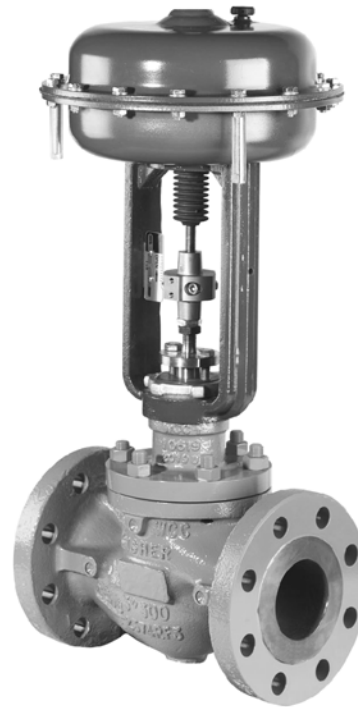


Fisher® 3024C Diaphragm Actuator

The 3024C actuator is a compact spring opposed pneumatic diaphragm actuator incorporating a cast yoke mounting and is suitable for general purpose actuation of globe valves. It will position the valve plug in response to varying controller or valve positioner pneumatic output signals applied to the actuator diaphragm. The 3024C actuator can be assembled as either direct-acting or reverse-acting and provides dependable and on-off or throttling operation of automatic control valves.



W8488 3024C Actuator Mounted on Fisher Valve

Features

- **Application Versatility**—With eight different configurations available, there is an actuator size to meet your needs. Multi-spring combinations allow for accurate selection of actuator thrust and valve travel.
- **Reversible Action**—The simple design allows the change of action from direct to reverse acting without the requirement for extra parts. Change of action can be easily made in the field.
- **High Thrust Capability**—The moulded diaphragm and high strength casings allow for a maximum casing pressure of 6 bar, enabling a high stem thrust for a given size diaphragm.
- **Positive Connections**—Split block stem connection provides a solid transfer of motion while allowing easy mounting and no linkages that create lost motion or inaccurate valve positioning.
- **Rugged Construction**—The cast steel yoke and heavy duty steel casings provide stability, protection against corrosion, longevity, and resistance against misuse.
- **Severe Temperature Applications**—Through careful selection of construction materials, this actuator can be used for a wide range of ambient temperature conditions from a minimum of -40°C to a maximum of $+82^{\circ}\text{C}$.
- **Compact Design**—The compact size minimizes weight and space needed.

Available Configurations

Refer to figure 1.



Direct Action

With the direct action mode on the 3024C actuator, applying air pressure to the upper side of the diaphragm forces the actuator stem downward while, at the same time, compressing the springs on the underside of the diaphragm. Refer to figure 1. When this pressure is reduced, the opposing spring force moves the actuator stem upwards. Should the loading pressure fail, the springs force the stem to the extreme upward position, thereby providing fail-open action for a push-down-to-close valve.

Reverse Action

With the reverse action mode, air is applied on the underside of the diaphragm while opposing spring force is on the top side. Increasing air pressure will force the stem upwards. When the loading pressure is reduced, the stem moves downwards. Should loading pressure fail, the springs force the stem to the extreme downward position, thereby providing fail-closed action for a push-down-to-close valve.

Valve Compatibility

With the availability of both metric and imperial threaded stem connectors, the 3024C can be used with a range of valve body assemblies such as the Fisher metric 1018S construction or imperial easy-e™ and RSS valve body constructions, along with others.

Table 1. Handwheel Specifications

ACTUATOR SIZE	HANDWHEEL DIAMETER		TURNS PER mm/INCH TRAVEL		RIM FORCE (1, 2)		HANDWHEEL OUTPUT FORCE	
	mm	Inch	mm	Inch	N	lbs	N	lbs
30 and 30E	200	7.87	0.24	6.1	179	40	5000	1125
34, 34E, 40, and 40E	250	9.84	0.21	5.4	286	64	10000	2250
45 and 45E	250	9.84	0.21	5.5	400	90	14000	3150

1. Tangential handwheel force required to produce the handwheel output force shown.
2. Brass operating nut and stainless steel screw.

Accessories

Handwheels

An optional side-mounted handwheel can be fitted to all sizes of actuator with travel up to 32 mm (1.25 inch) and where the maximum actuator thrust is less than 14,000 N (3150 lbf). These handwheels provide a robust method of manually operating the valve in an emergency or when there is a loss of instrument air. Refer to figures 2 and 3 and table 1 for details.

Note, a side-mounted handwheel cannot be fitted on the sizes 45 and 45E actuator if an adjustable travel stop is fitted as well.

When mounted on a direct action actuator, turning the handwheel clockwise always moves the stem downwards. When mounted on a reverse action actuator, turning the handwheel clockwise moves the stem upwards. Disengagement of the handwheel to enable automatic operation is simply accomplished by rewinding the handwheel.

