



# linear globe valve actuators

## Product Guide

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Climate Controls Americas is a leading supplier of products, systems and services that control indoor environment, temperature, comfort and climate. With hundreds of patents awarded for design and technology, we manufacture the most complete line of HVAC control products in the industry. Our Six Sigma practices and internationally recognized ISO 9001 quality certification assures that our products are manufactured to the highest standards. Our products interact to effectively manage building comfort and energy use in accordance with environmental issues.

### **Invensys Climate Controls**

As one of the world's largest manufacturers of building control products, Climate Controls has maintained a long history of combining innovative Engineering with customer requirements to build HVAC control products of lasting value and exceptional reliability. Climate Controls provides a full line of easy-to-use systems and component products to optimize commercial building operation, offering a single source for all your building control needs.

### **DuraDrive Linear Valve Actuators**

Our Linear Actuators are designed to mount directly onto two-way or three-way globe valves with integral linkage. They provide linear travel to operate valves in chilled water, hot water and steam applications. Offering a large selection of durable and cost effective Spring Return and Non-Spring Return models to meet your HVAC needs.

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## New Spring Return Linear Series



- 105 lbf (487 N) with 1/2" (13mm) nominal linear stroke
- Direct mounts to globe valves with integral linkage
- Available in Two-Position, Floating and Proportional models with Spring Return
- Polymer enclosure is air plenum rated NEMA 2 and UL Type 2 approved
- Automatically sets input span to match valve travel
- Compact size for ease of installation in limited space
- Manual override to allow positioning of valve and preload
- UL, cUL, CE and C-Tick approvals

### MX51-71X3 and MX61-71X3 Series

- 220 lbf (979 N) with 5/8" (16 mm) or 1-1/16" (27 mm) linear stroke
- Direct mounts to globe valves with integral linkage
- Available in Two-Position, Floating and Proportional models with Spring Return
- Automatically sets input span to match valve travel
- Manual override to allow positioning of valve and preload
- UL, cUL, CE and C-Tick approvals



### MX51-7203 and MX61-7203 Series





## Linear Spring Return Actuators MX51-710X, 105 lbf Series



### Easy Installation

Direct-coupled connection for quick installation

### Operating Temperature

Operating temperature rating -22° to 140°F

### Enhanced Feature Save Time

Actuator automatically sets input span to match valve travel adjusting to exact stroke to ensure proper valve close-off. Eliminates manual linkage adjustments!

### Compact Size

Allows more room to maneuver in tight spaces

### Manual Override

Standard feature, included in price

### Torque Overload Protection

Prevents motor burn out, extending actuator life

### 5-Year Warranty

5-year warranty from date of manufacture, represents our dedication to quality



Note: For illustration purposes only. Actual size not shown.



## Linear Spring Return Actuators MX51-720X, 220 lbf Series



### Easy Field Installation

Integral linkage simplifies installation

### Low Power Requirements

Fewer transformers and less Energy = Savings!

### High Temperature Ratings

Operates in -22°F to 140°F ambient temperature with up to 366°F fluid through the valve

### Stall Protection

Electronic overload protection prevents actuator damage

### Highly Visible Position Indicator

Shows orientation of valve position allowing fast and accurate setup and checkout

### Wide Range in Valves

MX51-720X Series; 1-1/4" to 2" (VB-7XXX)  
MX61-720X Series; 2-1/2" to 4" (VB-9XXX)

### Low Noise Operation

Quiet, brushless motor technology

### 5-Year Warranty

5-year warranty from date of manufacture, represents our dedication to quality



Note: For illustration purposes only. Actual size not shown.



## Linear Non-Spring Return Actuators MF-631X3 Series



### Available Torque

220 lbf (935 N) output force with automatic load limit

### Control Options

Floating actuator controlled by a SPDT center off controller or a DDC controller with equivalent control action (contact or triac)

### Temperature Ratings

Wide operating ambient range of 0 to 140°F

### Easy Installation

Integral linkage for 1/2" to 2" valves

### Optional Features

- Adjustable SPDT auxiliary switch on -500 models
- MF-63123 available with position feedback potentiometer
- Optional control module cards for proportional control: MFC-8000 for 6-9 Vdc and MFC-420 for 4-20 mAdc

### Rugged Construction

Die Cast housing and all-metal gear train built to withstand harsh conditions

Note: For illustration purposes only. Actual size not shown.



## Linear Non-Spring Return Actuators MX-2XXX3 Series



### Available Torque

45 lbf (200 N) output with automatic load limit for self-adjusting travel and long motor life (MS-22353 and MF-22XX3 Series)

80 lbf (355 N) output (MF-23XX3 Series)

### Optional Control Choices

Floating actuator controlled by DDC controller with Contact or Triac output or SPDT center off controller (MF-22XX3 Series) Proportional actuator controlled by 2-10 Vdc or 4-20 mA (MS-22353)

### Chilled Fluid Applications

Thermally isolated models available for use with chilled fluids

### Easy Actuator Installation

Integral linkage for two and three-way stem up open valve bodies allow easy connection to a wide range of valve sizes

### Synchronous Motor Technology

Synchronous motor for consistent timing

### Manual Override

Allows actuator to be manually set upon loss of power releases automatically when power is restored

### Precision Control

Optional feedback potentiometer for precision control and position indication (MS-22353 and MF-22353 Series)

Note: For illustration purposes only. Actual size not shown.



## **DuraDrive Linear Spring Return Part Numbering System**

*To order your DuraDrive Actuator choose the following:*



## **Non-Spring Return Part Numbering System**

*To order your Actuator choose the following:*



## Actuator Selection Chart

### MX51-710X, 105 lbf Series Spring Return Actuators

Control Signal	Part Number	Actuator Code	Actuator Power Input						Approximate Stroke Timing in Seconds @ 70F (21°C) <sup>a</sup>		Valve <sup>b</sup> Size
			Voltage	Wiring System	Running		Holding	Powered	Spring Return		
					50/60 Hz VA	DC W	50/60 Hz W				
Two Position	MA51-7103-000		24Vac ±20% 20-30 Vdc	Appliance Wire	5.3	4.1	0.15	1.2	44	19	Need info
	MA51-7103-100		24Vac ±20% 20-30 Vdc	Plenum Cable	5.3	4.1	0.15	1.2	44	19	
	MA51-7100-000		120 Vac ±10% 50/60 Hz	Appliance Wire	7.9	6.2	n/a	2.1	44	19	
	MA51-7101-000		230 Vac ±10% 50/60 Hz	Appliance Wire	7.4	5.4	n/a	2.1	44	19	
Floating	MF51-7103-000		24Vac ±20% 20-30 Vdc	Appliance Wire	6.9	4.7	0.16	2.1	60	16	
	MF51-7103-100		24Vac ±20% 20-30 Vdc	Plenum Cable	6.9	4.7	0.16	2.1	60	16	
Proportional	MS51-7103-000 <sup>e</sup>		24Vac ±20% 20-30 Vdc	Appliance Wire	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-100		24Vac ±20% 20-30 Vdc	Plenum Cable	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-020		24Vac ±20% 20-30 Vdc	Appliance Wire	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-120		24Vac ±20% 20-30 Vdc	Plenum Cable	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-030		24Vac ±20% 20-30 Vdc	Appliance Wire	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-130		24Vac ±20% 20-30 Vdc	Plenum Cable	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-040 <sup>f</sup>		24Vac ±20% 20-30 Vdc	Appliance Wire	7.8	4.9	0.16	3.4	60	16	
	MS51-7103-140 <sup>f</sup>		24Vac ±20% 20-30 Vdc	Plenum Cable	7.8	4.9	0.16	3.4	60	16	
	MS51-7103-050		24Vac ±20% 20-30 Vdc	Appliance Wire	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-150		24Vac ±20% 20-30 Vdc	Plenum Cable	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-060		24Vac ±20% 20-30 Vdc	Appliance Wire	6.6	4.2	0.14	1.5	60	16	
	MS51-7103-160		24Vac ±20% 20-30 Vdc	Plenum Cable	6.6	4.2	0.14	1.5	60	16	

<sup>a</sup> Timing was measured with the actuator mounted on a VB-7XXX Series valve.

<sup>b</sup> See chart below for general information on close-off ratings.

Actuator P/N	Control Type	Close-Off Pressure Rating (PSI)					
		1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
MX51-710X-XXX	Two Position, Floating or Proportional	Need info					

<sup>c</sup> Current VB-7XXX Series Valves and obsolete VB-9XXX Series Valves (1-1/4" only).

<sup>d</sup> Current VB-9XXX Series Valves (2-1/4" to 4") and obsolete VB-9XXX series valves (1-1/2" to 2").

<sup>e</sup> 4 - 20 mAdc with AM-708 500 ohm field-installed resistor.

<sup>f</sup> Has 20 Vdc power supply for System 8000 applications.



