
INSTALLATION INSTRUCTIONS

LOW VOLTAGE CONTROL CIRCUIT WIRING

MODELS

WA**

WL**

WD*D**

WL*D**



Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

Since 1914...Moving ahead just as planned.

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**TABLE 1
DIAGRAM TO USE WITH UNIT AND VENTS**

System Type	Model Series	No Vents		MFAD, CRV or ERV		Economizer		CS2000A*
		Electronic	Programmable	Electronic	Programmable	Electronic	Programmable	
Air Conditioner	W**A, W**L	1	1	3	2	4	4	11
Air Conditioner w/Dehumidification Sequence	W**A*D W**L*D	6	5	8	7	9	10	11

WIRING – LOW VOLTAGE WIRING

230/208V, 1 phase and 3 phase equipment 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 this Manual. See Table above.

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*.

“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 in conjunction with dehumidification units.

**LOW VOLTAGE CONNECTIONS
FOR DDC CONTROL**

Fan Only	Energize G
Cooling Mode	Energize Y, G
1st Stage Heating	Energize W1
2nd Stage Heating (if employed)	Energize W1, W2
Ventilation	Energize G, A
Dehumidification (if employed)	Energize 3

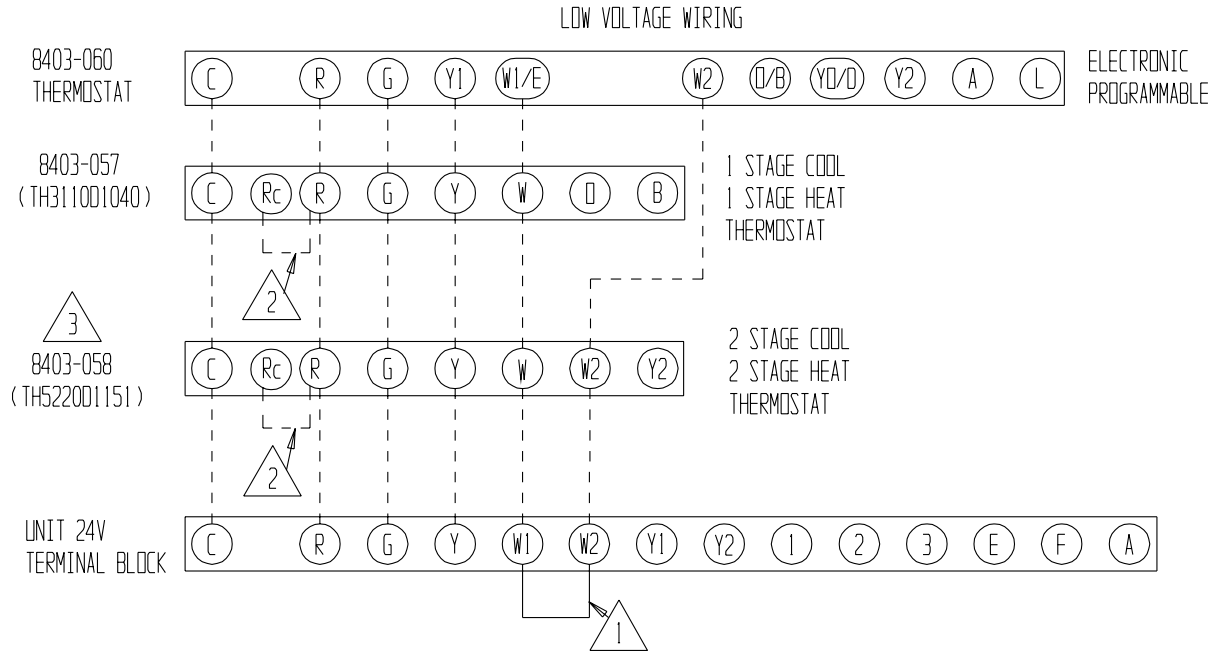
**TABLE 3
WALL THERMOSTAT**




Thermostat	Predominate Features
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

**TABLE 4
THERMOSTAT WIRE SIZE**

Transformer VA	FLA	Wire Gauge	Maximum Distance In Feet
55	2.3	20 gauge	45
		18 gauge	60
		16 gauge	100
		14 gauge	160
		12 gauge	250

