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# INSTALLATION INSTRUCTIONS

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## CMH-31 Low Ambient Control, Compressor Cutout Thermostat and Compressor Start Assist Relay Kit For Use with W18HA, W24HA, W30HA and W36HA Single Phase Wall-Mount Heat Pumps

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The CMH-31 is a field-installable combination of low ambient fan cycling control, outdoor thermostat and compressor start assist device to be used with a Bard wall-mounted heat pump.

The CMH-31 kit consists of:

- 8406-112 Low Ambient Fan Cycling Switch
- 910-2013 Relay and Compressor Cutout Thermostat Assembly
- 910-1097 Compressor Start Assist Device
- 3/8" vinyl-covered clamps
- Required fasteners
- 7960-773 Installation Instructions

The CMH-31 kit is for use with Bard models W18HA, W24HA, W30HA and W36HA single phase wall-mount heat pumps.

### Compressor Cutout Thermostat

Heat pump compressor operation at outdoor temperatures below 0° is neither desirable nor advantageous in terms of efficiency. An outdoor thermostat can be applied to take the mechanical heating (compressor) offline, and send the (compressor) signal to energize electric heat

in its place (to make electric heat first stage heating). This can also be applied to limit the quantity of available electric heat. **Example:** Heat pump with 10KW second stage heat. Once the outdoor thermostat has switched, 15KW without compressor.

### INSTALLATION

1. Disconnect all power to wall-mount unit.
2. Remove outer and inner control panel covers.
3. Remove right side condenser inlet grille.
4. Remove all three front service panels.
5. Mount 910-2013 relay assembly into unit control panel as shown in Figure 1 on page 4. Use phillips head screws included with kit to attach relay to control panel.
6. Remove cover from vertical gray cable duct on control panel to allow wire harness from installed relay to route into it (see Figure 1).

**NOTE:** The unit wiring diagram (included with unit literature assembly and also located on inner control panel cover) can be used to wire this kit. However, the following instructions listed



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*here provide the necessary connections point-by-point.*

7. Locate yellow/white wire that runs from the 12-pin plug on the top of the low voltage box to:
  - Defrost logic control board on 1 phase non-dehum models
  - Phase monitor on 3 phase non-dehum models
  - Dehum logic control board on all dehum models

Remove from its original position and plug into yellow/white wire from the 910-2013 relay and compressor cutout thermostat assembly installed in Step 5. Locate orange/black wire from the 910-2013 relay and connect where yellow/white wire was removed.

