ALLTORQUE®

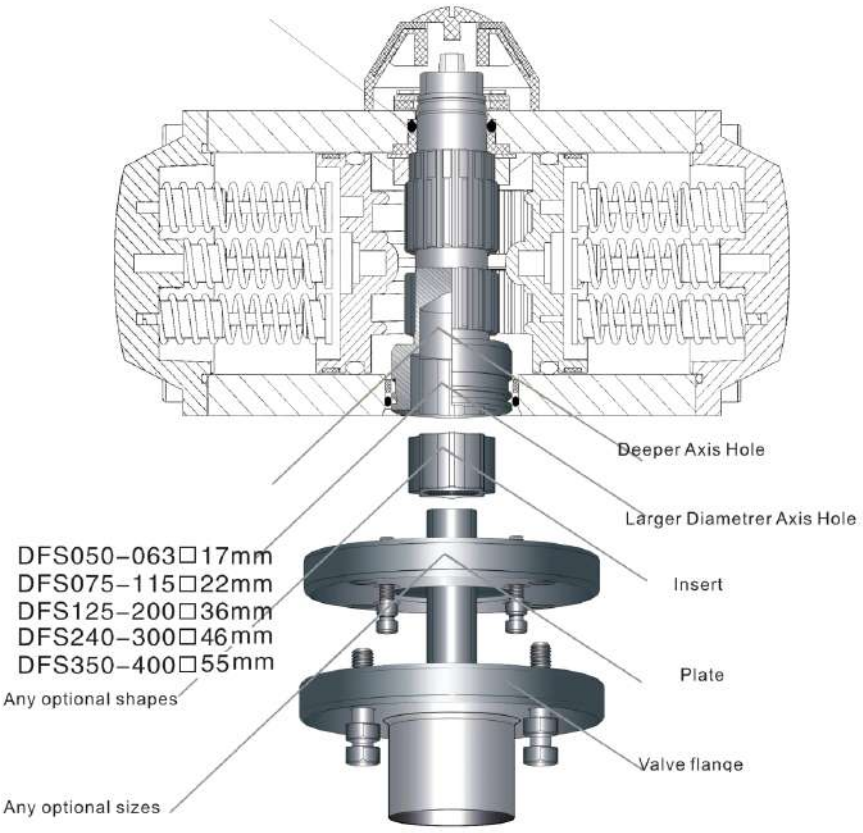
Patent No: ZL 200930382594.7



Two Piston Pneumatic Actuator



No ring groove on the top of drive shaft



Patent No:ZL200930382594.7







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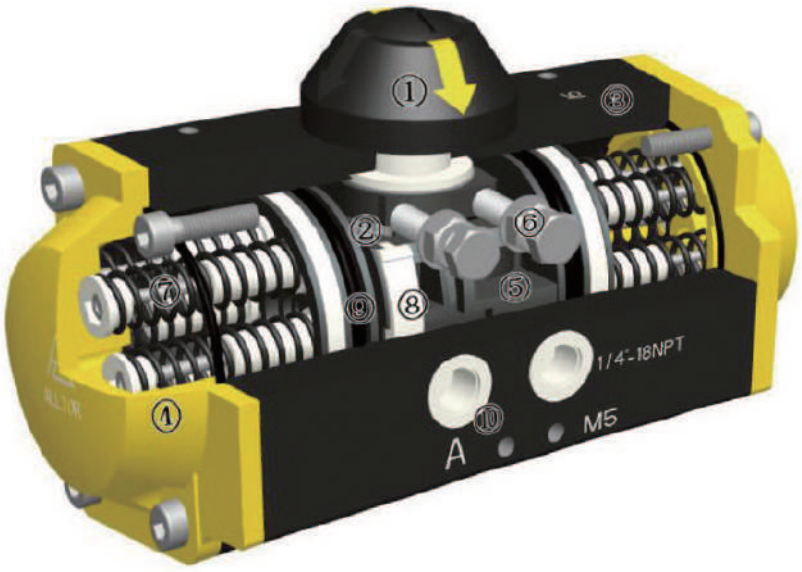
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Design & Construction



1. Indicator
Indicator according to VID/VIE3845 is convenient for mounting accessories such as limit switch box, Positioner and etc.

2. Pinion
The design of the nickel–plated alloy steel integrated forging pinion drive is according the NAMUR,ISO5211 and DIN3337 standards. Special standard are available upon request.

3. Actuator Body
High quality aluminum alloy extrusion formed. The surface has been treated by anodized hardening followed by epoxy polyester coating. Other surface treatments are available e.g. PTFE and Nickel plating as well as other colour coatings on request.

4. End Cap
The surface has been treated by anodized hardening followed by epoxy polyester coating. Other surface treatments are available on request e.g. PTFE and Nickel plating as well as other colours on request.

5. Piston
Manufactured from Die–cast aluminum and treated by anodized hardening process. Symmetric mounting of the piston helps to ensure easy maintenance. Reverse action requirements can be achieved by inverting the pistons.

6. Adjusting Bolt
The two independent adjustment bolts can adjust opening and closing of the mounted valve within±5° .

7. Spring
Preloaded high grade springs with surface epoxy resin painted, which can be demounted conveniently to satisfy different requirements of torque by changing quantity of springs.

8. Piston Ring
Manufactured from low friction long life material POM. Can be easily changed for maintenance purposes.

9. O–rings
Standard NBR rubber O–rings provide trouble–free operation at standard temperature ranges. For other temperature requirements relevant materials can be offered on request.

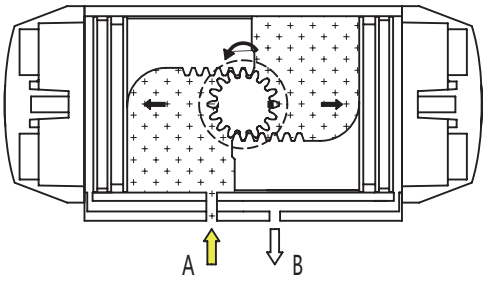
10. Air Connection
Conforms to NAMUR standards

11. All stop parts are manufactured from SS304.

Operations

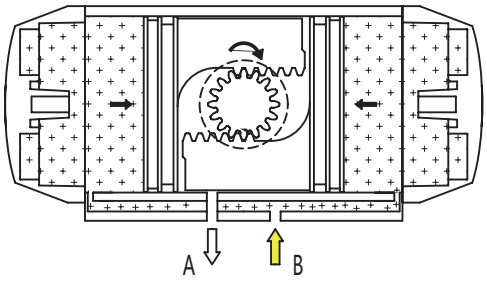
The standard rotation is clockwise to close; counter-clockwise rotation is obtained when port A is pressurized.

Double Acting Operation Function (Standard Rotation) Top View



CCW

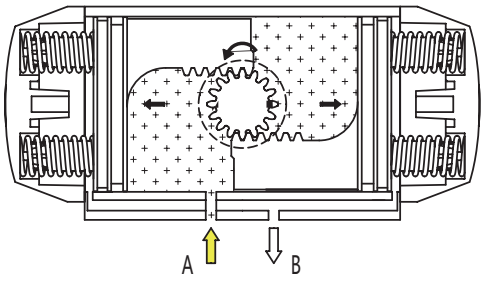
Air supplied to Port A forces the pistons apart and toward end positions, with exhaust air exiting at Port B, a counter-clockwise rotation is obtained.



CW

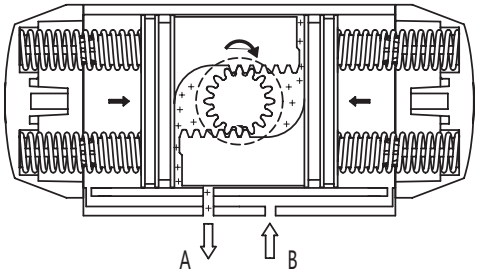
Air supplied to Port B forces the pistons together with exhaust air exiting at Port A, a clockwise rotation is obtained.

Single Acting Operation Function (Standard Rotation) Top View



CCW

Air supplied to Port A forces the pistons apart and toward end positions, compressing the springs with exhaust air exiting at Port B, a counter-clockwise rotation is obtained.

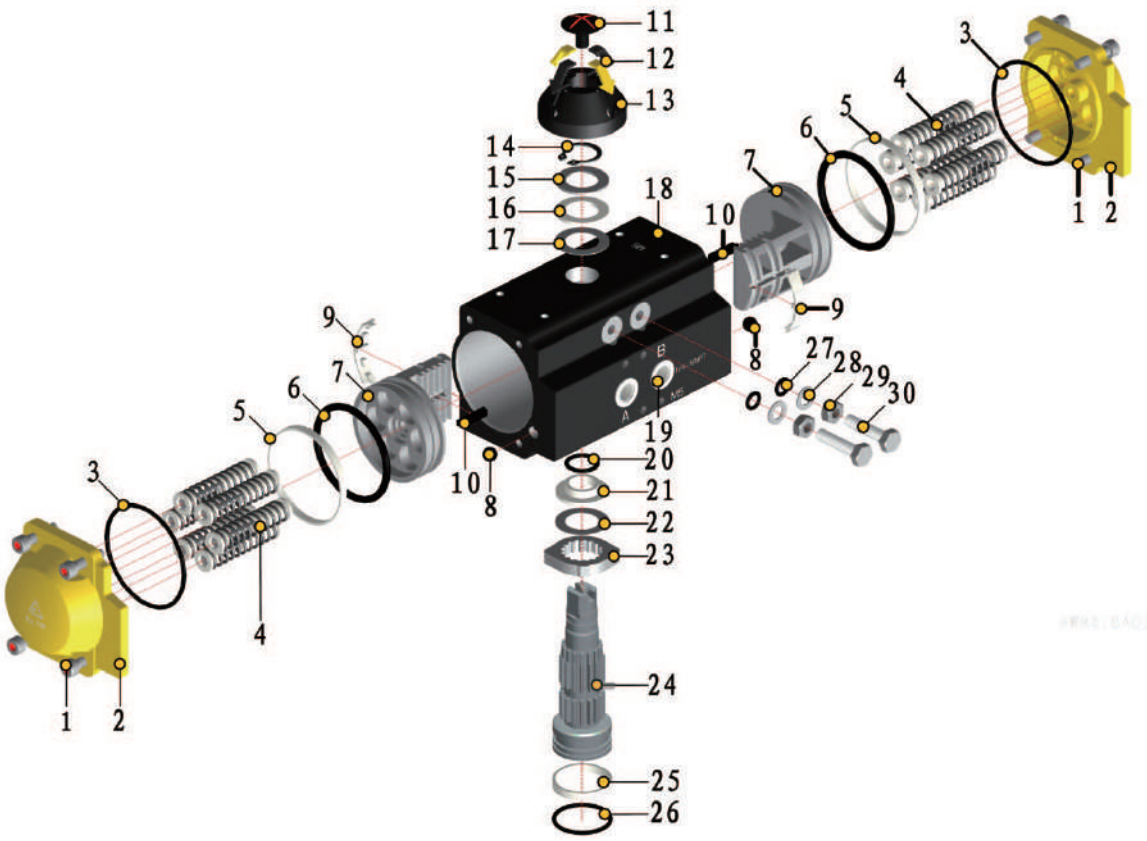


CW

On loss of air pressure (air or electric failure) at port A allows the springs to force the pistons to the centre position with exhaust air exiting at Port A, a clockwise rotation is obtained.

