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	CHEIFM-5	ERVF-A3	MFAD-3
CRVS-3A		ERVF-C3	MFAD-5
CRVS-5		ERVF-A5	
CRVS-5A		ERVF-C5	
CHCRV-5			
CHCRV-5A			

CONTENTS

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	215 – 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
8403-100* (H6062A1000)	Electronic humidistat DPST Humidity range 10-90% with adjustable stops
8403-047 (H200-10-21-10)	Electronic dehumidistat SPST closes-on-rise Humidity range 10-90% with adjustable stops

* If using Honeywell HumidiPRO (H6062A1000) 8403-100 humidistat, it must be configured for dehumidification in the menu.

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
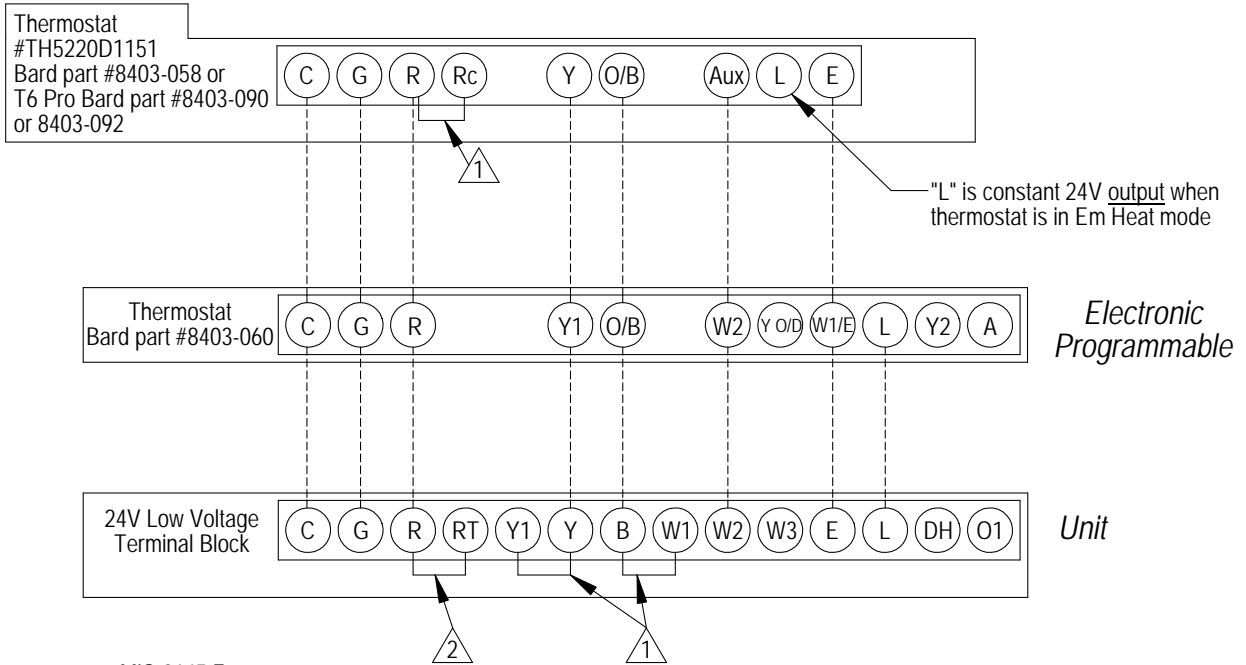
Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090
or 8403-092

C G R Rc   Y O/B   Aux L E

1

"L" is constant 24V output when
thermostat is in Em Heat mode

Thermostat
Bard part #8403-060

C G R   Y1 O/B   W2 Y O/D W1/E L Y2 A

Electronic
Programmable

24V Low Voltage
Terminal Block

C G R RT Y1 Y B W1 W2 W3 E L DH O1

Unit

2   1

MIS-2645 F

⚠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*

⚠️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-2633 E

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.*

Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090
or 8403-092

"L" is constant 24V <u>output</u> when
thermostat is in Em Heat mode

24V Low Voltage
Terminal Block

Unit

Red
Orange
Black
Brown/White

CRV
ERV
Ventilation
Packages

MFAD

Black
Red

MIS-2646 F

△1 *Factory Jumper Installed*

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

△3 *Do not connect orange wire.*

△4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*
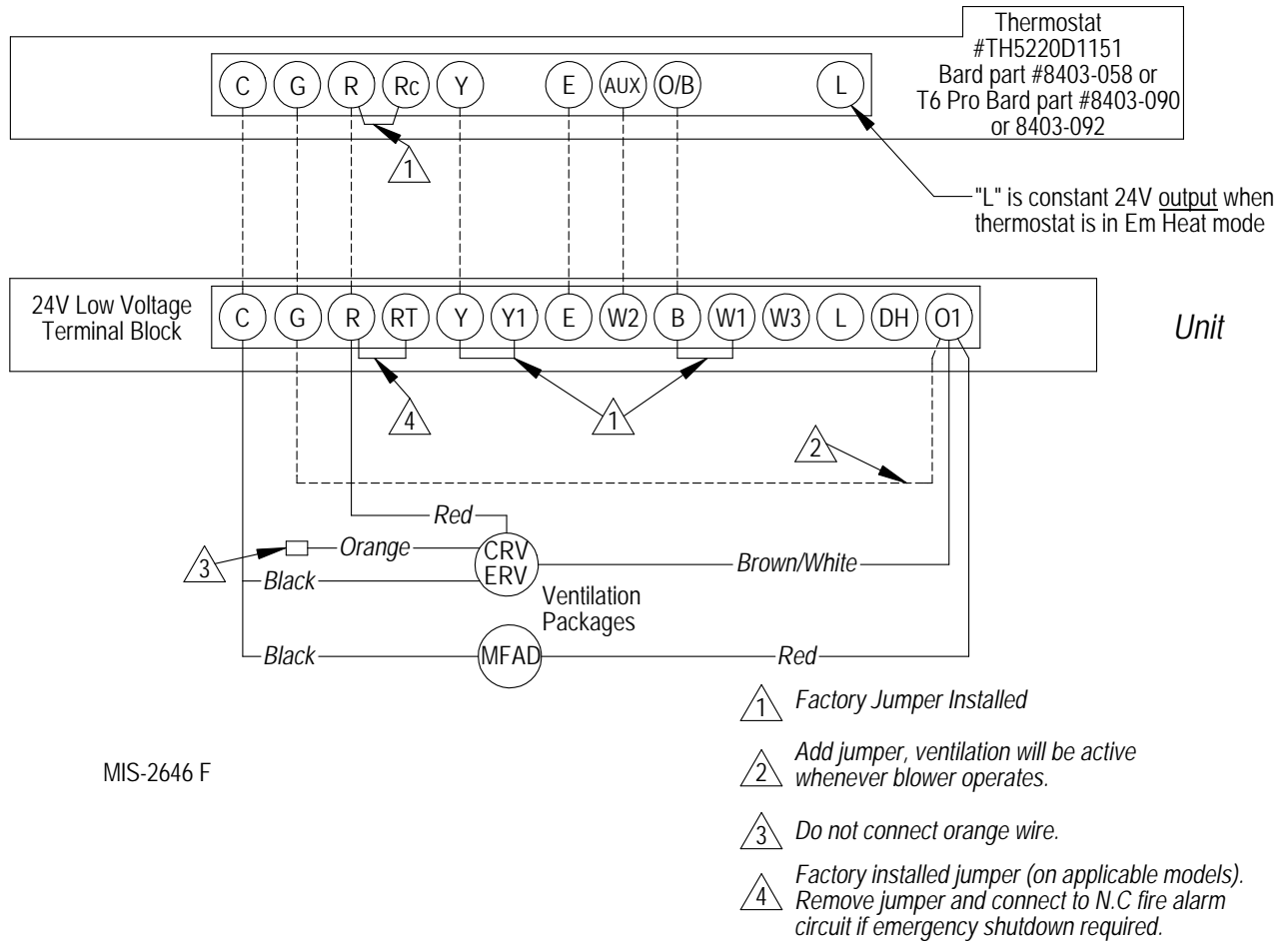
FIGURE 4
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package with Thermostat with CO_2 Controller