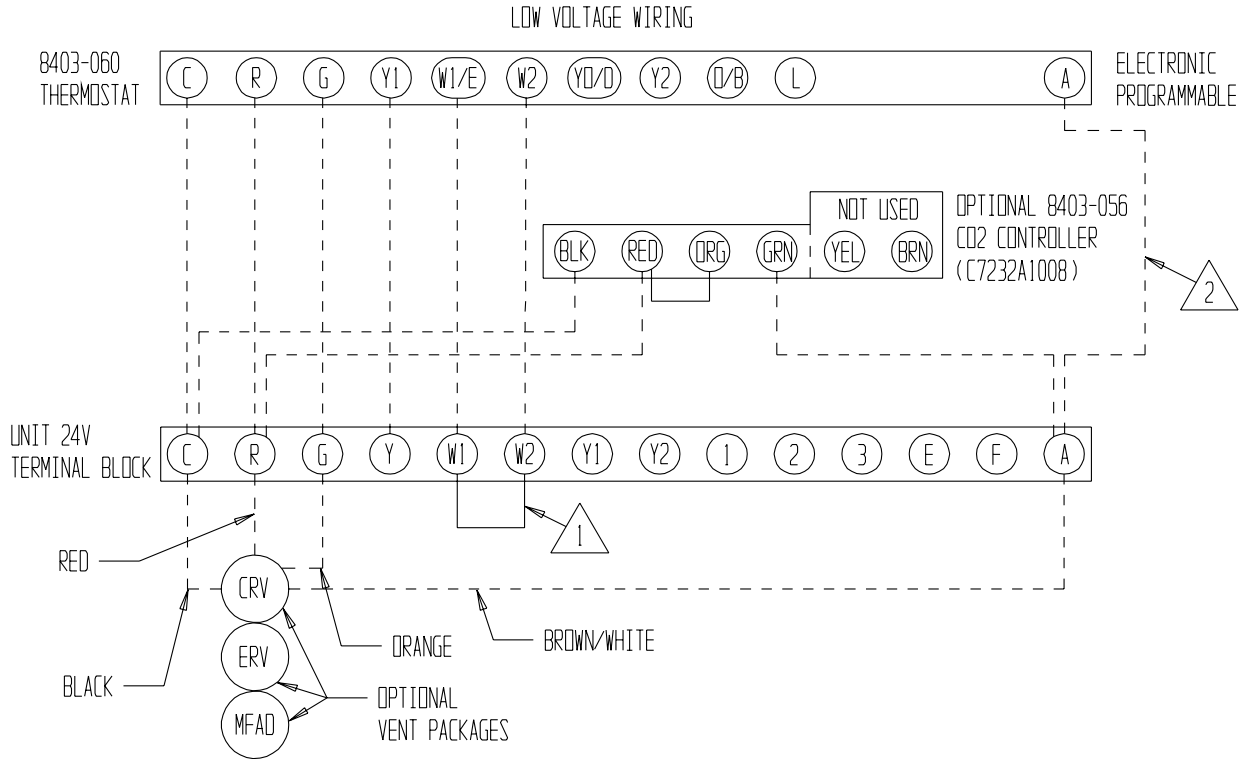
FIGURE 1
BASIC A/C with OPTIONAL ELECTRIC HEAT
NO ECONOMIZER or VENTILATION PACKAGES



