

MSD II ACTUATORS

The MSD II is a pneumatic, spring-opposed diaphragm actuator operating from plant air. Excellent long-term accuracy and reliability is achieved through the use of multiple springs in the actuator.

The rugged one-piece yoke, the pressed steel diaphragm case and the special nylon reinforced diaphragm provide dependable, high thrust performance. Additionally, the precision formed diaphragm eliminates friction and reduces variations in the effective area during operation which, in turn, results in exceptional linearity.

An optional top or side-mounted manual override is available on both direct and reverse acting actuators. Six different sizes of the MSD II actuators with various accessories can virtually satisfy all application requirements.

Features

Excellent Performance: As a multi-spring type, operation is precise and repeatability is excellent minimizing the hysteresis error.

Fast Response: The pressure-tight chamber to which air pressure is connected has a small volume for fast response.

Rugged Construction: All parts are engineered and tested for long life under millions of cycles.

Specifications

- Type:** Multi-spring opposed rolling diaphragm
- Action:** Direct Acting (DA)
Reverse Acting (RA)
- Materials:** See Table 1 on Page 3
- Operating Temperature:** -20°F to 180°F
(-30°C to 80°C)
- Operating Pressure:** See Table 2 on Page 4
- Maximum Stroke:** 0.8 in. to 5 in.
(20mm to 130mm)
- Manual Override:** Top mounted (all sizes) or
Side mounted (400, 500, 650 only)
- Accessories:** Positioner, filter regulator, solenoid valve, limit switches, position transmitter, booster and transducer are available for actuator mounting.
- Dimensions:** See Tables 3, 4 and 5 on Pages 5, 6 and 7

Actuator Size	Effective Diaphragm (inch ² /cm ²)	Actuator Stem Size Diameter ø(mm)	Maximum Stroke (inch/mm)	Thrust at 3psi (lbs/Kgf)	Max Allowable Operating Pressure (psig)/(Kg/cm ² G)
250	42/270	1/25	0.8/20	120/54	70/5
290	53/340	1/25	1.6/40	150/68	70/5
340	82/530	1/25	2.0/50	235/106	60/4
400	116/750	1.3/32	2.8/70	330/150	60/4
500	194/1250	1.3/32	2.8/70	550/250	60/4
500L	194/1250	1.3/32	4.0/100	550/250	60/4
650	326/2100	1.3/32	5.1/130	925/420	60/4

Table 1 MSD II Actuator Assembly Materials

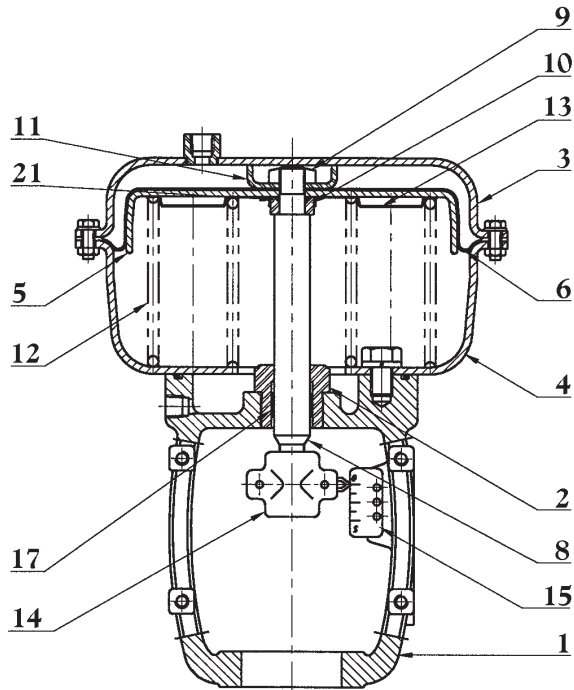


Figure 1
Direct Acting (DA)

