

APPLICATION AND USE

Spring return rotary actuators MX41-7 have a rotary output for direct coupling to air dampers. Models are available for on/off operation from 230Vac or 24Vac power supplies and 24Vac floating point control.

- Direct coupling to all normal dampers without mounting brackets or linkage kits - saves site time;
- Universal clamp provides direct mounting to dampers shafts up to 19mm diameters up to 13mm square;
- Case IP 54;
- Clockwise and counterclockwise rotation available, determined by Left or Right hand mounting;
- Spring tensions whilst the damper is being operated;
- Positive spring return operation, for example under power failure;
- Provides 95° of rotation; rotation limiting available;
- Visual position indicator;
- Optional built-in auxiliary switches to provide for interfacing or switching;
- Cable gland and Blanking plugs supplied fitted;
- MS4x-7xxx series provided with Left/Right switch for selection of direct or reverse action control mode.



Model	MA40-7041-G00	MA40-7041-G01	MA40-7043-G00	MA40-7043-G01	MF40-7043-G00	MF40-7043-G01	MS40-7043-G00	MS40-7043-G01
Power supply	230Vac ±10%		24Vac ± 20%		24Vac ± 20%		24Vac ± 20%	
Voltage	230Vac ±10%		24Vac ± 20%		24Vac ± 20%		24Vac ± 20%	
VA (60Hz)	6.0		4.9		8.1		7.8	
VA (50Hz)	8.3		5.0		8.7		8.1	
Watt (running)	5.4		4.0		4.0		3.5	
Watt (holding)	2.6		2.2		2.2		1.5	
Electrical connection	0,9m cable							
Auxiliary switch	-	1 SPDT 6A (1.5A) @ 230Vac, UL listed, adjustable 0 to 95° (0 to 1 scale)	-	One S PDT 6A (1.5A) @ 24Vac, UL listed, adjustable 0 to 95° (0 to 1 scale).	-	One SPDT 6A (1.5A) @ 24Vac, UL listed, adjustable 0 to 95° (0 to 1 scale).	-	One SPDT 6A (1.5A) @ 24Vac, UL listed, adjustable 0 to 95° (0 to 1 scale).
Input control signal	ON/OFF, spring return. SPST control contacts or Triacs				24Vac		2×10Vcc @ 80kΩ or 4×20mAcc @ 500Ω	
Action	Open/Close with single pole contact control.				Floating Point Control.		Proportional Modulation Control.	
Feedback position	MS40-7043: 2 to 10Vdc (max. 0.7mA) output signal for position feedback or to operate slave actuators.							
Torque	4Nm (minimum)							
Direction of rotation	Clockwise or Counterclockwise rotation, determined by Left/Right Hand mounting.							
Angular stroke	95° ± 5° max. Adjustable (see end of stroke limits).							
end of stroke limits	Stroke limiting device. Stop block adjuster used to limit angle of rotation from 40° to 95°							
Damper shaft clamp	Universal mounting clamp used for shafts up to 15mm diameter, 13mm ²							
Nominal damper area	Up to 0,74m ² based on 0.042 Nm per m ² of damper area (but see damper manufacturer's specifications)							
Position indicator	Visual Indicator 0 to 1 (0 is spring return position).							
Running time (21°C)								
motor operation	<50s				<130s			
spring return	<26s				<25s			
Temperature								
storage	-40T70°C							
operating	-30T50°C							
Humidity	15±95% R.H. non-condensing							
Protection class	IP54							
Angcey listings	UL873 (E9429) - CUL Canadian Standards (C22.2 No. 24-93) European Community: EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).							
Application	Two-position control from a thermostat, time switch or other switching device having a mains rated change-over contact.		Two-position control from a thermostat, time switch or other switching device having a 24V rated change-over contact.		Floating Point Control.		Modulating control from any controller providing a 2-10Vdc	

ACCESSORIES

AM-703 Input Rescaling Module, adjusts signals to 2-10Vdc, zero and span adjustment.