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

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



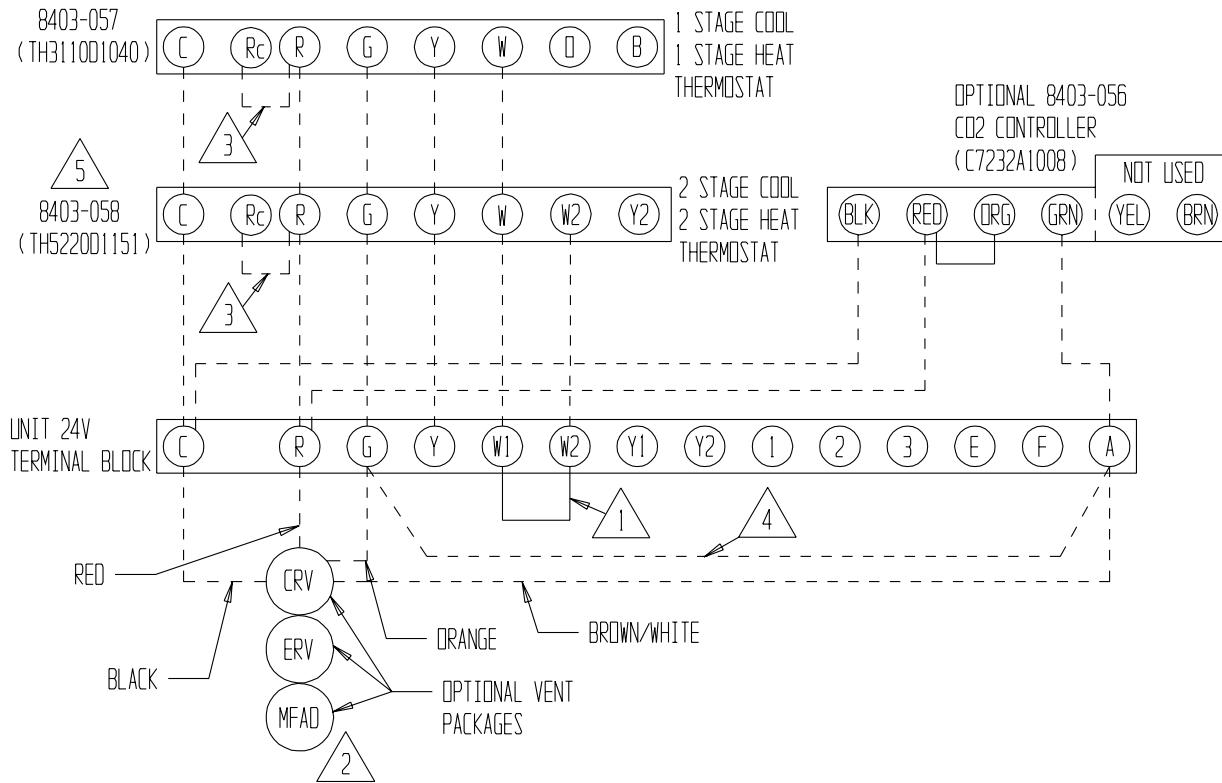
1 REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW






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

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FIGURE 3
OPTIONAL MFAD, CRV or ERV VENTILATION PACKAGES
with NON-PROGRAMMABLE THERMOSTAT

