S10 & S11

Pneumatic actuator

IOM
Installation
Operation
Maintenance

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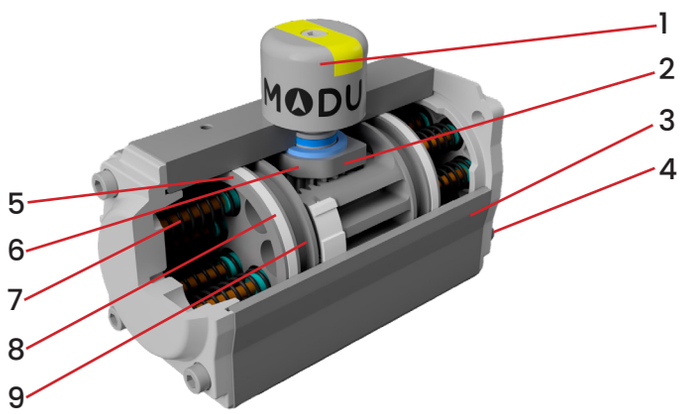
Introduction

S10 and S11 actuators is aluminium rack & pinion actuators available in both double acting (S10) and single acting, spring return (S11). This kind of actuator features a top mount multifunction indicator for inductive feedback and open-close stop adjustment as a standard. Actuators are designed for 90° quarter-turn valves and is suitable for VDI/VDE top connection for mechanical switchbox and positioners.



Structure

1. Indicator
Position indicator with VDI/VDE connection is convenient for mounting accessories such as limit switch box, positioner and so on.

2. Pinion
The pinion is made from high-precision nickel alloy steel, fully compatible with the latest standards of ISO5211, DIN3337 and NAMUR.

3. Actuator body
The extruded aluminium alloy ASTM6005 body are treated with hard anodized surface. Options: Powder polyester painted, PTFE or nickel plated.

4. End caps
Die-casting aluminium powder polyester painted. Optins: PTFE or nickel plated.

5. Pistons
The twin rack pistons are made from die-casting aluminium treated with hard anodized. Symmetric mounting position, long cycle life and fast operation, reversing rotation by simply inverting the pistons.

6. Travel adjustment
The two independent external travel stop adjustment bolts can adjust ±5°at both open and close directions easily and precisely.

7. High performance springs
Preloaded coated springs are made from the high quality steel coated to resist corrosion and with longer cycle life. Springs can be reconfigurated to change output torque.

8. Bearings & guides
Made from low friction, long-life compound material, to avoid the direct contact between metals.

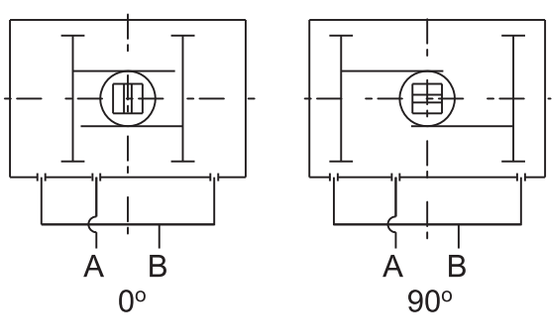
9. O-rings
NBR rubber o-rings provide trouble-free operation at standard temperature ranges. Options: For high and low temperature, viton or silicone is used.

Operating principle - double acting

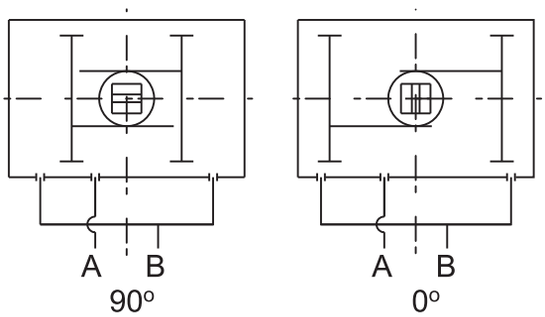
Standard Rotation: Air to port A forces the pistons outwards, causing the pinion to turn counter clockwise while the air is being exhausted from port B. Air to port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from port A.

Reverse Rotation: Air to port A forces the pistons outwards, causing the pinion to turn clockwise while the air is being exhausted from port B. Air to port B forces the pistons inwards, causing the pinion to turn counter clockwise while the air is being exhausted from port A.