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

"L" is constant 24V <u>output</u> when thermostat is in Em Heat mode

Thermostat #TH5220D1151 Bard part #8403-058 or T6 Pro Bard part #8403-090 or 8403-092

Optional CO_2 Controller Bard part #8403-067 or 8403-096

24V Low Voltage Terminal Block

Unit

Red

Orange

Black

Brown/White

CRV ERV

Ventilation Packages

Black

MFAD

Red

⚠1 *Factory Jumper Installed*

⚠2 *Connect orange wire to "G" only if optional CO_2 controller is used.*
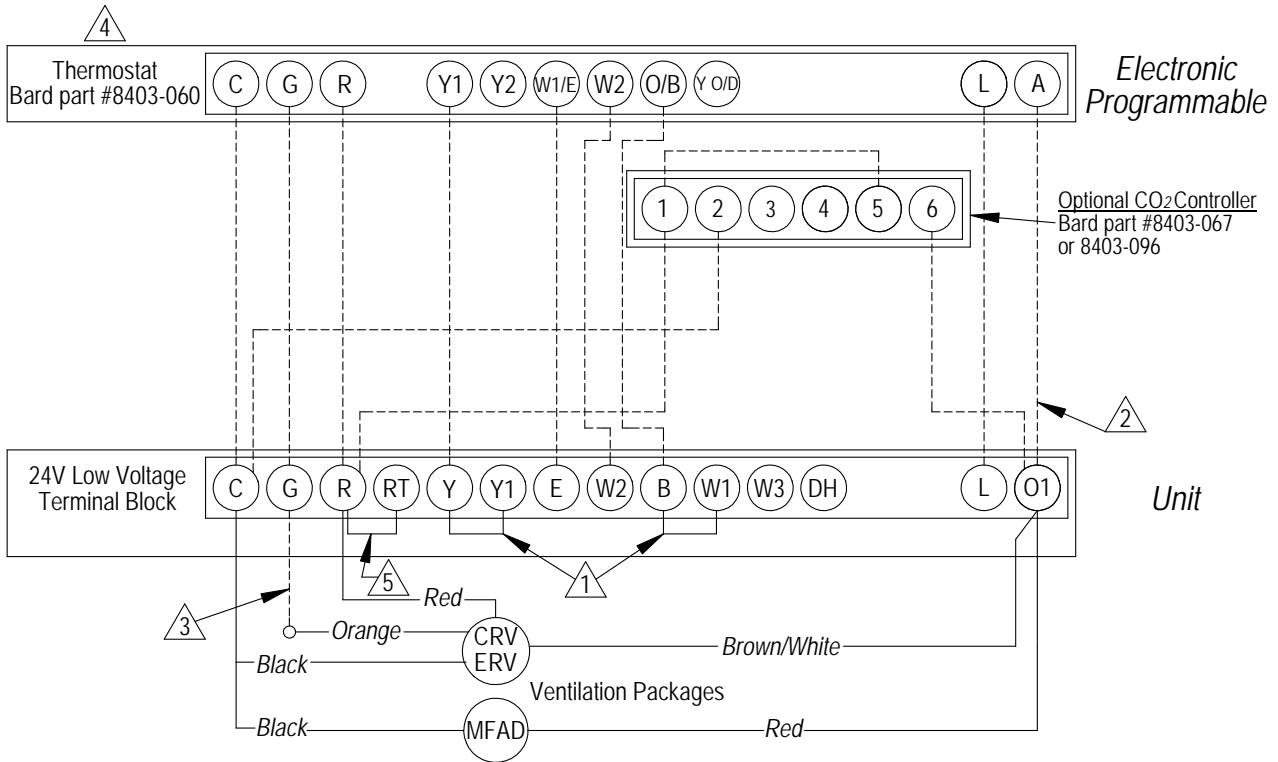
⚠3 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2634 H

FIGURE 5
Low Voltage Wiring Diagram:
Heat Pump with Optional EIFM Economizer "E" Vent Option
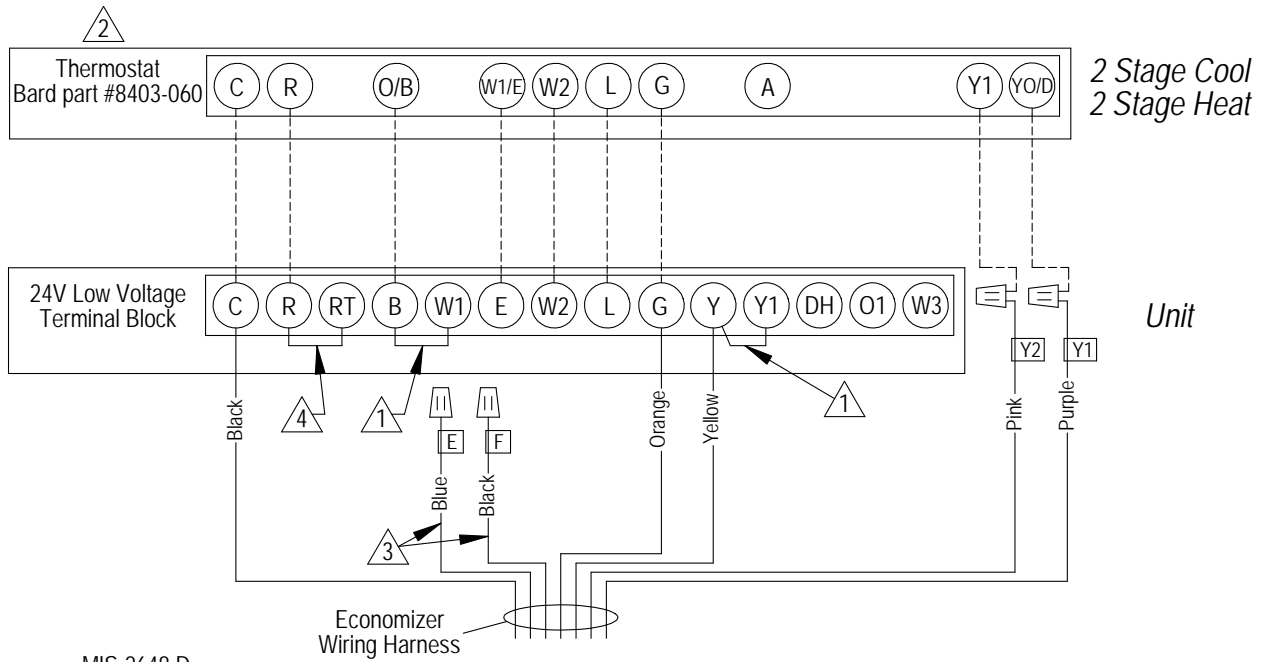
MIS-2648 D