AM-705 Positioner

AM-706 Min and/or Manual Positioner for flush panel mount.

AM-710 Universal clamp for shaft from 16 up to 19mm

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OPERATION

Warning - This are spring return actuators. Keep clear of all moving parts at all times.

The direction of operation of the spring return function and motor operation of all models is determined by left hand or right hand mounting onto the damper.

All actuators are directly mounted onto the damper shaft using a universal mounting clamp and provide true mechanical spring return operation for reliable, positive close-off on air tight dampers. When power is applied, the actuator moves to its powered position, at the same time tensing the spring return safety mechanism. When the power is removed, the spring returns the actuator to its normal position.

The spring return system provides consistent torque to the damper with, and without, power applied to the actuator. All actuators provide 95° of rotation and are equipped with a graduated position indicator showing 0 to 1.

Some models are provided with two built-in auxiliary switches. The SPDT switches are provided for interfacing or signalling, for example, fan start-up. The switching function is adjustable between 0° to 95° rotation (0 to 1 scale).

INSTALLATION AND MOUNTING

The actuator is fitted directly to the damper and the clamp tightened securely to the damper shaft. A universal anti-rotation bar is supplied with each actuator and must be fitted to prevent rotation during operation.

A stroke limiting device (stop block) is used to limit the stroke between 40 and 95°.

General precautions

MA40-7041 series at mains voltage and therefore present a possible electrical shock hazard. Disconnect the power supply before and during installation to prevent electric shock and equipment damage. Observe local wiring regulations and earthing requirements. If auxiliary switches are fitted and used at mains voltage, observe local wiring regulations, earthing requirements and all usual electric shock safety precautions. Where screening is required, use either screened cable or MICC. Use an isolator with a minimum contact gap of 3mm (conforming to EN 60335-1) to isolate the MA40-7041 series actuators from the mains supply.

MA41-7043, MF41-7043 and MS40-7043 Series actuators must be connected to 24Vac via a safety transformer conforming to EN 60742.

MX40-7043 series actuators are not recommended for applications needing multiple actuators mounted on a common shaft. Avoid electrical noise interference. Do not install near large contactors, electrical machinery, or welding equipment.

For applications requiring flexible metal conduit, use reduced (thin) wall types only.

Do not exceed ratings of the device(s).

Certifications

Federal Communications Commission (FCC)

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy and may cause harmful interference if not installed and used in accordance with the instructions. Even when instructions are followed, there is no guarantee that interference will not occur in a particular situation—which can be determined by turning the equipment off and on—the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Canadian Department of Communications (DOC)

Note: This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

European Standard EN 55022. This is a Class B digital (European Classification) product.

Location

Avoid locations where excessive moisture, corrosive fumes, vibration, or explosive vapours are present.

The actuator should only be mounted directly on the damper shaft in locations that clear the maximum dimensions of the actuator case and allow the actuator to be mounted flush to the surface of the terminal box and perpendicular to the damper shaft.

Note: Some terminal boxes have sheet metal screw heads or other protrusions near the damper shaft. In these cases, a spacer or shim may be added under the anti-rotation bracket of the actuator to make the actuator perpendicular to the shaft.

Before mounting the actuator, determine the direction of rotation and take into account the length of the damper shaft. These are covered in the following section.

Mounting

The zero (0) position on the position indicator is the normal or spring return position. When the actuator is mounted with the 'R' side facing the installer and the control system initiates actuator movement (either by applying the appropriate voltage, increasing the control signal or by driving the actuator open, as appropriate), the actuator will rotate in the counterclockwise direction. Similarly, when the actuator is mounted with the 'L' side facing the installer and the control system calls for actuator movement, the actuator will rotate in the clockwise direction.

1. Move the damper to its normal position. Check that the controller action is set to match the damper application, as follows:
 - For normally closed damper - when damper is closed, actuator position indicator should be approximately 0°. When damper is open, the actuator position indicator should be approximately 90°.
 - For normally opened damper - when damper is open, actuator position indicator should be approximately 0°. When damper is closed, the actuator position indicator should be approximately 90°.