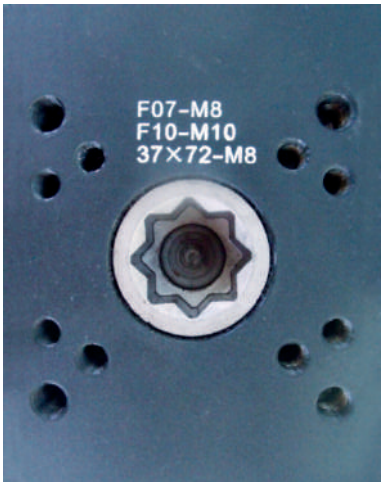
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Explode View









Compared with other ordinary actuators, we drill four extra thread holes on the bottom of actuator. Using our connecting plates, it can be connected with all kinds of international standard valve flanges fairly.

The large diameter hole of the output pinion on the bottom makes our actuator suitable for all kinds of valve stems and connecting keys by using our insert. Efficient and economic.

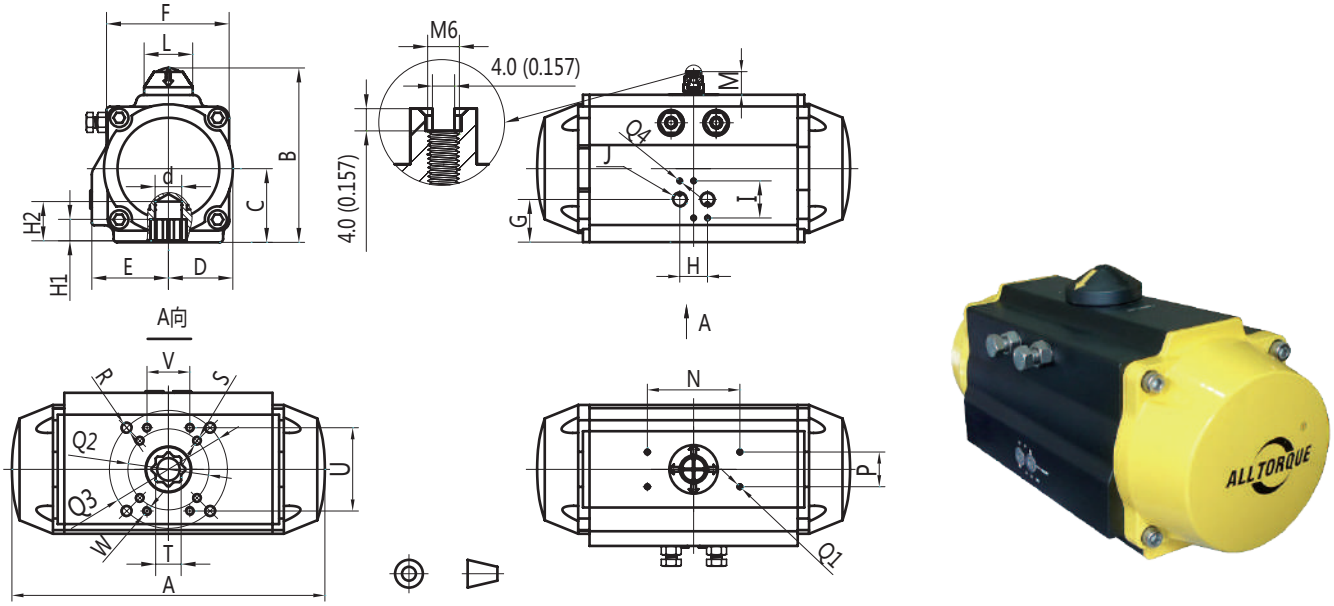
Extra deep hole for pinion shaft on the bottom of actuator is suitable for any long size valve stem.

ALLTORQUE®

Parts List

No.	Part Description	Q.TY	Materials	Surface Treated	Optional Material
1	Socket Head Screw	8	SUS 304		
2	End Cap	2	AL380 ≤ DFS 200 WCB ≥ DFS 240	Anode Hardening +Polyester Coating	CF8/CF8M
3	"O"ring (Cylinder Head)	2	NBR Rubber		Viton / Silicone Rubber
4	Spring	2–12	Spring Steel	Epoxy resin Coating	
5	Piston Ring	2	POM		
6	"O"Ring (Piston)	2	NBR Rubber		Viton / Silicone Rubber
7	Piston	2	AL380	Anode Hardening	
8	Stopper	2	NBR Rubber		Viton / Silicone Rubber
9	Guide Ring	2	PA6		
10	Guide Block	2	PA6		
11	Indicator Bolt	1	ABS		
12	Indicator Arrowhead	4	ABS		
13	Indicator	1	ABS		
14	Snap Ring	1	Stainless Steel		
15	Washer	1	SUS 304		
16	Disc Bearing	1	POM		
17	Washer	1	SUS 304		
18	Body	1	AL6063–T6	Anode Hardening +Polyester Coating	CF8/CF8M
19	Plug	2	PVC		
20	"O"Ring (Pinion Top)	1	NBR Rubber		Viton / Silicone Rubber
21	Bearing (pinion Top)	1	POM		
22	Disc Bearing	1	SUS 304		
23	Stroke Adjustment Stop	1	SAE 1020	Nickel Plated	CF8/CF8M
24	Pinion Shaft	1	SAE 1045	Nickel Plated	SUS304/SUS316
25	Bearing(Pinion Bottom)	1	POM		
26	"O" ring (pinion bottom)	1	NBR Rubber		Viton / Silicone Rubber
27	"O"Ring (Adjusting Bolt)	2	NBR Rubber		Viton / Silicone Rubber
28	Metal Washer	2	SUS 304		
29	Nut	2	SUS 304		
30	Adjusting Bolt	2	SUS 304		

(DFS032-DFS400)
Installation Size(DFS032-DFS400)



Metric Unit mm

Model / Size	DFS032	DFS040	DFS050	DFS063	DFS075	DFS085	DFS100	DFS115	DFS125	DFS145	DFS160	DFS180	DFS200	DFS240	DFS265	DFS300	DFS350	DFS400
A	82	109	148	159	213	249	271	315	346	412	443	492	547	614	729	839	900	1158
B	72	75	91	107	124	138	149	175	190	210	230	254	277	346	388	408	460	517
C	31	28	34	42	51	58	64	73	79	88	98	110	122	146	167	178	205	234
D	20.5	27	29	36	44	49	56	64	69	80	88	99	109	131	147	162	189	260
E	30	33	41	47	53	57	66	77	82	92	98	106	112	131	147	173	195	260
F	50.5	60	53	66	82	92	106	121	130	149	160	180	198	231	254	290	336	331
G	26	28	26	30	29	32	37	37	46	53	52	60	66	70	90	85	92	233
H	24	24	24	24	24	24	24	24	24	24	24	24	24	40	40	40	40	40
I	32	32	32	32	32	32	32	32	32	32	32	32	32	45	45	45	45	45
J	NPT1/8"	NPT1/8"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT3/8"	NPT3/8"	NPT1/2"	NPT1/2"	NPT1/2"
L	ϕ30	ϕ30	ϕ40	ϕ40	ϕ40	ϕ40	ϕ40	ϕ60	ϕ60	ϕ60	ϕ60	ϕ80	ϕ80	ϕ80	ϕ80	ϕ80	ϕ75	ϕ75
M	20	20	20	20	20	20	20	30	30	30	30	30	30	50	50	50	50	50
N	25.5	41	80	80	80	80	80	80	80	80	80	130	130	130	130	130	130	130
P	25.5	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Q1	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5
Q2	ϕ36	ϕ36	ϕ42	ϕ50	ϕ50	ϕ50	ϕ70	ϕ70	ϕ102	ϕ102	ϕ102	ϕ102	ϕ102	ϕ125	–	–	–	–
Q3	–	ϕ50	–	–	ϕ70	ϕ70	ϕ102	ϕ102	–	ϕ125	ϕ125	ϕ140	ϕ140	ϕ165	ϕ165	ϕ165	ϕ254	ϕ254
Q4	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M6	M6	M6	M6	M6
R	–	4–M6	–	–	4–M8	4–M8	4–M10	4–M10	–	4–M12	4–M12	4–M16	4–M16	4–M20	4–M20	4–M20	8–M16	8–M16
S	4–M5	4–M5	4–M5	4–M6	4–M6	4–M6	4–M8	4–M8	4–M10	4–M10	4–M10	4–M10	4–M10	4–M12	–	–	–	–
T	9	9	17	17	22	22	22	22	36	36	36	36	36	46	46	46	55	55
H1	11	11	12	16	19	19	23	23	29	29	29	42	42	50	50	50	60	60
d	–	–	ϕ14.3	ϕ14.3	ϕ19.5	ϕ19.5	ϕ23	ϕ23	ϕ36	ϕ36	ϕ36	ϕ38	ϕ38	ϕ48	ϕ48	ϕ48	ϕ55	ϕ55
H2	–	–	32	34	34	34	48	48	65	65	65	92	92	92	92	92	100	100
U	–	–	–	–	–	–	72	72	72	72	72	99	99	–	–	–	–	–
V	–	–	–	–	–	–	37	37	37	37	37	53	53	–	–	–	–	–
W	–	–	–	–	–	–	M8	M8	M8	M8	M8	M10	M10	–	–	–	–	–