DA standard rotation



DA reverse rotation

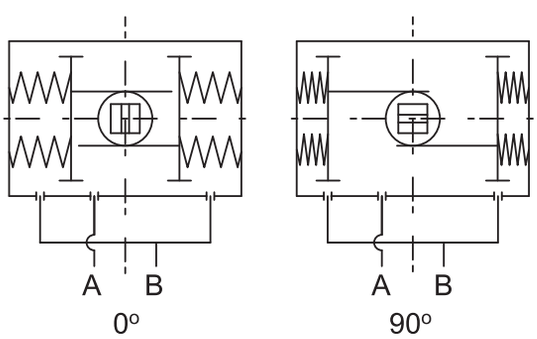


Operating principle - spring return

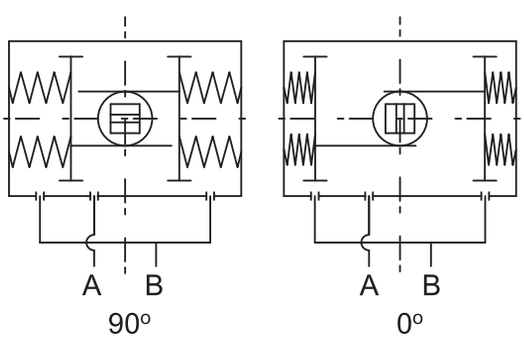
Standard rotation: Air to port A forces the pistons outwards, causing the springs to compress, the pinion turns counter clockwise while air is being exhausted from port B. Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port A

Reverse rotation: Air to port A forces the pistons outwards, causing the springs to compress, the pinion turns clockwise while air is being exhausted from port B. Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns counter clockwise while air is being exhausted from port A.

