

Actuator replacement starts with the damper, not the actuator.

The same old motor can be applied several ways depending on how the fusible link or primary high limit sensor was employed along with the spring(s).

With combination fire and smoke dampers, the high temperature limit can be achieved several ways. For technical details on different methods go to:
<http://www.belimo.us/sh/firesmoke/images/BasicTrainingFireSmokeDamperActuatorReplacement.pdf>

Smoke dampers have no fire function and replacing the actuator can be done based on the actuator type.

Old dampers with motors that used cables, pulleys, and special mounting methods cannot be replaced. The entire damper must be replaced. Consult damper rep or Belimo for details.

A set of digital photographs is useful in identifying these applications.

Fire and Smoke Damper Actuator Replacement Checklist

Damper Make*	Model.....	Dimensions*.....(Approximate usually OK.)
Actuator Make*	Model.....	Drive & Spring Times...../(.....(15 or 75)
Temperature Required*.....	Voltage*.....	Amperage.....
Torque.....Based on size and make or UL data.		Belimo is lowest, but just in case, do not overload a breaker.

WARNING!

UL requires using instructions to ensure correct replacement is accomplished. For that reason, the make and model are needed.

**OLD EXTERNAL ACTUATOR SPRINGS MUST BE REMOVED
 IN SOME CASES THERE WAS A SINGLE SPRING FOR ACTUATOR AND SHAFT SPRING FIRE FUNCTION. IN THOSE CASES, A NEW THERMAL SENSOR MAY NEED TO BE INSTALLED.
 INSTRUCTIONS ARE AVAILABLE AND MUST BE USED.**

Consult local AHJ - Fire Marshal or Building Official for permit requirements. In particular, where alarm wiring is touched, retesting is typically required.

TTT-VAT

Technical actuator characteristics can be found using the TTT-VAT questions:
 Temperature, Time, Torque, & Voltage should be equal or better.
 Amperage draw should be equal or lower to ensure a breaker is not overloaded.
 Damper and actuator should be Tested after installation. See Fire Marshal form.

Codes

UL does not regulate replacement and repair.
 The local Fire Marshal or Building Official is the Authority Having Jurisdiction.
 NFPA 80 (fire) and NFPA 105 (smoke) require damper repair as soon as possible.

Consult local AHJ for any other rules. A Fire Marshal form can be found at:
http://www.belimo.us/sh/firesmoke/images/3_MEA_Fire_Marshal_Form_F&S_Actuators.pdf
 (Form can be used in New York City for MEA also.)

Note that if any alarm or smoke control wires are touched, a retesting of the system is often required.

For assistance -

 Call Larry Felker at 775-857-4243 or 800 987-9042 x 5205 on West Coast
 Call Belimo Technical Support at 800 543-9038 East Coast

TTT-VAT
 Temperature
 Time
 Torque
 Voltage
 Amperage
 Test



Accurate (Pottorff, PCI) in New York.

<http://asm-mech.com/>

MA418	Two methods possible.	1) Fusible link.	FSNF up to 16 sq. ft. 2 sections. FSAF 12 sq.ft. single section.
		2) Thermal sensor.	
MA220, MA230		350°F	
SEE POTTORFF.		FSLF. 4 sq.ft. 3'w x 2'h (not 2'x3').	
		FSNF if linkage needed.	

The existing shaft spring must be disconnected and the fusible link replaced with a bolt
 A thermal sensor must be installed.
 See instructions on www.belimo.us in the Fire and Smoke Dashboard:
http://www.belimo.us/sh/firesmoke/images/Pottorff_MA220_Field_Replacement.pdf

Air Louvers & Dampers (Ruskin in NYC) Maspeth

http://www.nyccsmacna.org/members/profile_air.html

See Ruskin.

Air Balance

<http://www.airbalance.com/abimain.asp>

(American Warming, Arrow, Cesco, Louvers and Dampers)

ECM & MultiProducts	FSLF 3 sq. ft. and smaller. FSNF where linkages needed.
	FSNF up to 12 sq.ft. 350°F

On older dampers there are major modifications required to replace actuators.
 Special instructions needed for most. Call Belimo for details.

