

MBE/MBR

BLOWER CABINET INSTALLATION INSTRUCTIONS

Goodman Manufacturing Company, L.P. © 2004-2009, 2011
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www.goodmanmfg.com -or- www.amana-hac.com
P/N: IO-239F Date: June 2011

THIS PRODUCT CONTAINS ELECTRONIC COMPONENTS WHICH REQUIRE A DEFINITE GROUND. PROVISIONS ARE MADE FOR CONNECTION OF THE GROUND. A DEDICATED GROUND FROM THE MAIN POWER SUPPLY OR AN EARTH GROUND MUST BE PROVIDED.

INTRODUCTION

This booklet contains the installation and operating instructions for your modular blower cabinet. All warnings and precautions within this booklet must be observed. Improper installation can result in unsatisfactory operation or dangerous conditions and void the warranty. Read this booklet and any instructions packaged with accessories prior to installation. Give this booklet to the user and explain its provisions. The user should retain this booklet for future reference.

CHECKING PRODUCT RECEIVED

Upon receiving the unit, inspect it for damage from shipment. Claims for damage, either shipping or concealed, should be filed immediately with the shipping company. Check the unit model number, specifications, electrical characteristics and accessories to determine if they are correct. In the event an incorrect unit is shipped, it must be returned to the supplier and must NOT be installed. The manufacturer assumes no responsibility for installation of incorrectly shipped units.

REPLACEMENT PARTS

ORDERING PARTS

When reporting shortages or damages, or ordering repair parts, give the complete unit model and serial numbers as stamped on the unit's nameplate.

Replacement parts for this appliance are available through your contractor or local distributor. For the location of your nearest distributor, consult the white business pages, the yellow page section of the local telephone book or contact:

CONSUMER AFFAIRS
GOODMAN MANUFACTURING COMPANY, L.P.
7401 SECURITY WAY
HOUSTON, TEXAS 77040
(877) 254-4729

IMPORTANT SAFETY INSTRUCTIONS

RECOGNIZE SAFETY SYMBOLS, WORDS, AND LABELS

The following symbols and labels are used throughout this manual to indicate immediate or potential hazards. It is the owner's responsibility to read and comply with all safety information and instructions accompanying these symbols. Failure to heed safety information increases the risk of property damage, product damage, personal injury or death.

WARNING

HIGH VOLTAGE!
Disconnect ALL power before servicing.
Multiple power sources may be present.
Failure to do so may cause property damage,
personal injury or death.



WARNING

Installation and repair of this unit should be performed **ONLY** by individuals meeting (at a minimum) the requirements of an "entry level technician" as specified by the Air Conditioning, Heating, and Refrigeration Institute (AHRI). Attempting to install or repair this unit without such background may result in product damage, personal injury or death.

**DANGER**
PELIGRO



CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

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GENERAL INFORMATION

The MBR/MBE Blower Cabinets are used in combination with a cased evaporator coil. This combination of blower and coil functions as the indoor part of a split air-conditioning system, and may be matched with a remote condensing or heat pump unit. The blower cabinet can also function as an electric furnace when used with an electric heater.

NOTE: The electric heating elements for electric furnace installation are not shipped with the cabinet and are field-installed. Systems should be properly sized by heat gain and loss calculations made according to methods of the Air Conditioning Contractors Association (ACCA) or equivalent. It is the contractor's responsibility to ensure the system has adequate capacity to heat or cool the conditioned space.



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CLEARANCES AND ACCESSIBILITY

The unit can be positioned for upflow, counterflow, horizontal right or horizontal left operation. Zero clearance is allowed on all sides for combustible materials. Thirty-six inches should be allotted on the door side for maintenance and service.

To reduce risk of rusting, do not install the unit blower directly on the ground or on a floor that is likely to be wet. In such environments, the unit must be elevated by use of a sturdy, nonporous material.

INSULATION

To ensure efficient operation, review the following precautions.

- If the unit is located in an area with high ambient temperature and/or high humidity, the air handler may be subject to nuisance sweating of the casing. On these installations, a wrap of 2" fiberglass insulation with a vapor barrier is recommended.
- The factory recommends insulating the duct running through any unconditioned spaces.

To reduce operating sound and vibration transmission use flexible canvas duct connections at the cabinet.

INSTALLATION INSTRUCTIONS

BLOWER WITH CASED EVAPORATOR COIL INSTALLATION

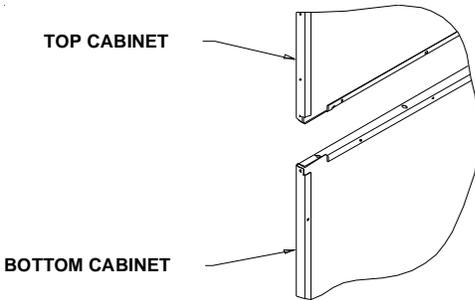


Figure 1

Secure the coil and blower together with the two connector plates and screws supplied in the blower bag assembly. Use one connector plate and six screws on each side of the unit. If accessory electric heat is to be added, install now per the instructions shipped with the heater kit.

UPFLOW INSTALLATION

For upflow installations, the blower cabinet must sit on top of the coil cabinet (Figure 2). **NOTE:** All panels should be in place before installing the cabinet.

1. Place the blower and coil cabinet assembly upright on the return duct or duct opening. Ensure that there is ample support for the cabinet assembly and all attached ductwork.
2. Connect refrigerant and condensate drain connections per the evaporator coil installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
3. Attach supply ductwork. Seal connections between unit and ductwork as required to reduce/eliminate air leakage.

4. Make electrical connections as specified in "Electrical" section of this manual.

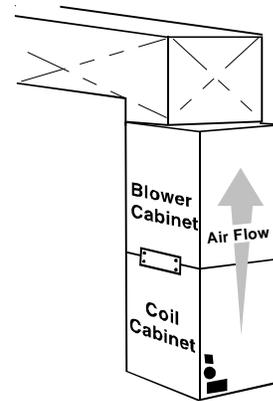


Figure 2 - Upflow Application

COUNTERFLOW INSTALLATION

For counterflow installations, the evaporator coil cabinet must sit on top of the blower cabinet (Figure 3). **NOTE:** All panels should be in place when installing the unit.

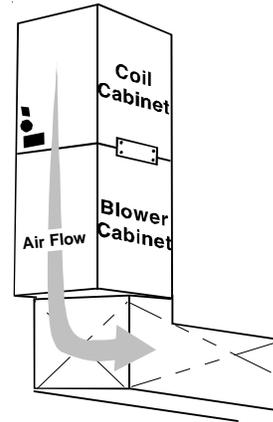


figure 3 - Counterflow Application

NOTE: Supply ductwork for counterflow applications, must be Class I. However, if combustible ductwork is used, sheet metal protection is required.

1. Place the blower and coil cabinet assembly supply outlet on the supply duct or duct opening. Ensure there is ample support for the unit and all attached ductwork.
2. Connect refrigerant and condensate drain connections per the evaporator coil installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
3. Attach return ductwork. Seal connections between unit and ductwork as required to reduce/eliminate air leakage.
4. Make electrical connections as specified in "Electrical" section of this manual.

HORIZONTAL INSTALLATION

For horizontal installations, the coil cabinet must be upstream of the blower cabinet (Figures 5 and 6). **NOTE:** All panels should be in place when installing the unit.

1. Set the unit near its final installation place. The unit must be supported along the entire length of the unit. Rubber isolation pads may be used to reduce sound and vibration transmission. Ensure there is ample support for the unit and all attached ductwork.

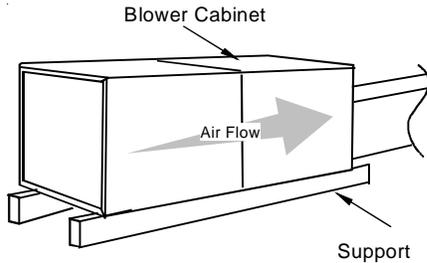


FIGURE 5 - Attic Installation

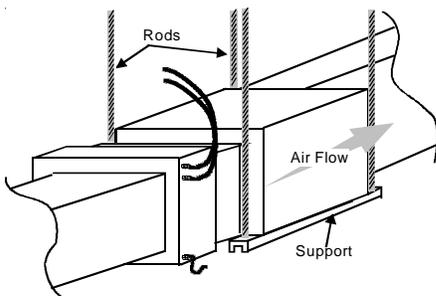


FIGURE 6 - Hanging Installation

2. If installed above a finished ceiling or living space, be sure to put a secondary drain pan under the entire unit, and pipe the drain separately from the main condensate drain.
3. Connect refrigerant and condensate drain connections per the coil section installation instructions. Ensure refrigerant and drain lines do not interfere with service access to the unit.
4. Attach return and supply ductwork. Seal connections.
5. Make electrical connections as specified in "Electrical" section of this manual.

MBE Only: Counterflow and Horizontal Applications

Loosen motor mount and rotate motor (See Figure 4). Be sure motor is oriented with the female connections on the casing pointing down. If the motor is not oriented with the connections pointing down, water will collect in the motor and cause premature failure.

NOTE: After rotating motor, tighten motor mount to secure motor. Be sure that the gap between the motor and the insulation is the same as it was before loosening the motor mount. This will ensure that the blower wheel is properly spaced inside the blower housing.

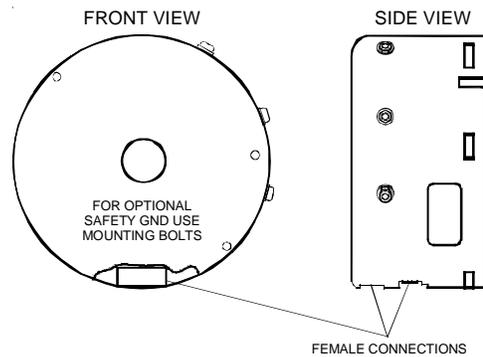


FIGURE 4 - MBE Motor Orientation

Electrical Connections

Consult the local power company and local codes before installing this unit. All wiring must be in accordance with the National Electrical Code as well as all local codes. Knockouts have been provided on side and top of the cabinet for the installation of the electrical conduit. If the knockouts on the cabinet sides are used for electrical conduit, an adapter ring must be used in order to meet UL1995 safety requirements. Use Minimum Circuit Ampacity and type of wire to determine proper wire size. The unit **MUST** be properly grounded. A ground lug is provided in the unit.

Check all factory connections before connecting electrical power to unit to ensure none were loosened or disconnected during shipping and handling.

⚠ WARNING
TO PREVENT PERSONAL INJURY OR DEATH DUE TO ELECTRICAL SHOCK, DISCONNECT THE ELECTRICAL POWER BEFORE ELECTRICALLY CONNECTING THE UNIT.

⚠ CAUTION
TO AVOID THE RISK OF PROPERTY DAMAGE, PERSONAL INJURY OR FIRE USE ONLY COPPER CONDUCTORS.

⚠ CAUTION
TO AVOID THE RISK OF PERSONAL INJURY, WIRING TO THE UNIT MUST BE PROPERLY POLARIZED AND GROUNDED.

⚠ WARNING
ALL WIRING MUST COMPLY WITH APPLICABLE LOCAL AND NATIONAL CODES. TYPE AND LOCATION OF FUSED DISCONNECT SWITCH(ES) MUST COMPLY WITH ALL APPLICABLE CODES AND PROVIDE OVERCURRENT PROTECTION AS SHOWN ON THE NAMEPLATE.

HIGH VOLTAGE WIRING

If heater kits will not be installed, remove the proper size knockout for the electrical conduit connection. Connect electrical conduit to the unit using two washers to make an approved connection.

The power supply wires must be connected to the red and black power wiring. Two wire nuts are provided in the bag assembly for this connection. Wrap the wire nuts with electrical tape. (Insulated crimp type connectors, field supplied, may be substituted for the wire nuts and electrical tape provided proper size connectors are used.) A ground wire MUST be connected to the ground lug inside the unit.

LOW VOLTAGE WIRING

Low voltage wiring connections are made at the top of the cabinet. See the "Thermostat Wiring" section of this manual for typical low voltage wiring connections. A minimum 18 AWG wire must be used for installations up to 50 feet and 16 AWG wire for installations over 50 feet.

MISCELLANEOUS ELECTRICAL

The unit transformer is factory connected for 240 V operation. If unit is to operate on 208 V, disconnect the red wires from terminal 3 of the unit transformer and connect them to terminal 2 of the unit transformer.

INSTALLER: It is important to follow these instructions when installing the MB series of air handlers.

THERMOSTAT CONNECTIONS

The following composite wiring diagrams detail various configurations in which your MB air handler can be used. Examples include single stage cooling, two stage cooling and heat pump with single or two stage electric heating. All these configurations can be applied with convenient connections to outdoor thermostat applications.

The following sections will be detailed:

- Single Stage Cooling (GMC Thermostat part # CHT18-60 or equivalent)
- Heat Pump (GMC Thermostat part #HPT18-60 or equivalent)
- Two Stage Cooling with Conventional Two Stage Thermostat (GMC Thermostat part #CHT90-120 or equivalent)
- Two Stage Cooling with Conventional Two Stage Thermostat (Encoded with Add-on Diodes)
- Two Stage Encoded Thermostat from Goodman Manufacturing Part #CHET18-60

Each diagram details the connections between room thermostat and MB air handlers, and the connections between the MB air handlers and the Condensing Unit (or Heat Pump) with optional connections to Outdoor Thermostats. For each configuration,

refer to the explanation of the proper jumper(s) to remove for the corresponding blower speed that will result in the programmed ECM™ motor on MBE units.

