



#### Before replacing actuator, damper must be inspected and determined to be fully functional. See NFPA 80 &/or NFPA 105 for recommended check list.

### Replacement of Greenheck MP2985 & 2986 Motors with Belimo FSxx Series

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www.belimo.us/firesmoke



### UL®

In the "Marking & Application Guide, Dampers for Fire Barrier and Smoke Applications & Ceiling Dampers" April 2013 by Underwriters Laboratories Inc.®, page 6 they state:

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 manufacturer's normal field servicing program."

#### 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.

Chapter 7 IBC & IFC "Containment" Dampers				
Commissioning				
End of first year				
Every 4 years except in ho	spitals every 6 years			
Chapter 9 IFC "Smoke Contro	System" Dampers			
Dedicated	Non-dedicated			
Commissioning	Commissioning			
Semi-annually	Annually			
Chapter 9 IBC & IFC				
Fire detection & Smoke control systems				
Dedicated	Non-dedicated			
Weekly self-test	Not required			

Fire & smoke dampers are appliances and field replacement of components is required 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 Smoke Control System (FSCS) panel. Retesting is required. 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.

# See NFPA 80 & NFPA 105 for details. The damper cleaning and examination check list here is based on them.

Damper installation shall meet code requirements. Fire stopping and drywall integrity shall be confirmed. Damper blades shall be in plane of wall. Duct shall be fall away with no fasteners connected to damper sleeve.

- a. Dampers and ducts shall be cleaned of all foreign debris and dust build-up.
- b. All exposed moving parts of the damper shall be dry lubricated as required by the manufacturer. Do not use oil as it draws dirt.
- c. Damper shall be examined without defective old motor or new actuator to determine:
  - i. The damper shall fully close from the open position.
  - ii. Damper shall fully open from the closed position.
  - iii. There are no obstructions to the operation of the damper. The damper shall not be blocked from closure in any way due to rusted, bent, misaligned, or damaged frame or blades. The damper shall not have defective hinges, side &/or blade seals, or other moving parts. The damper frame shall not be penetrated by any foreign objects that would affect operation.
- d. If the damper is equipped with a fusible link, the link shall be removed for testing to ensure full closure and lock-in-place if so equipped. If the link is damaged or painted, it shall be replaced with a link of the same size, temperature, and load rating.
- e. The fusible link shall be reinstalled after testing is complete.

After installation and wiring of new actuator it shall be tested.

- a. The checklist may be customized using material here and in NFPA Standards. Multiple geometric configurations of springs, fusible link, thermal sensor(s), and actuation are possible. Confirm with AHJ if any additional requirements exist.
- b. Electric thermal sensors, if present, must be tested and replaced if defective.
- c. The test shall be conducted with normal HVAC airflow.
- d. When equipped with smoke detection activation, the smoke detector shall be activated and damper operation observed.

Test voltage input to actuators and repair as necessary if voltage is not correct. Old breakers often deliver below 115V and failed actuators may be due to power supply problems.

For the Air Movement and Control Association damper maintainance manual go to: <a href="http://www.amca.org/publications/damper\_maintenance.aspx">http://www.amca.org/publications/damper\_maintenance.aspx</a>



#### 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 Acceptance testing details below.

(Mnemonic device: TTT-VAT)





### **Cross Reference**

#### MultiProducts

There is no one to one replacement. Rather, all the old linkage parts, external spring, and motor are removed and the new actuator is direct coupled to the damper shaft. Double check that the fusible link and shaft spring are intact. See BAE 165 below if not.

