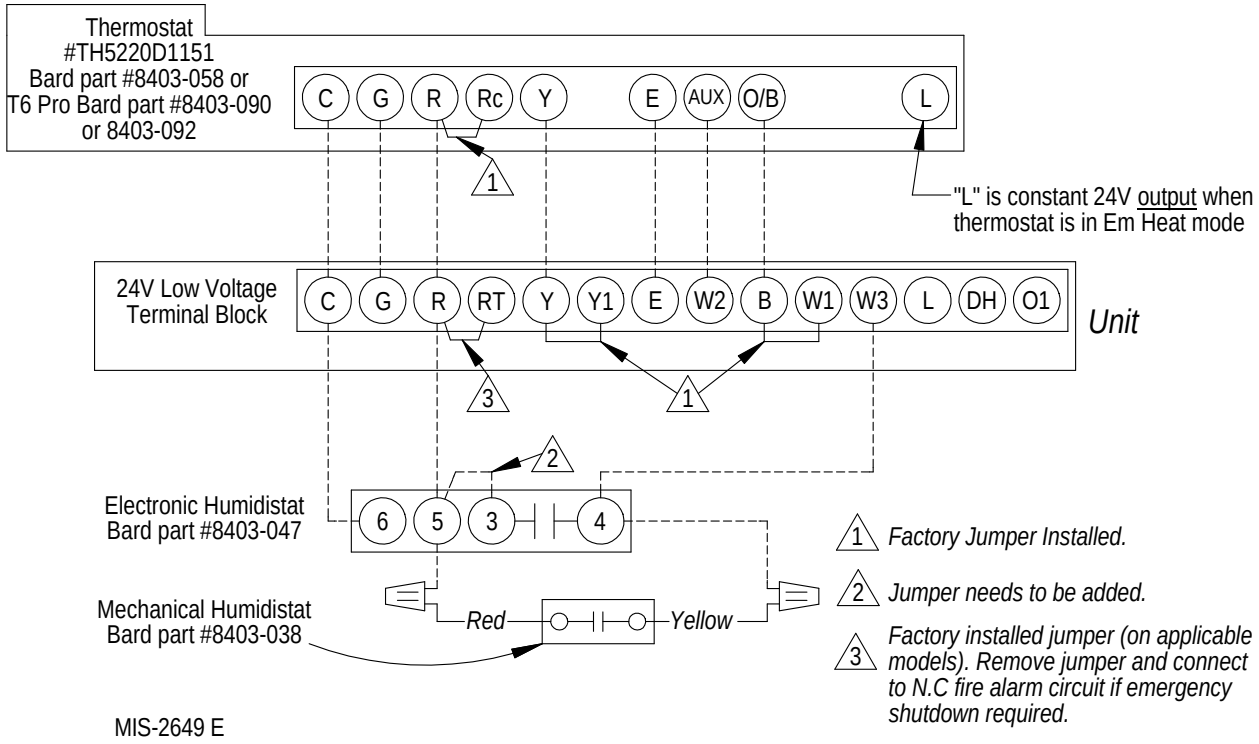
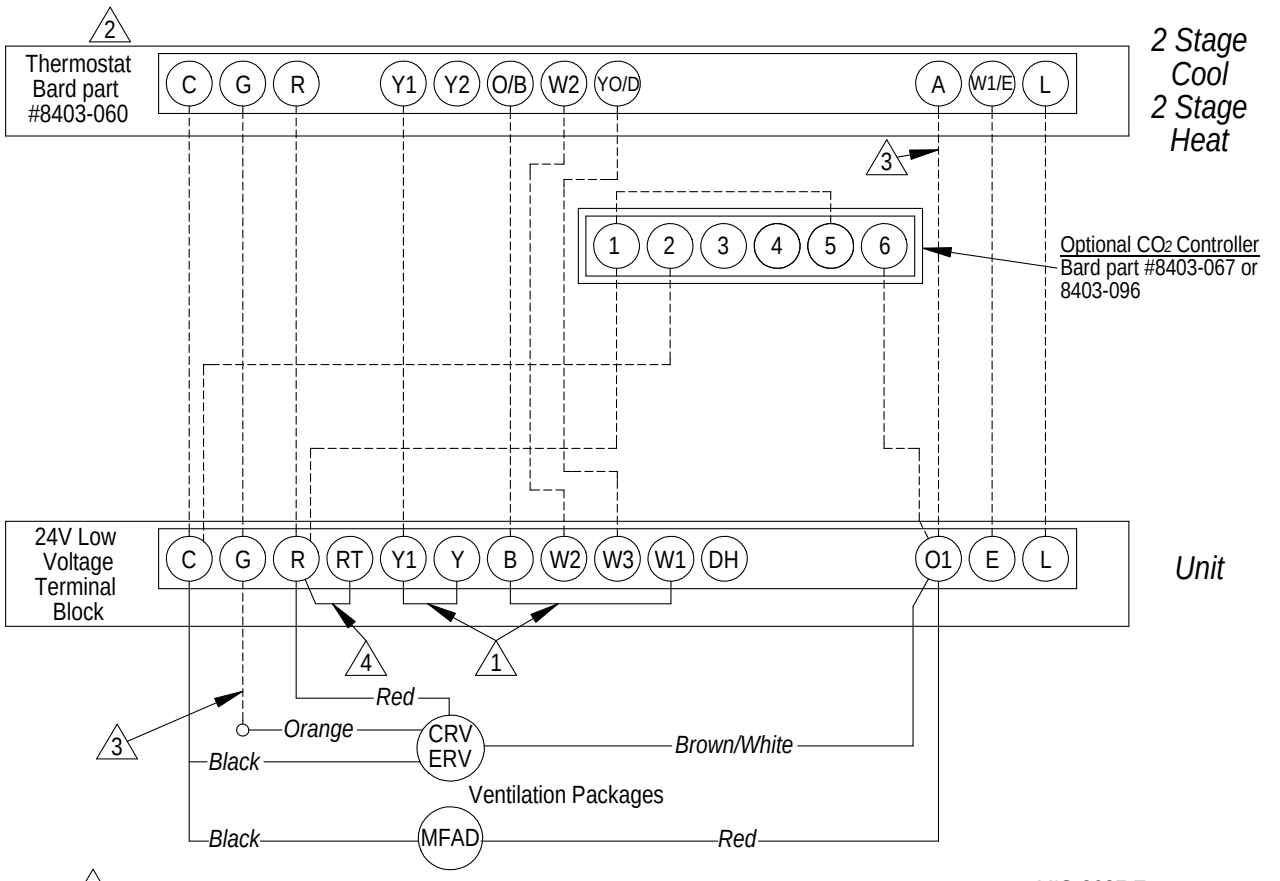


