



Before replacing actuator, damper must be inspected and determined to be fully functional.

INSTRUCTION SHEET

Replacement of Air Balance Honeywell ML & MS with Belimo FSLF or FSNF Series

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Installer must be trained and experienced with repair of fire and smoke dampers and actuators.

In the “Marking & Application Guide, Dampers for Fire Barrier and Smoke Applications & Ceiling Dampers” April 2003 by Underwriters Laboratories Inc., page 6 states:

DAMPER ACTUATORS

“... field mounting or substitution of actuators is not covered within the scope of the UL certification of the product. However, this does not necessarily preclude replacement of actuators in the field. Like any appliance, field servicing of these products is not covered under the scope of the UL certification and factory follow-up service program. As with any part of the damper, it is expected that replacement of actuators in the field be done in accordance with the damper manufacture’s normal field servicing program.”

This document follows the UL requirements and the acceptance testing that Air Balance deems necessary to ensure proper operation of a fire and smoke damper after actuator replacement.

Code and Standard Issues

In general, the administrative section of codes state that all mechanical and electrical systems must be kept in working order and an individual section may state that all life safety devices and systems must be operable. NFPA 80 (Fire) & NFPA 105 (Smoke) require periodic testing and repair of dampers as soon as possible after any deficiency is uncovered.

Fire & smoke dampers are considered to be appliances and field replacement of components is to be expected when failure of any component occurs.

The Authority Having Jurisdiction (local Fire Marshal and/or Building Official) must be consulted if any blade or auxiliary switches are employed and are connected to the fire alarm system or to a Fire Fighters Control System. A permit and inspection may be required since connections to an alarm system have been touched.

NFPA 80 (Fire) & NFPA 105 (Smoke)

NFPA requires damper inspection and repair of dampers.
See www.nfpa.org for Standards. Details not covered here.

Local Code Approval

While it is not detailed in codes, the following rules should be followed for selecting Belimo actuators for replacement:

Check the technical specifications to ensure an “equal or better” actuator is used.

- **Temperature** – the replacement actuator shall have been UL555S tested at the same or better temperature as the original actuator. 250°F or 350°F are standard.
- **Time** – the replacement actuator shall drive open and spring closed at a speed equal or faster than presently required by codes. (The AHJ may grant an exception and “grandfather” slower actuators where the original actuator was slower.)
- **Torque** – replacement actuator shall have equal or greater torque than the failed actuator.
- **Voltage** – replacement actuator shall have the same voltage rating as the original.
- **Amperage** – the replacement actuator(s) shall not draw more amperage than the original(s) and cause the total connected amp draw on a circuit breaker to be greater than allowed by electrical code.
- **Final Testing** – actuated damper and associated devices shall be tested for proper operation. See Fire Marshal Notification Form on last page.

(Mnemonic device: TTT-VAT)



In all cases, installation must comply with any and all local electrical and life safety codes. Operation of the system after installation must be performed to verify proper damper cycling. Final checkout requires verifying correct function.



Note: That where any fire alarm wiring is touched, the fire department must be informed.

Cross Reference

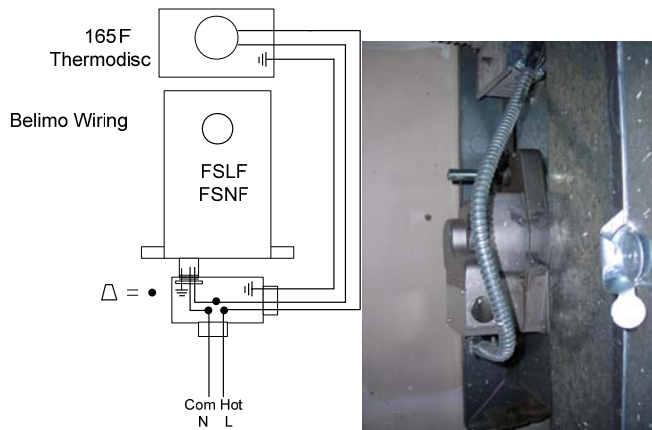
Honeywell	VAC	Torque in-lb	Replacement	Notes
ML4105A1000	120	50	FSLF120*	Any of these with 32003532-002 auxiliary switch package: add -S to Belimo part number.
ML4105B1009	120	50	FSLF120*	
M4105C, D	230	50	FSLF230*	
ML4115A1009	120	30	FSLF120	
ML4115B1008	120	30	FSLF120	
ML4115C, D	230	30	FSLF230	ML4105 no longer made.
ML4202	120	20	FSLF120	
ML4302	120	20	FSLF120	
ML8202	24	20	FSLF24	
ML8302	24	20	FSLF24	
ML8105A1006	24	50	FSLF24*	ML8105 no longer made.
ML8105B1005	24	50	FSLF24*	
ML8115A1005	24	30	FSLF24	
ML8115B1004	24	30	FSLF24	
MS4209F	120	80	FSNF120*	
MS4309F	120	80	FSNF120*	
MS8209F	24	80	FSNF24*	
MS8309F	24	80	FSNF24*	
MS4120F1006	120	175	FSAF120*	No aux
MS4120F1204	120	175	FSAF120-S*	2 SPST
MS8120F1002	24	175	FSAF24*	No aux
MS8120F1200	24	175	FSAF24-S*	2 SPST