MP2985E	115V 24W	.335A Run	.36A Stall	Belimo FSLF12O
MP2986A	24V 19W	1.5A Run	1.6A Stall	Belimo FSLF24

Siebe/Barber	Power	Torque	Aux Switches	Belimo	Notes		
MA220	120 VAC	30	Owneries	ESI F120 US	1.2.4		
MA221	240 VAC	30		FSLF230 US	1, 2, 4		
MA223	24 VAC	24 VAC 30 FSLF24 US 1. 2. 4					
MA230	120 VAC	50		FSNF120 US	1, 2, 3		
MA231	240 VAC	50		FSNF230 US	1, 2, 3		
MA233	24 VAC	50		FSNF24 US	1, 2, 3		
MA240	120 VAC	50			5,6		
MA250	120 VAC	50		FSNF120 US	1, 2, 3, 4		
MA251	230 VAC	50		FSNF230 US	1, 2, 3, 4		
MA253	24 VAC 50 FSNF24 US 1, 2, 3, 4				1, 2, 3, 4		
MA-318	24 VAC	60		FSNF24 US	1, 3		
	FSNF24 -S						
MA-318-500	24 VAC	60	1	US	1, 3		
MA-418	120 VAC	60		FSNF120 US	1, 3		
MA 419 500	120 \/AC	60	1	FSNF120-S	1 2		
MA-410-500	Direct cour	le the Bel	imo where sh	aft is available	1, 3		
1	Some were direct coupled.						
	FSTF <1.5	sq.ft. FS	SLF <4				
2	sq.ft.						
3	FSNF <12	sq.ft. FS	SAF*A <18 sc	.ft.			
4	For Pottorff with shaft spring see: https://www.belimo.us/mam/americas/technical_documents/pdf- web/fire_and_smoke_doc/pottorff-ma2xx_to_belimo.pdf						
5	Motor was not 90 degree and pulley and cable were usually used. Some geometric changes are necessary to simplify.						
6	Provide ph Link, Typic Otherwise	otos. Moto ally direct investigat	or, linkage, bl couple to dai	ades, fusible link, mper shaft if avail v	McCabe © able.		



Honeywell	Voltage	Control	Torque	Aux	Replacement	
ML4105A1000	120 VAC	On/Off	30		FSLF120 US	*
ML4105B1009	120 VAC	On/Off	30		FSLF120 US	*
ML4105C1008	230 VAC	On/Off	30		FSLF230 US	*
ML4105D1007	230 VAC	On/Off	30		FSLF230 US	*
ML4115A1009	120 VAC	On/Off	30		FSLF120 US	*
ML4115A1017	120 VAC	On/Off	30		FSLF120 US	*
ML4115B1008	120 VAC	On/Off	30		FSLF120 US	*
ML4115B1016	120 VAC	On/Off	30		FSLF120 US	*
ML4115C1007	230 VAC	On/Off	30		FSLF230 US	*
ML4115C1015	230 VAC	On/Off	30		FSLF230 US	*
ML4115D1006	230 VAC	On/Off	30		FSLF230 US	*
ML4115D1014	230 VAC	On/Off	30		FSLF230 US	*
ML4115H1002	120 VAC	On/Off	30		FSLF120 US	*
ML4115J1019	120 VAC	On/Off	30		FSLF120 US	*
ML4202F1000	120 VAC	On/Off	20		FSLF120 US	*
ML4202F1000	120VAC	On/Off	20		FSLF120 US	*
ML4302F1008	120 VAC	On/Off	20		FSLF120 US	*
ML8105A1006	24 VAC	On/Off	30		FSLF24 US	*
ML8105B1005	24 VAC	On/Off	30		FSLF24 US	*
ML8115A1005	24 VAC	On/Off	30		FSLF24 US	*
ML8115A1013	24 VAC	On/Off	30		FSLF24 US	*
ML8115B1004	24 VAC	On/Off	30		FSLF24 US	*
ML8115B1012	24 VAC	On/Off	30		FSLF24 US	*
ML8115H	24 VAC	On/Off	30		FSLF24 US	*
ML8115J	24 VAC	On/Off	30		FSLF24 US	*
ML8202	24 VAC	On/Off	20		FSLF24 US	*
ML8302	24 VAC	On/Off	20		FSLF24 US	*
MS4104F1010	120 VAC	On/Off	30		FSLF120 US	*
MS4104F1210	120 VAC	On/Off	30	2	FSLF120-S US	*
MS4109F1010	120 VAC	On/Off	80		FSNF120 US	
MS4109F1210	120 VAC	On/Off	80	2	FSNF120-S	
MS4120F1006	120 VAC	On/Off	175		FSAFA120	
MS4120F1204	120 VAC	On/Off	175	2	FSAF120A-S	
MS4209F1007	120 VAC	On/Off	80		FSNF120 US	
MS4309F1005	120 VAC	On/Off	80		FSNF120 US	

