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# INSTALLATION INSTRUCTIONS

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## Honeywell Black Box Actuator Replacement Kit 8620-354\*

For Replacement of Bard 8602-017 or  
8602-037 Actuators in Bard Ventilation Options  
with Modulating Operation

\* Replaces Honeywell M7415A1006 or  
M7415B1004 Actuators



*Climate Control Solutions*

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## Overview

The replacement actuator kit should only be installed by a trained heating and air conditioning technician. These instructions serve as a guide to the technician installing a vent actuator, not as a step-by-step procedure with which the mechanically inclined owner can install the kit.

The actuator kit is shipped in one carton, which contains the actuator motor, crank arm kit, miscellaneous hardware, updated wiring diagram and installation instructions.

This kit is for use in vent packages with modulating operation. It will replace the actuator and crank arm in the vent package.

Kit includes:

- 8602-117 spring-return actuator motor, 22 in/lb
- 113-962 actuator mounting plate
- 113-964 actuator mounting plate
- 113-965 actuator mounting plate
- 8602-008 ball joint crank arm pivot
- 7961-966 actuator mounting template
- 7961-312-0570 actuator replacement label
- Electrical connectors and mounting hardware
- 4114A108 wiring diagram
- 4114A109 wiring diagram
- 4114A273 wiring diagram
- 4114A274 wiring diagram
- 2100-771 installation instructions

Field-supplied tools needed:

- Appropriate personal protection equipment, including gloves and safety glasses
- Drill/driver
- 5/16" hex driver bit
- 1/8" drill bit
- 3/4" drill bit
- Phillips driver bit or screwdriver
- 7/16" wrenches (2)
- 5/16" wrench
- Wire cutter/stripper/crimp tool

## Operating Modes

This kit can be set up to function in two modes:

### Multi-Position Modulation (Based on Operating Mode)

This kit can be set up to open the damper blade to different predetermined positions to provide adequate outdoor air for the given space during each mode of operation when the thermostat or building management system sends an occupied signal to the unit. Refer to the unit or vent manual for blade adjustment airflow information.

### Fully Modulating (0-10V)

This kit can be set up for full modulation of the damper blade based on a 0-10V input signal from a CO<sub>2</sub> sensor or other 0-10V source when the thermostat or building management system sends an occupied signal to the unit. In this mode, the damper blade can be adjusted to a minimum open position (OV signal) when the thermostat or building management system sends an occupied signal to the unit.

## Special Installation Situations

In some cases, space constraints or arm positioning may require that the actuator be oriented or mounted differently than described in the installation instructions provided on the following pages. The actuator may be oriented multiple ways on each of the three mounting brackets provided, and may be flipped to allow both clockwise and counter-clockwise operation. Additionally, the plate may be mounted anywhere within the vent package (as space allows) using the included self-tapping screws. If an alternate placement or orientation is required, review the considerations noted below to determine the best way to install the actuator assembly.

For proper operation of the new actuator:

- The new actuator must be mounted so that the arm rotates in the same direction (CW, CCW) as the original actuator. (Actuator can be mounted with either side facing out. Each face is marked with the rotation direction on CLOSING of the actuator as seen from that face.)
- The assembly must be located so that the center of rotation on the new actuator arm is in the same place as the original actuator.
- The assembly must be located so that the centerline of the crank arm ball joint aligns with the center of the damper blade rod and pin.

Refer to the actuator assembly instructions found in Figure 2 on page 6 for general assembly diagrams and instructions.

# INSTALLATION

## WARNING

**Electrical shock hazard.**

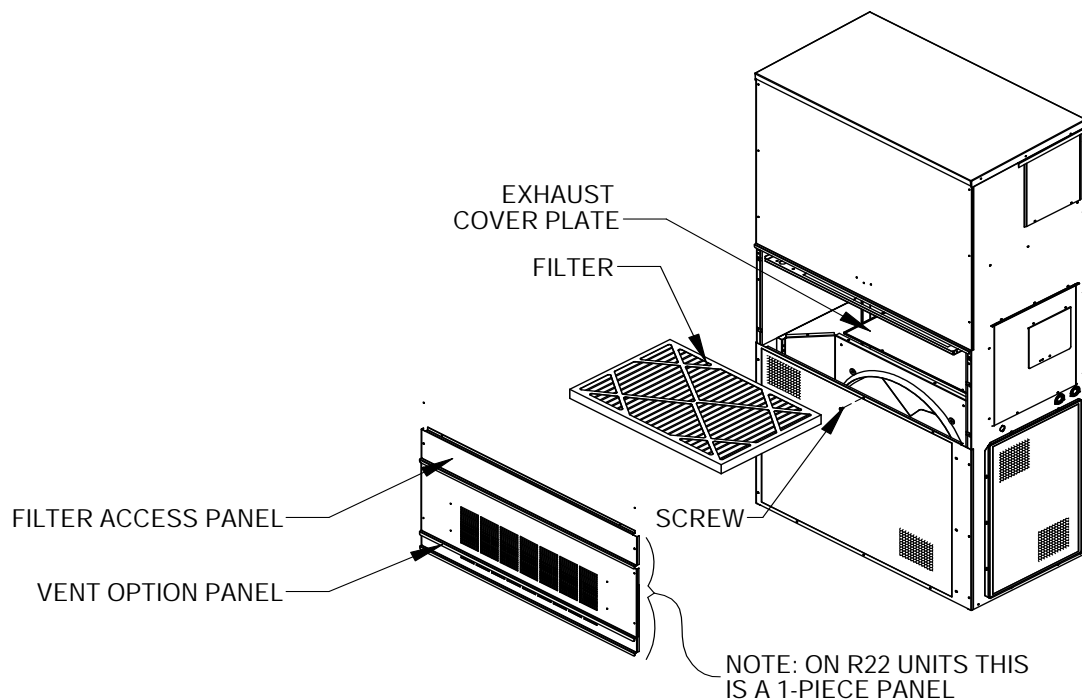
**Disconnect remote power supply or supplies before servicing.**