Imperial Unit Inch

Model / Size	DFS032	DFS040	DFS050	DFS063	DFS075	DFS085	DFS100	DFS115	DFS125	DFS145	DFS160	DFS180	DFS200	DFS240	DFS265	DFS300	DFS350	DFS400
A	3.23	4.29	5.83	6.26	8.39	9.80	10.67	12.40	13.62	16.22	17.44	19.37	21.54	24.17	28.70	33.03	35.43	45.59
B	2.83	2.95	3.58	4.21	4.88	5.43	5.87	6.89	7.48	8.27	9.06	10.00	10.91	13.62	15.28	16.06	18.11	20.35
C	1.22	1.10	1.34	1.65	2.01	2.28	2.52	2.87	3.11	3.46	3.86	4.33	4.80	5.75	6.57	7.01	8.07	9.21
D	0.81	1.06	1.14	1.42	1.73	1.93	2.20	2.52	2.72	3.15	3.46	3.90	4.29	5.16	5.79	6.38	7.44	10.24
E	1.18	1.30	1.61	1.85	2.09	2.24	2.60	3.03	3.23	3.62	3.86	4.17	4.41	5.16	5.79	6.81	7.68	10.24
F	1.99	2.36	2.09	2.60	3.23	3.62	4.17	4.76	5.12	5.87	6.30	7.09	7.80	9.09	10.00	11.42	13.23	13.03
G	1.02	1.10	1.02	1.18	1.14	1.26	1.46	1.46	1.81	2.09	2.05	2.36	2.60	2.76	3.54	3.35	3.62	9.17
H	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	1.57	1.57	1.57	1.57	1.57
I	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.26	1.77	1.77	1.77	1.77	1.77
J	NPT1/8"	NPT1/8"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT1/4"	NPT3/8"	NPT3/8"	NPT1/2"	NPT1/2"	NPT1/2"
L	ϕ1.18	ϕ1.18	ϕ1.57	ϕ1.57	ϕ1.57	ϕ1.57	ϕ1.57	ϕ2.36	ϕ2.36	ϕ2.36	ϕ2.36	ϕ3.15	ϕ3.15	ϕ3.15	ϕ3.15	ϕ3.15	ϕ2.95	ϕ2.95
M	0.79	0.79	0.79	0.79	0.79	0.79	0.79	1.18	1.18	1.18	1.18	1.18	1.18	1.97	1.97	1.97	1.97	1.97
N	1.00	1.61	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	3.15	5.12	5.12	5.12	5.12	5.12	5.12	5.12
P	1.00	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
Q1	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5
Q2	ϕ1.42	ϕ1.97	ϕ1.65	ϕ1.97	ϕ1.97	ϕ1.97	ϕ2.76	ϕ2.76	ϕ4.02	ϕ4.02	ϕ4.02	ϕ4.02	ϕ4.02	ϕ4.92	–	–	–	–
Q3	–	ϕ1.65			ϕ2.76	ϕ2.76	ϕ4.02	ϕ4.02		ϕ4.92	ϕ4.92	ϕ5.51	ϕ5.51	ϕ6.50	ϕ6.50	ϕ6.50	ϕ10	ϕ10
Q4	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M5	M6	M6	M6	M6	M6
R	–	4–M6	–	–	4–M8	4–M8	4–M10	4–M10	–	4–M12	4–M12	4–M16	4–M16	4–M20	4–M20	4–M20	8–M16	8–M16
S	4–M5	4–M5	4–M5	4–M6	4–M6	4–M6	4–M8	4–M8	4–M10	4–M10	4–M10	4–M10	4–M10	4–M12	–	–	–	–
T	0.35	0.35	0.67	0.67	0.87	0.87	0.87	0.87	1.42	1.42	1.42	1.42	1.42	1.81	1.81	1.81	2.17	2.17
H1	0.43	0.43	0.47	0.63	0.75	0.75	0.91	0.91	1.14	1.14	1.14	1.65	1.65	1.97	1.97	1.97	2.36	2.36
d	–	–	ϕ0.56	ϕ0.56	ϕ0.77	ϕ0.77	ϕ0.91	ϕ0.91	ϕ1.42	ϕ1.42	ϕ1.42	ϕ1.50	ϕ1.50	ϕ1.89	ϕ1.89	ϕ1.89	ϕ2.17	ϕ2.17
H2	–	–	1.26	1.34	1.34	1.34	1.89	1.89	2.56	2.56	2.56	3.62	3.62	3.62	3.62	3.62	3.94	3.94
U	–	–	–	–	–	–	2.83	2.83	2.83	2.83	2.83	3.90	3.90	–	–	–	–	–
V	–	–	–	–	–	–	1.46	1.46	1.46	1.46	1.46	2.09	2.09	–	–	–	–	–
W	–	–	–	–	–	–	M8	M8	M8	M8	M8	M10	M10	–	–	–	–	–

1. Top mounting connection is in line with VDI/VDE3845 standards, permitting direct installation of accessories such as positioner or limit switch box.

2. Bottom mounting connection is in line with ISO5211 and DIN3337 standards.

3. Air supply connection is in line with VDI/VDE3845 and NAMUR standards, and can install solenoid valves conveniently.

Weight & Air Consumption

Metric Unit mm

Data / Model	Body Diameter	Air Consumption Per Stroke Actual Volume/L		Opening Time DA	Closing Time DA	Approximate Weight–DA
	Φ(mm)	CCW (L)	CW (L)	S (sec.)	S (sec.)	kg
DFS032	32	0.015	0.034	0.13	0.14	0.322
DFS040	40	0.032	0.068	0.14	0.16	0.695
DFS050	50	0.08	0.13	0.17	0.19	1.08
DFS063	63	0.15	0.25	0.19	0.22	1.55
DFS075	75	0.30	0.48	0.23	0.27	2.75
DFS085	88	0.50	0.73	0.33	0.35	3.78
DFS100	100	0.75	1.08	0.42	0.48	5.3
DFS115	115	1.19	1.8	0.72	0.93	8.4
DFS125	125	1.55	2.18	0.84	1.09	9.93
DFS145	145	2.40	3.55	1.32	1.42	14.1
DFS160	160	3.20	4.72	1.6	2.0	18.35
DFS180	180	4.30	6.80	2	2.4	25
DFS200	200	5.87	9.53	2.7	3.5	35
DFS240	240	10	15	3.5	4.5	63
DFS265	270	15	23	4.5	5.0	79
DFS300	300	21.1	30.5	8.8	12.7	135.8
DFS350	350	30.8	44.4	13	19	234.3
DFS400	400	48.3	69.6	20	29	338

Imperial Unit Inch

Data / Model	Body Diameter	Air Consumption Per Stroke Actual Volume/L		Opening Time DA	Closing Time DA	Approximate Weight–DA
	Φ(In)	CCW (L)	CW (L)	S (sec.)	S (sec.)	lb
DFS032	1.26	0.015	0.034	0.13	0.14	0.71
DFS040	1.57	0.032	0.068	0.14	0.16	1.53
DFS050	1.97	0.08	0.13	0.17	0.19	2.38
DFS063	2.48	0.15	0.25	0.19	0.22	3.42
DFS075	2.95	0.30	0.48	0.23	0.27	6.06
DFS085	3.46	0.50	0.73	0.33	0.35	8.33
DFS100	3.94	0.75	1.08	0.42	0.48	11.68
DFS115	4.53	1.19	1.8	0.72	0.93	18.5
DFS125	4.92	1.55	2.18	0.84	1.09	21.89
DFS145	5.71	2.40	3.55	1.32	1.42	31.08
DFS160	6.30	3.20	4.72	1.6	2.0	40.45
DFS180	7.09	4.30	6.80	2	2.4	55.12
DFS200	7.87	5.87	9.53	2.7	3.5	77.16
DFS240	9.45	10	15	3.5	4.5	138.89
DFS265	10.63	15	23	4.5	5.0	174.16
DFS300	11.81	21.1	30.5	8.8	12.7	299.39
DFS350	13.780	30.8	44.4	13	19	516.54
DFS400	15.75	48.3	69.6	20	29	745.16

* The above indicated moving time of the actuator, are obtained in the following testcons:

(1)Room temperature
(2)Actuator stroke 90°
(3)Solenoid valve with orifice of 4mm and flow capacity QN 400L/min.
(4)Inside pipe diameter 5mm
(5)Medium clean air
(6)Air supply pressure 5.5 bar (79.75psi)
(7)Actuator without external resistance load

Output Torque of Double Acting Actuator(metric)

metric unit N.m

Output Torque of Double Acting Actuator							
Model \ Air Pressure	3.0bar	4.0bar	5.0bar	5.5bar	6.0bar	7.0bar	8.0bar
DFS032	3.2	4.5	5.9	6.6	7.2	8.5	9.8
DFS040	5	7	9	10	11	13	15
DFS050	9.5	12	15.8	17.5	19	23	26.5
DFS063	16	21.5	28.7	31	34	39	46
DFS075	34	47	58.5	63	69	80.5	91
DFS085	53	70	88	98	106	124	145
DFS100	76.5	104	127	142	155	184	214
DFS115	129	170	215	236	258	301	344
DFS125	163	210	268	300	328	385	442
DFS145	230	315	420	462	504	590	690
DFS160	350	450	560	625	675	788	910
DFS180	445	607	760	848	910	1064	1237
DFS200	625	840	1058	1165	1260	1462	1681
DFS240	1070	1435	1785	1970	2150	2508	2865
DFS265	1745	2320	2900	3200	3500	4080	4670
DFS300	2195	2927	3681	4025	4391	5122	5854
DFS350	3205	4274	5369	5876	6411	7479	8547
DFS400	5024	6698	8415	9210	10048	11722	13397

ALLTORQUE®

Output Torque of Spring Return Actuator(metric)

metric unit N.m

Model \ Size	Springs Qty	Output Torque of Spring Return Actuator														Spring Return	
		3.0bar		4.0bar		5.0bar		5.5bar		6.0bar		7.0bar		8.0bar		0°	90°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
DFS 040	2					6.0	4.0	7.0	5.0	8.0	6.0	10.0	8.0	12.0	10.0	3.0	5.0
	4									6.0	2.0	8.0	4.0	10.0	6.0	5.0	9.0
DFS 050	5	6.5	4.8	9.0	7.3	12.8	11.1	14.5	12.8	16.0	14.3	20.0	18.3	23.5	21.8	3.0	4.7
	6	**5.7**	**3.8**	8.2	6.3	12.0	10.1	13.7	11.8	15.2	13.3	19.2	17.3	22.7	20.8	3.8	5.7
	7	5.0	2.8	7.5	5.3	11.3	9.1	13.0	10.8	14.5	12.3	18.5	16.3	22.0	19.8	4.5	6.7
	8			**6.7**	**4.2**	10.5	8.0	12.2	9.7	13.7	11.2	17.7	15.2	21.2	18.7	5.3	7.8
	9			6.0	3.3	9.8	7.1	11.5	8.8	13.0	10.3	17.0	14.3	20.5	17.8	6.0	8.7
	10					**9.1**	**6.2**	10.8	7.9	12.3	9.4	16.3	13.4	19.8	16.9	6.7	9.6
	11					8.3	5.1	**10.0**	**6.8**	11.5	8.3	15.5	12.3	19.0	15.8	7.5	10.7
	12					7.5	4.0	9.2	5.7	**10.7**	**7.2**	14.7	11.2	18.2	14.7	8.3	11.8
DFS 063	5	10.3	7.4	15.8	12.9	23.0	20.1	25.3	22.4	28.3	25.4	33.3	30.4	40.3	37.4	5.7	8.6
	6	**9.2**	**5.6**	14.7	11.1	21.9	18.3	24.2	20.6	27.2	23.6	32.2	28.6	39.2	35.6	6.8	10.4
	7	8.1	3.8	13.6	9.3	20.8	16.5	23.1	18.8	26.1	21.8	31.1	26.8	38.1	33.8	7.9	12.2
	8			**12.4**	**7.7**	19.6	14.9	21.9	17.2	24.9	20.2	29.9	25.2	36.9	32.2	9.1	13.8
	9			11.2	5.9	18.4	13.1	20.7	15.4	23.7	18.4	28.7	23.4	35.7	30.4	10.3	15.6
	10			10.0	4.1	**17.2**	**11.3**	19.5	13.6	22.5	16.6	27.5	21.6	34.5	28.6	11.5	17.4
	11					16.1	9.5	**18.4**	**11.8**	21.4	14.8	26.4	19.8	33.4	26.8	12.6	19.2
	12					15.0	7.8	17.3	10.1	**20.3**	**13.1**	25.3	18.1	32.3	25.1	13.7	20.9
DFS 075	5	22.5	16.0	35.5	29.0	47.0	40.5	51.5	45.0	57.5	51.0	69.0	62.5	79.5	73.0	11.5	18.0
	6	**20.5**	**12.5**	33.5	25.5	45.0	37.0	49.5	41.5	55.5	47.5	67.0	59.0	77.5	69.5	13.5	21.5
	7	18.3	9.0	31.3	22.0	42.8	33.5	47.3	38.0	53.3	44.0	64.8	55.5	75.3	66.0	15.7	25.0
	8			**29.0**	**18.5**	40.5	30.0	45.0	34.5	51.0	40.5	62.5	52.0	73.0	62.5	18.0	28.5
	9			26.9	15.0	38.4	26.5	42.9	31.0	48.9	37.0	60.4	48.5	70.9	59.0	20.1	32.0
	10			24.7	11.5	**36.2**	**23.0**	40.7	27.5	46.7	33.5	58.2	45.0	68.7	55.5	22.3	35.5
	11					34.0	19.5	**38.5**	**24.0**	44.5	30.0	56.0	41.5	66.5	52.0	24.5	39.0
	12					31.8	16.0	36.3	20.5	**42.3**	**26.5**	53.8	38.0	64.3	48.5	26.7	42.5
DFS 085	5	34.2	23.0	51.2	40.0	69.2	58.0	79.2	68.0	87.2	76.0	105.2	94.0	126.2	115.0	18.8	30.0
	6	**30.5**	**17.2**	47.5	34.2	65.5	52.2	75.5	62.2	83.5	70.2	101.5	88.2	122.5	109.2	22.5	35.8
	7	26.8	11.4	43.8	28.4	61.8	46.4	71.8	56.4	79.8	64.4	97.8	82.4	118.8	103.4	26.2	41.6
	8			**40.2**	**22.6**	58.2	40.6	68.2	50.6	76.2	58.6	94.2	76.6	115.2	97.6	29.8	47.4
	9			36.6	16.8	54.6	34.8	64.6	44.8	72.6	52.8	90.6	70.8	111.6	91.8	33.4	53.2
	10			32.9	11.0	**50.9**	**29.0**	60.9	39.0	68.9	47.0	86.9	65.0	107.9	86.0	37.1	59.0
	11					47.2	23.2	**57.2**	**33.2**	65.2	41.2	83.2	59.2	104.2	80.2	40.8	64.8
	12					43.5	17.4	53.5	27.4	**61.5**	**35.4**	79.5	53.4	100.5	74.4	44.5	70.6
DFS 100	5	51.4	37.5	78.9	65.0	101.9	88.0	116.9	103.0	129.9	116.0	158.9	145.0	188.9	175.0	25.1	39.0
	6	**46.3**	**29.6**	73.8	57.1	96.8	80.1	111.8	95.1	124.8	108.1	153.8	137.1	183.8	167.1	30.2	46.9
	7	41.2	21.7	68.7	49.2	91.7	72.2	106.7	87.2	119.7	100.2	148.7	129.2	178.7	159.2	35.3	54.8
	8			**63.6**	**41.3**	86.6	64.3	101.6	79.3	114.6	92.3	143.6	121.3	173.6	151.3	40.4	62.7
	9			58.5	33.4	81.5	56.4	96.5	71.4	109.5	84.4	138.5	113.4	168.5	143.4	45.5	70.6
	10			53.5	25.6	**76.5**	**48.6**	91.5	63.6	104.5	76.6	133.5	105.6	163.5	135.6	50.5	78.4
	11					71.4	40.7	**86.4**	**55.7**	99.4	68.7	128.4	97.7	158.4	127.7	55.6	86.3
	12					66.2	32.8	81.2	47.8	**94.2**	**60.8**	123.2	89.8	153.2	119.8	60.8	94.2