# Actuator Selection Chart

## MXX1-720X, 220 lbf Series Spring Return Actuators

Control Action	Part Number	Actuator Code	Actuator Power Input								Linear Stroke Inches	Approximate Stroke Timing in Seconds @ 70°F (21°C) <sup>a</sup>		Output Force Rating lb.-(Newton)		Valve <sup>b</sup> Size
			Voltage		Running		Holding		Powered	Spring Return		Min.	Max. Stall			
			50 Hz	60 Hz	DC	50/60 Hz										
			VA	W	VA	W	Amps	W								
Two Position	MA51-7203	593	24Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	.29	2.8	5/8	<100	<35	220 (979)	495 (2202)	1-1/4" to 2" <sup>c</sup>	
	MA51-7200	592	120 Vac ±10%	11.7	8.8	10.0	8.4	N/A	3.6/5.0	5/8	<100	<35	220 (979)	495 (2202)	1-1/4" to 2" <sup>c</sup>	
	MA51-7201	591	230 Vac ±10%	15.5	9.5	10.6	8.5	N/A	4.6/3.3	5/8	<100	<35	220 (979)	495 (2202)	1-1/4" to 2" <sup>c</sup>	
	MA61-7203	596	24 Vac ±20% 22-30 Vdc	9.8	7.5	9.7	7.5	.29	2.8	1-1/16	<190	<40	220 (979)	495 (2202)	2-1/2" to 4" <sup>d</sup>	
	MA61-7200	595	120 Vac ±10%	11.7	8.8	10.0	8.4	N/A	3.6/5.0	1-1/16	<190	<40	220 (979)	495 (2202)	2-1/2" to 4" <sup>d</sup>	
	MA61-7201	594	230 Vac ±10%	15.5	9.5	10.6	8.5	N/A	4.6/3.3	1-1/16	<190	<40	220 (979)	495 (2202)	2-1/2" to 4" <sup>d</sup>	
Floating	MF51-7203	593	24 Vac ±20% 22-30 Vdc	9.8	7.7	9.7	7.7	.30	3.3	5/8	<100	<35	220 (979)	495 (2202)	1-1/4" to 2" <sup>c</sup>	
	MF61-7203	596	24 Vac ±20% 22-30 Vdc	9.8	7.7	9.7	7.7	.30	3.3	1-1/16	<190	<40	220 (979)	495 (2202)	2-1/2" to 4" <sup>c</sup>	
Proportional 2 - 10 Vdc	MS51-7203	593	24 Vac ±20% 22-30 Vdc	9.8	7.4	9.7	7.4	.28	2.9	5/8	<100	<35	220 (979)	495 (2202)	1-1/4" to 2" <sup>d</sup>	
	MS61-7203	596	24 Vac ±20% 22-30 Vdc	9.8	7.4	9.7	7.4	.28	2.9	1-1/16	<190	<40	220 (979)	495 (2202)	2-1/2" to 4" <sup>c</sup>	

<sup>a</sup> Timing was measured with no load applied to the actuator.

<sup>b</sup> See chart below for general information on close-off ratings.

Actuator P/N	Control Type	Close-Off Pressure Rating (PSI)					
		1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
MX51-720X	Two Position, Floating or Proportional	150	100	65	—	—	—
MX61-720X	—	—	—	—	33	22	12

<sup>c</sup> Current VB-7XXX Series Valves and obsolete VB-9XXX Series Valves (1-1/4" only).

<sup>d</sup> Current VB-9XXX Series Valves (2-1/4" to 4") and obsolete VB-9XXX series valves (1-1/2" to 2").



## Actuator Selection Chart

### MF-22XX3, 45 lbf Series Non-Spring Return Actuators

Control Action	Part Number	Actuator Code	Actuator Power Input			Feedback 15K 3/4 Pot. <sup>a</sup>	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke		Max. Stroke in in. (mm)	
			Voltage (+20%, -15%)	Hz	VA		60 Hz	50 Hz		
Floating <sup>bc</sup>	MF-22203		24 (Class 2 Power Supply)	50	60	1.5	No	126 ±30 sec.	151 ±30 sec.	9/16 (14.3)
	MF-22303						No			
	MF-22323						Yes			

<sup>a</sup> Running or manually adjusting the actuator before it is mounted to a valve changes the potentiometer setting and could also cause damage.

<sup>b</sup> xxxx

<sup>c</sup> xxxx

### MS-22353, 45 lbf Series Non-Spring Return Actuators

Control Action	Part Number	Actuator Code	Actuator Power Input			Feedback 2 to 10 Vdc <sup>a</sup>	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke		Max. Stroke in in. (mm)	
			Voltage (+20%, -15%)	Hz	VA		60 Hz	50 Hz		
Proportional <sup>bc</sup> 2 - 10 Vdc	MS-22353		24 Vac (Class 2 Power Supply)	50	60	4	Yes	126	151	9/16 (14.3)

<sup>a</sup> Running or manually adjusting the actuator before it is mounted to a valve changes the potentiometer setting and could also cause damage.

<sup>b</sup> xxxx

<sup>c</sup> xxxx



## Actuator Selection Chart

### MF-23XX3, 80 lbf Series Non-Spring Return Actuators

Control Action	Part Number	Actuator Code	Actuator Power Input				Feedback 15K ohm Pot. <sup>a</sup>	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke		Max. Stroke in in. (mm)
			Voltage (+20%, -15%)	Hz	VA	60 Hz		50 Hz		
Floating <sup>bc</sup>	MF-23203		24 (Class 2 Power Supply)	50	60	1.5	No	126	151	9/16 (14.3)
	MF-23303						No			
	MF-23323						Yes			

<sup>a</sup> Running or manually adjusting the actuator before it is mounted to a valve changes the potentiometer setting and could also cause damage.

<sup>b</sup> xxxx

<sup>c</sup> xxxx

### MF-631X3, 210 lbf Series Non-Spring Return Actuators

Control Signal	Part Number	Actuator Code	Actuator Power Input				Feedback (Ohms) 15K pot <sup>a</sup>	Aux Switch	Stroke in Inches (mm)	Timing in Seconds at 75°F		
			Voltage (+10/-15%)	Hz	Amps	Watts				60 Hz	50 Hz	
Floating <sup>bc</sup>	MF-63103		24 Vac (Class II power supply)	50	60	0.30	6	No	No	1/2 (13) 3/4 (19) 1 (25)	60 90 120	72 108 144
	MF-63103-500							No	Yes			
	MF-63123							Yes	No			
	MF-63123-500							Yes	Yes			

<sup>a</sup> Running or manually adjusting the actuator before it is mounted to a valve changes the potentiometer setting and could also cause damage.

<sup>b</sup> xxxx

<sup>c</sup> xxxx



## MX51-710X, 105 lbf Series Spring Return Actuators

DuraDrive Linear Actuators are designed to mount directly onto two-way or three-way Globe Valves with integral linkage.



### Features:

- Two position models controlled by SPST controller
- Floating models controlled by SPDT floating controllers
- Proportional models controlled by 0-3 Vdc, 6-9 Vdc, 0-10 Vdc, 2-10 Vdc, or 4-20 mAdc
- 105 lbf (467 N) with 1/2" (13 mm) nominal linear stroke
- 24 Vac, 120 Vac, and 230 Vac models
- Durable polymer housings rated for up to NEMA 2/IP54 and for use in plenums
- Overload protection throughout stroke
- Automatically sets input span to match valve travel.
- Compact size to allow installation in limited space
- Manual override to allow positioning of valve and preload
- Direct mount to valves with integral linkage
- Five year warranty

### Specifications

Specifications											
Inputs											
<b>Control Signal</b>	<b>MA51-710X</b> — Two-Position.										
	<b>MF51-7103</b> — Floating point control, 24 Vac.										
	<b>MS51-7103</b> — Proportional, 2 - 10 Vdc, 0 - 3 Vdc, 6 - 9 Vdc, 0 - 10 Vdc or 4 - 20 mAdc.										
Power Requirements											
	All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.										
Part Number	Voltage	Wiring System	Power Input				Approximate Stroke Timing in Seconds @ 70F (21°C) <sup>a</sup>				
			Running 50/60 Hz VA	Running 50/60 Hz W	DC Amps	Holding 50/60 Hz W	Powered	SR			
MA51-7103-000	24Vac ±20% 20-30 Vdc	Appliance Wire	5.3	4.1	0.15	1.2	44	19			
MA51-7103-100		Plenum Cable	5.3	4.1	0.15	1.2					
MA51-7100-000	120 Vac ±10% 50/60 Hz	Appliance Wire	7.9	6.2	n/a	2.1	60	16			
MA51-7101-000		Appliance Wire	7.4	5.4	n/a	2.1					
MF51-7103-000	24Vac ±20% 20-30 Vdc	Appliance Wire	6.9	4.7	0.16	2.1	60	16			
MF51-7103-100		Plenum Cable	6.9	4.7	0.16	2.1					
MS51-7103-000		Appliance Wire	6.6	4.2	0.14	1.5					
MS51-7103-100		Plenum Cable	6.6	4.2	0.14	1.5					
MS51-7103-020		Appliance Wire	6.6	4.2	0.14	1.5					
MS51-7103-120		Plenum Cable	6.6	4.2	0.14	1.5					
MS51-7103-030		Appliance Wire	6.6	4.2	0.14	1.5					
MS51-7103-130		Plenum Cable	6.6	4.2	0.14	1.5					
MS51-7103-040 <sup>b</sup>		Appliance Wire	7.8	4.9	0.16	3.4					
MS51-7103-140 <sup>b</sup>		Plenum Cable	7.8	4.9	0.16	3.4					
MS51-7103-050		Appliance Wire	6.6	4.2	0.14	1.5					
MS51-7103-150		Plenum Cable	6.6	4.2	0.14	1.5					
MS51-7103-060		Appliance Wire	6.6	4.2	0.14	1.5					
MS51-7103-160		Plenum Cable	6.6	4.2	0.14	1.5					
<b>Connections</b>		3 ft (91 cm) appliance wire or plenum cables, enclosure accepts 1/2" (13 mm) conduit connectors. For M20 Metric connector, use AM-756 adaptor.									
<b>Motor Type</b>	Brushless DC										
Outputs											
<b>Electrical</b>	<b>Position Feedback Voltage (proportional or floating only)</b>										
	For voltage ranges, the feedback signal is the same range as the input signal. The 4-20mAdc current range and floating actuators have a 2-10 Vdc position feedback signal. The position feedback signal can supply up to 0.5 mA to operate up to four additional slave actuators.										

<sup>a</sup> Timing was measured with the actuator mounted on a VB-7XXX Series valve.

<sup>b</sup> Has 20 Vdc power supply for System 8000 applications.

