

Series 31
Multi Spring & Diaphragm Actuator

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Valve Model Numbering

Series	Size	Fail Action	Handwheel	Adjustable Travel Stop
31	2A - M60	1 – Fail Open	N - None	1 - Open
	2B - M100	2 - Fail Close	T – Top Mounted Handwheel	2 - Close
	2C - M160		S - Side Mounted Handwheel	3 - None

Key Features

Compactness:

Use of multiple springs enables reduction of the overall height of the actuator.

Field Reversible:

The design allows the change of action from direct to reverse acting without any additional parts. Change of action can be easily made in the field.

Application Versatility:

Specific spring design is offered for each actuator size – travel. Four spring ranges are achieved by varying the number of springs and initial compression of the springs. These four spring ranges are good enough to cover a wide range of actuator thrust requirements.

High Thrust Capability & Stiffness:

Series 31 is optimized for the much-desired combinations of high actuator thrust and high spring-stiffness within available instrumented air supply pressure of 4 bar.

Handwheel:

Side-mounted handwheel can be fitted to all sizes of actuators, for full travel operation. The handwheel designed in such a way, that the rim force required to achieve maximum output thrust, is within human comfort level. Also, the handwheel is positioned at a comfortable height within the valve actuator assembly.

Adjustable Travel Stops:

Top mounted adjustable up travel stops are available for all actuator sizes.



Actuator without Handwheel



Actuator with Handwheel

Actuator Thrust

Actuator	Effective	Actuator	Spring	No.of	Spring	Spring thrust		Net Pneumatic Thrust	
Size	Area (inch ²)	Travel (inch)	Level	Spring (Qty)	Rate (lbf/in)	Min (lbf)	Max (lbf)	Max (lbf)	Min (lbf)
M60	60	0.75	Lower	3	960	180	990	3420	2610
			Lower	6	1920	360	1980	3240	1620
			Upper	3	960	660	1440	2970	2160
			Upper	6	1920	1260	2880	2340	720
M100	100	0.75, 1.125, 1.5	Lower	3	800	300	1650	5700	4350
			Lower	6	1600	600	3300	5400	2700
			Upper	3	800	1050	2400	4950	3600
			Upper	6	1600	2100	4800	3900	1200
M160	160	1.125, 1.5, 2, 2.5	Lower	3	768	480	2640	9120	6960
			Lower	6	1536	960	5280	8640	4320
			Upper	3	768	1680	3840	7920	5760
			Upper	6	1536	3360	7680	6240	1920

Air Connection:

Standard : 1/4" NPT for Size 60 & 100 and 3/8" NPT for Size 160

Optional : 3/8" NPT for Size 60 & 100 and 1/2" NPT for Size 160.

Cross-Sectional View



Direct Acting (AFO)



Reverse Acting (AFC)

Part List

S.No	Item Description	Materials	S.No	Item Description	Materials
1	Lower Diaphragm Case	Carbon Steel	10	Stem Bushing	Carbon Steel
2	Upper Diaphragm Case	Carbon Steel	11	Hex Bolt	Carbon Steel
3	Yoke	Cast Iron	12	Seal Washer	Carbon Steel
4	Spring	Carbon Steel	13	Compression Nut	Carbon Steel
5	Diaphragm	Buna-N/Polyester	14	Vent Plug	Carbon Steel
6	Diaphragm Plate	Aluminum Alloys	15	Stroke Stop	Buna-N/Polyester
7	Stem	Stainless steel	16	Connector Insert	Buna-N/Polyester
8	Spring Guide	Carbon Steel	17	Gbox-Gear Housing	Cast Iron
9	Spacer	Carbon Steel			

Volumetric Data

Actuator Size	Travel	Clearance volume	Swept volume	Volume at full travel
	(inch)	(in ³)	(in ³)	(in ³)
M60	0.75	14.8	39.7	54.6
M100	0.75	24.2	65.6	89.8
M100	1.125	24.2	98.5	122.6
M100	1.5	24.2	131.3	155.5
M160	1.125	41.7	162.8	204.6
M160	1.5	41.7	217.1	258.8
M160	2	41.7	289.5	331.2
M160	2.5	41.7	361.9	403.6