Important: When matching the MBE air handlers to a single stage cooling unit or heat pump, remember to connect the "Y/Y2" thermostat connection on the Variable speed board (VSTB) to the thermostat. Connecting "Y1" will result in first stage cooling blower speed.

Note: The two stage configurations are illustrated to detail connections to the two capacity condensing units and heat pumps.

An equivalent thermostat can be used in place of the Goodman thermostat part number. The GMC thermostats listed are mercury type.

When utilizing the encoded version of a conventional two stage cooling and heating electronic thermostat (add-on diodes), a hard wire "C" (common of 24V secondary voltage) must be used. This encoded version will not work with a "power robbing" thermostat (i.e. no common connection). One TSTWK01 kit is required for the encoded applications on MBE units.

NOTE: When using a conventional two stage thermostat for cooling or heat pump applications with a two stage compressor, dip switch #4 must be set to the "OFF" position on MBE units.

MBE MOTOR

This section references the operation characteristics of the MBE model motor only. The ECM control board is factory set with the dipswitch #4 in the "ON" position and all other dipswitches are factory set in the "OFF" position. **For most applications, the settings are to be changed according to the electric heat size and the outdoor unit selection.**

The MBE product uses a General Electric ECM™ motor. This motor provides many features not available on the traditional PSC motor. These features include:

- Improved Efficiency
- Constant CFM
- Soft Start and Stop
- Improved Humidity Control

MOTOR SPEED ADJUSTMENT

Each ECM™ blower motor has been preprogrammed for operation at 4 distinct airflow levels when operating in Cooling/Heat Pump mode or Electric Heat mode. These 4 distinct levels may also be adjusted slightly lower or higher if desired. The adjustment between levels and the trim adjustments are made by changing the dipswitch(s) either to an "OFF" or "ON" position.

DIPSWITCH FUNCTIONS

The MBE air handler motor has an electronic control that contains an eight (8) position dip switch. The function of these dipswitches are shown in **Table 1**.

Dipswitch Number	Function
1	Electric Heat
2	
3	N/A
4	Indoor Thermostat
5	Cooling & Heat Pump CFM
6	
7	CFM Trim Adjust
8	

Table 1

CFM DELIVERY

Tables 2 and **3** show the CFM output for dipswitch combinations 1-2, and 5-6.

Model	Switch 1	Switch 2	Electric Heat CFM
MBE1200	OFF	OFF	1200
	ON	OFF	1000
	OFF	ON	800
	ON	ON	600
MBE1600	OFF	OFF	1600
	ON	OFF	1400
	OFF	ON	1200
	ON	ON	1000
MBE2000	OFF	OFF	1900
	ON	OFF	1600
	OFF	ON	1400
	ON	ON	1200

Table 2

Model	Switch 5	Switch 6	Cooling/HP CFM
MBE1200	OFF	OFF	1200
	ON	OFF	1000
	OFF	ON	800
	ON	ON	600
MBE1600	OFF	OFF	1600
	ON	OFF	1400
	OFF	ON	1200
	ON	ON	1000
MBE2000	OFF	OFF	2000
	ON	OFF	1800
	OFF	ON	1600
	ON	ON	1200

Table 3

THERMOSTAT “FAN ONLY” MODE

During Fan Only Operations, the CFM output is 30% of the cooling setting.

CFM TRIM ADJUST

Minor adjustments can be made through the dip switch combination of 7-8. **Table 4** shows the switch position for this feature.

NOTE: The airflow will not make the decreasing adjustment in Electric Heat mode.

CFM	Switch 7	Switch 8
+10%	ON	OFF
-15%	OFF	ON

Table 4

NOTE: If no adjustment is required, dipswitches 7 & 8 should be left in the OFF position.

HUMIDITY CONTROL

When using a Humidistat (normally closed), cut jumper PJ6 on the control board. The Humidistat will only affect cooling airflow by adjusting the Airflow to 85%.

TWO STAGE HEATING

When using staged electric heat, cut jumper PJ4 on the control board.

THERMOSTAT WIRING

Use thermostat wiring diagram **Figures 7 through 37** and those provided with the thermostat when making these connections.

NOTE: If the MBE blower is used with heat pumps, remove the “Y1-O” production wire.

MBR MOTOR

BLOWER PERFORMANCE DATA

SPEED	STATIC	MBR0800** SCFM	MBR1200** SCFM	MBR1600** SCFM	MBR2000** SCFM
HIGH	0.1	1240	1500	1800	2160
	0.2	1170	1460	1740	2080
	0.3	1120	1360	1680	1990
	0.4	1060	1280	1610	1890
	0.5	980	1200	1520	1790
	0.6	900	1110	1430	1690
MEDIUM	0.1	900	1380	1540	1730
	0.2	850	1320	1490	1670
	0.3	790	1270	1450	1590
	0.4	740	1200	1400	1520
	0.5	680	1140	1350	1420
	0.6	605	1040	1280	1320
LOW	0.1	650	1170	1130	1520
	0.2	590	1130	1100	1450
	0.3	540	1080	1070	1360
	0.4	500	1020	1030	1290
	0.5	430	950	990	1200
	0.6	330	830	930	1090

External static is for blower @ 230 volts. It does not include coil, air filter or electric heaters.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

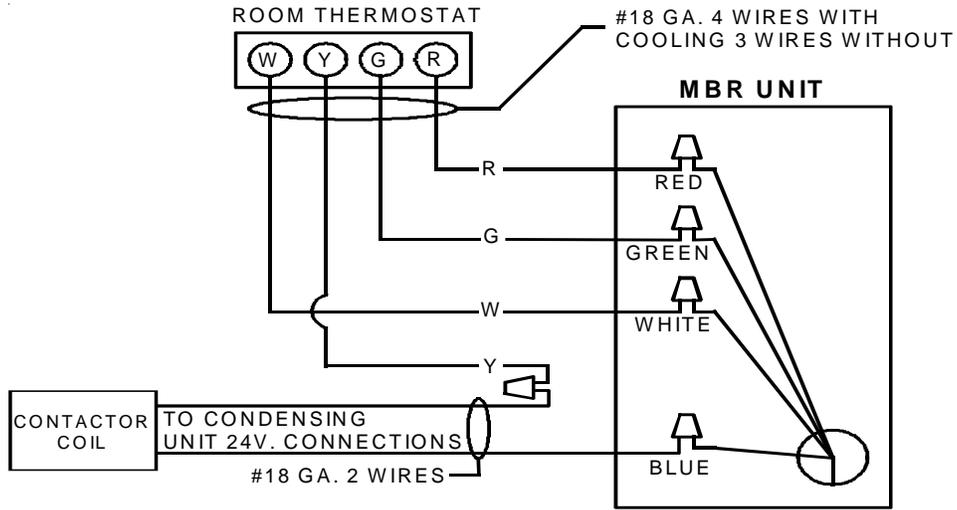


Figure 7- Low Voltage Wiring Diagram for Cooling Unit with optional heat kit 10KW and below

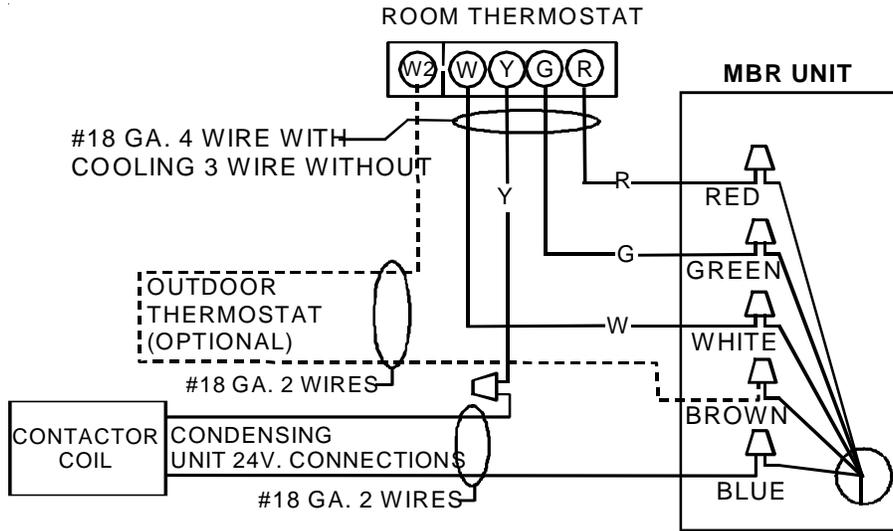


Figure 8 - Low Voltage Wiring Diagram for Cooling Unit with optional heat kit 15KW and above

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



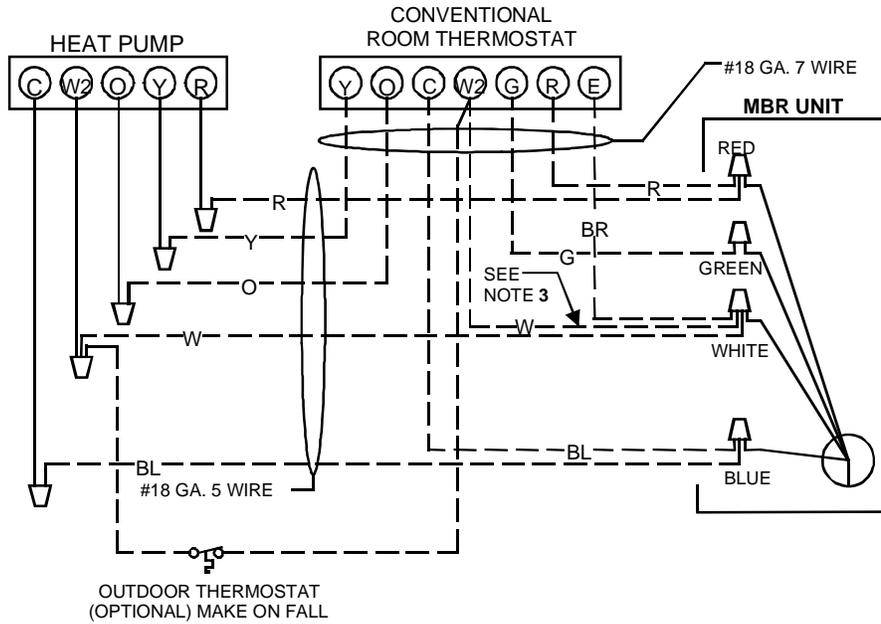
WARNING

HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING.
MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO
MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



**MBR
SYSTEM COMPOSITE DIAGRAM
800-2000
10 KW & BELOW**

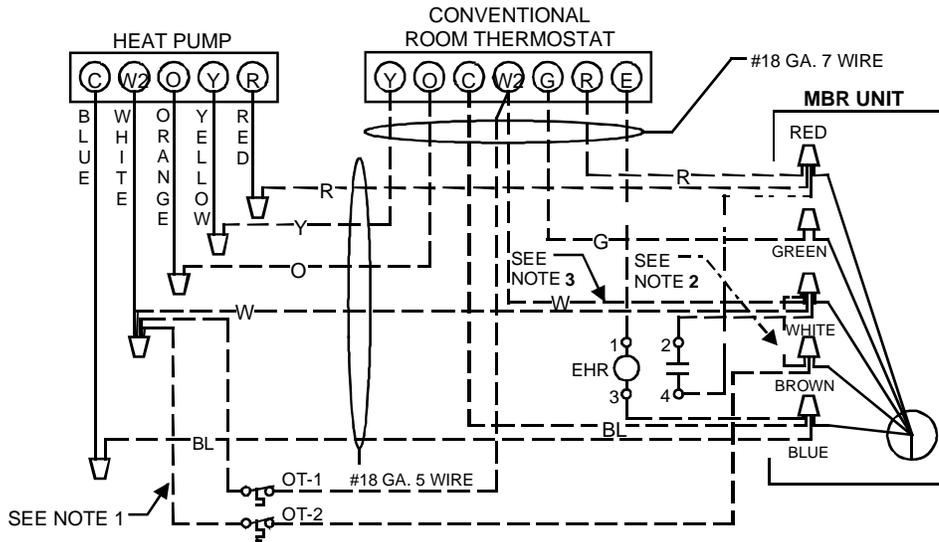
FIGURE 9



#18 GA. 6 WIRE NEEDED WHEN OT IS USED

**MBR
SYSTEM COMPOSITE DIAGRAM
1200-2000
ABOVE 10 KW**

FIGURE 10



#18 GA. 7 WIRE NEEDED WHEN (2) OTs ARE USED

NOTES

- 1) OUTDOOR THERMOSTAT (OT-1) SHOULD BE THE FIRST TO CLOSE AND THE FIRST TO OPEN.
 - 2) IF OUTDOOR THERMOSTAT IS NOT USED. TIE WHITE AND BROWN WIRES FROM AIR HANDLER TOGETHER.
 - 3) REMOVE WIRE WHEN USING OUTDOOR T-STAT.
- #18 GA. 7 WIRE NEEDED WHEN (2) OTs ARE USED

NOMENCLATURE

- OT - OUTDOOR THERMOSTAT (OPTIONAL)
- MOF - MAKE ON FALL
- EHR - EMERGENCY HEAT RELAY (OPTIONAL)