Adjustable Travel Stops

Top mounted adjustable up travel stops are available for all actuators from size 30 to 40E. For the larger sizes 45 and 45E, an adjustable stop can be fitted to the actuator stem below the diaphragm casings. Both constructions give total variable adjustment of the travel of the actuator by limiting movement in the upward direction. Refer to figures 4 and 5.

Others

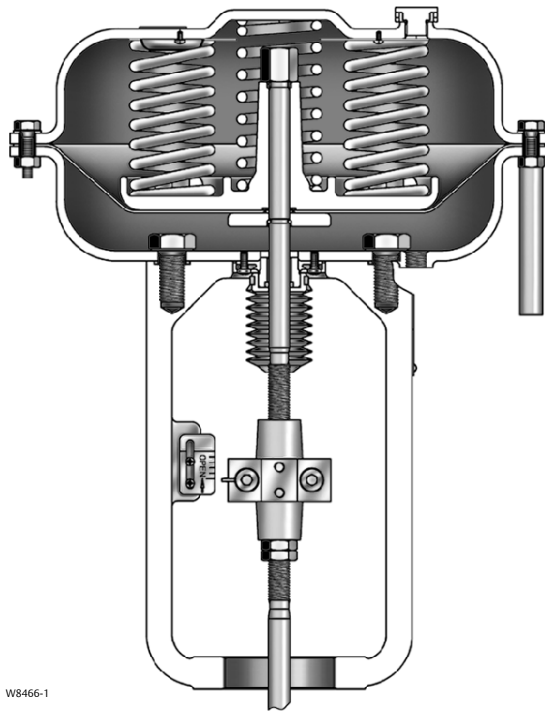
Accessories such as transducers, positioners, position transmitters, air relays, volume boosters, switching valves, lockup valves, limit switches, and solenoid valves are also available for actuator mounting. They are described in separate publications. Contact your Emerson Process Management sales office for details.

Contents

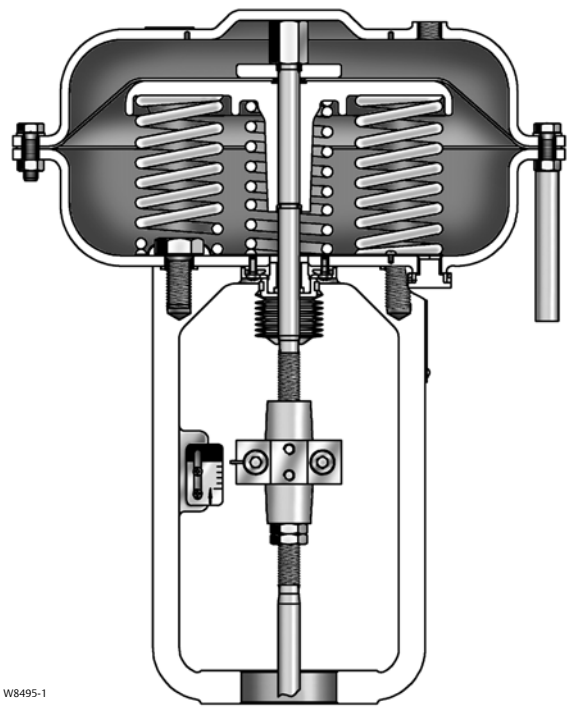
Features	1
Available Configurations	1
Direct Action	2
Reverse Action	2
Valve Compatibility	2
Accessories	2
Handwheels	2

Adjustable Travel Stops	2
Others	2
Construction Materials	6
General Specifications	6
Actuator Dimensions	9
Ordering Information	9

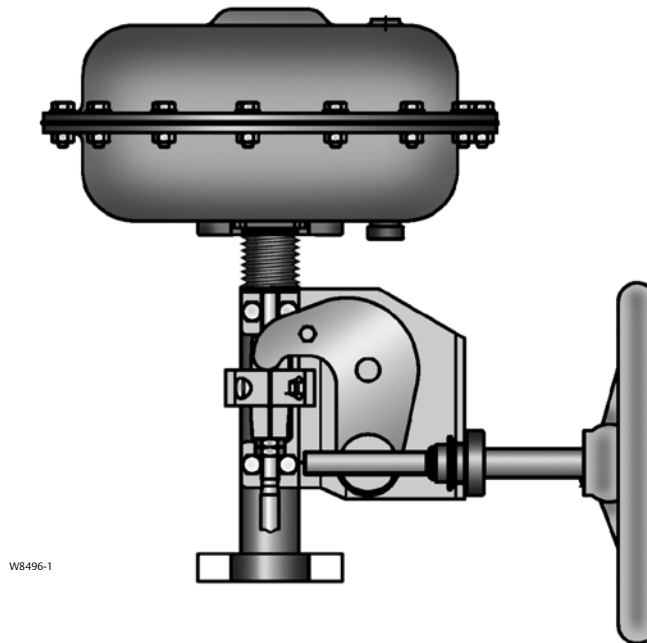
Figure 1. Typical Applications



3024C (AIR RETRACTS STEM)