LOW VOLTAGE WIRING

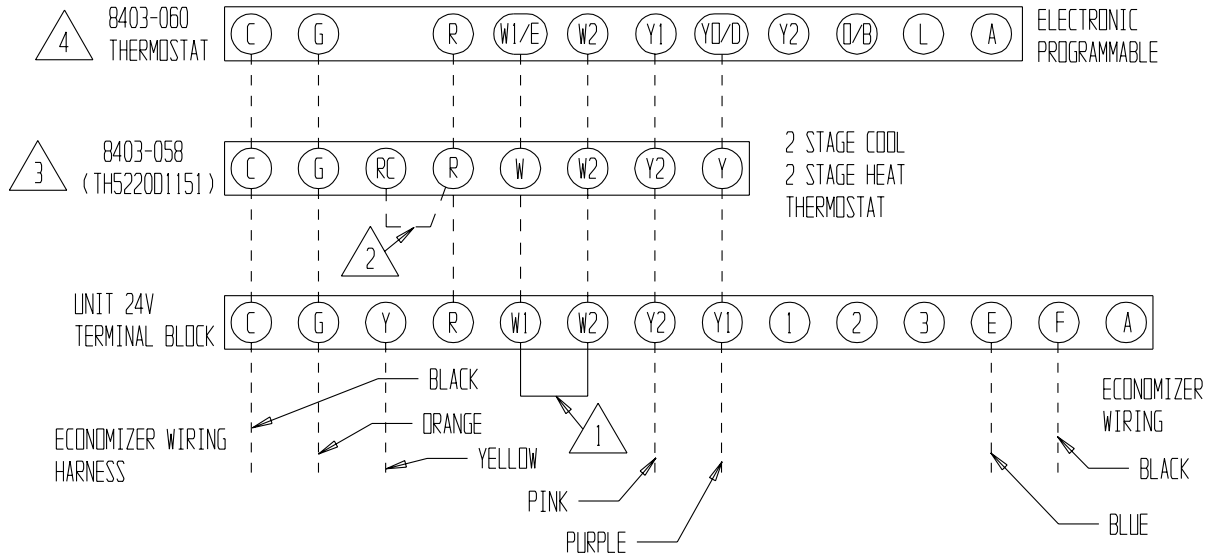


-  REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
-  OPTIONAL VENT OPTION SUGGESTED HOOK UP
-  FACTORY INSTALLED JUMPER
-  ADD JUMPER IF NO OCCUPIED SIGNAL AVAILABLE, VENT WILL RUN WHILE BLOWER IS ENERGIZED. REMOVE IF OPTIONAL CO2 CONTROLLER INSTALLED.
-  CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).

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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

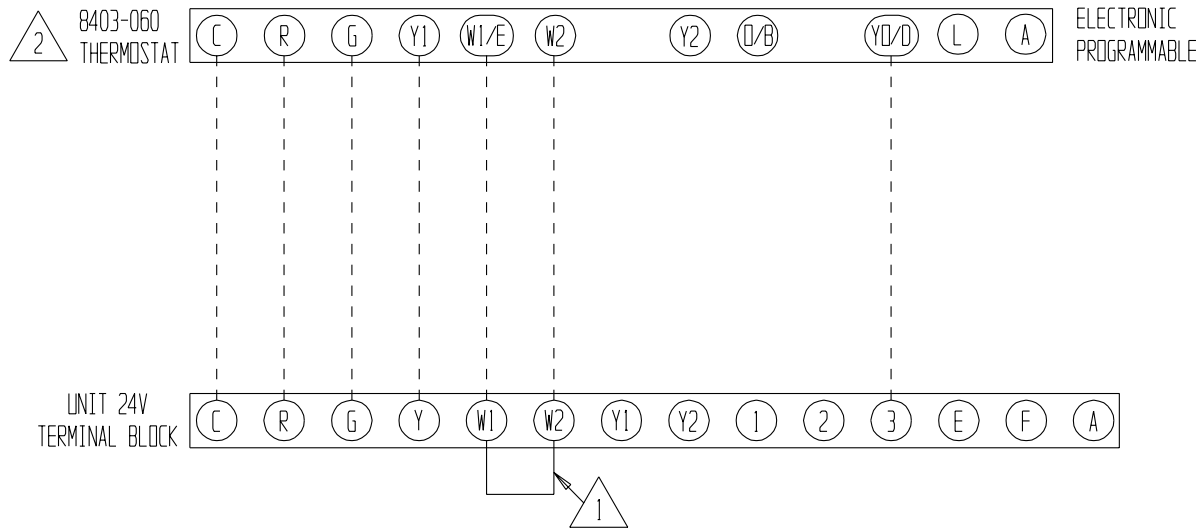
3 CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).