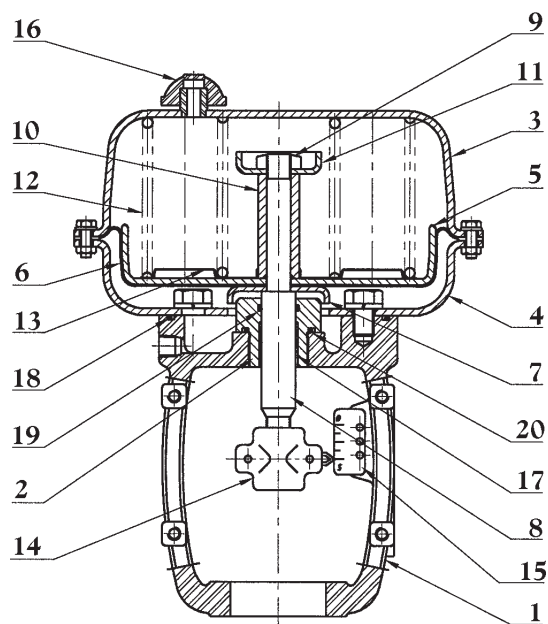


Figure 2
Reverse Acting (RA)

NO.	PART NAME	MATERIAL
1	Yoke	Cast Steel (A216 WCB) Nodular Cast Iron (A395)
2	Guide Bushing	Brass
3	Upper Diaph. Case	Carbon Steel
4	Lower Diaph. Case	Carbon Steel
5	Diaph. Plate	Carbon Steel
6	Diaphragm	EPDM / Nylon
7	Diaph. Washer	304 SS
8	Actuator Stem	316 SS
9	Stem Nut	304 SS
10	Spacer	304 SS
11	Stopper	304 SS
12	Spring	Spring Steel
13	Spring Guide	304 SS
14	Stem Clamp	304 SS
15	Travel Indicator	304 SS
16	Venting Cap	Brass
17	DU-Bearing	Graphite / 316 SS
18	O-Ring	EPDM
19	O-Ring	EPDM
20	O-Ring	EPDM
21	O-Ring	EPDM

Table 2 Operating Spring Range

Unit: (psi) / (kg/cm²), (inch/
mm)

