



3Nm Fire and Smoke 250°F Series Spring Return Direct Coupled Actuators

MS4103F, MS8103F

INSTALLATION INSTRUCTIONS

APPLICATION

MS4103F, MS8103F Spring Return Direct Coupled Actuators (DCA) are used within Fire/Smoke damper control applications. The actuator accepts an on/off signal from a single-pole, single-throw (spst) controller. Reversible mounting allows actuator to be used for either clockwise (cw) or counterclockwise (ccw) spring return and are designed to operate reliably in smoke control systems requiring Underwriter's Laboratories Inc. UL555S ratings up to 250°F.

FEATURES

- 27 lb-in (3 Nm) minimum driving torque
- Spring return timing < 25 s
- Optimized drive time < 45 s. No audible noise during holding
- Models available for 24V, 120/230 VAC.
- 95° angle of rotation
- Actuator holds rated torque at reduced power level

- Operating temperature from 14°F to 150°F (-10°C to 65°C) at 95% RH
- Housing design allows flush mounting to damper
- Models available with SPST position-indicating switches (10°, 80° stroke)
- Quarter-turn rotary valves, such as ball valves mounted directly to the drive shaft
- Available with cable on all models
- 1/2" 360° Conduit connection with thread

SPECIFICATIONS

Models:

See Table 1.

Device Weight:

1.7 lbs (0.78 kg)

Ambient Operating Temperature:

14°F to 150°F (-10°C to 65°C)

Shipping and Storage Temperature:

-40°F to 150°F (-40°C to 65°C)



38-00087EFRTA-01

Table 1. Models.

Model Number	Control Input / Output Description	SPST Aux Switches	1/2" 360° Conduit	Shaft Adapter	Torque	Supply Voltage	Driving/Holding (VA)	Drive (sec)
MS8103F1021	2-Position	No End Switches	Threaded	SCSA	3 Nm (27 in-lb)	24 VAC	6/3	<45s at operating temperature range
MS8103F1023			Clip-In	U-Bolt				
MS8103F1025			Clip-In	SCSA				
MS8103F1026				U-Bolt				
MS8103F1221		2 End Switches	Threaded	SCSA				
MS8103F1223			Clip-In	U-Bolt				
MS8103F1225			Clip-In	SCSA				
MS8103F1226				U-Bolt				
MS4103F1021		No End Switches	No End Switches	Threaded	SCSA	100-250 VAC	6/5	
MS4103F1023				Clip-In	U-Bolt			
MS4103F1025				Clip-In	SCSA			
MS4103F1026					U-Bolt			
MS4103F1221			2 End Switches	Threaded	SCSA			
MS4103F1223				Clip-In	U-Bolt			
MS4103F1225				Clip-In	SCSA			
MS4103F1226					U-Bolt			

Humidity Ratings:

5% to 95% R.H., Non-Condensing

Auxiliary Switches (Two SPST):

Fixed switches on 10 and 80 degrees
125 VAC, 1A, res. load

Mounting:

Self-Centering Shaft Adapter (shaft coupling):

Round Damper Shafts: 3/8 to 5/8 in. (9 to 16 mm)
Square Damper Shafts: 1/4 to 1/2 in. (6 to 13 mm)
Nominal tightening torque for self-centering shaft adapter screw is 106 lb-in (12 Nm)

Environmental Data as per UL 60730:

Purpose of Control	Operating Control
Action Type	1
Pollution Degree	3
Impulse Voltage	330 V for Class 2 (SELV) models MS8103F 2500 V for Line voltage models MS4103F

Non Self-Centering Shaft Adapter:

Round Damper Shafts: 1/4 to 3/4 in. (6 to 19 mm)
Square Damper Shafts: 1/4 to 1/2 in. (6 to 13 mm)
Nominal tightening torque for non self-centering shaft adapter screws is 62 lb-in (7 Nm)

Minimum Damper Shaft Length for Self-Centering Shaft Adapter:

3.25 in. (83 mm) recommended

Minimum Damper Shaft Length for Non Self -Centering Shaft Adapter:

3 in. (75 mm)

Spring Return Timing (at rated load and operating temperature range):

< 25 seconds

Cable Specification:

Low-Voltage Power Cable: Plenum rated, 3 ft (0.914 m) length from end of access cover, 18 AWG
Line-Voltage Power Cable: Flammability rating UL VW1, 3 ft (0.914 m) length from end of access cover, 18 AWG
Switch Cable: Appliance Rated, 3 ft (0.914 m) length from end of access cover, 18 AWG

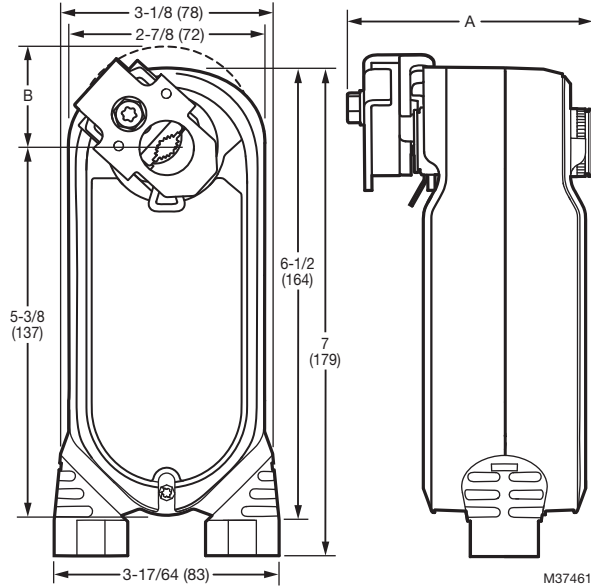


Fig. 1. Dimensional drawing of actuator in in. (mm). See Table 2 for A and B dimensions.

Table 2. Shaft Adapters.

Type of Shaft Adapter	A	B
Self-Centering Adapter	3.54 in. (90 mm)	1.54 in. (39 mm)
Non Self-Centering Adapter	3.11 in. (79 mm)	1.57 in. ¹ (40 mm)

¹ For 1/2 shaft.

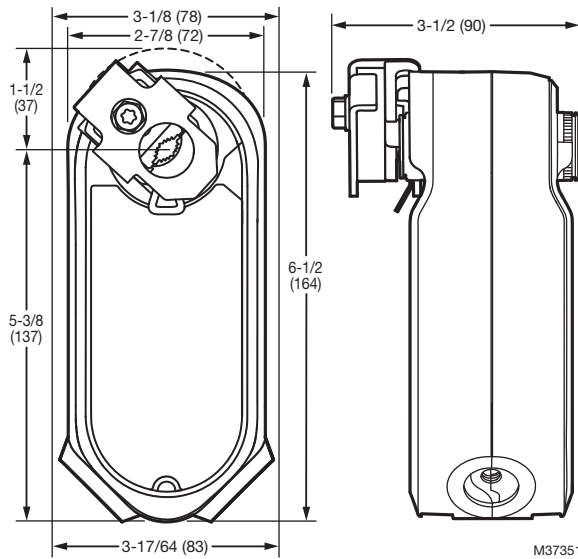


Fig. 2. Dimensional drawing of actuator without conduit in in. (mm).

Cycling Requirements:

The actuator and the internal spring are designed to require no special cycling during long-term holding. Honeywell recommends following all local, state and national codes for periodic testing of the entire smoke control system. Refer to National Fire Protection Association (NFPA) National Fire Codes®: NFPA90A, NFPA92A and NFPA92B for your application. NFPA recommends periodic examination of each fire/smoke damper (semi-annually or annually) to ensure proper performance.

Stroke:

95° ±3°, mechanically limited.