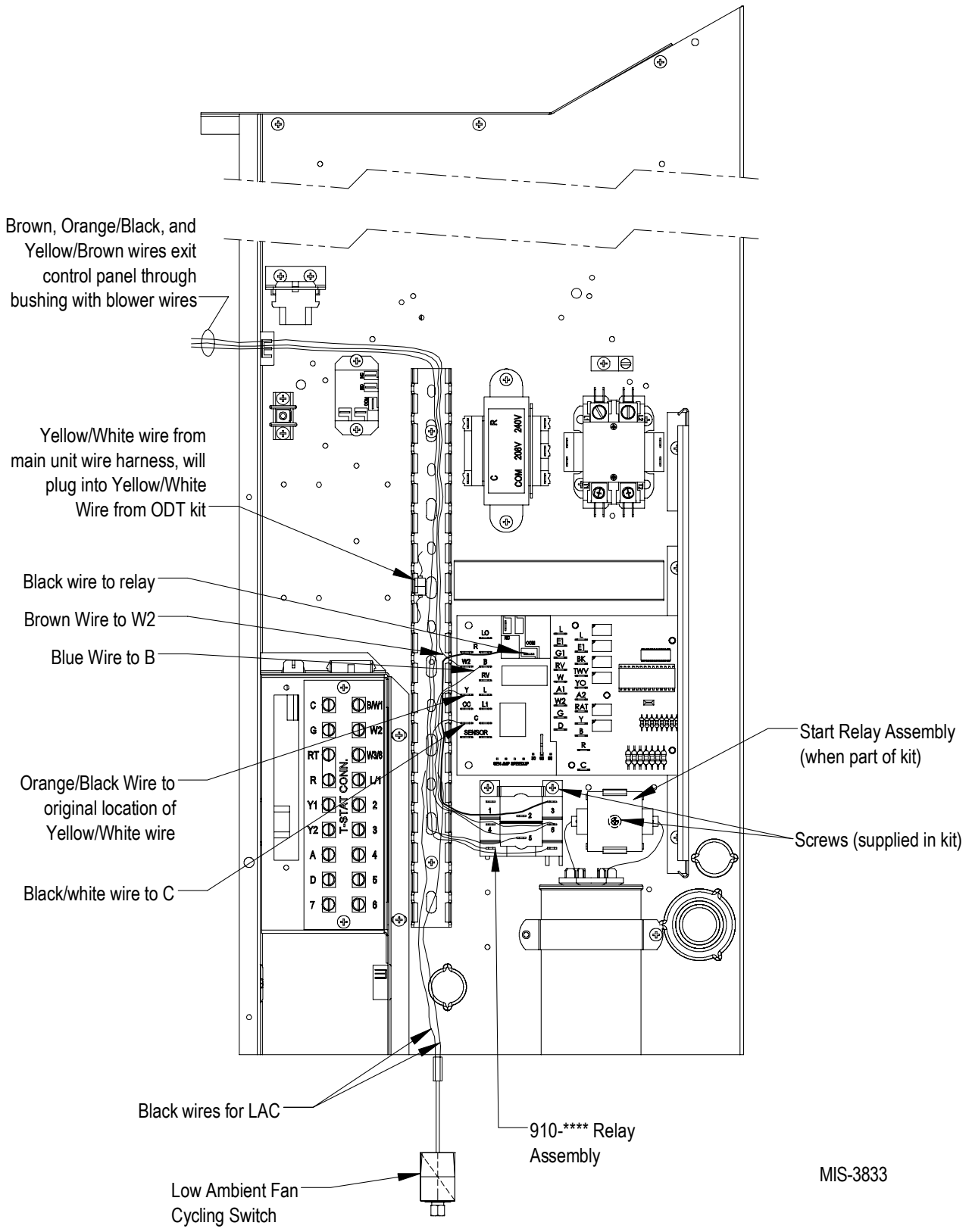
8. Locate black wire from the relay assembly and route through cable duct to defrost control logic board (see Figure 1). Before connecting this black wire to the NC fan relay contact on the defrost control logic board, remove wire that is currently connected there (on 230V models, it's the black outdoor fan motor lead; on 460V models, red/black wire) and connect that wire to Terminal 3 on the installed relay.
9. Locate black/white wire from relay assembly and route through cable duct to defrost control logic board. Connect the wire to the C terminal. If the heat pump is a dehum unit, remove the black/white wire already connected to C terminal and stack it back onto the black/white wire from the relay assembly.
10. Locate blue wire from relay assembly and route through cable duct to defrost control logic board. Connect to B terminal. Remove blue wire already connected to B terminal and stack it back onto the blue wire from the relay assembly.
11. Locate brown wire from relay assembly and route through cable duct to defrost control logic board. Connect to W2 terminal. Remove brown wire already connected to W2 terminal and stack it back onto the brown wire from the relay assembly.
12. Route orange/black, yellow/brown and brown wires up the cable duct in the control panel. After removing the permagum from around the blower motor wires, route the wires into the blower compartment and replace the permagum around all the wires (see Figures 1 and 2 on pages 4 and 5).
13. Locate the outdoor thermostat shipped in the CMH-31 kit along with two (2) phillips head screws. Use the two screws to attach the outdoor thermostat onto the side of the control panel adjacent to the indoor blower in the blower compartment (see Figure 2).

14. Carefully unroll the capillary tube and sensing bulb of the outdoor thermostat, and route it into the condenser section through the tubing grommet in the condenser partition. Secure the capillary tubing to the insulated suction line with the supplied cable tie.
15. Continue routing the outdoor thermostat bulb within the condenser section as shown in Figure 3 on page 6. Secure the bulb as per the drawing using the vinyl-covered clamps and hex head screws included in the kit. Dress the capillary tube to ensure no tube-rubs occur and secure with supplied cable ties in both the condenser and ventilation sections.
16. Connect the orange/black wire to outdoor thermostat Terminal #1, the yellow/brown wire to Terminal #2 and the brown wire to Terminal #3.
17. Use a phillips drive screw (included in kit) to attach the 910-1097 start assist device to the control panel as shown in Figure 1.
18. The two wires from the 910-1097 start assist device connect to the compressor capacitor. Connect one wire to the COM terminal and the other to the HERM terminal.
19. A service port is located on the refrigerant liquid line just above the liquid line filter drier (mounted to the outdoor fan shroud). This port is intended for the application of 8406-112 low ambient fan cycling switch (see Figure 3 on page 6). Remove the service cap from this service port and quickly thread the low ambient fan cycling switch onto this port. Once snug, use two wrenches to tighten the switch an additional 1/4 turn (one to hold the service port and one on the switch). Use soap bubbles to confirm the seal is completely tight on this connection.
20. Route the two black leads from the low ambient fan cycling switch up into the control panel with the other wires from this compartment, taking care to route and secure the wires. Use cable ties included with kit. Route the two black wires into the cable duct and then out the side of the cable duct towards the installed 910-2013 relay. Connect these two wires to Terminal 1 and Terminal 3 of the relay.
21. Verify outdoor thermostat setpoint. Factory default is 10°F.
22. Recheck all wiring. Turn on power to unit. Check for proper operation of the unit by energizing in cooling mode. The condenser fan motor should not run until the discharge pressure has exceeded 350 PSI. Should the liquid pressure fall below 225 PSI while running, the condenser fan motor will de-energize until the head pressure again builds to 350 PSI. Switch to heating mode. The condenser