Actuator Size	Off-Balance Pressure	RA (Air Fail Close)			DA (Air Fail Open)		
		Spring Range	Set Pressure	Stroke	Spring Range	Set Pressure	Stroke
250	3/0.2	3~ 15/0.2~ 1.0	21/1.4	0.8/20	3~ 15/0.2~ 1.0	21/1.4	0.8/20
	6/0.4	8~ 18/0.4~ 1.2	24/1.6	0.8/20	6~ 18/0.4~ 1.2	27/1.8	0.8/20
	9/0.6	9~ 18/0.6~ 1.2	24/1.6	0.8/20	6~ 12/0.4~ 1.2	30/2.0	0.8/20
	12/0.8	12~ 21/0.8~ 1.4	27/1.8	0.8/20	6~ 18/0.4~ 1.2	33/2.2	0.8/20
290	3/0.2	3~ 15/0.2~ 1.0	21/1.4	1.6/40	3~ 15/0.2~ 1.0	21/1.4	1.6/40
		3~ 15/0.2~ 1.0	21/1.4	2.0/50	3~ 15/0.2~ 1.0	21/1.4	2.0/50
	6/0.4	6~ 18/0.4~ 1.2	24/1.6	0.8/20	6~ 18/0.4~ 2.0	39/2.6	1.2/30
		6~ 30/0.4~ 2.0	36/2.4	1.2/30	6~ 30/0.4~ 2.0	39/2.6	1.2/30
	9/0.6				6~ 18/0.4~ 1.2	30/2.0	0.6/20
					6~ 30/0.4~ 2.0	42/2.6	1.2/30
	12/0.8	12~ 24/0.8~ 1.6	30/2.0	0.8/20	6~ 18/0.4~ 1.2	33/2.2	0.6/20
					6~ 30/0.4~ 2.0	45/3.0	1.2/30
	3/0.2	3~ 15/0.2~ 1.0	21/14	1.6/40	3~ 15/0.2~ 1.0	21/14	1.6/40
	3/0.2	3~ 15/0.2~ 1.0	20/50	1.6/40	3~ 15/0.2~ 1.0	21/14	2.0/50
340	6/0.4	6~ 30/0.4~ 2.0	36/2.4	1.6/40	3~ 15/0.2~ 1.0	24/1.6	1.6/40
					6~ 30/0.4~ 2.0	39/2.6	1.6/40
	9/0.6	9~ 27/0.6~ 1.8	38/2.2	1.6/40	6~ 30/0.4~ 2.0	42/2.8	1.6/40
	12/0.8	12~ 30/0.8~ 2.0	36/2.4	1.2/30	6~ 24/0.4~ 1.6	39/2.6	1.2/30
	16/1.2	18~ 30/1.2~ 2.0	36/2.4	0.8/20	6~ 18/0.4~ 1.2	39/2.6	0.8/20
400	5/0.2	3~ 15/0.2~ 1.0	21/1.4	2.0/50	3~ 15/0.2~ 1.0	21/1.4	2.0/50
		3~ 15/0.2~ 1.0	21/1.4	2.8/70	3~ 15/0.2~ 1.0	21/1.4	2.8/70
	6/0.4	6~ 18/0.4~ 1.2	24/1.6	2.0/50	6~ 18/0.4~ 1.2	27/1.8	2.0/50
		6~ 18/0.4~ 1.2	24/1.6	1.6/40	6~ 18/0.4~ 1.2	27/1.8	1.6/40
	9/0.6	9~ 21/0.6~ 1.4	27/1.8	1.6/40	6~ 18/0.4~ 1.2	30/2.0	1.6/40
		9~ 27/0.6~ 1.8	33/2.2	12.0/50	6~ 18/0.4~ 1.2	30/2.0	2.0/50
	12/0.8	12~ 21/0.8~ 1.4	27/1.8	1.2/30			
		12~ 21/0.8~ 1.4	27/1.8	1.8/40	8~ 18/0.4~ 1.2	33/2.2	1.6/40
12~ 30/0.8~ 2.0		36/2.4	2.0/50				
500 500L	3/0.2	3~ 15/0.2~ 1.0	21/1.4	2.8/70	3~ 15/0.2~ 1.0	21/1.4	2.8/70
		3~ 15/0.2~ 1.0	21/1.4	4.0/100	3~ 15/0.2~ 1.0	21/1.4	4.0/100
	6/0.4	6~ 18/0.4~ 1.2	24/1.6	2.8/70	3~ 15/0.2~ 1.0	24/1.6	2.8/70
		6~ 18/0.4~ 1.2	24/1.6	2.8/70	3~ 15/0.2~ 1.0	24/1.6	4.0/100
		6~ 30/0.4~ 2.0	36/2.4	2.6/70	6~ 30/0.4~ 2.0	36/2.4	2.6/70
	9/0.6	9~ 21/0.6~ 1.4	27/1.6	2.0/50	9~ 21/0.6~ 1.4	33/2.2	2.0/50
	12/0.8	12~ 30/0.8~ 2.0	36/2.4	2.0/50	6~ 24/0.4~ 1.6	39/2.6	2.0/50
650	3/0.2	3~ 15/0.2~ 1.0	21/1.4	5.0/130	3~ 15/0.2~ 1.0	21/1.4	5.0/130
	6/0.4	6~ 18/0.4~ 1.2	21/1.6	5.0/130	6~ 18/0.4~ 1.2	21/1.6	5.0/130