MA418	FSNF up to 12 sq.ft. 350°F. Thermal sensors not fusible links were used.
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Most Air Balance before 2002 need careful examination before replacement.

A number of variations exist which are no longer manufactured:

- 1) Negator spring contacts the damper blade. Several sensor methods were used.
- 2) Crankarm-pully has a spring built in. Also referred to as a "wrap spring clutch break."
 Both 1) and 2) were without jackshaft. See photo's below.
- 3) MultiProducts with thermal sensors and jackshaft.
 The high temperature limit may be a fusible link or a fusible rod.

- 1) Negator spring contacts the damper blade.

From the outside of the duct, the actuator is visible. However, replacement sometimes involves rebuilding the linkage to the damper blade. ECM shown below. Out of business.



External Motor.

If damper looks like this use "Air Balance Fusible Rod Model ECM to Belimo Actuator Instructions and Acceptance Testing" as basis for analysis. Replacement will require Belimo actuator and a parts kit from AB.



Negator spring

Fusible Rod

Air Balance continued

ECM and MultiProduct both used.

2) Crankarm-pully has a spring built in. Variety of linkage methods were used. Call with model number for assistance.

[Call for information.](#)



Wrap spring clutch break Remove and discard old clutch break, shaft, cable, fusible link, and hook.



Negator spring holder. (Spring missing.)

Above needs parts available from Air Balance. Call for information.

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.

3) MultiProducts with thermal sensors and jackshaft.

<http://www.belimo.us/sh/firesmoke/images/AB MP Jackshafted to Belimo Replacement Instructions.doc>

Inside



Motor with external springs



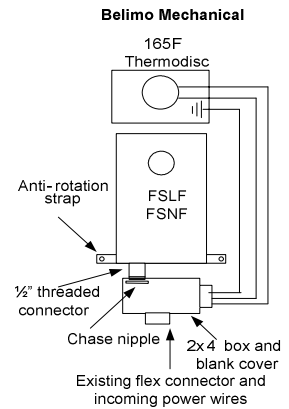
External motor

HW ML4115, ML4202	FSLF
HW MS4209	FSNF

<http://www.belimo.us/sh/firesmoke/images/ReplacementHoneywellML4115andSimilarMotors.pdf>

Direct coupled. Straightforward replacement.

Outside view. Completed retrofit



Greenheck

<http://www.greenheck.com/>

MA220, MA230 FSLF

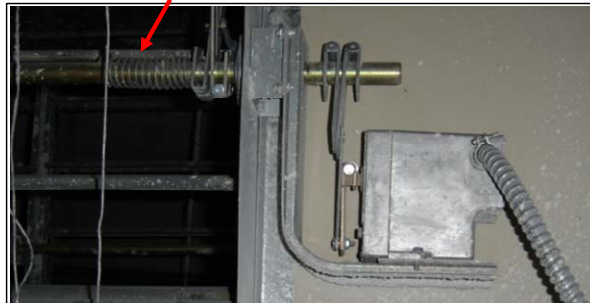
Used 2 springs. Red arrows point at external one used for actuator. Internal one is preloaded and releases if fusible link melts.

Remove old motor, bracket and spring. Belimo can then be direct coupled easily.



MA418, MA318 FSNF or FSAF

Application shown to right allows direct coupling. Linkages needed in some cases where space constraints dictate.



ML4115, MS4202 FSLF up to 30" x 30"

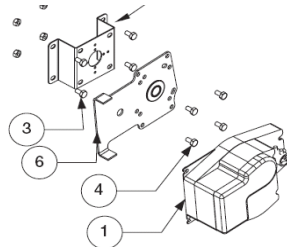
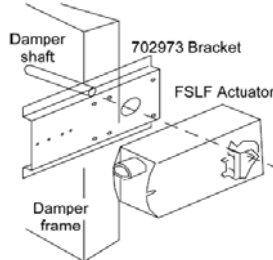
In general, oil-filled spring return motors like the MA418 are straightforward replacements. In this case, the Belimo FSNF or FSAF may be direct coupled. The shaft spring should be examined and exercised to prove it is still operational. The fusible link cannot be seen, however it should release the shaft spring.