4 MUST BE CONFIGURED FOR ECONOMIZER FOR YO/D OUTPUT TO BE ACTIVE AS FIRST STAGE COOLING.

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

LOW VOLTAGE WIRING



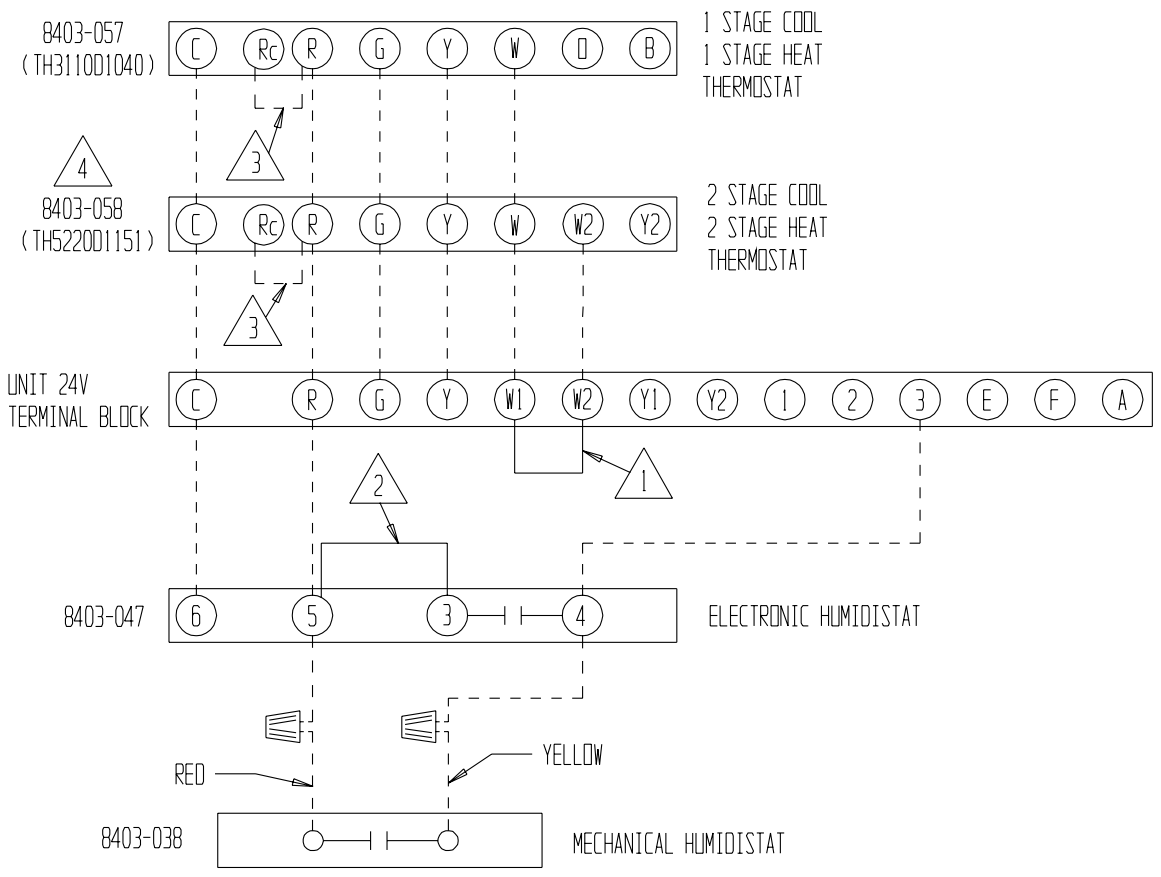
1 REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW





2 MUST BE CONFIGURED FOR "NO ECONOMIZER" TO MAKE YO/D OUTPUT ACTIVE FOR HUMIDITY CONTROL

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

LOW VOLTAGE WIRING

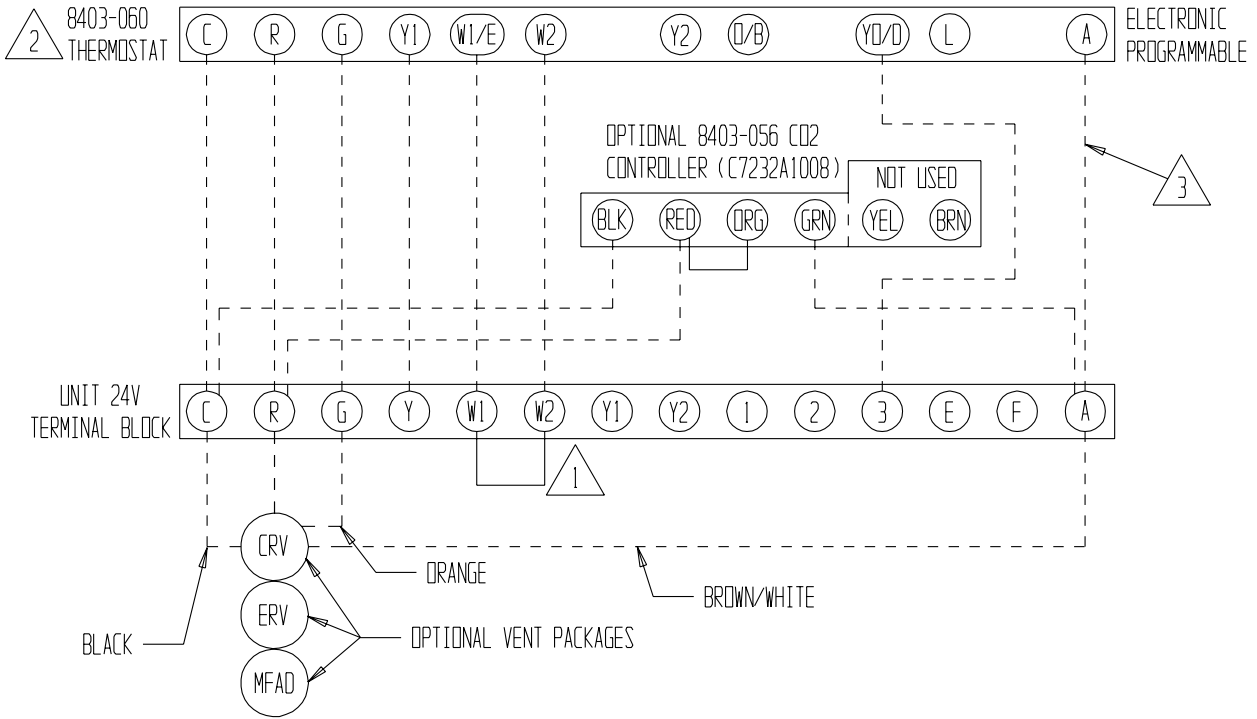





-  REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
-  JUMPER NEEDS TO BE ADDED
-  FACTORY INSTALLED JUMPER
-  CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).

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FIGURE 7
A/C with DEHUMIDIFICATION SEQUENCE
with VENTILATION PACKAGE USING
8403-060 COMBINATION TEMPERATURE and HUMIDITY CONTROLLER