Table 3 Standard Actuator Dimensions

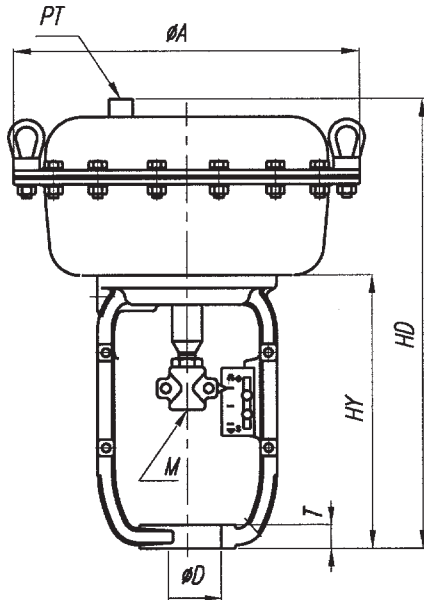


Figure 3 Direct Acting (DA)

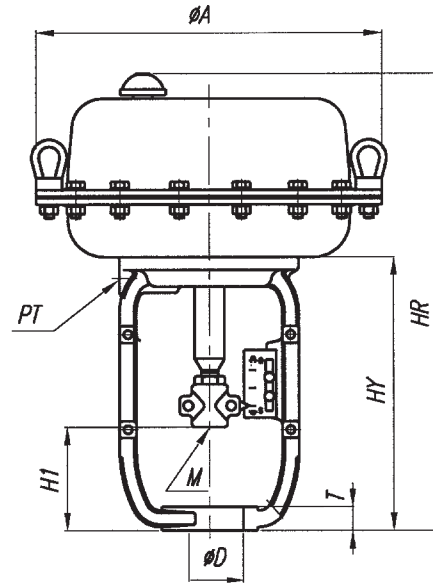


Figure 4 Reverse Acting (RA)

Unit: inch/mm

Size	250	290	340	400	500	500L	650
øA	9.8/250	11.4/290	13.4/340	15.8/400	19.7/500	19.7/500	25.6/650
HD	13.2/335	14.8/375	15.5/400	18.1/460	22.0/558	22.0/588	29.5/750
HR	13.6/345	15.2/385	16.1/410	18.5/470	22.4/568	23.5/598	29.7/753
HY	7.9/200	9.1/230	9.1/230	9.8/250	11.8/300	11.8/300	14.4/366
H1	3.0/75			3.6/92	3.8/97	4.0/102	4.8/122
øD	2.2/56			3.2/80			3.9/100
T	0.8/20			1.0/25			1.6/40
M	M14 * 1.5P			M24 * 1.5P			
PT	1/4"						3/8"

Note: All dimensions are for reference only

Table 4 Dimensions (With Top-Mounted Manual Override)

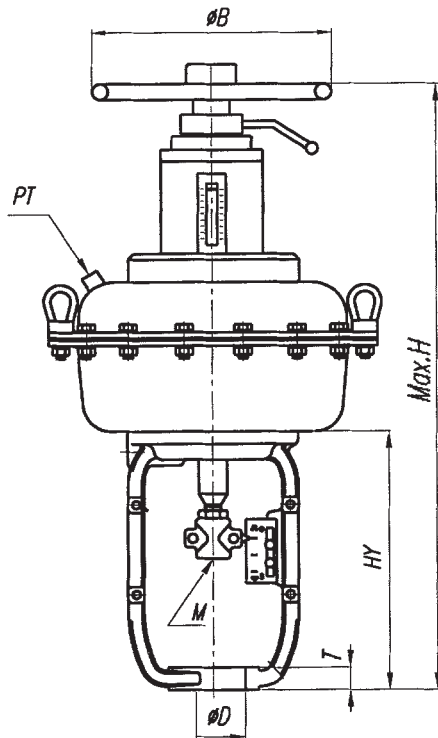


Figure 5 Direct Acting (DA)