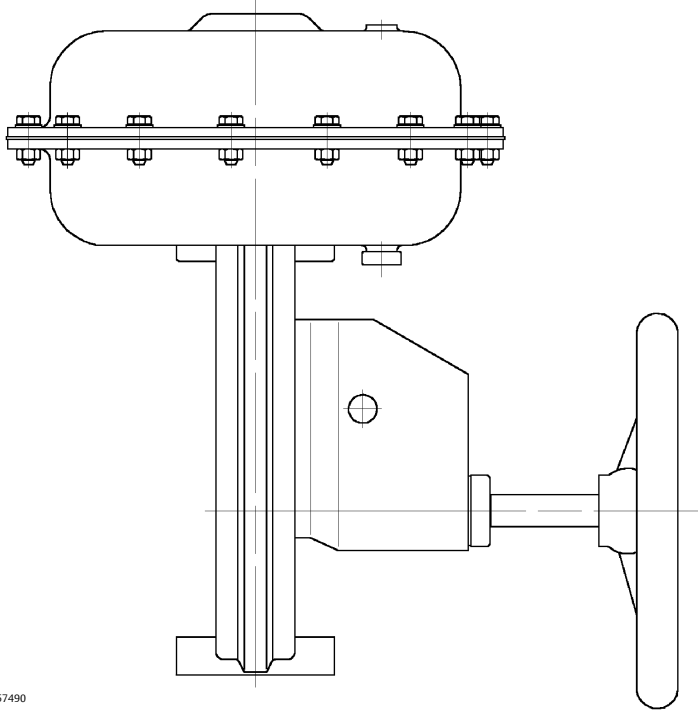


3024C (AIR EXTENDS STEM)



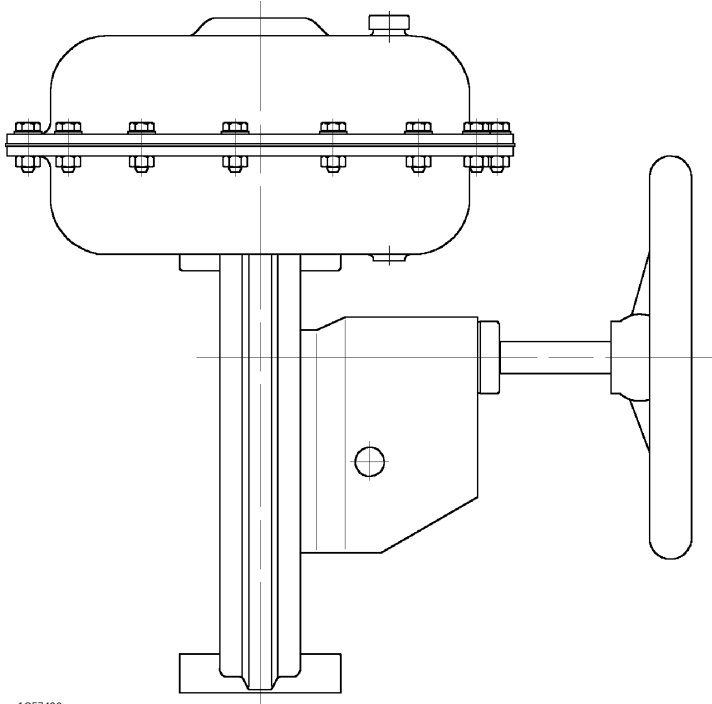
3024C FITTED WITH A SIDE-MOUNTED HANDWHEEL

Figure 2. Side-Mounted Handwheel with Air-Extends-Stem Actuator



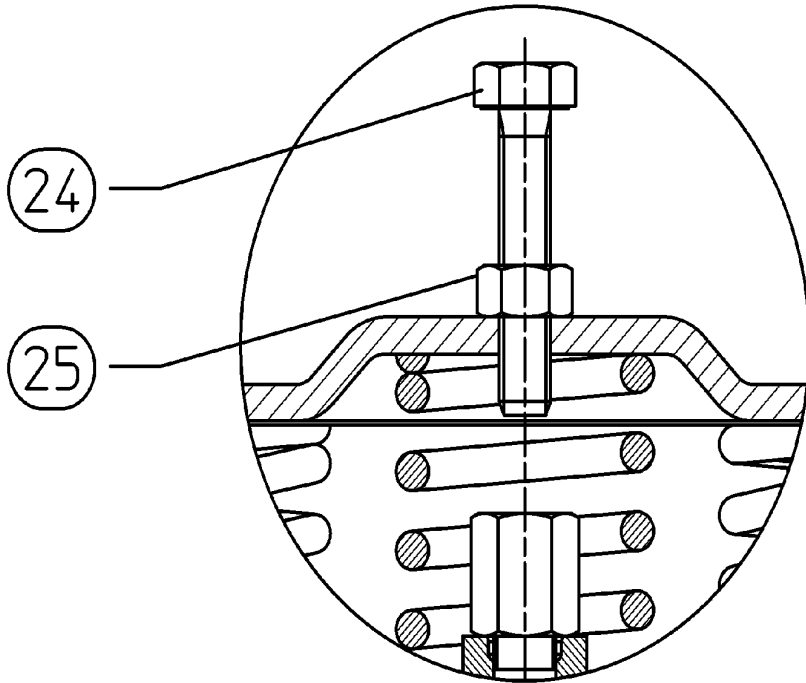
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Figure 3. Side-Mounted Handwheel with Air-Retracts-Stem Actuator