**Failure to do so could result in electric shock or death.**

### Basic Installation

1. Unpack the 8620-354 kit, which includes the actuator, crank arm kit, CRV control board, hardware, motor mounting template, replacement adhesive wiring diagrams and installation instructions.
2. Disconnect power to the unit using the unit breaker or disconnect switch.
3. From existing wall-mount unit, remove and save the filter access panel and vent option panel (see Figure 1). Remove and save the existing filter.
4. Unhook the pushrod from the black box motor crank arm.
5. Make a note of the position of the crank arm on the black box actuator—the new actuator arm must be oriented in the same way. Also, make a note of the "off" position and open position in each stage of unit operation (if applicable) of the crank arm.
6. Disconnect the control wires from the black box motor. Remove the motor and discard.
7. If applicable, disconnect the control wires from the existing CRV control board. Remove board and discard.
8. Using a punch or other sharp object, punch out the four (4) #1 holes in the adhesive motor mounting template. Orient the arrows towards the front of the unit, line up the #1 holes with the black box mounting holes and adhere template to the vent base. Using a punch and a 1/8" drill bit, drill out the three (3) #2 holes in the template. Remove adhesive template from base.
9. Assemble the new actuator and crank arm kit using the actuator assembly instructions provided in Figure 2. Be sure to orient the crank arm in the

**FIGURE 1**  
Remove Panels and Filter



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same position as the original, paying attention to the direction of rotation. (Actuator can be mounted with either side facing out. Each face is marked with the rotation direction on CLOSING of the actuator as seen from that face.)

10. Mount the assembly to the vent base with three (3) hex-head screws (provided) using the new holes drilled in Step 8.

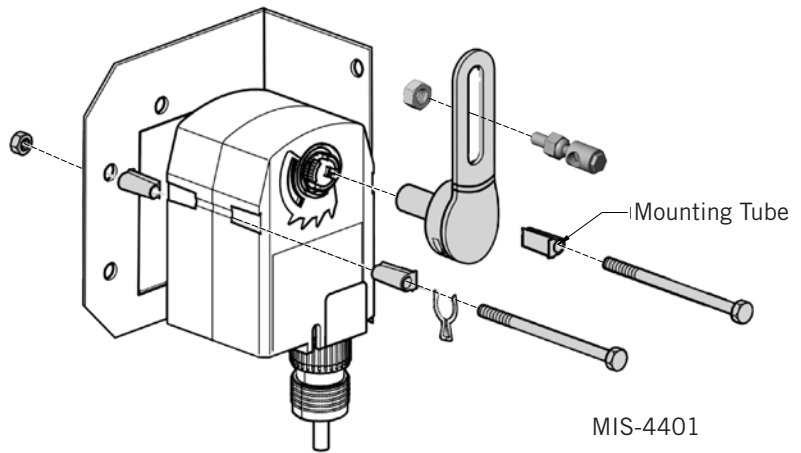
**FIGURE 2**  
**Actuator Assembly Instructions**

The actuator replacement kit allows the actuator to be mounted in either a horizontal or vertical position to meet space requirements.

The mounting bracket is designed to mount the actuator in the same mounting locations as common foot-mounted, crank arm style actuators. Hole patterns in the base match common Honeywell™, Siebe™ (Barber Coleman™) and Johnson Controls™ actuators for easy retrofit.