<http://www.belimo.us/sh/firesmoke/images/ReplacementHoneywellML4115andSimilarMotors.pdf>

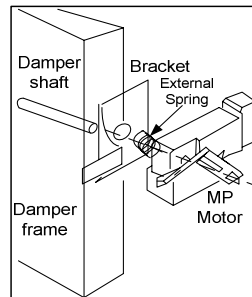
http://www.belimo.us/sh/firesmoke/images/Greenheck_FSNF_on_FS_Dampers.pdf

MS4120, GGD FSNF or FSAF up to 12 sq.ft.

Optional bracket available from Greenheck rep.

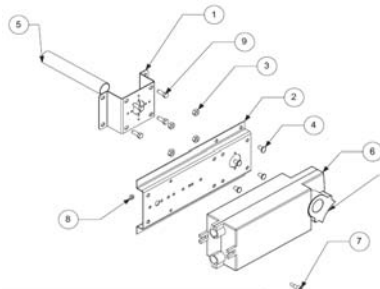


MultiProducts FSLF
FSNF if linkages needed

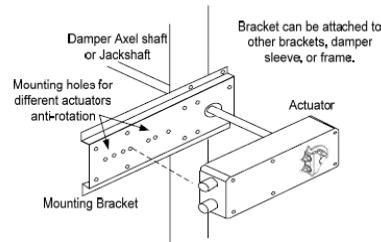


Belimo ZG-LMSA-1/2-5 is a 1/2" shaft extension 5" long.

Optional bracket available.



651815 Bracket may be used. Belimo fits on same bracket.



Hugh Richards NYC (Prefco)

Now Complete Spiral Metals. See Prefco.

Imperial NYC

See Safe-Air

<http://www.imperialdamper.com/products.html>

Leader

All	FSNF
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<http://www.leaderindustries.com/>

Leader has always used the 2 spring approach.
 Remove old motor, linkage, and spring. Install Belimo.
 Only FSNF UL Listed as of this file date.
 Examine damper and send digital photographs if more direction needed.
 Use various drawings in this document as references.

Lloyd Industries

All	FSNF
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<http://www.firedamper.com/>

Present damper using the dual spring approach so replacement straightforward.
 Only FSNF Listed.

Nailor

MultiProducts	FSNF + linkage parts
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<http://www.nailor.com/OnlineCatalogs/CAC/CACCINTRO.pdf>

[http://www.belimo.us/sh/firesmoke/images/MultiProducts to Belimo FS actuators on Nailor dampers.pdf](http://www.belimo.us/sh/firesmoke/images/MultiProducts%20to%20Belimo%20FS%20actuators%20on%20Nailor%20dampers.pdf)

MA220, 230	FSNF listed up to 36" x 48"
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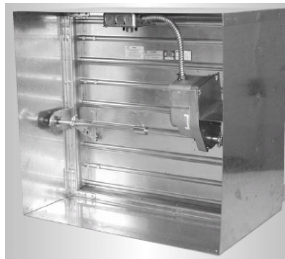
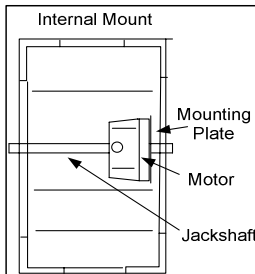
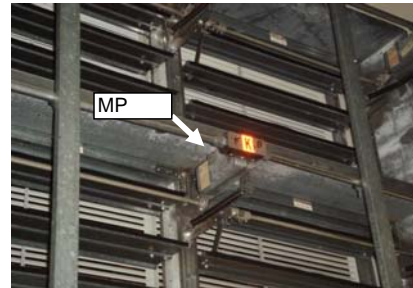
Modern dampers use the thermal sensor method for fire sensing.
 Actuator replacement is straightforward direct coupling.

ML4115	FSLF UL555S listed only 18" x 6".
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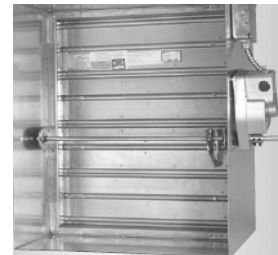
More to come.