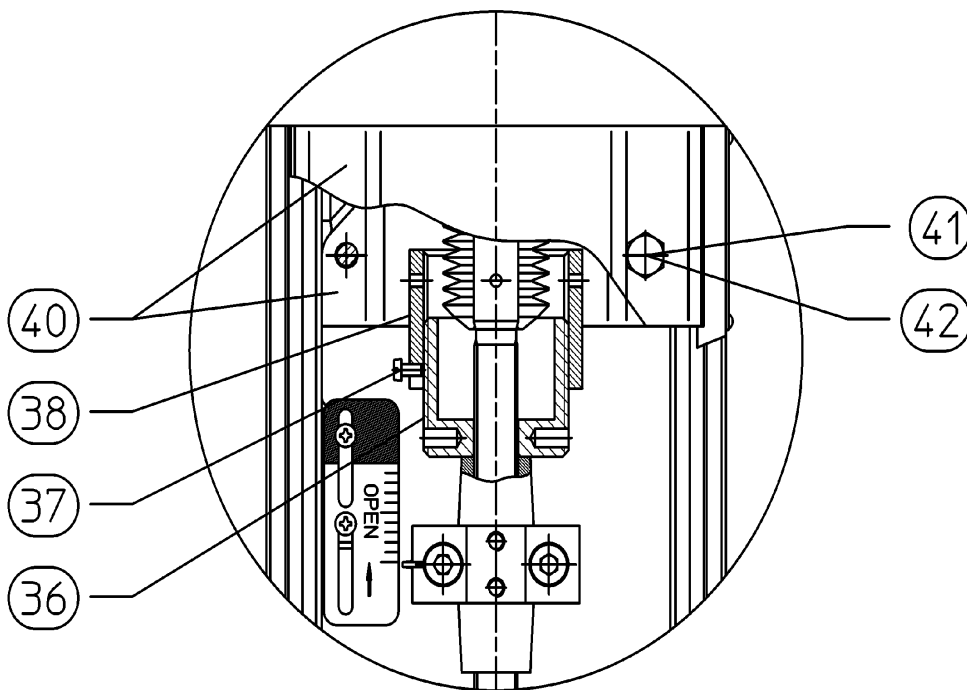
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Figure 4. Up Stop for Actuator Sizes up to 40 and 40E



3Q57478

Figure 5. Up Stop for Actuator Sizes 45 and 45E



3Q57478

Construction Materials

Refer to figure 1.

Diaphragm Casings: Steel

Diaphragm: Nitrile

Diaphragm Plate: Aluminium

Springs: Steel

Spring locator: Steel

Actuator Stem: Stainless steel

O-Rings: Nitrile

Yoke: Cast steel

Stem Connector: Steel

Nameplate: Stainless steel

Travel Indicator Scale: Stainless steel

General Specifications

The sizes 30, 34, 40 and 45 are typically used with the 1018S valve bodies. The sizes 30E, 34E, 40E and 45E are used with such valves as the easy-e or RSS.

**Table 2. Volumetric Data
(Air-to-Open and Air-to-Close)**

ACTUATOR SIZE	ACTUATOR TRAVEL	VOLUME (L)	
		0% Travel	100% Travel
30	16 mm	0.6	0.9
30E	0.75 inch		
34	16 mm	1.9	2.6
34E	0.75 inch		
40	32 mm	1.5	2.8
40E	1.125 inch	1.5	2.8
	1.5 inch	1.8	3.3
	2 inch	1.5	3.5
45	32 mm	3.0	5.7
45E	1.125 inch	3.0	5.7
	1.5 inch	3.8	7.0
	2 inch	3.0	7.4

