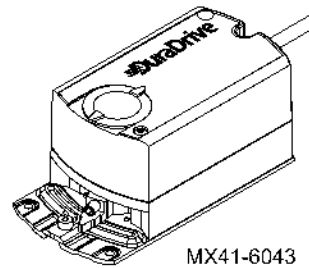
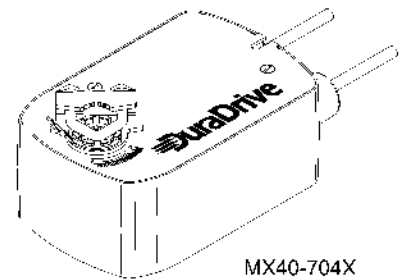


Selection Guide

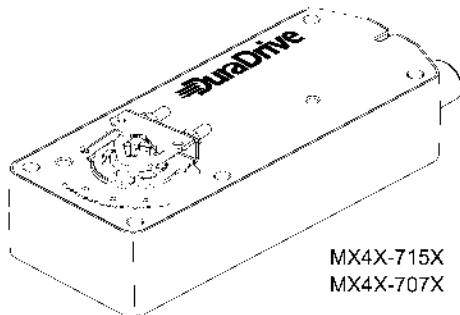
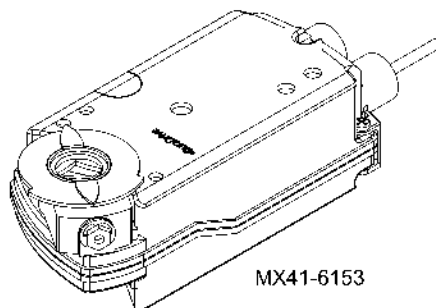
Applications

DuraDrive Direct Coupled Actuators are designed to accept two-position, floating, or proportional control from a DDC system or from a thermostat, for control of HVAC applications. The actuators are designed to be used in both damper and valve control applications. Typical applications include air handling units, unit ventilators, fan coil units, VAV terminals, control dampers, inlet guide vanes, and linked valve assemblies.

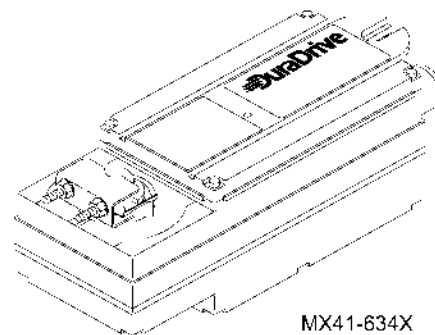
Use the following guide to select actuators for damper applications. Refer to the Applicable Literature table for valve literature.

MX41-6043
MX41-6083

MX40-704X

MX4X-715X
MX4X-707X

MX41-6153

MX41-634X
MX40-717X

Applicable Literature

F-Number	Description	Audience	Purpose
F-27211	MF41-6043/MS41-6043 Series, MF41-6083/ MS41-6083 Series Non-Spring Return Direct Coupled Actuator Installation Instructions	<ul style="list-style-type: none"> - Sales Personnel - Application Engineers - Installers - Service Personnel - Start-up Technicians 	<p>Describes the actuator's features, specifications, and possible applications. Provides step-by-step mounting instructions.</p>
F-27212	MF41-6153, MS41-6153 Non-Spring Return Direct Coupled Actuator Installation Instructions		
F-27213	MF41-6043/MF41-6083 Series Non-Spring Return Rotary 24 Vac Three-Position Control Electronic Damper Actuators General Instructions		
F-27214	MS41-6043/MS41-6083 Series Non-Spring Return Rotary 24 Vac Modulating Control 0 to 10 Vdc Electronic Damper Actuators General Instructions		
F-27215	MF41-6153/MS41-6153 Series Non-Spring Return Rotary Electronic Damper Actuators General Instructions		
F-26744	MF41-6343 DuraDrive Series Non-Spring Return Direct Coupled Actuator General Instructions		
F-26745	MS41-634X DuraDrive Series Non-Spring Return Direct Coupled Actuator General Instructions		
F-26742	MA40-717X DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26748	MS40-717X DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26749	MF40-7173 DuraDrive Series Spring Return Direct Coupled Actuator General instructions		
F-26644	MF4X-7XX3, MF4X-7XX3-50X DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26642	MA4X-7XX3, MA4X-7XX3-50X, MA4X-7XXX, MA4X-7XXX-50X DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-26645	MS4X-7XX3, MS4X-7XX3-50X DuraDrive Series Spring Return Direct Coupled Actuator General Instructions		
F-27160	MX4X-6XXX-220/-230 and MX4X-7XXX-220 Actuator/Linkage Assemblies for 2-1/2" to 6" Globe Valves General Instructions		
F-26750	MA4X-XXXX-2XX, MF4X-XXXX-2XX, MS4X-XXXX-2XX Series Actuator/Linkage Assemblies for 1/2" to 2" Globe Valves General Instructions	<p>Describes the globe valve actuator/linkage assembly's features, specifications, and possible applications. Provides step-by-step mounting instructions.</p>	
F-27087	VX-2X13-5XX-9-XX Series, VB-2X13-500-9-XX Series DuraLynx Ball Valve Assemblies and Ball Valve Body/Linkage Assemblies Installation Instructions	<p>Describes the actuator/linkage/ball valve assemblies' features, specifications, and possible applications. Provides step-by-step mounting instructions.</p>	
F-26752	VX-7000 and VX-9000 Series, MX4X-6XXX and MX4X-7XXX Series, Linked Globe Valve Assemblies and Actuator/Linkage Assemblies with DuraDrive Actuators Selection Guide	<p>Provides features, specifications, mounting dimensions, and other criteria useful to the selection of linked globe valve assemblies and actuator/linkage assemblies with DuraDrive actuators.</p>	
F-27086	VX-2X13-5XX-9-XX Series DuraLynx Ball Valve Assemblies and VB-2X13-500-9-XX Series Ball Valve Body/Linkage Assemblies Selection Guide.	<p>Provides features, specifications, mounting dimensions, and other criteria useful to the selection of linked ball valve assemblies with DuraDrive actuators.</p>	
F-27216	MF41/MS41-6043 Series 24 Vac, 35 lb-in. Non-Spring Return, Direct-Coupled Electronic Damper Actuators Submittal Sheet	<ul style="list-style-type: none"> - Sales Personnel - Application Engineers 	<p>Describes features and specifications of the MX41-6043 series actuators.</p>
F-27217	MF41/MS41-6083 Series 24 Vac, 70 lb-in., Non-Spring Return Direct-Coupled Electronic Damper Actuators Submittal Sheet	<ul style="list-style-type: none"> - Sales Personnel - Application Engineers 	<p>Describes features and specifications of the MX41-6083 series actuators.</p>

F-Number	Description	Audience	Purpose
F-27218	MF41/MS41-6153 Series, 24 Vac, 133 lb-in., Non-Spring Return, Direct-Coupled Electronic Damper Actuators Submittal Sheet	<ul style="list-style-type: none"> - Sales Personnel - Application Engineers 	Describes features and specifications of the MX41-6153 series actuators.
F-26785	VX-2000, VX-7000, VB-2000, MX4X-7XXX, and MX40-6XXX Series Ball and Globe Linked Valve Assemblies, Valve/Linkage Assemblies, and Actuator/Linkage Assemblies Cross-Reference Guide	<ul style="list-style-type: none"> - Sales Personnel - Application Engineers 	Provides part number cross referencing of phased-out devices with the new Invensys Building Systems Actuator/Linkage Assemblies, and Ball and Globe Linked Valve Assemblies.
F-11080	Valve Selection Chart Water	<ul style="list-style-type: none"> - Application Engineers - Installers - Service Personnel - Start-up Technicians 	Provides charts, equations, and diagrams to assist in the configuration of valve system applications. TOOL-150, valve sizing slide rule may be purchased separately.
F-11366	Valve Selection Chart Steam (two-way valves only)		
F-13755	CA-28 Control Valve Sizing		
F-26080	EN-205 Water System Guidelines		
			Describes Invensys Building Systems approved water treatment practices.

Product Warranty

DuraDrive actuators are covered by a five year warranty.

Using this Selection Guide

This selection guide contains the following sections:

Actuator Part Numbering System

This section explains the DuraDrive actuator part numbering system.

Actuator Selection Chart

Use this chart as a quick reference guide. Refer to Actuator Selection section for specifications data, as well as mounting dimensions.

Actuator Accessories Chart

Use this section to choose the appropriate accessories for the selected actuator.

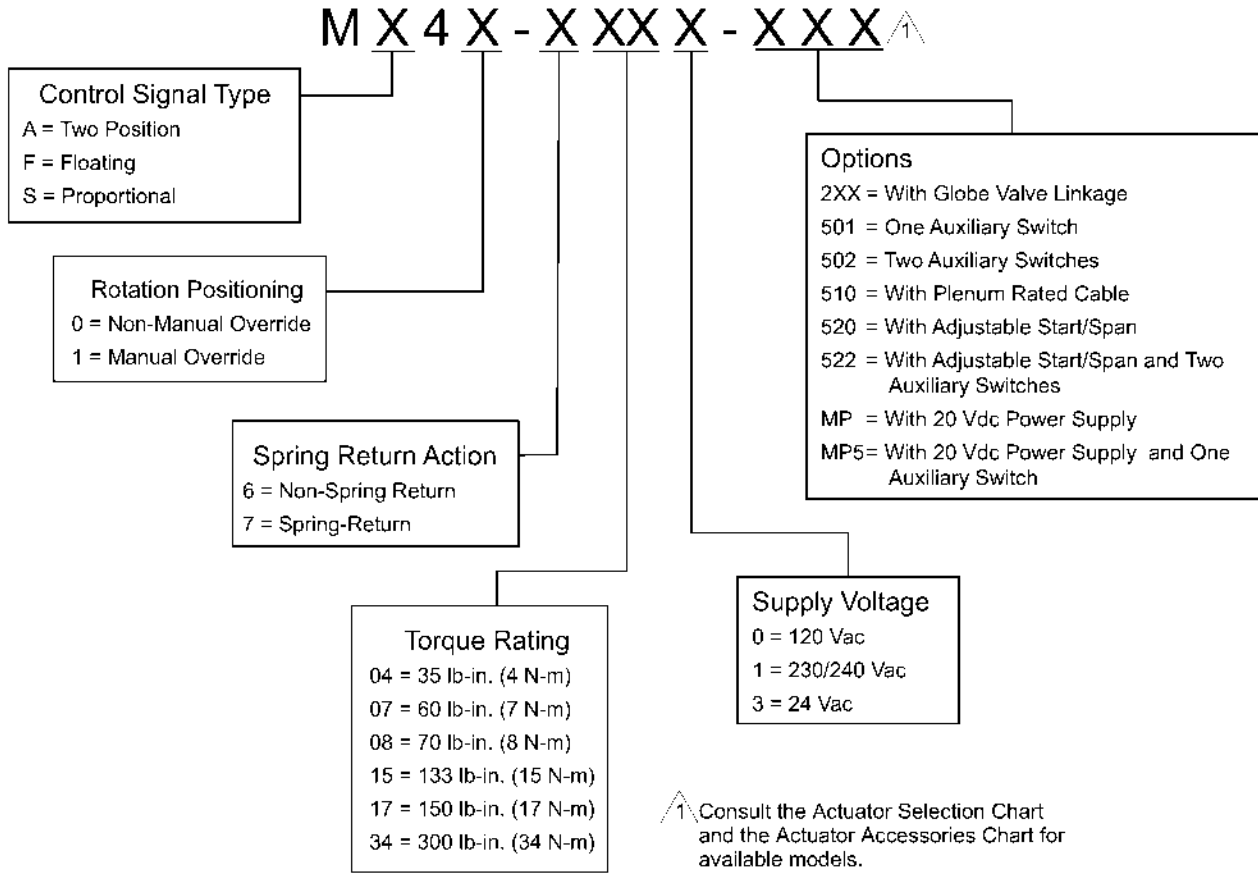
Actuator Specifications and Mounting Dimensions

Use this section to choose the appropriate actuator for the application. This section includes actuator specifications data, as well as mounting dimensions.

Damper Actuator Cross-Reference

Refer to this section for actuator replacement data.

Actuator Part Numbering System



Actuator Selection Chart

Spring-Return Actuators

Table-1 MX40-704X, MX4X-707X, and MX4X-715X Series Spring-Return Actuators.