fan motor should run anytime the compressor is running regardless of the discharge pressure. Run unit through defrost cycle. The condenser fan motor should de-energize during the defrost cycle.

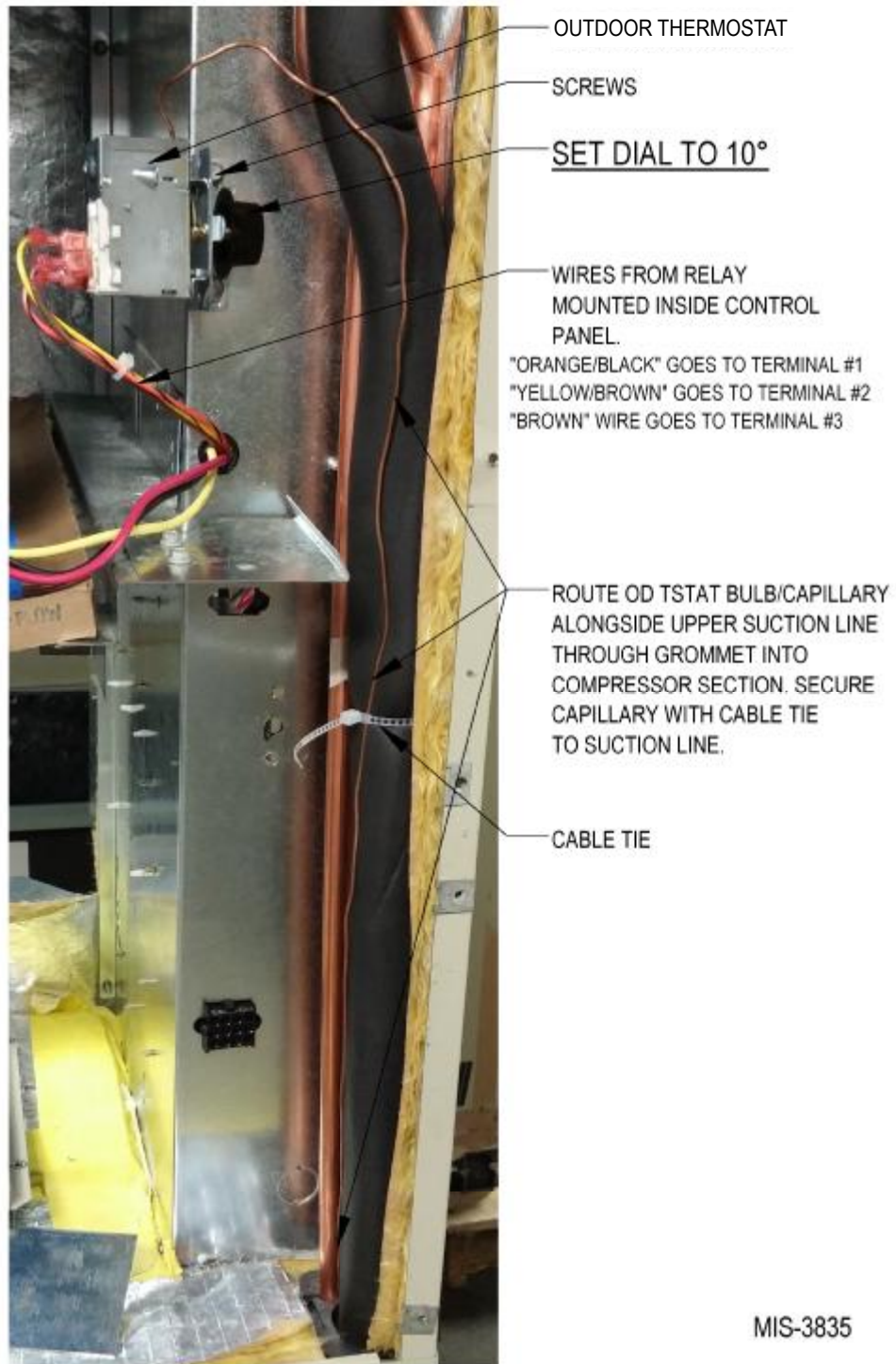
23. Apply "This unit is equipped with CMH-31 control module" label to the inside of the inner control panel cover above the unit wiring diagram.
24. Re-install all three front service panels.
25. Re-install right side condenser inlet grille.
26. Re-install electrical cable duct cover.
27. Re-install inner and outer control panel covers.
28. Restore unit power.