ML4209	FSNF listed up to 36" x 48"
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MS4120	FSNF listed up to 36" x 48"
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Internal mount



External mount

For short shaft mounting of FSLFs, use the ZG-LMSA-1/2-5. 1/2" diameter, 5" long. It fits thru the FSLF and allows mounting.

NCA

<http://www.ncamfg.com/Catalog-PDFs/MotorsActuators-UL.pdf>

MA220, MA230	FSLF
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MultiProducts	FSLF
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MA418	FSNF
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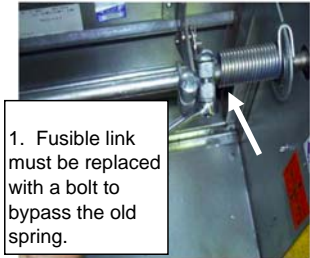
Modern dampers use the thermal sensor method for fire sensing.
 Actuator replacement is straightforward direct coupling.
 All older dampers used dual springs. The actuator spring must be removed or bypassed before installing a Belimo.
 The fusible link spring should be left as is.

ML4115	FSLF	350F	24" x 24"
MS4209	FSNF	250F	48" X 36"

NCA was purchased by Metal Industries who also owns Prefco.
 United Enertech has a franchise as does Complete Spiral Metals in NYC.

MA220, MA230	FSLF, FSNF if linkages needed.
	FSAF provides features not included in FSLF or FSNF. UL testing underway Oct 2008.

The existing shaft spring must be disconnected and the fusible link replaced with a bolt
 A thermal sensor must be installed.



1. Fusible link must be replaced with a bolt to bypass the old spring.



2. Then a new primary thermal sensor must be installed to control the actuator electrically.

See complete instructions on belimo.us in the Fire and Smoke Dashboard.
http://www.belimo.us/sh/firesmoke/images/Pottorff_MA220_Field_Replacement.pdf

Prefco

ML4115, ML4202	FSNF
MultiProducts	FSNF

http://www.belimo.us/sh/firesmoke/images/PrefcoMcCabeOldmotorReplacementBelimoFS_Series.pdf
http://www.belimo.us/sh/firesmoke/images/Prefco_Mod_5000_Actuator_Replacement.pdf

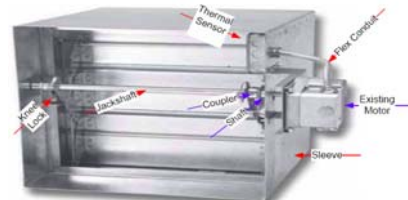
In NYC, all Belimos are MEA, however the UL555S listing must exist before use.

Belimo replacements are available only for the PHL 5800 MB2 or MB3 actuator – all other 5800 series actuators must be replaced with OEM equipment.

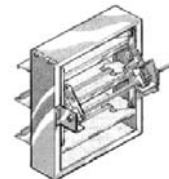
Larger access door may need to be installed. In some cases no actuator solution exists and damper must be replaced

Call for information.

5050/5150 damper shown at right.



Prefco had a wide variety of mounting methods. Where a shaft existed, Belimo FSNF may be used. Where no shaft was present, refer to Prefco.

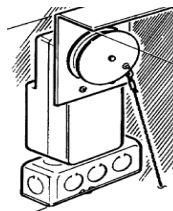


McCabe® Link

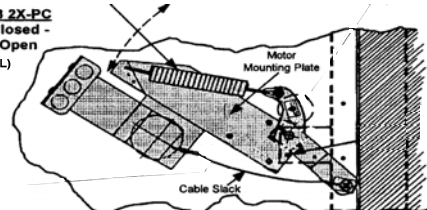
As of this file date, Prefco had not tested FSLF. Note Metal Industries owns both Prefco and NCA.

Models that cannot use Belimo.

5800 EMB



5800 EMB 2X-PC (Power Closed - Spring Open) (TYPICAL)

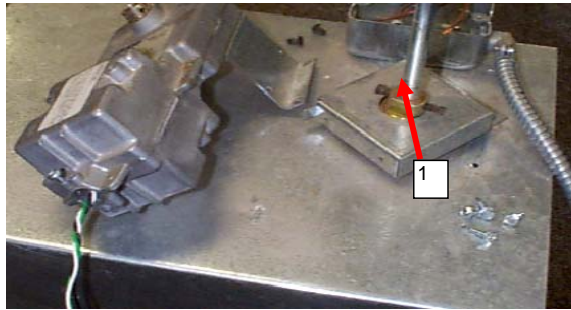


Ruskin models are almost exclusively thermal sensor.