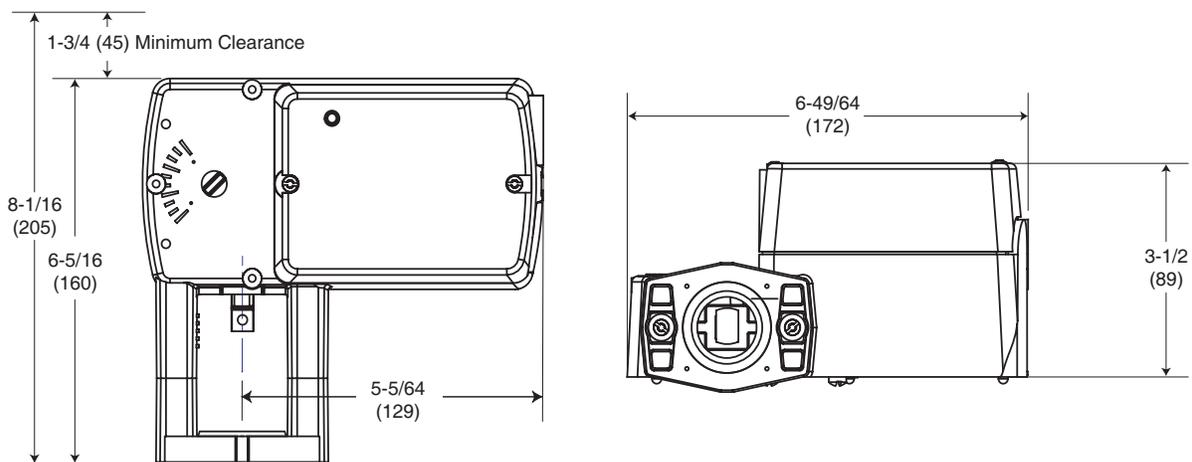


## MX51-710X, 105 lbf Series Spring Return Actuators

### Specifications Continued

<b>Mechanical</b>	<b>Output torque rating:</b> 105 lbf (467 N)
	<b>Approx. Stroke Timing:</b> See Power Requirements table on page 14.
	<b>Manual Override:</b> Allows positioning of valve and preload using manual crank.
	<b>Right/Left Jumper:</b> Permits reverse acting/direct acting linear motion (MS51 only).
<b>Environment</b>	
<b>Temperature Limits</b>	<b>Shipping &amp; Storage:</b> -40 to 160 °F (-40 to 71 °C).
	<b>Operating:</b> -22 to 140 °F (-30 to 60 °C).
	<b>Temperature Restrictions:</b> For maximum ambient 140 °F (60 °C) the maximum allowable fluid temperature should not exceed 366 °F (186 °C).
<b>Humidity</b>	15 to 95% RH, non-condensing.
<b>Locations</b>	NEMA 1. NEMA 2 (enclosure is air plenum rated), UL Type 2 (IEC IP54) with customer supplied water tight conduit connectors.
<b>Agency Listings</b>	
<b>UL</b>	UL-873, Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment).
<b>European Community</b>	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
<b>cUL</b>	UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.
<b>Australia</b>	This product meets requirements to bear the C-Tick Mark according to the terms specified by the Communications Authority under the Radio Communications Act 1992.
<b>Accessories</b>	
<b>AM-756</b>	Metric Conduit Adapter M20 x 1.5 to 1/2" NPT
<b>AM-770</b>	Replacement valve linkage parts kit
<b>AM-764</b>	Linkage kit for damper applications
<b>For MS51-7103 Models</b>	
<b>AM-703</b>	Input rescaling module, adjust signals to 2-10 Vac, zero and span adjust
<b>AM-704</b>	Interface, pulse width modulation (PWM)
<b>AM-705</b>	Positioner (NEMA 4 housing)
<b>AM-706</b>	Min and/or manual positioner for flush panel mount
<b>AM-708</b>	500 ohm resistor for 4 to 20 mA control signal

### Mounting Dimensions



Dimensions shown  
are in inches (mm).



## Actuator Specifications and Mounting Dimensions

DuraDrive Linear Actuators are designed to mount directly onto two-way or three-way valves with integral linkage.



### Features:

- Two position models controlled by SPST controller or triacs
- Floating models controlled by SPDT floating controllers or triacs
- Proportional models controlled by 2-10 Vdc, or 4-20 mAdc with the addition of a 500 ohm resistor
- 220 lbf (979 N) with 5/8" (16 mm) or 1-1/16" (27 mm) linear stroke
- 24 Vac, 120 Vac, and 230 Vac models
- Rugged die-cast housings rated for NEMA 2, UL Type 2/IP54
- Overload protection throughout stroke
- Compact size to allow installation in limited space
- Manual override to allow positioning of valve and preload
- Direct mount to valves with integral linkage
- Five year warranty

### MXX1-720X Series Spring Return Actuators

#### Specifications

##### Inputs

<b>Control Signal</b>	<b>MAX1-720X</b> — On-off spring return, SPST control contacts or Triacs (500mA rated).
	<b>MFX1-7203</b> — Floating point, SPDT control contacts or Triacs (500 mA rated) 24 Vac.
	<b>MSX1-7203</b> — Proportional, 2 - 10 Vdc or 4 - 20 mAdc with 500 ohm resistor.
<b>Power Requirements</b>	<b>MAX1-720X</b> — 24 Vac $\pm$ 20%, 22 to 30 Vdc, 120 Vac $\pm$ 10%, 230 Vac $\pm$ 10%, 50/60 Hz. All 24 Vac circuits are Class 2. All circuits 30 Vac and above are Class 1.
	<b>MFX1-7203, MSX1-7203</b> — 24 Vac $\pm$ 20%, Class 2, 22 to 30 Vdc.

Part Number	Actuator Power Input	Approximate Stroke Timing in Seconds @ 70°F (21°C) <sup>a</sup>							
		Running					Powered	Spring Return	
		50 Hz		60 Hz		DC			
Voltage	VA	W	VA	W	Amps	Holding 50/60 Hz W			
<b>MA51-7203</b>	24Vac $\pm$ 20% 22-30 Vdc	9.8	7.5	9.7	7.5	.29	2.8	<100	<35
<b>MA51-7200</b>	120 Vac $\pm$ 10%	11.7	8.8	10.0	8.4	N/A	3.6/5.0		
<b>MA51-7201</b>	230 Vac $\pm$ 10%	15.5	9.5	10.6	8.5	N/A	4.6/3.3		
<b>MA61-7203</b>	24 Vac $\pm$ 20% 22-30 Vdc	9.8	7.5	9.7	7.5	.29	2.8	<190	<40
<b>MA61-7200</b>	120 Vac $\pm$ 10%	11.7	8.8	10.0	8.4	N/A	3.6/5.0		
<b>MA61-7201</b>	230 Vac $\pm$ 10%	15.5	9.5	10.6	8.5	N/A	4.6/3.3		
<b>MF51-7203</b>	24 Vac $\pm$ 20% 22-30 Vdc	9.8	7.7	9.7	7.7	.30	3.3	<100	<35
<b>MF61-7203</b>	24 Vac $\pm$ 20% 22-30 Vdc	9.8	7.7	9.7	7.7	.30	3.3	<190	<40
<b>MS51-7203</b>	24 Vac $\pm$ 20% 22-30 Vdc	9.8	7.4	9.7	7.4	.28	2.9	<100	<35
<b>MS61-7203</b>	24 Vac $\pm$ 20% 22-30 Vdc	9.8	7.4	9.7	7.4	.28	2.9	<190	<40

<sup>a</sup> Timing was measured with no load applied to the actuator.

**Connections** 3 ft (91 cm) appliance cables, 1/2 inch (13 mm) conduit connectors. For M20 Metric conduit, use AM-756 adaptor.

**Motor Type** Brushless DC.

#### Outputs

**Electrical** **Position Feedback Voltage (proportional only):**

**MSX1-7203** — 2 - 10 Vdc (max. 0.5 mA) output signal for position feedback or to operate up to four additional slave actuators.

**Mechanical** **Output torque rating:** 220 lbf (979 N)

**Linear Stroke:** **MX51-720X** — 5/8" (16 mm). **MX61-720X** — 1-1/16" (27 mm).

**Approx. Stroke Timing:** 100 seconds for 5/8" stroke. 190 seconds for 1-1/16" stroke.

**Manual Override:** Allows positioning of valve and preload using manual crank.

**Right/Left Switch:** Permits reverse acting/direct acting linear motion (MSX1 only).



## MXX1-720X Series Spring Return Actuators

### Specifications Continued

#### Environment

##### Ambient Temperature Limits

**Shipping and storage:** -40 to 160 °F (-40 to 71 °C).

**Operating:** 0 to 140 °F (-18 to 60 °C).

**Temperature Restrictions:**

Actuator	Max. Allowable Ambient @ Max. Fluid Temperatures	Valve Body
MX51-720X	140 °F (60 °C) @ 281 °F (138 °C)	VB-721X, 722X
	120 °F (49 °C) @ 300 °F (149 °C)	VB-73XX
	100 °F (38 °C) @ 340 °F (171 °C)	VB-725X, 726X
	90 °F (32 °C) @ 366 °F (186 °C)	VB-727X, 728X
MX61-720X	140 °F (60 °C) @ 300 °F (149 °C)	VB-9XXX, 2-1/2" to 4" current production