Approvals:

UL60730
IEC 60730-1 and Part 2-14
UL555S Temperature Degradation Test, Long Term Holding test

Waste Electrical and Electronic Equipment (WEEE):



Correct disposal of this product (applicable in the European Union and other European countries with separate collection systems). This product should be disposed of, at the end of its useful life, as per applicable local laws, regulations, and procedures.

Enclosure Ratings:

IP54, depends on position according to “Determine Appropriate Mounting Orientation” on page 4.
NEMA 2
Flame Resistance UL94-5VA
UL2043, switch wiring dependent on conduit installation

Noise Rating (Typical):

Driving Open: < 50 dB(A)
Spring Return: < 57 dB(A)
Holding: No audible noise

Accessories:

Wall Mount Kit
Crank Arm Kit
Self-Centering Shaft Adapter
Anti-Rotation Bracket
Non Self-Centering Shaft Adapter

TYPICAL SPECIFICATION

Spring return actuators shall be direct coupled type requiring neither crankarm nor linkage and be capable of direct mounting to a jackshaft of up to 3/4 in. diameter. The actuator shall connect to the shaft using a removable output hub with a self-centering shaft coupling. This coupling shall provide concentric mounting and include an integral adjustable range-stop mechanism.

All spring return actuators must be designed for either clockwise or counterclockwise fail-safe operation with a continuously engaged mechanical spring. This spring must return the valve or actuator to a fail-safe position within 25 seconds of power loss.

All actuators shall be designed for a minimum of 30,000 full-stroke cycles at rated torque and temperature, 30,000 spring return cycles. Run time shall be constant and independent of: load, temperature (operating temperature range), and supply voltage (within specifications). All actuators shall be UL60730 and cUL (CSA22.2) listed, have a five year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Honeywell.

IMPORTANT

The Actuator is designed to meet UL555S standard at 250°F (121°C) on applicable marked models. The actuator must be tested with the damper to achieve this rating.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation.

CAUTION

Electrical Shock or Equipment Damage Hazard.
Low voltage can shock individuals or short equipment circuitry.

Disconnect power supply before installation.

IMPORTANT

All wiring must comply with applicable codes, ordinances and regulations.

Location

These actuators are designed to mount directly to a damper external drive shaft. The shaft coupling fastens to the drive shaft. The actuator housing includes slots which, along with an anti-rotation bracket, secure the actuator to the damper frame or duct work (see Fig. 8).

NOTES:

- When mounted correctly, these slots allow the actuator to *float* without rotating relative to the damper shaft.
- Using other brackets or linkages, the actuator can be foot-mounted or tandem-mounted.



CAUTION

Motor Damage Hazard.

Corrosive vapors and acid fumes can damage metal and plastic parts.

Install motor in areas free of acid fumes and other deteriorating vapors.



CAUTION

Equipment Damage Hazard.

Tightly securing actuator to damper housing can damage actuator.

Mount actuator to allow it to float along its vertical axis.

Preparation

Before mounting the actuator onto the damper shaft, determine the:

- Damper/valve opening direction for correct spring return rotation. The actuator can be mounted to provide clockwise or counterclockwise spring return by flipping or turning the unit over.
- Damper shaft size (see the Specifications section).

Determine Appropriate Mounting Orientation

The actuators are designed to open a damper by driving the damper shaft in either a clockwise ↻ or counterclockwise ↺ direction (see Fig. 3).

NOTES:

- Actuators are shipped in the fully closed (spring return) position.
- The groove on the adapter points to a location on the label to indicate the hub rotary position.

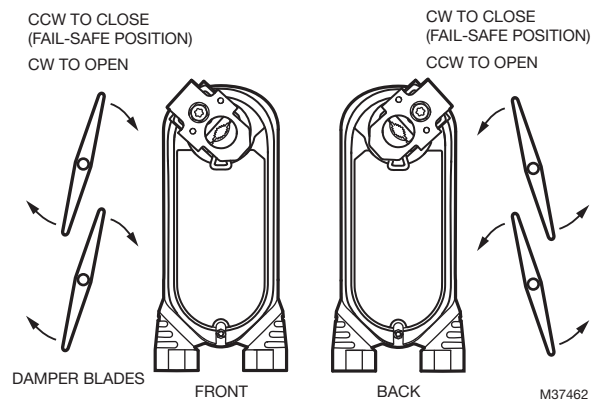


Fig. 3. Spring Return DCA mounting orientation.