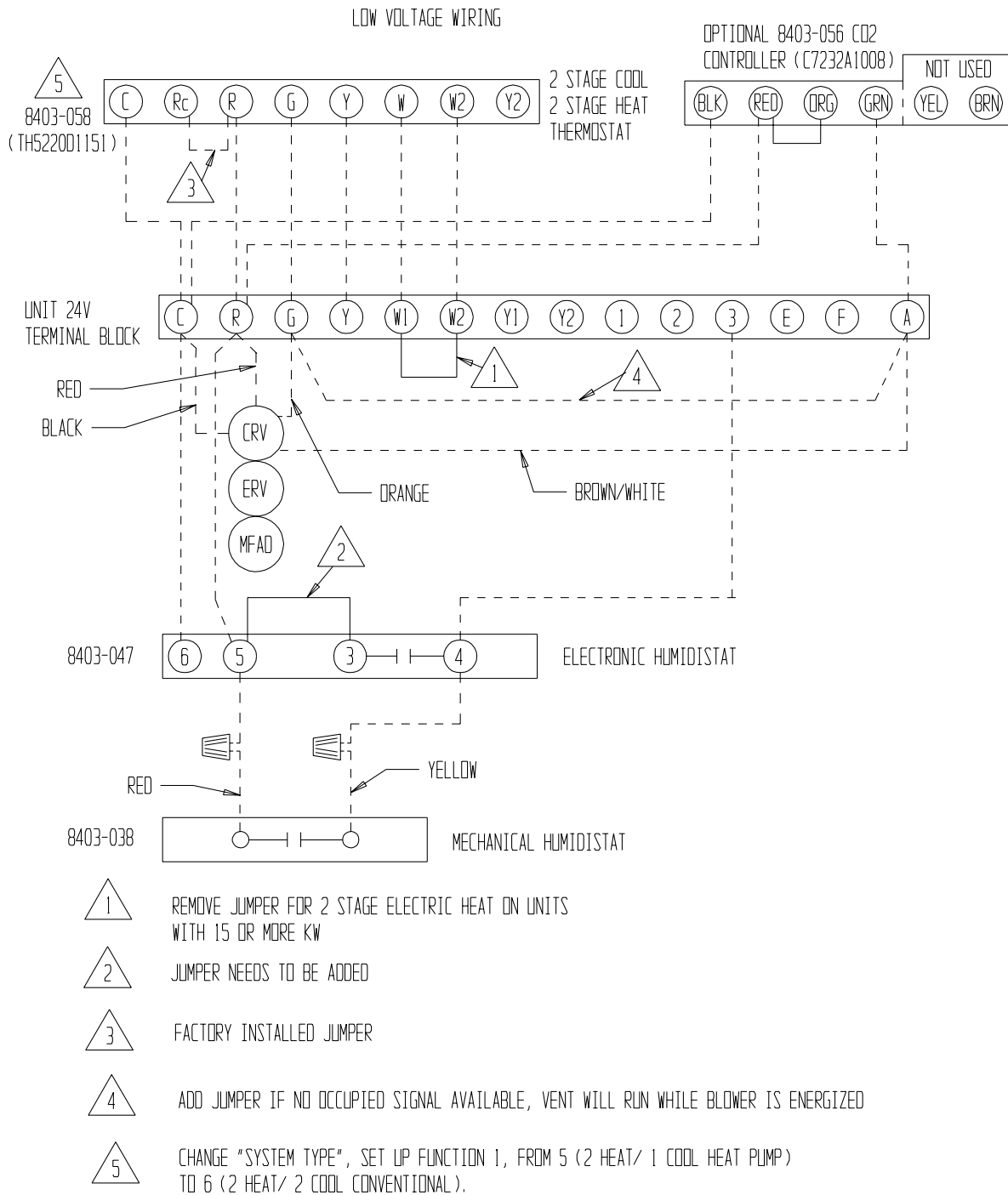
LOW VOLTAGE WIRING



-  REMOVE JUMPER FOR 2 STAGE ELECTRIC HEAT ON UNITS WITH 15 OR MORE KW
-  MUST BE CONFIGURED FOR "NO ECONOMIZER" TO MAKE YD/D OUTPUT ACTIVE FOR HUMIDITY CONTROL
-  DO NOT CONNECT "A" FROM 8403-060 IF OPTIONAL CO2 CONTROLLER IS USED

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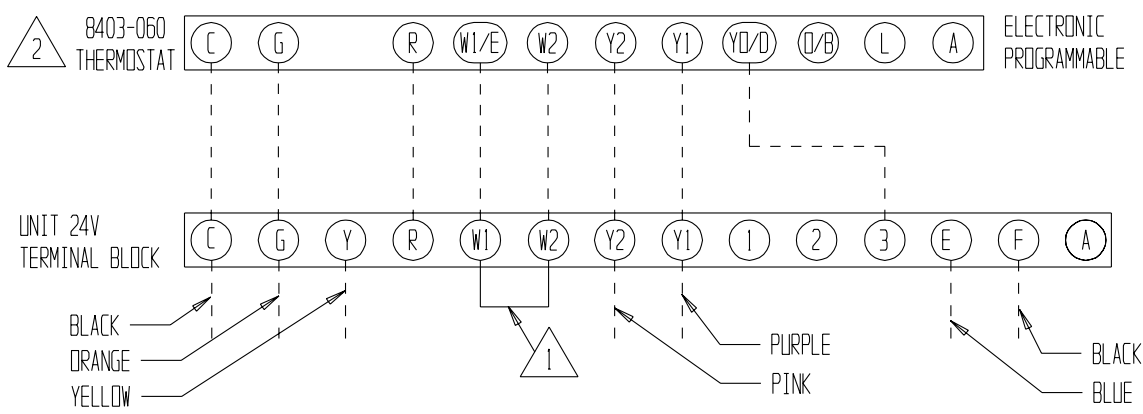
FIGURE 8
A/C with DEHUMIDIFICATION SEQUENCE
with VENTILATION PACKAGE USING
NON-PROGRAMMABLE THERMOSTAT
and SEPARATE HUMIDITY CONTROLLER



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FIGURE 10
A/C with DEHUMIDIFICATION SEQUENCE
& ECONOMIZER with 8403-060
COMBINATION TEMPERATURE and HUMIDITY CONTROL