For greater detail see <u>www.belimo.us/firesmoke</u> RETROFIT or download from <u>https://www.belimo.us/mam/americas/technical\_documents/pdf-</u> web/fire\_and\_smoke\_doc/fire\_smoke\_competitive\_replacement\_data\_reference.pdf



MS4604F1010	230 VAC	On/Off	30		FSLF230	*
MS4604F1210	230 VAC	On/Off	30	2	FSLF230-S	*
MS4609F1010	230 VAC	On/Off	80		FSNF230	
MS4609F1210	230 VAC	On/Off	80	2	FSNF230-S	
MS4620F1005	230 VAC	On/Off	175		FSAF230A	
MS4620F1203	230 VAC	On/Off	175	2	FSAF230A-S	
MS4709F1014	230 VAC	On/Off	80		FSNF230 US	
MS4809F1012	230 VAC	On/Off	80		FSNF230 US	
MS7520A2015	24 VAC	2-10V, 4-20mA	175		FSAFB24-SR US	
MS8104F1010	24 VAC	On/Off	30		FSLF24	*
MS8104F1210	24 VAC	On/Off	30		FSLF24	*
MS8109F1010	24 VAC	On/Off	80		FSNF24	
MS8109F1210	24 VAC	On/Off	80	2	FSNF24-S	
MS8120F1002	24 VAC	On/Off	175		FSAF24A	
MS8120F1200	24 VAC	On/Off	175	2	FSAF24A-S	
MS8209F1003	24 VAC	On/Off	80		FSNF24 US	
MS8309F1001	24 VAC	On/Off	80		FSNF24 US	
S20230-F	230 VAC	On/Off	175		FSAF230A	
S20230-F-SW2	230 VAC	On/Off	175	2	FSAF230A-S	
S2024-F	24 VAC	On/Off	175		FSAF24A	
S2024-F-SW2	24 VAC	On/Off	175	2	FSAF24A-S	
SPH2 Aux Switch					**	
32003532-002 A	ux Switch					**

\* Use FSNF series if damper is > 4 sq.ft. \*\* Use -S model of proper voltage.

Nominal sq.ft. per UL555S testing.	Temp	Actuator	
<4	350°F	FSLF	36" w x 24" h also.
<12	350°F	FSNF	Multisections also.
<16	250°F	FSNF	Multisections also.
<18	350°F	FSAF*A	Multisections also.

The FSTF series actuators were introduced in 2013. They are 18 in-lb and designed for under 1.5 sq.ft. of fire and smoke damper. Use on larger dampers only when replacing an existing FSTF on a fire and smoke damper.

The FSLF is recommended for small dampers.

Belimo actuators pass UL555S at the same damper sizes as the Honeywell.	NOTE. Although an actuator may operate a larger sized damper use the UL listed sizing. Call for assistance.
Sizes as the Honeywell.	