Measure Damper/Valve Shaft Length

If the shaft is less than 3.25 in. long for SCSA, the shaft coupling must be located between the damper/valve and actuator housing. If the shaft length is more than three inches, the shaft coupling may be located on either side of the actuator housing.

If the coupling must be moved from one side of the actuator to the other, reverse the spring return direction and flip the actuator. Follow these instructions (see Fig. 4):

1. Remove the retainer clip from the shaft coupling and set it aside for later use.
2. Remove shaft coupling from one side of the actuator.
3. Replace the shaft coupling on the opposite side of the actuator aligning it based on the stroke labeling.
4. Replace the retainer clip on the shaft coupling using the groove of the coupling.

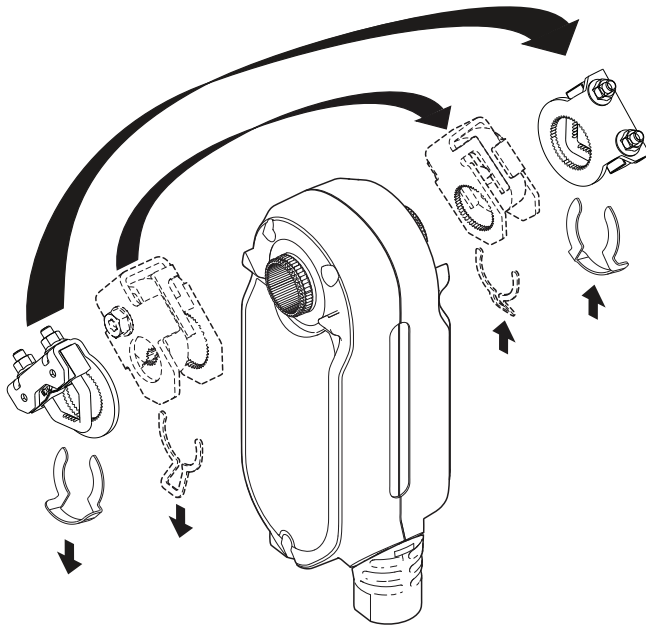


Fig. 4. Mounting shaft coupling to actuator opposite side.

Non-Standard Stroke

Mechanical Stroke Limit Reduction

For applications requiring a span less than 95 degrees, a simple adjustment can be made. When the rotational mounting of the shaft coupling is changed, the actuator drives less than the full 95 degree stroke.

The stroke is adjustable in 7.5 degree increments. Once adjusted, the actuator drives until the shaft coupling reaches the mechanical stop (part of the housing). The stop causes the motor to discontinue driving and the shaft coupling drives no farther. When the actuator returns, it stops at the fail-safe position.

To limit the stroke range, proceed as follows:

1. Remove the retainer clip from the shaft coupling and set it aside for later use.
2. Remove shaft coupling from the actuator.

3. Rotate the coupling to the desired position, aligning it based on the stroke labeling. See Fig. 5.

NOTE: The shaft coupling location determines the travel span.

EXAMPLE: Setting shaft coupling to an approximate fail-safe position of 30 degrees (as indicated on the housing) limits stroke to 60 degrees. (See Fig. 5.)

4. Install the shaft coupling at this position.
5. Replace the retainer clip on the shaft coupling using the groove of the coupling.