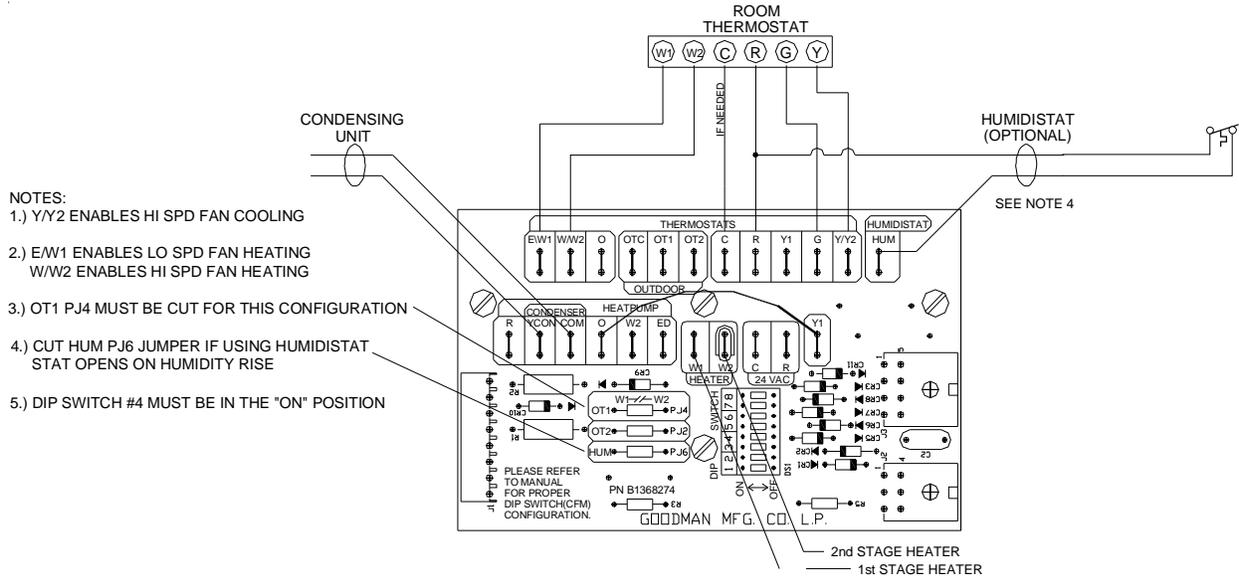
COLOR CODES

- R - RED
- Y - YELLOW
- W - WHITE
- BL - BLUE
- V - VIOLET
- G - GREEN
- O - ORANGE
- PK - PINK

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

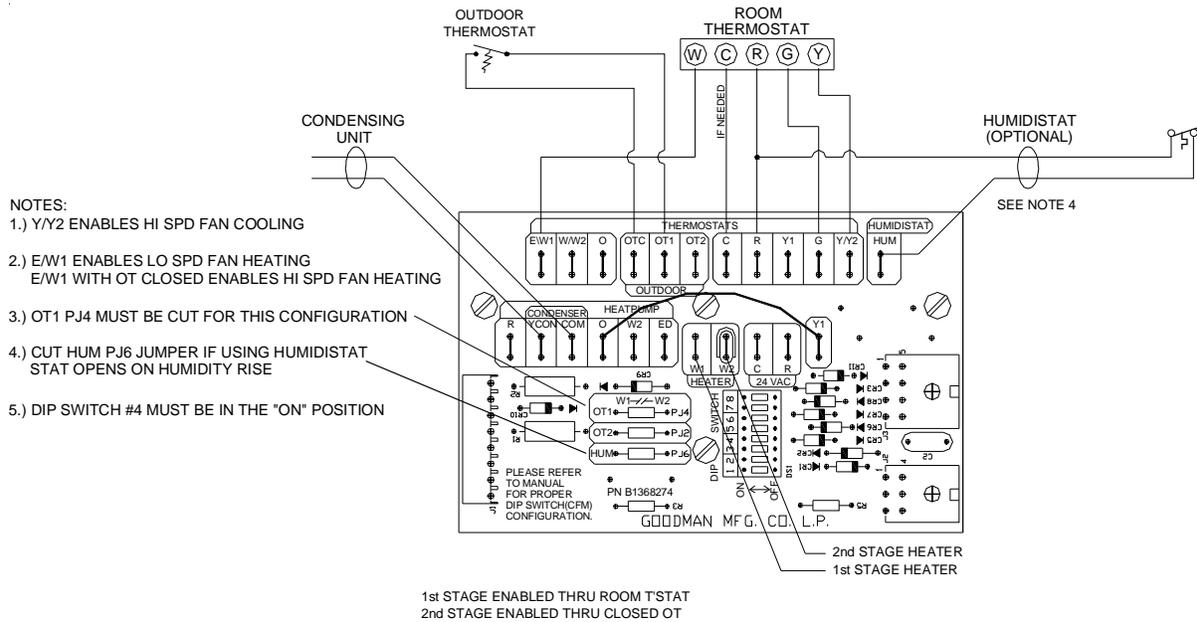
WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

SINGLE STAGE COOLING WITH SINGLE OR TWO STAGE HEATING



COOLING ONLY - 2 STAGE HEAT THERMOSTAT

Figure 11



COOLING ONLY - 2 STAGE HEAT (1st ROOM T'STAT & 2nd OT)

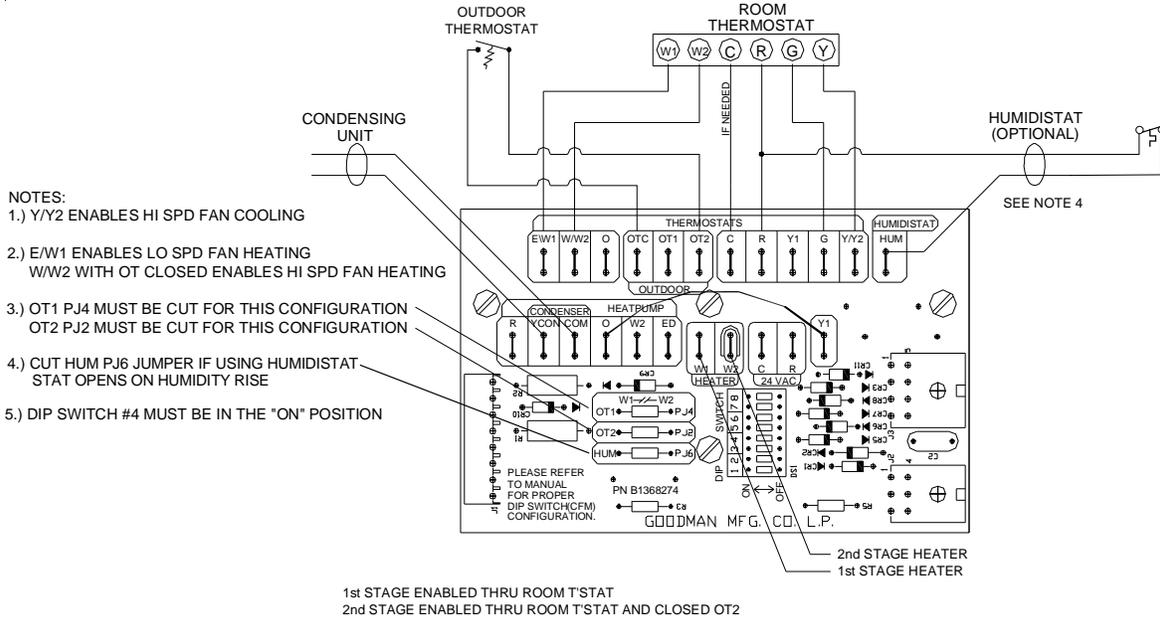
Figure 12

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



WARNING

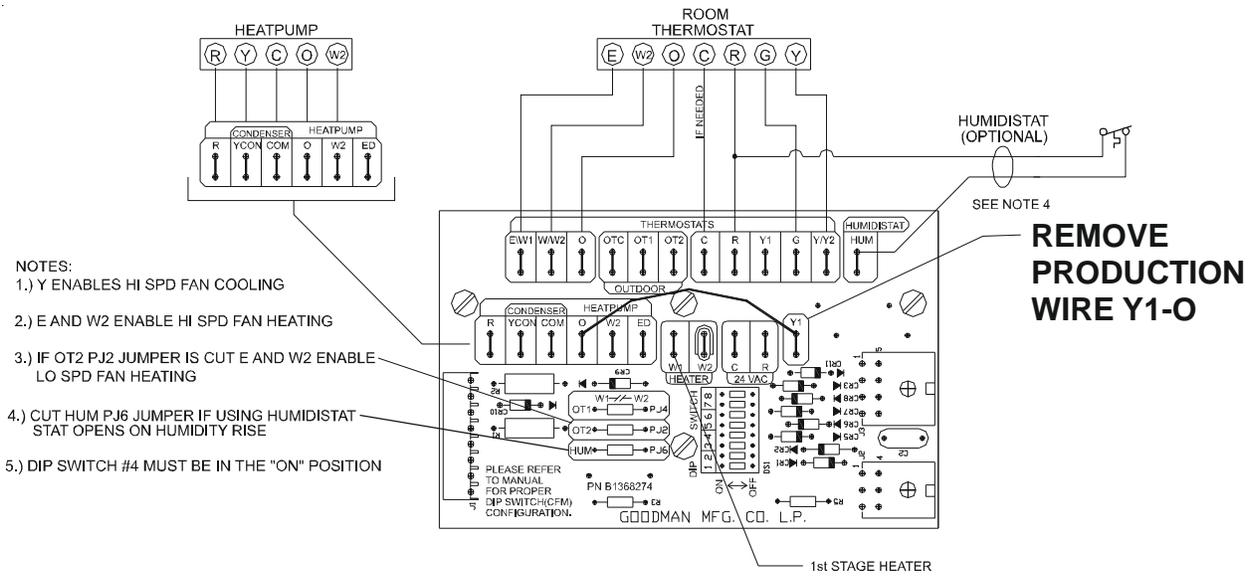
HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



COOLING ONLY - 2 STAGE HEAT (T'STAT ENABLED OT)

Figure 13

HEAT PUMP WITH SINGLE OR TWO-STAGE HEATING (OPTIONS FOR EMERGENCY HEAT)



HEATPUMP - WITH 1 STG EMHT 1 STG AUX HEAT

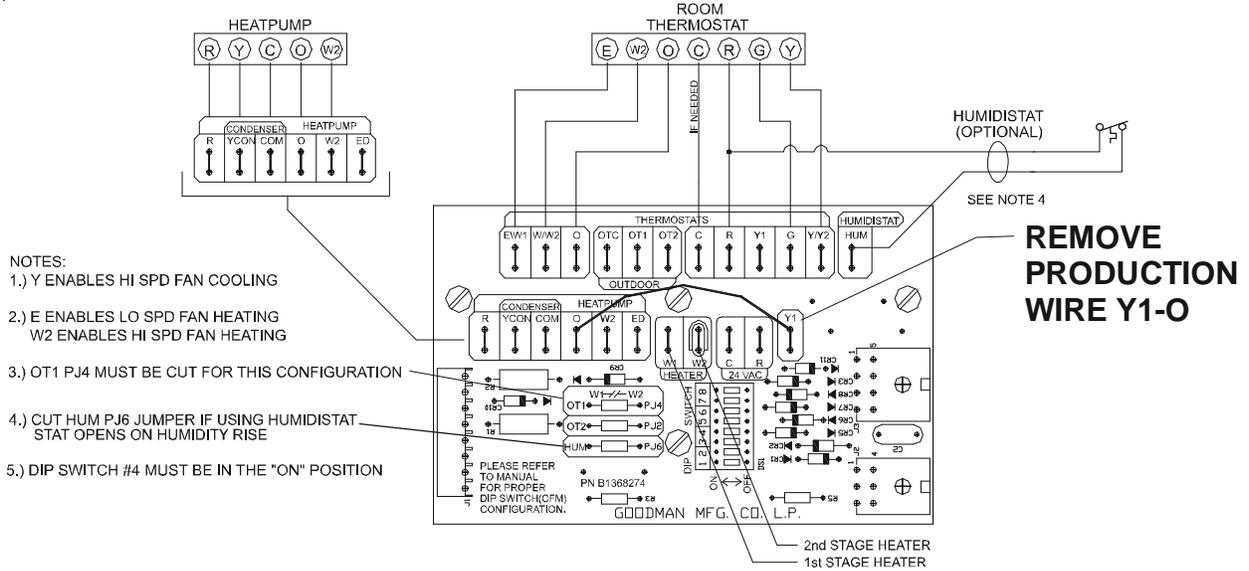
Figure 14

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



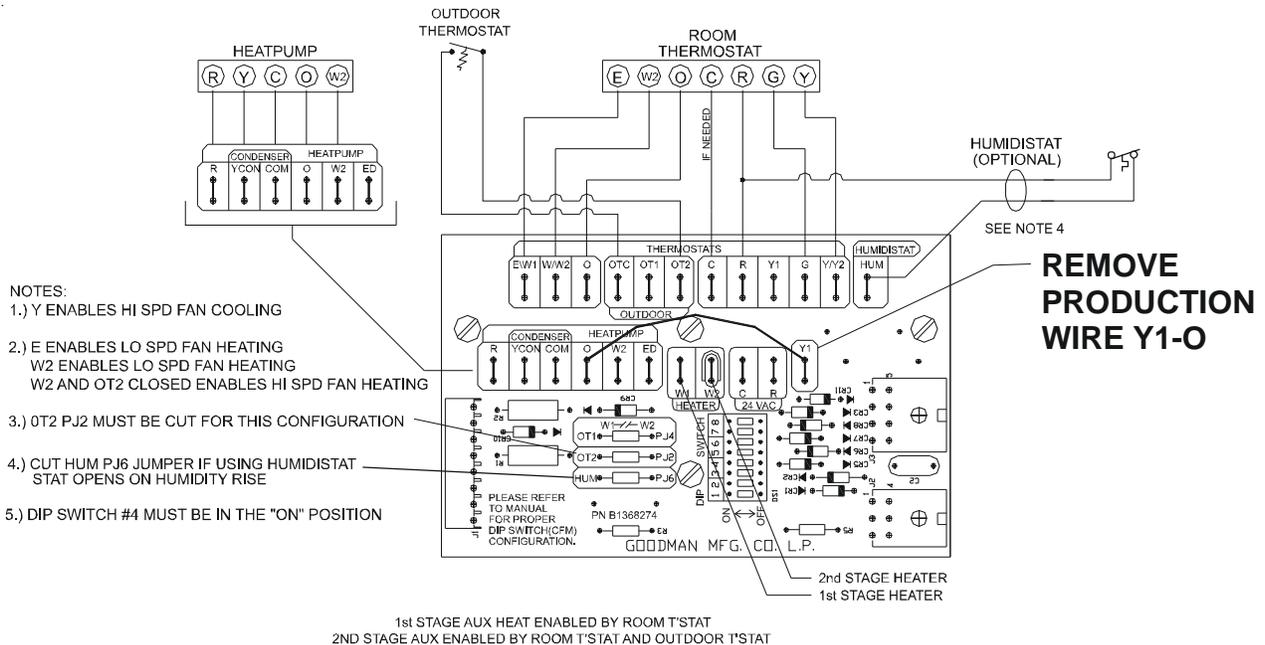
WARNING

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HEATPUMP - 2 STG EMHT 1 STG AUX HEAT

