


# MSD-III Diaphragm Actuator



  
*Engineering  
GREAT Solutions*

**Multi-Spring Diaphragm Actuator**

# MSD-III Diaphragm Actuator

The MSD-III is a pneumatic diaphragm actuator with a robust rolling diaphragm and multi-spring design. Available in direct-acting (DA) and reverse-acting (RA). Fail open and close are achieved by the multi-spring force or compressed air. Additionally, the rugged one-piece cast yoke, pressed diaphragm case and special nylon-reinforced diaphragm provide dependable high force actuation performance. The MSD-III is available in five sizes to cover a wide range of applications. A manual handwheel is an optional extra on both direct-acting (DA) and reverse-acting (RA) actuators as an option.

## Key features

- > Multi-spring design
  - Excellent long-term accuracy and fail mode reliability are achieved through the multiple spring design with high compression force
- > Rugged one-piece yoke
  - Provides maximum strength and rigidity
- > Diaphragm case
  - Pressed steel case provides high mechanical strength and protection in the event of over-pressurisation. Further reinforcements are provided for actuator sizes greater than 290 to ensure safe operation
- > Thrust & stroke capability
  - Two actuator types and five sizes allow a wide range of applications
- > Diaphragm
  - Moulded elastomer with fabric insert for strength, long life and high sensitivity. The precisely formed diaphragm eliminates any friction and reduces variations in the effective areas during linear operation
- > Various air connection sizes
  - Various air connection sizes provide various accessory applications
- > Linearity
  - The moulded rolling diaphragm and deep cases minimise area change and provide a linear relation between travel and air pressure

## Benefits

- > **Excellent performance**

As a multi-spring type, operation is precise and repeatability is excellent, minimising the hysteresis error
- > **Fast response**

The actuator air chamber volume is minimised to reduce dead-time and be more responsive to changes in air pressure
- > **Rugged construction**

The MSD-III diaphragm actuator has undergone extreme durability tests and with numerous installations over 20 years, it has proven to be a reliable solution for control valves



*Precise operation and reliable repeatability*

*Air chamber volume is minimised to reduce dead-time*



*Proven, reliable solution for control valves*

## Technical Details

### Type

Pneumatic multi-spring diaphragm actuator

### Spring action

DA (Direct Acting - Springs to open)

RA (Reverse Acting - Springs to close)

### Material

Refer to material table on next page

### Temperature

-29 °C to 80 °C (optional -45 °C, -55 °C)

### Operation pressure

4.2 kgf/cm<sup>2</sup> to 5.0 kgf/cm<sup>2</sup>

### Stroke range

20mm to 130mm

### Optional manual override

Top handwheel (250, 290, 370)

Side handwheel (480, 550)

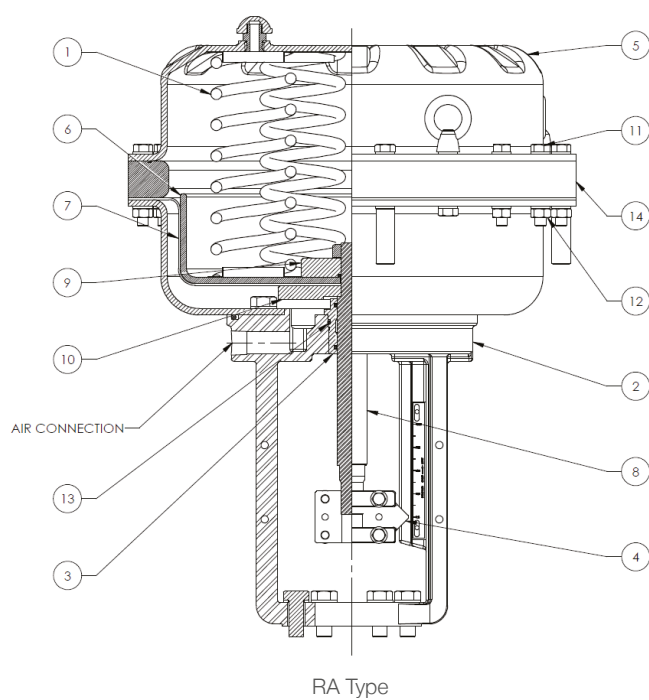
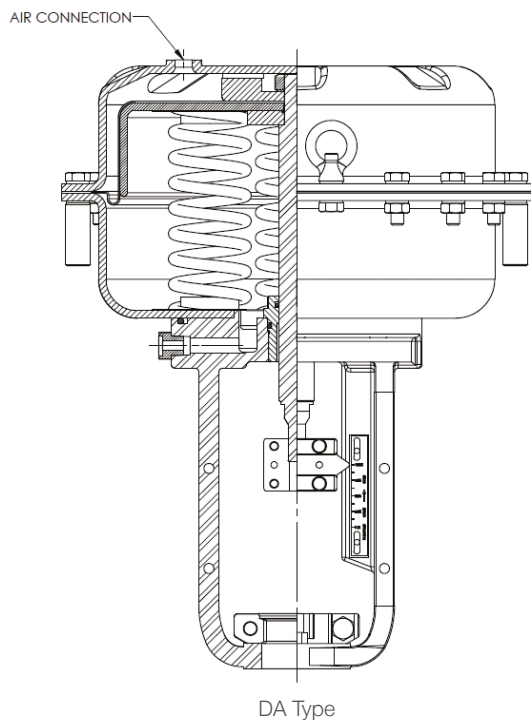
### Certificates