#### Siemens Make & Model **Belimo Replacement** Power GGD121 24 FSNF24 FSAF24 GGD221 FSAF120 FSNF120 120 FSNF230 GGD321 230 FSAF230

GND12x.1x	24V	FSLF24
GND22x.1x	120V	FSLF120
GND32x.1x	230V	FSLF230

#### Electronic Fuse Link (24 Vac)

ASK79.165 165°F (74°C)	BAE165 US
ASK79.212 212°F (100°F)	None. Call if needed.
ASK79.250 250°F (121°C)	None. Call if needed.
ASK79.350 350°F (177°C)	None. Call if needed.

|--|

Notes:			



#### MultiProducts

#### Prefco 5800 EMB

In all cases disconnect external motor spring without compromising fusible link and internal spring ability to close the blades. These are quite old and changes may have been made over the years. Investigate operation. Confirm voltage. Check fusible links or McCabe © Link. Verify damper functions after replacement by testing damper open and spring closed.	FSTF if less than 1.5 sq.ft. FSLF from 1.5 to 4 sq.ft. FSNF up to 10 sq.ft.	Use -S models if auxiliary switches are required.
Use of FSLF is recommended for dampers less than 4 sq.ft. For linkage applications all FSTF & FSNF parts can be used.		

		1
5800EMB2XPO	FSLF120	
5800EMB2XPC	FSLF120	
5800EMB1	FSLF120	5800EMB1 - Outside the duct, top mount, power open
		5800EMB7 - Inside the duct, bottom mount, power
5800EMB7	FSLF120	closed
		5800EMB10 - Outside the duct, bottom mount, power
5800EMB10	FSLF120	closed
5800EMB5	FSLF120	5800EMB5 - Inside the duct, top mount, power open
5800EMB8	FSLF24	
5800EMB9	FSLF120	

While direct coupling is preferable, some applications require linkages. See **Linkages** below for an example of a FSTF linkaged to a Prefco internally.

Model	Voltage	Notes
2430	120VAC	
2553A	120VAC	1
2585	120VAC	2
2659	120VAC	3
2724	120VAC	4
2781	24/120 VAC	5
2814A-SQ	120VAC	6
2814-SQ	120VAC	7
2920	120VAC	8
2985	120VAC	9
2986	120VAC	10
3158	120VAC	11
3159	120VAC	12
5983	120VAC	13
6247	120VAC	14
MZRHM	120VAC	15
TB2000/1	120VAC	16

All 12	0V, FSLF120	
	Nailor	
	5953	
	5949	
	M12, MZRHM	
	6247	
	5186	



1	Square shaft inserted into damper sleeve with special crankarm. If a smoke damper, replacement may be possible and requires a new shaft and other linkage parts. If a combination fire and smoke damper, Belimo may not be capable of being used. See Air Balance with MP2553.
2	Typically these were linkaged using a crank arm on the square motor shaft and the spring was on the round shaft. Remove all linkage parts and direct couple to damper shaft.
3	Safe-Air / Imperial. Typically linkaged. There was an internal spring and fusible link for the fire function.
4	Except in rare occasions where space constraints exist, simply remove all linkage parts and direct couple on damper shaft. Use old motor as a mounting platform for anti-rotation strap
5	Usually on a Negator Spring damper. For pneumatic, the FSLF120 will usually work. For electric, the Ruskin kit FSLF120/MP must be ordered from a Ruskin rep.
6	10 in-lb. "A" model = CW rotation; plain = CCW. Check voltage. FSLF replaces both in most cases. Use FSTF when linkages necessary
7	10 in-lb. "A" model = CW rotation; plain = CCW. Check voltage. FSLF replaces both in most cases. Use FSTF when linkages necessary.
8	Inside clamp mounting or a shaft extension required.
9	See Greenheck Installation Instructions. Typically these were linkaged using a crank arm on the square shaft and the spring was on the round shaft. Remove all linkage parts and direct couple to damper shaft.
10	See Greenheck Installation Instructions. Typically these were linkaged using a crank arm on the square shaft and the spring was on the round shaft. Remove all linkage parts and direct couple to damper shaft
11	Some were direct coupled to the damper shaft with an external spring. Some were linkaged using a crank arm on the square motor shaft and the spring was on the round shaft. Remove all linkage parts and direct couple.
12	Some were direct coupled to the damper shaft with an external spring. Some were linkaged using a crank arm on the square motor shaft and the spring was on the round shaft. Remove all linkage parts and direct couple.
13	https://www.belimo.us/mam/americas/technical_documents/pdf- web/fire_and_smoke_doc/nailor_multiproducts_to_belimo_fs_instructions.pdf
14	Nailor. Remove linkage parts and mount to damper shaft. FSLF for dampers < 4 sq.ft. and FSNF for dameprs > 4 sq.ft.
15	Nailor. Remove linkage parts and mount to damper shaft. FSLF for dampers < 4 sq.ft. and FSNF for dameprs > 4 sq.ft.
16	Typically these were linkaged using a crank arm on the square motor shaft and the spring was on the round shaft. Remove spring and all linkage parts and direct couple to damper shaft.