FIGURE 8
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package
Using Electronic Thermostat with Combination Temperature and Humidity Control with Optional CO_2 Controller

*For CRVS-*A information, refer to Figure 17 on page 21.*



1 *Factory Jumper Installed*

2 *Must be configured to "no economizer" to make YO/D output active for humidity control. Must be configured to programmable and fan set to programmed fan for the "A" output to function during scheduled occupied periods.*

3 *Do not connect "A" from thermostat if optional CO^2 controller is used. Connect orange wire to "G" only when optinal CO^2 controller is used.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2637 E

FIGURE 9
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package Using Thermostat (No Occupied Signal)

*For CRVS-*A information, refer to Figure 18 on page 22.*

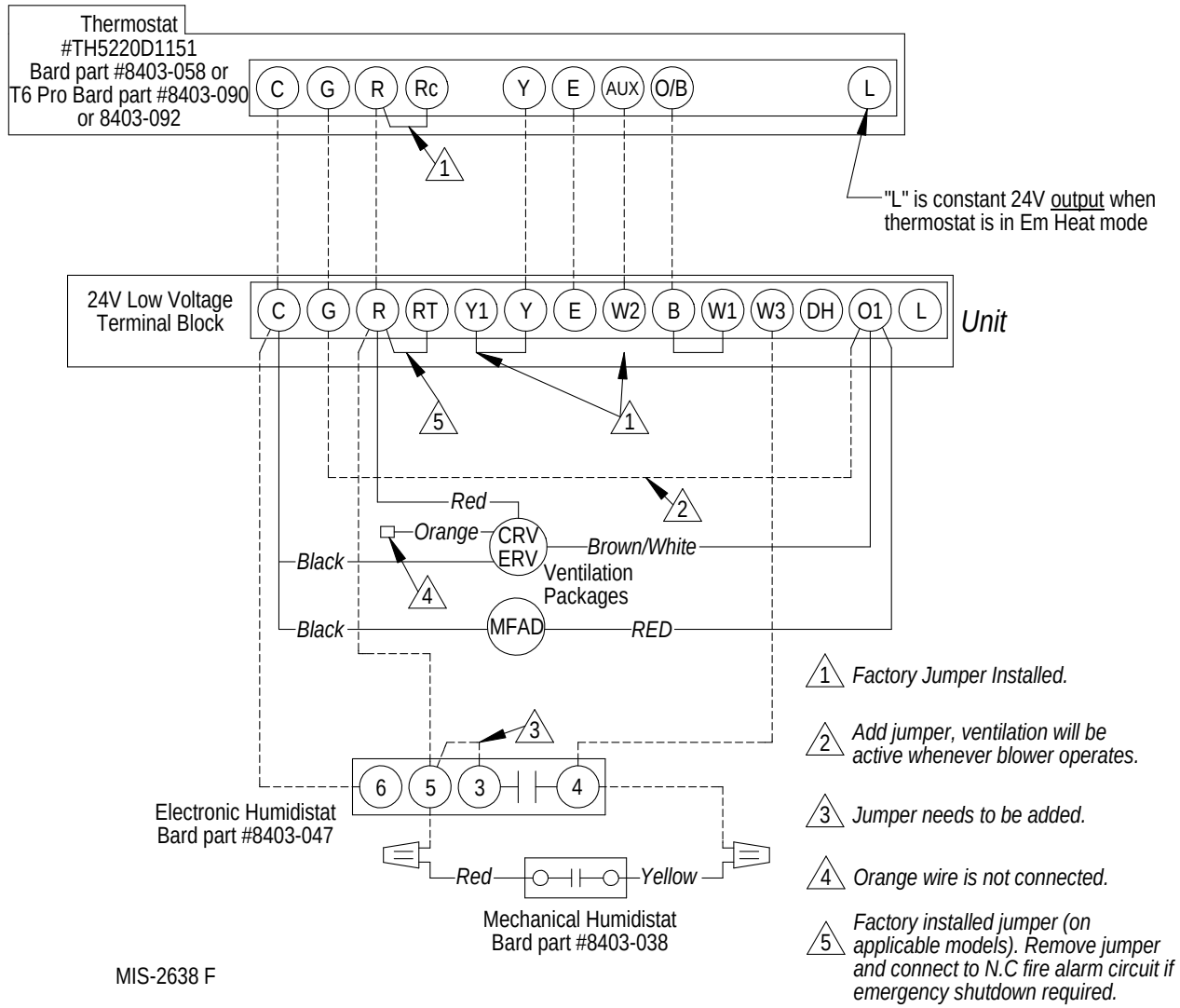


FIGURE 10
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package
Using Thermostat with CO_2 Controller