Figure 15



HEATPUMP - 2 STG EMHT 2 STG AUX - 1 OUTDOOR T'STAT

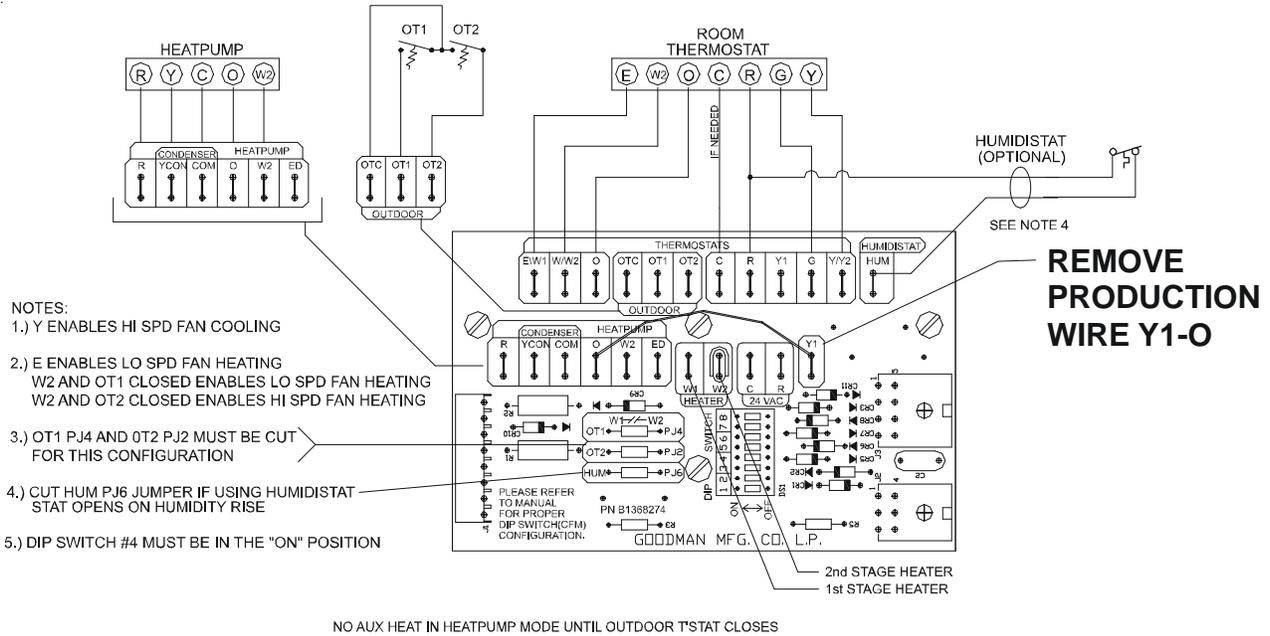
Figure 16

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



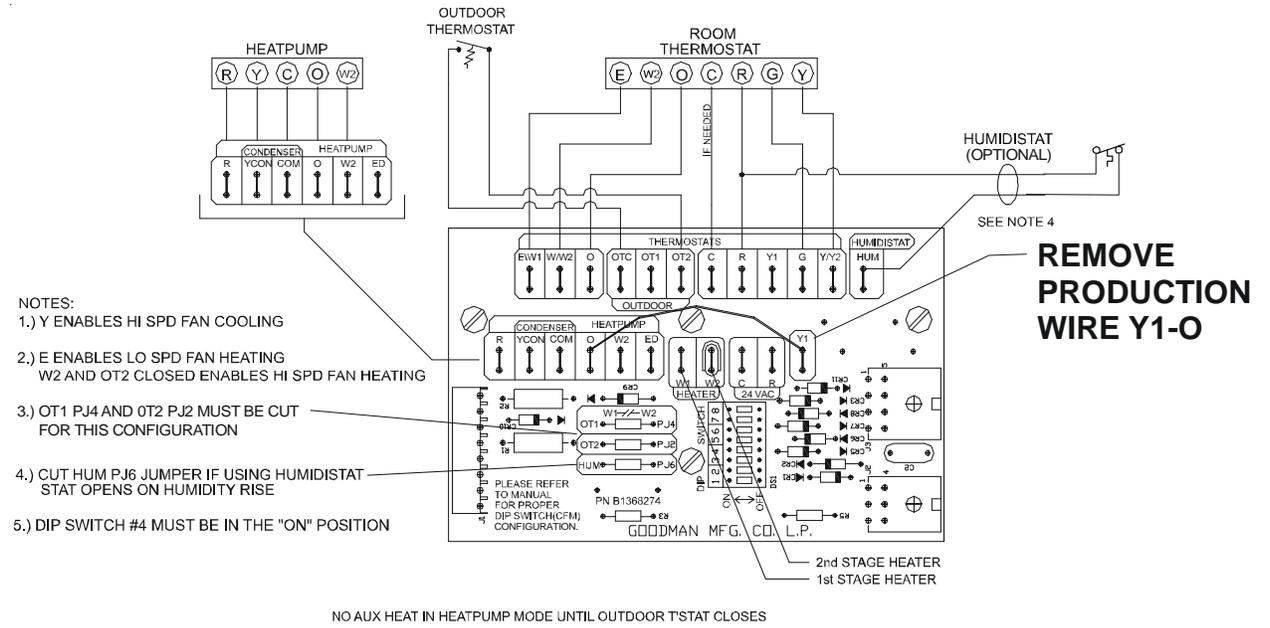
WARNING

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HEATPUMP - 2 STG EMHT 2 STG AUX - 2 OUTDOOR T'STATS