Output Torque of Spring Return Actuator(metric)

metric unit N.m

Model \ Size	Spring Quantity	Output Torque of Spring Return Actuator														Spring Return	
		3.0bar		4.0bar		5.0bar		5.5bar		6.0bar		7.0bar		8.0bar			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
DFS 115	5	88	63	131	106	174	149	195	170	217	192	260	235	303	279	41	66
	6	**80**	**50**	123	93	166	136	187	158	209	180	252	222	295	266	49	79
	7	72	37	115	80	158	123	179	145	200	166	244	209	287	252	57	92
	8			**106**	**67**	149	110	171	132	192	153	235	196	279	239	66	105
	9			98	54	141	97	163	118	184	140	227	183	270	226	74	118
	10					**133**	**84**	154	105	176	127	219	170	262	213	82	131
	11					125	71	**146**	**92**	168	114	211	157	254	200	90	144
	12							138	79	**159**	**101**	202	144	245	187	98	157
DFS 125	5	112	82	159	129	217	187	249	219	277	247	334	304	391	361	51	81
	6	**102**	**65**	149	112	207	170	239	202	266.5	230	323.5	287	380.5	344	61.5	98
	7	91	49	138	96	196	154	228	186	256	214	313	271	370	328	72	114
	8			**127**	**79**	185	137	217	169	245	197	302	254	359	311	83	131
	9			117	62	175	120	207	152	234.5	180	291.5	237	348.5	294	93.5	148
	10			106	45	**164**	**103**	196	135	224	163	281	220	338	277	104	165
	11					154	87	**186**	**119**	213.5	147	270.5	204	327.5	261	114.5	181
	12					143	70	175	102	**203**	**130**	259.5	187	316.5	244	125.5	198
DFS 145	5	149	103	234	188	339	293	381	335	450	404	509	463	609	563	81	127
	6	**132**	**77**	217	162	322	267	364	309	433	378	492	437	592	537	98	153
	7	115	51	200	136	305	241	347	283	416	352	475	411	575	511	115	179
	8			**184**	**110**	289	215	331	257	400	326	459	385	559	485	131	205
	9			167	85	272	190	314	232	383	301	442	360	542	460	148	230
	10			150	59	**255**	**164**	297	206	366	275	425	334	525	434	165	256
	11					239	138	**281**	**180**	350	249	409	308	509	408	181	282
	12					223	112	265	154	**334**	**223**	393	282	493	382	197	308
DFS 160	5	240	185	340	285	450	395	515	460	565	510	678	623	800	745	110	165
	6	**217**	**152**	317	252	427	362	492	427	542	477	655	590	777	712	133	198
	7	194	118	294	218	404	328	469	393	519	443	632	556	754	678	156	232
	8			**271**	**185**	381	295	446	360	496	410	609	523	731	645	179	265
	9			249	151	359	261	424	326	474	376	587	489	709	611	201	299
	10			226	118	**336**	**228**	401	293	451	343	564	456	686	578	224	332
	11					313	194	**378**	**259**	428	309	541	422	663	544	247	366
	12					291	161	356	226	**406**	**276**	519	389	641	511	269	399
DFS 180	5	289	206	451	368	604	521	692	609	754	671	908	825	1081	998	156	239
	6	**257**	**159**	419	321	572	474	660	562	722	624	876	778	1049	951	188	286
	7	225	112	387	274	540	427	628	515	690	577	844	731	1017	904	220	333
	8			**355**	**226**	508	379	596	467	658	529	812	683	985	856	252	381
	9			324	179	477	332	565	420	627	482	781	636	954	809	283	428
	10			292	132	**445**	**285**	533	373	595	435	749	589	922	762	315	475
	11					414	238	**502**	**326**	564	388	718	542	891	715	346	522
	12					382	191	470	279	**532**	**341**	686	495	859	668	378	569
DFS 200	5	409	307	624	522	842	740	949	847	1044	942	1246	1144	1465	1363	216	318
	6	**367**	**244**	582	459	800	677	907	784	1002	879	1204	1081	1423	1300	258	381
	7	325	181	540	396	758	614	865	721	960	816	1162	1018	1381	1237	300	444
	8			**498**	**334**	716	552	823	659	918	754	1120	956	1339	1175	342	506
	9			455	272	673	490	780	597	875	692	1077	894	1296	1113	385	568
	10			412	209	**630**	**427**	737	534	832	629	1034	831	1253	1050	428	631
	11					588	365	**695**	**472**	790	567	992	769	1211	988	470	693
	12					545	302	652	409	**747**	**504**	949	706	1168	925	513	756

ALLTORQUE®

Output Torque of Spring Return Actuator(metric)

metric unit N.m

Model \ Size	Springs Qty	Output Torque of Spring Return Actuator														Spring Return	
		3.0bar		4.0bar		5.0bar		5.5bar		6.0bar		7.0bar		8.0bar		0°	90°
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°		
DFS 240	5	705	543	1070	908	1420	1258	1605	1443	1785	1623	2143	1981	2500	2338	365	527
	6	**631**	**438**	996	803	1346	1153	1531	1338	1711	1518	2069	1876	2426	2233	439	632
	7	558	331	923	696	1273	1046	1458	1231	1638	1413	1995	1772	2351	2128	512	739
	8			**845**	**590**	1199	940	1384	1125	1564	1308	1922	1667	2277	2023	586	845
	9			778	486	1128	836	1313	1021	1493	1203	1848	1563	2202	1918	657	949
	10			704	383	**1054**	**733**	1239	918	1419	1098	1773	1458	2129	1812	731	1052
	11					980	627	**1165**	**812**	1345	994	1700	1352	2055	1708	805	1158
	12					906	518	1091	703	**1271**	**890**	1625	1248	1980	1602	879	1267
DFS 265	5	1203	945	1778	1520	2358	2100	2658	2400	2958	2700	3538	3280	4128	3870	542	800
	6	**1092**	**790**	1671	1363	2249	1940	2549	2240	2849	2540	3429	3120	4019	3710	653	955
	7	985	629	1564	1206	2140	1780	2449	2080	2470	2380	3320	2960	3910	3550	760	1116
	8			**1457**	**1045**	2031	1620	2330	1920	2631	2220	3211	2800	3801	3390	865	1275
	9			1350	886	1922	1460	2222	1760	2522	2060	3102	2640	3682	3230	980	1440
	10			1234	724	**1813**	**1300**	2113	1600	2413	1900	2993	2480	3583	3070	1086	1596
	11					1704	1140	**2004**	**1440**	2304	1740	2884	2320	3474	2910	1193	1754
	12					1600	990	1895	1280	**2195**	**1580**	2775	2160	3365	2750	1300	1910
DFS 300	5	1457	1088	2189	1820	2943	2574	3287	2918	3653	3284	4384	4015	5116	4747	738	1107
	6	**1310**	**868**	2042	1600	2796	2354	3140	2698	3506	3064	4237	3795	4969	4527	885	1327
	7	1163	647	1895	1379	2649	2133	2993	2477	3359	2843	4090	3574	4822	4306	1032	1548
	8			**1748**	**1158**	2502	1912	2846	2256	3212	2622	3943	3353	4675	4085	1179	1769
	9			1600	937	2354	1691	2698	2035	3064	2401	3795	3132	4527	3864	1327	1990
	10			1453	716	**2207**	**1470**	2551	1814	2917	2180	3648	2911	4380	3643	1474	2211
	11					2060	1249	**2404**	**1593**	2770	1959	3501	2690	4233	3422	1621	2432
	12							2256	1372	**2622**	**1738**	3353	2469	4085	3201	1769	2653
DFS 350	5	2129	1591	3198	2660	4293	3755	4800	4262	5335	4797	6403	5865	7471	6933	1076	1614
	6	**1914**	**1269**	2983	2338	4078	3433	4585	3940	5120	4475	6188	5543	7256	6611	1291	1936
	7	1700	947	2769	2016	3864	3111	4371	3618	4906	4153	5974	5221	7042	6289	1505	2258
	8			**2554**	**1694**	3649	2789	4156	3296	4691	3831	5759	4899	6827	5967	1720	2580
	9			2339	1372	3434	2467	3941	2974	4476	3509	5544	4577	6612	5645	1935	2902
	10			2124	1050	**3219**	**2145**	3726	2652	4261	3187	5329	4255	6397	5323	2150	3224
	11					3005	1823	**3512**	**2330**	4047	2865	5115	3933	6183	5001	2364	3546
	12							3297	2007	**3832**	**2542**	4900	3610	5968	4678	2579	3869
DFS 400	5	3341	2499	5015	4173	6732	5890	7527	6685	8365	7523	10039	9197	11714	10872	1683	2525
	6	**3004**	**1994**	4678	3668	6395	5385	7190	6180	8028	7018	9702	8692	11377	10367	2020	3030
	7	2668	1489	4342	3163	6059	4880	6854	5675	7692	6513	9366	8187	11041	9862	2356	3535
	8			**4005**	**2658**	5722	4375	6517	5170	7355	6008	9029	7682	10704	9357	2693	4040
	9			3669	2153	5386	3870	6181	4665	7019	5503	8693	7177	10368	8852	3029	4545
	10			3332	1648	**5049**	**3365**	5844	4160	6682	4998	8356	6672	10031	8347	3366	5050
	11					4712	2860	**5507**	**3655**	6345	4493	8019	6167	9694	7842	3703	5555
	12							5171	3150	**6009**	**3988**	7683	5662	9358	7337	4039	6060