*For CRVS-*A information, refer to Figure 18 on page 22.*

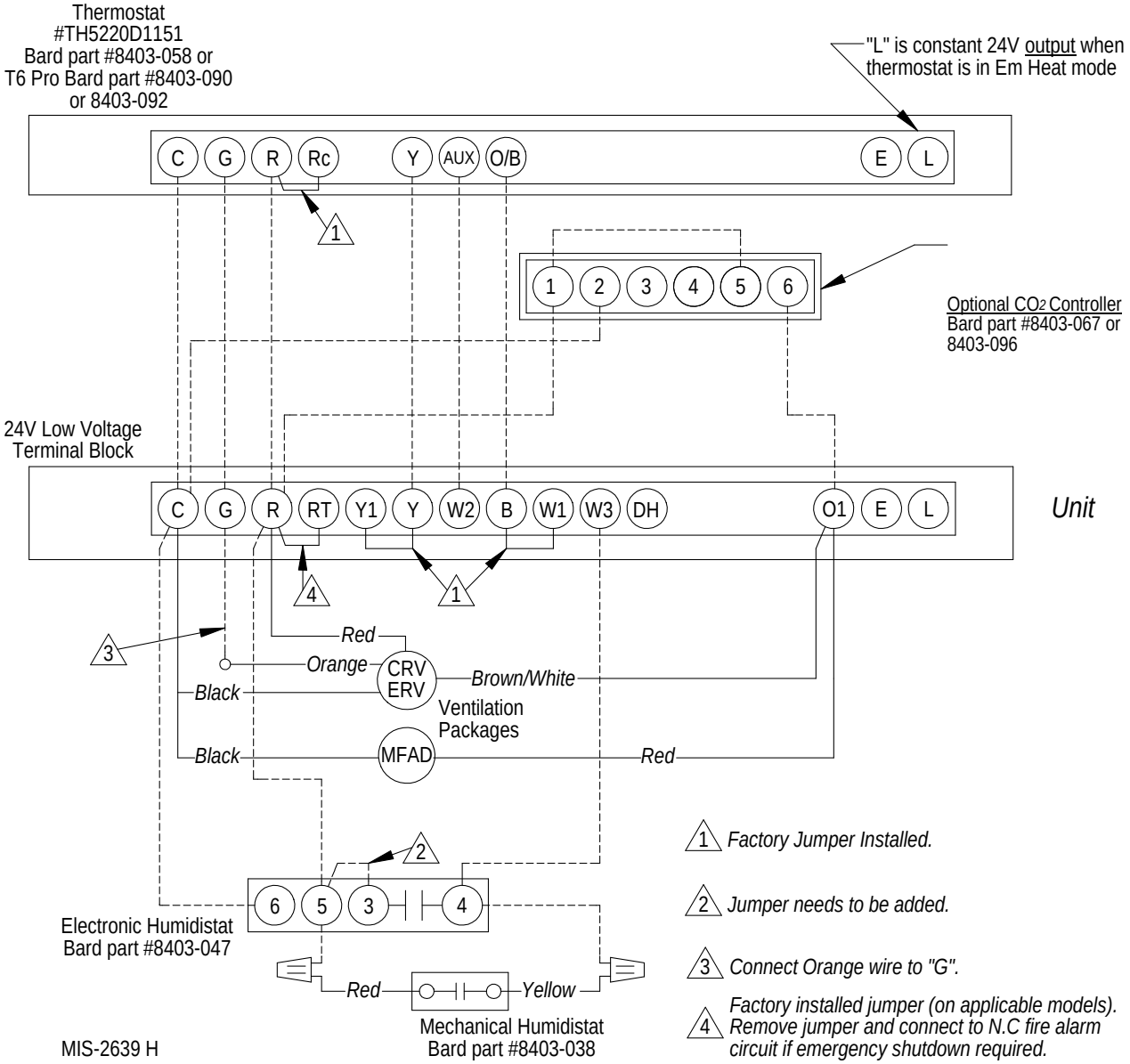