△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

Thermostat
Bard part #8403-060

△2

C G R Y1 W1/E Y2 W2 YO/D O/B L A

Electronic Programmable

24V Low Voltage
Terminal Block

C G R RT Y1 Y E W1 W2 W3 B DH L O1

Unit

△3 △1

△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.*
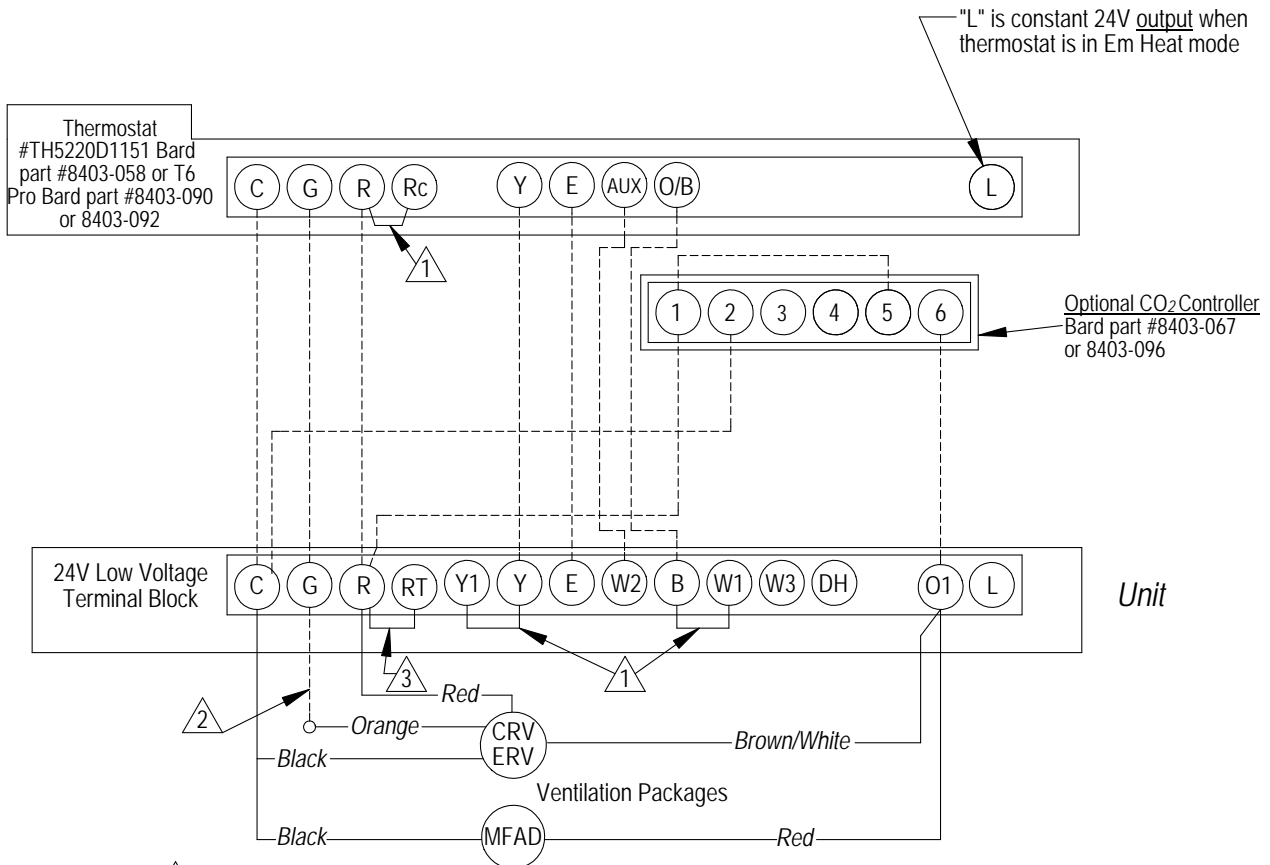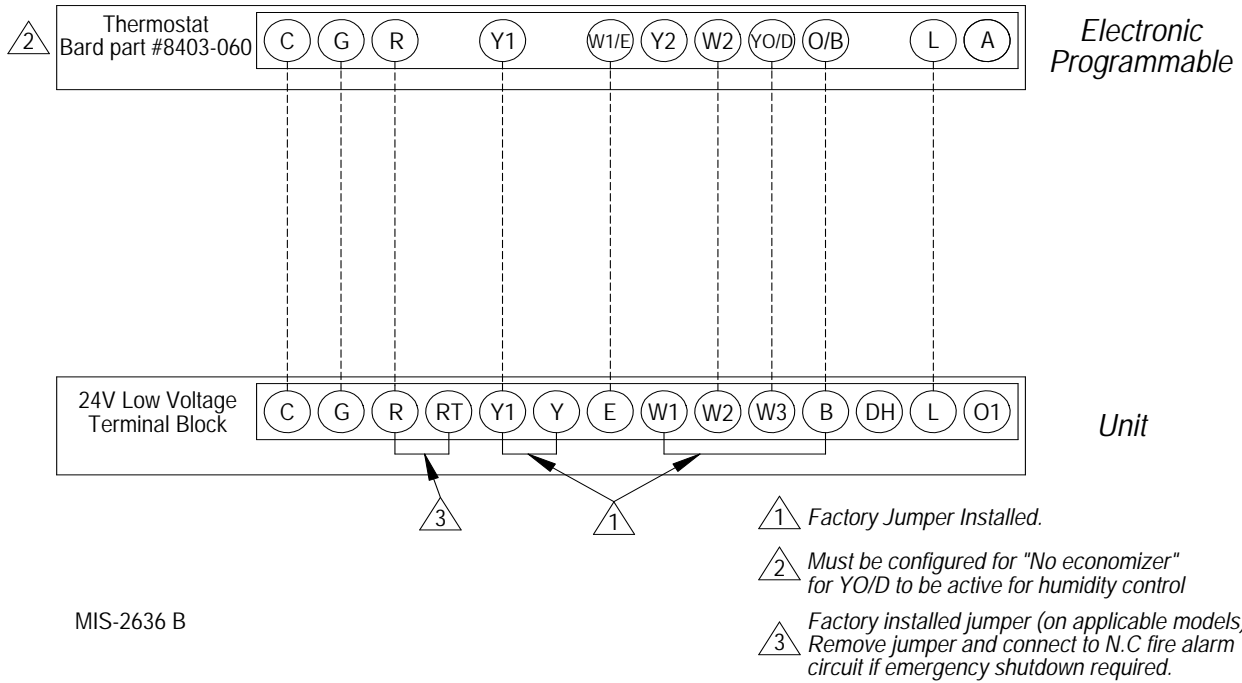
MIS-2636 B

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

Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090
or 8403-092

C G R Rc Y E AUX O/B L

"L" is constant 24V output when thermostat is in Em Heat mode

24V Low Voltage Terminal Block

C G R RT Y Y1 E W2 B W1 W3 L DH O1 *Unit*

ELECTRONIC HUMIDISTAT
BARD PART #8403-047
OR
BARD PART #8403-100 4
ELECTRONIC HUMIDISTAT

C R U/DEH U/DEH

Red *Yellow*

Mechanical Humidistat
Bard part #8403-038

1 FACTORY JUMPER INSTALLED.

2 JUMPER NEEDS TO BE ADDED.

3 FACTORY INSTALLED JUMPER (ON APPLICABLE MODELS). REMOVE JUMPER AND CONNECT TO N.C FIRE ALARM CIRCUIT IF EMERGENCY SHUTDOWN REQUIRED.