Note: The actuator is usually shipped with the universal mounting clamp mounted to the 'L' side of the actuator.

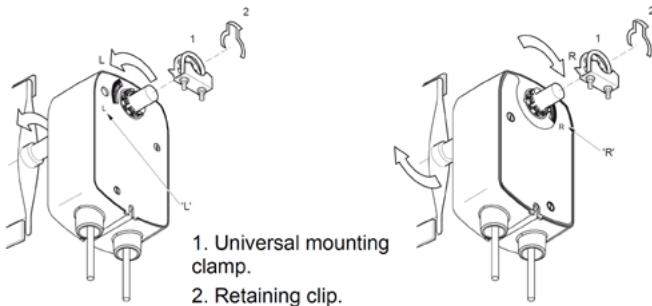
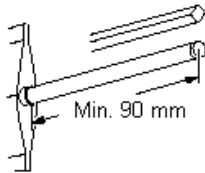
2. Determine the direction of rotation required by the damper application and ensure that the clamp is on the correct side; if the clamp is not on the correct side, remount it as follows:
 - Find the letters 'R' and 'L' on opposite tabs on the clamp.
 - If mounting the actuator with the 'L' side out, position the clamp so that the pointer section of the tab with the 'L' is positioned at 0 and the spline pattern of the clamp mates with the spline of the actuator. Slip the clamp over the spline.
 - If mounting the actuator with the 'R' side out, use the same procedure as for the 'L' side out, but use the 'R' tab instead of the 'L' tab.

- Test for adequate shaft length by sliding the actuator over the shaft. The shaft should extend at least 3mm through the clamp. Long shafts should be at least 90mm, in which case the clamp should be fitted on the installer's side of the actuator, and short shafts should be at least 20mm, in which case the clamp should be fitted to the damper side of the actuator.

Note: All actuators are shipped with a standard universal mounting clamp installed. For damper shafts larger than 16mm in diameter, the AM-710 universal mounting clamp is required (order separately). The AM-710 clamp accommodates round shaft sizes up to 19mm in diameter

- On the basis of the shaft length proceed as follows.

Long Damper Shaft Mounting



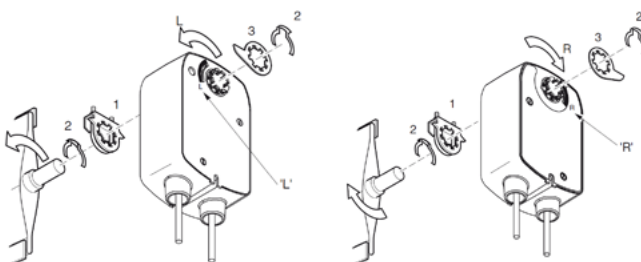
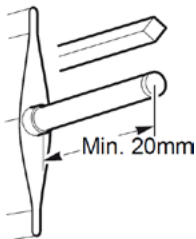
- Universal mounting clamp.
- Retaining clip.

Clockwise motor drive
Counterclockwise spring return

Counterclockwise motor drive
Clockwise spring return

- Secure the universal mounting clamp to the actuator using the retaining clip.
- Position the damper at its normal (spring return) position and check that it is fully closed or completely open.
- Continue from Step 5.