Output Torque of Double Acting Actuator(inch)

Imperial unit in–lb：

Output Torque of Double Acting Actuator							
Model \ Air Pressure	40PSI	60PSI	70PSI	80PSI	90PSI	100PSI	120PSI
DFS032	26	41	51	59	67	76	92
DFS040	41	64	77	89	101	113	137
DFS050	77	110	135	155	174	201	243
DFS063	130	197	245	275	311	340	421
DFS075	277	430	500	559	632	702	833
DFS085	431	641	752	870	970	1081	1328
DFS100	623	952	1085	1261	1419	1604	1959
DFS115	1050	1556	1837	2095	2362	2625	3149
DFS125	1327	1923	2289	2664	3003	3357	4047
DFS145	1872	2884	3588	4102	4862	5145	6317
DFS160	2849	4120	4784	5549	6180	6871	8331
DFS180	3622	5557	6492	7529	8331	9278	11325
DFS200	5087	7690	9037	10344	11536	12748	15390
DFS240	8709	13138	15248	17492	19684	21869	26230
DFS265	14203	21240	24772	28413	32044	35577	42755
DFS300	17865	26798	31443	35738	40201	44663	53595
DFS350	26086	39130	45862	52173	58695	65215	78251
DFS400	40891	61322	71881	81775	91993	102213	122654

ALLTORQUE®

Output Torque of Spring Return Actuator(inch)

Imperial unit in–lb:

Model \ Size	Springs Qty	Output Torque of Spring Return Actuator														Spring Return	
		40PSI		60PSI		70PSI		80PSI		90PSI		100PSI		120PSI		0°	90°
		0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °		
DFS 040	2					51	33	62	45	73	56	87	69	110	93	27	44
	4									55	21	70	34	92	58	44	80
DFS 050	5	53	39	82	67	109	95	129	114	146	131	174	160	215	200	27	42
	6	**46**	**31**	75	58	103	86	122	105	139	122	167	151	208	190	34	50
	7	41	23	69	49	97	78	115	96	133	113	161	142	201	181	40	59
	8			**61**	**38**	90	68	108	86	125	103	154	133	194	171	47	69
	9			55	30	84	61	102	78	119	94	148	125	188	163	53	77
	10					**78**	**53**	96	70	113	86	142	117	181	155	59	85
	11					71	44	**89**	**60**	105	76	135	107	174	145	66	95
	12					64	34	82	51	**98**	**66**	128	98	167	135	73	104
DFS 063	5	84	60	145	118	197	172	225	199	259	233	290	265	369	342	50	76
	6	**75**	**46**	135	102	187	156	215	183	249	216	281	249	359	326	60	92
	7	66	31	125	85	178	141	205	167	239	200	271	234	349	309	70	108
	8			**114**	**70**	167	127	194	153	228	185	261	220	338	295	81	122
	9			103	54	157	112	184	137	217	168	250	204	327	278	91	138
	10			92	38	**147**	**97**	173	121	206	152	240	188	316	262	102	154
	11					138	81	**163**	**105**	196	135	230	173	306	245	112	170
	12					128	67	154	90	**186**	**120**	221	158	296	230	121	185
DFS 075	5	183	130	325	266	402	346	457	399	526	467	602	545	728	668	102	159
	6	**167**	**102**	307	233	385	316	439	368	508	435	584	514	710	636	119	190
	7	149	73	287	201	366	286	420	337	488	403	565	484	689	604	139	221
	8			**266**	**169**	346	256	399	306	467	371	545	453	668	572	159	252
	9			246	137	328	226	381	275	448	339	527	423	649	540	178	283
	10			226	105	**309**	**197**	361	244	428	307	507	392	629	508	197	314
	11					291	167	**342**	**213**	407	275	488	362	609	476	217	345
	12					272	137	322	182	**387**	**243**	469	331	589	444	236	376
DFS 085	5	278	187	469	366	591	496	703	604	798	696	917	820	1155	1053	166	266
	6	**248**	**140**	435	313	560	446	670	552	764	643	885	769	1122	1000	199	317
	7	218	93	401	260	528	396	637	501	731	590	853	718	1088	947	232	368
	8			**368**	**207**	497	347	605	449	698	536	821	668	1055	894	264	419
	9			335	154	467	297	574	398	665	483	790	617	1022	840	296	471
	10			301	101	**435**	**248**	541	346	631	430	758	567	988	787	328	522
	11					403	198	**508**	**295**	597	377	725	516	954	734	361	573
	12					372	149	475	243	**563**	**324**	693	466	920	681	394	625
DFS 100	5	418	305	722	595	871	752	1038	914	1189	1062	1385	1264	1729	1602	222	345
	6	**377**	**241**	676	523	827	684	993	844	1143	990	1341	1195	1683	1530	267	415
	7	335	177	629	450	784	617	947	774	1096	917	1297	1127	1636	1458	312	485
	8			**582**	**378**	740	549	902	704	1049	845	1252	1058	1589	1385	358	555
	9			536	306	696	482	857	634	1002	773	1208	989	1543	1313	403	625
	10			490	234	**654**	**415**	812	565	957	701	1164	921	1497	1241	447	694
	11					610	348	**767**	**494**	910	629	1120	852	1450	1169	492	764
	12					566	280	721	424	**862**	**557**	1074	783	1403	1097	538	834

Output Torque of Spring Return Actuator(inch)

Imperial unit in–lb:

Model \ Size	Springs Qty	Output Torque of Spring Return Actuator														Spring Return	
		40PSI		60PSI		70PSI		80PSI		90PSI		100PSI		120PSI		0°	90°
		0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °		
DFS 115	5	716	513	1199	970	1487	1273	1731	1509	1987	1758	2267	2049	2774	2554	363	584
	6	**651**	**407**	1126	851	1418	1162	1660	1403	1913	1648	2197	1936	2701	2435	434	699
	7	586	301	1053	732	1350	1051	1589	1287	1831	1520	2127	1822	2628	2307	504	814
	8			**970**	**613**	1273	940	1518	1172	1758	1401	2049	1709	2554	2188	584	929
	9			897	494	1205	829	1447	1048	1685	1282	1979	1596	2472	2069	655	1044
	10					**1136**	**718**	1367	932	1611	1163	1910	1482	2399	1950	726	1159
	11					1068	607	**1296**	**817**	1538	1044	1840	1369	2325	1831	797	1274
	12							1225	701	**1456**	**925**	1761	1256	2243	1712	867	1389
DFS 125	5	911	667	1456	1181	1854	1598	2211	1944	2536	2261	2912	2651	3580	3305	451	717
	6	**826**	**529**	1360	1025	1765	1453	2117	1793	2440	2106	2821	2502	3484	3149	544	867
	7	741	399	1263	879	1675	1316	2024	1651	2344	1959	2729	2363	3387	3003	637	1009
	8			**1163**	**723**	1581	1171	1926	1500	2243	1804	2633	2215	3287	2847	735	1159
	9			1067	568	1491	1025	1833	1349	2147	1648	2542	2066	3191	2692	827	1310
	10					**1401**	**880**	1740	1198	2051	1492	2450	1918	3094	2536	920	1460
	11					1312	743	**1647**	**1056**	1955	1346	2359	1779	2998	2390	1013	1602
	12					1218	598	1549	906	**1854**	**1190**	2263	1630	2898	2234	1111	1752
DFS 145	5	1213	838	2142	1721	2897	2504	3382	2974	4120	3699	4438	4037	5576	5154	717	1124
	6	**1074**	**627**	1987	1483	2751	2281	3231	2743	3964	3461	4290	3810	5420	4916	867	1354
	7	936	415	1831	1245	2606	2059	3081	2512	3809	3223	4142	3584	5264	4678	1018	1584
	8			**1685**	**1007**	2469	1837	2939	2282	3662	2985	4002	3357	5118	4440	1159	1814
	9			1529	778	2324	1624	2788	2060	3506	2756	3854	3139	4962	4211	1310	2036
	10			1373	540	**2179**	**1401**	2637	1829	3351	2518	3706	2912	4806	3973	1460	2266
	11					2042	1179	**2495**	**1598**	3204	2280	3566	2686	4660	3735	1602	2496
	12					1905	957	2353	1367	**3058**	**2042**	3427	2459	4514	3497	1743	2726
DFS 160	5	1953	1506	3113	2609	3845	3375	4572	4084	5173	4669	5912	5432	7324	6821	974	1460
	6	**1766**	**1237**	2902	2307	3649	3093	4368	3791	4962	4367	5711	5144	7114	6518	1177	1752
	7	1579	960	2692	1996	3452	2803	4164	3489	4752	4056	5511	4848	6903	6207	1381	2053
	8			**2481**	**1694**	3256	2521	3959	3196	4541	3754	5310	4560	6692	5905	1584	2345
	9			2280	1382	3068	2230	3764	2894	4340	3442	5118	4264	6491	5594	1779	2646
	10			2069	1080	**2871**	**1948**	3560	2601	4129	3140	4918	3976	6280	5292	1982	2938
	11					2675	1658	**3356**	**2299**	3918	2829	4717	3680	6070	4980	2186	3239
	12					2487	1376	3160	2006	**3717**	**2527**	4525	3392	5868	4678	2381	3531
DFS 180	5	2352	1676	4129	3369	5161	4452	6143	5407	6903	6143	7917	7193	9897	9137	1381	2115
	6	**2091**	**1294**	3836	2939	4888	4050	5859	4989	6610	5713	7638	6784	9604	8707	1664	2531
	7	1831	911	3543	2509	4614	3649	5575	4572	6317	5283	7359	6374	9311	8276	1947	2947
	8			**3250**	**2069**	4341	3238	5291	4146	6024	4843	7080	5955	9018	7837	2230	3372
	9			2966	1639	4076	2837	5016	3729	5740	4413	6810	5545	8734	7407	2505	3788
	10			2673	1208	**3802**	**2435**	4732	3311	5447	3983	6531	5136	8441	6976	2788	4204
	11					3538	2034	**4457**	**2894**	5164	3552	6260	4726	8157	6546	3062	4620
	12					3264	1632	4173	2477	**4871**	**3122**	5981	4316	7864	6116	3345	5036
DFS 200	5	3328	2498	5713	4779	7195	6323	8425	7519	9558	8624	10864	9975	13412	12479	1912	2814
	6	**2987**	**1986**	5328	4202	6836	5785	8052	6960	9173	8047	10498	9425	13028	11902	2283	3372
	7	2645	1473	4944	3625	6477	5247	7679	6401	8789	7471	10132	8876	12643	11325	2655	3929
	8			**4559**	**3058**	6118	4717	7306	5850	8404	6903	9766	8336	12259	10757	3027	4478
	9			4166	2490	5751	4187	6925	5300	8011	6335	9391	7795	11865	10190	3407	5027
	10			3772	1913	**5383**	**3649**	6543	4741	7617	5759	9016	7246	11471	9613	3788	5584
	11					5024	3119	**6170**	**4190**	7233	5191	8649	6705	11087	9045	4160	6133
	12					4657	2581	5788	3631	**6839**	**4614**	8275	6156	10693	8469	4540	6691