Ruskin Models Made by Honeywell				
H2000A, B	120	20-50	FSLF	These are ML4105, ML4115, and ML4202 types.
H2024A, B	24	20-50	FSLF	

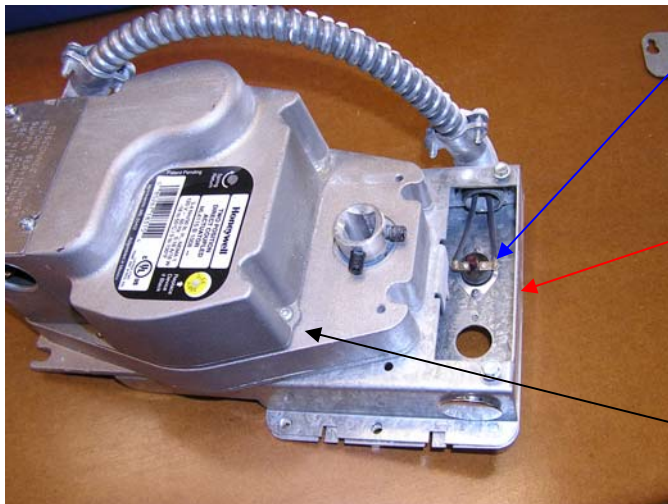
Nominal sq.ft. per UL555S testing.	Sq.ft.	Temp	Actuator	
	<3	350°F	FSLF	See NOTE below.
	<12	350°F	FSNF	

* More important than the torque rating is the damper manufacturers' UL555S testing. Each manufacturer tests Belimo separately and has different sizes UL555S listed.	NOTE: Although an actuator may pass a larger sized damper, use the UL listed sizing. Visit www.belimo.us/firesmoke "What's New" for a cross reference by manufacturer.
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Fire & Smoke Damper Technical Details



For short shaft mounting, the ZG-LMSA-1/2-5 can be used. Alternately, the clamp can be installed between the actuator and sheet metal.



165°F (typical) sensor

Sheet metal holder bracket and mounting plate.

This compartment does not have to be opened except to reset sensor during acceptance testing. The bracket does not have to be removed from damper.

Four bolts hold actuator to the mounting plate.



Read Data Sheet provided in box with each actuator for specific wiring details.



Disconnect and lock out power before starting to disconnect old motor.

Replacement Instructions

1. Disconnect power and wires from motor in wiring compartment.
2. Disconnect flex connection from actuator to mounting base.
3. Loosen set screws on shaft and 4 screws holding motor to base. Remove motor.
4. Several anti-rotation mounting scenarios are possible. See Mounting Methods below.
5. Mount Belimo FSLF or FSNF over shaft.
6. Connect anti-rotation strap.
7. Close damper tightly, tighten nuts on clamp.
8. Pull out old wires and pull Belimo wires thru flex. Cut off excess. Wire nut Belimo wires to existing sensor wires.
9. Connect green ground on 120V models. Connect hot and neutral (or common if 24VAC). See Wiring Methods below.

Conformance test required. See Fire Marshal form on last page.