**Humidity** 15 to 95% RH, non-condensing.

**Locations** NEMA1, NEMA 2, UL Type 2 (IEC IP54) with customer supplied watertight conduit connectors.

#### Agency Listings

**UL** UL-873, Underwriters Laboratories (File #E9429 Category Temperature-Indicating and Regulating Equipment).

**European Community** EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).

**cUL** UL Listed for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.

**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.

#### Accessories

**AM-763** 1/8" Hexcrank for manual override

**AM-756** Metric conduit adapter M20 x 1.5 to 1/2" NPT

**AM-731** Mounting kit - MX51-720X (included with actuator)

**AM-732** Mounting kit - MX61-720X (included with actuator)

**AM-733** Obsolete VB-9XXX retrofit kit 1-1/2 to 2" valves after 9404 date code

**AM-734** Obsolete VB-9XXX retrofit kit 1-1/2 to 2" valves prior to 9404 date code

#### For MSX1-7203 Models

**AM-703** Input rescaling module, adjust signals to 2-10 Vac, zero and span adjust

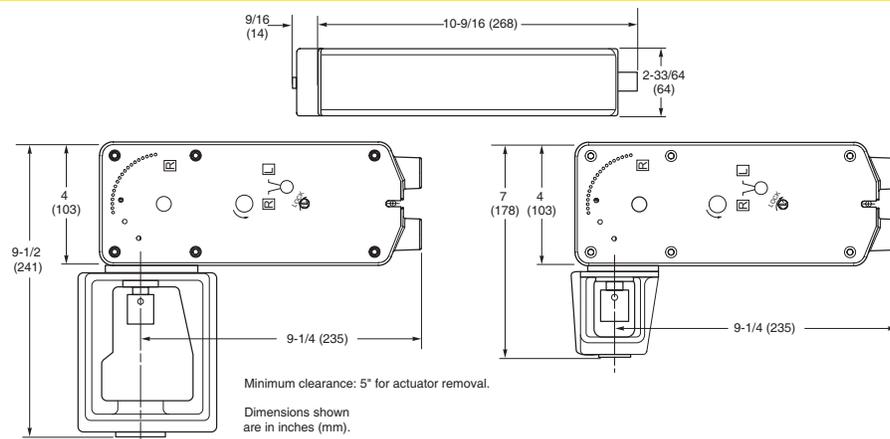
**AM-704** Interface, pulse width modulation (PWM)

**AM-705** Positioner (NEMA 4 housing)

**AM-706** Min and/or manual positioner for flush panel mount

**AM-708** 500 ohm resistor for 4 to 20 mA control signal

## Mounting Dimensions



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## Actuator Specifications and Mounting Dimensions

The MF-631X3 Series floating valve actuator is an air-immersed, non-spring return actuator to be used with floating controllers.



### Features:

- Floating actuator controlled by SPDT floating controller or DDC controller with equivalent control action (contact or triac)
- Optional control module cards for proportional control: MFC-8000 for 6 - 9 Vdc and MFC-420 for 4 - 20 mAdc
- 210 lbf (935 N) output with automatic load limit
- Wide operating ambient range of 0 to 140°F
- Synchronous motor assures accurate stroke timing
- MF-63123 series available with a position feedback potentiometer
- Self-adjusting travel and position feedback potentiometer mechanisms
- Manual override operation with automatic release
- Adjustable SPDT auxiliary switch on -500 models
- Rugged construction: die cast housing, double thread 1/2" dia. stainless steel jackscrew, roller thrust bearings, and all-metal gear train
- Integral linkage for 1/2" to 2" valves (Optional linkage for 2-1/2" to 4" valves)

### MF-631X3 Non-Spring Return Actuator

#### Specifications

##### Inputs

**Control Signal** MF-631X3

**SPDT Floating Control Contacts or 2 SPST Control Contacts:**

Recommended minimum contact rating of 1/2 Amp at 24 Vac, inductive load.

**Triacs:** DDC controller output must be able to switch 1/2 amp inductive load. Recommended triac voltage rating of 200 Vac, minimum.

##### Power Requirements

All 24 Vac circuits are Class 2.

Part Numbers	Actuator Power Input				Feedback (ohms)	Timing in Seconds @75°F				
	Voltage (+10/-15%)	Hz	Amps	Watts		15K	60 Hz	50 Hz		
MF-63103	24 Vac (Class II power supply)	50	60	0.30	6	No	60	72		
MF-63103-500						No			90	108
MF-63123						Yes			120	144
MF-63123-500						Yes				

**Connections** Coded screw terminals.

**Motor Type** Synchronous

##### Outputs

**Electrical** **Auxiliary Switch (-500 models):** SPDT, adjustable over actuator stroke of 1" (25 mm).

Rating: 1 amp at 24 Vac, 50/60 Hz. Pilot duty rating: 24 VA at 24 Vac.

**Position Feedback Signals:** Reference Power Requirements Table above.

**Connections:** Coded screw terminals.

**Mechanical** **Force:** 210 lbf (935 N) minimum, with automatic load limit.

**Stroke:** Up to maximum of 1" (25 mm) self-adjusting.

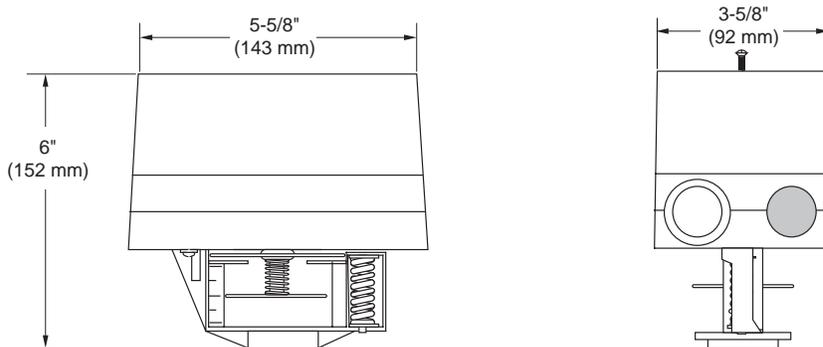
**Timing:** 120 seconds per inch (25 mm) at 60 Hz. 144 seconds per inch (25 mm) at 50 Hz. Reference Power Requirements Table above.



## MF-631X3 Non-Spring Return Actuators

Specifications Continued																						
Environment																						
<b>Ambient Temperature Limits</b>	<b>Shipping and storage:</b> -40 to 160°F (-40 to 71°C). <b>Operating:</b> Minimum 0°F (-18°C). Maximum See table below.																					
	<table border="1"> <thead> <tr> <th>Valve Body Part Number</th> <th>Maximum Allowable Ambient Temperature<sup>a</sup> Maximum Allowable Fluid Temperature</th> <th>Temperature °F (°C)</th> </tr> </thead> <tbody> <tr> <td>VB-7213-0-4-P VB-7214-0-4-P VB-7215-0-4-P VB-9213-0-X-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>125 (52) 281 (138)</td> </tr> <tr> <td>VB-7253-0-4-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>100 (38) 340 (171)</td> </tr> <tr> <td>VB-7273-0-4-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>100 (38) 366 (185)</td> </tr> <tr> <td>VB-7313-0-4-P VB-7314-0-4-P VB-7315-0-4-P VB-9313-0-X-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>125 (52) 281 (138)</td> </tr> <tr> <td>VB-9313-0-5-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>100 (38) 300 (149)</td> </tr> <tr> <td>VB-7323-0-4-P</td> <td>Maximum Ambient Temperature Max. Allowable Fluid Temperature</td> <td>125 (52) 281 (138)</td> </tr> </tbody> </table>	Valve Body Part Number	Maximum Allowable Ambient Temperature <sup>a</sup> Maximum Allowable Fluid Temperature	Temperature °F (°C)	VB-7213-0-4-P VB-7214-0-4-P VB-7215-0-4-P VB-9213-0-X-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	125 (52) 281 (138)	VB-7253-0-4-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	100 (38) 340 (171)	VB-7273-0-4-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	100 (38) 366 (185)	VB-7313-0-4-P VB-7314-0-4-P VB-7315-0-4-P VB-9313-0-X-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	125 (52) 281 (138)	VB-9313-0-5-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	100 (38) 300 (149)	VB-7323-0-4-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	125 (52) 281 (138)
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VB-7323-0-4-P	Maximum Ambient Temperature Max. Allowable Fluid Temperature	125 (52) 281 (138)																				
	<small><sup>a</sup> When used with chilled water, the maximum allowable ambient temperature is 140 °F (60 °C). When used with hot water, the maximum allowable ambient temperature is affected by heat transference from the valve. This allows slightly lower temperatures, as listed, for proper operation of the actuator.</small>																					
<b>Humidity</b>	5 to 95% RH, non-condensing.																					
<b>Locations</b>	NEMA Type 1.																					
<b>Agency Listings (Actuator)</b>																						
<b>UL</b>	UL-873, Underwriters Laboratories (File # E9429 Category Temperature Indicating and Regulating Equipment).																					
<b>European Community</b>	EMC Directive (89/336/EEC).																					
<b>cUL</b>	Certified for use in Canada by Underwriters Laboratories. Canadian Standard C22.2 No. 24-93.																					
<b>Accessories</b>																						
<b>ACME-1001-200</b>	Potentiometer board kit for MF-63103 (order separately)																					
<b>MFC-420</b>	Control module card for 4 - 20 mAdc (order separately)																					
<b>MFC-8000</b>	Control module card for 6 - 9 Vdc (order separately)																					
<b>YBA-519-1</b>	Locknuts, two are included with the actuator																					
<b>Valve Linkage</b>																						
<b>AV-671</b>	Linkage for 1-1/2" and 2" obsolete VB-9XXX valves (order separately)																					
<b>AV-672</b>	Linkage for 2-1/2" to 4" VB-9XXX valves, except VB-9323 (order separately)																					
<b>AV-673</b>	Linkage for 1/2" to 2" Johnson Controls VB-3754, VB-3924, and VB-4324 valves																					
<b>AV-674</b>	Linkage for 1/2" to 3" Honeywell V5011F, V5011G, and V5013F valves																					

## Mounting Dimensions



# Invensys®

## Actuator Specifications and Mounting Dimensions

The MS-22353 Proportional Valve Actuator is a non-spring return actuator used with proportional 2 - 10 Vdc or 4 - 20 mAdc controllers and standard 1/2" to 1-1/4" two-way and three-way valve bodies for control of heating and cooling coils.