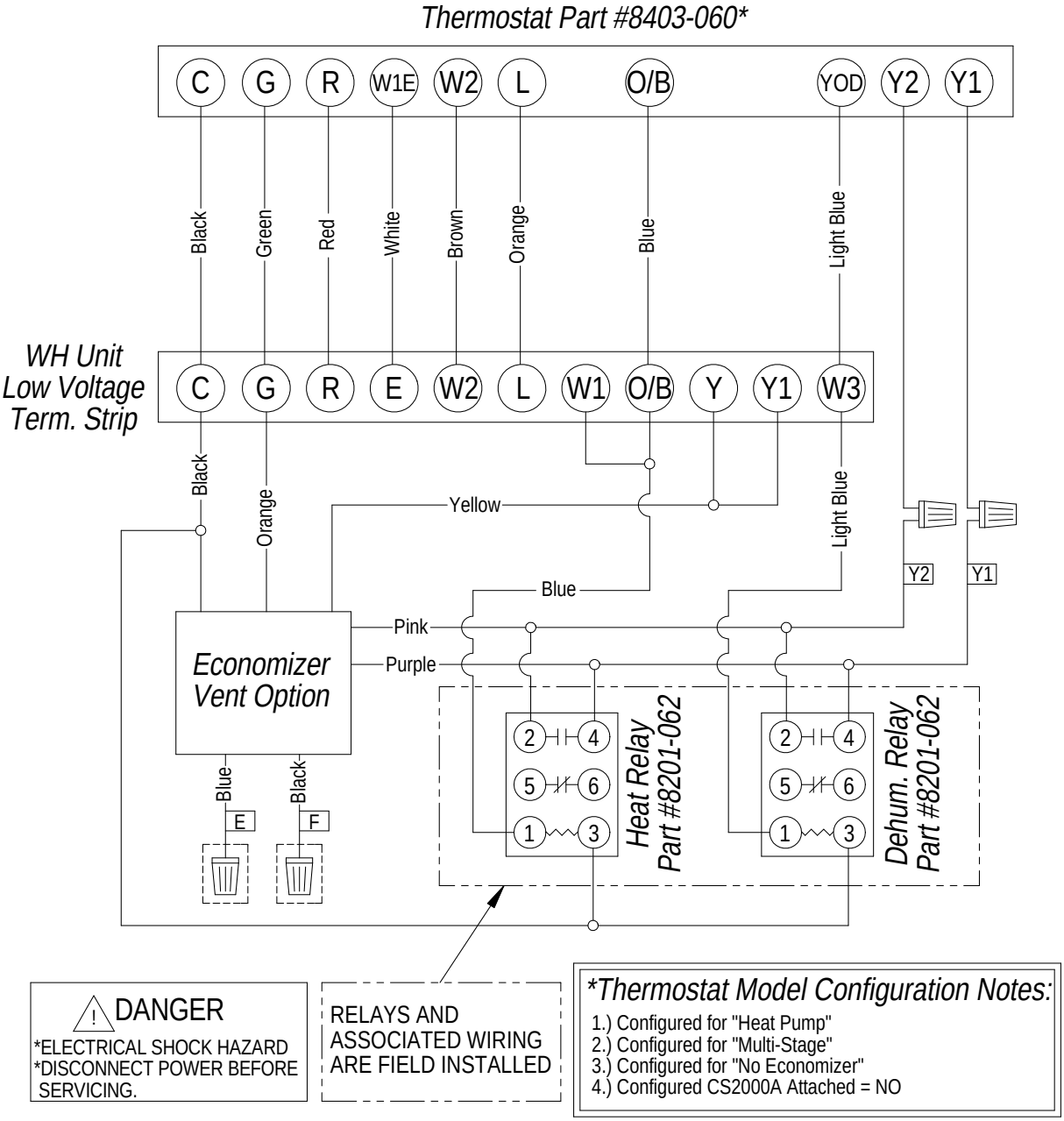
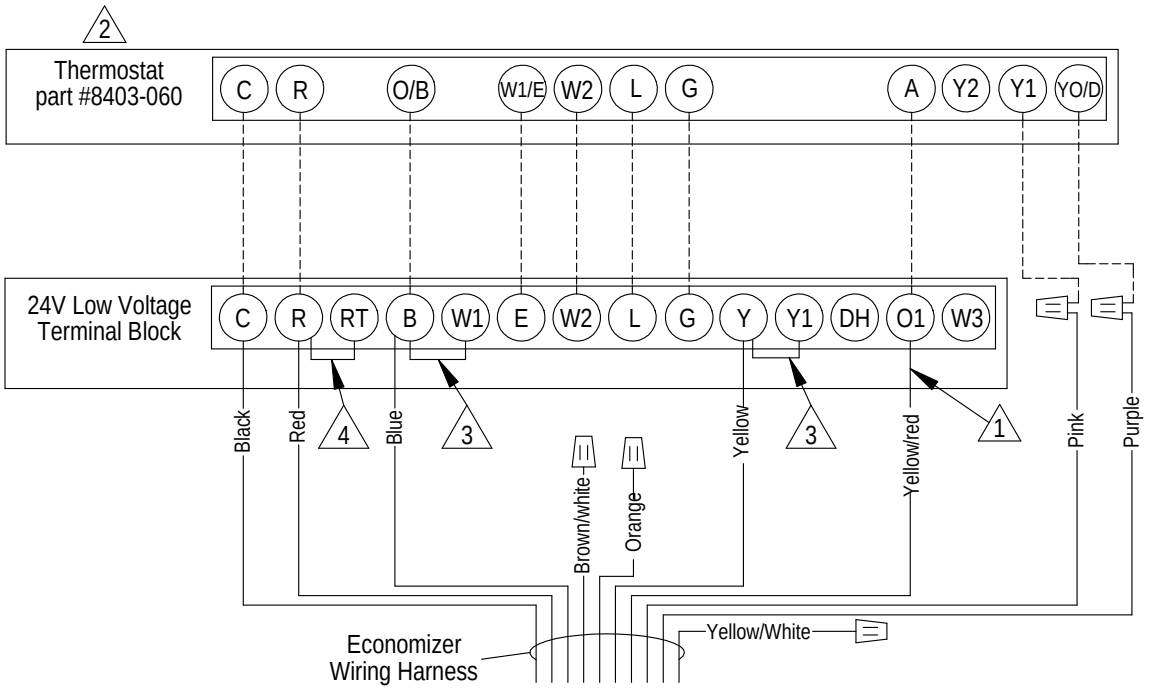