Mounting Methods



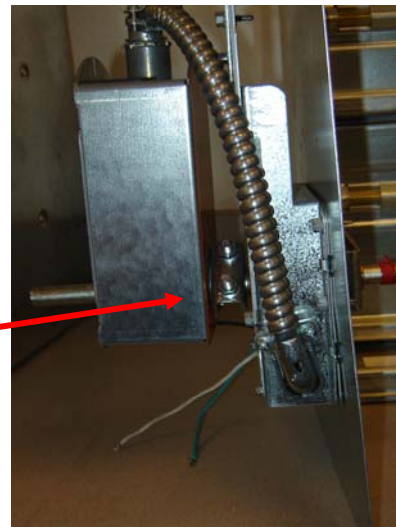
Typical External Mount

Note: short shaft.

Short Shaft Mounting

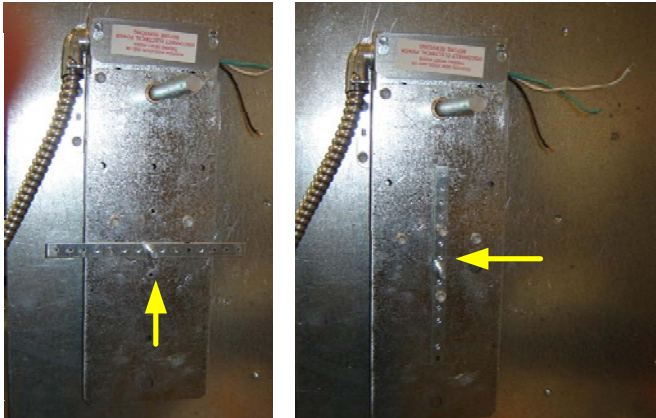
The Belimo clamp is very stable when mounted between the actuator and the supporting sheet metal.

After mounting, tighten the clamp nuts with a 10mm, long-nosed, deep-well, ¼" drive socket.



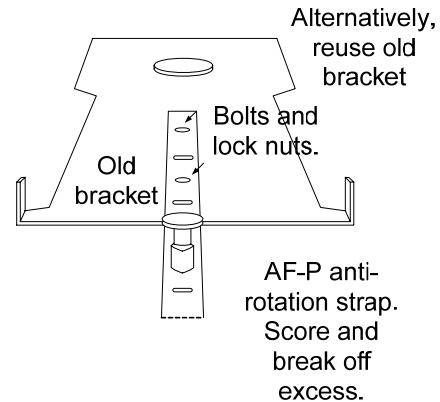
Actuators are mounted on the sleeve of the damper in some cases with a remote sensor and sometimes within the sheet metal bracket shown below.

Belimo FSLF anti-rotation strap mounted. (Yellow arrow.)
 Shaft adaptors and other mounting plates are available.