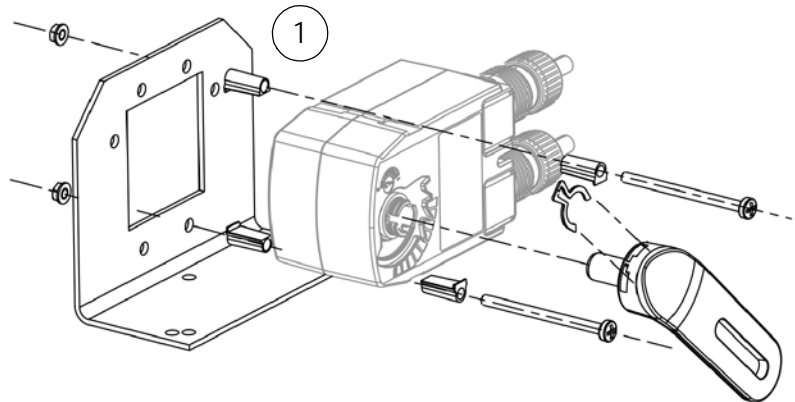
**IMPORTANT:** Mounting bracket must be in place first and securely fastened with the supplied sheet metal screws before assembling actuator onto the bracket. All four (4) mounting tubes must be used when fastening the actuator to the bracket.

Orient actuator so that the crank arm rotates in the proper direction. Each face is labeled with the Closing direction from that side – CW or CCW.

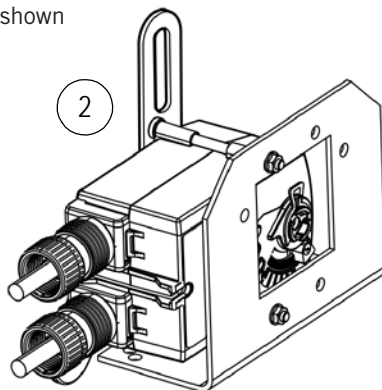


**To install crank arm:**

Install crank arm into hollow axle and insert accompanying clip into crank arm slot as shown in ①. Finish assembly of actuator with crank arm onto bracket with supplied hardware.



Final assembly shown in ②.



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11. Attach the push rod to the new crank arm. Make sure the damper is fully closed before tightening the bolt on the crank arm pivot assembly.
12. **Units That Originally Had a CRV Control Board Only**

**NOTE:** For units that DID NOT originally have a CRV control board, refer to Figure 4 on page 8 for the appropriate wiring information.

Using the (4) new standoffs provided, mount the new CRV control board (8201-167) in the same location as the control board that was removed in Step 7.

Refer to the wiring diagram matrix in Table 1. Find the new wiring diagram that correlates to the existing wiring diagram in the unit vent (see Figures 3-6 on pages 7-10). Use the new diagram to connect the wires from the old CRV control board to the new CRV control board (8201-167). Discard unused wires and tie up any unused wire ends out of the way of the damper blade and motor using the wire ties provided.

**TABLE 1**  
**Wiring Diagram Correlation Matrix**

Original Wiring Diagram	New Wiring Diagram
4114-101C	4114-108
4114-103	4114-109
4056-159B	4056-273
4056-195C	4056-273
4056-187B	4056-274
4056-187M	4056-274

In some models, the red 24V "hot" wire shown in Figure 3 (page 7) is not present. If this is the case, use the red wire provided to connect the 24V tab on the new CRV control board to the R terminal on the low voltage terminal strip in the unit control panel. Secure wire with the provided zip ties.