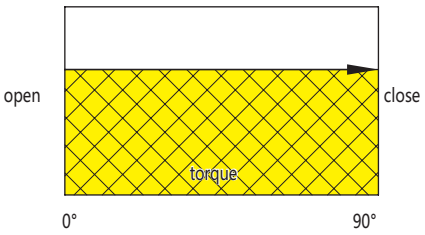
ALLTORQUE®

Output Torque of Spring Return Actuator(inch)

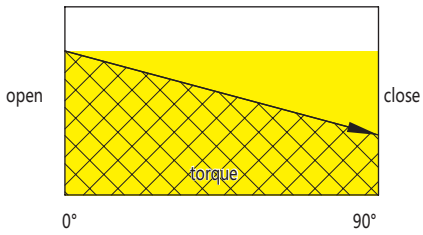
Imperial unit in–lb:

Model \ Size	Springs Qty	Output Torque of Spring Return Actuator														Spring Return	
		40PSI		60PSI		70PSI		80PSI		90PSI		100PSI		120PSI		0°	90°
		0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °	0°	90 °		
DFS 240	5	5737	4419	9796	8313	12134	10749	14249	12811	16342	14859	18685	17273	22888	21405	3230	4664
	6	**5135**	**3564**	9119	7352	11501	9852	13592	11878	15665	13898	18040	16357	22210	20444	3885	5593
	7	4541	2694	8450	6372	10878	8938	12944	10929	14996	12936	17395	15450	21524	19482	4531	6540
	8			**7736**	**5402**	10245	8032	12287	9987	14319	11975	16758	14535	20846	18521	5186	7478
	9			7123	4449	9639	7143	11656	9064	13669	11014	16113	13628	20160	17560	5814	8399
	10			6445	3506	**9006**	**6263**	11000	8150	12991	10052	15459	12713	19491	16589	6469	9310
	11					8374	5358	**10343**	**7209**	12314	9100	14823	11788	18814	15637	7124	10248
	12					7742	4426	9686	6241	**11636**	**8148**	14169	10882	18127	14667	7779	11213
DFS 265	5	9790	7690	16278	13916	20149	17944	23597	21307	27081	24719	30849	28599	37793	35431	4797	7080
	6	**8887**	**6429**	15298	12479	19217	16577	22629	19886	26083	23254	29898	27204	36795	33966	5779	8452
	7	8016	5119	14319	11041	18286	15210	21742	18466	22613	21789	28948	25809	35797	32501	6726	9877
	8			**13339**	**9567**	17355	13843	20685	17045	24087	20324	27997	24414	34799	31036	7655	11284
	9			12359	8111	16423	12475	19726	15625	23089	18860	27047	23019	33709	29571	8673	12744
	10			11297	6628	**15492**	**11108**	18759	14204	22091	17395	26097	21624	32803	28106	9611	14125
	11					14560	9741	**17791**	**12784**	21094	15930	25146	20229	31805	26642	10558	15523
	12					13672	8459	16823	11364	**20096**	**14465**	24196	18833	30807	25177	11505	16904
DFS 300	5	11857	8854	20041	16662	25147	21994	29181	25905	33444	30066	38225	35008	46838	43460	6531	9797
	6	**10661**	**7064**	18695	14648	23891	20115	27876	23952	32098	28051	36943	33089	45492	41445	7832	11744
	7	9464	5265	17349	12625	22635	18226	26571	21990	30752	26028	35662	31162	44146	39422	9133	13700
	8			**16003**	**10602**	21379	16338	25266	20028	29406	24005	34380	29236	42800	37399	10434	15656
	9			14648	8578	20115	14449	23952	18066	28051	21982	33089	27309	41445	35376	11744	17612
	10			13302	6555	**18858**	**12561**	22647	16104	26706	19958	31808	25382	40100	33352	13045	19567
	11					17602	10672	**21342**	**14142**	25360	17935	30526	23455	38754	31329	14346	21523
	12							20071	12247	**24525**	**16701**	28993	21169	37912	30088	15657	23481
DFS 350	5	17326	12947	29278	24353	36683	32086	42613	37837	48843	43917	55829	51138	68398	63473	9523	14284
	6	**15576**	**10327**	27310	21405	34846	29334	40704	34978	46874	40969	53954	48331	66430	60525	11425	17134
	7	13834	7707	25351	18457	33017	26583	38805	32120	44915	38021	52089	45523	64471	57577	13319	19983
	8			**23382**	**15509**	31180	23832	36896	29261	42947	35073	50214	42715	62502	54629	15222	22833
	9			21414	12561	29343	21080	34987	26402	40979	32126	48339	39908	60534	51681	17125	25683
	10			19446	9613	**27506**	**18329**	33078	23544	39010	29178	46465	37100	58566	48733	19028	28532
	11					25677	15577	**31179**	**20685**	37051	26230	44599	34293	56606	45785	20921	31382
	12							29333	17915	**35840**	**24422**	42370	30952	55387	43969	22826	34244
DFS 400	**5**	27189	20337	45913	38205	57524	50329	66823	59348	76583	68874	87532	80191	107244	99535	14895	22346
	6	**24446**	**16227**	42828	33581	54644	46014	63831	54864	73498	64251	84594	75787	104158	94912	17877	26816
	7	21712	12117	39752	28958	51773	41699	60848	50381	70422	59628	81664	71384	101082	90288	20851	31285
	8			**36666**	**24334**	48894	37384	57856	45898	67336	55004	78726	66981	97997	85665	23833	35754
	9			33590	19711	46022	33068	54873	41415	64260	50381	75796	62578	94921	81042	26807	40223
	10			30505	15088	**43143**	**28753**	51882	36931	61175	45758	72858	58175	91836	76418	29789	44693
	11					40263	24438	**48890**	**32448**	58090	41134	69919	53771	88750	71795	32772	49162
	12							45907	27965	**55013**	**36511**	66990	49368	85674	67172	35745	53631

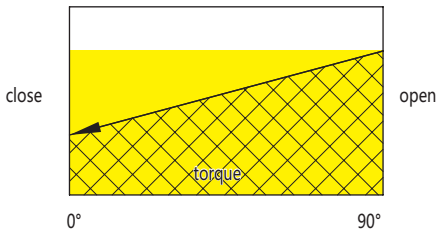
Output Torque of Double Acting Actuator



Output Torque of Spring Return Actuator



with air



Out of air

Service Conditions to Consider

1. Operating media:

Dry or lubricated air, or inert gas, or non–corrosive gases that compatible with actuator inner parts and lubricant are available. The media temperature must 10℃ lower than ambient temperature at least, and the maximum particle diameter must less than 20 μ .

2. Air supply pressure:

3 Bar (40 PSI) ~ 8 Bar (120 PSI)

3. Operating temperature:

a. Standard: –20℃ ~ +80℃
b. Low temperature: –40℃ ~ +80℃
c. High temperature: –15℃ ~ +150℃

4. Travel adjustment:

Have adjustment range of ±5° for the rotating 90° .

5. Lubricant:

Use the lubricant that temperature range at –20℃ to +80℃ . Select special lubricant when the operating condition is low temperature or high temperature.

The Grade of Anticorrosion & Recommended Service Environment

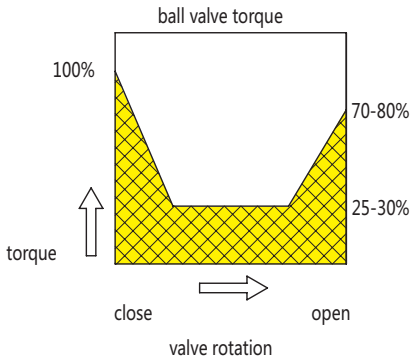
Parts	The Grade of Anticorrosion	
	A	B
Body	Anodise Hardening + Epoxy Polyester Coating	Stainless Steel CF8/CF8M
CAP	Anodise Hardening + Epoxy Polyester Coating	Stainless Steel CF8/CF8M
Drive Shaft	Carbon Steel Nickel Plated	Stainless Steel CF8/CF8M
Piston	Anodise Hardening	Stainless Steel CF8/CF8M
Service Condition	Normal Condition or Low Thickness Acid Environment	High Thickness Acid Environment

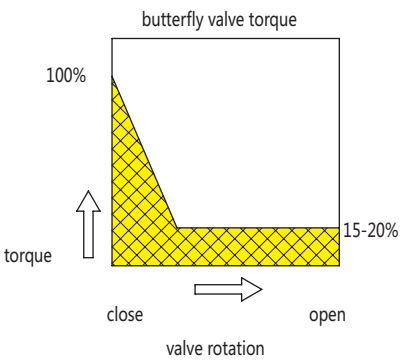
Actuator Sizing Guide

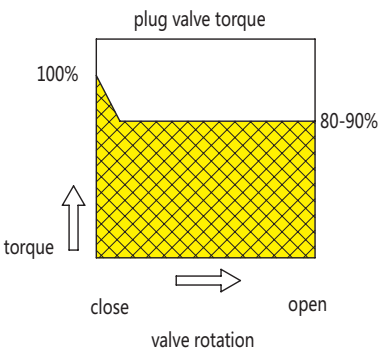
Actuation sizing data:

- This reference data are designed to help choose DFS actuator. Before installing the DFS actuator on valve, you must consider the following factors:
- The operating life of this actuator is 3 years or 1 million times.
- Non–metal parts should be replaced when the actuator is used over half a million times.
- The air pressure for the actuator.
- The operation torque of valve coupled with safety factor that manufacturer recommended (based on operations).
- The types of actuator, i.e. Double acting actuator and Spring return actuator, and its output torque under certain supply air.
- Actuator' s direction of rotation and failure mode (failure open and close)
- It is very important to choose a correct actuator. For example, the stem will be over forced if the actuator is too big. Whereas, there will be not enough torque to operate valve if the actuator is too small. Usually, we consider the required torque to operate valves is from the frictions between metal parts of valve (such as ball and disc) and seals (body). According to the valves' working condition, a lot of factors can influence the torque, such as operating temperature, frequency of operation, management and pressure difference, delivery media (lubricated, dry, muddy).

Below quoted torque characteristics of three different types of 90° travel valves:







Actuator Sizing Guide

Ball Valve:

Ball valve construction concept is based essentially on a polished ball (include a through port) contained in two seats (upstream and downstream). The ball rotation allows the flow, or stops the flow through the valve. Differential Pressure between upstream and downstream pressures forces the ball against the downstream seat (floating ball). In this case, the valve torque is generated by the friction between ball and seat and also between stem and packing. As shown in the diagram , the highest torque point is when, in presence of pressure, the valve is in the closed position, and passes to the open position (breakaway torque).

Butterfly Valve:

Butterfly valve construction concept is based essentially on a disc fixed on an axis, which in the closed position, is completely contained by the seat. The open position is obtained when, with a rotation, the disc (through its stem) becomes parallel to the flow. On the contrary, the closed position is obtained when the disc is perpendicular to the flow. In the case of the butterfly valve, the torque is generated by the friction between the disc and the seat, by the stem packing and also by the differential pressure that forces on the disc. The highest torque point, as shown in the diagram, is in the closed position, and only after a small rotation it is considerably reduced.