Short Damper Shaft Mounting

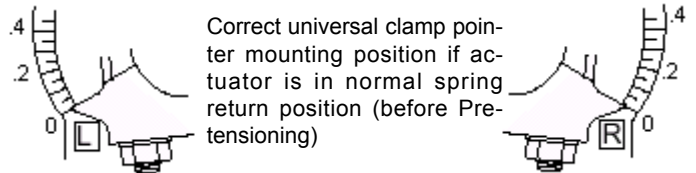


- Universal mounting clamp.
- Retaining clip.
- Damper position indicator

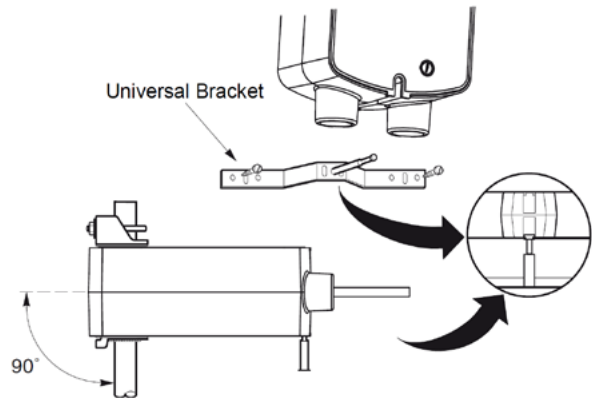
- Determine the best orientation for the universal mounting clamp on the back of the actuator. The best orientation provides the easiest access to the two nuts on the V-clamp.
- Engage the clamp to the actuator as close as possible to the determined orientation, then lock the clamp in place using the remaining retainer clip.
- Place position indicator on the actuator and secure with the retainer clip. Ensure that the position indicator is at the before Pre-tensioning position (see following illustration).
- Position the damper at its normal (spring return) position and check that it is fully closed or completely open.

Position Indication and Pre-tensioning

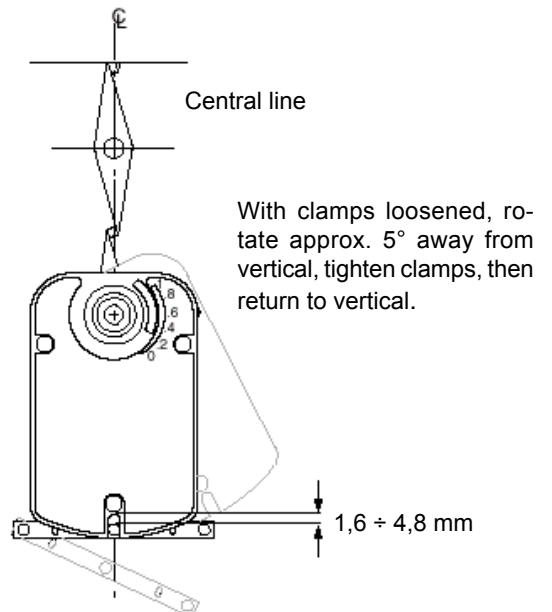
- Slide the actuator over the shaft and verify that the position indication pointer on the universal mounting clamp is in the normal spring return position.



- Tighten the universal mounting clamp, finger tight only.
- Align the universal bracket at the base of the actuator and drill mounting holes. Bend the bracket as needed to reach the duct.

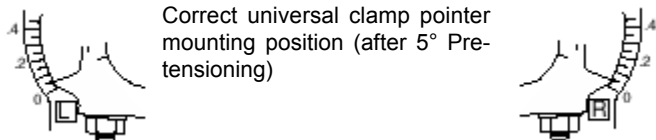


- Place a No.8 self-tapping screw in one side of the universal bracket and mount it to the duct at the base of the actuator. Do not tighten the screw.
- Pivot the universal bracket away from the actuator.



With clamps loosened, rotate approx. 5° away from vertical, tighten clamps, then return to vertical.

10. Loosen the universal mounting clamp (making sure not to move the damper shaft) and rotate the actuator approximately 5° in the direction which would open the damper.
11. Tighten the universal mounting clamp to the shaft, ensuring that it is in the correct mounting position.
12. Manually rotate the actuator to align with universal bracket.
13. Pivot the universal bracket into place and secure both sides.
14. Tighten all fasteners. Tighten the two nuts on the clamp using a 7/16" spanner or socket and apply 8.2 to 10.8 Nm of torque.
15. Check that the universal mounting clamp (or AM-709) pointer mounting position is at 5°.