Actuator Type	Part Numbers	Power Input								SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Output Torque Rating lb.-in. (N-m)		
		Voltage	Running				Holding		Powered		Spring Return	Min. ^a	Max. Stall		
			50 Hz		60 Hz		DC Amps	50 Hz						60 Hz	
			VA	W	VA	W		W						W	
Two-Position	MA40-7043	(page 17)	24 Vac ± 20% 22-30 Vdc	4.4	2.9	4.4	2.9	0.11	0.8	0.8	No	<50	<26	35 (4)	150 (17)
	MA40-7043-501			One ^b											
	MA40-7040		120 Vac ± 10%	6.4	3.8	4.3	3.4	—	1.6	1.2	No	<50	<26		
	MA40-7040-501			One ^b											
	MA40-7041			230 Vac ± 10%	5.8	4.1	4.6	3.9	—	1.5	1.2	No	<50		
MA40-7041-501	One ^b														
Floating	MF40-7043 ^c	(page 17)	24 Vac ± 20% 22-30 Vdc	5.9	4.4	5.9	4.4	0.17	2.9	2.9	No	<130	<25		
	MF40-7043-501 ^c			One ^b											
Proportional	MS40-7043 ^c	(page 17)	24 Vac ± 20% 22-30 Vdc	5.6	4.2	5.6	4.2	0.15	2.4	2.4	No	<130	<25		
	MS40-7043-501 ^c			One ^b											
	MS40-7043-MP		24 Vac 22-30 Vd	6.6	5.0	6.6	5.0	0.17	3.2	3.2	No	<130	<25		
	MS40-7043-MP5			One ^b											
Two-Position	MA40-7073	(page 19)	24 Vac ± 20% 22-30 Vdc	4.8	3.2	4.8	3.2	0.13	0.8	0.8	No	<80	<40		
	MA41-7073 ^d			Two ^e											
	MA40-7073-502		120 Vac ± 10%	10.7	4.2	5.6	3.6	—	2.0	1.2	No				
	MA41-7070 ^d			Two ^e											
	MA40-7070-502			230 Vac ± 10%	17.0	5.1	8.0	4.0	—	2.7	1.4			No	
	MA41-7071 ^d		Two ^e												
Floating	MF40-7073	(page 19)	24 Vac ± 20% 22-30 Vdc	6.2	4.8	6.2	4.8	0.18	2.8	2.8	No	<195	<30		
	MF41-7073 ^d			Two ^e											
	MF40-7073-502			24 Vac ± 20% 22-30 Vdc	5.8	4.6	5.8				4.6			0.17	2.3
MF41-7073-502 ^d	Two ^c														
Proportional	MS40-7073	(page 19)	24 Vac ± 20% 22-30 Vdc	5.8	4.6	5.8	4.6	0.17	2.3	2.3	No	<195	<30		
	MS41-7073 ^d			Two ^c											
	MS40-7073-502			Two ^c											

^a De-rating required for spring return actuators at low temperatures.

^b One adjustable from 0 to 95° rotation (0 to 1 scale).

^c With plenum-rated cable.

^d Equipped with manual override.

^e One adjustable from 25° to 85° rotation and one set to operate @ 5° fixed.

Table-1 MX40-704X, MX4X-707X, and MX4X-715X Series Spring-Return Actuators. (Continued)

Actuator Type	Part Numbers	Power Input									SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Output Torque Rating lb.-in. (N-m)	
		Voltage	Running				Holding		Powered	Spring Return		Min. ^a	Max. Stall		
			50 Hz		60 Hz		50 Hz	60 Hz							
			VA	W	VA	W	DC Amps	W						W	
Two-Position	MA40-7153 MA41-7153 ^d	24 Vac ± 20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8	No	<190	<30	133 (15)	350 (40)	
	MA40-7153-502 MA41-7153-502 ^d									Two ^c					
	MA40-7150 MA41-7150 ^d	120 Vac ± 10%	11.7	8.8	10.0	8.4	—	3.6	5.0	No					
	MA40-7150-502 MA41-7150-502 ^d									Two ^c					
	(page 21)	MA40-7151 MA41-7151 ^d	230 Vac ± 10%	15.5	9.5	10.6	8.5	—	4.6	3.3					No
		MA40-7151-502 MA41-7151-502 ^d													Two ^e
Floating	MF40-7153 MF41-7153 ^d	24 Vac ± 20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.30	3.3	3.3	No					
	MF40-7153-502 MF41-7153-502 ^d									Two ^e					
	Proportional	MS40-7153 MS41-7153 ^d	24 Vac ± 20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9	No				
MS40-7153-502 MS41-7153-502 ^d		Two ^e													

- ^a De-rating required for spring return actuators at low temperatures.
- ^b One adjustable from 0 to 95° rotation (0 to 1 scale).
- ^c With plenum-rated cable.
- ^d Equipped with manual override.
- ^e One adjustable from 25° to 85° rotation and one set to operate @ 5° fixed.

Table-2 MX40-717X Series Spring-Return Actuators.

Part Numbers		Power Input @ 50/60 Hz				SPDT Auxiliary Switches	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load		Output Torque Rating lb.-in. (N-m)	
		Voltage	Watts	VA			Powered	Spring Return	Min. ^a	Max. Stall
				Running	Holding					
MA40-7173	(page 23)	24 Vac ± 20%	5.4	9.6	4.1	No	<145	<75	150 (17)	450 (51)
MA40-7170 ^b		120 Vac ± 10%	7.2	11.4	9.4	No				
MA40-7171		240 Vac ± 10%	7.4	11.8	9.5	No				
MF40-7173		24 Vac ± 20%	5.5	10.0	4.3	No				
MS40-7173		24 Vac ± 20%	7.1	9.4	5.4	No				
MS40-7170 ^b		120 Vac ± 10%	7.1	11.1	9.1	No				
MS40-7171		240 Vac ± 10%	7.2	11.8	10.1	No				

- ^a De-rating required for spring return actuators at low temperatures.
- ^b The CE directive is not applicable to this model.

Non-Spring Return Actuators

Table-3 Non-Spring Return Actuators.

Part Numbers	Power Input @ 50/60 Hz				SPDT Auxiliary Switches ^a	Approximate Timing in Seconds @ 70 °F (21 °C) with No Load	Actuator Output Torque Rating (Minimum) lb.-in. (N-m)
	Voltage	Watts	VA				
			Running	Holding			
MF41-6043 ^b	24 Vac +20/-15%	2.0	2.3	—	No	90 @ 60 Hz 108 @ 50 Hz	35 (4)
MF41-6043-502 ^{bc}		2.0	2.3	—	2		
MF41-6043-510 ^{bd}		2.0	2.3	—	No		
MS41-6043 ^b		3.0	3.3	1.2	No		
MS41-6043-502 ^{bc}		3.0	3.3	1.2	2		
MS41-6043-520 ^{be}		3.0	3.3	1.2	No		
MS41-6043-522 ^{bf}		3.0	3.3	1.2	2		
MF41-6083 ^b	24 Vac +20/-15% ^g	2.0	2.3	—	No	125 @ 60 Hz 150 @ 50 Hz	70 (8) ^g
MF41-6083-502 ^{bc}		2.0	2.3	—	2		
MF41-6083-510 ^b		2.0	2.3	—	No		
MS41-6083 ^b		3.0	3.3	1.2	No		
MS41-6083-502 ^{bc}		3.0	3.3	1.2	No		
MS41-6083-520 ^{be}		3.0	3.3	1.2	No		
MS41-6083-522 ^{bf}		3.0	3.3	1.2	2		
MF41-6153	24 Vac +20/-15% ^h	3.0	3.0	—	No	133 (15) ^h	
MS41-6153		4.0	5.0	1.2	No		
MF41-6343	24 Vac ± 20%	3.8	7.0	3.6	No	<145	300 (34)
MS41-6343		4.8	7.1	5.0	No		

^a Auxiliary switch ratings are as follows:

Auxiliary Switch Ratings		
	MX41-6043, MX41-6083	MX41-6153
AC Rating	24 Vac, 4 A resistive, 2 A inductive	24 Vac, 6 A resistive, 2 A inductive
DC Rating	12 to 30 Vdc, DC 2 A	

^b Equipped with plenum-rated cable.

^c Equipped with two built-in auxiliary switches.

^d Equipped with 1k Ω feedback potentiometer.

^e Equipped with adjustable start/span.

^f Equipped with adjustable start/span and two auxiliary switches.

^g Minimum voltage at high temperatures: 24 Vac, +20%, -10% at 90 to 130 °F ambient.

^h Minimum voltage at high temperatures: 24 Vac, +20%, -5% (MF models) and 24 Vac, +20%, -10% (MS models) at 85 to 130 °F ambient.

Actuator Accessories Chart

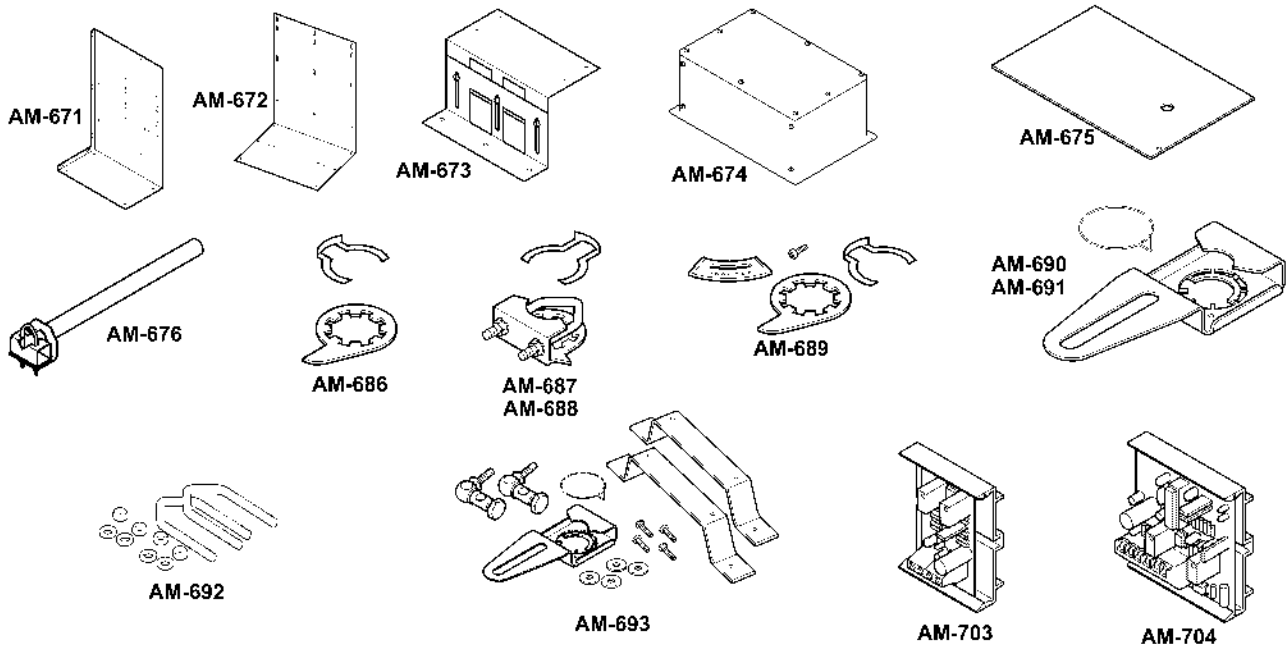


Figure-1

Part Numbers	Description	Spring Return Actuators							Non-Spring Return Actuators							General Instructions Document
		MA40-704X Series MF40-7043	MS40-7043	MA4X-707X Series MF4X-7073 Series	MS4X-7073 Series	MA4X-715X Series MF4X-7153 Series	MS4X-7153	MA40-717X Series MF40-7173	MS40-7173	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343	
AM-671 ^{abcd}	Mounting Bracket	X	X	X	X	X	X									
AM-672 ^{abcd}		X	X	X	X	X	X									
AM-673 ^c		X	X	X	X	X	X									
AM-674	Weather Shield & Base	X	X	X	X	X	X	X	X						X	X
AM-675		X	X	X	X	X	X									
AM-676	Shaft Extension	X	X	X	X	X	X	X	X						X	X
AM-686	Position Indicator			X	X	X	X									
AM-687 ^e	V-clamp			X	X	X	X									
AM-688	Replacement Universal Clamp			X	X	X	X									
AM-689	Rotation Limiter			X	X	X	X									
AM-690	Crank Arm			X	X	X	X									
AM-691				X	X	X	X									
AM-692 ^f		V-bolt			X	X	X	X								
AM-693 ^{gh}	Crank Arm Kit			X	X	X	X									
AM-703	Span Adjustment		X		X		X		X		X		X		X	
AM-704	Modulation Interface		X		X		X		X		X		X		X	

^a AM-693 crank arm kit required.