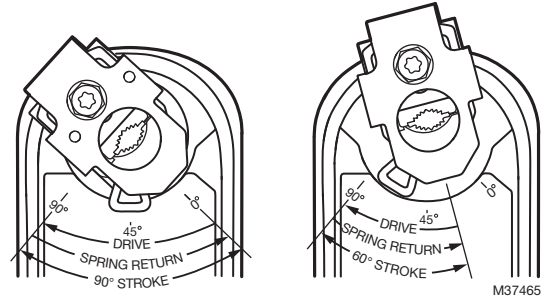


Fig. 5. Stroke reduction.

Mounting



CAUTION

Device Malfunction Hazard.
Improper shaft coupling tightening causes device malfunction.

Tighten shaft coupling with proper torque to prevent damper shaft slippage.



CAUTION

Actuator Damage Hazard.
Using actuator as shaft bearing causes device damage.

Use actuator only to supply rotational torque. Avoid any side loads to actuator output coupling bearings.



CAUTION

Equipment Damage Hazard.
Can damage the motor beyond repair.

Never turn the motor shaft by hand or with a wrench.

Forcibly turning the motor shaft can damage the gear train.

To mount the actuator to an external drive shaft of a damper, proceed as follows:

1. Place actuator over damper shaft; and hold mounting bracket in place. See Fig. 8.
2. Mark screw holes on damper housing.
3. Remove actuator and mounting bracket.
4. Drill or center-punch holes for mounting screws (or use no.10 self-tapping sheet metal screws).

5. Turn damper blades to desired normal (closed) position.
6. Place actuator and mounting bracket back into position and secure bracket to damper box with sheet metal screws.
7. Using 10 mm wrench, tighten shaft coupling securely onto damper shaft using maximum 106 lb-in. (12 Nm) torque.

NOTE: See Fig. 6 for proper mounting to a square damper shaft.

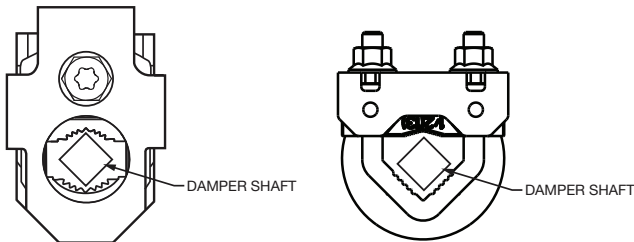


Fig. 6. Proper mounting to square damper shaft.

To achieve ingress protection rating IP54, the actuator needs to be mounted according to Fig. 7. IP54 applies for all mounting positions except with cable-up position (crossed out) Fig. 7.

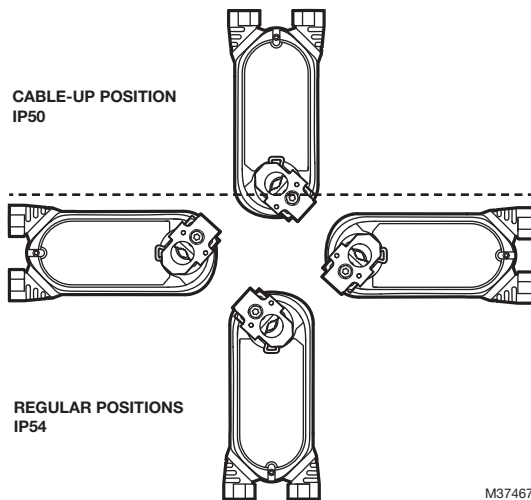
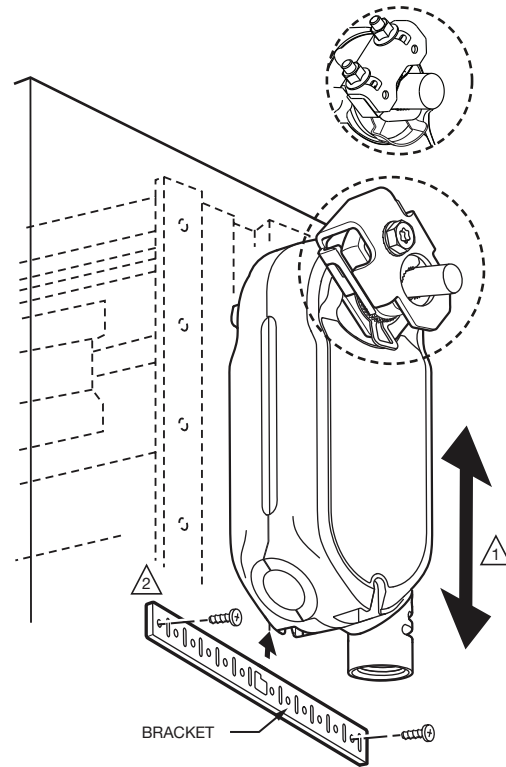