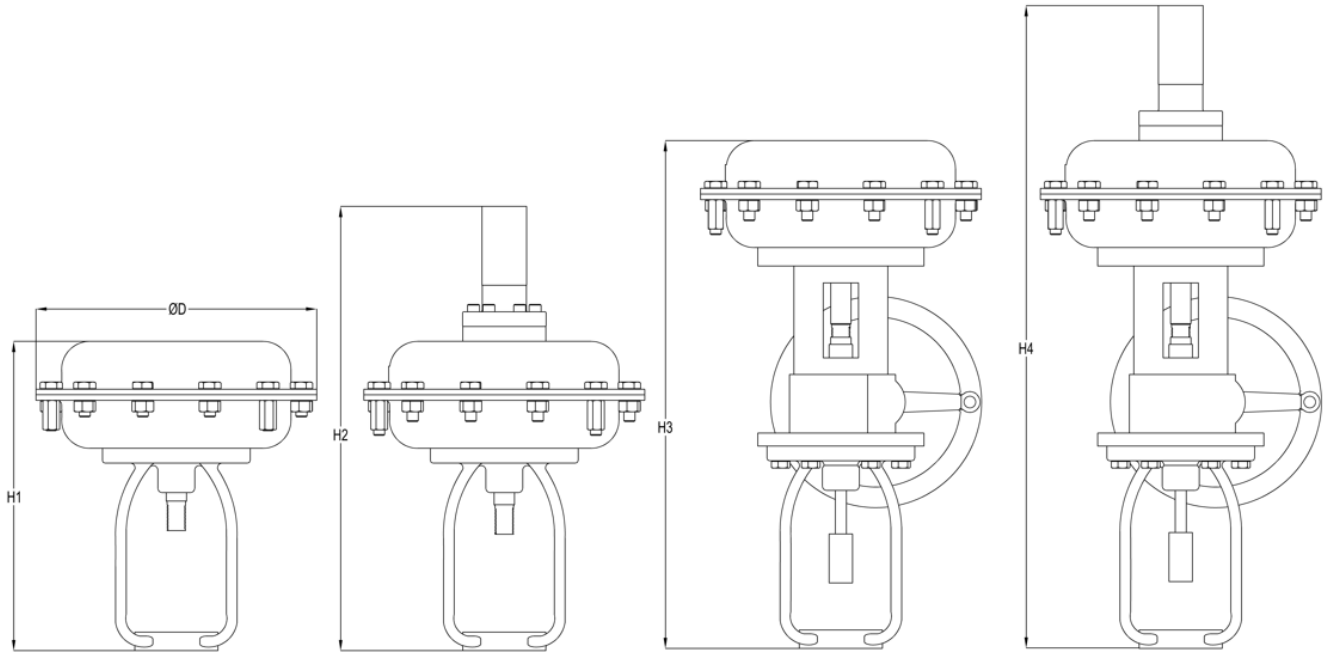
Handwheel

Actuator	Max. Travel	H/W Dia	Turns per inch	Rim Force	H/W Output Force
Size	(inch)	(inch)	No off	(lbf)	(lbf)
M60	0.75	9	5	84	2700
M100	1.5	12	9	92	4500
M160	2.5	15.3	17	98	7200

Actuator with Handwheel



Dimensions and Weight



Actuator	Spring	Dimensions (mm)						Weight (Kg)	
Size	Range	D	H1	H2	H3	H4	L1	W/O HW	W/ HW
M60	All	304	340	480	550	700	211	28	46
M100	All	375	450	635	706	891	220	50	77
M160	All	476	580	895	928	1234	220	106	165

Actuator Standout

Actuator	Effective Area	Travel	Valve stem connection	Yoke Boss Diameter	Act. Standout*
Size	(inch ²)	(inch)	(inch)	(inch)	(inch)
M60	60	0.75	0.375	2.36	4.2
M100	100	1.5	0.5	2.36	4.5
M160	160	2.5	0.75	2.36	5.2

*Actuator Standout for Air fail close.



Factory Address

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