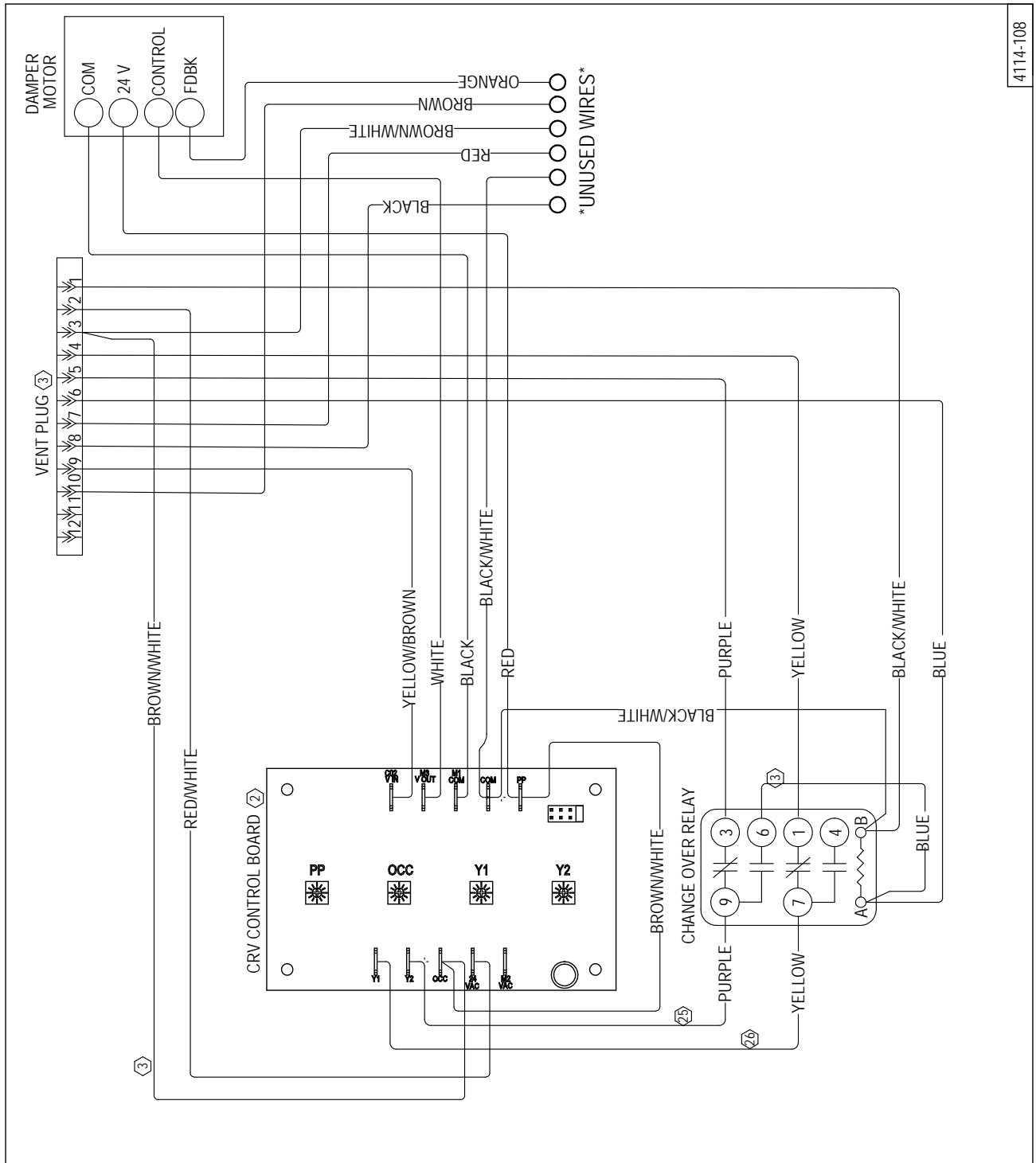
13. Cut the new actuator lead wires to an appropriate length and strip each wire. Crimp a 1/4" male quick connector (provided) on the red, white and black wires. Fold the orange wire back against the lead wire and tape (see Figure 7 on page 11). Secure excess wire using the included zip ties. See Table 1 for the appropriate wiring diagram.

**14. WGS Units Only**

Remove both vent plugs/harnesses and discard. Use a center punch and 3/4" drill bit to drill a 3/4" hole in the filter partition near where the vent plug was located. Install the 3/4" grommet provided and route the actuator lead wires through the new grommet and through the existing grommet in the control panel side (see Figure 8 on page 12). Connect the actuator lead to the CRV board per wiring diagram 4056-273 on page 9.