SR standard rotation

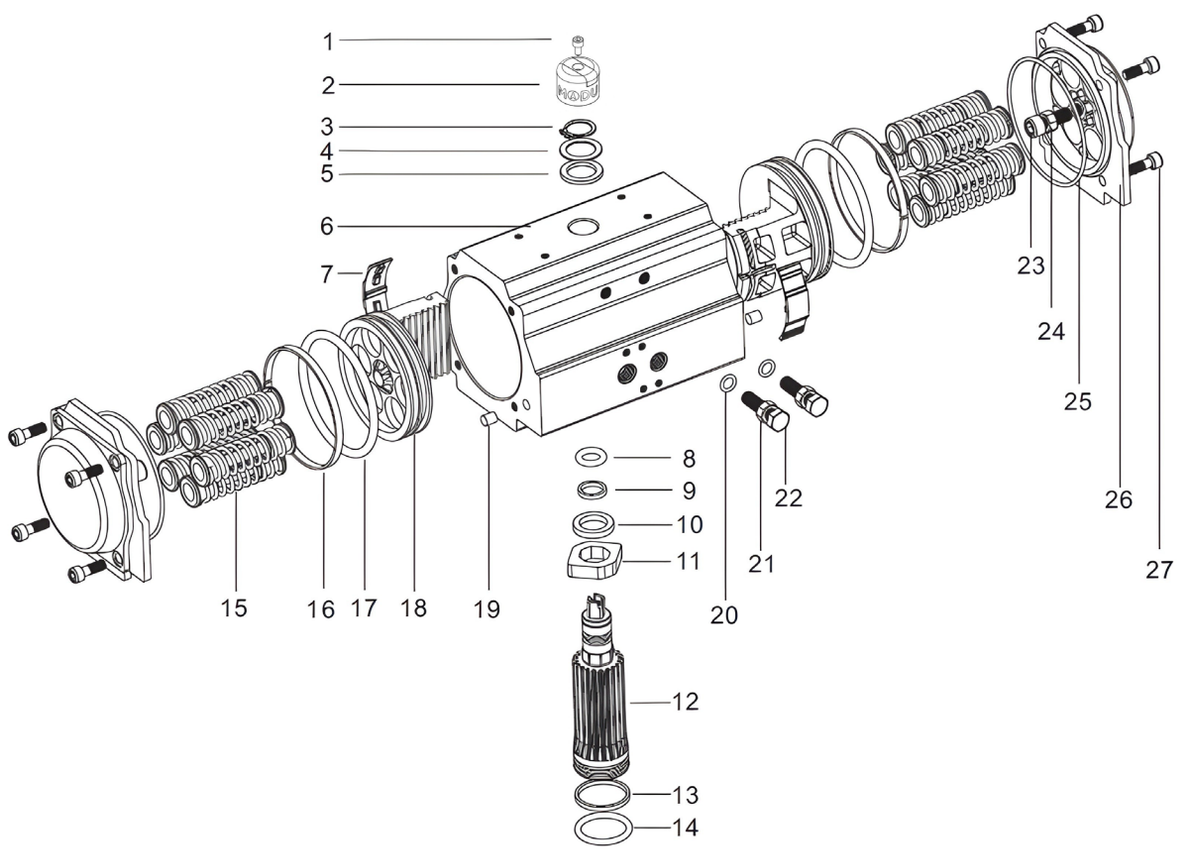


SR reverse rotation



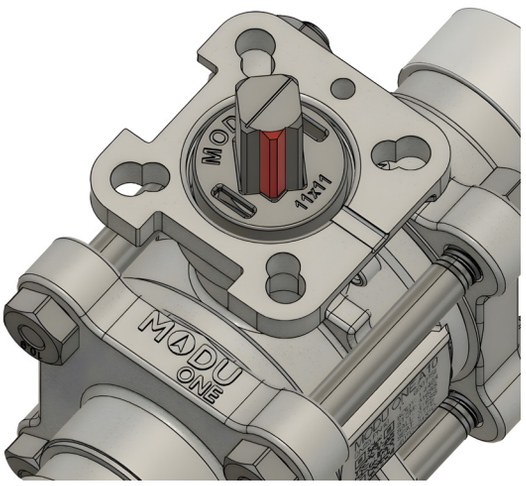
Parts description

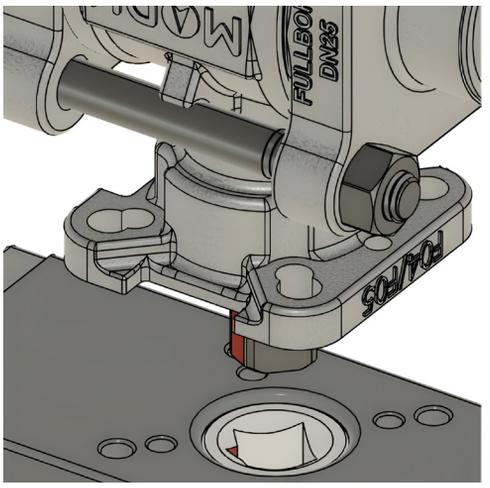
Pos	Description	Material
1	Indicator bolt	Stainless Steel AISI304/ABS
2	Indicator	Plastic (ABS) / AISI304
3	Circlip	Stainless Steel AISI304
4	Trust washer	Stainless Steel AISI304
5	Outside washer	POM
6	Body	Aluminum (6005-T5)
7	Guide	POM
8	O-ring	NBR
9	Bearing	POM
10	Inside washer	POM
11	Cam	Steel 45
12	Pinion	Steel 45, nickel-plated
13	Bearing	POM
14	O-ring	NBR
15	Spring (Not DA)	Spring steel
16	Bearing	POM
17	O-ring	NBR
18	Piston	Aluminum (A380)
19	Plug	NBR
20	O-ring	NBR
21	Nut	Stainless Steel AISI304 / A2
22	Adjust screw / bolt	Stainless Steel AISI304 / A2
23	Stop bolt	Stainless Steel AISI304 / A2
24	Stop nut	Stainless Steel AISI304 / A2
25	O-ring	NBR
26	End cap	Aluminum (A380)
27	Cap screw	Stainless Steel AISI304 / A2