^b Cannot be used with MX41-634X or MX40-717X series actuators.

^c Drill appropriate mounting holes where needed.

^d The large "C"-shaped clamps included in AM-693 crank arm kit are required for mounting the actuator. Drill appropriate mounting holes where needed.

^e For shafts to 1.05" diameter or 5/8" square.

^f For shafts to 3/4" and 1.05" diameter (with AM-690 and AM-691, respectively).

^g Use the self-tapping screws and flat washers provided in kit to mount actuator.

^h AM-692 V-bolt kit required.

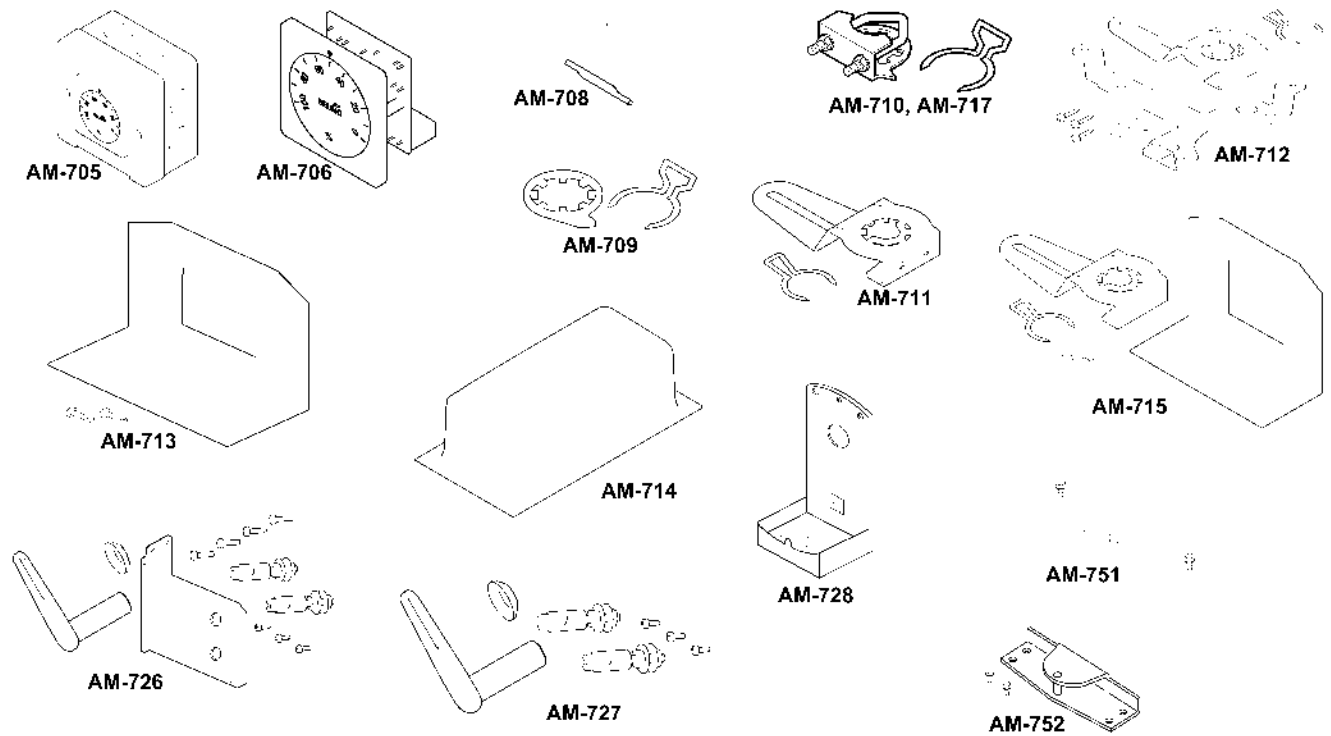


Figure-2

Part Numbers	Description	Spring Return Actuators							Non-Spring Return Actuators							General Instructions Document	
		MA40-704X Series MF40-7043	MS40-7043	MA4X-707X Series MF4X-7073 Series	MS4X-7073 Series	MA4X-715X Series MF4X-7153 Series	MS4X-7153 Series	MA40-717X Series MF40-7173	MS40-7173	MF41-6043	MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153		MF41-6343
AM-705	Positioner		X		X	X		X		X		X		X		X	F-26895
AM-706			X		X	X		X		X		X		X		X	
AM-708	500 Ω Resistor		X		X	X				X		X		X			
AM-709	Position Indicator & Stroke Limiter	X	X														F-26896
AM-710 ^a	V-clamp	X	X														
AM-711	Crank Arm Adaptor Kit	X	X														
AM-712			X	X													
AM-713	Bracket	X	X														
AM-714	Weather Shield	X	X	X	X	X	X										F-25097
AM-715	Crank Arm Adaptor Kit	X	X														F-26896
AM-717	Replacement Universal Clamp	X	X														F-26896
AM-726	Crank Arm Adaptor								X	X	X	X					F-26802
AM-727									X	X	X	X					
AM-728 ^b	Conduit Adaptor								X	X	X	X					
AM-751	Anti-rotation Bracket							X	X						X	X	F-26898
AM-752								X	X						X	X	

^a For shafts up to 3/4" diameter round or up to 1/2" square.

^b Cannot be used when creating a linked valve/actuator assembly.

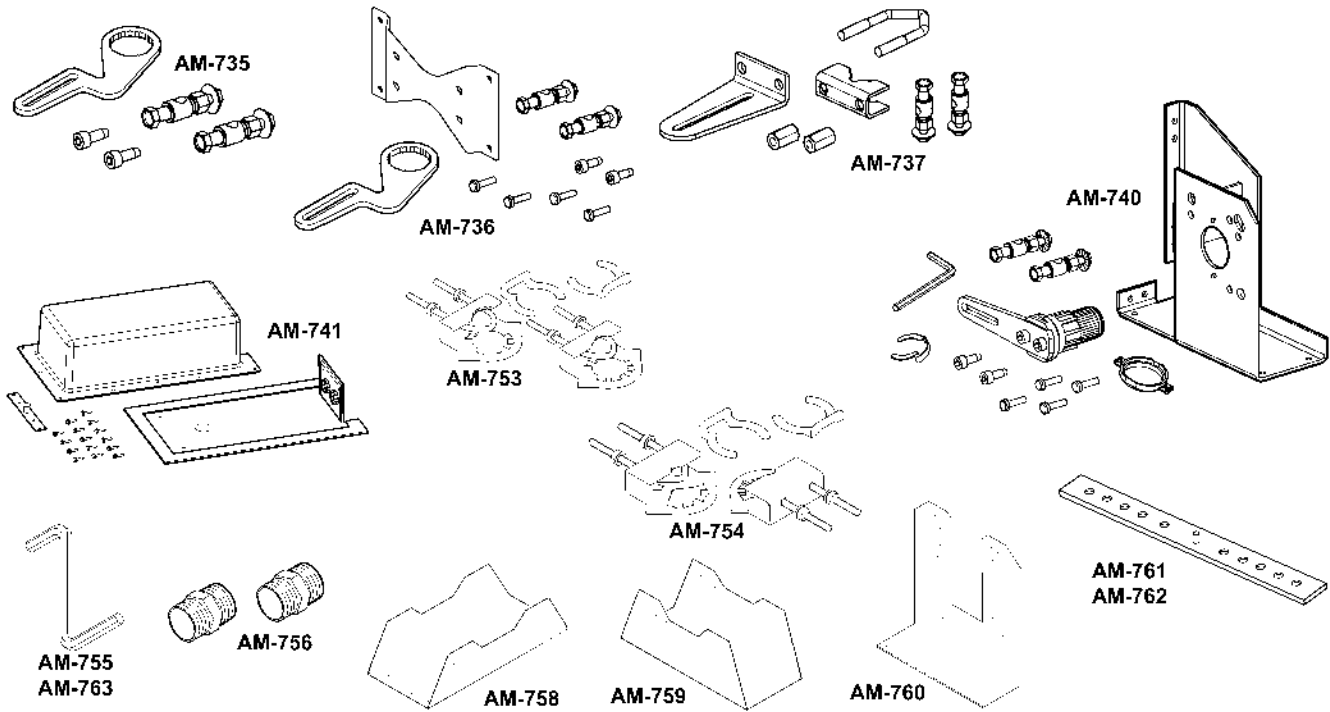


Figure-3

Part Numbers	Description	Spring Return Actuators								Non-Spring Return Actuators						General Instructions Document	
		MA40-704X Series MF40-7043	MS40-7043	MA4X-707X Series MF4X-7073 Series	MS4X-7073 Series	MA4X-715X Series MF4X-7153 Series	MS4X-7153 Series	MA40-717X Series MF40-7173	MS40-7173	MF41-6043 MS41-6043	MF41-6083	MS41-6083	MF41-6153	MS41-6153	MF41-6343		MS41-634X Series
AM-735	Crank Arm Kit											X	X			F-27246	
AM-736	Crank Arm Kit with Bracket											X	X			F-27247	
AM-737	Universal Crank Arm ^a											X	X			F-27248	
AM-740	Replacement Kit											X	X			F-27249	
AM-741	Weather Shield							X	X	X	X	X				F-27250	
AM-753 ^b	Mounting Clamp						X	X						X	X	F-26898	
AM-754 ^c							X	X						X	X		
AM-755	Manual Override Crank													X	X		
AM-756	Metric Conduit Adaptor	X	X	X	X	X	X	X	X					X	X	F-26899	
AM-758	Short "U" Mounting Bracket			X	X	X	X									F-25096	
AM-759	Tall "U" Mounting Bracket			X	X	X	X										
AM-760	Slotted "L" Mounting Bracket			X	X	X	X										
AM-761	7-inch Anti-Rotation Bracket	X	X													F-26986	
AM-762	9-inch Anti-Rotation Bracket	X	X	X	X	X	X	X	X					X	X	F-25098	
AM-763	Manual Override Crank			X ^d	X ^d	X ^d	X ^d									F-25098	
TF-711-02	Sealtight Conduit Connector							X	X						X	X	—
TF-713-02									X	X						X	X
TF-5521	Pipe Plug							X	X						X	X	—

^a For Honeywell Floor Mount Mod Motor.

^b For shafts 3/4" round and 5/8" square.

^c For shafts 3/8" to 1/2" round and square.

^d Only used on MX41-707X-XXX, MX41-715X-XXX.

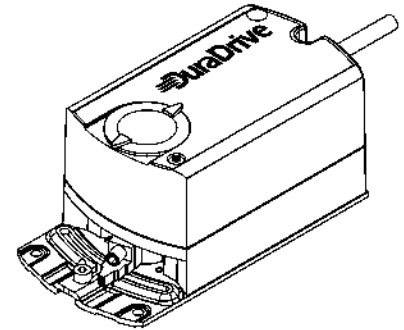
Actuator Specifications and Mounting Dimensions

MF41-6043 and MS41-6043 Actuators

For non-spring return applications requiring floating or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round, square, or hexagonal damper shaft
- Rated at 35 lb-in. (4 N-m) torque, minimum
- Does not require any limit switches
- Manual override allows positioning for installation and manual operation
- MF41-6043 provides floating point control (3-position)
- MS41-6043 provides proportional control compatible with 0 to 10 Vdc
- Models available with: independently adjustable dual auxiliary switches; adjustable start point (offset) and span
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MF41-6043 — Floating three-position control, 24 Vac.
	MS41-6043 — Proportional, 0 to 10 Vdc; input resistance 100 k Ω .
Control signal adjustment available with MS40-6043-520 and MS40-6043-522:	
Start point (offset) — Between 0 and 5 Vdc (factory setting = 0 Vdc)	
Span — 2 to 30 Vdc	

Power Requirements All 24 Vac circuits are Class 2.

Part Numbers	Power Input @ 50/60 Hz			
	Voltage	Running VA	Holding VA	Watts
MF41-6043	24 Vac +20/-15%	2.3	—	2.0
MS41-6043	24 Vac +20/-15%	3.3	1.2	3.0

Connections 3 ft. (0.9 m) long, 18 AWG leads, plenum-rated.