## Application

Greenheck used a dual spring approach. The external spring closes the motor. A hidden internal spring is held back by a fusible link. It is not involved in the smoke function and should not be changed.

Below and right. Black arrow points to the 1/4" motor shaft and spring. White arrow points to the damper shaft which is hidden.





The motors above are connected by linkage as shown in the photographs below. The Belimo FSLF can be direct coupled if space exists for mounting. A bracket may have to be fabricated from 16 ga. Sheet metal to hold the anti-rotation strap. The geometry of the situation determines the mounting method.



View of damper frame, blade, and shaft.





#### **RIGHT!**

The Greenheck high temperature damper closing is accomplished with a fusible link and a shaft spring.

Replace the fusible link if necessary and test the closing function.

THIS SPRING AND FUSIBLE LINK MUST REMAIN IN PLACE. Detail of spring, arm, and fusible link.





#### WRONG!

This spring has been disconnected from the linkage.

It must be repaired or the damper replaced.

Test when reattached to ensure the damper closes if fusible link melts.





Close-up view showing external shaft spring and part of the linkage. Both will be removed so that the Belimo can be mounted on the shaft.



1 Spring. Motor is applied the same as any linkage application. Remove spring and actuator.

2 This shaft is not mounted to the damper.



Crankarm is connected to the damper shaft. The Belimo may be direct coupled over the shaft. For short shaft mounting, place clamp of actuator between actuator and damper. See p9.

If a linkage is needed due to space constraints, use FSNF with ZG-AF or other linkage kit with rod. See Mounting Methods Guide and Mechanical Accessories Booklets at www.belimo.us.



	View fron and actua	w the damper	
1. 19 18 3	Part No.	Qty.	Description
1 × 80 1 1 1 1 1 1	1	1	Anchor Bracket
	2	4	1/4"-20 x 1/2" Thread Cutting Screws
	3	1	5∕ns" Bolt with Nut
- 21 La	4	1	Linkage
	5	1	Actuator Assembly
	6	1	Set Screw
	7	1	Shaft Collar
T	8	1	E-Ring
4	9	1	Knurl Pin
2	10	1	Stand Off Bracket (Used with Shaft Extension)
	11	1	Ball Bearing (Used with Shaft Extension)
	12	2	1/4"-20 Spinlock Nut
	13	1	1/4"-20 x 11/4" Bolt

#### Disassembly of MP mounted motor







#### Damper shaft / Jackshaft extends out thru motor.



Remove spring, bracket and MP motor. Do not remove bearing or bracket. Jackshaft extends beyond the outboard bearing bracket and the Belimo FSLF can be direct coupled.

A plate will be needed to attach the anti-rotation strap. An alternate plate is available from Greenheck and is shown below.





The FSTF is frequently the best solution for small dampers. While it has passed UL 555S on a 20" x 20" damper, we recommend 1.5 sq.ft. maximum for replacement on old dampers which may be corroded or racked and have a higher torque load than a new damper.





### Mounting

#### Short shaft



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.

Clamp





FSLF mounted on the damper shaft. Two sheet metal screws hold the anti-rotation strap. Two nuts secure coldweld clamp onto shaft.