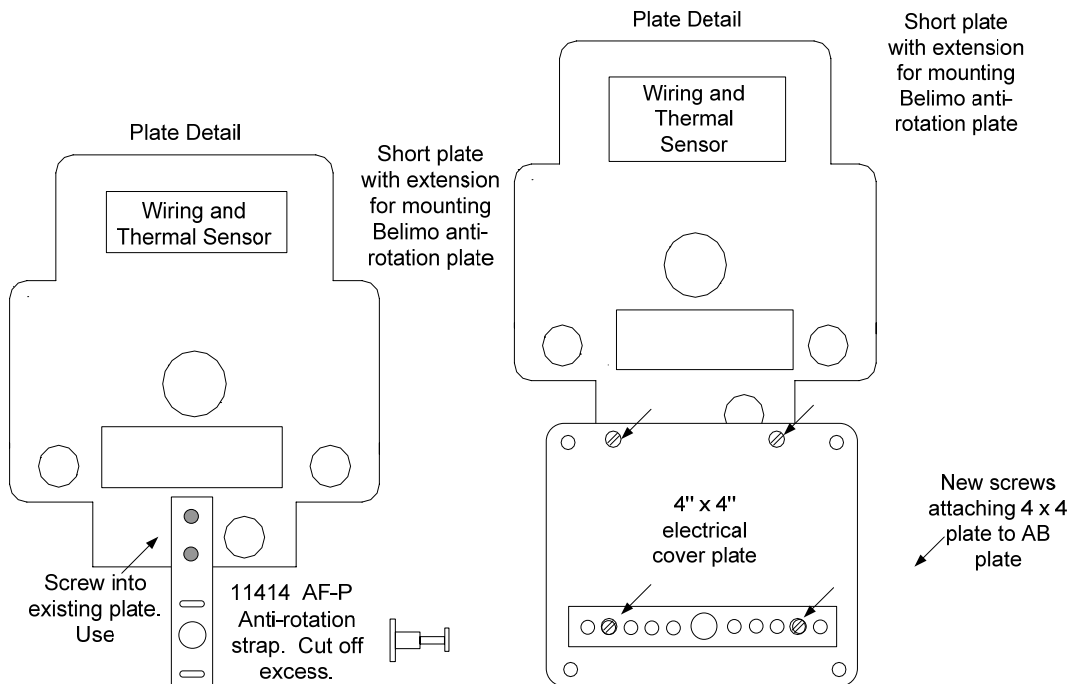


On small dampers the actuator may be hung out in the air. The duct must be able to fall away, so actuator cannot be attached to the duct.

For small dampers where the actuator must hang out in the air.



In all cases, the stud of the anti-rotation strap should fit in the middle of the slot at the bottom of the Belimo. This allows the actuator to move as necessary to compensate for any non-concentric rotation of the damper shaft.



Completed Mounting



On small dampers the actuator may be hung out in the air. The duct must be able to fall away, so actuator cannot be attached to the duct.



WARNING!

Actuator anti-rotation strap may not be screwed to the duct. It must attach to either the sleeve or to the mounting bracket. The duct must be able to fall away from the damper in case of ceiling collapse in a fire.

If replacing a motor used on a damper with fusible link and shaft spring, investigate operation and determine that external spring and link are operable. Refer to damper manufacturer's instructions for the specific damper in question.



WARNING!

USE CAUTION!

Spring is under high torsion and may cause serious injury! If any external springs are present, exercise caution – wear face and hand protection.

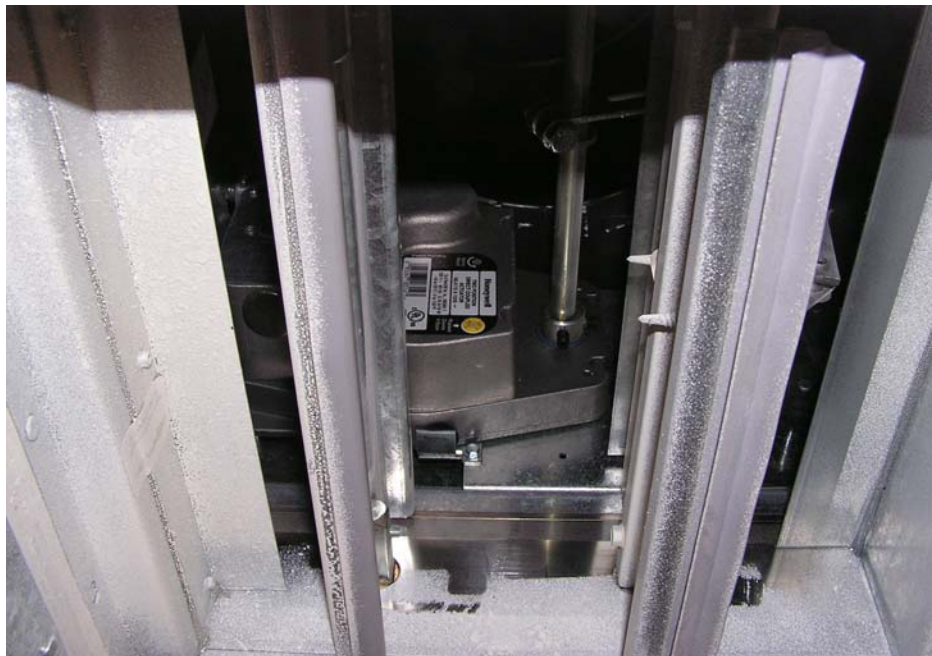
Internal Mounted

The Belimo actuator is located in the same place when internally mounted. The jackshaft holds one end of the Belimo and the anti-rotation strap holds the other end.