### Features:

- Proportional actuator controlled by 2 - 10 Vdc or 4 - 20 mA
- 45 lbf (200 N) output with automatic load limit for self-adjusting travel and long motor life
- Synchronous motor for consistent timing
- Manual override with automatic release
- 2 - 10 Vdc actuator position feedback signal
- Integral linkage for all standard 1/2" to 1-1/4" IBS two-way stem-up open and three-way valve bodies for a wide variety of applications
- Compact size for application flexibility
- Rugged construction with die cast housing
- 100 ohm input impedance for the 4 - 20 mA input

### MS-22353 Non-Spring Return Actuator

#### Specifications

##### Inputs

**Control Signal** MS-22353 — 2 - 10 Vdc or 4 - 20 mAdc, Proportional control signals (fixed span and start point).

##### Input Impedance,

100 ohm minimum for voltage input.

100 ohm for current input.

##### Power Requirements

Part Number	Actuator Power Input			Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke	
	Voltage (+20%, -15%)	Hz	VA	60 Hz	50 Hz
MS-22353	24 Vac (Class 2 Power Supply)	50 60	4	126	151

**Connections** 4 foot (1.2 m) color coded 18 AWG, plenum cable rated for UL.

##### Motor Type

Synchronous

##### Outputs

##### Electrical

**Position Feedback Signal:** 2 - 10 Vdc non-adjustable.

**Connections:** 4 foot (1.2 m) color coded 18 AWG, plenum cable rated for UL.

##### Mechanical

**Force:** 45 lbf (200 N) minimum with automatic load limit.

**Stroke:** Up to 9/16" (14.3 mm) maximum, self-adjusting.

**Timing:** Reference Power Requirements table above.

Valve Body Part Number <sup>a</sup>	Valve Sizes	Close-off Pressure (psi) <sup>b</sup> Nominal
Two-Way Valves VB-7211 VB-7212 VB-7213 VB-7214 VB-7215 <sup>c</sup>	1/2"	130
	3/4"	80
	1"	40
	1-1/4"	25
Three-Way Mixing Valves VB-7312 VB-7313 VB-7314 VB-7315 <sup>c</sup>	1/2"	130
	3/4"	80
	1"	40
	1-1/4"	25

<sup>a</sup> MS-22353 actuators may also be used with VB-9XXX valves. Refer to **Invensys Building Systems Components, F-25683**, for available valves.

<sup>b</sup> Close off ratings describe only the differential pressure which the actuator can close with adequate seating force. Refer to Invensys Building Systems Components, F-25683

<sup>c</sup> Metric thread 15 to 32 mm (Rp 1/2 to Rp 1-1/4).

##### Environment

##### Ambient Temperature Limits

**Shipping and storage:** -40 to 160°F (-40 to 71°C).

##### Operating:

**Minimum** 40°F (4°C).

**Maximum** See table below.

Actuator Part Number	Temperature of Media in the Valve Body (Check Rating of the Valve)		Maximum Ambient Temperature of Actuator	Dew Point Temperature <sup>a</sup>
	Minimum	Maximum		
MS-22353	40°F (4°C) <sup>b</sup>	281°F (138°C)	115°F (46°C)	88°F maximum with 40°F fluid (31°C maximum with 4°C fluid) <sup>b</sup>
		220°F (104°C)	140°F (60°C)	

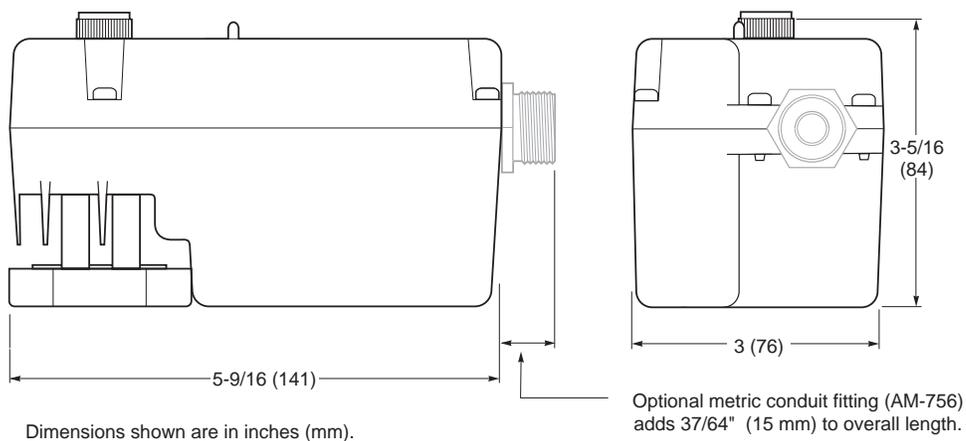
<sup>a</sup> Dew point temperature applies only to chilled water applications.

<sup>b</sup> The dew point temperature cannot be more than 48°F (26.7°C) above the fluid temperature.

## MS-22353 Non-Spring Return Actuator

Specifications Continued	
<b>Environment Continued</b>	
<b>Humidity</b>	5 to 95% RH, non-condensing. See Temperature Limits Table page 20 for maximum dew point temperature.
<b>Locations</b>	NEMA Type 1.
<b>Enclosure Protection Class</b>	IP31 according to EN 60529, BS EN 60529.
<b>Agency Listings</b>	
<b>UL</b>	UL 873, Underwriters Laboratories (File # E9429 Category Temperature-Indicating and Regulating Equipment).
<b>cUL</b>	Certified for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.
<b>European Community</b>	EMC Directive (89/336/EEC). Low Voltage Directive (72/23/EEC).
<b>Accessories</b>	
<b>AV-641</b>	Valve linkage kit (replacement parts only, order separately)
<b>AV-642</b>	Four-way valve linkage kit for Controlli valve bodies
<b>AV-644</b>	Valve linkage kit (included with MS-22353 actuator)
<b>AM-756</b>	Metric male 20 mm conduit fitting (m20 x 1.5 - 8g) 11 mm nominal thread length

## Mounting Dimensions





## Actuator Specifications and Mounting Dimensions

The MF-22XX3 Series Floating Valve Actuator is a non-spring return actuator used with floating DDC controllers and standard 1/2" to 1-1/4" two-way and three-way valve bodies for control of heating and cooling coils.



### Features:

- Floating actuator controlled by DDC controller with contact or Triac output or SPDT center off controller
- 45 lbf (200 N) output with automatic load limit for self-adjusting travel and long motor life
- Synchronous motor for consistent timing
- Manual override with automatic release
- Optional feedback potentiometer available for precision control or position indication
- Integral linkage for all standard 1/2" to 1-1/4" IBS two-way stem-up open and three-way valve bodies for a wide variety of applications
- Compact size for application flexibility
- Rugged construction with die cast housing

### MF-22XX3 Series Actuators

Specifications																																		
<b>Inputs</b>																																		
<b>Control Signal</b>	<b>MF-22XX3</b> <b>SPDT Center Off (Floating) Control Contacts or Two SPST Control Contacts</b> — Minimum rating of 250 mA @ 24 Vac inductive load. <b>Two Triacs</b> — DDC output must be able to switch 250 mA (24 VA) inductive load (150 Vac minimum).																																	
<b>Power Requirements</b>	<table border="1"> <thead> <tr> <th rowspan="2">Part Number</th> <th colspan="3">Actuator Power Input</th> <th rowspan="2">Feedback</th> <th colspan="2">Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke</th> </tr> <tr> <th>Voltage (+20%, -15%)</th> <th>Hz</th> <th>VA</th> <th>15k 3/4 Pot.</th> <th>60 Hz</th> <th>50 Hz</th> </tr> </thead> <tbody> <tr> <td>MF-22203</td> <td rowspan="3">24 (Class 2 Power Supply)</td> <td rowspan="3">50</td> <td rowspan="3">60</td> <td rowspan="3">1.5</td> <td>No</td> <td rowspan="3">±30 sec.</td> <td rowspan="3">151 ±30 sec.</td> </tr> <tr> <td>MF-22303</td> <td>No</td> </tr> <tr> <td>MF-22323</td> <td>Yes</td> </tr> </tbody> </table>	Part Number	Actuator Power Input			Feedback	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke		Voltage (+20%, -15%)	Hz	VA	15k 3/4 Pot.	60 Hz	50 Hz	MF-22203	24 (Class 2 Power Supply)	50	60	1.5	No	±30 sec.	151 ±30 sec.	MF-22303	No	MF-22323	Yes								
Part Number	Actuator Power Input			Feedback	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke																													
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MF-22203	24 (Class 2 Power Supply)	50	60	1.5	No	±30 sec.	151 ±30 sec.																											
MF-22303					No																													
MF-22323					Yes																													
<b>Connections</b>	4 foot (1.2 m) color coded 18 AWG, plenum cable rated for UL and IEC-332-3 category C.																																	
<b>Motor Type</b>	Synchronous																																	
<b>Outputs</b>																																		
<b>Electrical</b>	<b>Position Feedback Signal:</b> 15K ohm nominal potentiometer. Reference Power Requirements table above. <b>Connections:</b> 4 foot (1.2 m) color coded 18 AWG, plenum cable rated for UL.																																	
<b>Mechanical</b>	<b>Force:</b> 45 lbf (200 N) minimum with automatic load limit. <b>Stroke:</b> Up to 9/16" (14.3 mm) maximum, self-adjusting. <b>Timing:</b> Reference Power Requirements table above. <b>Manual Operator:</b> Allows actuator to be manually set at any position upon loss of power. Releases automatically when power is restored.																																	
	<table border="1"> <thead> <tr> <th>Valve Body Part Number<sup>a</sup></th> <th>Valve Sizes</th> <th>Close-off Pressure (psi)<sup>b</sup> Nominal</th> </tr> </thead> <tbody> <tr> <td rowspan="5">Two-Way Valves</td> <td>1/2"</td> <td>130</td> </tr> <tr> <td>3/4"</td> <td>80</td> </tr> <tr> <td>1"</td> <td>40</td> </tr> <tr> <td rowspan="2">1-1/4"</td> <td></td> <td>25</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td rowspan="5">Three-Way Mixing Valves</td> <td>1/2"</td> <td>130</td> </tr> <tr> <td>3/4"</td> <td>80</td> </tr> <tr> <td>1"</td> <td>40</td> </tr> <tr> <td rowspan="2">1-1/4"</td> <td></td> <td>25</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>		Valve Body Part Number <sup>a</sup>	Valve Sizes	Close-off Pressure (psi) <sup>b</sup> Nominal	Two-Way Valves	1/2"	130	3/4"	80	1"	40	1-1/4"		25			Three-Way Mixing Valves	1/2"	130	3/4"	80	1"	40	1-1/4"		25							
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<sup>a</sup> MF-22XX3 actuators may also be used with VB-9XXX valves. Refer to <b>Invensys Building Systems Components Catalog, F-25683</b> , for available valves. <sup>b</sup> Close off ratings describe only the differential pressure which the actuator can close with adequate seating force. Refer to <b>Invensys Building Systems Components Catalog, F-25683</b> . <sup>c</sup> Metric thread 15 to 32 mm (Rp 1/2 to Rp 1-1/4).																																		



