

Belimo Damper Motor Retrofit Kit Installation Instructions

For a Cambridge S Series Heater

Required tools:

- Multi-meter
- Drill with 5/16" nut driver bit
- Utility knife
- Wire stripper
- Phillips screwdriver
- Flathead screwdriver
- Adjustable wrench
- Side cutters
- Flashlight
- Needle-Nose pliers
- Channel lock pliers
- Ratchet, 9/16" socket, and extension

Reference Drawings:

- 90-9691: S400, S800
- 90-9692: S950, S1200, S1600
- 90-9693: S1850, S2200, S3200

Reference Video:

This QR code will take you to the installation video. It is highly recommended that you watch the video prior to or during installation.

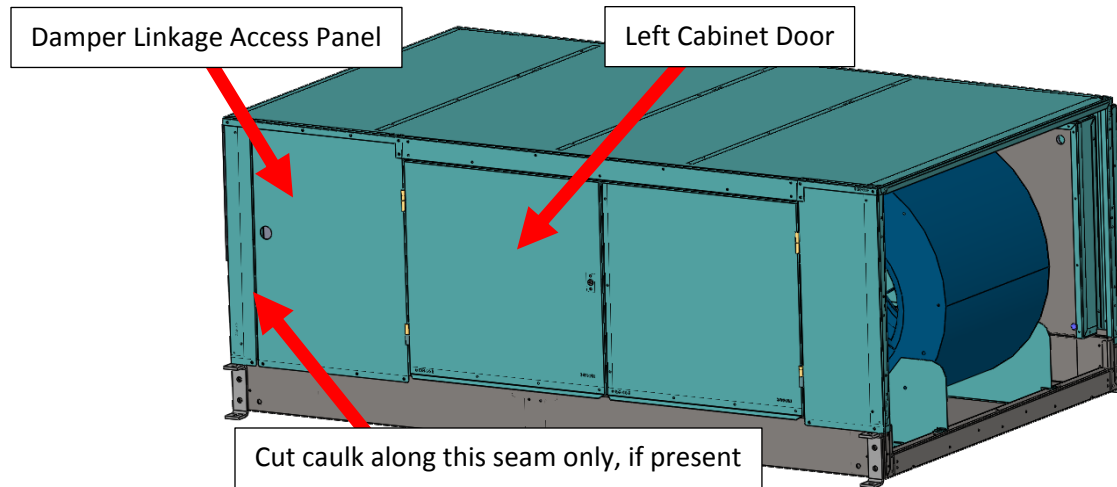


Note:

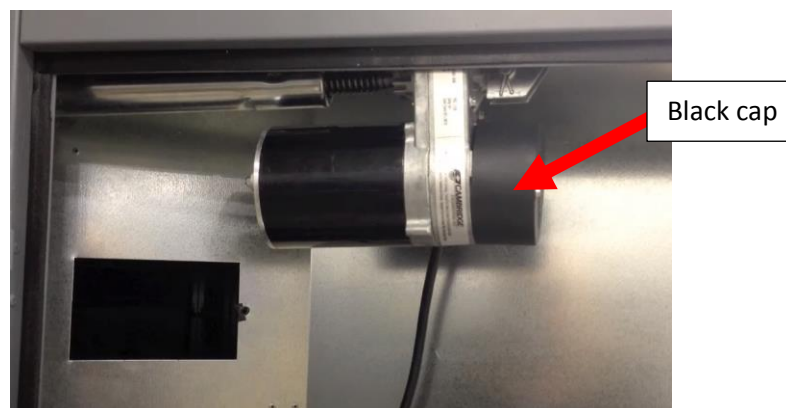
In the following procedure, the original damper linkage gets removed and a newly designed "Channel – Damper Linkage" (linkage arm) is installed. If the unit was manufactured in 2014 or earlier, Cambridge can supply a hole-saw kit (part number 90-9704) to give the installer access to the upper damper drive bracket. Units manufactured in 2015 or after have a removable panel that provides the installer access to the upper drive bracket. The hole-saw kit includes a 2 ½" hole saw, 2 ½" cap, template to determine the location of the hole, and instructions. There are 3 separate templates due to the different cabinet sizes; be sure to use the correct template.