4 HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

MIS-2649 F

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.*
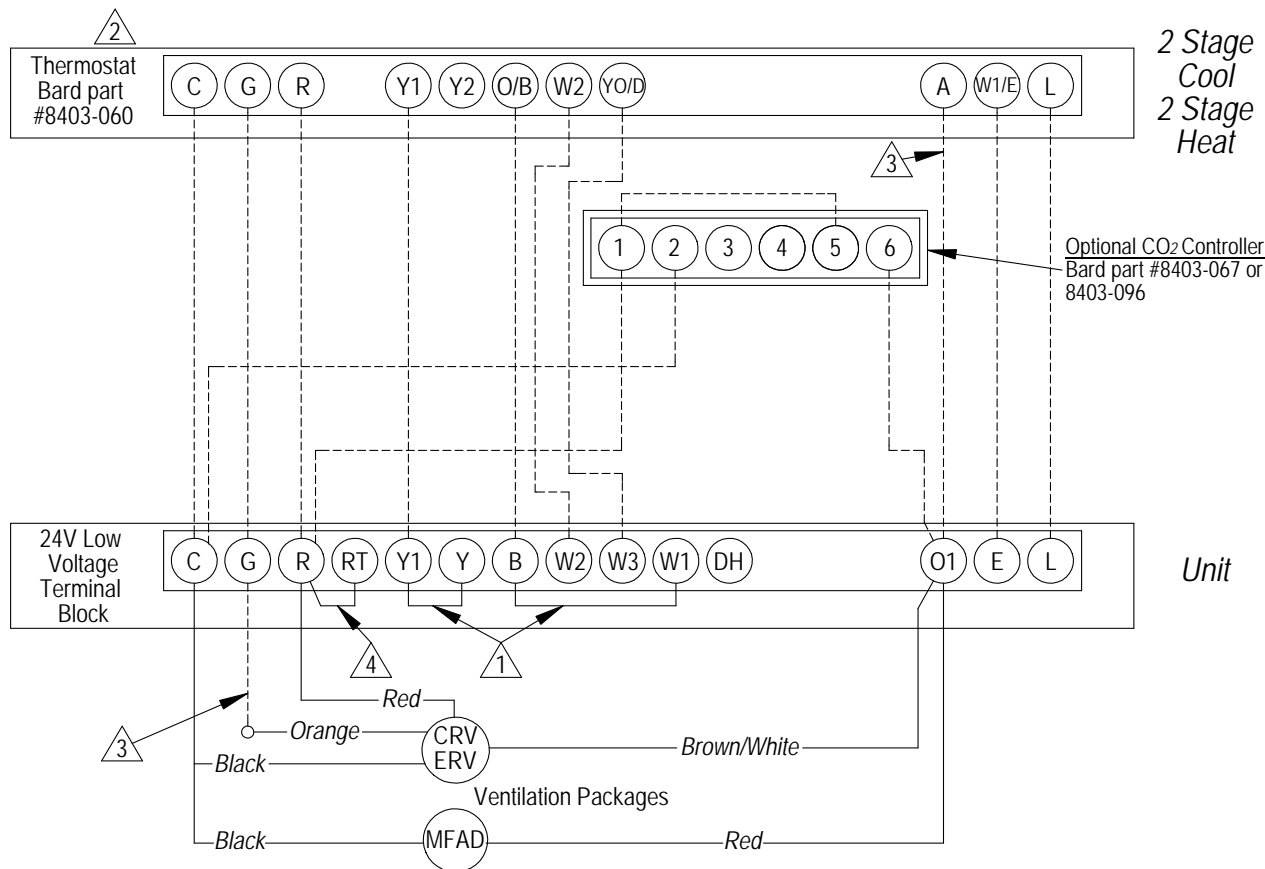
MIS-2637 E

△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.*

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.*

Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090
or 8403-092

C G R Rc   Y E (AUX) (O/B)   L

"L" is constant 24V output when
thermostat is in Em Heat mode

24V Low Voltage
Terminal Block

C G R RT Y1 Y E W2 B W1 W3 DH O1 L   *Unit*

Red
Orange CRV
ERV
Black   Brown/White
Ventilation
Packages
Black   MFAD   RED

ELECTRONIC HUMIDISTAT
BARD PART #8403-047
OR
BARD PART #8403-100
ELECTRONIC HUMIDISTAT

MIS-2638 G

C R U/DEH   U/DEH

Red   Yellow

Mechanical Humidistat
Bard part #8403-038

△1 *FACTORY JUMPER INSTALLED.*

△2 *ADD JUMPER, VENTILATION WILL BE ACTIVE WHENEVER BLOWER OPERATES.*

△3 *JUMPER NEEDS TO BE ADDED.*

△4 *ORANGE WIRE IS NOT CONNECTED.*

△5 *FACTORY INSTALLED JUMPER (ON APPLICABLE MODELS). REMOVE JUMPER AND CONNECT TO N.C FIRE ALARM CIRCUIT IF EMERGENCY SHUTDOWN REQUIRED.*

△6 HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

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.*

Thermostat
#TH5220D1151
Bard part #8403-058 or
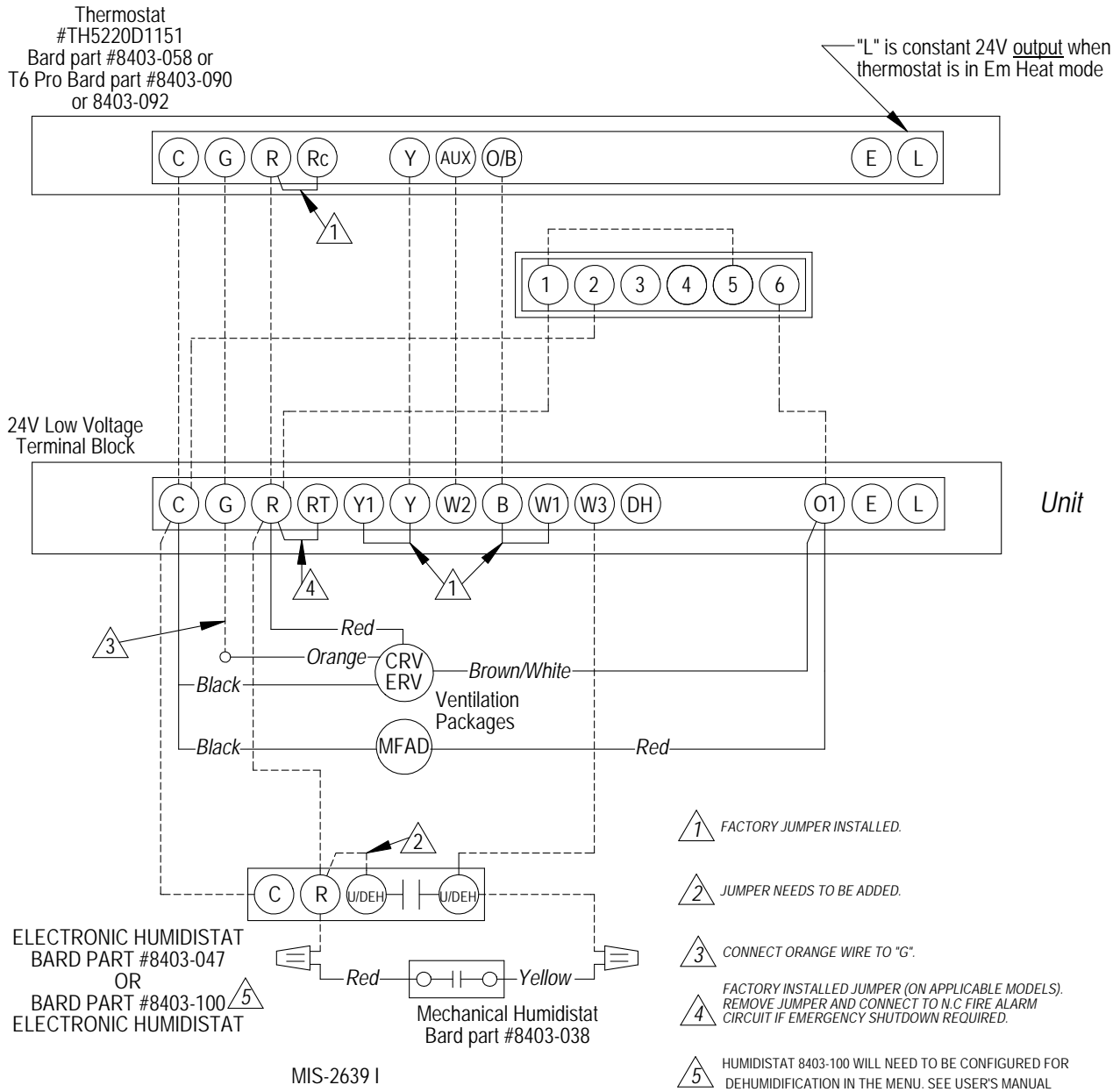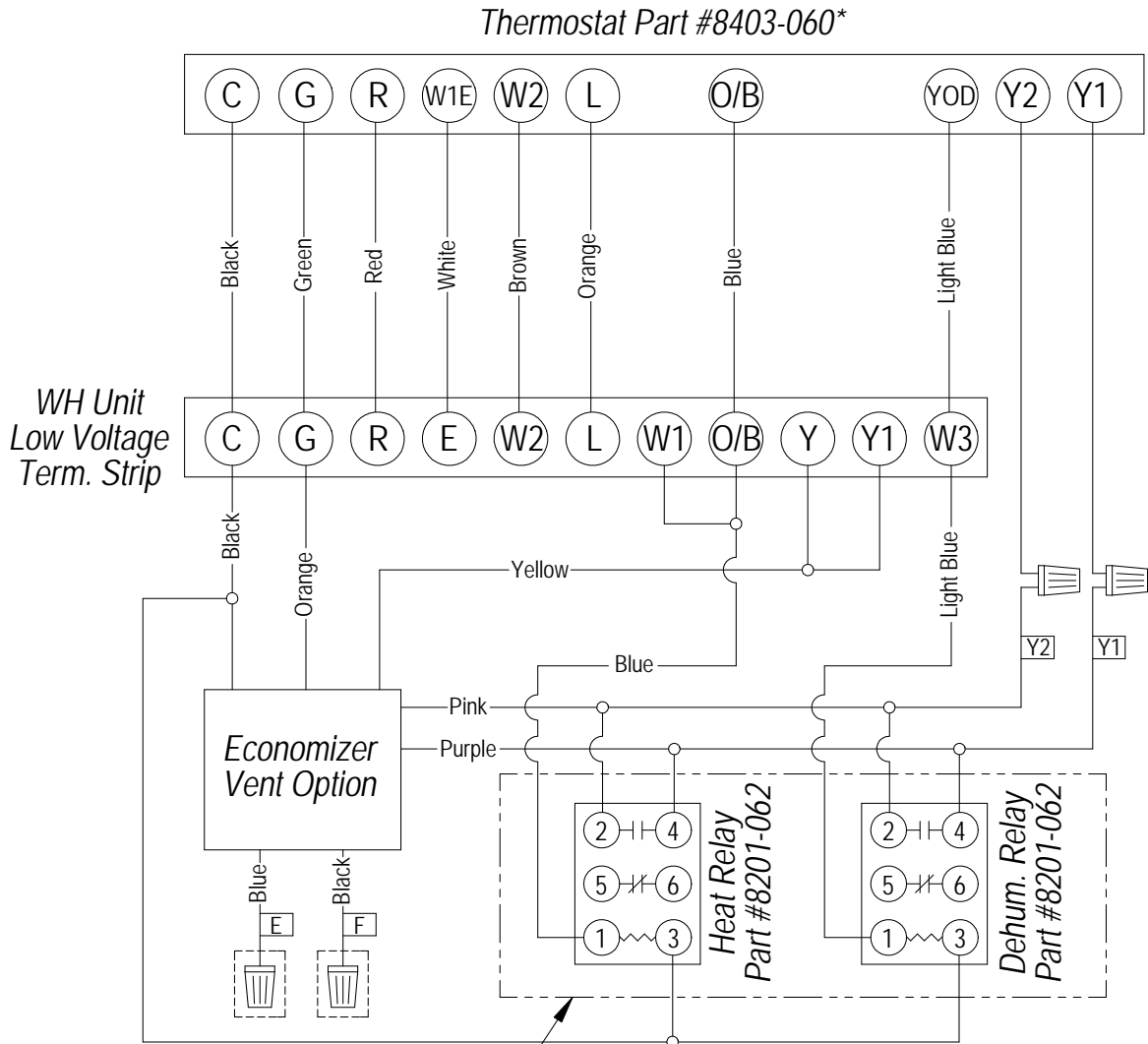T6 Pro Bard part #8403-090
or 8403-092