## MF-22XX3 Non-Spring Return Series Actuators

### Specifications Continued

#### Environment

**Ambient Temperature Limits** Shipping and storage: -40 to 160°F (-40 to 71°C).  
**Operating:**  
**Minimum** 40°F (4°C).  
**Maximum** See table below.

Part Number	Temperature of Media in the Valve Body (Check Rating of the Valve)		Maximum Actuator Ambient Temperature	Dew Point Temperature
	Minimum	Maximum		
MF-22203	70°F (21°C)	281°F (138°C) 220°F (104°C)	115°F (46°C) 140°F (60°C)	Non-condensing <sup>a</sup>
MF-22303 MF-22323	40°F <sup>b</sup> (4°C)	281°F (138°C) 220°F (104°C)	115°F (46°C) 140°F (60°C)	88°F Dew Point maximum with 40°F fluid (31°C Dew Point maximum with 4°C fluid) <sup>b</sup>

<sup>a</sup> Do not use MF-22203 models in chilled water applications.

<sup>b</sup> The dew point temperature cannot be more than 48°F (26.7°C) above the fluid temperature.

**Humidity** 5 to 95% RH, non-condensing. See Temperature Limits table above for maximum dew point temperature.

**Locations** NEMA Type 1.

**Enclosure Protection Class** Designed to meet IP31Class, according to EN 60529, BS EN 60529.

#### Agency Listings

**UL** UL 873, Underwriters Laboratories (File # E9429 Category Temperature-Indicating and Regulating Equipment).

**cUL** Certified for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.

**European Community** EMC Directive (89/336/EEC).

#### Accessories

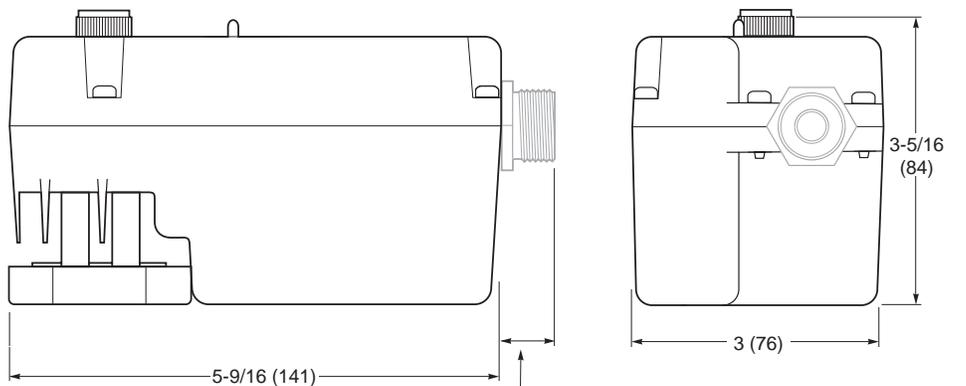
**AV-641** Valve linkage kit (replacement parts only, order separately)

**AV-642** Four-way valve linkage kit for Controlli valve bodies

**AV-644** Valve linkage kit (included with MS-22353 actuator)

**AM-756** Metric male 20 mm conduit fitting (m20 x 1.5 - 8g) 11 mm nominal thread length

## Mounting Dimensions



Dimensions shown are in inches (mm).

Optional metric conduit fitting (AM-756) adds 37/64" (15 mm) to overall length.

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## Actuator Specifications and Mounting Dimensions

The MF-23XX3 Series Floating Valve Actuator is a non-spring return actuator used with floating DDC controllers that operate standard 1/2" to 2" two-way and three-way valve bodies for control of heating and cooling coils.



### Features:

- Floating actuator controlled by DDC controller with contact or Triac output or SPDT center off controller
- 80 lbf (355 N) of output
- Synchronous motor for consistent timing
- Manual override with automatic release
- Optional feedback potentiometer available for precision control or position indication
- Integral linkage for all standard 1/2" to 2" IBS two-way stem-up open and three-way valve bodies for a wide variety of applications
- Compact size for application flexibility
- Rugged construction with die cast housing

### MF-23XX3 Non-Spring Return Series Actuators

#### Specifications

##### Inputs

**Control Signal** MF-23XX3

**SPDT Center Off (Floating) Control Contacts or Two SPST Control Contacts** — Minimum rating of 250 mA @ 24 Vac inductive load. DDC controller must time out the control signal to the actuator after three minutes or less

**Two Triacs** — DDC output must be able to switch 250 mA (24 VA) inductive load (150 Vac minimum).

##### Power Requirements

Part Number	Actuator Power Input			Feedback 15 ohm Pot.	Typical Timing in Sec. @ 75°F for 1/2" (12.7mm) Stroke		
	Voltage (+20%, -15%)	Hz	VA		60 Hz	50 Hz	
MF-23203	24 (Class 2 Power Supply)	50	60	1.5	No	126	151
MF-23303					No		
MF-23323					Yes		

**Connections** 4 foot (1.2 m) color coded 18 AWG, UL rated plenum cable.

**Motor Type** Synchronous

##### Outputs

**Electrical** **Position Feedback Signal:** 15K ohm nominal potentiometer. Reference Power Requirements table above.

**Connections:** 4 foot (1.2 m) color coded 18 AWG, UL rated plenum cable.

##### Mechanical

**Force:** 80 lbf (355 N) minimum at low line voltage (-15%).

**Stroke:** Up to 9/16" (14.3 mm) maximum, self-adjusting.

**Timing:** Reference Power Requirements table above.

**Manual Operator:** Allows actuator to be manually set at any position upon loss of power. Releases automatically when power is restored.

Valve Body Part Number <sup>a</sup>	Valve Sizes	Close-off Pressure (psi) <sup>b</sup> Nominal
Two-Way Valves VB-7213 VB-7214 VB-7215 <sup>c</sup> VB-7253 VB-7273	1/2"	250
	3/4"	170
	1"	80
	1-1/4"	50
	1-1/2"	33
	2"	16
Three-Way Mixing Valves VB-7312 VB-7313 VB-7314 VB-7315 <sup>c</sup>	1/2"	250
	3/4"	170
	1"	80
	1-1/4"	50
	1-1/2"	33
	2"	16
Three-Way Diverting Valves VB-7332	All Sizes	250

<sup>a</sup> Close off ratings describe only the differential pressure which the actuator can close with adequate seating force. Refer to Invensys Building Systems Components Catalog, F-25683.



## MF-23XX3 Non-Spring Return Series Actuators

### Specifications Continued

#### Environment

**Ambient Temperature Limits** **Shipping and storage:** -40 to 160°F (-40 to 71°C).  
**Operating:**  
**Minimum** 40°F (4°C).  
**Maximum** See table below.

Part Number	Temperature of Media in the Valve Body (Check Rating of the Valve)		Maximum Actuator Ambient Temperature	Dew Point Temperature
	Minimum	Maximum		
MF-23203	70°F (21°C)	281°F (138°C) 220°F (104°C)	115°F (46°C) 140°F (60°C)	Non-condensing <sup>a</sup>
MF-23303 MF-23323	40°F <sup>D</sup> (4°C)	281°F (138°C) 220°F (104°C)	115°F (46°C) 140°F (60°C)	88°F Dew Point maximum with 40°F fluid (31°C Dew Point maximum with 4°C fluid) <sup>b</sup>

<sup>a</sup> Do not use MF-23203 models in chilled water applications.

<sup>b</sup> The dew point temperature cannot be more than 48°F (26.7°C) above the fluid temperature.