Motor Type Synchronous

Outputs

Electrical	Position output signal — Feedback potentiometer available with MF41-6043-510: 0 to 1000 Ω < 10 mA
	Output voltage: 0 to 10 Vdc
	Maximum output current: 1 mA
	Dual auxiliary switches available with MF41-6043-502, MS41-6043-502, MF41-6043-522, and MS41-6043-522.
	AC Rating: 24 Vac, 4 A resistive, 2 A inductive
	DC Rating: 12 to 30 Vdc, DC 2 A
	Switching hysteresis: 2°
	Switch Range: Switch A — 0 to 90° range in 5° intervals Recommended range usage — 0 to 45° Factory setting — 5°
	Switch B — 0 to 90° range in 5° intervals Recommended range usage — 45 to 90° Factory setting — 85°
	Timing: 90 sec. at 60 Hz, 108 sec. at 50 Hz

Actuator Specifications

Mechanical	
	Output torque rating: 35 lb-in. (4 N-m).
	Stroke: Normal angle of rotation is 90°, limited to a maximum of 95°. Field adjustable to limit travel on either end of stroke. Set for 5° preload at the factory.
	Position indicator: Adjustable pointer is provided for position indication. See the Note in "Switch Range."
	Output shaft setscrew: tightening torque 55 to 60 lb-in. (6.3 to 6.8 N-m).
	Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications
Environment	
Temperature Limits	Shipping and storage: -40 to 158 °F (-40 to 70 °C) ambient. Operating: -25 to 130 °F (-32 to 55 °C) ambient.
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA Type 2.
Agency Listings	
UL	UL-873, Underwriters Laboratories.
European Community	EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50081-2).
cUL	Canadian Standards C22.2 No. 24-93.
Accessories	
AM-726	Rotary-to-Linear Bracket
AM-727	Rotary-to-Linear Crank Arm
AM-728	Conduit Adapter
AM-741	Weather Shield Kit

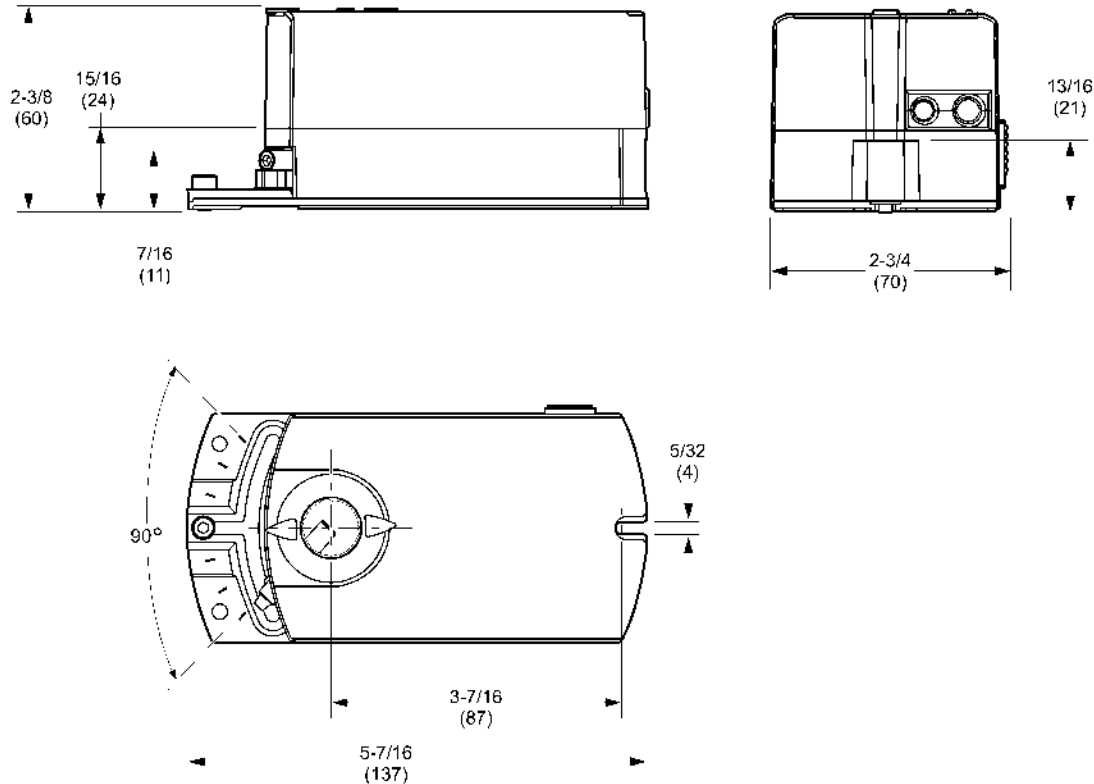


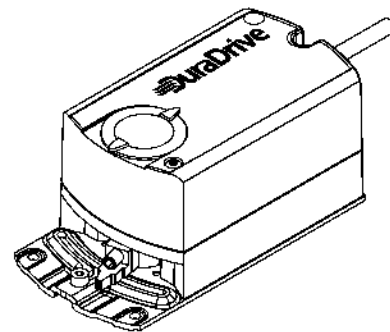
Figure-4 MF41-6043 and MS41-6043 Mounting Dimensions.

MF41-6083 and MS41-6083 Actuators

For non-spring return applications requiring floating or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round, square, or hexagonal damper shaft
- Rated at 70 lb-in. (4 N-m) torque, minimum
- Does not require any limit switches
- Manual override allows positioning for installation and manual operation
- MF41-6083 provides floating point control (3-position)
- MS41-6083 provides proportional control compatible with 0 to 10 Vdc
- Models available with: independently adjustable dual auxiliary switches; adjustable start point (offset) and span
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MF41-6083 — Floating three-position control, 24 Vac.
	MS41-6083 — Proportional, 0 to 10 Vdc; input resistance 100 kΩ.

Control signal adjustment available with MS41-6083-520 and MS41-6083-522:

Start point (offset) — Between 0 and 5 Vdc (factory setting = 0 Vdc)

Span — 2 to 30 Vdc

Power Requirements All 24 Vac circuits are Class 2.

Part Numbers	Power Input @ 50/60 Hz			
	Voltage ^a	Running VA	Holding VA	Watts
MF41-6083	24 Vac +20/-15%	2.3	—	2.0
MS41-6083	24 Vac +20/-15%	3.3	1.2	3.0

^a Minimum voltage at high temperatures: 24 Vac, +20%, -10% at 90 to 130 °F ambient.

Connections 3 ft. (0.9 m) long, 18 AWG leads, plenum-rated.

Motor Type Synchronous

Outputs

Electrical	Position output signal — Feedback potentiometer available with MF41-6083-510: 0 to 1000Ω < 10 mA
	Output voltage: 0 to 10 Vdc
	Maximum output current: 1 mA
	Dual auxiliary switches available with MF41-6083-502, MS41-6083-502, MF41-6083-522, and MS41-6083-522.
	AC Rating: 24 Vac, 4 A resistive, 2 A inductive
	DC Rating: 12 to 30 Vdc, DC 2 A
	Switching hysteresis: 2°
	Switch Range: Switch A — 0 to 90° range in 5° intervals Recommended range usage — 0 to 45° Factory setting — 5°
	Switch B — 0 to 90° range in 5° intervals Recommended range usage — 45 to 90° Factory setting — 85°
	Timing: 125 sec. at 60 Hz, 150 sec. at 50 Hz

Actuator Specifications

Mechanical	
	Output torque rating: 70 lb-in. (8 N-m).
	Stroke: Normal angle of rotation is 90°, limited to a maximum of 95°. Field adjustable to limit travel on either end of stroke. Set for 5° preload at the factory.
	Position indicator: Adjustable pointer is provided for position indication. See the Note in "Switch Range."
	Output shaft setscrew: tightening torque 55 to 60 lb-in. (6.3 to 6.8 N-m).
	Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications
Environment	
Temperature Limits	Shipping and storage: -40 to 158 °F (-40 to 70 °C) ambient. Operating: -25 to 130 °F (-32 to 55 °C) ambient.
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA Type 2.
Agency Listings	
UL	UL-873, Underwriters Laboratories.
European Community	EMC Directive (89/336/EEC). Emissions (EN50081-1). Immunity (EN50081-2).
cUL	Canadian Standards C22.2 No. 24-93.
Accessories	
AM-726	Rotary-to-Linear Bracket
AM-727	Rotary-to-Linear Crank Arm
AM-728	Conduit Adapter
AM-741	Weather Shield Kit

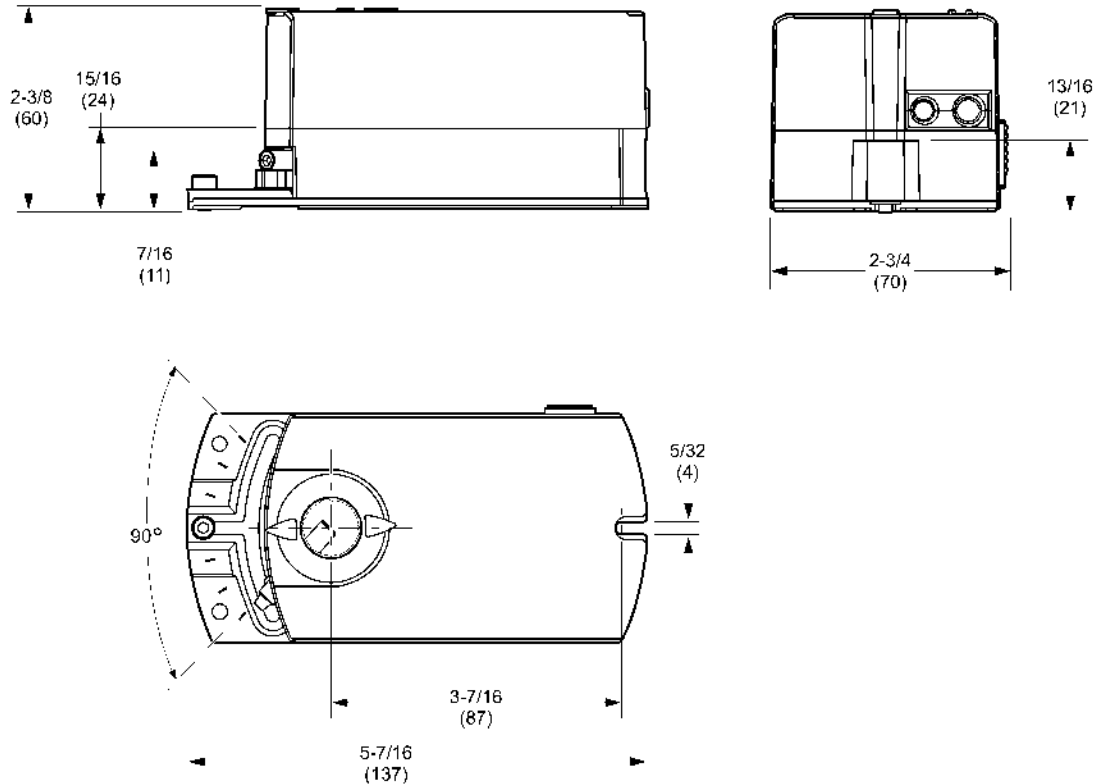


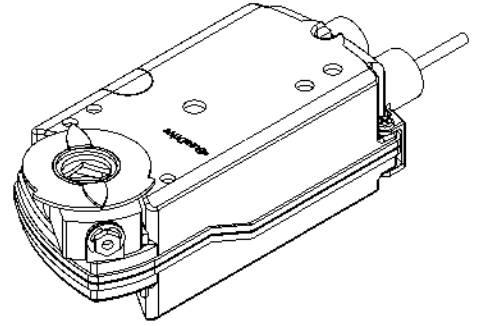
Figure-5 MF41-6083 and MS41-6083 Mounting Dimensions.

MF41-6153 and MS41-6153 Actuators

For non-spring return applications requiring floating or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 133 lb-in (15 N-m) torque rating
- Does not require any limit switches
- Manual override to allow positioning for installation and manual operation
- MF41-6153 provides floating point control (drive open-hold-drive closed)
- MS41-6153 provides proportional control compatible with 0 to 10 Vdc or 0 to 20 mAdc
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MF41-6153 — Three position. MS41-6153 — Proportional, 0 to 10 Vdc, input resistance 100 kΩ.
-----------------------	--------------------------------------------------------------------------------------------------------------

Power Requirements All 24 Vac circuits are Class 2.