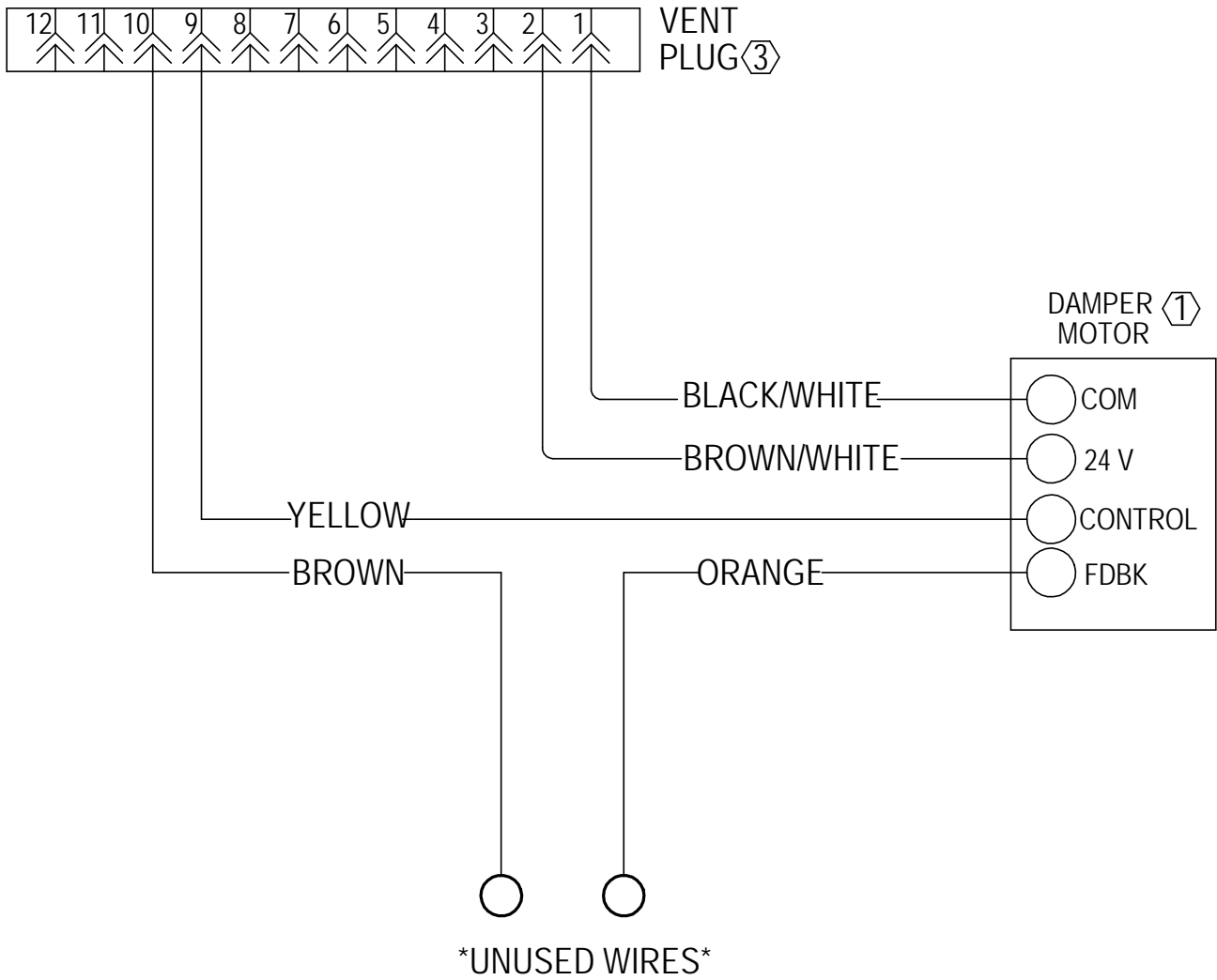
15. Once installation is complete, adhere the appropriate wiring diagram (using the existing wiring diagram number and referencing Table 1) over the existing wiring diagram on the ventilator. Then, adhere the 7961-312-0570 label (included) to the vent base or blade near the vent wiring diagram to indicate that an actuator kit has been installed.