LOW VOLTAGE WIRING



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

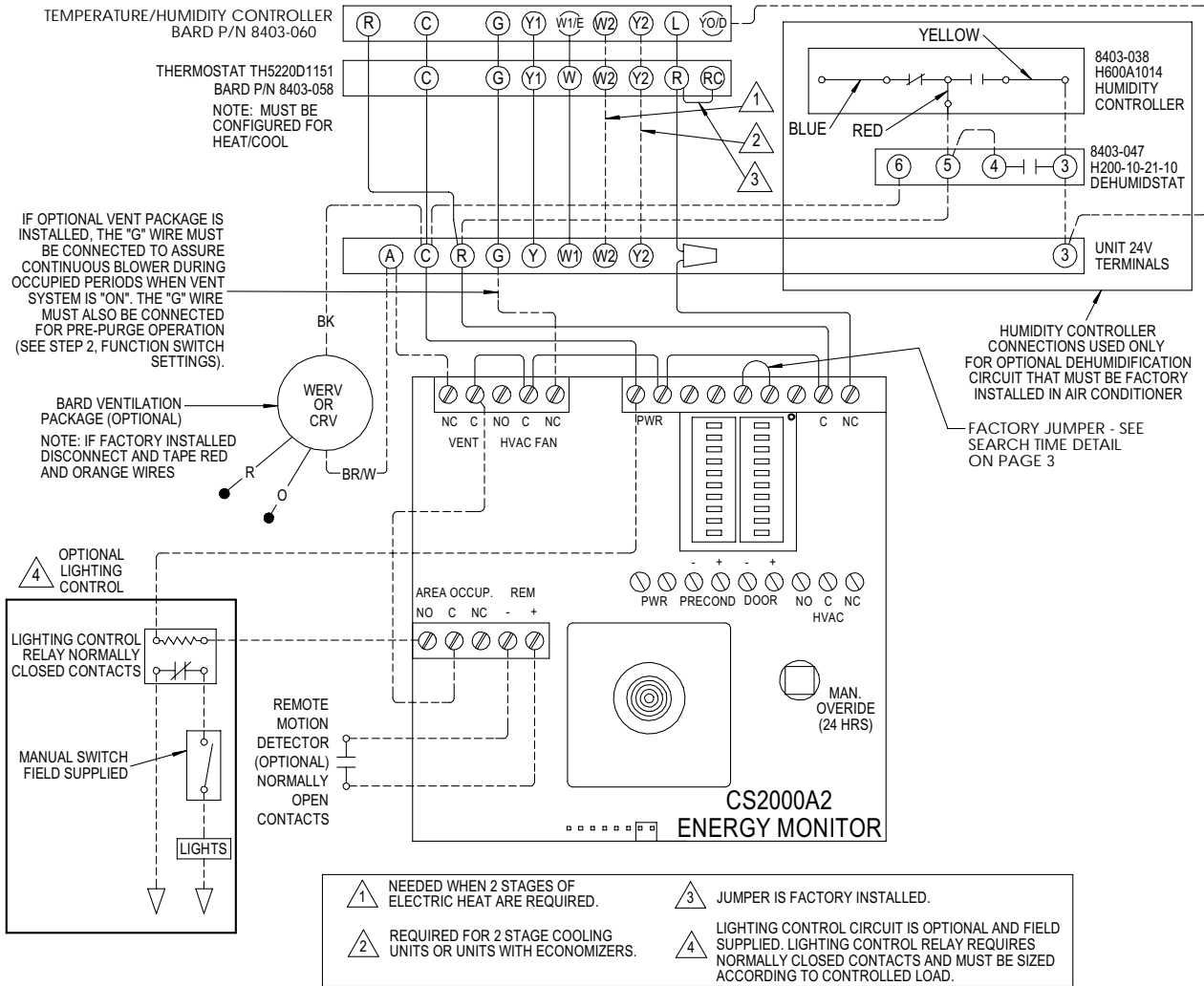


MUST BE CONFIGURED FOR NO ECONOMIZER AND MULTI-STAGE FOR Y1 OUTPUT TO BE ACTIVE AS FIRST STAGE COOLING AND YD/D TO BE ACTIVE FOR HUMIDITY CONTROL

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FIGURE 11

AIR CONDITIONER CONNECTION DIAGRAM



RECOMMENDED SWITCH SETTINGS SHOWN BELOW

FUNCTION SWITCHES		TEMPERATURE SWITCHES	
LEARN			90
PRE P			84
MODE			81
RATE			78
SEARCH-TIME			68
N/C			65
STAGE			62
AUX			58
DEMAND 2			54
DEMAND 1			48