Part Numbers	Power Input @ 50/60 Hz			
	Voltage	Running VA	Holding VA	Watts
MF41-6153	24 Vac +20/-15% ^a	3.0	—	3.0
MS41-6153	24 Vac +20/-15% ^b	5.0	1.2	4.0

^a Minimum voltage at high temperatures: 24 Vac, +20%, -5% at 85 to 130 °F ambient.
^b Minimum voltage at high temperatures: 24 Vac, +20%, -10% at 85 to 130 °F ambient.

Connections 3 ft. (91 cm) long plenum-rated cables, 18 AWG color coded leads.

Motor Type Synchronous.

Outputs

Electrical **Timing:** Approx. 125 sec. at 60 Hz; 150 sec. at 50 Hz.

Dual Auxiliary Switch Ratings:

AC Rating, 24 Vac, AC 6A resistive, AC 2A inductive.

DC Rating, : 12 to 30 Vdc, DC 2A.

Switch Ranges:

Switch A 0° to 90° with 5° intervals.

Recommended Range Usage 0° to 45°.

Factory Setting 5°.

Switch B 0° to 90° with 5° intervals.

Recommended Range Usage 45° to 90°.

Factory Setting 85°.

Switch Hysteresis: 2°.

Mechanical **Output torque rating:** 133 lb-in (15 N-m).

Stroke: Angle of rotation is limited to a nominal 90° (maximum 95°), field adjustable to limit travel on either end of stroke. Set for 5° preload at the factory.

Position indicator: Adjustable pointer is provided for position indication.

Damper Shaft Clamp: Direct coupled using a through hole output hub.

Shaft Sizes: 1/4" to 3/4" (6.4 mm to 20.5 mm) diameter round
1/4" to 1/2" (6.4 mm to 13 mm) square

Minimum Shaft Length: 3/4" (20 mm)

Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications.

Weight: 2.2 lb (1 kg)

Actuator Specifications

Environment

Temperature Limits	Shipping and storage: -40 to 158 °F (-40 to 70 °C) ambient. Operating: -25 to 130 °F (32 to 55 °C)
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 1 (IEC IP54).

Agency Listings (Actuator)

UL	UL-873, Underwriters Laboratories.
European Community	EMC Directive (89/336/EEC). Immunity (EN61000-6-2). Emission (EN 50081-1).
cUL	Canadian Standards C22.2 No. 24-93.

Accessories

AM-735	Crank Arm Kit
AM-736	Crank Arm Kit with Bracket
AM-737	Universal Crank Arm for Honeywell Floor Mount Mod Motor
AM-740	Replacement Kit
AM-741	Weather Shield Kit

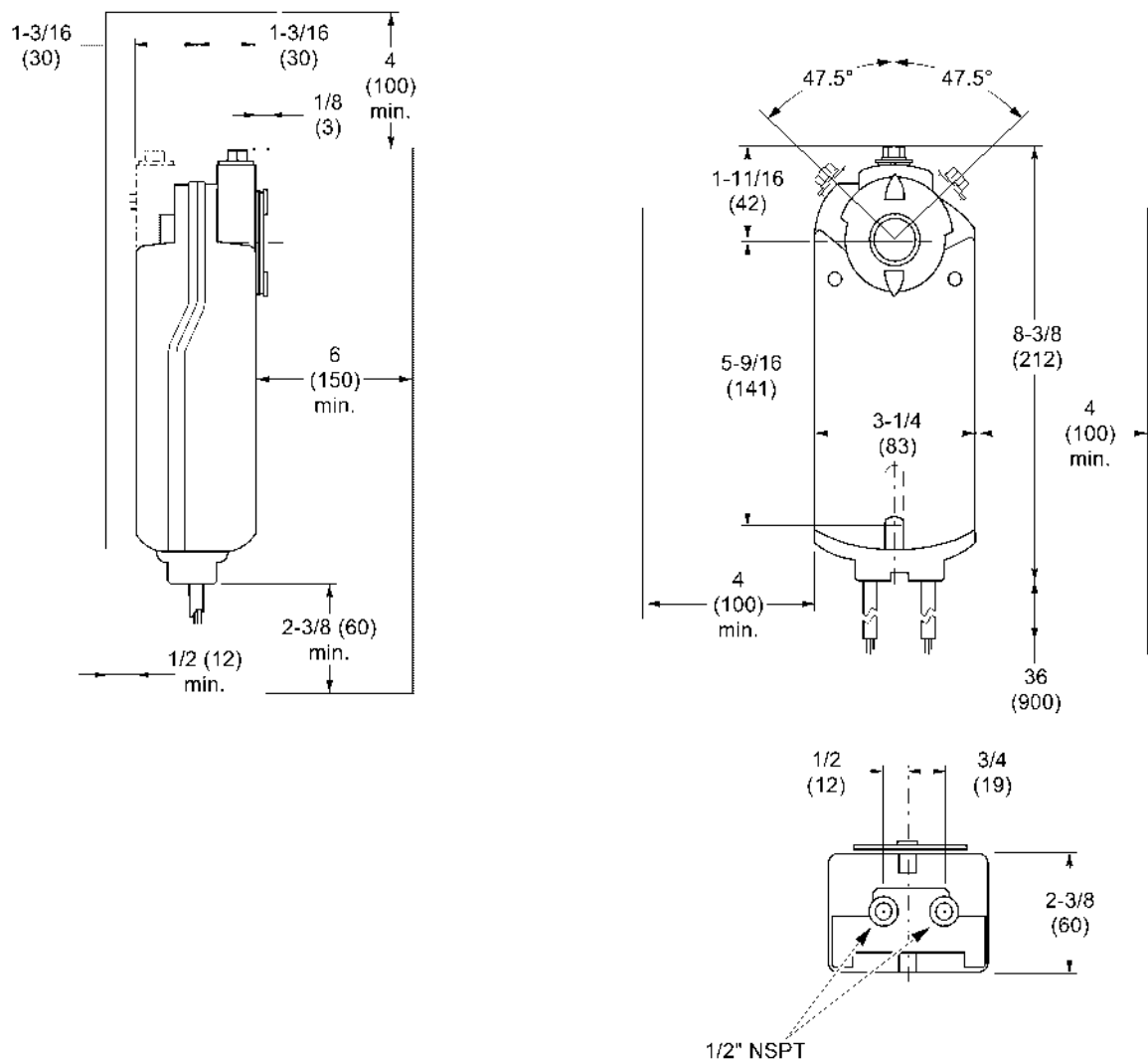


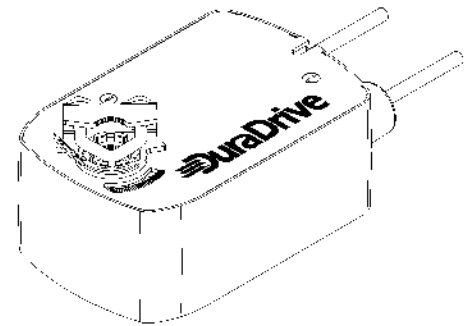
Figure-6 MF41-6153 and MS41-6153 Mounting Dimensions.

MA40-704X, MF40-7043, and MS40-7043 Series Actuators

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 35 lb-in (4 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- True mechanical clockwise or counterclockwise spring return operation for reliable, positive close-off in airtight applications
- Visual position indicator
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating
- 5-year warranty



Actuator Specifications

Inputs

Control Signal

MA40-704X and MA40-704X-501 — On-off. SPST control contacts or Triacs (500 mA rated).

MF40-7043 and MF40-7043-501 — Floating point control, 24Vac.

MS40-7043 and MS40-7043-501 — Spring return, proportional, 2 to 10 Vdc or 4 to 20 mAdc with a 500 Ω resistor.

Power Requirements

All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.

Part Numbers	Voltage 50/60 Hz	Running					Holding	
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz
		VA	W	VA	W		W	W
MA40-7043 and MA40-7043-501	24 Vac \pm 20% 22-30 Vdc	4.4	2.9	4.4	2.9	0.11	0.8	0.8
MS40-7043 and MS40-7043-501	24 Vac \pm 20% 22-30 Vdc	5.6	4.2	5.6	4.2	0.15	2.4	2.4
MS40-7043-MP MS40-7043-MP5	24 Vac \pm 20% 22-30 Vdc	6.6	5.0	6.6	5.0	0.17	3.2	3.2
MF40-7043 and MF40-7043-501	24 Vac \pm 20% 22-30 Vdc	5.9	4.4	5.9	4.4	0.17	2.9	2.9
MA40-7040 and MA40-7040-501	120 Vac \pm 10%	6.4	3.8	4.3	3.4	—	1.6	1.2
MA40-7041 and MA40-7041-501	230 Vac \pm 10%	5.8	4.1	4.6	3.9	—	1.5	1.2

Connections

MA40-704X and MA40-704X-501 — 3 ft. (91 cm) long, appliance cables, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor.

MF40-7043 and MF40-7043-501, MS40-7043 and MS40-7043-501 — 3 ft. (91 cm) long, plenum-rated cables, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor.

Motor Type

Brush—**MA40-704X**.

Brushless DC—**MF40-7043, MS40-7043**.

Outputs

Electrical

Control Mode: Switch provided for selection of direct acting or reverse acting control mode on proportional models.

Timing: Approximate timing for MA40-704X series is 50 seconds. Approximate timing for MF40-7043 series or M40-7043 series is 130 seconds.

Actuator Specifications

Electrical (continued)	One auxiliary switch available with MX40-7043-501 and MS40-7043-MP5, SPDT 6A resistive @ 24 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 24 Vac.
	One auxiliary switch available with MA40-7040-501 or MA40-7041-501, SPDT 6A resistive @ 250 Vac, adjustable 0 to 95° (0 to 1 scale). Switch meets VDE requirements for 6 (1.5)A, 250 Vac.
	Position Feedback Voltage "AO": 2 to 10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators.
Mechanical	Output Torque Rating: 35 lb-in. (4 N-m) minimum, 150 lb-in. (17 N-m) maximum.
	Stroke: Rotation is limited to 95° ± 5° maximum, adjustable from 40 to 95° with a mechanical stop.
	Position Indicator: Visual indicator, 0 to 1 (0 is the spring-return position).
	Direction of Rotation: CW or CCW rotation is available through reversible mounting.
	Damper Shaft Clamp: Direct coupled using a through hole output hub.
	Damper Shaft Size: Up to 5/8" in diameter and 1/2" square. With AM-710, up to 3/4" in diameter and 1/2" square.
	Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications.
Environment	
Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C).
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 2 (IEC IP54).
Agency Listings	
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).
cUL	Canadian Standards C22.2 No. 24.
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
Australia	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.

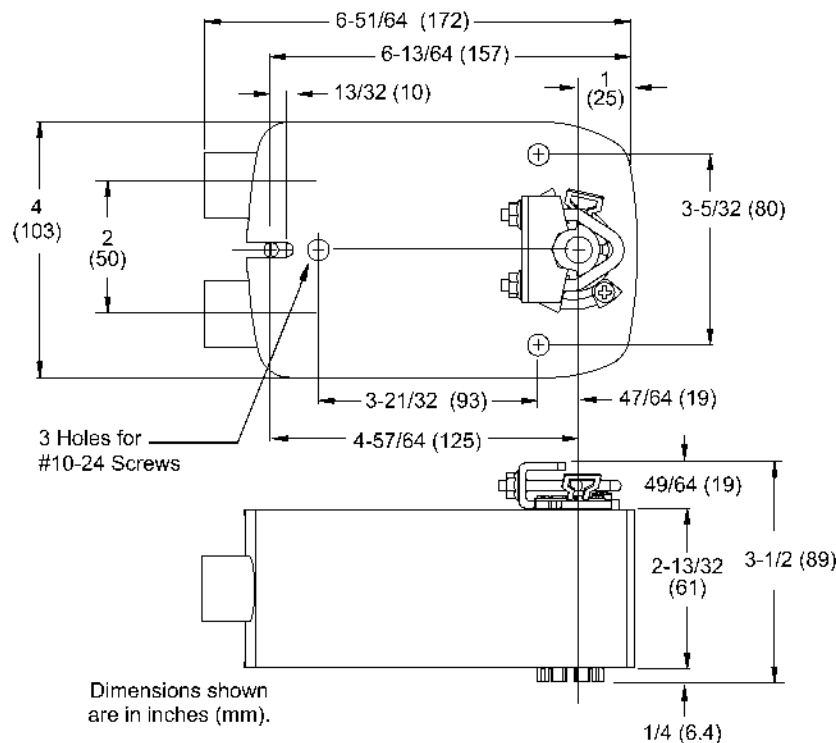


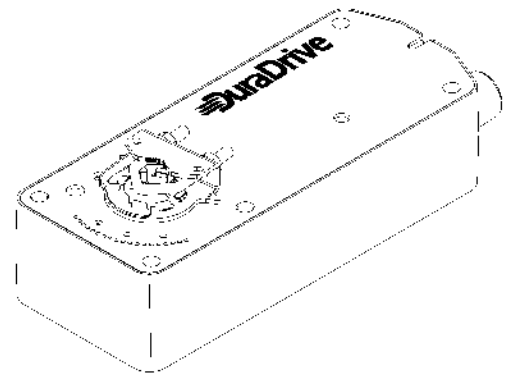
Figure-7 MX40-704X Series Mounting Dimensions.