FIGURE 11
Low Voltage Wiring Diagram:
WH1 Dehum. with Economizer and #8403-060 Thermostat (EIFM) "E" Vent Option**



4200-001 B

FIGURE 12
Low Voltage Wiring Diagram:
1-stage Heat Pump with Optional Electric Heat without Dehumidification with ECONWM∗ Style Economizer
"S", "W" or "T" Vent Option



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

2 *Must be configured for heat pump / multistage/ no economizer/ to enable YO/D output to be active as dehumidification output*

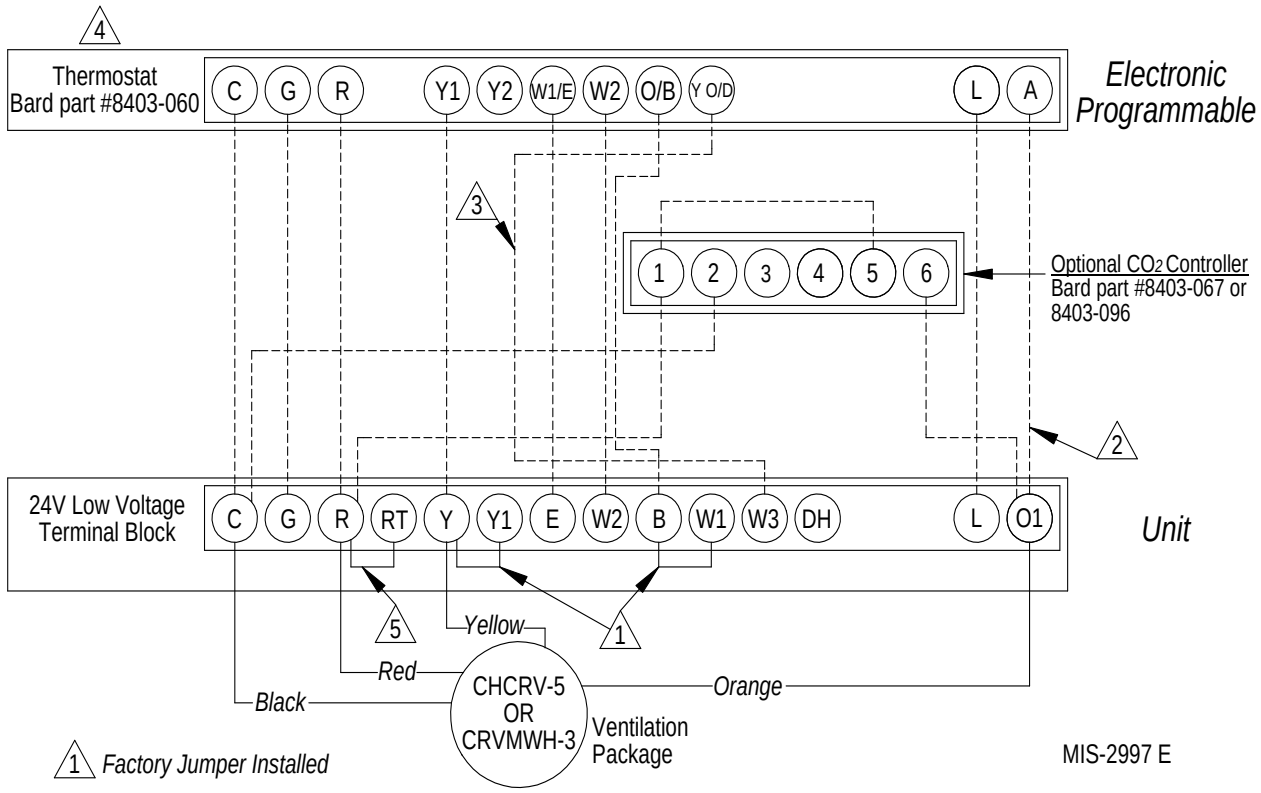
3 *Factory Jumper Installed.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2981 D

FIGURE 13
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVMWH-3 or CHCRV-5 Ventilation Package with Programmable Thermostat (Recommended)

For CHCRV-5A information, refer to Figure 15 on page 19.



1 *Factory Jumper Installed*

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

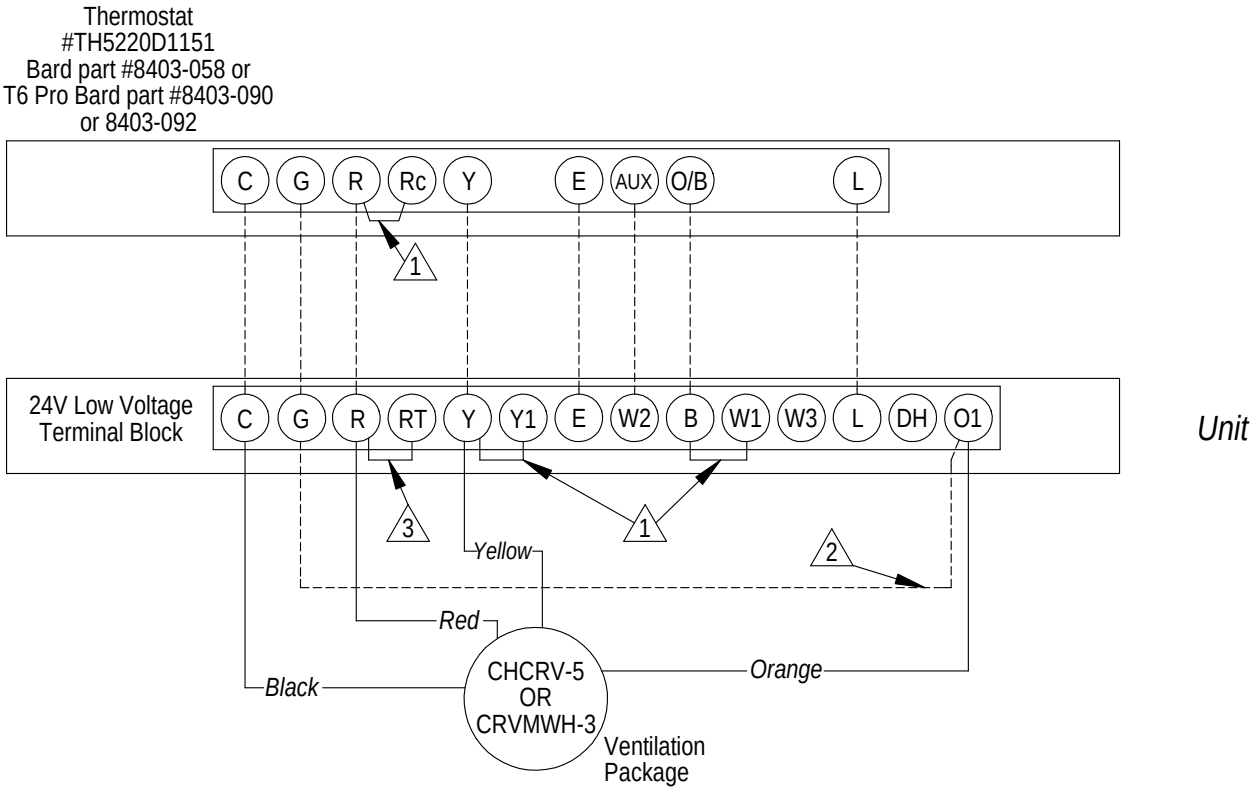
3 *Wire only needed for dehumidification units*

4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 14
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVMWH-3 or CHCRV-5 Ventilation Package with Thermostat (No Occupied Signal)

For CHCRV-5A information, refer to Figure 16 on page 20.