Plug Valve:

The construction principle of the plug valve is basically according to the plug sealed in the conical cock body. There is a channel at a direction of the plug. Along with plug screws in the valve, the valve will open or close. The operating torque is decided by the friction of the valve seat and the plug during the open and close process and is often not influenced by the fluid’s pressure. As shown in the picture. The torque is maximal when the valve closes. As without the influence of the pressure, the superior torque will be kept at the following operation.

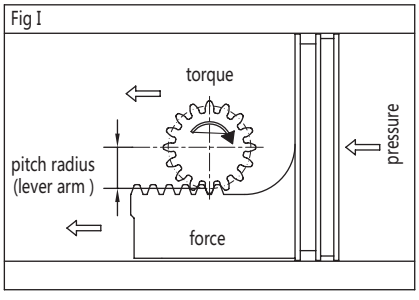
Actuator Sizing Guide

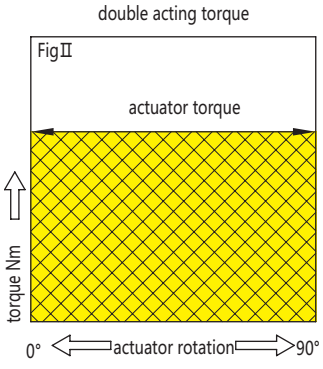
Double Acting Actuation Guide:

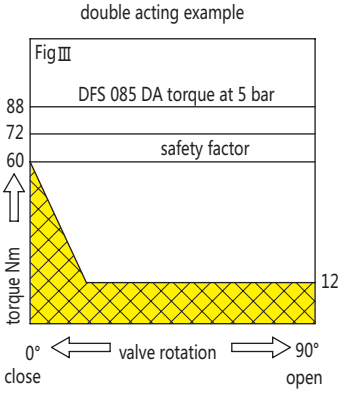
The output torque of rack and pinion pneumatic actuator=piston pressure (air supply pressure) × pitch radius (lever of arm), as Fig. Ⅰ. Besides, the friction resistance and efficiency are very high. As Fig. Ⅱ, both of the output torque are linear when CCW or CW. The suggested safety factor for double acting actuators under normal working conditions is 15%–20%.

Example (check the technical data sheet)

- Butterfly valve’s output torque=60NM
- Safety factor (20%)=60NM × (1+20%)=72NM
- Air supply pressure =5 bar
- When air supply pressure is 5 Bar, the kind of DFS double acting actuator with output 72NM you need at least is DFS085 for this operation.







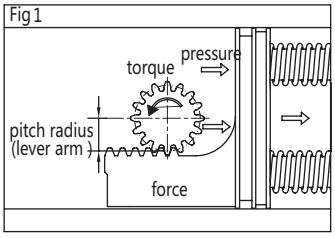
Actuator Sizing Guide

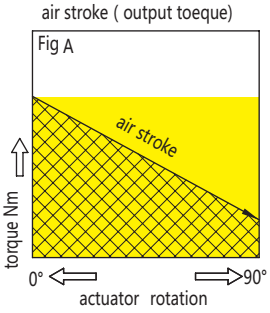
Spring Return Actuation Sizing Guide:

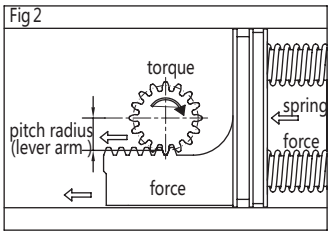
In the application of SR actuator, the output torque is coming from two different process of operation (Fig.1 and Fig.2). According to the travel position (0° and 90°), every operation gets two different torque. SR actuator's output torque=pressure (air or spring work on the piston) × pitch radius (lever of arm).

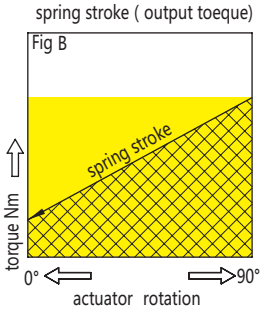
The first situation (Fig.1): output torque is coming from air supply pressure inside the Port 2 and squeezing the spring. It is known as "air travel output torque" . In this situation, air supply pressure pressurized from 0 ° position to 90 ° position. As squeeze spring have a reaction force, torque is decreasing gradually from the starting 0 ° position to 90 ° position (Fig. A).

The second situation (Fig.2): the output torque is coming from the spring return forcing work on the piston when out of air. It is known as "spring travel output torque" . In this situation, because of the comeback of spring, torque is decreasing gradually from the starting 90° position to 0° position (Fig. B).



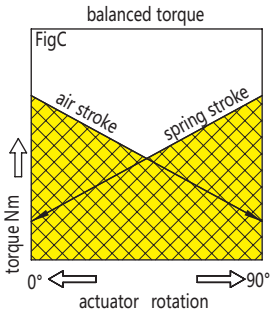


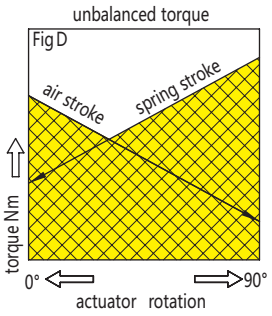




In a word, DFS actuator is designed base on the fact that two situations get one balanced torque, i.e. the numbers of springs are the same as air supply pressure readings each side (4 bar, 4 springs each side), as shown in Fig. C. There are possibilities to get an unbalanced torque in every situation, as shown in Fig. D, by changing the number of springs and air supply pressure(such as six springs each side and 5.5 bar air supply pressure, and vice versa).

Actuator Sizing Guide





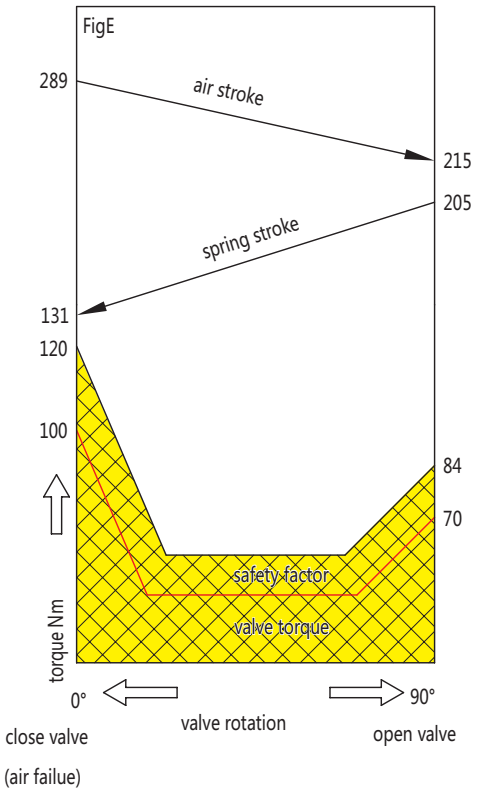
In the application of SR actuator, there are two situations: out of air open or out of air close. The suggested safety factor for spring return actuators under normal working conditions is 20%–25%.

Example (check the technical data sheet):

- Springs closed (out of air)
- Ball valve’s output torque=100NM
- Safety factor (20%)=100 × (1+20%)=120NM
- Air supply pressure= 5 Bar

The selected actuator is DFS145, therefore it gets the following data (Fig.E):

- Spring stroke 0° =131NM
- Spring stroke 90° =205NM
- Air stroke 0° =289NM
- Air stroke 90° =215NM

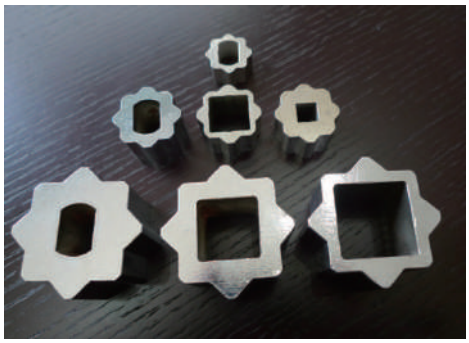


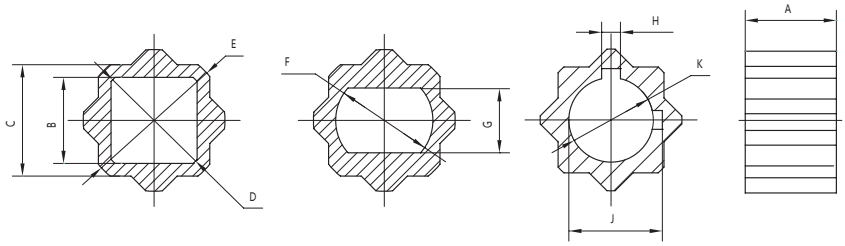
Trouble Shooting

Trouble Phenomena	Checking Item	Solution
Pneumatic Valve Does Not Act.	1 Does the solenoid work normally? 2 Is the circuit burned? 3 Is the mandrel of the solenoid blocked by impurity?	1 Replace the solenoid 2 Replace the circuit. 3 Remove the impurity
	With air supplying the pneumatic actuator, are the o–rings or the cylinder broken?	Replace the broken o–rings and cylinder body
	Is impurity blocking the valve?	Clean out the impurity, replace the broken parts
	Is the handle of the manual equipment at the manual state?	Put the handle to the pneumatic state
Acting Slowly	Is the air supply pressure insufficient?	Improve the air pressure
	Is the output torque of pneumatic actuator not enough?	Select a bigger model of the pneumatic actuator
	Is the valve stem or other parts assembled too tightened?	Reassemble and adjust the valve
	Is the air supply pipe blocked making the air flux too small?	Clean out the block, replace the filter stem
The Feedback Has No Signal	Is the power shorted out or stopped?	Check the circuitry
	Is the cam of the feedback in the incorrect position?	Adjust the cam to the correct position
	Is the jiggle on–off broken?	Replace the jiggle on–off