MA4X-707X, MF4X-7073, and MS4X-7073 Series Actuators

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 60 lb-in (7 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- Visual position indication
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housing for NEMA 2/IP54 rating
- MF41-707X-XXX equipped with manual override
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MA4X-707X and MA4X-707X-502 — On-off, SPST control contacts or Triacs (500 mA rated). MF4X-7073 and MF4X-7073-502 — Floating point control, 24Vac. MS4X-7073 and MS4X-7073-502 — Spring return, proportional, 2 to 10 Vdc or 4 to 20 mAdc with a 500 Ω resistor.
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Power Requirements All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.

Part Numbers	Voltage 50/60 Hz	Running					Holding	
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz
		VA	W	VA	W		W	W
MA4X-7073 and MA4X-7073-502	24 Vac ± 20% 22-30 Vdc	4.8	3.2	4.8	3.2	0.13	0.8	0.8
MS4X-7073 and MS4X-7073-502	24 Vac ± 20% 22-30 Vdc	5.8	4.6	5.8	4.6	0.17	2.3	2.3
MF4X-7073 and MF4X-7073-502	24 Vac ± 20% 22-30 Vdc	6.2	4.8	6.2	4.8	0.18	2.8	2.8
MA4X-7070 and MA4X-7070-502	120 Vac ± 10%	10.7	4.2	5.6	3.6	—	2.0	1.2
MA4X-7071 and MA4X-7071-502	230 Vac ± 10%	17.0	5.1	8.0	4.0	—	2.7	1.4

Connections 3 ft. (91 cm) long, appliance cables, 1/2 in. conduit connectors. For M20 Metric conduit, use AM-756 adaptor.

Motor Type Brush—MA4X-707X.
Brushless DC—MF4X-7073, MS4X-7073.

Outputs

Electrical **Control Mode:** Switch provided for selection of direct acting or reverse acting control mode on proportional models.
Timing: Approximate timing for MA4X-707X series is 80 seconds. Approximate timing for MF4X-7073 series or M4X-7073 series is 195 seconds.
Two auxiliary switches available with MX4X-7071-502 or MX4X-7070-502, SPDT 7A resistive @ 250 Vac, one fixed @ 5° and one adjustable 25 to 85°. Switch meets VDE requirements for 7 (2.5)A, 250 Vac.

Actuator Specifications (Continued)

Electrical (continued)	Two auxiliary switches available with MX4X-7073-502, SPDT 7A resistive @ 24 Vac, one fixed @ 5° and one adjustable 25 to 85°. Switches meet VDE requirements for 6 (1.5)A, 24 Vac. Position Feedback Voltage "AO", 2 to 10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators.
Mechanical	Output Torque Rating: 60 lb-in. (7 N-m) minimum, 250 lb-in. (28 N-m) maximum. Stroke: Rotation is limited to 95° ± 5° maximum, adjustable from 30 to 95° with AM-689 rotation limiter. Position Indicator: Pointer and (-5 to 90°) scale are provided for position indication (-5° is the normal, or spring-return, position). Direction of Rotation: CW or CCW rotation is available through reversible mounting. Damper Shaft Clamp: Direct coupled using a through hole output hub. Damper Shaft Size: Up to 3/4" in diameter and 1/2" square. With AM-687, up to 1.05" in diameter and 5/8" square. Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications. Manual Override: For MX41-707X manual override rotation is adjustable from -5° to 85° by using manual override crank.
Environment	
Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C).
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in the down position.
Agency Listings	
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).
cUL	Canadian Standards C22.2 No. 24.
European Community	EMC Directive (89/336/EEC), Low Voltage Directive (72/23/EEC).
Australia	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.

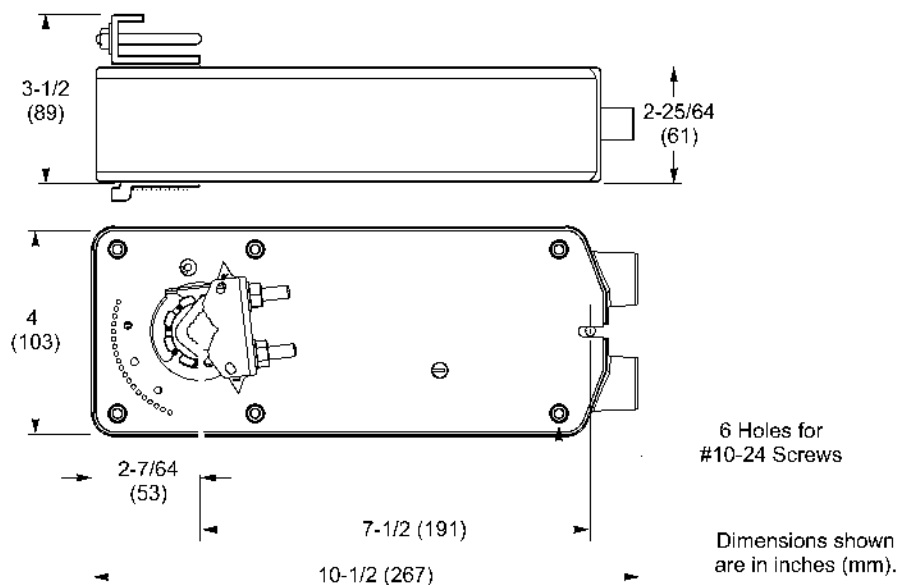


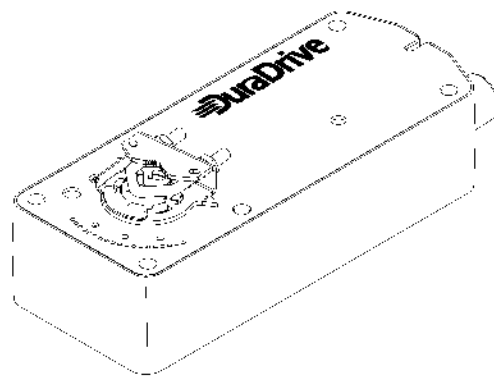
Figure-8 MX4X-707X Series Mounting Dimensions.

MA4X-715X, MF4X-7153, and MS4X-7153 Series Actuators

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 133 lb-in (15 N-m) torque rating
- Overload protection throughout rotation
- Optional built-in auxiliary switches
- True mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- Visual position indicator
- Direct acting or reverse acting control mode available on proportional models
- Rotation limiting available
- Rugged die-cast housings for NEMA 2/IP54
- MX41-715X-XXX equipped with manual override
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MA4X-715X and MA4X-715X-502 — On-off. SPST control contacts or Triacs (500 mA rated).
	MF4X-7153 and MF4X-7153-502 — Floating point control 24 Vac.
	MS4X-7153 and MS4X-7153-502 — Proportional, 2 to 10 Vdc or 4 to 20 mAdc with a 500 Ω resistor.

Power Requirements All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.

Part Numbers	Voltage 50/60 Hz	Running					Holding	
		50 Hz		60 Hz		DC Amps	50 Hz	60 Hz
		VA	W	VA	W		W	W
MA4X-7153 and MA4X-7153-502	24 Vac ± 20% 22-30 Vdc	9.8	7.5	9.7	7.5	0.29	2.8	2.8
MS4X-7153 and MS4X-7153-502	24 Vac ± 20% 22-30 Vdc	9.8	7.4	9.7	7.4	0.28	2.9	2.9
MF4X-7153 and MF4X-7153-502	24 Vac ± 20% 22-30 Vdc	9.8	7.7	9.7	7.7	0.30	3.3	3.3
MA4X-7150 and MA4X-7150-502	120 Vac ± 10%	11.7	8.8	10.0	8.4	—	3.6	5.0
MA4X-7151 and MA4X-7151-502	230 Vac ± 10%	15.5	9.5	10.6	8.5	—	4.6	3.3

Connections 3 ft. (91 cm) long, appliance cable, 1/2 in. conduit connectors. For M20 Metric conduit, use AM-756 adaptor.

Motor Type Brushless DC—MA4X-715X, MF4X-7153, MS4X-7153.

Outputs

Electrical **Control Mode:** Switch provided for selection of direct acting or reverse acting control mode on proportional models.

Timing: Approximate timing is 190 seconds.

Two auxiliary switches available with MX4X-7151-502 or MX4X-7150-502, SPDT 7A resistive @ 250 Vac, one fixed @ 5° and one adjustable 25 to 85°. Switch meets VDE requirements for 7 (2.5)A, 250 Vac.

Actuator Specifications (Continued)

Electrical (continued)	Two auxiliary switches available with MX4X-7153-502, SPDT 7A resistive @ 24 Vac, one fixed @ 5° and one adjustable 25 to 85°. Switches meet VDE requirements for 6 (1.5)A, 24 Vac.
	Position Feedback Voltage, 2 to 10 Vdc (maximum 0.5 mA) output signal for position feedback or operation of up to four slave actuators.
Mechanical	Output Torque Rating: 133 lb-in. (15 N-m) minimum, 350 lb-in. (40 N-m) maximum.
	Stroke: Rotation is limited to 95° ± 5° maximum, adjustable from 30 to 95° with AM-689 rotation limiter.
	Position Indicator: Pointer and (-5 to 90°) scale are provided for position indication (-5° is the normal, or spring-return, position).
	Direction of Rotation: CW or CCW rotation is available through reversible mounting.
	Damper Shaft Clamp: Direct coupled using a through hole output hub.
	Damper Shaft Size: Up to 3/4" in diameter and 1/2" square. With AM-687, up to 1.05" in diameter and 5/8" square.
	Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications.
	Manual Override: For MX41-715X rotation is adjustable from -5° to 85° by using manual override crank.
Environment	
Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -22 to 140 °F (-30 to 60 °C).
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 1, NEMA 2 (IEC IP54) with conduit connector in the down position.
Agency Listings	
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).
cUL	Canadian Standards C22.2 No. 24.
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
Australia	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.

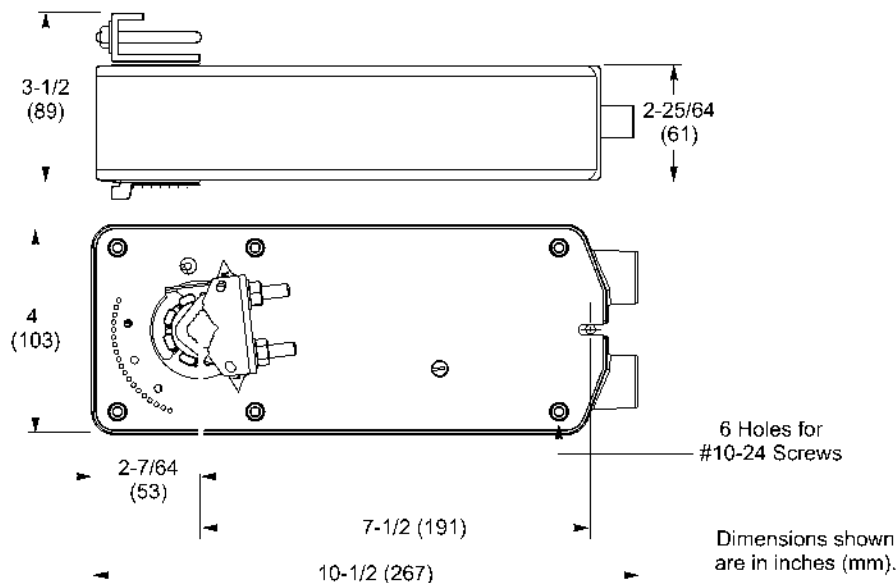


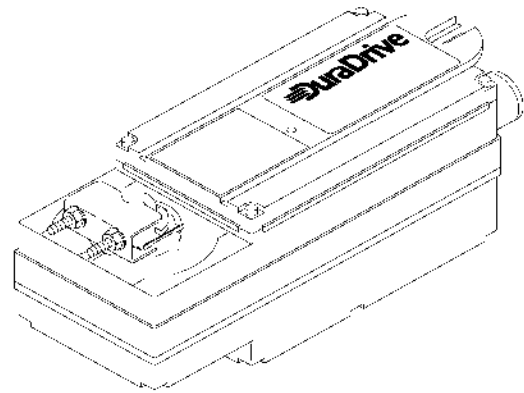
Figure-9 MX4X-715X Series Mounting Dimensions.