Jackshaft Installation (MA40-704X, MF40-7043, MS40-7043Series)

The MA40-704X, MF40-7043 and MS40-7043 series actuators are designed for use with jackshafts up to 16mm in diameter. In most applications, the actuator may be mounted in the same manner as a standard damper shaft application. If the jackshaft diameter is larger than 16mm in diameter, the optional AM-710 universal clamp must be used.

Adjusting an Auxiliary Switch (where fitted)

The MA40-704X-G01, MF40-7043-G01 and MS40-7043-G01 actuators include one built-in SPDT auxiliary switch which can be used for interfacing or signalling (e.g., for fan start-up). The switch is adjustable between 0° and 95° of rotation (0 to 1 scale). To make an adjustment:

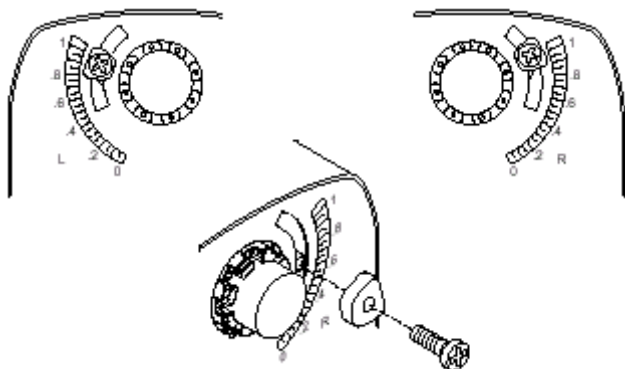
1. The actuator must be in its normal (spring return) position.
2. Use a flat screw driver to rotate the switch pointer until it is at the desired switch position on the 0 to 1 scale.

Rotation Limitation

The Stop Block is used in conjunction with the tab on the universal clamp or the AM 709 position indicator. In order to function properly, the clamp or indicator must be mounted correctly.

The Stop Block is used in applications where a damper has a designed rotation that is less than 90°, for example with a 45° or 60° rotating damper.

1. Determine the amount of damper rotation required. The actuator stop block provides limited rotation from 40° to 95.
2. Loosen the screw securing the stop block to the actuator. Note: The actuator is shipped with the Stop Block mounted to the 'L' side. If the damper application requires the 'R' side face the installer, simply remove the Stop Block and screw and move it to the new location.



Adjusting Stop Block for Limited Rotation

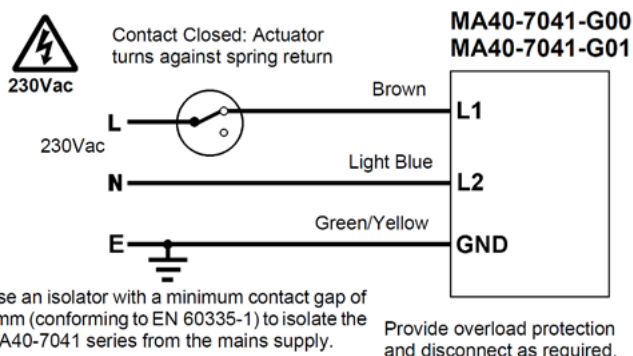
WIRING DIAGRAMS

Class 2 control and power lead wiring must be routed separately from line voltage wiring and any other non-class 2 circuits. Line voltage, auxiliary switch and auxiliary switch leads must be connected to a Class 1 circuit.

WARNING - these are spring return acutators. Keep clear of all moving parts when power is removed. Only switch off power if spring return is required.

Model	Series	Max cable length (m)		
		14 AWG	16 AWG	18 AWG
24Vac	MA40-7043-G00	335	213	134
	MA40-7043-G01			
24Vac	MF40-7043-G00	183	122	76
	MF40-7043-G01			
24Vac	MS40-7043-G00	213	131	82
	MS40-7043-G01			
24Vac	MA40-7041-G00	11,278	7,163	4,511
	MA40-7041-G01			

TWO POSITION CONTROL - 230V



TWO POSITION CONTROL - 24V