Figure 17



HEATPUMP - 2 STG EMHT 1 STG AUX - 1 OUTDOOR T'STAT

Figure 18

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



WARNING

HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



TWO-STAGE COOLING WITH CONVENTIONAL TWO-STAGE THERMOSTAT

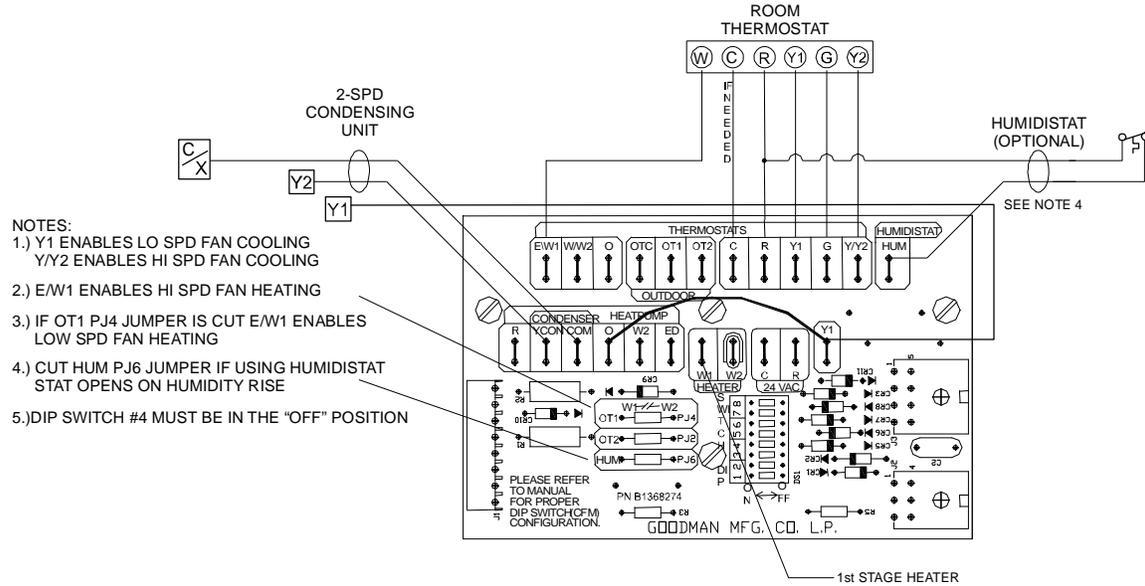


Figure 19

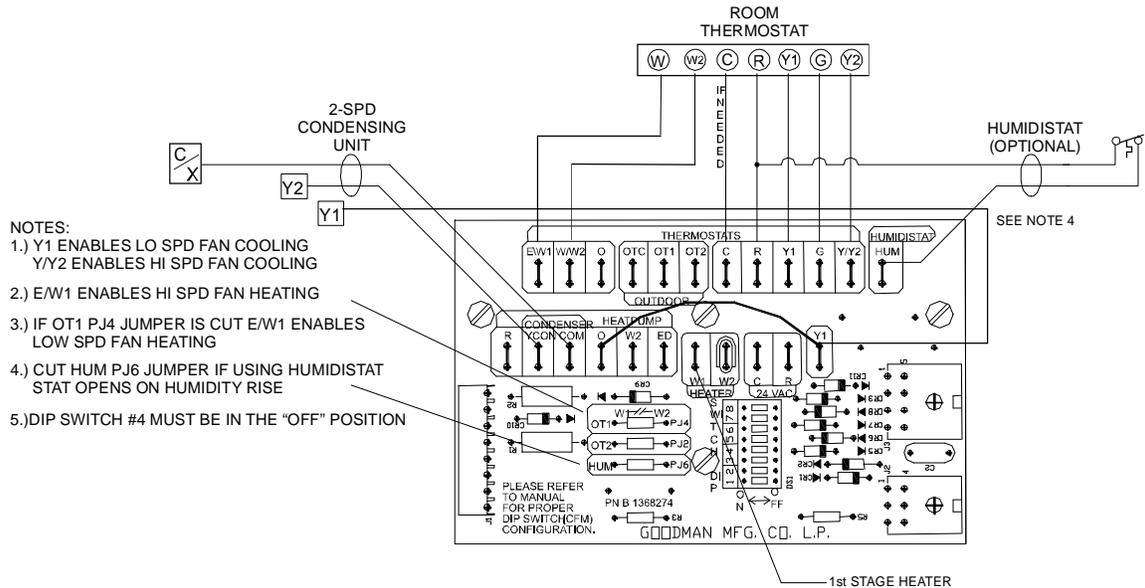


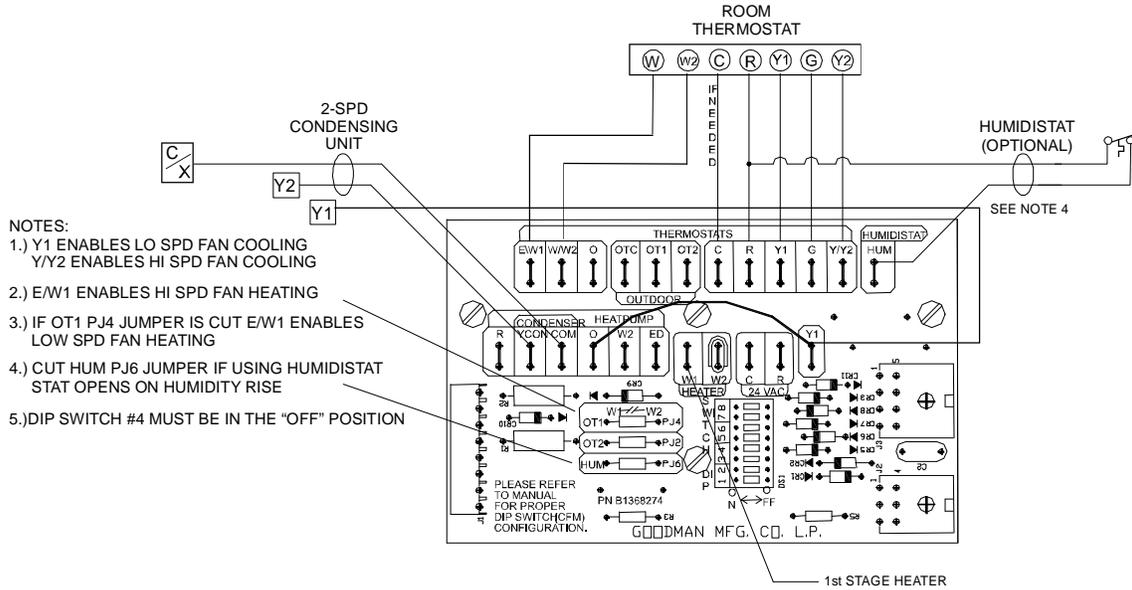
Figure 20

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



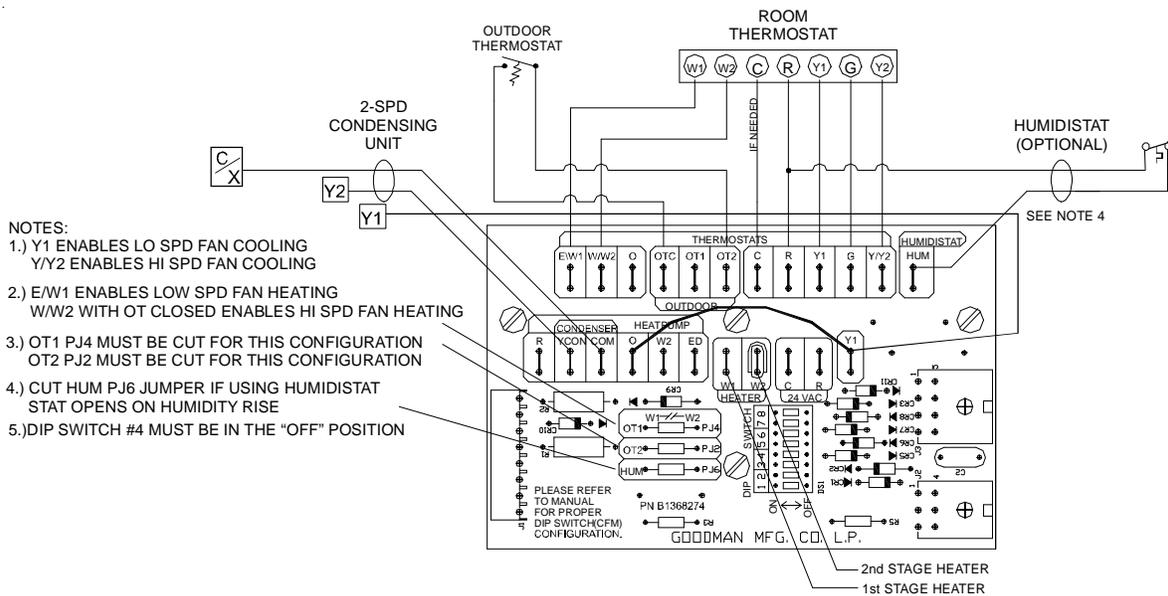
WARNING

HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



2 SPD COOLING ONLY - WITH 2 STAGE HEAT THERMOSTAT

Figure 21



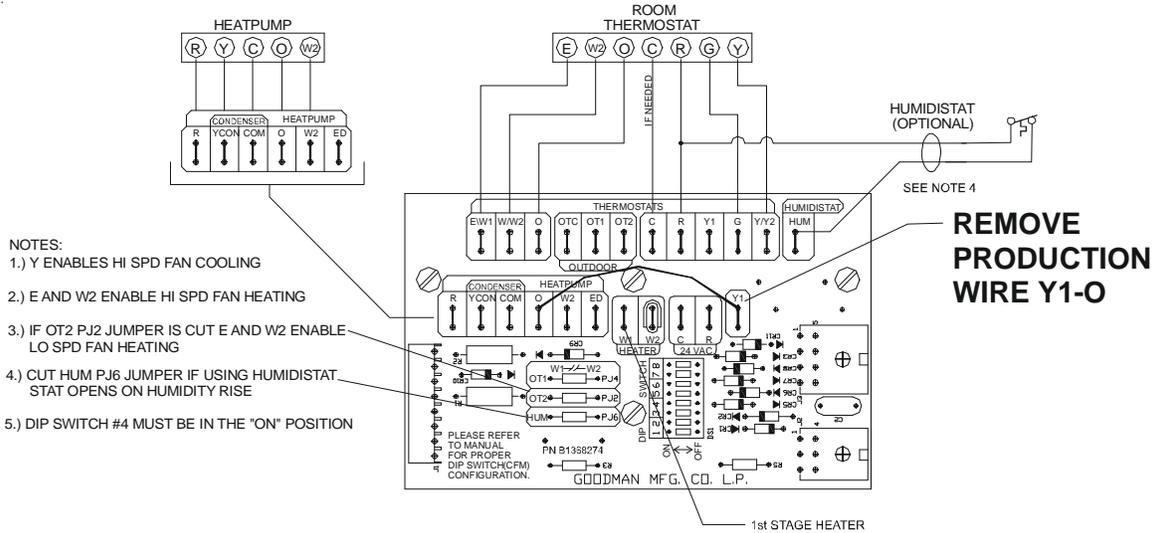
2 SPD COOLING ONLY - 2 STAGE HEAT (T' STAT ENABLED OT)

Figure 22

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

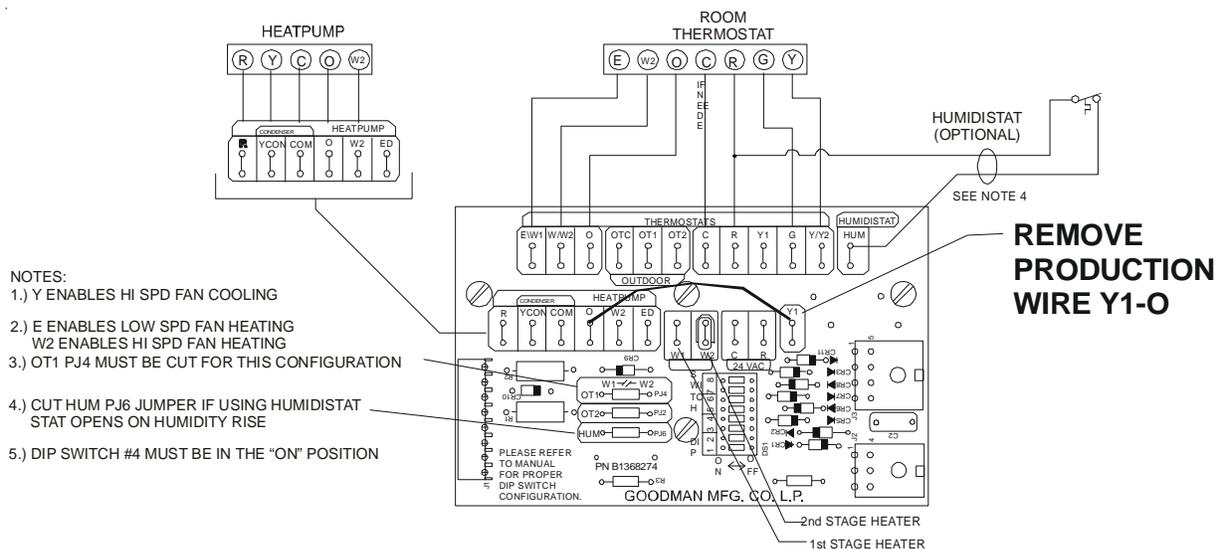
WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

HEAT PUMP WITH SINGLE OR TWO STAGE HEATING WITH CONVENTIONAL THERMOSTAT (OPTIONS FOR EMERGENCY HEAT)