"L" is constant 24V <u>output</u> when
thermostat is in Em Heat mode

C G R Rc   Y (AUX) (O/B)   E L

1 2 3 4 5 6

24V Low Voltage
Terminal Block

C G R RT Y1 Y W2 B W1 W3 DH   O1 E L   *Unit*

Red
Orange CRV / ERV *Brown/White*
Black
Ventilation Packages
Black MFAD *Red*

C R U/DEH | U/DEH

ELECTRONIC HUMIDISTAT
BARD PART #8403-047
OR
BARD PART #8403-100
ELECTRONIC HUMIDISTAT

Red Mechanical Humidistat *Yellow*
Bard part #8403-038

MIS-2639 I

1 FACTORY JUMPER INSTALLED.

2 JUMPER NEEDS TO BE ADDED.

3 CONNECT ORANGE WIRE TO "G".

4 FACTORY INSTALLED JUMPER (ON APPLICABLE MODELS).
REMOVE JUMPER AND CONNECT TO N.C FIRE ALARM
CIRCUIT IF EMERGENCY SHUTDOWN REQUIRED.

5 HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR
DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

FIGURE 11
Low Voltage Wiring Diagram:
W**H1 Dehum. with Economizer and #8403-060 Thermostat (EIFM) "E" Vent Option

Thermostat Part #8403-060*

| C | G | R | W1E | W2 | L | O/B | YOD | Y2 | Y1 |

Black | Green | Red | White | Brown | Orange | Blue | Light Blue

WH Unit Low Voltage Term. Strip

| C | G | R | E | W2 | L | W1 | O/B | Y | Y1 | W3 |

Black | Orange

Yellow

Blue

Pink

Purple

Light Blue

Y2 | Y1

Economizer Vent Option

Blue | Black

E | F

Heat Relay Part #8201-062

2	4
5	6
1	3

Dehum. Relay Part #8201-062

2	4
5	6
1	3

⚠ **DANGER**
*ELECTRICAL SHOCK HAZARD
*DISCONNECT POWER BEFORE SERVICING.

RELAYS AND ASSOCIATED WIRING ARE FIELD INSTALLED

Thermostat Model Configuration Notes:
1.) Configured for "Heat Pump"
2.) Configured for "Multi-Stage"
3.) Configured for "No Economizer"
4.) Configured CS2000A Attached = NO