If needed, a perforated strap or U shaped sheet metal bracket can be put around the actuator for mechanical support.

It may be necessary to disassemble jackshaft to remove old motor and mount the Belimo actuator.

Wiring and testing internally mounted actuators is identical to that for the externally mounted actuators.

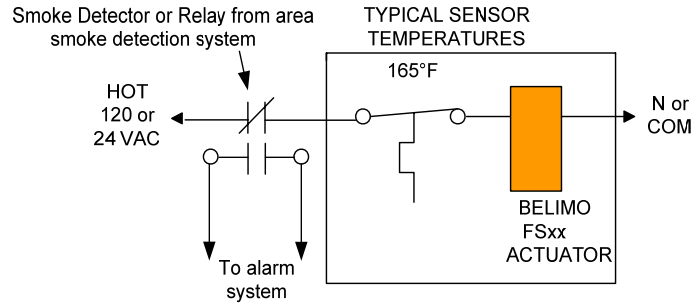


Wiring

There are three wiring schemes that describe all applications. While the geometry of the wire runs may vary, the connections are straightforward.

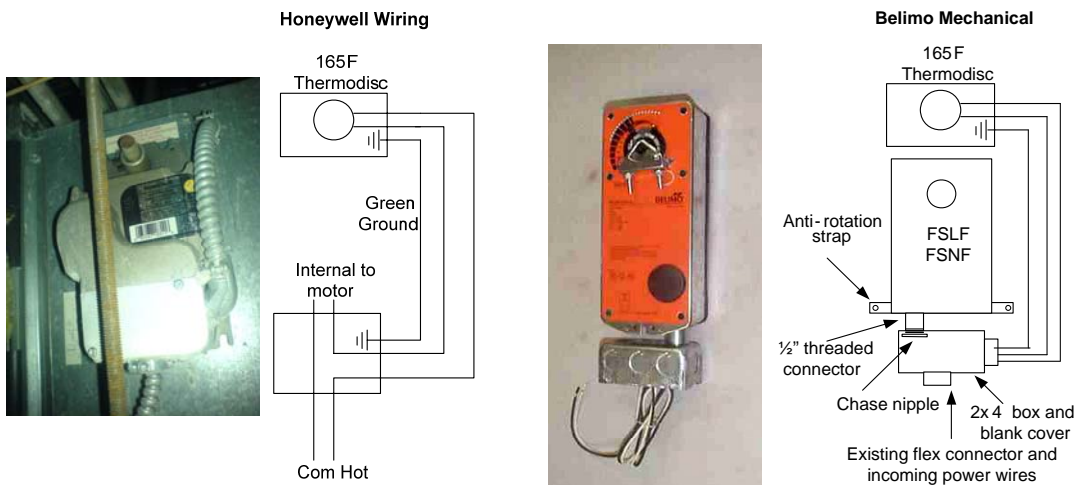
TYPICAL FIRE - SMOKE COMBINATION DAMPER WIRING

Electric thermal disc



Regardless of the wiring routes used, this drawing shows the wiring necessary for a UL555S damper and actuator. Use it as a basis for any of the other wiring schematics. Note that the alarm connections are not touched when replacing an actuator. This is a major concern for Fire Marshals.

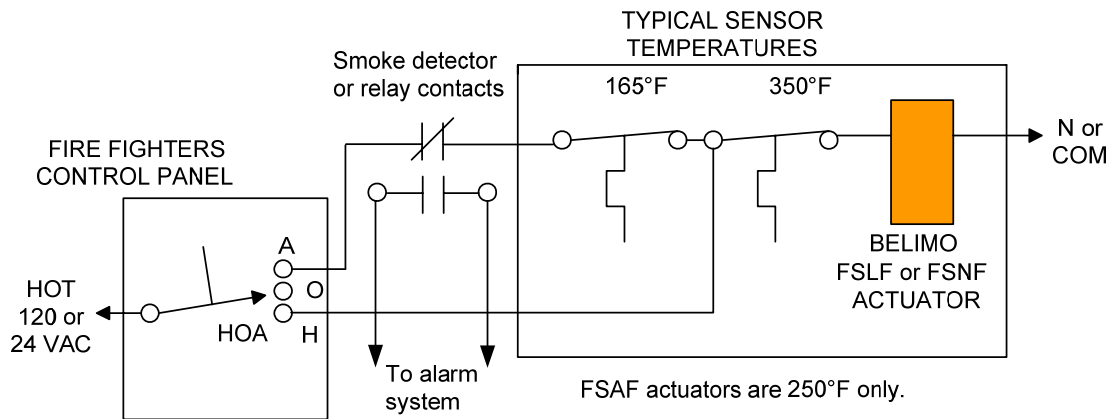
Honeywell with actuator wiring compartment used for junctions.