16. Re-install unit air filter, filter access panel and vent option panel.
17. Restore unit power.
18. Verify actuator operation by following the steps provided on page 13.

**FIGURE 3**  
**Wiring Diagram 4114-108**  
 (Replaces 4114-101C)



4114-108

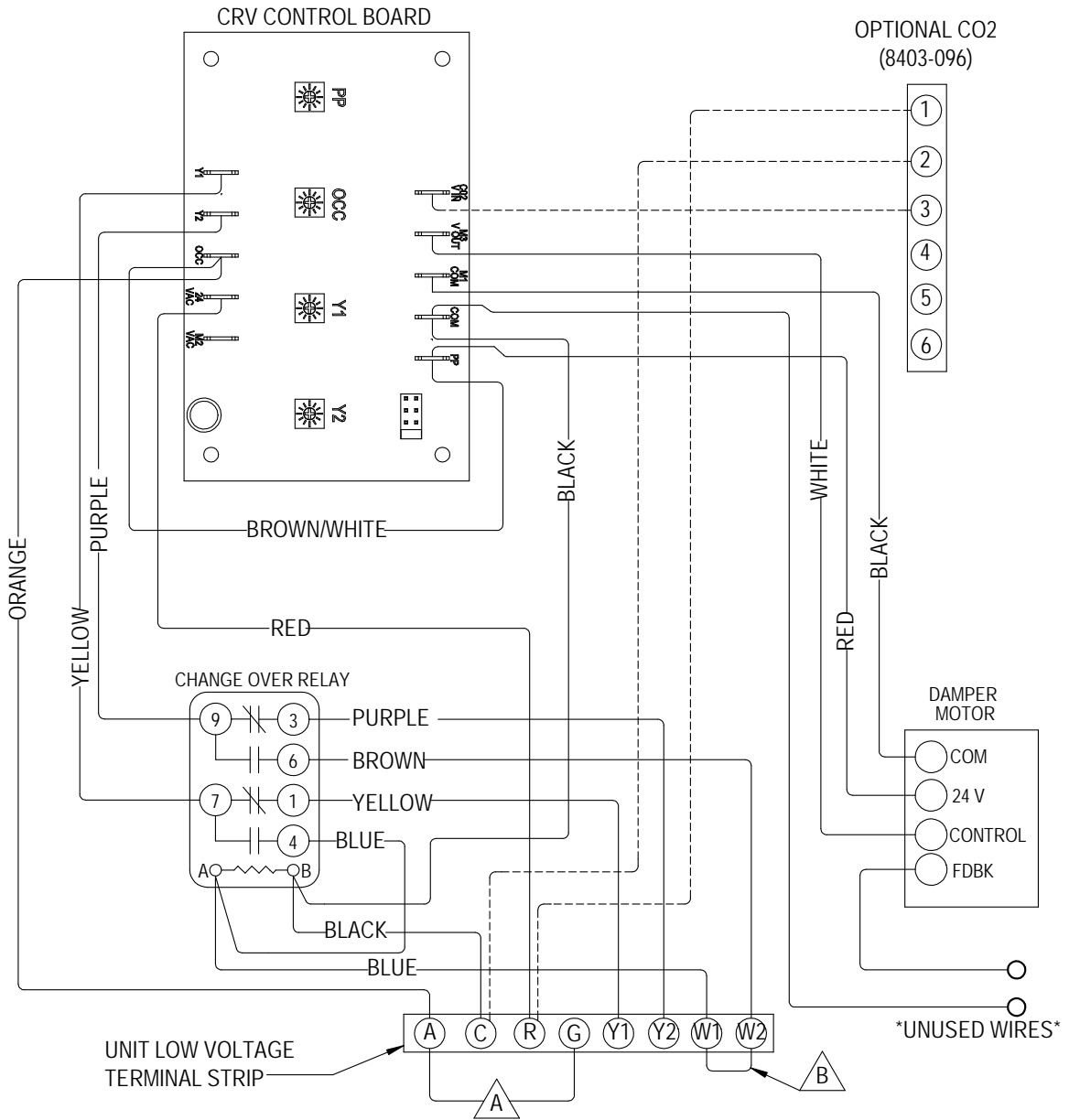
**FIGURE 4**  
**Wiring Diagram 4114-109**  
**(Replaces 4114-103)**