Table 3. Specifications

Specification		Actuator Size							
		30	30E	34	34E	40	40E	45	45E
Nominal Effective Area		See tables 4 and 5							
Maximum Operating Pressure to Diaphragm	Bar	6							
	psig	87							
Maximum Travel	mm	16	---	16	---	32	---	32	---
	Inch	---	0.75	---	0.75	---	2	---	2
Yoke Boss Diameter	mm	54 mm	54 mm	54 mm	54 mm	71 mm	71 mm	71 mm	71 mm
	Inch	2-1/8	2-1/8	2-1/8	2-1/8	2-13/16	2-13/16	2-13/16	2-13/16
Valve Stem Connector Thread	mm	M12 x 1.75	---	M12 x 1.75	---	M16 x 2	---	M16 x 2	---
	Inch	---	3/8-24	---	3/8-24	---	1/2-20	---	1/2-20
Temperature Range	°C	Nitrile diaphragm and steel studs and nuts: -40 to +82							
	°F	Nitrile diaphragm and steel studs and nuts: -40 to + 180							
Pressure Connections	Inch	1/4 - 18 NPT							
Maximum Approximate Weight (without handwheel)	kg	9.5	9.5	18.0	18.0	19.5	21.5	33.5	35.5
	lb	20.9	20.9	39.7	39.7	43.0	47.4	73.9	78.3
Maximum Approximate Weight (with handwheel)	kg	16.5	16.5	25.0	25.0	26.5	28.5	40.5	42.5
	lb	36.4	36.4	55.1	55.1	58.4	62.8	89.3	93.7

Table 4. Additional Specifications (Action - Air Extends Stem)

SIZE	SPRING SET/QTY	TRAVEL		SPRING RANGE		EFFECTIVE DIAPHRAGM AREA (1)		MAXIMUM OUTPUT THRUST (MAXIMUM ACTUATOR STEM FORCE)(2)	
		mm	Inch	Bar	Psig	cm ²	Inches ²	N	Lb
30	217/3	16	---	0.3 - 1.1	4 - 16	160	24.8	7840	1760
	218/5			1.3 - 2.0	19 - 29	160	24.8	6400	1440
	218/7			1.8 - 2.9	26 - 42	160	24.8	4960	1120
30E	217/3	---	0.75	0.3 - 1.3	4 - 19	160	24.8	7520	1690
	218/5			1.3 - 2.2	19 - 32	160	24.8	6080	1360
	218/7			1.8 - 3.0	26 - 44	160	24.8	4800	1070
34	219/3	16	---	0.3 - 1.1	4 - 16	400	62.0	19,600	4400
	212/5			0.9 - 1.7	13 - 25	400	62.0	17,200	3840
	212/7			1.3 - 2.3	19 - 33	400	62.0	14,800	3350
34E	219/3	---	0.75	0.3 - 1.3	4 - 19	400	62.0	18,800	4220
	212/5			0.9 - 1.8	13 - 26	400	62.0	16,800	3780
	212/7			1.3 - 2.5	19 - 36	400	62.0	14,000	3160
40	212/3	32	---	0.4 - 1.3	6 - 19	390	60.5	18,300	4110
	213/6			0.8 - 1.8	12 - 26	390	60.5	16,400	3690
	214/7			1.2 - 2.4	17 - 35	390	60.5	14,000	3150
40E	212/3 213/6 214/7	---	1.125	0.4 - 1.2	6 - 17	390	60.5	18,700	4230
				0.8 - 1.7	12 - 25	390	60.5	16,800	3750
				1.2 - 2.3	17 - 33	390	60.5	14,400	3270
	213/4 214/5 214/7	---	1.5	0.3 - 1.0	4 - 15	380	58.9	19,000	4240
				0.6 - 1.5	9 - 22	380	58.9	17,100	3830
				0.9 - 2.1	13 - 30	380	58.9	14,800	3360
	213/4 214/5 214/7	---	2	0.2 - 1.2	3 - 17	370	57.4	17,800	4220
				0.5 - 1.7	7 - 25	370	57.4	15,900	3560
				0.7 - 2.4	10 - 35	370	57.4	13,300	2980
45	221/8	32	---	0.8 - 1.6	12 - 23	790	122	34,800	7810
	221/12			1.2 - 2.5	17 - 36	790	122	27,600	6220
	223/12			1.5 - 3.1	22 - 45	790	122	22,900	5120
45E	221/8 221/12 223/12	---	1.125	0.8 - 1.6	12 - 23	790	122	34,800	7810
				1.2 - 2.3	17 - 33	790	122	29,200	6590
				1.5 - 3.0	22 - 44	790	122	23,700	5250
	221/8 221/12 223/12	---	1.5	0.5 - 1.4	7 - 20	780	121	35,900	8110
				0.8 - 2.2	12 - 32	780	121	29,600	6650
				1.0 - 2.7	15 - 39	780	121	25,700	5810
	221/8 221/12 223/12	---	2	0.5 - 1.7	7 - 25	770	119	33,100	7380
				0.7 - 2.5	10 - 36	770	119	26,900	6070
				0.9 - 3.1	12 - 45	770	119	22,300	5000

1. Effective diaphragm area at 0% valve travel from seat.
2. Based upon 6 bar operating pressure to the diaphragm and valve travel at 0% from seat. This does not consider limitation to the valve such as stem buckling load. Consult your Emerson Process Management sales office for details.