MA220, MA230 FSLF

Remove defective actuator & **external spring [1]**.
 Straightforward replacement. CAUTION!
 SPRING UNDER TENSION. WEAR EYE AND HAND PROTECTION.

http://www.belimo.us/sh/firesmoke/images/MA220_Replacement_on_Ruskin.pdf



MA418 FSNF

ML4115	FSLF	4 sq.ft. 350F
MS4902	FSNF	4 sq.ft. to 8 sq.ft. at 350F
MS4120	FSAF	12 sq.ft. at 250F

GGD FSNF or FSAF at damper sizes above.

Phillips T150 FSNF or FSAF at damper sizes above.

Check jackshaft spring [1] and fusible link [2]. Field modifications may have been made on these old dampers changing factory function. Motor has no spring. When power is removed, damper is driven closed by spring. Thermal sensors were used to cut electrical power to the motor and allow spring to close damper. Smoke function was by smoke detector.

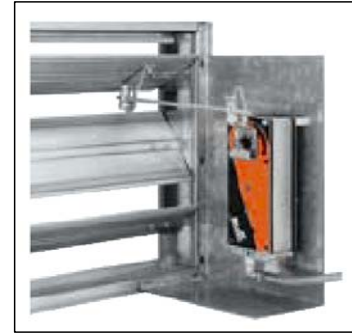


Old spring must be disabled. Best to loosen arms, and let spring unwind on shaft. DANGER - SPRING IS UNDER TENSION. INJURY CAN OCCUR. USE CAUTION. WEAR PROTECTIVE GLOVES AND EYE PROTECTION. After releasing tension, drive shaft pin out to release spring. Slide down shaft and hold with pin.

Then install FSxx on old plate or use ZG-100 or equal to mount new actuator.

[3] Illegal 4 hour fusible link. Pencils, which at least burn faster, are also illegal.

Use of instructions is required by UL when changing old actuators.



Left.

The above photograph exemplifies a not uncommon error. Obsolete Phillips P150 motor was used originally. Barber Colman MA418's were installed to replace the defectives P150's which did not have internal springs like more modern motors. However, the old shaft spring was left functioning. The MA418's have to do double duty by holding against their own internal spring as well as the old spring. The replacement motors fail prematurely.

Right.

The Belimo FSNF or FSAF can be mouted a number of ways. Use of a ZG-100 is shown here.

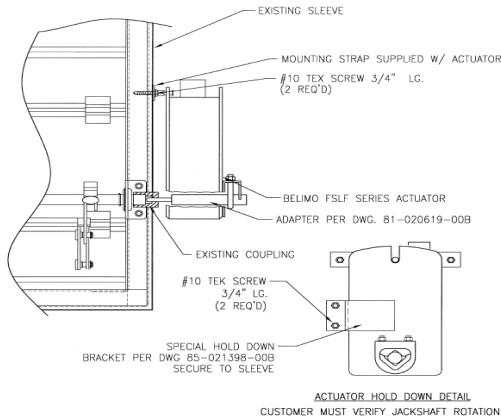
http://www.belimo.us/belib/Accessories/Mechanical_Accessories.pdf
http://www.belimo.us/belib/Application_Guides/Mounting_Methods.pdf

MP2781 MultiProducts	FSLF120/MP kit. Available from Ruskin only.
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Old negator springs must be present and working. If not, replace the damper.

In order to adapt the old MP motor with its .2" square male shaft end, a female socket was welded onto the damper shaft. The welded piece must stay on the shaft. A shaft adapter insert and actuator with hold down bracket is available from Ruskin.



Ruskin part number FSLF120/MP. This must be ordered from Ruskin or local Ruskin Representative. Go to www.ruskin.com for list.