Note that actuator floats freely. Clamp cold welds when teeth dig into the damper shaft and the anti-rotation strap stud allows the actuator to move if shaft is not perfectly concentric. Rigid mounting by jamming the stud into the U-slot of actuator is NOT usually best.



**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.



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





FSNF mounted on the damper shaft. Two screws hold the anti-rotation strap. Two nuts secure cold-weld clamp onto shaft.

FSAF mounts the same.



Depending on the geometry, any number of mounting arrangements are correct. The most common are shown here Alternately, the anti-rotation strap can be attached to any Belimo linkage, an electrical J-box cover plate, or to a pieced of U-channel.

It is important to remember that the ducts are fall-away. The actuator mounting cannot interfere with the ability of the duct to fall from the damper. The damper must continue to protect the wall. See Belimo Mounting Methods Guide for more mounting drawings.

See Belimo Mounting Methods Guide for more drawings. Link on page 19. Anti-rotation strap can be attached to bracket, 4 x 4 plate, or sheet metal bracket.







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.









## Linkage mounting



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



Possible alternate arrangements for damper clip. (FSNF, FSAF actuators shown.)



Belimo linkage kits: https://www.belimo.com/pim/mam /americas/technical\_documents/d ata\_sheets/man-airacc/Mechanical\_Accessories.pdf

Mounting Methods Guide: https://www.belimo.us/mam/americ as/technical\_documents/pdfweb/guides/mounting\_methods.pdf



### Miscellaneous parts

Should they be needed, Belimo carries a range of parts. Ball joints and 5/16" rods are available from most distributors.



**SH8** (not shown – see picture page 9). Push-rod for KG6 & KG8 ball joints. 5/16" 36" long Use SH10 3/8" rods for GMB and dual FSAF or FSNF linkages. 5/16" can bend under heavy loads.



### Thermal sensor replacements – BAE165 US



#### Belimo BAE165 US

Where existing sensor is defective or one must be added, the 165°F primary sensor may be used. Original equipment is recommended although not strictly required by code. UL does not regulate replacement or repair. See NFPA 80 or NFPA 105.



### **Auxiliary Switches**

#### Damper blade switch assembly



#### Externally mounted auxiliary switches



Where the original switches for signaling position to a Fire Fighters' Smoke Control Panel or to local indicator lights must be replaced or are inoperative the Belimo –S model actuators may be used or a S2A-F may be installed.

#### Belimo S2A-F

FSLF (mid 2014ff), FSNF, and FSAF actuators can use the add on switch package.







## Wiring



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





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.



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



#### Belimo Auxiliary Switches for position indication to FSCS

The auxiliary switches are used to provide status indication to the fire fighters' smoke control panel. Typically there are two or three status lights or leds. This wiring is the responsibility of the fire alarm company. If it is touched, they must retest to verify proper operation. These switches are not alarm, but rather indicating.



- Damper must be free to move from open to closed without undue stress.
- Damper and duct must be clean and free of all debris.
- Test damper and controls per Fire Marshal's checklist below.
- Fire alarm company may need to be present to verify proper status indication at FSCS panel.



### **Building Official / Fire Marshal Notification Form**

Retain this portion of checklist at premises for inspection. See local AHJ 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. Fusible Link Combination Damper

- a. 
  □ Open smoke detector or relay wire or contact to cut power. Damper springs closed.
- b. □ Reconnect power. *Damper drives open.*
- c. D Unhook fusible link. Replace if broken. PROTECH HANDS. Damper springs closed.
- d.  $\Box$  Reopen damper and rehook fusible link.
- e. 
  □ Repeat steps a. and b. Damper drives open.

#### 2. Reopenable Two Sensor Fire-Smoke Combination Damper

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

The sequence will be similar to that described below. After the above test perform the tests below.

#### 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. D 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.  $\Box$  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 I	lentifying Numbers	
		•••

Date
Contractor
Service Technician (Print)
Service Technician (Signed)
Phone Number ()
lotes