Table 5. Additional Specifications (Action - Air Retracts Stem)

SIZE	SPRING SET/QTY	TRAVEL		SPRING RANGE		EFFECTIVE DIAPHRAGM AREA ⁽¹⁾		MAXIMUM OUTPUT THRUST (MAXIMUM ACTUATOR STEM FORCE) ⁽²⁾	
		mm	Inch	Bar	Psig	cm ²	Inches ²	N	Lb
30	217/3	16	---	0.5 - 1.3	7 - 19	170	26.4	780	170
	218/5			1.4 - 2.2	20 - 32	170	26.4	2360	530
	218/7			2.0 - 3.1	29 - 45	170	26.4	3360	760
30E	217/3	---	0.75	0.3 - 1.3	4 - 19	175	27.1	550	120
	218/5			1.2 - 2.2	17 - 32	175	27.1	2180	490
	218/7			1.8 - 3.1	26 - 45	175	27.1	3110	700
34	219/3	16	---	0.6 - 1.4	9 - 20	410	63.6	2450	550
	212/5			1.1 - 1.9	16 - 28	410	63.6	4610	1040
	212/7			1.6 - 2.7	23 - 39	410	63.6	6560	1480
34E	219/3	---	0.75	0.4 - 1.4	6 - 20	420	65.1	1880	420
	212/5			1.0 - 1.9	15 - 28	420	65.1	4120	930
	212/7			1.4 - 2.7	20 - 39	420	65.1	5870	1320
40	212/3	32	---	0.4 - 1.3	6 - 19	450	69.8	1880	420
	213/6			0.8 - 1.8	12 - 26	450	69.8	3640	820
	214/7			1.2 - 2.4	17 - 35	450	69.8	5530	1240
40E	212/3 213/6 214/7	---	1.125	0.5 - 1.3	7 - 19	440	68.2	2200	500
				0.9 - 1.8	13 - 26	440	68.2	3970	890
				1.3 - 2.4	19 - 35	440	68.2	5920	1330
	213/4 214/5 214/7	---	1.5	0.4 - 1.1	6 - 16	410	63.6	1560	350
				0.7 - 1.6	10 - 23	410	63.6	3010	680
				1.0 - 2.3	15 - 33	410	63.6	4270	960
	213/4 214/5 214/7	---	2	0.2 - 1.2	3 - 17	440	68.2	1060	240
				0.5 - 1.8	7 - 26	440	68.2	2390	540
				0.8 - 2.5	12 - 36	440	68.2	3400	760
45	221/8	32	---	0.8 - 1.7	12 - 25	940	146	7790	1750
	221/12			1.2 - 2.5	17 - 36	940	146	11,700	2630
	223/12			1.6 - 3.2	23 - 46	940	146	14,700	3300
45E	221/8 221/12 223/12	---	1.125	0.9 - 1.7	13 - 25	910	141	8350	1880
				1.4 - 2.5	20 - 36	910	141	12,500	2810
				1.7 - 3.2	25 - 46	910	141	15,700	3530
	221/8 221/12 223/12	---	1.5	0.7 - 1.6	10 - 23	870	135	6150	1380
				1.1 - 2.4	16 - 35	870	135	9230	2080
				1.3 - 3.1	19 - 45	870	135	11,500	2590
	221/8 221/12 223/12	---	2	0.5 - 1.7	7 - 25	940	146	4740	1070
				0.8 - 2.6	12 - 38	940	146	7110	1600
				0.9 - 3.2	13 - 46	940	146	8800	1980

1. Effective diaphragm area at 0% valve travel from seat.
2. Based on zero operating pressure to the diaphragm and valve travel at 0% from valve seat. This does not consider limitations such as stem buckling load. Consult your Emerson Process Management sales office for details.

Actuator Dimensions

See table 6.

Table 6. Dimensions⁽¹⁾

ACTUATOR SIZE	VALVE TRAVEL	YOKE BOSS, INCHES	C	E	F ⁽²⁾	AR	Js	Hs	M (ARS) ⁽³⁾	M (AES) ⁽⁴⁾
			Millimeters							
30	16 mm	2-1/8 (54 mm)	215	370	140	105	205	280	185	80
34	16 mm	2-1/8 (54 mm)	315	400	140	105	250	280	185	80
40	32 mm	2-13/16 (71 mm)	315	420	170	133	250	280	210	100
45	32 mm	2-13/16 (71 mm)	420	450	170	133	250	280	210	100
Inches										
30E	0.75	2-1/8	8.5	14.6	5.6	4.7	8.1	11.0	7.3	3.1
34E	0.75	2-1/8	12.4	15.8	5.6	4.7	9.8	11.0	7.3	3.1
40E	1.125	2-13/16	12.4	17.9	8.1	6.6	9.8	11.0	9.6	5.5
40E	1.5	2-13/16	12.4	18.9	8.3	6.6	9.8	---	---	---
40E	2	2-13/16	12.4	18.9	8.5	6.2	9.8	---	---	---
45E	1.125	2-13/16	16.5	19.3	8.1	6.6	9.8	11.0	9.6	5.5
45E	1.5	2-13/16	16.5	20.1	8.3	6.6	9.8	---	---	---
45E	2	2-13/16	16.5	20.1	8.5	6.2	9.8	---	---	---