Installation Instructions:

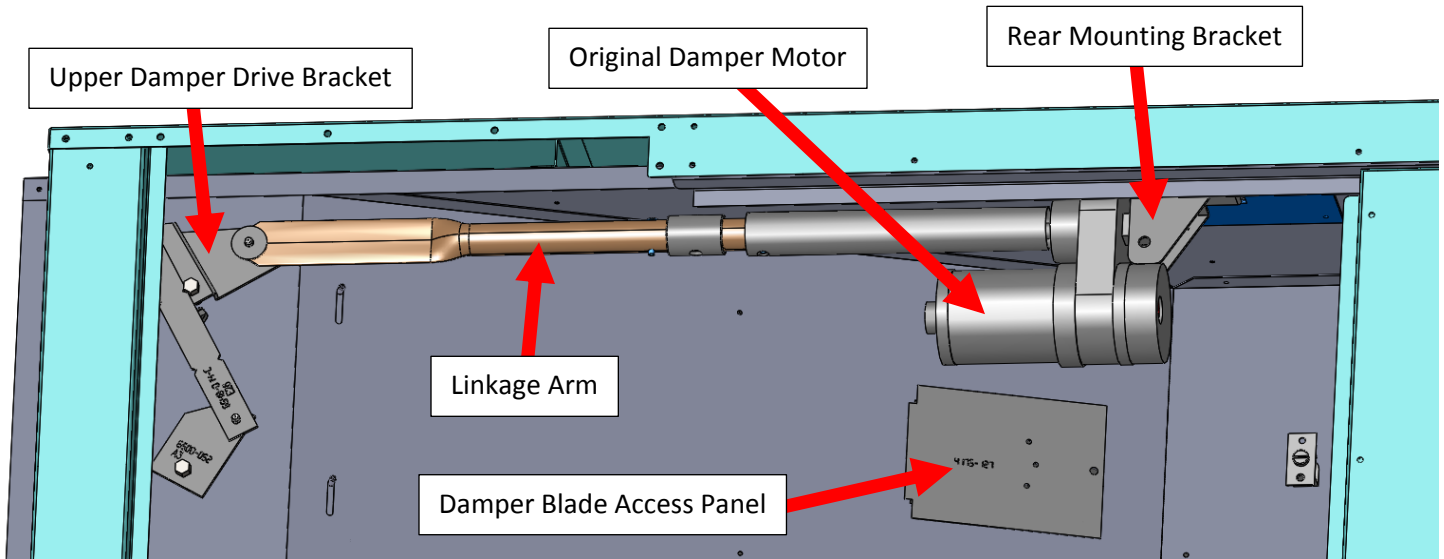
1. Turn off power to the unit and verify with a multi-meter.
2. Remove the left cabinet door from the drive side of the unit (opposite side of the electrical enclosure). The door slides down onto the hinges so pull up on the door to remove and clear the hinges.



3. Remove the 5/16" sheet metal screws that fasten the damper linkage access panel to the unit cabinet; the door hinges are part of this panel. If there is caulk in the seam between the access panel and the unit cabinet, it will need to be cut with a utility knife. Be sure to NOT cut the caulk that exists between the unit and the downturn. For units manufactured prior to 2015, see note above about the available hole-saw kit.
4. Remove the large black cap from the back of the original damper motor and detach the four wires that come from the black S.O. cable to the motor. There are four wire leads: brown, black, white, and red. Set the cable to the side.