MA40-717X, MF40-7173, and MS40-717X Series Actuators

For spring return applications requiring floating, two-position, or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 150 lb-in (17 N-m) torque rating
- Overload protection throughout rotation
- Oil immersed gear train provides continuous lubrication
- NEMA 4 housing (IEC IP56)
- Automatic current sensing motor control provides extended reliability and repeatable timing
- Provides true mechanical clockwise or counterclockwise spring return operation for reliable positive close-off in airtight applications
- MA40-717X models provide on-off control
- MF40-7173 models provide floating point control (drive open-hold-drive closed)
- MS40-717X models provide proportional control compatible with 2 to 10 Vdc or 4 to 20 mAdc with integral resistor
- 5-year warranty



Actuator Specifications

Inputs

Control Signal	MA40-717X — Two wire, SPST or Triacs.
	MF40-7173 — SPDT floating control output, Triacs (500 mA rated), or 2 SPST contacts.
	MS40-717X — proportional, 2 to 10 Vdc or 4 to 20 mAdc with integral 500 Ω resistor.

Power Requirements

All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.

Part Numbers	Power Input @ 50/60 Hz			
	Voltage	Running VA	Holding VA	Watts
MA40-7173	24 Vac ±20%	9.6	4.1	5.4
MS40-7173	24 Vac ±20%	9.4	5.4	7.1
MF40-7173	24 Vac ±20%	10.0	4.3	5.5
MA40-7170	120 Vac ±10%	11.4	9.4	7.2
MS40-7170	120 Vac ±10%	11.1	9.1	7.1
MA40-7171	240 Vac ±10%	11.8	9.5	7.4
MS40-7171	240 Vac ±10%	11.8	10.1	7.2

Impedance 2 to 10 Vdc, 80KΩ. 4 to 20 mAdc, 500Ω. (MS40-717X models only)

Connections 24 inch (61 cm) long appliance cables, 18 AWG color coded leads with 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor.

Motor Type Brushless DC

Actuator Specifications (Continued)

Outputs

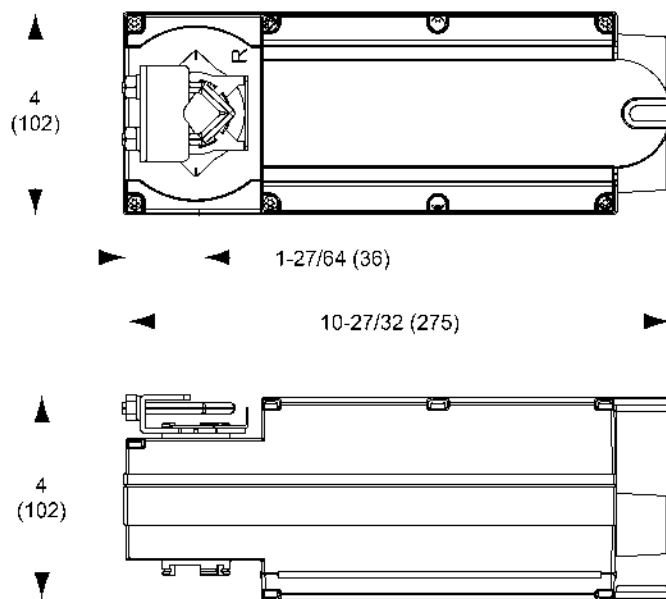
Electrical	Stroke: Electronically limited to $93^{\circ} \pm 1^{\circ}$.
	Timing: Approximate timing is 145 seconds.
Mechanical	Output Torque Rating: 150 lb-in. (17 N-m) minimum, 450 lb-in. (51 N-m) maximum.
	Position Indicator: Pointer and scale are provided for position indication (0° is the normal, or spring-return, position).
	Direction of Rotation: CW or CCW rotation is available through reversible mounting.
	Damper Shaft Clamp: Direct coupled using a through hole output hub.
	Damper Shaft Size: Up to $3/4$ " in diameter, $1/2$ " square. With AM-687, up to 1.05" in diameter and $5/8$ " square.
	Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications.

Environment

Temperature Limits	Shipping and storage: -40 to 160°F (-40 to 71°C) ambient. Operating: -25 to 140°F (-32 to 60°C).
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 1 (IEC IP10). NEMA 4 (IEC IP 56) with customer supplied water tight conduit connectors.

Agency Listings

UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
cUL	Canadian Standards C22.2 No. 4-93.
Australia	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.



Dimensions shown
are in inches (mm).

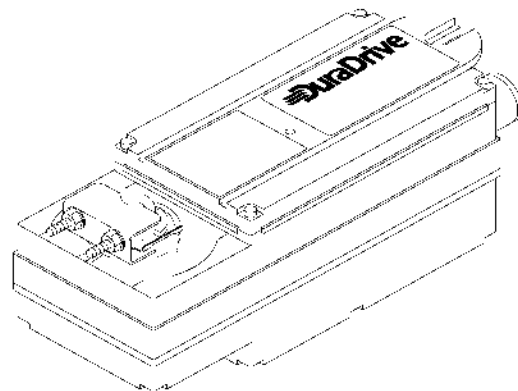
Figure-10 MX40-717X Series Mounting Dimensions.

MF41-6343 and MS41-634X Series Actuators

For non-spring return applications requiring floating or proportional modulation control of dampers and valves in HVAC systems.

Features:

- Direct mount to round or square damper shaft
- 300 lb-in (34 N-m) torque rating
- Overload protection throughout rotation
- Oil immersed gear train provides continuous lubrication
- NEMA 4 housing (IEC IP56)
- Manual override to allow positioning for installation and manual operation
- Automatic current sensing motor control provides extended reliability and repeatable timing
- MF41-6343 models provide floating point control (drive open-hold-drive closed)
- MS41-634X models provide proportional control compatible with 2 to 10 Vdc or 4 to 20 mAdc with integral resistor
- 5-year warranty



Actuator Specifications

Inputs

Control Signal **MF41-6343** — SPDT floating control output, Triacs (500 mA rated), or 2 SPST contacts.
MS41-634X — proportional, 2 to 10 Vdc or 4 to 20 mAdc with integral 500 Ω resistor.

Power Requirements All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.

Part Numbers	Power Input @ 50/60 Hz			
	Voltage	Running VA	Holding VA	Watts
MS41-6343	24 Vac $\pm 20\%$	7.1	5.0	4.8
MS41-6340	120 Vac $\pm 10\%$	9.6	8.8	5.0
MS41-6341	240 Vac $\pm 10\%$	10.1	9.2	5.2
MF41-6343	24 Vac $\pm 20\%$	7.0	3.6	3.8

Connections 24 inch (61 cm) long appliance cables, 1/2 in. conduit connector. For M20 Metric conduit, use AM-756 adaptor.

Motor Type Brushless DC

Outputs

Electrical **Stroke:** Electronically limited to $93^\circ \pm 1^\circ$.

Timing: Approximate timing is 145 seconds.

Mechanical **Output torque rating:** 300 lb-in. (34 N-m) minimum, 600 lb-in. (64 N-m) maximum.

Position indicator: Pointer and scale are provided for position indication).

Direction of rotation: CW or CCW rotation is available through reversible mounting.

Damper Shaft Clamp: Direct coupled using a through hole output hub.

Damper Shaft Size: 3/8" to 1/2" round and 3/8" to 1/2" square. With AM-754, up to 1.05" in diameter and 5/8" square.

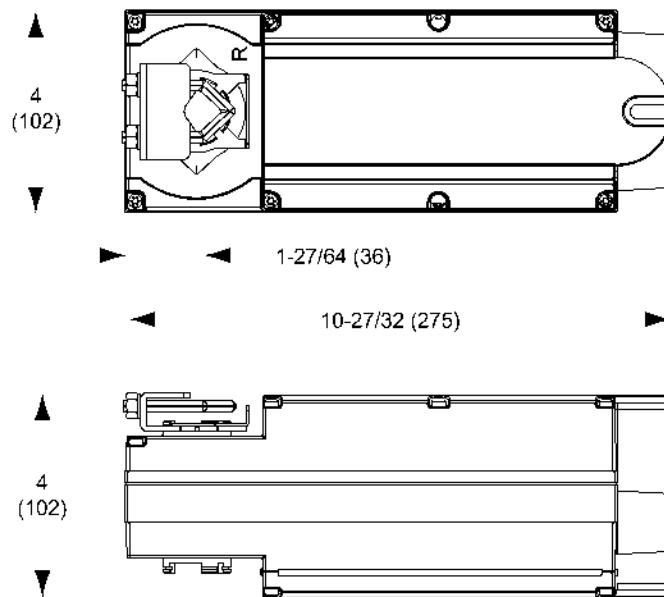
Nominal Damper Area: Actuator sizing should be done in accordance with damper manufacturer's specifications.

Manual Override: Activated by the manual override crank.

Environment

Actuator Specifications (Continued)

Temperature Limits	Shipping and storage: -40 to 160 °F (-40 to 71 °C) ambient. Operating: -25 to 140 °F (-32 to 60 °C).
Humidity	5 to 95% RH, non-condensing.
Locations	NEMA 1 (IEC IP10), NEMA 4 (IEC IP56) with customer supplied water tight conduit connectors.
Agency Listings	
UL	UL 873, Underwriters Laboratories (File #9429 Category Temperature-Indicating and Regulating Equipment).
European Community	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
cUL	Canadian Standards C22.2 No. 4-93.
Australia	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radiocommunications Act 1992.



Dimensions shown
are in inches (mm).

Figure-11 MX41-634X Series Mounting Dimensions.

Damper Actuator Cross Reference

Invensys Building Systems assumes no responsibility for guaranteeing the acceptability of any suggested replacement in this section. The emphasis has been placed on providing a replacement actuator of the same specifications wherever possible. The user must determine the acceptability of the substitution by reviewing the actuator specifications.

The cross reference tables list Invensys Building Systems Direct-Coupled Actuators which may replace obsolete SEC and Belimo devices, as well as older Invensys devices. The tables list two-position, floating, and proportional actuators. The devices to be replaced are listed alphanumerically in the left-hand column, with the suggested Invensys replacement in the center column. The replacement actuators in this list represent what we believe are equivalent units.