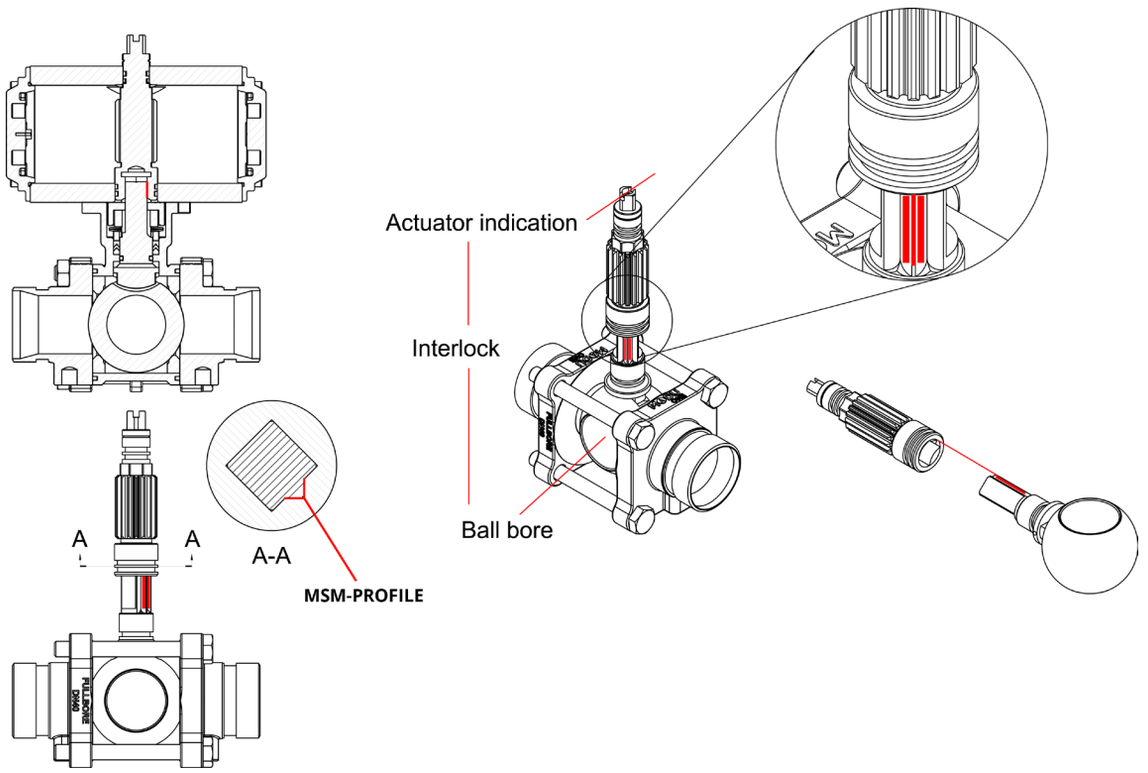


MODU Safe Mounting®

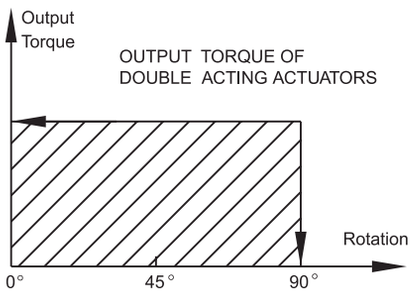
MODU Safe Mounting® for optimal process safety. An important part of PSM (Process Safety Management) and a unique safety feature for protection of employees and production, since it prevents incorrect installation of the pneumatic actuator on the valve. The advantage with the MODU Safe Mounting® system is that you secure the ball's position always matches the actuator's indicator. There will always be an interlock between ball and actuator, which means, that it is always possible to indentify the position of ball bore. MODU Safe Mounting® can only be achieved using 3-pcs ball valve type A10 and pneumatic actuators type S10/S11 from MODU Valves A/S. MSM will not be possible with other third party valves and actuators.







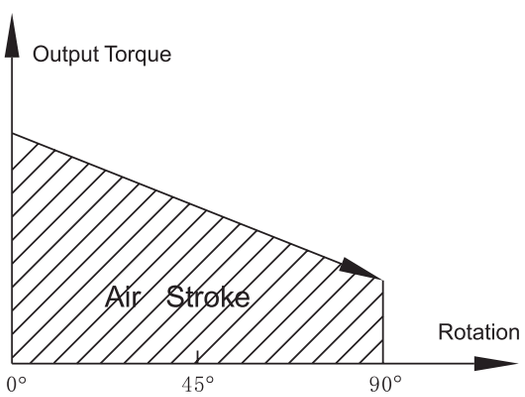
Output Torque - Double acting [Nm]