MIS-2998 D

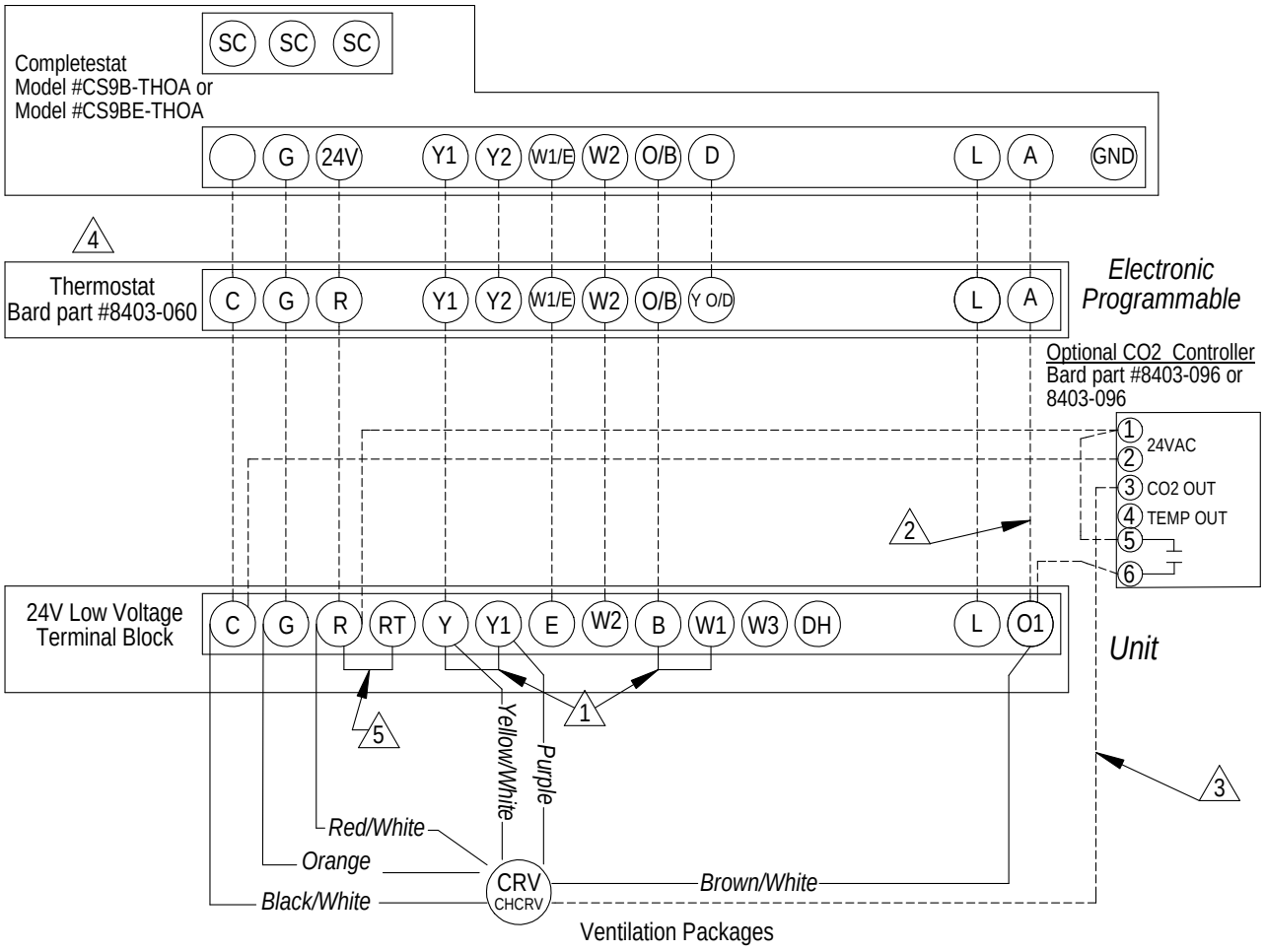
1 *Factory Jumper Installed*

2 *Add jumper, ventilation will be active whenever blower operates.*

3 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 15
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVS-*A or CHCRV-5A Ventilation Package
with Programmable Thermostat (Recommended), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figure 2 on page 6.*
For CHCRV-5 (non A version) information, refer to Figure 13 on page 17.