4114-109



**FIGURE 5**  
**Wiring Diagram 4056-273**  
**(Replaces 4056-159B and 4056-195C)**



**AIR CONDITIONER CONNECTION DIAGRAM**



ALTERNATE CONNECTION FOR CONSTANT VENTILATION

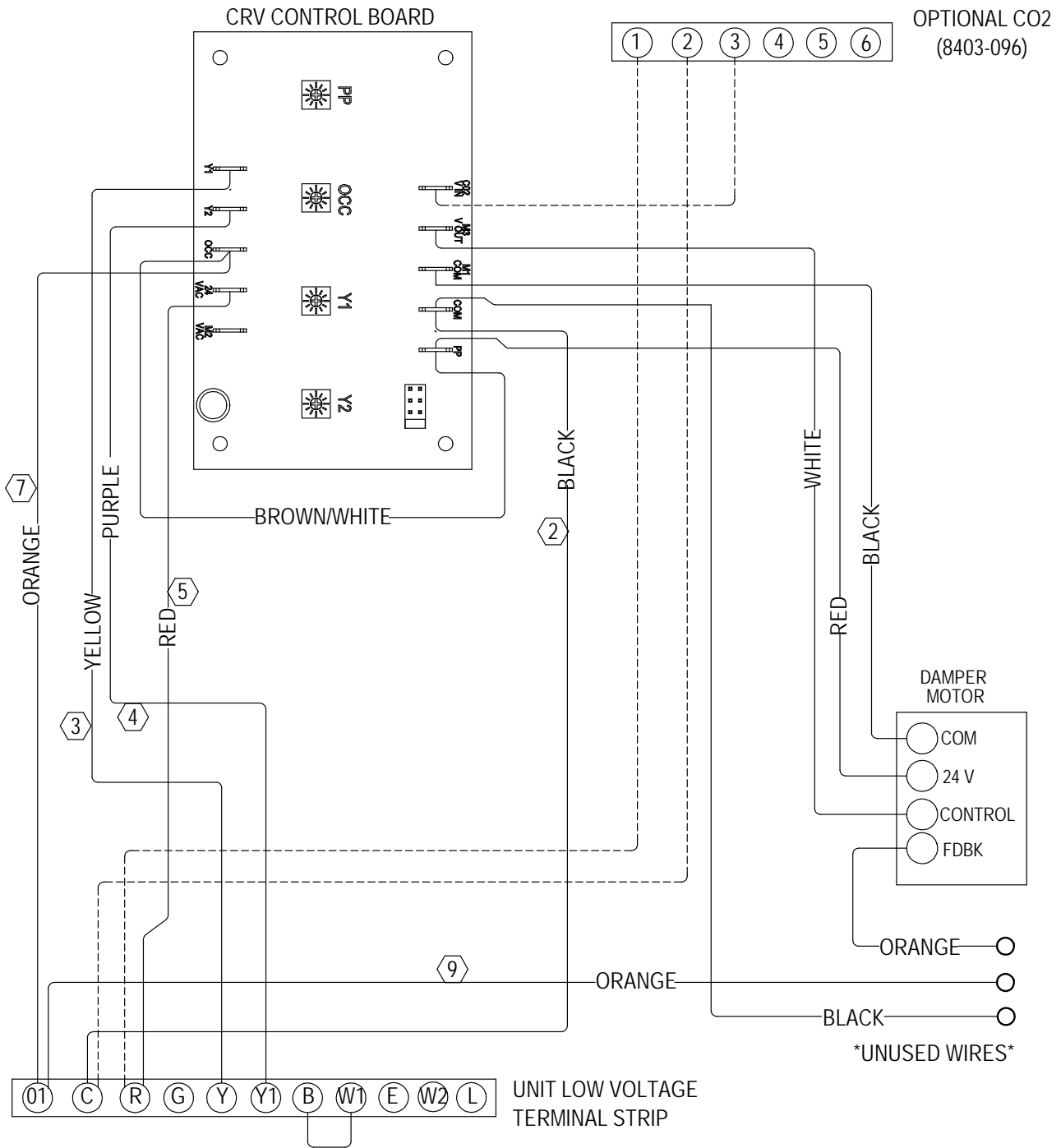


JUMPER IS NOT PRESENT IN WA\*S1 UNITS

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 REQUIRED FIELD WIRING FOR  
 OPTIONAL CO2 SENSOR

4056-273

**FIGURE 6**  
**Wiring Diagram 4056-274**  
 (Replaces 4056-187B and 4056-187M)



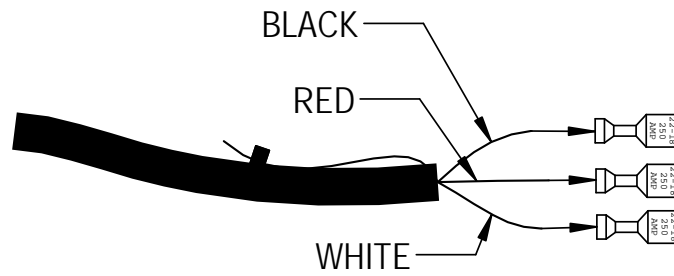
HEAT PUMP CONNECTION DIAGRAM

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 REQUIRED FIELD WIRING FOR  
 OPTIONAL CO2 SENSOR

4056-274

**FIGURE 7**  
**Actuator Lead Wiring Prep**

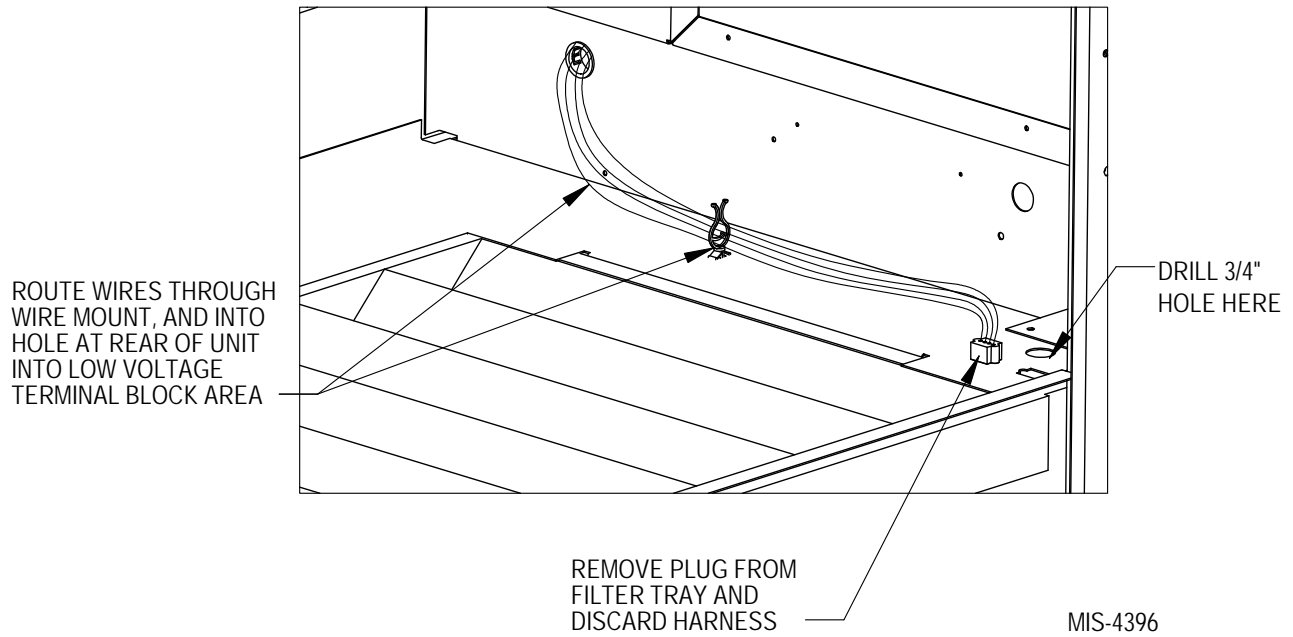
Strip black, white and red wires and crimp a 1/4" straight quick connector (P/N 8611-064) on each. Cut any exposed copper off the end of the orange wire and fold back against the wire lead. Tape off.