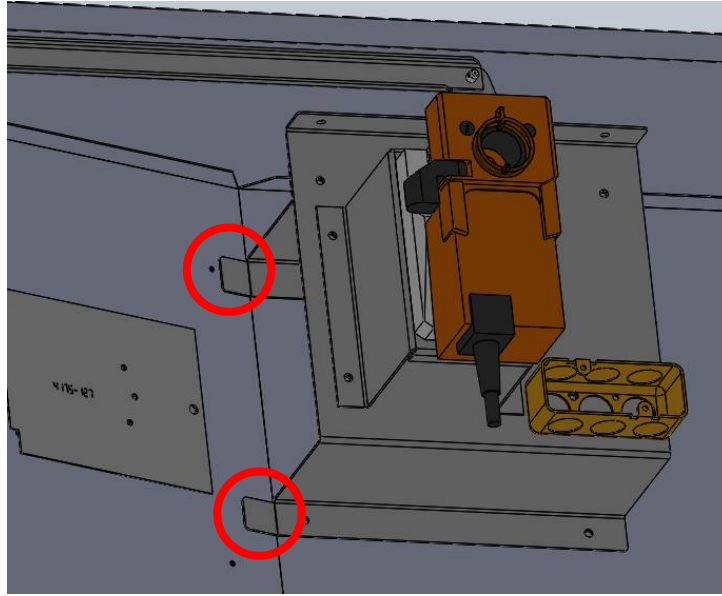
5. Remove the original damper motor, linkage arm, mounting bracket, and internal access panel on the side of the discharge duct as shown below.



6. Cut the original damper motor cable as near as possible to the end as shown below on the damper motor end. Leave the rest of the cable in place – do not remove from electrical enclosure (main electrical panel on opposite side of the unit).



7. Attach the new damper mounting structure.
- Align the bends on the “Channel – Actuator Mount” and “Channel – Actuator Mount Support” with the bends on the duct
 - Press the “Channel – Actuator Mount” upward until it makes contact with the roof
 - Use 2x self-tapping tek screws to attach the bottom. (Take care not to strip the sheet metal. Reduce the drill torque.)
 - Use 2x self-tapping tek screws to attach the top. (Take care not to strip the sheet metal. Reduce the drill torque.)



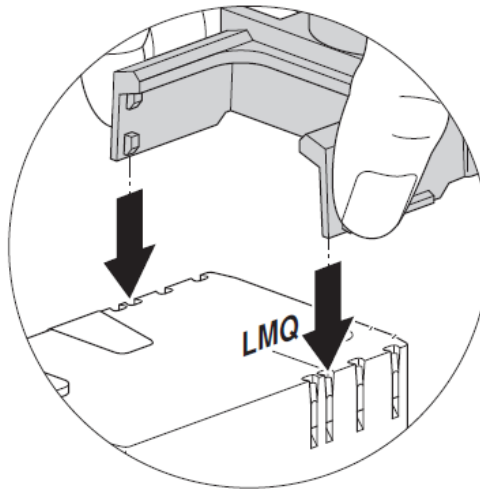
8. Attach the damper motor, end-switch and support assembly “Channel – Belimo Mount” (already pre-assembled) to the “Channel – Actuator Mount” with 4x rounded radius screws.
9. Install the junction box to the “Channel – Actuator Mount” with 2x rounded radius screws using the pre-drilled holes for proper alignment.
10. Attach the “Channel – Damper Linkage” to the ¼” PEM stud pilot pin on the damper motor.
 - a. To help align the “Channel – Damper Linkage” to the motor drive pin, press and hold the damper motor service switch to allow for free movement of the “Bracket – Actuator Arm”
 - b. Place the “Channel – Damper Linkage” on the pin
 - c. Place a washer on the pin
 - d. Insert the cotter pin through the hole
 - e. Using a pliers, spread the tabs apart on the cotter pin so it cannot slide out
 - f. Note: spare screws, washers, and cotter pins are included in the kit



11. Attach the other end of the “Channel – Damper Linkage” to the ¼” PEM stud pilot pin on the upper damper drive bracket.
 - a. Use the same method to secure as shown in step 10



12. Verify that the end switch is properly attached in the correct slot of the Belimo damper motor (note: this should already be done – simply verify it is installed correctly)
 - a. Push the end switch onto the damper motor using the notches **second from the bottom**



- b. Align the spring loaded black plastic guide with the end switch coupling holes on the back- verify both plastic pins are inserted in both coupling holes