RETROFIT KIT FOR CONVERTING AN EXISTING MP2781 TO FSLF SERIES ACTUATOR
 Kit contains actuator, shaft adaptor, hold down, and instruction sheet.

http://www.belimo.us/sh/firesmoke/images/Ruskin_Damper_with_obsolete_MP2781_MultiProducts_Motor_to_Belimo_FSLF120.pdf

Safe-Air

<http://www.safeair-dowco.com/>

MA220, MA230	FSLF	Safe Air has always used the dual spring approach. A variety of Multiproducts motors were used also. Send digital photographs for use in determining instructions required.
MA418	FSNF	

United Enertech

<http://www.unitedenertech.com/news/>
 NCA franchise

Vent Products

No longer making smoke or combination dampers. Call for information. Older models still exist.

ACTUATOR REPLACEMENT STARTS WITH THE DAMPER, NOT THE ACTUATOR.

More important than motor-actuator characteristics is the UL Listing and Mounting. See Damper Mfgs. Note that while replacement by electrical and torque characteristics may be straightforward, mounting may require special methods or preclude use of Belimo.

Note that torque is not measured the same by all companies. Use UL555S tested area results given in damper OEM sections above.

Barber Colman-Siebe--Invensys-TAC

Model	Power	Torque-Stroke	Belimo Replacement
MA318	24	60-180 stroke	FSNF24
MA418	120	60-180 stroke	FSNF120
MA220	120	Remove external spring.	FSLF120
MA230	120	Remove external spring.	FSLF120
MA240	No direct replacement 180 degree rotation. With linkage kit may be possible depending on mounting geometry.		
MA250	Same as MA220/230 series.		

Honeywell	Power	Torque-Stroke	Belimo Replacement & Notes
ML4105A1000	120 CCW	50 FSLF120	FSNF120 should be used
ML4105B1009	120 CW	50 FSLF120	for dampers over 4 sq.ft.
M4105C1008	230 CCW	50 FSLF230	
ML4105D1007	230 CW	50 FSLF230	Where linkages are needed, use FSNF.
ML4115A1009	120 CCW	30 FSLF120	This includes internal mount.
ML4115B1008	120 CW	30 FSLF120	
ML4115C	230 CCW	30 FSLF230	
ML4115D	230 CW	30 FSLF230	
ML4202	120 CW	20 FSLF120	
ML4302	120 CCW	20 FSLF120	
ML4702	230 CW	20	FSNF230
ML4802	230 CCW	20	FSNF230
ML8202	24 CW	20	FSNF24
ML8302	24 CCW	20	FSNF24

Torque: the exact torque does not matter. Most important is the UL555S listing.



32003532-002 Aux Switch Package

Use **-S** model.

ML8105A1006	24 CCW	50 FSLF24	FSNF120 should be used
ML8105B1005	24 CW	50 FSLF24	for dampers over 4 sq.ft.
ML8115A1005	24 CCW	30 FSLF24	Where linkages are needed, use FSNF.
ML8115B1004	24 CW	30 FSLF24	
MS4209F	120 CW	80	FSNF120
MS4309F	120 CCW	80	FSNF120
MS4709F	230 CW	80	FSNF230
MS4809F	230 CCW	80	FSNF230
MS8209F	24 CW	80	FSNF24
MS8309F	24 CCW	80	FSNF24

TTT-VAT
TEMPERATURE
TIME
TORQUE
VOLTAGE
AMPERAGE
TEST

Honeywell	Power	Torque-Stroke	Belimo Replacement & Notes
MS4120F1006	120	175 in- No aux	FSAF within FSAF120
MS4120F1204	120	175 in- 2 SPST	UL555 listing FSAF120-S
MS4620F1005	230	175 in- No aux	parameters. FSAF230
MS4620F1203	230	175 in- 2 SPST	16 sq.ft to FSAF230-S
MS8120F1002	24	175 in- No aux	20 sq.ft. FSAF24
MS8120F1200	24	175 in- 2 SPST	FSAF24-S
S2024-F	24	175 in- No aux	S = Halogen and silicone free wires.
S20230-F	230	175 in- No aux	S = Double insulated actuators.
S2024-F-SW2	24	175 in- 2 SPDT	
SO230-F-SW2	230	175 in- 2 SPDT	Consider Belimo BF series.