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
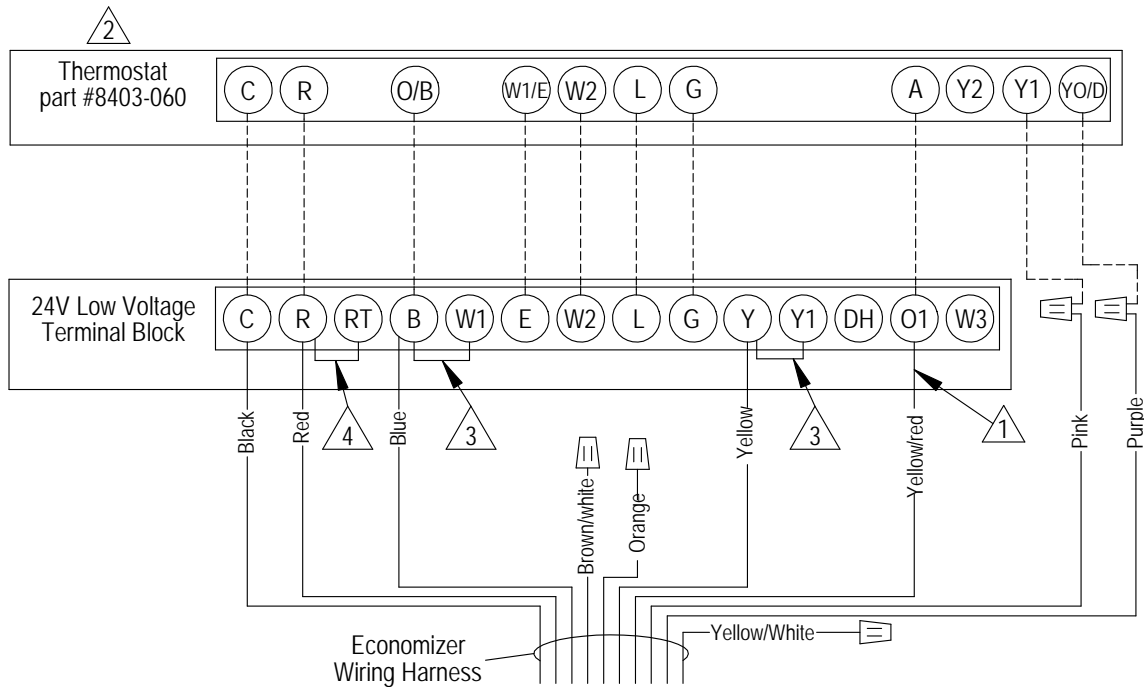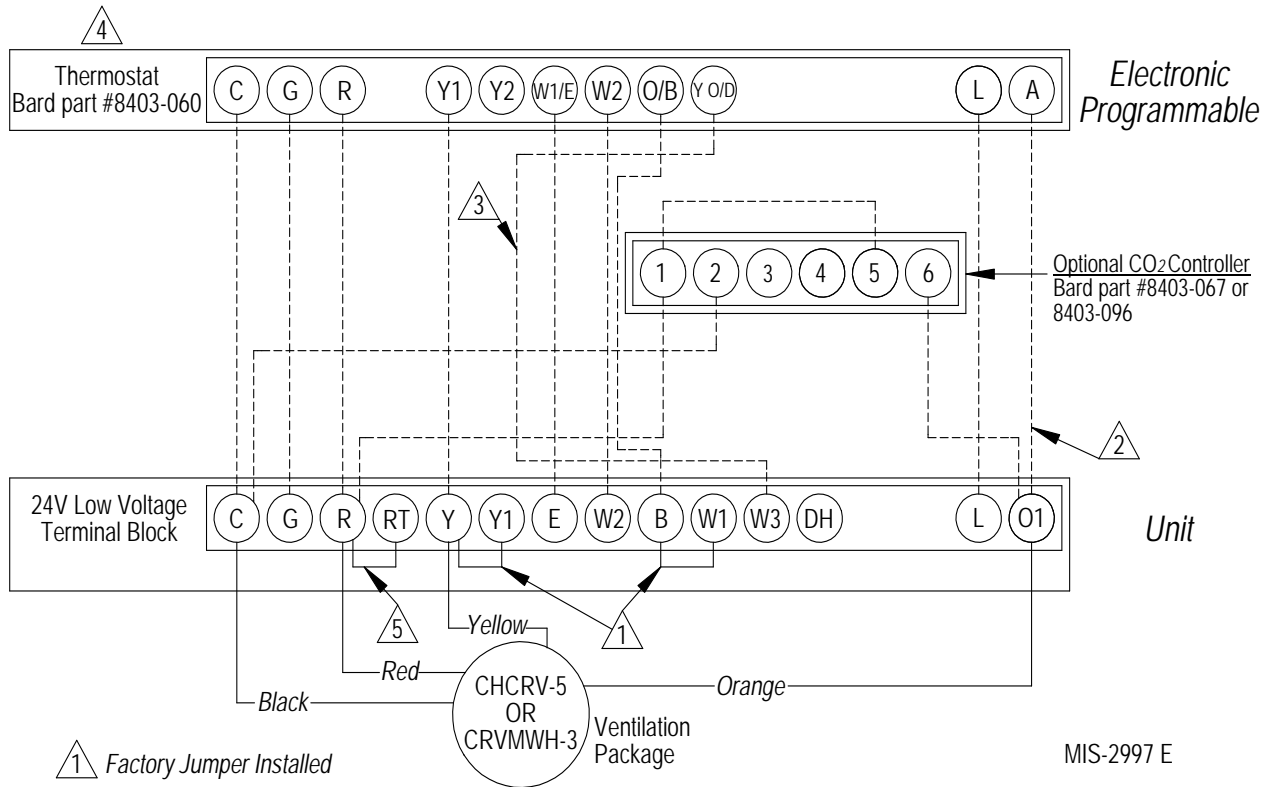

Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.

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

Factory Jumper Installed.

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.*

Thermostat Bard part #8403-060

C G R Y1 Y2 W1/E W2 O/B Y O/D L A

Electronic Programmable

Optional CO_2 Controller Bard part #8403-067 or 8403-096

1 2 3 4 5 6

24V Low Voltage Terminal Block

C G R RT Y Y1 E W2 B W1 W3 DH L O1

Unit

Yellow
Red
Black
Orange

CHCRV-5 OR CRVMWH-3 Ventilation Package

MIS-2997 E

△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.

Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090
or 8403-092

24V Low Voltage Terminal Block

Unit

CHCRV-5 OR CRVMWH-3 Ventilation Package

Yellow

Red

Black

Orange
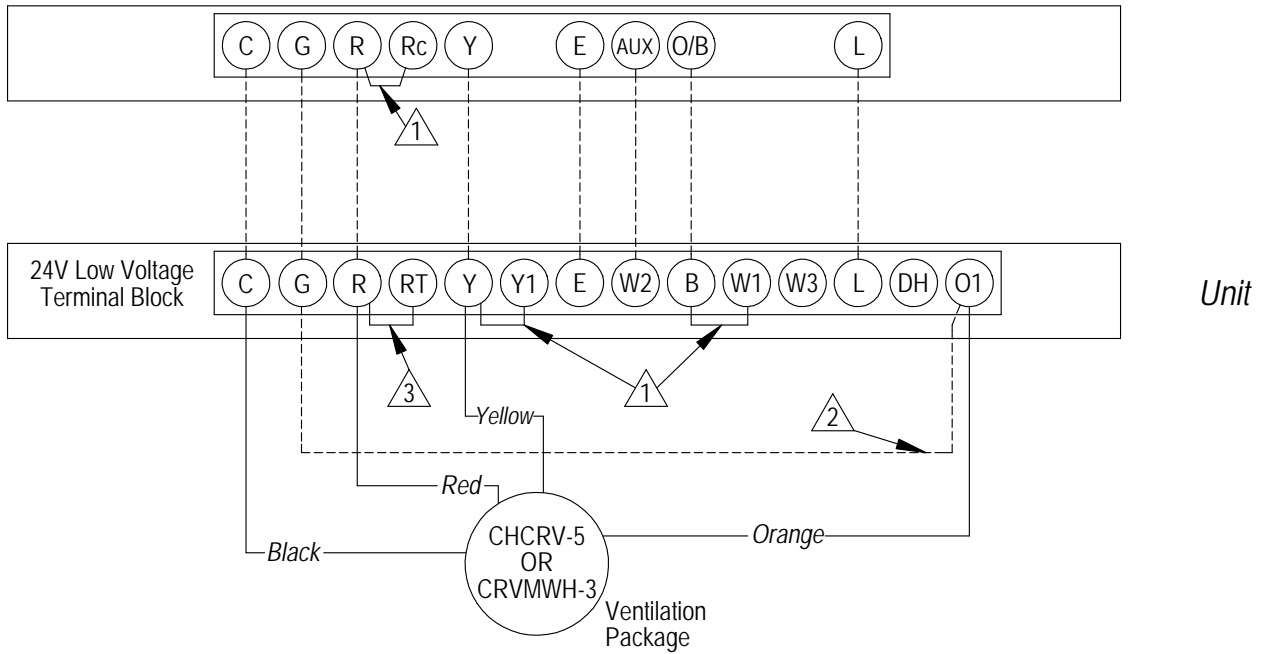
MIS-2998 D

$\triangle$1 *Factory Jumper Installed*

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

$\triangle$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.*
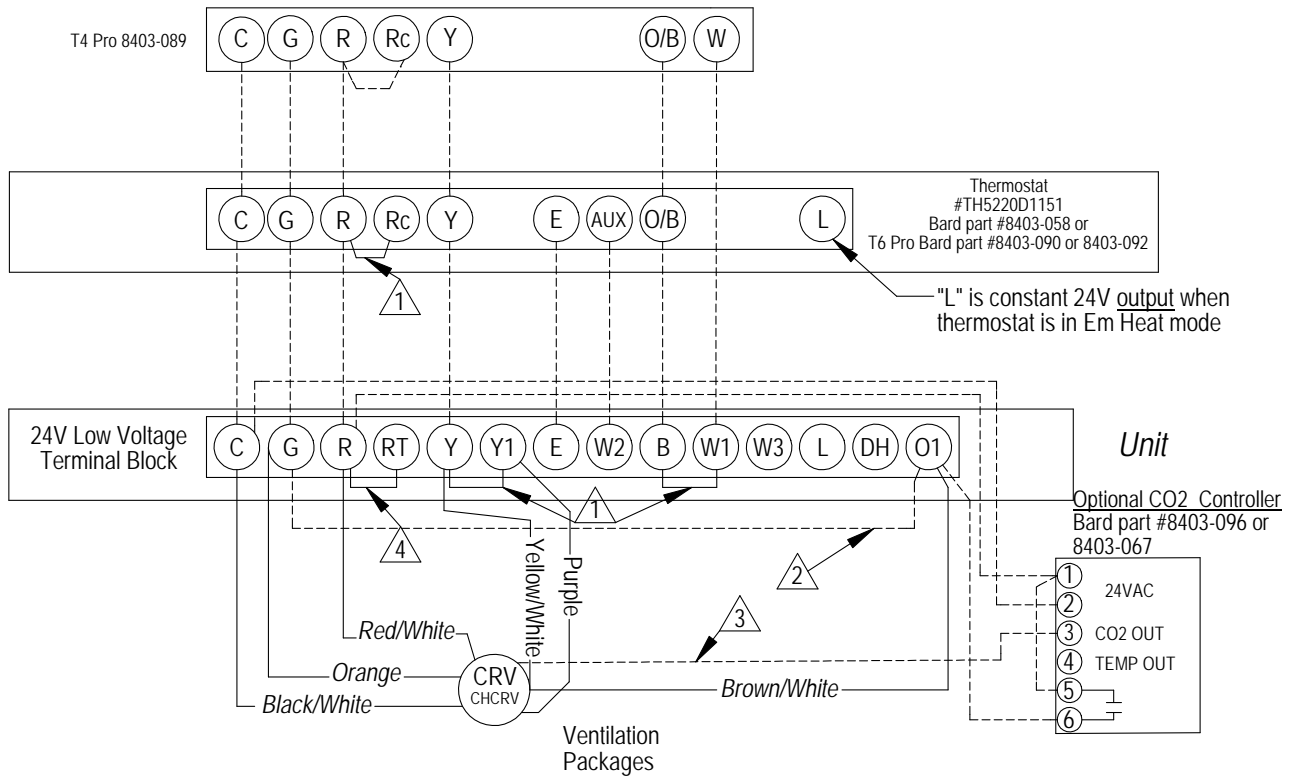*For CHCRV-5 (non A version) information, refer to Figure 13 on page 17.*
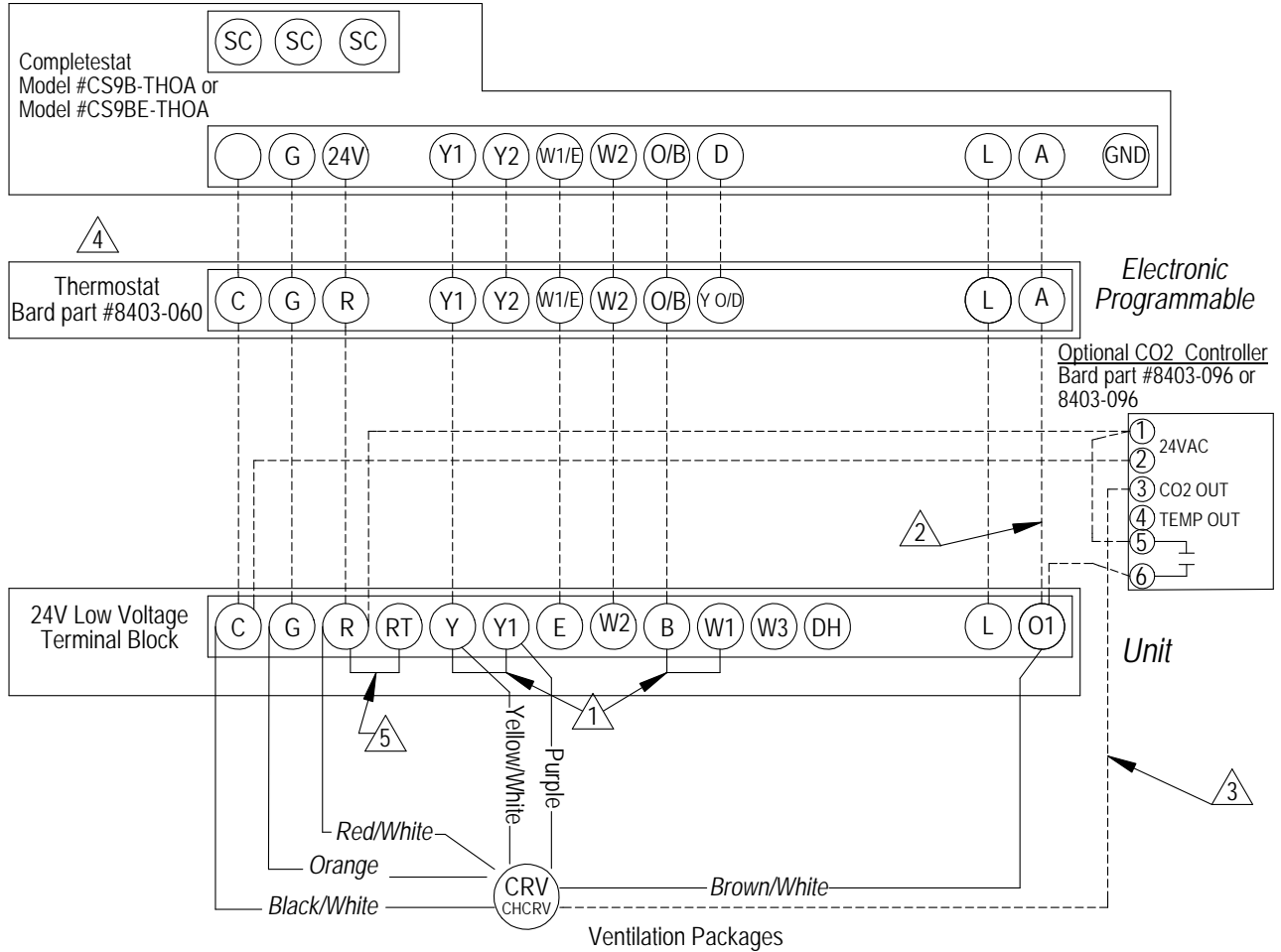
△1 *Factory Jumper Installed*

△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 CO₂ 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.

T4 Pro 8403-089

Thermostat
#TH5220D1151
Bard part #8403-058 or
T6 Pro Bard part #8403-090 or 8403-092