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Accessories_Insert



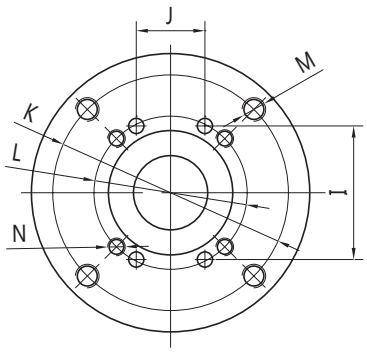


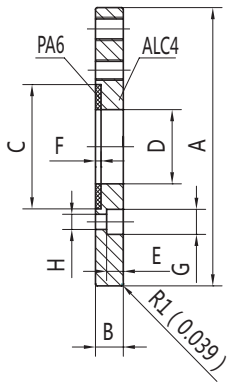
Model \ Size		A		B		C		D		E		F		G		H		J		K	
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
DFS 050	1	12.0	0.47	14.0	0.55	17.0	0.67	Φ19.2	Φ0.76	Φ22.2	Φ0.87										
	2	12.0	0.47	11.0	0.43	17.0	0.67	Φ15.2	Φ0.60	Φ22.2	Φ0.87										
	3	12.0	0.47	9.0	0.35	17.0	0.67	Φ12.5	Φ0.49	Φ22.2	Φ0.87										
	4	12.0	0.47			17.0	0.67			Φ22.2	Φ0.87	Φ14.4	Φ0.57	9.6	0.38						
	5	12.0	0.47			17.0	0.67			Φ22.2	Φ0.87					3.1	0.12			Φ12.8	Φ0.50
DFS 063	1	16.0	0.63	14.0	0.55	17.0	0.67	Φ19.2	Φ0.76	Φ22.2	Φ0.87										
	2	16.0	0.63	11.0	0.43	17.0	0.67	Φ15.2	Φ0.60	Φ22.2	Φ0.87										
	3	16.0	0.63	9.0	0.35	17.0	0.67	Φ12.5	Φ0.49	Φ22.2	Φ0.87										
	4	16.0	0.63			17.0	0.67			Φ22.2	Φ0.87	Φ14.4	Φ0.57	9.6	0.38						
	5	16.0	0.63			17.0	0.67			Φ22.2	Φ0.87					3.1	0.12			Φ12.8	Φ0.50
DFS 075 085	1	18.0	0.71	19.0	0.75	22.0	0.87	Φ26.2	Φ1.03	Φ28.2	Φ1.11										
	2	18.0	0.71	17.0	0.67	22.0	0.87	Φ23.2	Φ0.91	Φ28.2	Φ1.11										
	3	18.0	0.71	14.0	0.55	22.0	0.87	Φ19.2	Φ0.76	Φ28.2	Φ1.11										
	4	18.0	0.71	11.0	0.43	22.0	0.87	Φ15.2	Φ0.60	Φ28.2	Φ1.11	Φ14.4	Φ0.57	9.6	0.38						
	5	18.0	0.71	9.0	0.35	22.0	0.87	Φ12.5	Φ0.49	Φ28.2	Φ1.11	Φ16.0	Φ0.63	11.2	0.44						
	6	18.0	0.71			22.0	0.87			Φ28.2	Φ1.11	Φ19.2	Φ0.76	12.8	0.50						
	7	18.0	0.71			22.0	0.87			Φ28.2	Φ1.11					5.1	0.20			Φ15.9	Φ0.63
DFS 100 115	1	23.0	0.91	19.0	0.75	22.0	0.87	Φ26.2	Φ1.02	Φ28.2	Φ1.11										
	2	23.0	0.91	17.0	0.67	22.0	0.87	Φ23.2	Φ0.91	Φ28.2	Φ1.11										
	3	23.0	0.91	14.0	0.55	22.0	0.87	Φ19.2	Φ0.76	Φ28.2	Φ1.11										
	4	23.0	0.91	11.0	0.43	22.0	0.87	Φ15.2	Φ0.59	Φ28.2	Φ1.11	Φ14.4	Φ0.57	9.6	0.38						
	5	23.0	0.91			22.0	0.87			Φ28.2	Φ1.11	Φ16.0	Φ0.63	11.2	0.44						
	6	23.0	0.91			22.0	0.87			Φ28.2	Φ1.11	Φ19.2	Φ0.76	12.8	0.50						
	7	23.0	0.91			22.0	0.87			Φ28.2	Φ1.11					5.1	0.20			Φ19.2	Φ0.75
DFS 125 145 160	1	29.0	1.14	27.0	1.06	36.0	1.42	Φ37.2	Φ1.46	Φ48.2	Φ1.9										
	2	29.0	1.14	22.0	0.87	36.0	1.42	Φ29.2	Φ1.15	Φ48.2	Φ1.9										
	3	29.0	1.14	19.0	0.75	36.0	1.42	Φ26.2	Φ1.03	Φ48.2	Φ1.9										
	4	29.0	1.14			36.0	1.42			Φ48.2	Φ1.9	Φ22.4	Φ0.88	16.0	0.63						
	5	29.0	1.14			36.0	1.42			Φ48.2	Φ1.9	Φ19.2	Φ0.76	12.8	0.50						
	6	29.0	1.14			36.0	1.42			Φ48.2	Φ1.9	Φ18.0	Φ0.63	11.2	0.44						
	7	29.0	1.14			36.0	1.42			Φ48.2	Φ1.9					6.4	0.25	31.8	1.25	Φ28.7	Φ1.13
	8	29.0	1.14			36.0	1.42			Φ48.2	Φ1.9					8.1	0.32			Φ28.7	Φ1.13
DFS 180	1	42.0	1.65	27.0	1.06	36.0	1.42	Φ37.2	Φ1.46	Φ48.2	Φ1.9										
	2	42.0	1.65	22.0	0.87	36.0	1.42	Φ29.2	Φ1.15	Φ48.2	Φ1.9										
	3	42.0	1.65			36.0	1.42			Φ48.2	Φ1.9					6.4	0.25	31.8	1.25	Φ28.7	Φ1.13
	4	42.0	1.65			36.0	1.42			Φ48.2	Φ1.9	Φ22.4	Φ0.88	16.0	0.63						
	5	42.0	1.65			36.0	1.42			Φ48.2	Φ1.9					8.1	0.32			Φ31.9	Φ1.26
DFS 200	1	42.0	1.65	27.0	1.06	36.0	1.42	Φ37.2	Φ1.46	Φ48.2	Φ1.9										
	2	42.0	1.65			36.0	1.42			Φ48.2	Φ1.9					6.4	0.25	31.8	1.25	Φ28.7	Φ1.13
	3	42.0	1.65			36.0	1.42			Φ48.2	Φ1.9					10.1	0.40			Φ33.5	Φ1.32

Order Guide : DFS050 - 1
Mode size

Customized sizes are available upon requests.

Accessories_ Plate, Bracket





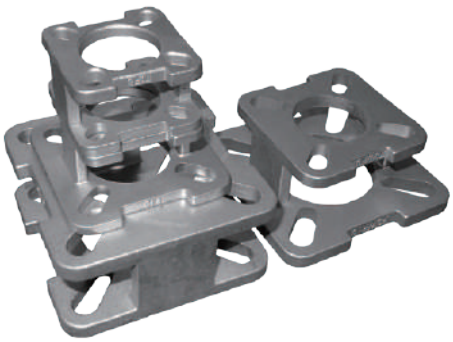


Model / Size	DFS050		DFS063/075/085		DFS100/115		DFS125/145/160		DFS180/200	
	mm	in	mm	in	mm	in	mm	in	mm	in
A	ϕ102.0	ϕ4.00	ϕ102.0	ϕ4.00	ϕ102.0	ϕ4.00	ϕ152.4	ϕ6.00	ϕ152.4	ϕ6.00
B	12.0	0.47	12.0	0.47	15.0	0.59	15.0	0.59	20.0	0.79
C	ϕ28.5	ϕ1.11	ϕ38.5	ϕ1.51	ϕ38.5	ϕ1.51	ϕ63.0	ϕ2.64	ϕ81.0	ϕ3.19
D	ϕ17	ϕ0.67	ϕ21.0	ϕ0.83	ϕ21.0	ϕ0.83	ϕ40.0	1.57	ϕ40.0	ϕ1.57
E	6.0	0.24	7.0	0.28	9.0	0.35	9.0	0.35	11.0	0.43
F	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12	3.0	0.12
G	ϕ9.5	ϕ0.37	ϕ11.0	ϕ0.43	ϕ14.0	ϕ0.55	ϕ14.0	ϕ0.55	ϕ17.0	ϕ0.67
H	ϕ5.2	ϕ0.20	ϕ6.2	ϕ0.24	ϕ8.2	ϕ0.33	ϕ8.2	ϕ0.33	ϕ10.5	ϕ0.41
I	–	–	–	–	72.0	2.83	72.0	2.83	99.0	3.90
J	–	–	–	–	37.0	1.46	37.0	1.46	53.0	2.08
K	ϕ82.6	3.25	ϕ82.6	3.25	ϕ82.6	ϕ3.25	ϕ127.0	ϕ5.00	ϕ127.0	ϕ5.00
L	–	–	–	–	–	–	ϕ82.6	ϕ3.25	–	–
M	M10	3/8–16UNC	M10	3/8–16UNC	M10	3/8–16UNC	M12	1/2–13UNC	M12	1/2–13UNC
N	–	–	–	–	–	–	M10	3/8–16UNC	–	–

We design and produce a series of connection flange and adapter kit to install actuator on valve conveniently, or use ISO bracket or ISO gear box as a connection transition.

Connection braket,CF8 (304) castings. converted szie:
F03/F04 to F03/F05 H=29.5mm;
F04/F05 to F04/F05 H=29.5mm;
F04/F05 to F05/F07 H=29.5mm;
F05/F07 to F07/F10 H=40.0mm;
F07/F10 to F07/F10 H=44.0mm;

Other sizes and material available supply.



Other Series Products



ALL TORQUE® two piston,four piston, vane actuator and scotch yoke pneumatic actuator products, have got more patents, and also CE, ATEX certificate. Their output torque is from 5 N.m to 32000 N.m under 5 bar air pressure.



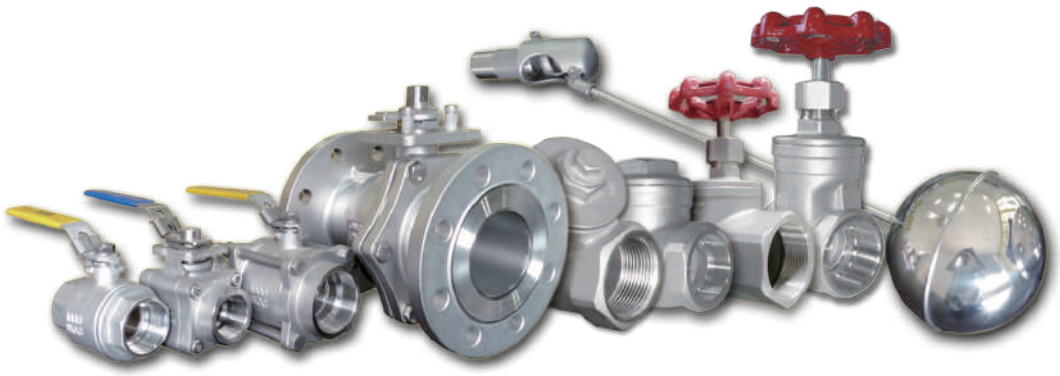
ALL TORQUE® electric actuator products, patent &, Explosion-proof structure design. The output torque is from 30 N.m to 3500 N.m.



ALL TORQUE® DFL210 , DFL1000 (explosion-proof structure design) limit switch, IP67 water-proof design.



ALL TORQUE® solenoid valve prducts, have stable and reliable performance.



ALL TORQUE® manufacture stainless steel CF8M (316) valves , with OEM exported. They are flanged ball valves, 1pc, 2pc, 3pc ball valves, gate valves, check valves, globe valves, filter, pneumatic angle seat valves, floating ball valves and so on.

Patent No： ZL 200930382594.7

How to order

Actuator Model	Double Acting	Spring Return	Spring Code	Open Angle	Thread	Options
DFS032 DFS040 DFS050 DFS063 DFS075 DFS085 DFS100 DFS115 DFS125 DFS145 DFS160 DFS180 DFS200 DFS240 DFS265 DFS300 DFS350 DFS400	DA	SR	02、04 05、06 07、08 09、10 11、12	0° ~ 90°	I=Imperial Unit in-lb M=Metric Unit Nm	P=Normal temp NBR seal (4 ℉ to 126 ℉ -20℃ to 80℃) P1=High temp VITON seals(4 ℉ to 250 ℉ -20℃ to 120℃) P2=Low temp SILICONE seals(40 ℉ to 176 ℉ -40℃ to 80℃) T=Actuator locking device L=A port airing, clockwise rotation
DFS050		SR	05	90°	M	P

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