1 *Factory Jumper Installed*

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

3 *Connect orange wire to "G" only if optional CO_2 controller is used.*

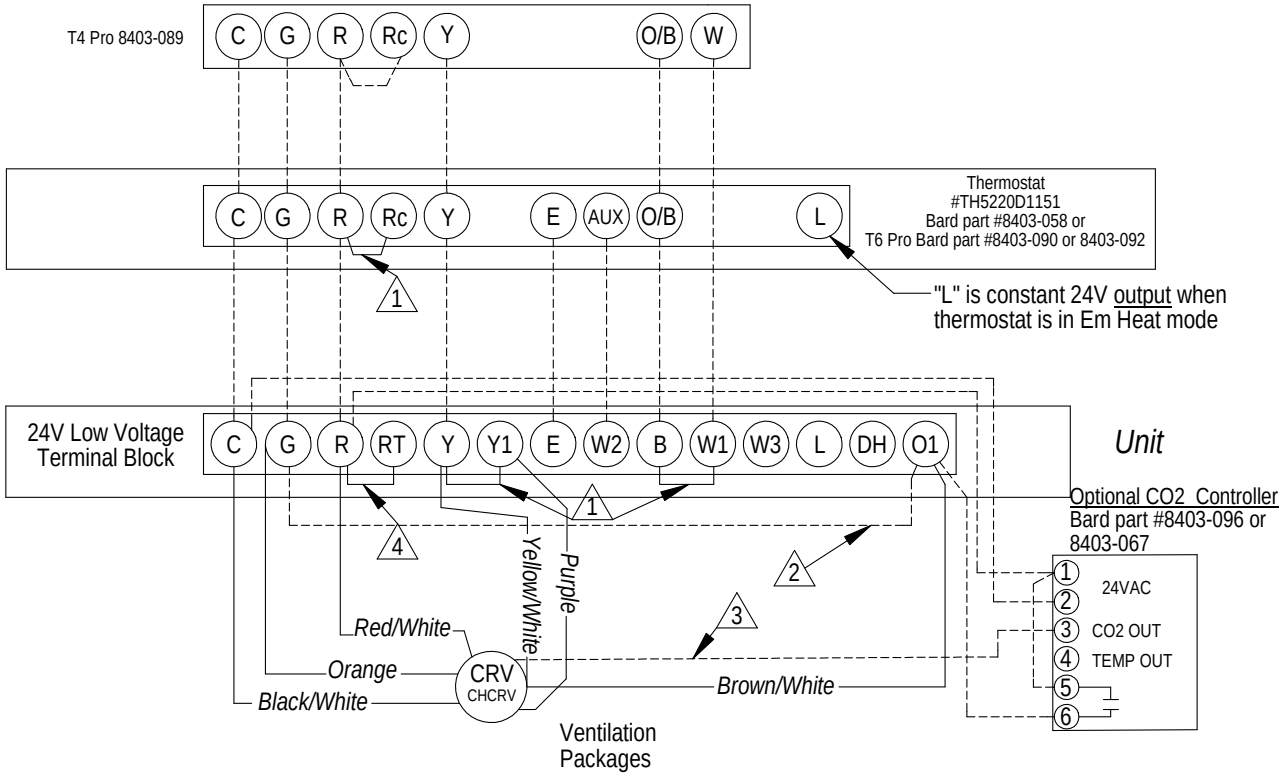
4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-4352 A

FIGURE 16
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVS-*A or CHCRV-5A Ventilation Package
with Thermostat (No Occupied Signal), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figures 3 and 4 on pages 7 and 8.*
For CHCRV-5 (non A version) information, refer to Figure 14 on page 18.



1 *Factory Jumper Installed*

2 *Add jumper, ventilation will be active whenever blower operates.Will require a wire change on vent relay to prevent relay lock-out. Refer to ventilator wiring diagram.*

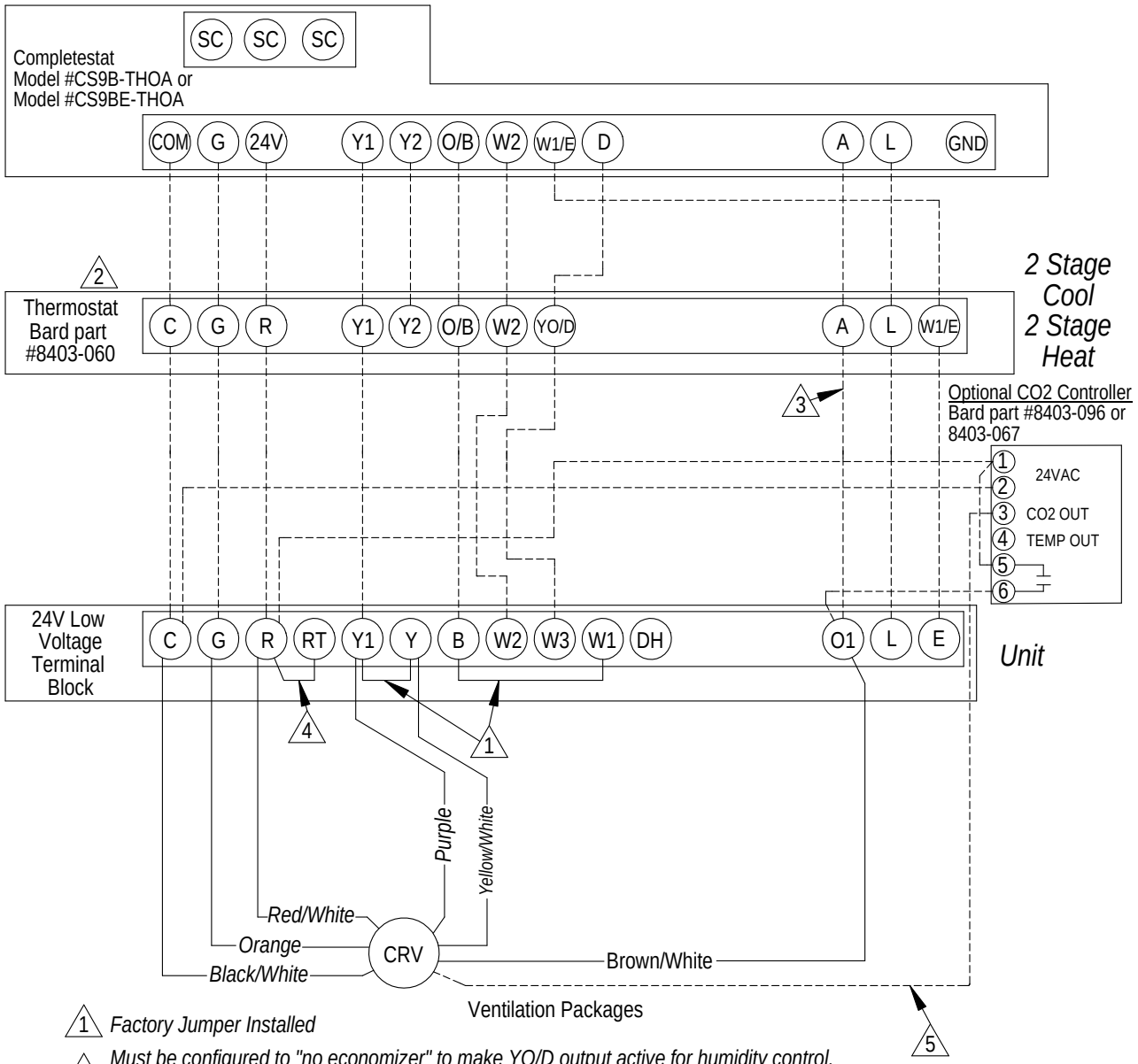
3 *Connect field wire for modulating CO2 ventilator control. Do NOT connect on/off ventilator control (To minimum blade position)*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-4353 A