SIL, TRCU, ATEX

### Spring bench set list

Actuator size	Effective area (cm <sup>2</sup> )	Stroke (mm)	Spring range (kg/cm <sup>2</sup> )		Seat thrust (kgf) @ 5kg/cm <sup>2</sup>	
			RA	DA	RA	DA
250	270	20	1.6 - 3.2	0.8 - 2.4	432	702
			-	0.6 - 1.8	-	864
		30	0.8 - 3.2	0.8 - 3.2	216	486
			-	0.6 - 2.4	-	702
290	350	20	2.5 - 4.0	0.7 - 1.7	875	1155
			2.1 - 3.3	0.6 - 1.3	735	1295
		30	1.8 - 4.0	0.7 - 2.2	630	980
			1.5 - 3.3	0.6 - 1.7	525	1155
		40	1.1 - 4.0	0.7 - 2.6	385	840
			0.9 - 3.3	0.6 - 2.0	315	1050
370	625	30	2.6 - 4.4	0.8 - 2.1	1625	1813
			2.0 - 3.4	0.7 - 1.8	1250	2000
		40	2.0 - 4.4	0.8 - 2.5	1250	1563
			1.5 - 3.4	0.7 - 2.2	937.5	1750
		50	1.4 - 4.4	0.8 - 3.0	875	1250
			1.0 - 3.4	0.7 - 2.6	625	1500
480	1075	50	2.0 - 4.5	0.5 - 1.9	2150	3333
			1.6 - 3.5	0.6 - 2.0	1720	3225
			1.0 - 4.5	0.5 - 2.4	1075	2795
		70	1.7 - 4.0	0.5 - 2.5	1827.5	2688
			1.5 - 3.5	0.6 - 2.3	1612.5	2903
		100	0.7 - 4.0	0.5 - 3.2	752.5	1935
			0.6 - 3.5	0.6 - 3.0	645	2150
			-	-	-	-
550	1490	70	1.6 - 4.2	0.5 - 1.8	2384	4768
			1.0 - 3.7	-	1490	-
		100	1.3 - 3.6	0.5 - 2.3	1937	4023
			0.6 - 3.6	0.5 - 2.8	894	3278

## Materials



No	Part name	Standard material
1	Spring	Cr-Si coil spring wire
2	Yoke	A216 WCB
3	Guide bush	Bronze
4	Stem clamp	304 SS
5	Diaphragm case (upper/lower)	Carbon steel
6	Diaphragm plate	Carbon steel
7	Diaphragm	EPDM
8	Actuator stem	304 SS
9	Spacer	Carbon steel
10	Diaphragm washer	Carbon steel
11	Bolt	304 SS
12	Nut	304 SS
13	O-ring	EPDM
14	Extension adaptor	Aluminum

## Product dimensions

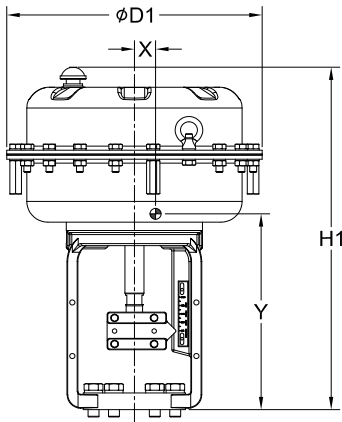


Figure 1. Standard (without handwheel)