HEATPUMP - WITH 1 STG EMHT 1 STG AUX HEAT

Figure 23



HEATPUMP - 2 STG EMHT 1 STG AUX HEAT

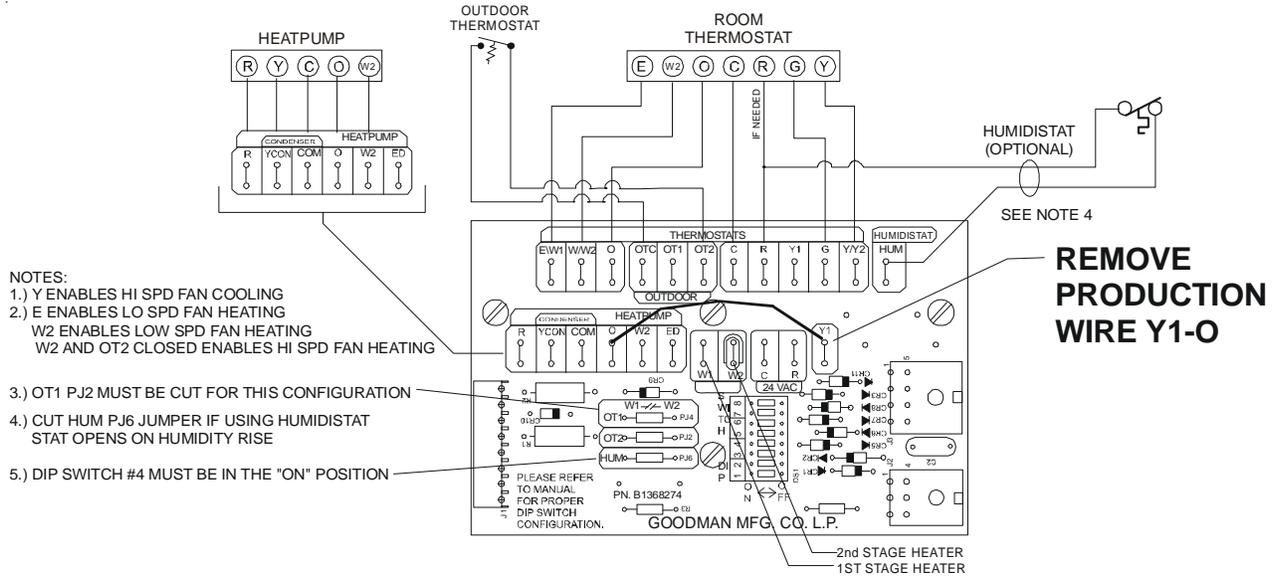
Figure 24

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



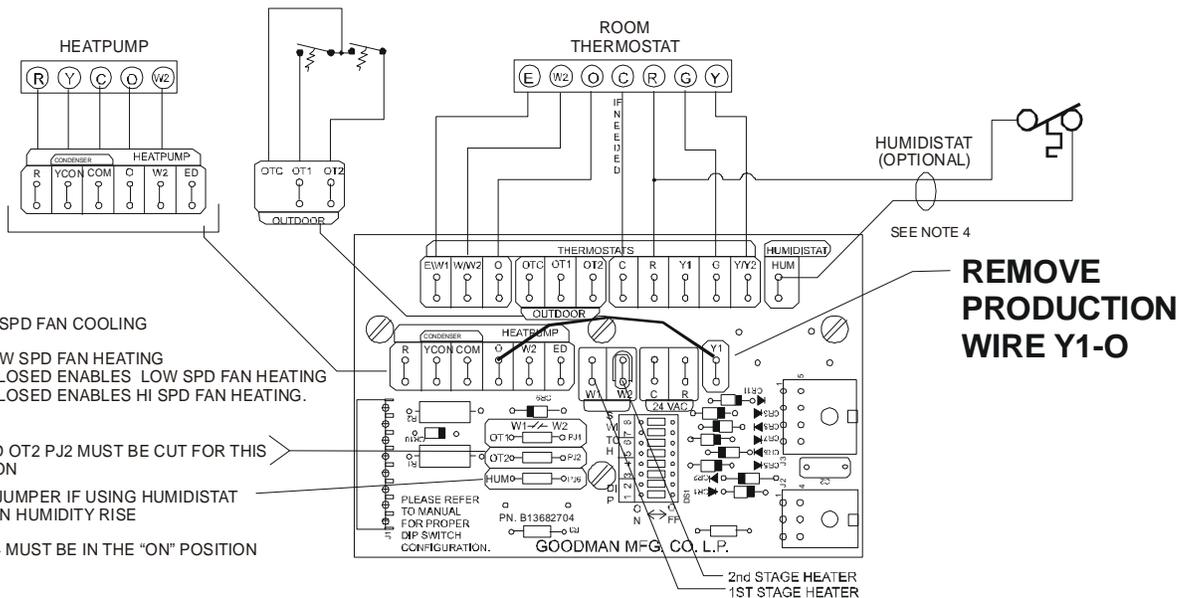
WARNING

HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



HEATPUMP - 2 STG EMHT 2 STAG AUX - 1 OUTDOOR T-STAT

Figure 25



NO AUX HEAT IN HEATPUMP MODE UNTIL OUTDOOR T'STAT CLOSES

HEATPUMP - 2 STG EMHT 2 STAG AUX - 2 OUTDOOR T-STAT

Figure 26

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

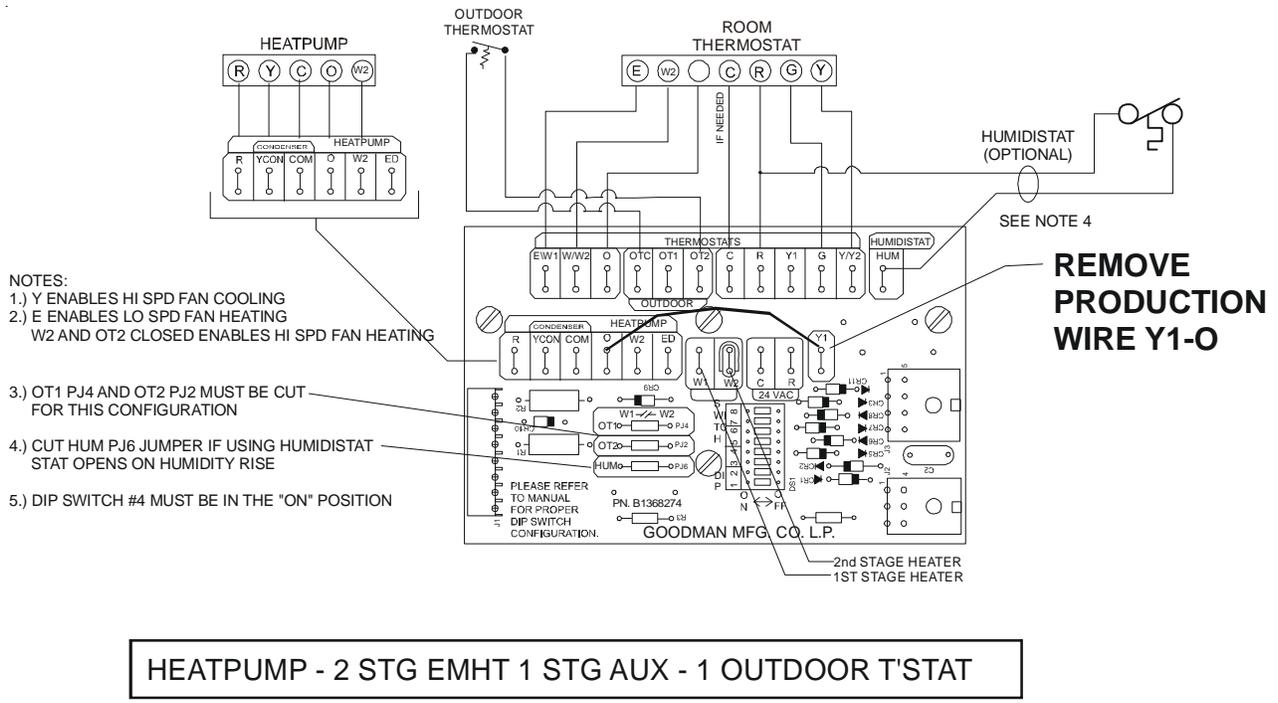


Figure 27

2 SPEED HEAT PUMP WITH SINGLE OR TWO-STAGE HEATING (OPTIONS FOR EMERGENCY HEAT) WITH CONVENTIONAL TWO-STAGE THERMOSTAT

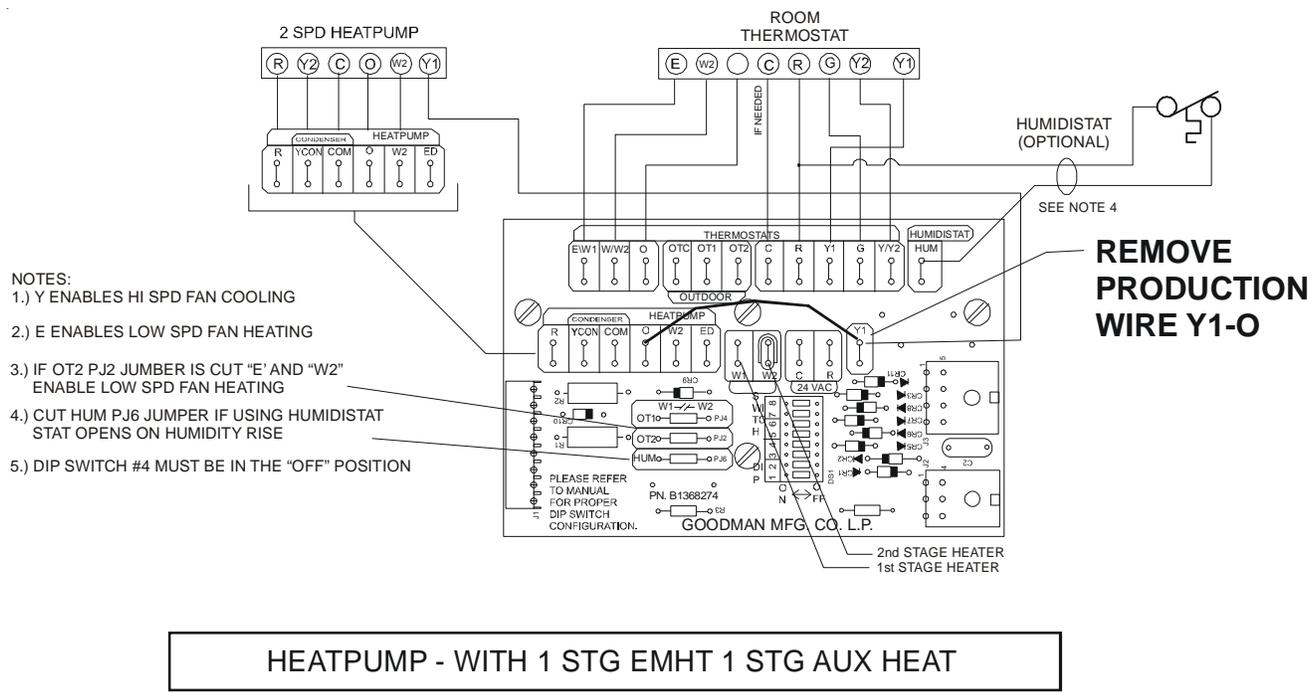
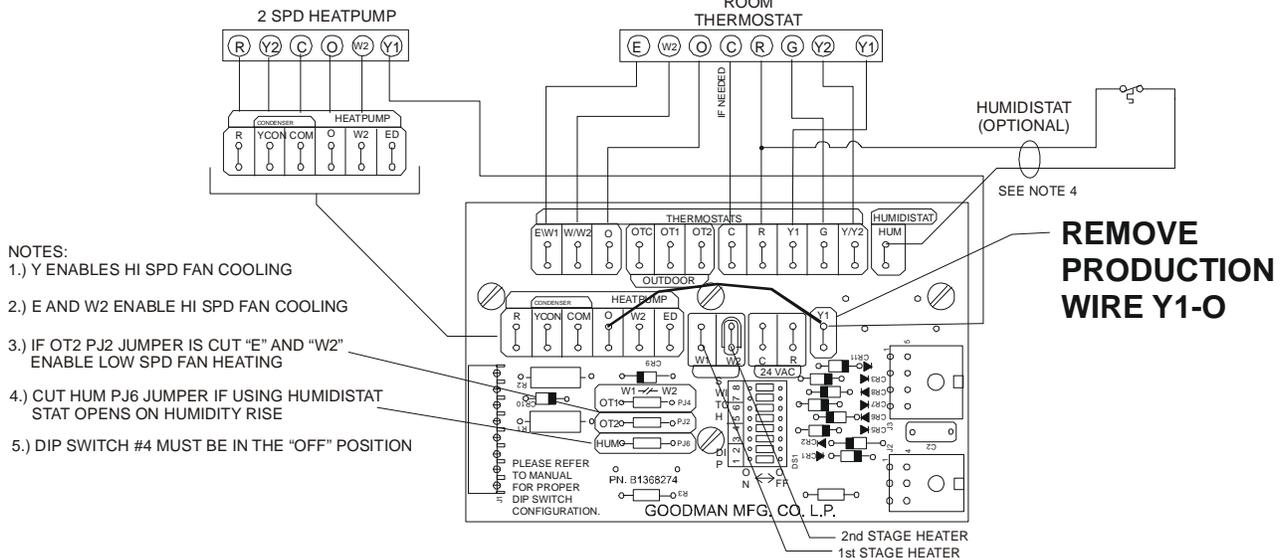


Figure 28

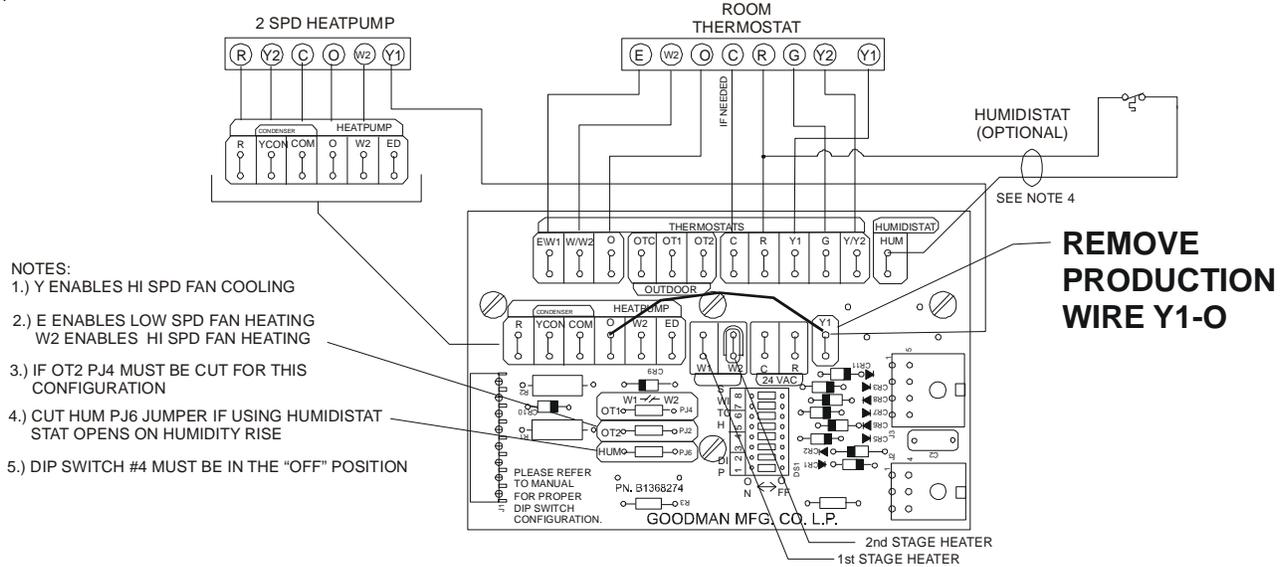
Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

WARNING **HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING.** MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



HEATPUMP - WITH 1 STG EMHT 1 STG AUX HEAT

Figure 29



HEATPUMP - 2 STG EMHT 1 STG AUX HEAT

Figure 30

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.



WARNING

HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING.
MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO
MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