**Humidity** 5 to 95% RH, non-condensing. See Temperature Limits table above for maximum dew point temperature.

**Locations** NEMA Type 1.

**Enclosure Protection Class** Designed to meet IP31Class, according to EN 60529, BS EN 60529.

#### Agency Listings

**UL** UL 873, Underwriters Laboratories (File # E9429 Category Temperature-Indicating and Regulating Equipment).

**cUL** Certified for use in Canada by Underwriters Laboratories. Canadian Standards C22.2 No. 24-93.

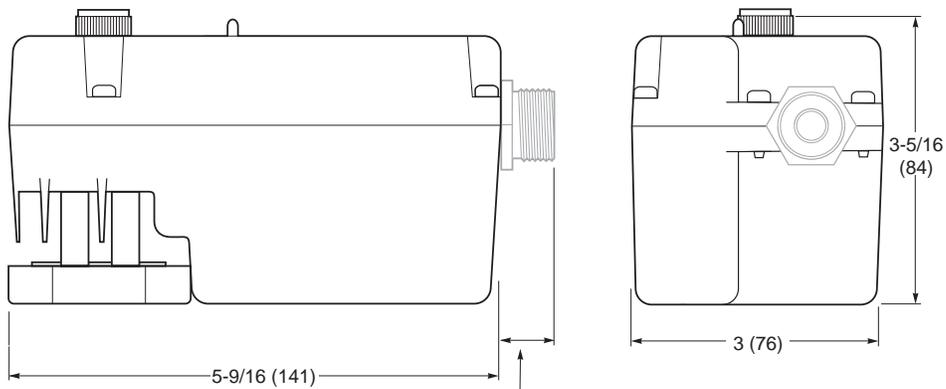
**European Community** EMC Directive (89/336/EEC).

#### Accessories

**AV-644** Valve linkage kit (included with MF-23XX3 actuator)

**AM-756** Metric male 20 mm conduit fitting (m20 x 1.5 - 8g) 11 mm nominal thread length

## Mounting Dimensions



Dimensions shown are in inches (mm).

Optional metric conduit fitting (AM-756) adds 37/64" (15 mm) to overall length.

# Accessories

Part Numbers	Description	SR Actuators					NSR Actuators				
		MA51-710X Series	MAX1-720X Series	MFY1-7103 Series	MFY1-7203 Series	MS51-7103 Series	MSX1-7203 Series	MF-631X3 Series	MF-22XX3 Series	MF-23XX3 Series	MS-22353 Series
AM-671 <sup>abcd</sup>		X	X	X		X	X	X		X	X
AM-672 <sup>abcd</sup>		X	X	X		X	X	X		X	X
AM-673 <sup>C</sup>		X	X	X		X	X	X		X	X
AM-674		X	X	X	X	X	X	X	X	X	X
AM-675	 <b>AM-703</b>	X	X			X	X	X		X	X
AM-676		X	X	X	X	X	X	X	X	X	X
AM-686			X	X			X	X			X
AM-687			X	X			X	X			X

# Accessories

Part Numbers	Description	Spring Return Actuators										Non-Spring Return Actuators									
		Two-Position				Floating			Proportional			Floating		Proportional							
		MA40-704X Series	MA4X-707X Series	MA4X-715X Series	MA40-717X Series	MF40-7043	MF4X-7073 Series	MF4X-7153 Series	MF40-7173	MS40-7043	MS4X-7073 Series	MS4X-7153	MS40-7173	MF41-6043	MF41-6083	MF41-6153	MF41-6343	MS41-6043	MS41-6083	MS41-6153	MS41-634X Series
 AM-688	Replacement Universal Clamp		X	X			X	X		X	X										
 AM-689	Rotation Limiter		X	X			X	X		X	X										
 AM-690	Crank Arm		X	X			X	X		X	X										
 AM-691			X	X			X	X		X	X										
 AM-692	V-bolt		X	X			X	X		X	X										
 AM-693 <sup>ab</sup>	Crank Arm Kit		X	X			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	

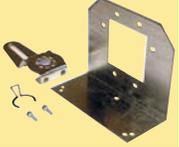
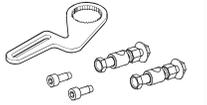
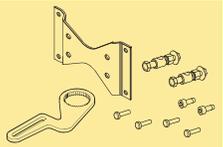
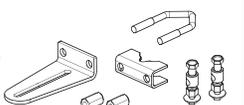
<sup>a</sup> Use the self-tapping screws and flat washers provided in kit to mount actuator.

<sup>b</sup> AM-692 V-bolt kit required.

# Accessories

Part Numbers	Description	Spring Return Actuators											Non-Spring Return Actuators								
		Two-Position				Floating			Proportional				Floating			Proportional					
		MAA40-704X Series	MAA4X-707X Series	MAA4X-715X Series	MAA40-717X Series	MF40-7043	MF4X-7073 Series	MF4X-7153 Series	MF40-7173	MS40-7043	MS4X-7073 Series	MS4X-7153 Series	MS40-7173	MF41-6043	MF41-6083	MF41-6153	MF41-6343	MS41-6043	MS41-6083	MS41-6153	MS41-634X Series
AM-705	 Positioner								X	X	X	X						X	X	X	
AM-706	 Positioner								X	X	X	X						X	X	X	
AM-708	 500 ohm Resistor								X	X	X							X	X		
AM-709	 Position Indicator & Stroke Limiter	X				X			X												
AM-710	 V-clamp	X				X			X												
AM-711	 Crank Arm Adaptor Kit	X				X			X												
AM-712	 Crank Arm Adaptor Kit	X				X			X												
AM-713	 Bracket	X				X			X												
AM-714	 Weather Shield	X	X	X		X	X	X	X	X	X										

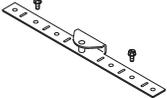
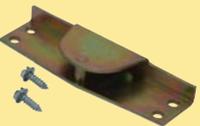
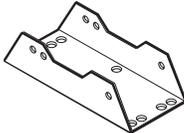
# Accessories

Part Numbers	Description	Spring Return Actuators											Non-Spring Return Actuators												
		Two-Position				Floating			Proportional				Floating			Proportional									
		MA40-704X Series	MA4X-707X Series	MA4X-715X Series	MA40-717X Series	MF40-7043	MF4X-7073 Series	MF4X-7153 Series	MF40-7173	MS40-7043	MS4X-7073 Series	MS4X-7153 Series	MS40-7173	MF41-6043	MF41-6083	MF41-6153	MF41-6343	MS41-6043	MS41-6083	MS41-6153	MS41-634X Series				
AM-715 	Crank Arm Adaptor Kit	X				X																			
AM-717 	Replacement Universal Clamp	X				X																			
AM-726 	Crank Arm Adaptor													X	X			X	X						
AM-727 															X	X			X	X					
AM-728 <sup>a</sup> 	Conduit Adaptor													X	X			X	X						
AM-735 	Crank Arm Kit															X								X	
AM-736 	Crank Arm Kit with Bracket															X								X	
AM-737 	Universal Crank Arm <sup>b</sup>															X								X	
AM-740 	Replacement Kit															X								X	

<sup>a</sup> Cannot be used when creating a linked valve/actuator assembly.

<sup>b</sup> For Honeywell Floor Mount Mod Motor.

# Accessories

Part Numbers	Description	Spring Return Actuators										Non-Spring Return Actuators									
		Two-Position				Floating			Proportional			Floating			Proportional						
		MAA40-704X Series	MAA4X-707X Series	MAA4X-715X Series	MAA40-717X Series	MF40-7043	MF4X-7073 Series	MF4X-7153 Series	MF40-7173	MS40-7043	MS4X-7073 Series	MS4X-7153 Series	MS40-7173	MF41-6043	MF41-6083	MF41-6153	MF41-6343	MS41-6043	MS41-6083	MS41-6153	MS41-634X Series
AM-741 	Weather Shield												X	X	X		X	X	X		
AM-751 	Anti-rotation Bracket				X			X				X				X					X
AM-752 					X			X				X				X					X
AM-753 	Mounting Clamp			X			X				X				X					X	
AM-754 				X				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	X				X				X	
AM-758 	Short "U" Mounting Bracket		X	X			X	X			X	X									
AM-759 	Tall "U" Mounting Bracket		X	X			X	X			X	X									

# Accessories

Part Numbers	Description	Spring Return Actuators											Non-Spring Return Actuators									
		Two-Position				Floating				Proportional			Floating			Proportional						
		MA40-704X Series	MA4X-707X Series	MA4X-715X Series	MA40-717X Series	MF40-7043	MF4X-7073 Series	MF4X-7153 Series	MF40-7173	MS40-7043	MS4X-7073 Series	MS4X-7153 Series	MS40-7173	MF41-6043	MF41-6083	MF41-6153	MF41-6343	MS41-6043	MS41-6083	MS41-6153	MS41-634X Series	
AM-760	 Slotted "L" Mounting Bracket		X	X			X	X			X	X										
AM-761	 7-inch Anti-Rotation Bracket	X				X				X												
AM-762	 9-inch Anti-Rotation Bracket	X	X	X	X	X	X	X	X	X	X	X				X						X
AM-763	 Manual Override Crank		X <sup>a</sup>	X <sup>a</sup>			X <sup>a</sup>	X <sup>a</sup>			X <sup>a</sup>	X <sup>a</sup>										
TF-5521	Pipe Plug				X				X				X			X						X

<sup>a</sup> Only used on MX41-707X-XXX, MX41-715X-XXX.