Requires 2 FSNF actuators for nominal torque needs. Belimo FSNF has passed UL555S AT 250F W/ 16 sq.ft of damper with one manufacturer.

Ruskin Models made by Honeywell

Belimo Replacement

Make & Model	Power	Torque-Stroke	Amperage draw	< 4 sq.ft.	> 4 sq.ft.
H2000A	120 CCW		.18A/.11A	FSLF120	FSNF120
H2000B	120 CW		18W/9W	"	"
H2024A	24 CCW		16VA run	FSLF24	FSNF24
H2024B	24 CW		8VA hold	"	"
H2230A	230 CCW		.13A18W	FSLF230	FSNF230
H2230B	230 CW		.1A/11W	"	"
32003532-002 Aux Switch Package			Use -S model of proper voltage.		

Siemens

Make & Model	Power	Torque-Stroke	Belimo Replacement & Notes
GGD121	24 110	FSAF24 FSNF24	Belimo FSNF limited to 12 sq.ft.
GGD221	120 110	FSAF120 FSNF120	Siemens spring is 108 with <10% reduction
GGD321	230 110	FSAF230 FSNF230	at elevated temperatures.
			They rate it at 142 in-#.
GND	.1U is up to 1" clamp. .3U is 1.05"		FSLFxx
Where thermal sensor is present, add chase nipple and hani-box and wire accordingly.			



Multiproducts

VERY IMPORTANT THAT THE FUSIBLE LINK METHOD BE EXAMINED. NOT ALL MP's CAN BE REPLACED.

2920 + spring, etc.

MP2781-SQ

MP2781-A-SQ

MP2814-SQ

For direct coupled use FSLF.

115 .24A run/.27A hold (yes, true!)

"A" model was CW rotation; plain was CCW

24 1.15A run/1.3A hold 10in-# torque

Inside clamp mounting or a shaft extension required.

Use FSNF where linkages needed.

Original was 1/4" shaft; replacement was 3/16" shaft.

FSLF120 replaces both.



MP2814A-SQ

TB2001

Unidirectional shaded pole.

Use damper size if necessary.

Remove external spring. ZG-AF and SH8 required.

FSLF24 replaces both.

ECM

Out of business.

FSLF if direct coupled possible. FSNF if linkages needed.

Linkages needed in many applications.

Call for information with damper make, model, and actuator info.

View from outside.



View from inside.



The entire damper has to be rebuilt in most cases. The ECM's are not available. They may not be repaired.

Rather than starting with the motor here, go to the Air Balance damper and the instructions are available.

AHJ must be informed and approve before replacement.



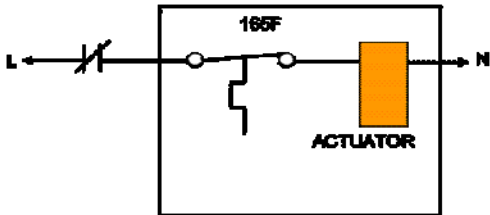
Wiring for the primary sensor is shown below.
For FSCS HOA switches see F&S Dashboard.



<http://www.belimo.us/sh/firesmoke/images/BasicTrainingFireSmokeDamperActuatorReplacement.pdf>

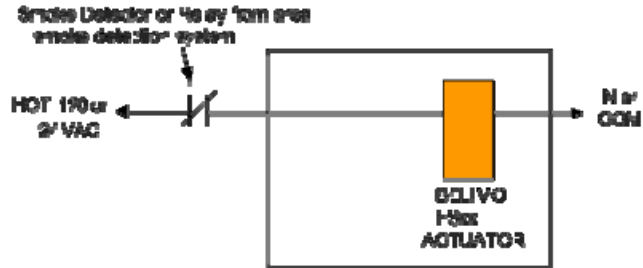
If any alarm wiring is touched, contact Fire Marshal to determine if a retesting is required.
If any building structural changes are made, contact Building Official for permit & inspection

Wiring for primary sensor applications.



Wiring when fusible link is retained and old spring used.

DAMPER ACTUATOR WIRING



For more information go to:

www.belimo.us
www.belimo.us/sh/FireSmoke/index.html