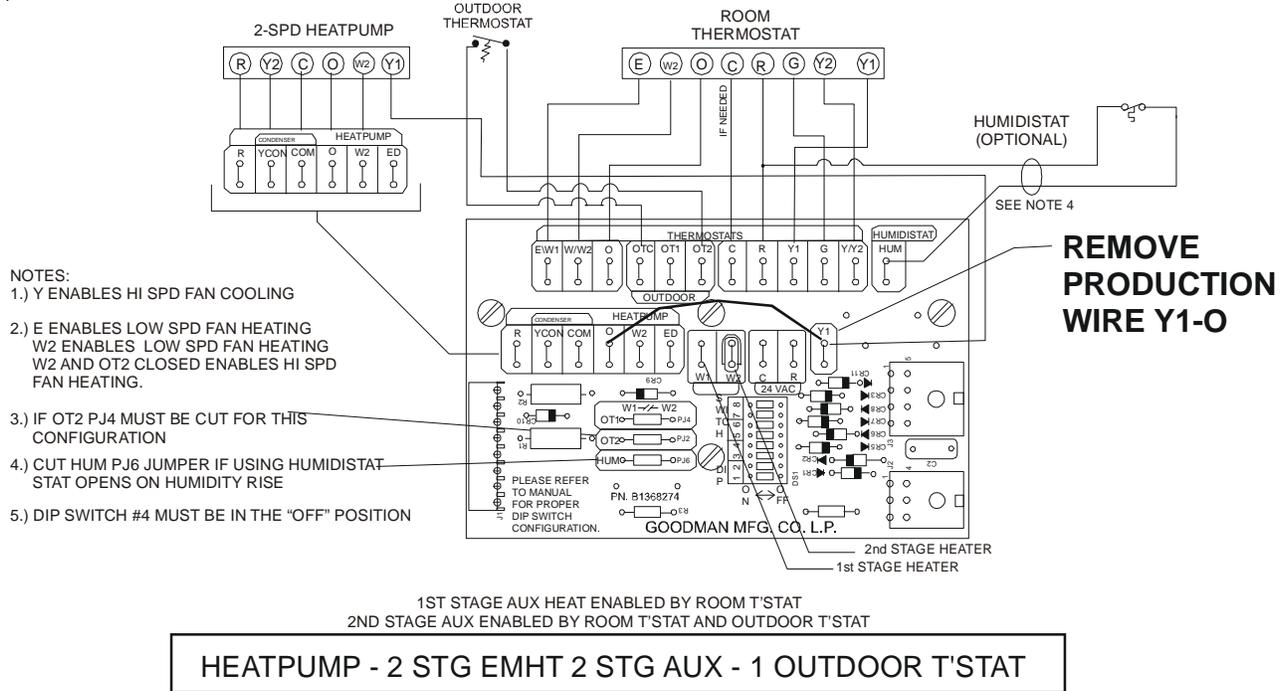


Figure 31

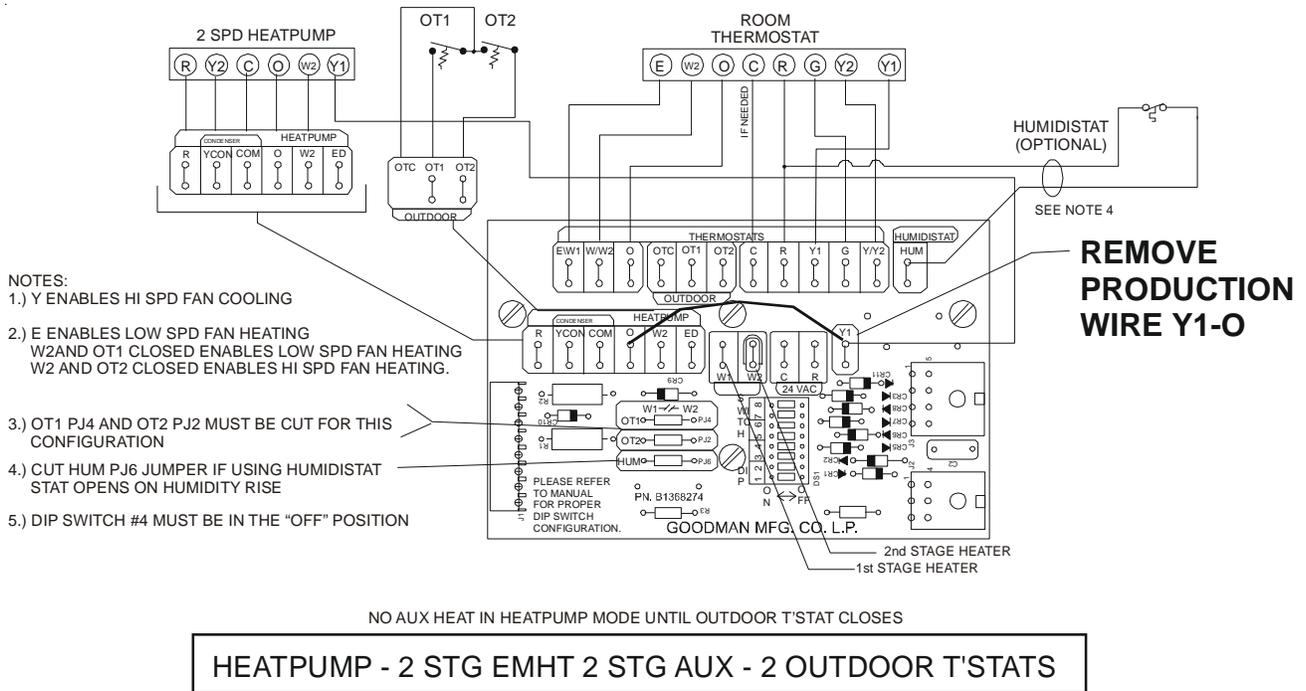


Figure 32

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

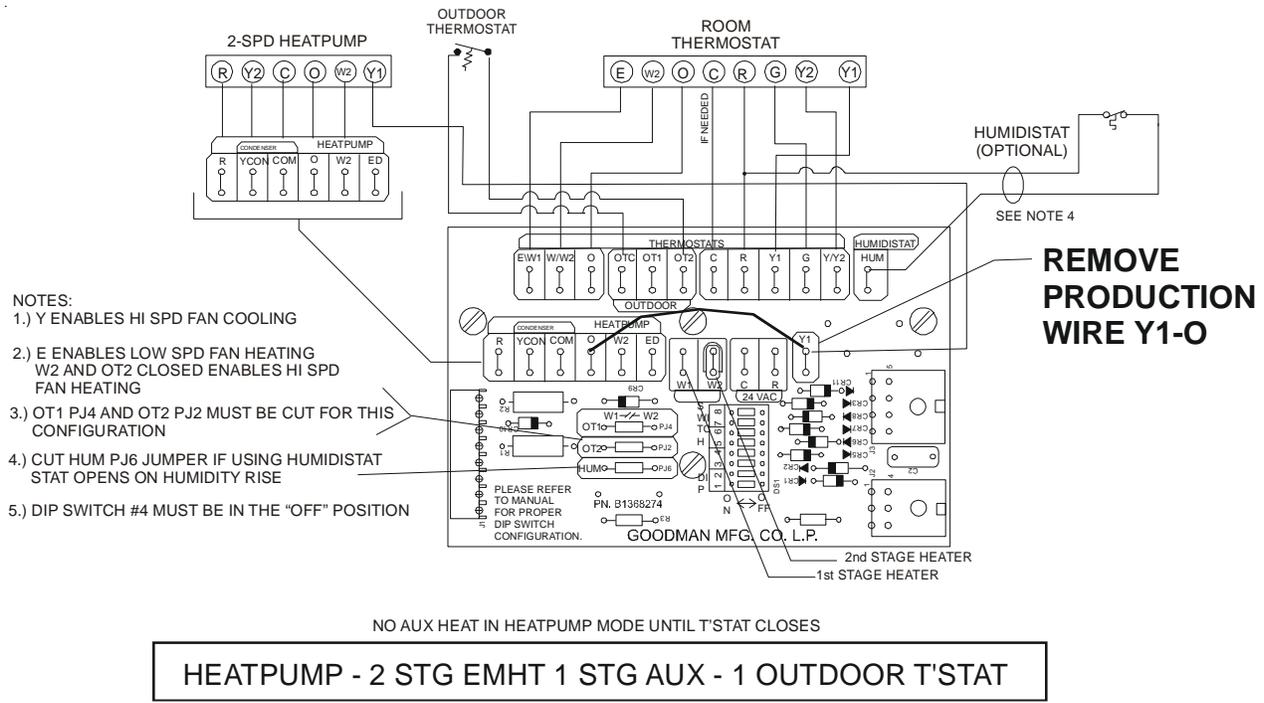


Figure 33

**TWO STAGE COOLING WITH CONVENTIONAL TWO STAGE THERMOSTAT
(ENCLOSED WITH ADD ON 1N006 DIODES)
TSTWK01 KIT REQUIRED**

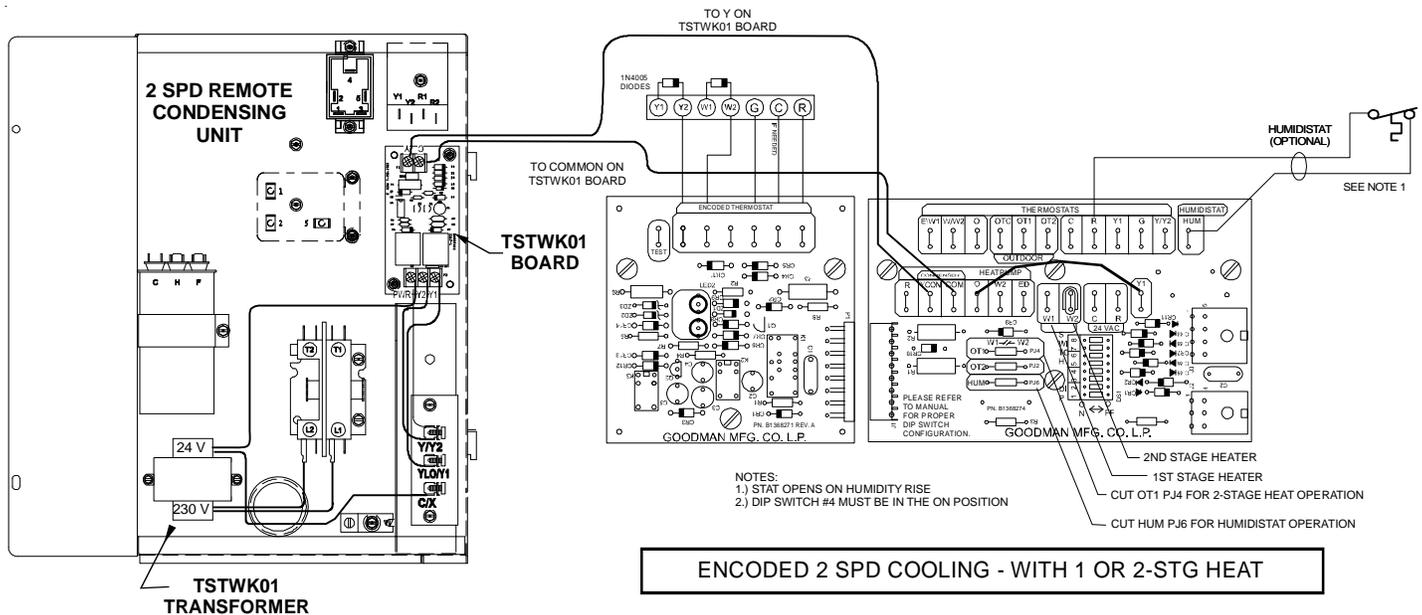


Figure 34

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

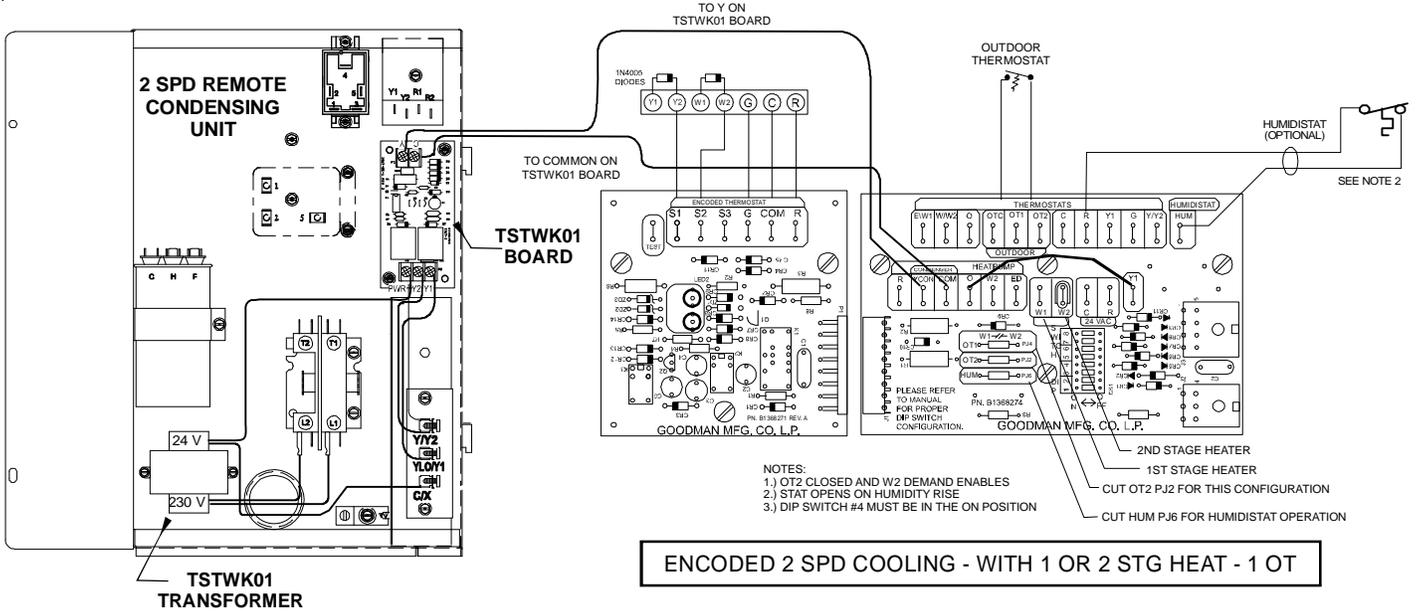


Figure 35

ENCODED TWO STAGE COOLING WITH GMC THERMOSTAT PART #CHET18-60 TSTWK01 KIT REQUIRED

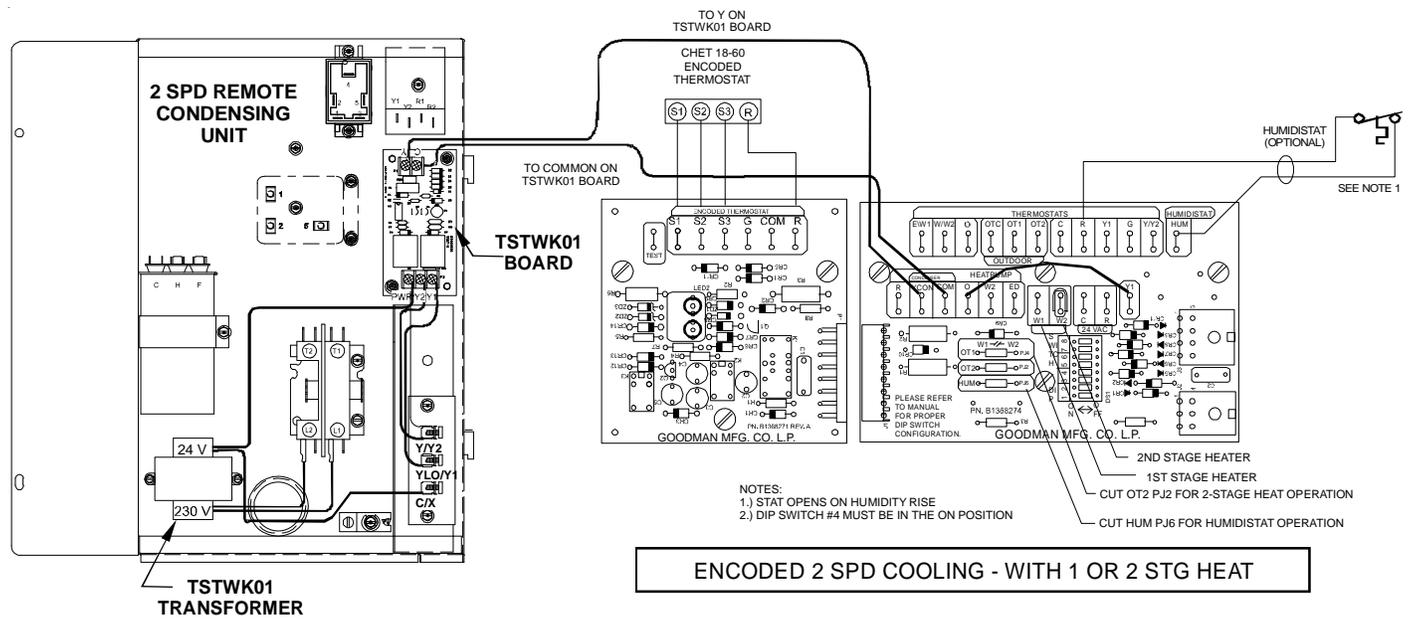
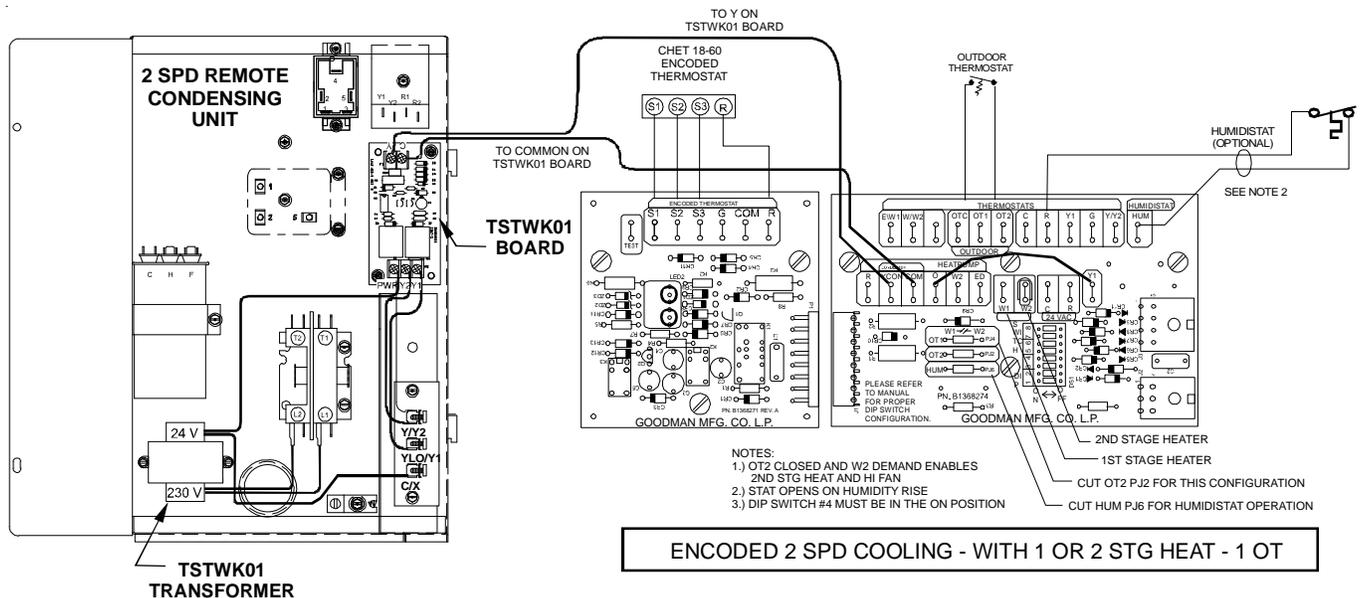


Figure 36

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



ENCODED 2 SPD COOLING - WITH 1 OR 2 STG HEAT - 1 OT

Figure 37

Troubleshooting Encoded Two Stage Cooling Thermostats Options

TEST INDICATION	FUNCTION	SIGNAL OUT	SIGNAL FAN
S1 +	LOW SPEED COOL	YCON +	Y1
* S1 - *	* LO SPEED COOL *	* YCON - *	* Y / Y2 HI *
S1 +-	HI SPEED COOL	YCON +-	Y / Y2
S2 +	LO SPEED HEAT	W1 HEATER	W / W1
S2 -	O	ED - (FUTURE USE)	O
S2 +-	LO SPEED HEAT HI SPEED HEAT	W1 HEATER W2 HEATER	W / W1 EM / W2
S3 +	G	NONE	G
* S3 - *	N/A	N/A	N/A
* S3 +- *	N/A	N/A	N/A
R +- COM	24 VAC GND	R TO T'STAT COM TO T'STAT	R C1 , C2

- NOTES:
- 1.) THE TEST SPADE CAN BE CONNECTED TO ANY OTHER TEST SPADE ON EITHER BOARD.
 - 2.) THE + LED WILL BE RED AND WILL LIGHT TO INDICATE + HALF CYCLES. THE - LED WILL BE GREEN AND WILL LIGHT TO INDICATE - HALF CYCLES. BOTH RED AND GREEN ILLUMINATED WILL INDICATE FULL CYCLES DENOTED BY +- .
 - 3.) SIGNAL OUT CONDITION FOR W1 , W2 HEATER WILL BE AFFECTED BY OT1 PJ4 AND OT2 PJ2 JUMPERS AND OUTDOOR THERMOSTATS ATTACHED. THE TABLE ABOVE ASSUMES OT1 PJ4 IS REMOVED AND OT2 PJ2 IS MADE WITH NO OUTDOOR THERMOSTATS ATTACHED.

The chart above provides troubleshooting for either version of the encoded thermostat option. This provides diagnostic information for the GMC CHET18-60 or a conventional two cool / two stage heat thermostat with IN4005 diodes added as called out in the above section.

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.