13. Set the end switch.

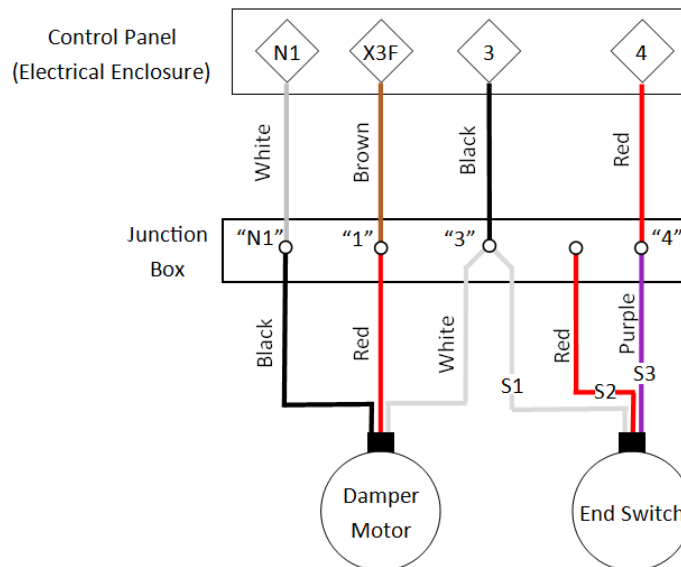
- a. Push the damper service switch and rotate the dampers fully open (counterclockwise to open) then release the service switch. Look through the damper blade access panel in the side of the discharge duct to visually verify that the dampers are fully open
- b. Turn the end switch dial until the arrow is 4 clicks clockwise past the vertical set point line (see the illustrations the end of the document for visuals)
- c. Reinstall access panel in the side of the discharge duct after setting end switch

14. Check that the rotation switch on the damper motor is set to position “1”.



15. Strip the previously cut damper motor cable outer jacket from step 3 about three inches. Strip each individual conductor 3/8".
16. Route the old damper motor cable through the bottom center junction box knockout using the provided white strain relief bushing; use channel lock pliers to squeeze the bushing to fit in the knockout.
17. In the junction box, attach the wires from the old damper motor cable to the labeled snapping wire clips as follows:
 - a. The brown wire goes to wire clip 1
 - b. The black wire goes to wire clip 3
 - c. The red wire goes to wire clip 4
 - d. The white wire goes to wire clip N1
 - e. The red "S2" wire coming from the end switch should already have a gray wire nut on it – this wire does not connect to anything

The following image is provided for reference:



18. Install the junction box cover.
19. In the electrical enclosure on the opposite side of the unit, remove the brown wire from its spade connection on terminal D on the main PC board unless the unit has a blue post purge timer (PPT). If there is a PPT, remove the brown wire from terminal #8 on the PPT base. If the unit is a LP gas heater or the unit has an external gas train it will have a PPT.
20. Cut off the push on from the brown wire removed in step 19 and strip the wire 3/8". If the unit has a PPT, there will be no push on terminal to be removed.
21. Attach this brown wire (previously on terminal D or #8 of PPT) to the black transformer wire supplied in the kit via a provided snapping wire clip.
 - a. The transformer wire has a fork on the other end



22. Attach the fork from the supplied black wire to the 24VAC fuse output of the main transformer.
 - a. The terminal is often the top left terminal of the fuses and labeled X3F; the fuse will be a 6 ¼ amp FLM or FNM fuse
 - b. Not all units will have the same labeling and orientation so verify

23. Note: spare screws, washers, or cotter pins are included in the kit. Do not be alarmed if some remain at the conclusion of this procedure.

24. Turn on power and test the unit.
 - a. Upon initial startup, the unit will self-calibrate itself by slowly opening and closing. Upon returning to the closed position, the unit should operate normally.
 - b. If the motor appears to be operating abnormally slow, press and hold the “Adaptation” button for 5 seconds to reset. Slow operation mode can be the result of an overload condition on the damper motor. To ensure the damper motor does not experience an overload condition, press the damper motor service switch and move the drive linkage back and forth. The damper assembly should move freely with little resistance to both ends of travel.
 - c. If, upon turning on the unit, the blower initially starts but turns off after the dampers are fully open, the end switch dial may not be properly set. Turn the dial a few clicks clockwise and try starting the unit again.

Damper Motor Illustration



Rotation Switch – set to “1”

Adaptation button

Notch for the end switch

End Switch Illustration