1. See figures 6 and 7.
2. This is the centre of the stem connector at the fully-up position. This ensures the positioner feedback arm, if fitted, is horizontal at mid-travel.
3. ARS - air retracts stem.
4. AES - air extends stem.

Ordering Information

When ordering please specify the following information:

Application Details:

1. On-off or throttling service
2. Input signal range
3. Maximum supply pressure
4. Valve body type and size with which the actuator will be used
5. Valve plug travel
6. Actuator thrust required with the actuator stem both fully retracted and fully extended

7. Stroking time requirements, if critical

8. Ambient temperature range

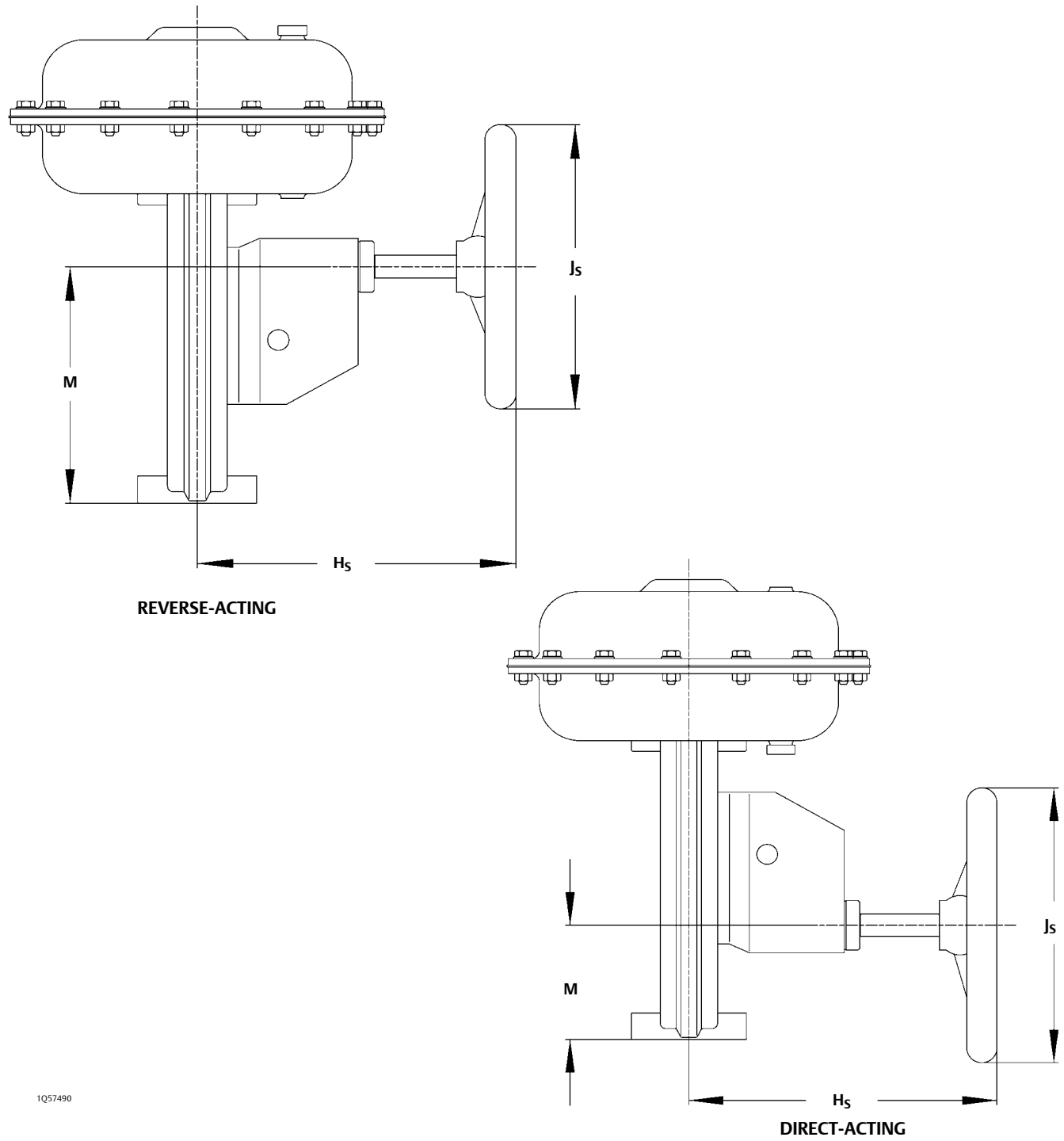
Actuator and Positioner

Be sure to specify the actuator type number required, whether a positioner is needed, whether a handwheel is required and whether an adjustable travel stop is required. Refer to the Specifications section in this bulletin. Review the information under each specification and in the referenced tables and figures. Specify the desired choice wherever there is a selection to be made.