If necessary add a chase nipple and junction box as shown above right for wiring connections.

The wiring below is commonly connected to alarm or smoke control electronic modules in modern systems. The functional sequence is the same.

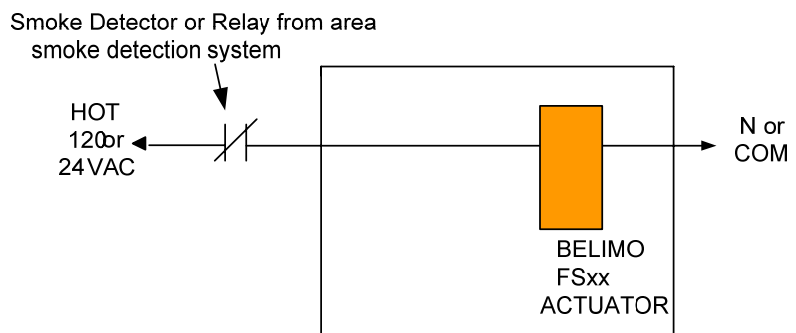
TYPICAL REOPENABLE DAMPER with FSCS



In rare cases the Honeywell motor was installed as a retrofit on dampers with fusible links. There is no electric sensor in the damper in that case as there is typically a shaft spring performing the fire function. Wiring is shown to right.

Fusible link DAMPER ACTUATOR WIRING

McCabe™ link DAMPER ACTUATOR WIRING



Investigate cause of Honeywell failure. For example, was old external spring removed correctly?



Note that where any fire alarm wiring is touched, the fire department must be informed.

Fire Marshal Notification Form

Retain this portion of checklist at premises for Fire Marshal inspection. See local AHJ or Fire Marshal for other information and requirements regarding conformance with NFPA 80 & NFPA 105.

Test Checklist (Smoke dampers do not have sensors. Only steps a & b apply.)

1. Single Sensor Combination Damper

- a. Open smoke detector or relay wire or contact to cut power. *Damper springs closed.*
- b. Reconnect power. *Damper drives open.*
- c. Open thermal sensor using heat gun. *Damper springs closed.*
- d. Press thermal sensor manual reset. *Damper drives open.*

Repeat 3 times to ensure operation. This imitates UL555S test.

2. Reopenable Two Sensor Fire-Smoke Combination Damper

(Since this system involves the Firefighters' Smoke Control System, inform fire department.)

With FSCS switch in Auto position:

- a. Disconnect power from smoke detector or relay contacts. *Actuator springs damper closed.*
- b. Reconnect power. *Actuator drives damper open.*
- c. Trip thermal sensor. *Actuator springs damper fully closed.*
- d. Press manual reset. *Actuator drives damper open.*

Test FSCS switch functions:

- a. Move FSCS switch to Off position. *Actuator springs damper fully closed.*
- b. Move FSCS switch to Hand position. *Actuator drives damper open.*
- c. Trip secondary (higher temperature) thermal sensor. *Actuator springs damper fully closed.*
- d. Press manual reset of secondary sensor. *Actuator drives damper open.*

Move FSCS switch back to Auto position:

- a. Actuator springs damper closed if Primary sensor is still open.
- b. Actuator stays open if Primary sensor has re-closed.

When completed, ensure sensors are reset and smoke detector is in normal state and FSCS switch is in Auto. Damper is normally Open; check sequence of operation.

Damper Numbers or Location Identifying Numbers.....

Date.....-.....-.....

Contractor.....

Service Technician (Print).....

Service Technician (Signed).....

Phone Number (.....).....

Notes.....

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