Part Numbers	Description	Spring Return Actuators						Non-Spring Return Actuators					
		Two-Position		Floating		Proportional		Floating			Proportional		
		MA4D-703X-XXX Series	MA4D-803X-XXX Series	MF4D-703X-XXX Series	MF4D-803X-XXX Series	MS4D-703X-XXX Series	MS4D-803X-XXX Series	MF4E-6043X Series	MF4E-6083X Series	MF4D-6043-XXX Series	MF4D-6083-XXX Series	MS4D-6043-XXX Series	MS4D-6083-XXX Series
AM-135 	Shaft Adapter							X	X				
AM-675 	Mounting Base									X	X		
AM-703 	Span Adjustment	X	X	X	X	X	X			X	X	X	X
AM-704 	Modulation Interface	X	X	X	X	X	X			X	X	X	X
AM-706 	Positioner	X	X	X	X	X	X			X	X	X	X
AM-708 	500 ohm Resistor	X	X	X	X	X	X			X	X	X	X
AM-714 	Weather Shield	X	X	X	X	X	X	X	X	X	X	X	X
AM-756 	Metric Conduit Adaptor	X	X	X	X	X	X			X	X	X	X
AM-763 	Manual Override Crank	X	X	X	X	X	X			X	X	X	X

# Accessories

Part Numbers	Description	Spring Return Actuators						Non-Spring Return Actuators					
		Two-Position		Floating		Proportional		Floating			Proportional		
		MA4D-703X-XXX Series	MA4D-803X-XXX Series	MF4D-703X-XXX Series	MF4D-803X-XXX Series	MS4D-703X-XXX Series	MS4D-803X-XXX Series	MF4E-6043X Series	MF4E-6083X Series	MF4D-6043-XXX Series	MF4D-6083-XXX Series	MS4D-6043-XXX Series	MS4D-6083-XXX Series
AM-769	Terminal Cover Guard							X	X				
AM-771	Crank Arm and Bracket Kit	X	X	X	X	X	X			X	X	X	X
AM-772	Reverse Mounting Bracket	X	X	X	X	X	X			X	X	X	X



## Direct Coupled 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) (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)
MA-7201	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)
MA-7201-500	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)
MA-7203	MA41-7073	24 Vac 60 lb-in. (7 N-m) (2-position) w/manual override

## Direct Coupled Actuator Cross Reference

### SEC to Invensys Actuators Continued

SEC P/N	Invensys P/N	Description
MA-7203-500	MA40-7073-502	24 Vac 60 lb-in. (7 N-m) w/aux switch (2-position)
MA-7203-500	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)
MA-7501	MA41-7150	120 Vac 133 lb-in. (15 N-m) (2-position) w/manual override
MA-7501-502	MA40-7150-502	120 Vac 133 lb-in. (15 N-m) w/aux switch (2-position)
MA-7501-502	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)
MA-7503	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)
MA-7503-502	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)
MA-7505	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)
MA-7505-502	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)
MF-6103	MF41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (floating), w/two aux switches
MF-6103	MF41-6043-510	24 Vac 35 lb-in. (4 N-m) NSR (floating), feedback potentiometer
MF-6203	MF41-6063	24 Vac 70 lb-in. (8 N-m) spdt NSR (floating)
MF-6203	MF41-6063-502	24 Vac 70 lb-in. (8 N-m) NSR (floating), w/two aux switches
MF-6203	MF41-6063-510	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)
MS-6103	MS41-6043-502	24 Vac 35 lb-in. (4 N-m) NSR (proportional), w/two aux switches
MS-6103	MS41-6043-520	24 Vac 35 lb-in. (4 N-m) NSR (proportional), adjustable start point (offset) and span
MS-6103	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	MS41-6063	24 Vac 70 lb-in. (8 N-m) 2-10 Vdc/4-20 mA dc NSR (proportional)
MS-6233	MS41-6063-502	24 Vac 70 lb-in. (8 N-m) NSR (proportional), w/two aux switches
MS-6233	MS41-6063-520	24 Vac 70 lb-in. (8 N-m) NSR (proportional), adjustable start point (offset) and span
MS-6233	MS41-6063-522	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 mA dc NSR (proportional)
MS-6633	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 mA dc 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)
MS-7203	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)
MS-7433	MS41-7153	24 Vac 133 lb-in. (15 N-m) (proportional) w/manual override

## Direct Coupled Actuator Cross Reference

### 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

## Direct Coupled Actuator Cross Reference

### Belimo to Invensys Actuators Continued

Belimo P/N	Invensys P/N	Description
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)
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 Vac200 lb-in. (34 N-m) spdt NSR(floating)
GM24-SR	MS41-6343	24 Vac200 lb-in. (34 N-m) 2 to 10 Vdc/4 to 10mA dc SR (proportional)
LF120	MA40-7040	120 Vac35 lb-in. (4 N-m) (2-position)
LF120-S	MA40-7040-501	120 Vac35 lb-in. (4 N-m) w/aux switch(2-position)
LF230	MA40-7041	230 Vac35 lb-in. (4 N-m) (2-position)
LF230-S	MA40-7041-501	230 Vac35 lb-in. (4 N-m) w/aux switch(2-position)
LF24	MA40-7043	24 Vac35 lb-in. (4 N-m) (2-position)
LF24-3	MF40-7043	24 Vac35 lb-in. (4 N-m) (floating)
LF24-S	MA40-7043-501	24 Vac35 lb-in. (4 N-m) w/aux switch (2-position)
LF24-3-S	MF40-7043-501	24 Vac35 lb-in. (4 N-m) w/aux switch (floating)
LF24-SR	MS40-7043	24 Vac35 lb-in. (4 N-m) (proportional)
LF24-SR-S	MS40-7043-501	24 Vac35 lb-in. (4 N-m) w/aux switch (proportional)
LM24	MF41-6043	24 Vac35 lb-in. (4 N-m) NSR (floating)
LM24-10P	MF41-6043-510	24 Vac35 lb-in. (4 N-m) NSR (floating)/feedback potentiometer
LM24-S	MF41-6043-502	24 Vac35 lb-in. (4 N-m) NSR (floating)/w/two aux switches
LM24-SR	MS41-6043	24 Vac35 lb-in. (4 N-m) NSR (proportional)
δ	MS41-6043-520	24 Vac35 lb-in. (4 N-m) NSR (proportional), adjustable start point(offset) and span
δ	MS41-6043-522	24 Vac35 lb-in. (4 N-m) NSR (proportional), w/two aux switches, adjustable stat point (offset) and span
δ	MS41-6043-502	24 Vac35 lb-in. (4 N-m) NSR (proportional), w/two aux switches
NF120	MA40-7070	120 Vac60 lb-in. (7 N-m) (2-position)
NF120-S	MA40-7070-502	120 Vac60 lb-in. (7 N-m) w/aux switch(2-position)
NF230	MA40-7071	230 Vac60 lb-in. (7 N-m) (2-position)
NF230-S	MA40-7071-502	230 Vac60 lb-in. (7 N-m) w/aux switch(2-position)
NF24	MA40-7073	24 Vac60 lb-in. (7 N-m) (2-position)
NF24-S	MA40-7073-502	24 Vac60 lb-in. (7 N-m) w/aux switch (2-position)
NF24-SR	MS40-7073	24 Vac60 lb-in. (7 N-m) (proportional)
NM24	MF41-6083	24 Vac70 lb-in. (8 N-m) spdt NSR (floating)
NM24	MF41-6083-502	24 Vac70 lb-in. (8 N-m) NSR (floating)/w/two aux switches
NM24	MF41-6083-510	24 Vac70 lb-in. (8 N-m) NSR (floating)/feedback potentiometer
NM24-SR	MS41-6083	24 Vac70 lb-in. (8 N-m) 2 to 10 Vdc/4 to 10mA dc SR(proportional)
NM24-SR	MS41-6083-502	24 Vac70 lb-in. (8 N-m) NSR (proportional), w/two aux switches
NM24-SR	MS41-6083-520	24 Vac70 lb-in. (8 N-m) NSR (proportional), adjustable start point(offset) and span
NM24-SR	MS41-6083-522	24 Vac70 lb-in. (8 N-m) NSR (proportional), w/two aux switches, adjustable stat point (offset) and span
SM24	MF41-6153	24 Vac133 lb-in. (15 N-m) spdt NSR(floating)
SM24-SR	MS41-6153	24 Vac133 lb-in. (15 N-m) 2 to 10 Vdc/4 to 10mA dc SR (proportional)
SM24-SR	MS41-6153-502	24 Vac133 lb-in. (15 N-m) NSR(proportional), w/two aux switches

## Direct Coupled Actuator Cross Reference

### MF4E-60X3X Invensys Actuators

Company	P/N	Invensys P/N	Description
Belimo	LM24-T	MF4E-60430	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Honeywell	ML6161B	MF4E-60430	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Honeywell	ML6174B	MF4E-60431	24 Vac 35 lb-in. (4 N-m) (floating) 180 sec. timing
Johnson	M9106-AGA-2N	MF4E-60430	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Johnson	M9106-IGA-2	MF4E-60431	24 Vac 35 lb-in. (4 N-m) (floating) 180 sec. timing
LANDIS & GYR	EA349	MF4E-60430	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
KMC	MEP-5071	MF4E-60830	24 Vac 70 lb-in. (8 N-m) (floating) 90 sec. timing
KMC	MEP-5703	MF4E-60830	24 Vac 70 lb-in. (8 N-m) (floating) 90 sec. timing
KMC	MEP-5061	MF4E-60831	24 Vac 70 lb-in. (8 N-m) (floating) 180 sec. timing
KMC	MEP-5063	MF4E-60831	24 Vac 70 lb-in. (8 N-m) (floating) 180 sec. timing

### MF4D-60X3 Invensys Actuators

Company	P/N	Invensys P/N	Description
Belimo	LM24-T	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Honeywell	ML6161B	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Honeywell	ML6174B	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 180 sec. timing
Johnson	M9106-AGA-2N	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
Johnson	M9106-IGA-2	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 180 sec. timing
LANDIS & GYR	EA349	MF4D-6043	24 Vac 35 lb-in. (4 N-m) (floating) 90 sec. timing
KMC	MEP-5071	MF4D-6083	24 Vac 70 lb-in. (8 N-m) (floating) 90 sec. timing
KMC	MEP-5703	MF4D-6083	24 Vac 70 lb-in. (8 N-m) (floating) 90 sec. timing
KMC	MEP-5061	MF4D-6083	24 Vac 70 lb-in. (8 N-m) (floating) 180 sec. timing
KMC	MEP-5063	MF4D-6083	24 Vac 70 lb-in. (8 N-m) (floating) 180 sec. timing







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