Valve Body and Accessories

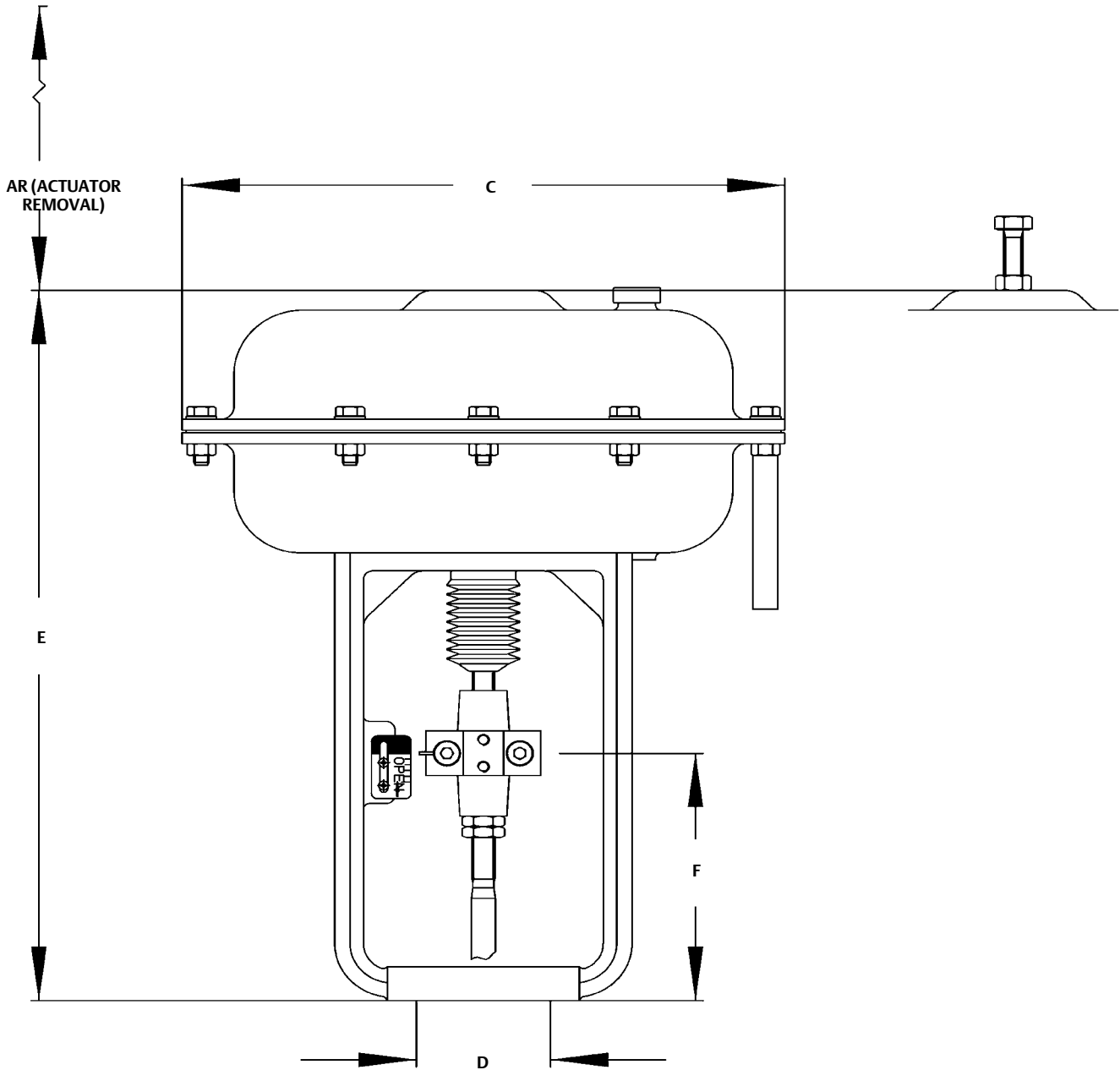
Refer to the separate valve body bulletin and bulletins covering accessories for ordering information.

Figure 6. Actuator Dimensions with Handwheel (see table 6)



1057490

Figure 7. Actuator Dimensions (see table 6)



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Product Bulletin

61.1:3024C
March 2012

3024C Actuator
D103051X012

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