Fig. 7. Mounting actuator for IP compliance.

Detail with U-Bolt



- 1 ENSURE THAT MOUNTING ASSEMBLY PREVENTS ACTUATOR ROTATION AND ALLOWS ACTUATOR TO FLOAT ALONG INDICATED AXIS. WHEN TOO TIGHT, THE RESULTING BINDING CAN DAMAGE THE ACTUATOR OR REDUCE TORQUE OUTPUT.
- 2 THE BRACKET CAN BE BENT TO ALLOW MOUNTING THE ACTUATOR PARALLEL TO THE MOUNTING SURFACE.

Fig. 8. Mounting actuator to damper housing.

WIRING



CAUTION

Electrical Shock or Equipment Damage Hazard.
Disconnect all power supplies before installation.
 Motors with auxiliary switches can have more than one disconnect.

IMPORTANT

All wiring must comply with local electrical codes, ordinances and regulations. Device is protected against electrical shock per IEC60730 Class II and uses Impedance protected motor. Use flexible conduit only or equivalent to protect all wiring.

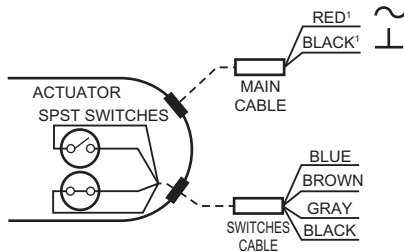


Fig. 9. Cable installation details.

¹ See Table 3.

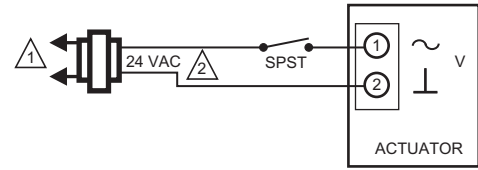
Switch operation

Gray/Black = Normally Open. Closed in range 80 degrees to Fully Open.

Blue/Brown = Normally Closed. Open in range 10 degrees to Fully Open.

Table 3. Wiring Details.

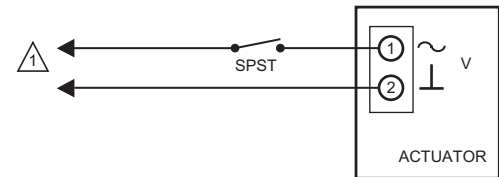
Model	Detail	Wiring
Low-Voltage	24V Hot	Red
Low-Voltage	24V Common	Black
Line-Voltage	Hot	Black
Line-Voltage	Common	White



¹ LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

² 24 VDC SUPPLY ACCEPTABLE

Fig. 10. Wiring for low-voltage.



¹ LINE VOLTAGE POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. USE SLOW BLOW 315 mA/250 VAC FUSE.

Fig. 11. Wiring for line-voltage.

Auxiliary Switches

Some models include Auxiliary Switches. For wiring details see Fig. 9.

CHECKOUT

Drive Open / Spring Return Operation

1. Mount actuator for required application (either clockwise ↻ or counterclockwise ↻ rotation to open the damper).
2. Connect power to power and common wire. (See Fig. 9 and Table 3.)
3. Actuator drives to full open position.
4. Disconnect power.
5. Actuator spring returns to Fully closed position.

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