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**FIGURE 8**  
**Grommet Installation for WG\*S Units**

For WG\*S units, remove the plug from the partition and discard both ends of the harness. Drill a 3/4" hole where shown below and insert a 3/4" grommet. Route the actuator lead wires through the new grommet and into the unit control panel as shown below.



## Setup and Operation Verification

### Units That Originally Had a CRV Control Board

The Bard unit will have a terminal on the low voltage strip in the unit control panel labeled either "A" or "O1" (refer to vent or unit wiring diagram). This terminal is energized by the thermostat or building management system to indicate occupancy in the conditioned space. The unit will also have two terminals for 1st stage and 2nd stage cooling. In some units, this will be Y and Y1, respectively. In newer units, this will be Y1 and Y2, respectively. This section will refer to these two terminals as the "1st stage" and "2nd stage" terminals. To verify operation of the replacement actuator, follow the steps below.

With the unit powered:

1. Connect a jumper from the "R" terminal to the "A" or "O1" (occupied) terminal on the low voltage terminal strip in the unit control panel.
2. Adjust the "OCC" pot on the CRV control board until the blade is at the desired position for blower-only unit operation (refer to the vent or unit manual for CRV airflow information). Observe that the vent damper blade opens to this position without interference or excessive noise.
3. Connect an additional jumper from the "R" terminal to the 1st stage terminal on the low voltage terminal strip in the unit control panel. Adjust the "Y1" pot on the CRV control board until the blade is at the desired position for part-load unit operation. Observe that the vent damper blade opens to this position without interference or excessive noise.

**NOTE:** *Single stage units will have a jumper bar connecting the 1st stage and 2nd stage terminals on the low voltage terminal strip in the unit control panel. If this is the case, skip this step.*

4. Connect an additional jumper from the "R" terminal to the 2nd stage terminal on the low voltage terminal strip in the unit control panel. Adjust the "Y2" pot on the CRV control board until the blade is at the desired position for full-load unit operation. Observe that the vent damper blade opens to this position without interference or excessive noise.

### Pre-Purge Function

The new CRV control board includes a pre-purge feature that opens the CRV to a predetermined setting for a predetermined amount of time when an occupied signal is first received from the thermostat or building management system. The pre-purge cycle time is based on the setting of the pre-purge timer. The pre-purge time can be set to 0, 30, 60 or 90 minutes using the PP jumper on the CRV control board. The pre-purge

function is triggered when the "A" or "O1" terminal on the low voltage terminal strip is energized, indicating occupancy. Once the selected time has passed, the blade will move to the position set by the "OCC", "Y1", or "Y2" potentiometer based on the unit's operating mode at that time.

5. To set the pre-purge damper blade setting, disconnect all the above jumpers from the low voltage terminal strip in the unit control panel. Move the "PP" jumper on the CRV control board to the desired pre-purge cycle time setting. Connect a jumper from the "R" terminal to the "A" or "O1" (occupied) terminal on the low voltage terminal strip in the unit control panel. Adjust the "PP" pot on the CRV control board until the blade is at the desired position for the CRV pre-purge cycle.
6. Disconnect the jumper from the "A" or "O1" terminal. Observe that the vent damper blade returns to the completely closed position.

This concludes the vent setup and operation checkout procedure.

### Units That Originally DID NOT Have a CRV Control Board

For units that DID NOT originally have a CRV control board, the CRV will only operate with full modulation using the 0-10V signal from a CO<sub>2</sub> sensor. To verify operation of the new actuator, follow the steps below.

With the unit powered:

1. Observe the position of the CRV damper blade.
2. Locate the CO<sub>2</sub> sensor in the room and blow gently on the sensor. This will introduce a high concentration of CO<sub>2</sub> to the sensor, causing an increase in output signal voltage.
3. Observe the CRV damper blade. The blade should modulate to introduce more outdoor air as the CO<sub>2</sub> sensor reads a higher CO<sub>2</sub> concentration. The blade should move without interference or excessive noise.
4. Continue to observe for several minutes. The blade should modulate to introduce less outdoor air as the CO<sub>2</sub> concentration at the sensor returns to normal. The blade should move without interference or excessive noise.

This concludes the vent checkout procedure.