**FIGURE 1**  
**Unit Control Panel**

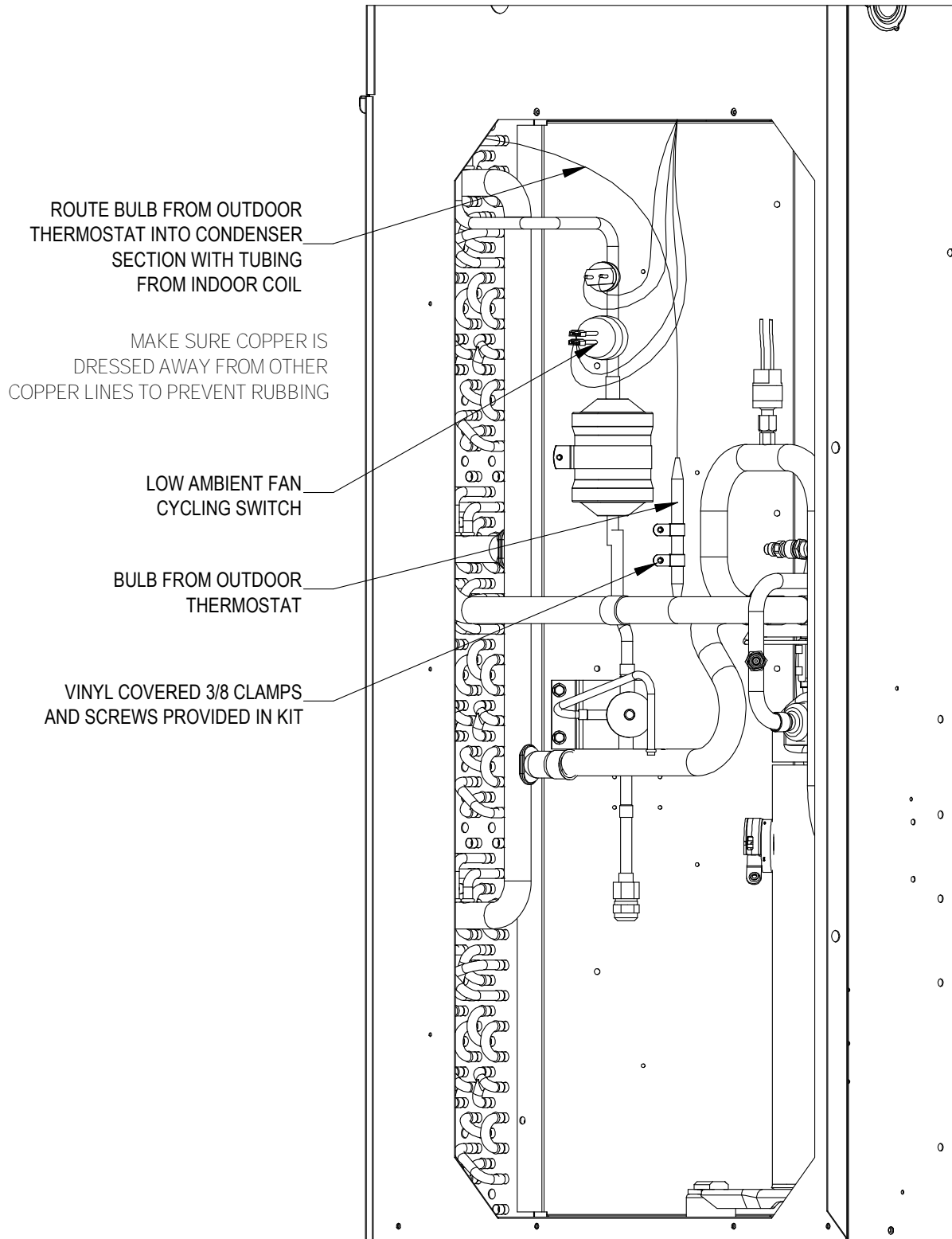


MIS-3833

**FIGURE 2**  
**Outdoor Thermostat Mounting and Wiring**



**FIGURE 3**  
**Mounting Outdoor Thermostat Bulb and/or Low Ambient Fan Cycling Switch**  
(as applicable)



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