A test lead or jumper wire can be added from the test terminal to any terminal on the B13682-74 or B13682-71 variable speed terminal board and provide information through the use of the LED lights on the B13682-71 VSTB control. Using this chart, a technician can determine if the proper input signal is being received by the encoded VSTB control and diagnose any problems that may be relayed to the output response of the B13682-74 VSTM control.

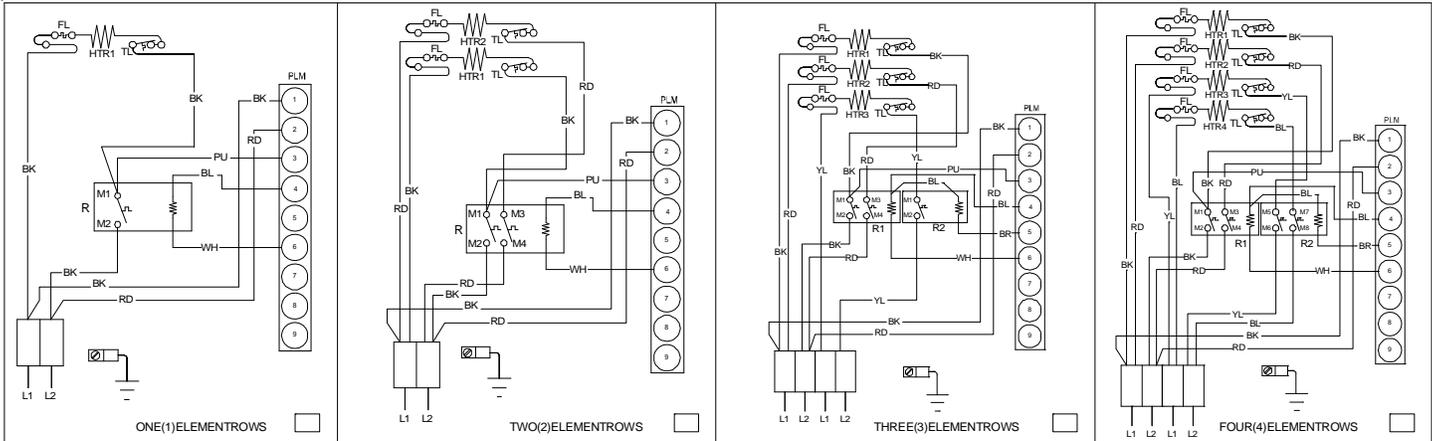
Example:

The system is calling for 1st stage cooling operation. The proper input signal from either thermostat option will cause the red “+” LED light to illuminate when the test terminal and the “S1” terminal are connected using a test lead or jumper wire. This verifies proper input from the thermostat. The proper output is a “YCON” signal to the RSG condensing unit. When a test

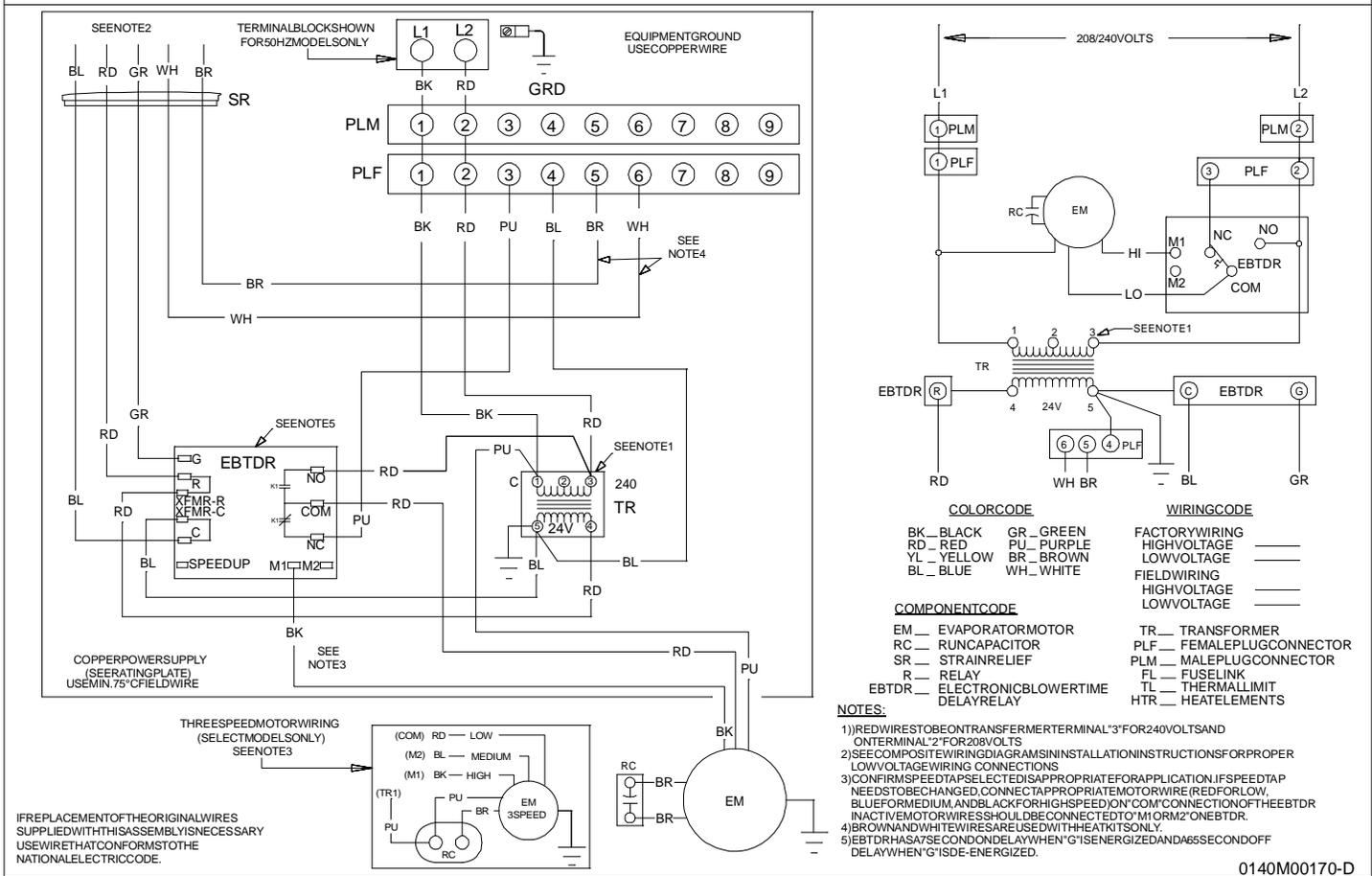
lead or jumper is connected between Test and YCON, the red “+” LED will illuminate. The corresponding response from the CKTS control will be an illuminated “LOW” LED light and 24V applied to the Low capacity contactor through the “LOW” terminal output.

This similar procedure can be utilized on any terminal on the VSTB controls. The chart above indicates the proper input and LED status as well as the corresponding out signal. Each mode of operation must be verified during the check out procedure when the units are installed. The LED light provides a easy method to verify operation without the use of a multi-meter.

WARNING HIGH VOLTAGE! DISCONNECT ALL POWER BEFORE SERVICING. MULTIPLE POWER SOURCES MAY BE PRESENT. FAILURE TO DO SO MAY CAUSE PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.



NOTE: WHEN INSTALLING HEATER KIT, ENSURE SPEED TAP DOES NOT EXCEED MINIMUM BLOWER SPEED (MBS) SPECIFIED FOR THE AIR HANDLER/HEATER KIT COMBINATION ON THIS UNIT'S SS&R PLATE. AFTER INSTALLING OPTIONAL HEAT KIT, MARK "X" IN THE PROVIDED ABOVE. MARK ACCORDING TO NUMBER OF HEATER ELEMENT ROWS INSTALLED. NO MARK INDICATES NO HEAT KIT INSTALLED.



014M00170-D

Wiring is subject to change, always refer to the wiring diagram on the unit for the most up-to-date wiring.