FIGURE 17
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional CRVS-*A Ventilation Package
Using Electronic Thermostat with Combination Temperature and Humidity Control with Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figure 8 on page 12.*



1 *Factory Jumper Installed*

2 *Must be configured to "no economizer" to make YO/D output active for humidity control. Must be configured to programmable and fan set to programmed fan for the "A" output to function during scheduled occupied periods.*

3 *Do not connect "A" from thermostat if optional CO_2 controller is used.*

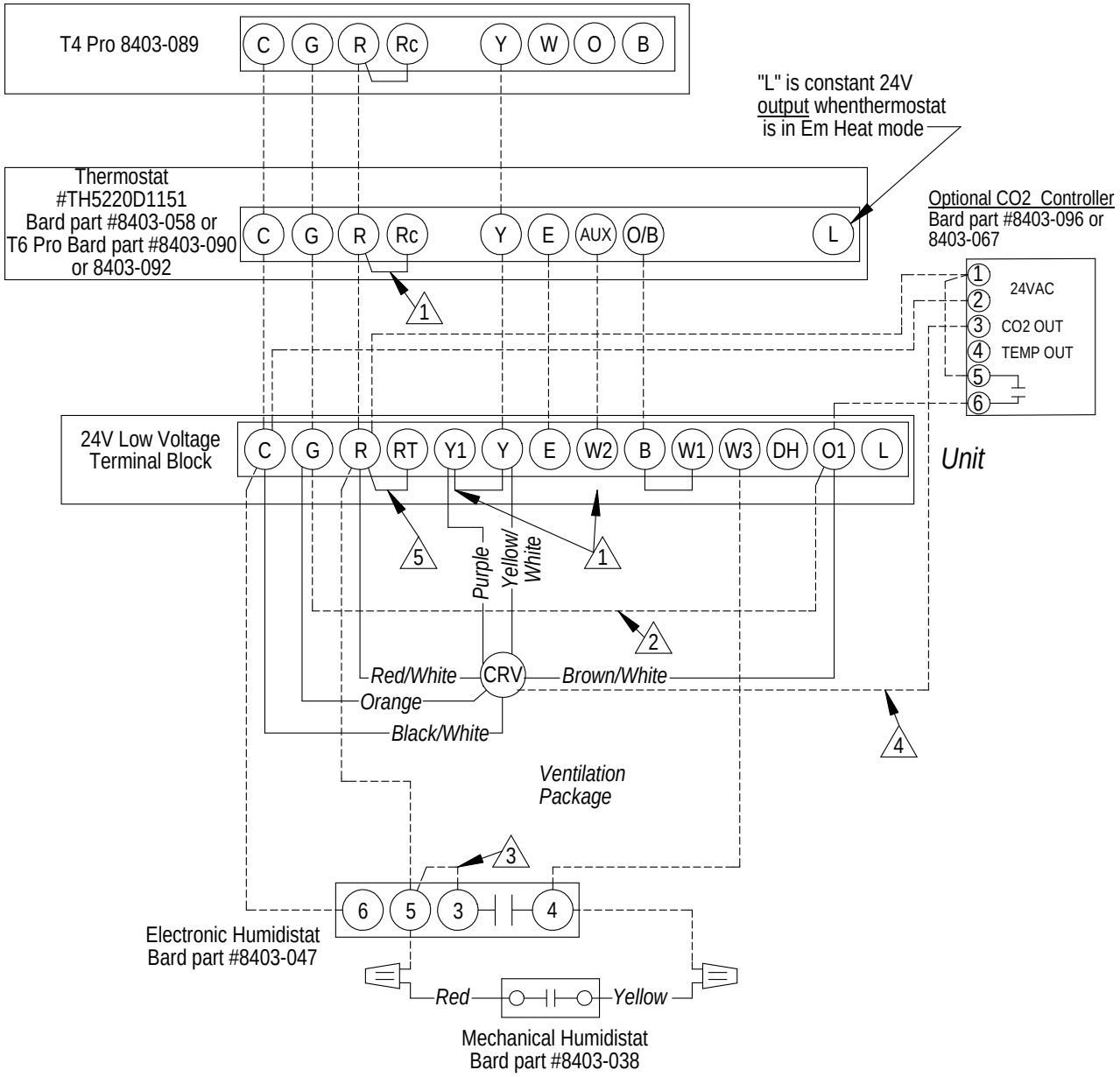
4 *Factory installed jumper (on applicable models).Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

5 *Connect field wire for modulating CO2 ventilator control. Do NOT connect for on/off ventilator control (To minimum blade position).*

MIS-4354 A

FIGURE 18
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional CRVS-*A Ventilation Package
Using Thermostat (No Occupied Signal), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figures 9 and 10 on pages 13 and 14.*



1. *Factory Jumper Installed.*
2. *Add jumper, ventilation will be active whenever blower operates. Will require a wire change on vent relay to prevent relay lock-out. Refer to ventilator wiring diagram.*
3. *Jumper needs to be added.*
4. *Connect field wire for modulating CO2 ventilator control. Do NOT connect for on/off ventilator control (To minimum blade position).*
5. *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-4355 A