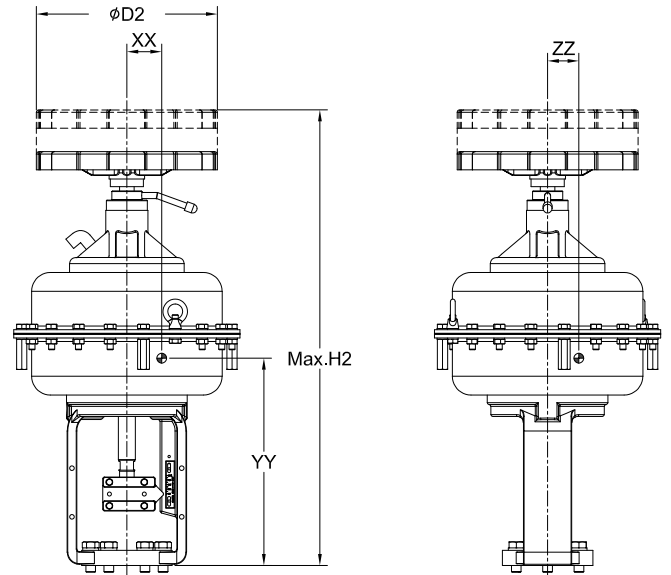
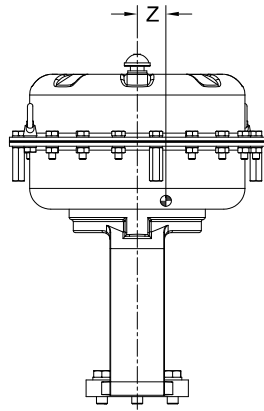


Figure 2. Top handwheel type (250, 290, 370)

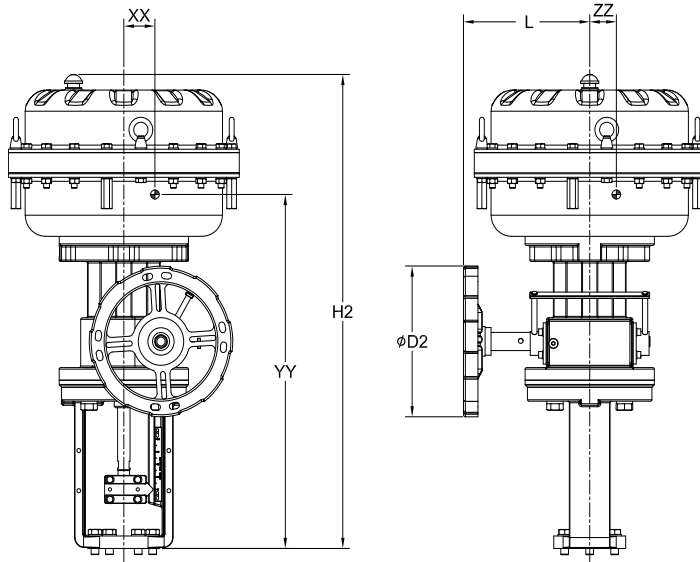


Figure 3. Side handwheel type (480, 550)

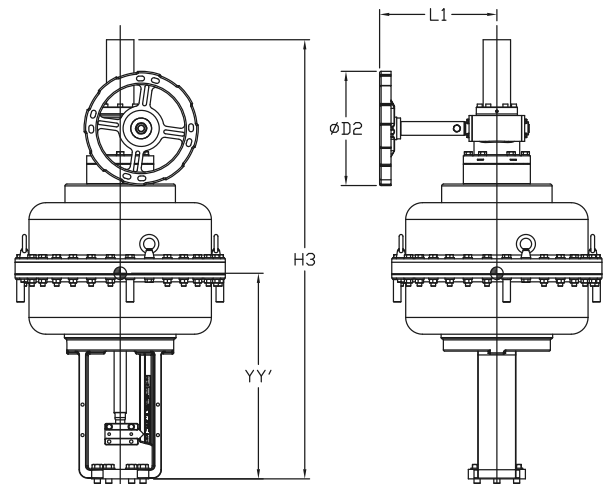


Figure 4. Top handwheel type (480, 550)

### Dimensions & weights

Actuator size	D1 (mm)	D2 (mm)	H1 (mm)	H2 (mm)	H3 (mm)	L (mm)	L1 (mm)	Weights (Kg)	
								Standard	With handle
250	250	300	380	580	N/A	N/A	N/A	15	24
290	292	300	430	620	N/A	N/A	N/A	22	30
370	375	300	520	730	N/A	N/A	N/A	48	59
480	482	300	660	950	1060	269	310	96	152
550	552	300	730	1070	1160	310	310	150	214

### Centre of gravity

Actuator size	Standard (mm)			With handle (mm)			
	X	Y	Z	XX	YY	YY'	ZZ
250	0.3	214	0	0.5	283	N/A	0
290	0.4	249	0	0.5	306	N/A	0
370	0.4	295	0	0.5	342	N/A	0
480	0.8	388	0	5.4	540	485	3.8
550	0.7	459	0	4.1	640	540	2.8

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