SEC to Invensys Actuators

SEC P/N	Invensys P/N	Description
—	MA40-7041	230 Vac 35 lb-in. (4 N-m) (2-position)
—	MA40-7041-501	230 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
—	MA40-7071	230 Vac 60 lb-in. (7 N-m) (2-position)
—	MA41-7071	230 Vac 60 lb-in. (7 N-m) (2-position) w/manual override
—	MA40-7071-502	230 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
—	MA41-7071-502	230 Vac 60 lb-in. (7 N-m) w/aux switch (2-position) w/manual override
—	MA40-7170	120 Vac 150 lb-in. (17 N-m) (17 N-m) (2-position)
—	MA40-7171	240 Vac 150 lb-in. (17 N-m) (2-position)
—	MA40-7173	24 Vac 150 lb-in. (17 N-m) (2-position)
—	MF40-7073	24 Vac 60 lb-in. (7 N-m) (floating)
—	MF41-7073	24 Vac 60 lb-in. (7 N-m) (floating) w/manual override
—	MF40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (floating)
—	MF41-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (floating) w/manual override
—	MF40-7153	24 Vac 133 lb-in. (15 N-m) (floating)
—	MF41-7153	24 Vac 133 lb-in. (15 N-m) (floating) w/manual override
—	MF40-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (floating)
—	MF41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (floating) w/manual override
—	MF40-7173	24 Vac 150 lb-in. (17 N-m) (floating)
—	MS40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (proportional)
—	MS41-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (proportional) w/manual override
—	MS40-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (proportional)
—	MS41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (proportional) w/manual override
—	MS40-7170	120 Vac 150 lb-in. (17 N-m) (proportional)
—	MS40-7171	240 Vac 150 lb-in. (17 N-m) (proportional)
—	MS40-7173	24 Vac 150 lb-in. (17 N-m) (proportional)
—	MS41-6340	120 Vac 300 lb-in. (34 N-m) NSR (proportional)
—	MS41-6341	240 Vac 300 lb-in. (34 N-m) NSR (proportional)
MA-7101	MA40-7040	120 Vac 35 lb-in. (4 N-m) (2-position)
MA-7101-500	MA40-7040-501	120 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
MA-7103	MA40-7043	24 Vac 35 lb-in. (4 N-m) (2-position)
MA-7103-500	MA40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
MA-7201	MA40-7070	120 Vac 60 lb-in. (7 N-m) (2-position)
	MA41-7070	120 Vac 60 lb-in. (7 N-m) (2-position) w/manual override
MA-7201-500	MA40-7070-502	120 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
	MA41-7070-502	120 Vac 60 lb-in. (7 N-m) w/aux switch (2-position) w/manual override
MA-7203	MA40-7073	24 Vac 60 lb-in. (7 N-m) (2-position)
	MA41-7073	24 Vac 60 lb-in. (7 N-m) (2-position) w/manual override
MA-7203-500	MA40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
	MA41-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (2-position) w/manual override
MA-7501	MA40-7150	120 Vac 133 lb-in. (15 N-m) (2-position)
	MA41-7150	120 Vac 133 lb-in. (15 N-m) (2-position) w/manual override

SEC P/N	Invensys P/N	Description
MA-7501-502	MA40-7150-502	120 Vac 133 lb-in. (15 N-m) w/aux switch (2-position)
	MA41-7150-502	120 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
MA-7503	MA40-7153	24 Vac 133 lb-in. (15 N-m) (2-position)
	MA41-7153	24 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
MA-7503-502	MA40-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (2-position)
	MA41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
MA-7505	MA40-7151	230 Vac 133 lb-in. (15 N-m) (2-position)
	MA41-7151	230 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
MA-7505-502	MA40-7151-502	230 Vac 133 lb-in. (15 N-m) w/aux switch (2-position)
	MA41-7151-502	230 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
MF-6103	MF41-6043	24 Vac 35 lb-in. (4 N-m) NSR (floating)
	MF41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (floating), w/two aux switches
	MF41-6043-510	24 Vac 35 lb-in. (4 N-m) NSR (floating), feedback potentiometer
MF-6203	MF41-6083	24 Vac 70 lb-in. (8 N-m) spdt NSR (floating)
	MF41-6083-502	24 Vac 70 lb-in. (8 N-m) NSR (floating), w/two aux switches
	MF41-6083-510	24 Vac 70 lb-in. (8 N-m) NSR (floating), feedback potentiometer
MF-6633	MF41-6153	24 Vac 133 lb-in. (15 N-m) spdt NSR (floating)
MF-6733	MF41-6343	24 Vac 300 lb-in. (34 N-m) spdt NSR (floating)
MF-7103	MF40-7043	24 Vac 35 lb-in. (4 N-m) (floating)
MF-7103-500	MF40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (floating)
MS-6103	MS41-6043	24 Vac 35 lb-in. (4 N-m) NSR (proportional)
	MS41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/two aux switches
	MS41-6043-520	24 Vac 35 lb-in. (4 N-m) NSR (proportional), adjustable start point (offset) and span
	MS41-6043-522	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/two aux switches, adjustable start point (offset) and span
MS-6233	MS41-6083	24 Vac 70 lb-in. (8 N-m) 2-10 Vdc/4-20 mAdc NSR (proportional)
	MS41-6083-502	24 Vac 70 lb-in. (8 N-m) NSR (proportional), w/two aux switches
	MS41-6083-520	24 Vac 70 lb-in. (8 N-m) NSR (proportional), adjustable start point (offset) and span
	MS41-6083-522	24 Vac 70 lb-in. (8 N-m) NSR (proportional), w/two aux switches, adjustable start point (offset) and span
MS-6633	MS41-6153	24 Vac 133 lb-in. (15 N-m) 2-10 Vdc/4-20 mAdc NSR (proportional)
	MS41-6153-502	24 Vac 133 lb-in. (15 N-m) NSR (proportional), w/two aux switches
MS-6733	MS41-6343	24 Vac 300 lb-in. (34 N-m) 2-10 Vdc/4-20 mAdc NSR (proportional)
MS-7103	MS40-7043	24 Vac 35 lb-in. (4 N-m) (proportional)
MS-7103-500	MS40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (proportional)
MS-7203	MS40-7073	24 Vac 60 lb-in. (7 N-m) (proportional)
	MS41-7073	24 Vac 60 lb-in. (7 N-m) (proportional) w/manual override
MS-7433	MS40-7153	24 Vac 133 lb-in. (15 N-m) (proportional)
	MS41-7153	24 Vac 133 lb-in. (15 N-m) (proportional) w/manual override

Invensys Old to Invensys New

Invensys Old	Invensys New	Description
MF40-6043	MF41-6043	24 Vac 35 lb-in. (4 N-m) NSR (floating)
MF40-6043-510	MF41-6043-510	24 Vac 35 lb-in. (4 N-m) NSR (floating), feedback potentiometer
MF40-6043-520	MF41-6043-520	24 Vac 35 lb-in. (4 N-m) NSR (floating), adjustable start point (offset) and span
MF40-6043-522	MF41-6043-522	24 Vac 35 lb-in. (4 N-m) NSR (floating), w/ two aux. switches, adjustable start point (offset) and span
MF40-6083	MF41-6083	24 Vac 70 lb-in. (8 N-m) NSR (floating)
MF40-6153	MF41-6153	24 Vac 133 lb-in. (15 N-m) NSR (floating)
MF40-6343	MF41-6343	24 Vac 300 lb-in. (34 N-m) NSR (floating)
MS40-6043	MS41-6043	24 Vac 35 lb-in. (4 N-m) NSR (proportional)
MS40-6043-510	MS41-6043-510	24 Vac 35 lb-in. (4 N-m) NSR (proportional), feedback potentiometer
MS40-6043-520	MS41-6043-520	24 Vac 35 lb-in. (4 N-m) NSR (proportional), adjustable start point (offset) and span
MS40-6043-522	MS41-6043-522	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/ two aux. switches, adjustable start point (offset) and span
MS40-6083	MS41-6083	24 Vac 70 lb-in. (8 N-m) NSR (proportional)
MS40-6153	MS41-6153	24 Vac 133 lb-in. (15 N-m) NSR (proportional)
MS40-6343	MS41-6343	24 Vac 300 lb-in. (34 N-m) NSR (proportional)

Belimo to Invensys Actuators

Belimo P/N	Invensys P/N	Description
—	MA40-7170	120 Vac 150 lb-in. (17 N-m) (2-position)
—	MA40-7171	240 Vac 150 lb-in. (17 N-m) (2-position)
—	MA40-7173	24 Vac 150 lb-in. (17 N-m) (2-position)
—	MF40-7073	24 Vac 60 lb-in. (7 N-m) (floating)
—	MF41-7073	24 Vac 60 lb-in. (7 N-m) (floating) w/manual override
—	MF40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (floating)
—	MF41-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (floating) w/manual override
—	MF40-7173	24 Vac 150 lb-in. (17 N-m) (floating)
—	MS40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (proportional)
—	MS41-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (proportional) w/manual override
—	MS40-7170	120 Vac 150 lb-in. (17 N-m) (proportional)
—	MS40-7171	240 Vac 150 lb-in. (17 N-m) (proportional)
—	MS40-7173	24 Vac 150 lb-in. (17 N-m) (proportional)
—	MS41-6340	120 Vac 300 lb-in. (34 N-m) NSR (proportional)
—	MS41-6341	240 Vac 300 lb-in. (34 N-m) NSR (proportional)
AF120	MA41-7150	120 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
AF120-S	MA41-7150-502	120 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
AF230	MA41-7151	230 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
AF230-S	MA41-7151-502	230 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
AF24	MA41-7153	24 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
AF24-3	MF41-7153	24 Vac 133 lb-in. (15 N-m) (floating) w/manual override
AF24-S	MA41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (2-position) w/manual override
AF24-3-S	MF41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (floating) w/manual override
AF24-SR	MS41-7153	24 Vac 133 lb-in. (15 N-m) (proportional) w/manual override
AF24-SR-S	MS41-7153-502	24 Vac 133 lb-in. (15 N-m) w/aux switch (proportional) w/manual override
AFR24-SR	MS40-7153	24 Vdc, 133 lb-in. (15 N-m) (proportional)
AFR24-3	MF40-7153	24 Vdc, 133 lb-in. (15 N-m) (floating)
AFR24-3-S	MF40-7153-502	24 Vdc, 133 lb-in. (15 N-m) (floating)
AFR120	MA40-7150	120 Vac, 133 lb-in. (15 N-m) (2-position)

Belimo P/N	Invensys P/N	Description
AFR120-S	MA40-7150-502	120 Vac, 133 lb-in. (15 N-m) (2-position), w/aux switch
AFR24	MA40-7153	24 Vac, 133 lb-in. (15 N-m) (2-position)
AFR24-S	MA40-7153-502	24Vac, 133 lb-in. (15 N-m) (2-position), w/aux switch
GM24	MF41-6343	24 Vac 300 lb-in. (34 N-m) spdt NSR (floating)
GM24-SR	MS41-6343	24 Vac 300 lb-in. (34 N-m) 2 to 10 Vdc/4 to 20 mAdc NSR (proportional)
LF120	MA40-7040	120 Vac 35 lb-in. (4 N-m) (2-position)
LF120-S	MA40-7040-501	120 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
LF230	MA40-7041	230 Vac 35 lb-in. (4 N-m) (2-position)
LF230-S	MA40-7041-501	230 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
LF24	MA40-7043	24 Vac 35 lb-in. (4 N-m) (2-position)
LF24-3	MF40-7043	24 Vac 35 lb-in. (4 N-m) (floating)
LF24-S	MA40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (2-position)
LF24-3-S	MF40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (floating)
LF24-SR	MS40-7043	24 Vac 35 lb-in. (4 N-m) (proportional)
LF24-SR-S	MS40-7043-501	24 Vac 35 lb-in. (4 N-m) w/aux switch (proportional)
LM24	MF41-6043	24 Vac 35 lb-in. (4 N-m) NSR (floating)
LM24-10P	MF41-6043-510	24 Vac 35 lb-in. (4 N-m) NSR (floating), feedback potentiometer
LM24-S	MF41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (floating), w/two aux switches
LM24-SR	MS41-6043	24 Vac 35 lb-in. (4 N-m) NSR (proportional)
—	MS41-6043-520	24 Vac 35 lb-in. (4 N-m) NSR (proportional), adjustable start point (offset) and span
—	MS41-6043-522	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/two aux switches, adjustable start point (offset) and span
—	MS41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/two aux switches
NF120	MA40-7070	120 Vac 60 lb-in. (7 N-m) (2-position)
NF120-S	MA40-7070-502	120 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
NF230	MA40-7071	230 Vac 60 lb-in. (7 N-m) (2-position)
NF230-S	MA40-7071-502	230 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
NF24	MA40-7073	24 Vac 60 lb-in. (7 N-m) (2-position)
NF24-S	MA40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
NF24-SR	MS40-7073	24 Vac 60 lb-in. (7 N-m) (proportional)
NM24	MF41-6083	24 Vac 70 lb-in. (8 N-m) spdt NSR (floating)
	MF41-6083-502	24 Vac 70 lb-in. (8 N-m) NSR (floating), w/two aux switches
	MF41-6083-510	24 Vac 70 lb-in. (8 N-m) NSR (floating), feedback potentiometer
NM24-SR	MS41-6083	24 Vac 70 lb-in. (8 N-m) 2 to 10 Vdc/4 to 20 mAdc NSR (proportional)
	MS41-6083-502	24 Vac 70 lb-in. (8 N-m) NSR (proportional), w/two aux switches
	MS41-6083-520	24 Vac 70 lb-in. (8 N-m) NSR (proportional), adjustable start point (offset) and span
	MS41-6083-522	24 Vac 70 lb-in. (8 N-m) NSR (proportional), w/two aux switches, adjustable start point (offset) and span
SM24	MF41-6153	24 Vac 133 lb-in. (15 N-m) spdt NSR (floating)
SM24-SR	MS41-6153	24 Vac 133 lb-in. (15 N-m) 2 to 10 Vdc/4 to 20 mAdc NSR (proportional)
	MS41-6153-502	24 Vac 133 lb-in. (15 N-m) NSR (proportional), w/two aux switches

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