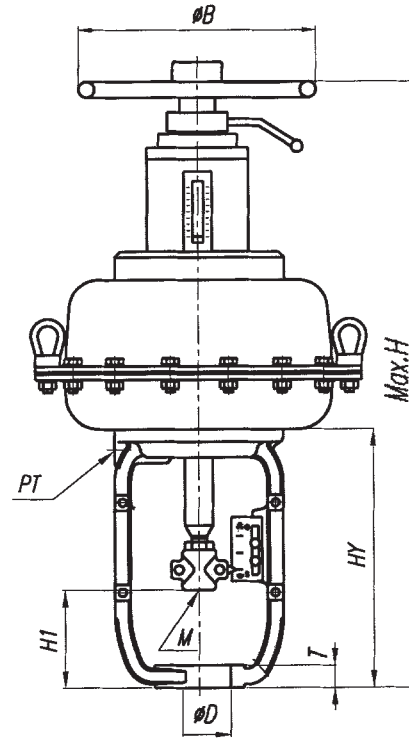


Figure 6 Reverse Acting (RA)

Unit: inch/mm

Turnes Per	250	290	340	400	500	500L	650
øB	8.7/210			11.8/300			15.8/400
H	20.9/530	23.6/600	25/635	29.9/760	35.4/900	36.6/930	53.1/1350
HY	7.9/200	9.1/230	9.1/230	9.8/250	11.8/300	11.8/300	14.4/366
H1	3.0/75			3.6/92	3.8/97	4.0/102	4.8/122
øD	2.2/56			3.2/80			3.9/100
T	0.8/20			1.0/25			1.6/40
M	M14 * 1.5P			M24 * 1.5P			
PT	1/4"						3/8"
Turns Per 10mm Travel	2.5			2			

Note: All dimensions are for reference only

Table 5 Dimensions (With Side-Mounted Manual Override)

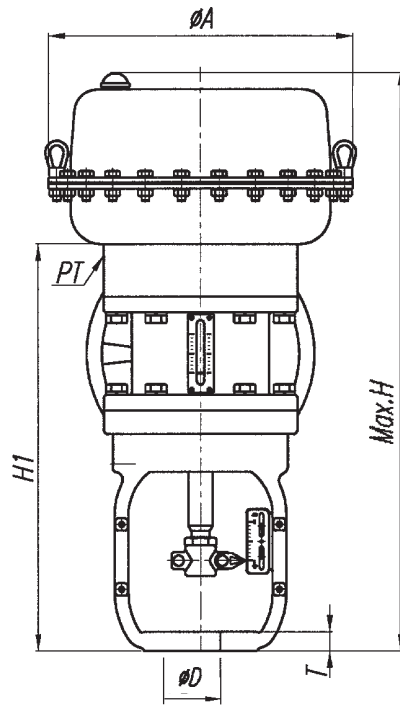


Figure 7

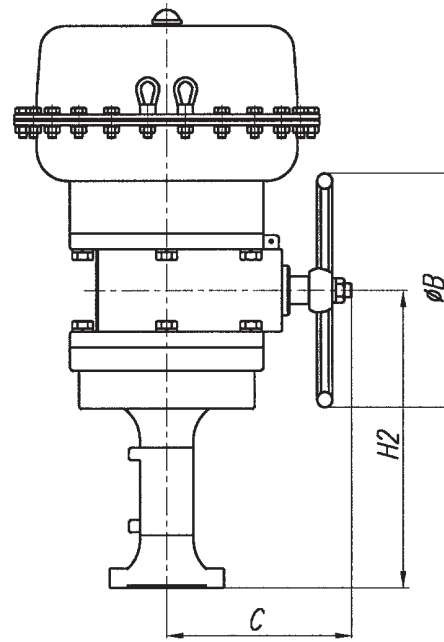


Figure 8

Unit: inch/mm

Size	400	500	500L	650
øA	15.8	19.7/500	19.7/500	25.6/650
H	27.9/710	35/890	36.2/920	45.7/1160
H1	19.5/495	24/610	24/610	29/736
H2	13.7/348	15.9/403	15.9/403	19.7/500
C	9.5/240	9.7/245	9.7/245	12.6/320
øB		11.8/300		15.8/400
øD		3.2/80		3.9/100
T		1.0/25		1.6/40
M	M24 * 1.5P			
PT		1/4"		3/8"
Turns Per 10mm Travel	4	4	4	4

Note: All dimensions are for reference only