"L" is constant 24V output when
thermostat is in Em Heat mode

24V Low Voltage
Terminal Block

Unit

Optional CO2 Controller
Bard part #8403-096 or
8403-067

1 24VAC
2
3 CO2 OUT
4 TEMP OUT
5
6

Red/White
Orange
Black/White

CRV
CHCRV

Yellow/White
Purple

Brown/White

Ventilation
Packages

△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 CO₂ Controller

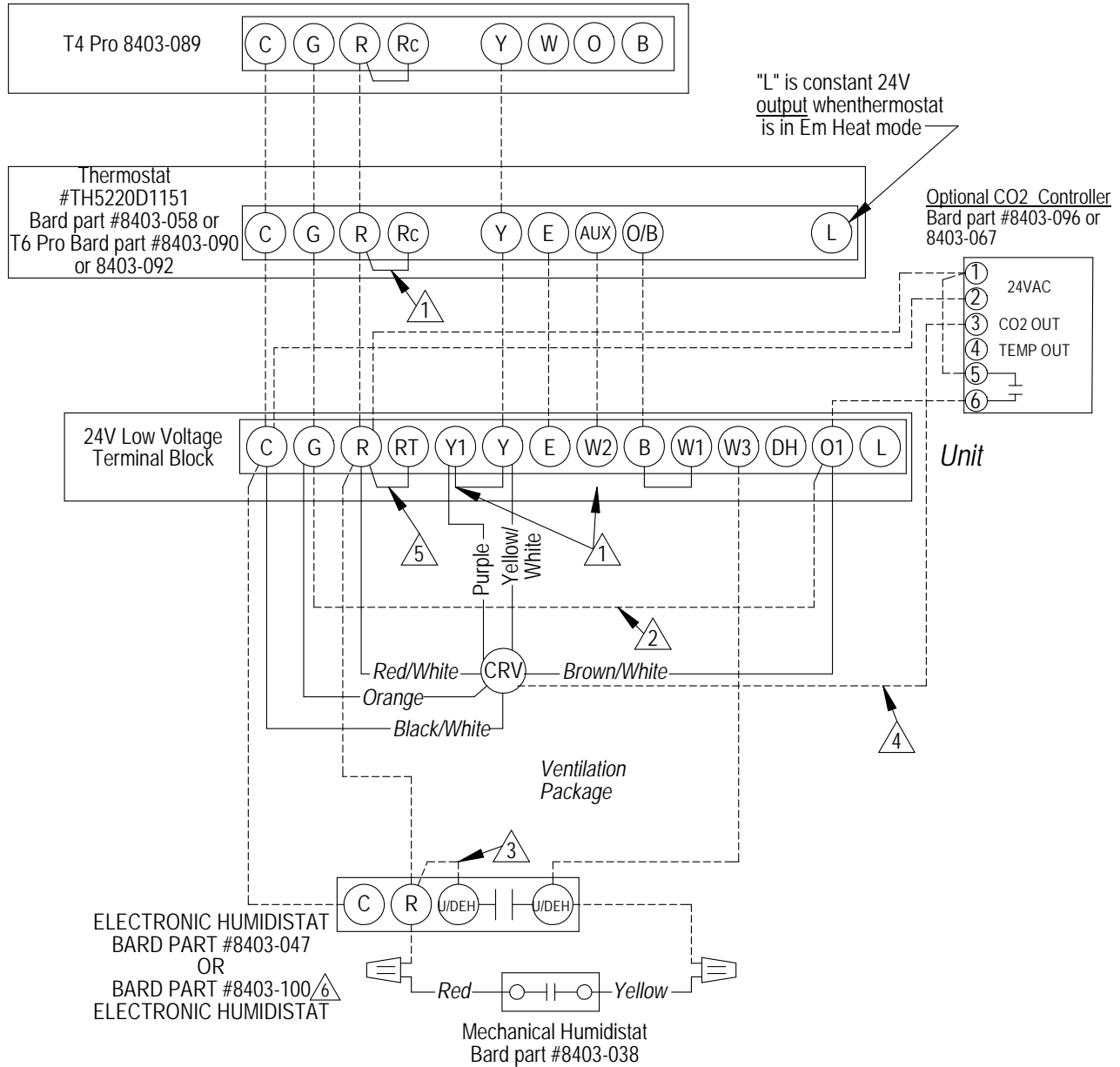*For CRVS-* (non A version) information, refer to Figure 8 on page 12.*
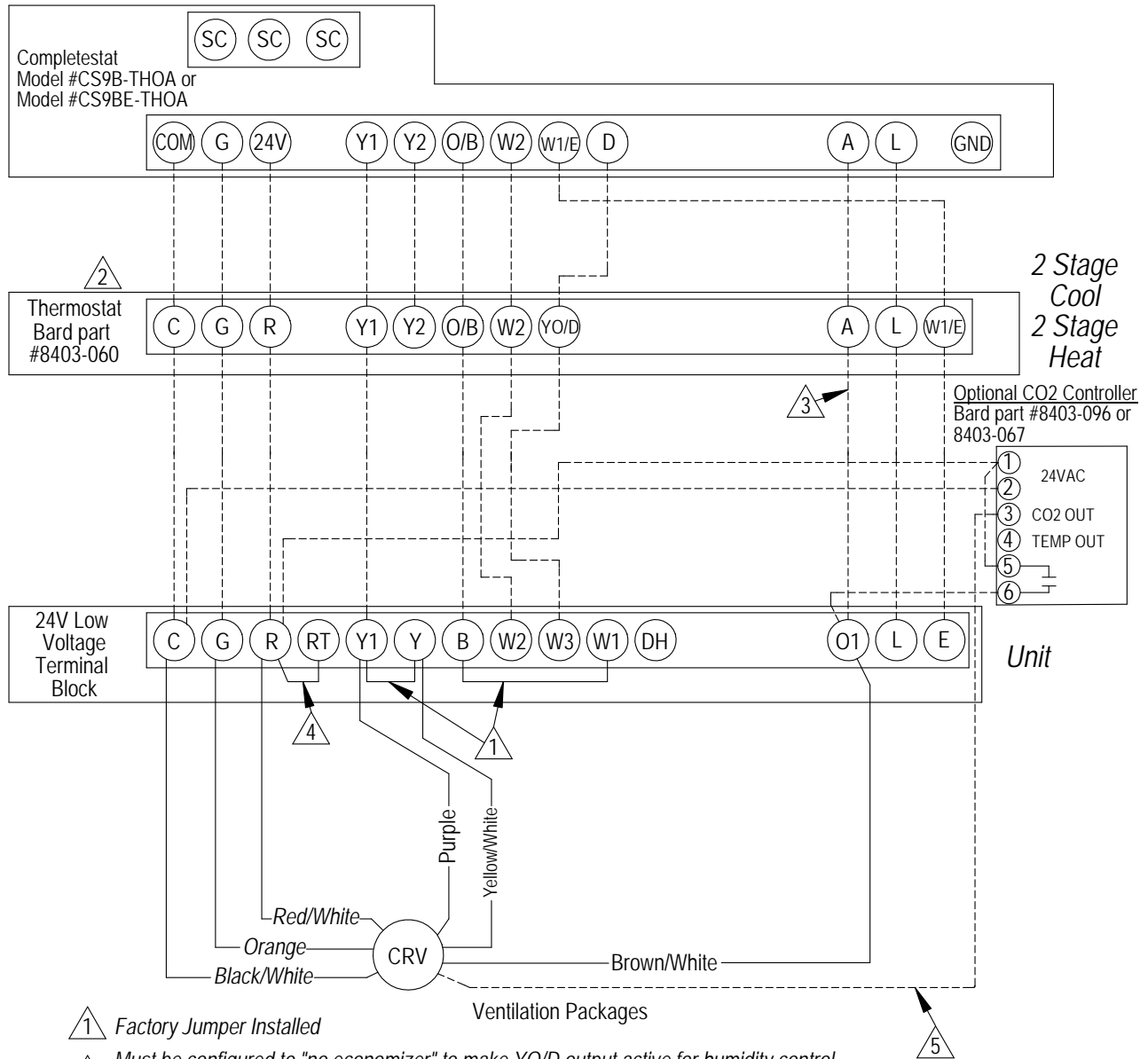
△1 *Factory Jumper Installed*

△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 CO₂ 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.*

T4 Pro 8403-089 — C G R Rc Y W O B

"L" is constant 24V <u>output</u> whenthermostat is in Em Heat mode

Thermostat #TH5220D1151 Bard part #8403-058 or T6 Pro Bard part #8403-090 or 8403-092 — C G R Rc Y E AUX O/B L

Optional CO2 Controller Bard part #8403-096 or 8403-067

1 24VAC
2
3 CO2 OUT
4 TEMP OUT
5
6

24V Low Voltage Terminal Block — C G R RT Y1 Y E W2 B W1 W3 DH O1 L   *Unit*

Purple
Yellow/White

Red/White — CRV — Brown/White
Orange
Black/White

Ventilation Package

ELECTRONIC HUMIDISTAT BARD PART #8403-047 OR BARD PART #8403-100 ELECTRONIC HUMIDISTAT

C R U/DEH U/DEH

Red — Yellow

Mechanical Humidistat Bard part #8403-038

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.

6. HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

MIS-4355 B