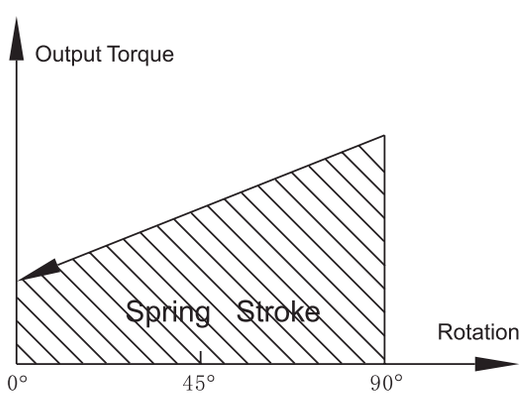


Model	Supply air [Bar] - Torques [Nm]										Weight	Air volumen [L]		Cycle time [sec]*	
	2	2.5	3	4	4.5	5	5.5	6	7	8	KG	Open	Close	Open	Close
MODU S10-32	3.1	3.8	4.6	6.1	6.9	7.6	8.4	9.2	10.7	12.2	0.7	0.05	0.06	0.50	0.40
MODU S10-40	4.8	6.0	7.2	9.5	10.7	11.9	13.1	14.3	16.7	19.1	0.8	0.06	0.08	0.55	0.47
MODU S10-52	8.0	10.0	12.0	16.0	18.0	20.0	21.9	23.9	27.9	31.9	1.4	0.12	0.16	0.60	0.53
MODU S10-63	14.6	18.2	21.9	29.2	32.8	36.5	40.1	43.8	51.1	58.4	2.0	0.21	0.23	0.66	0.58
MODU S10-75	20.1	25.1	30.1	40.1	45.1	50.2	55.2	60.2	70.2	80.3	2.7	0.30	0.34	0.70	0.64
MODU S10-83	31.4	39.2	47.0	62.7	70.5	78.4	86.2	94.1	109.7	125.4	3.1	0.43	0.47	0.83	0.73
MODU S10-92	45.1	56.4	67.7	90.3	101.6	112.9	124.1	135.4	158.0	180.6	4.6	0.64	0.73	0.90	0.86
MODU S10-105	66.1	82.7	99.2	132.2	148.8	165.3	181.8	198.4	231.4	264.5	6.8	0.95	0.88	1.24	1.20
MODU S10-125	100.3	125.4	150.5	200.6	225.7	250.8	275.9	301.0	351.1	401.3	8.9	1.60	1.40	2.30	1.70
MODU S10-140	171.0	213.8	256.5	342.0	384.8	427.5	470.3	513.0	598.5	684.0	13.3	2.50	2.20	2.40	2.00
MODU S10-160	266.0	332.5	399.0	532.0	598.5	665.0	731.5	798.0	931.0	1064.0	20.1	3.70	3.20	3.83	2.50
MODU S10-190	425.6	532.0	638.4	851.2	957.6	1064.0	1170.4	1276.8	1489.6	1702.4	31.3	5.90	5.40	4.45	3.55
MODU S10-210	532.0	665.0	798.0	1064.0	1197.0	1330.0	1463.0	1596.0	1862.0	2128.0	46.8	7.50	7.50	5.40	4.25
MODU S10-240	796.5	961.9	1154.3	1539.0	1731.4	1923.8	2116.1	2308.5	2693.3	3078.0	67.3	11.00	9.00	8.30	8.23
MODU S10-270	1169.6	1462.1	1754.5	2339.3	2631.7	2924.1	3216.5	3508.9	4093.7	4678.6	96.9	17.00	14.00	10.80	8.38

*Based on 6 bar supply air pressure, no load on actuator.

Output Torque - Spring return [Nm]





OUTPUT TORQUE OF PNEUMATIC ACTUATOR - SPRING RETURN (Unit:Nm)																	
Model	Spring Q.TY	Airpressure(Bar)														Springs' output	
		2.5		34				5		6		7		8			
		0° Start	90°0 End	°9 Start	0° EndS	0° tart	90°0 EndS	°9 Start	0° EndS	0° tart	90°0 End	°9 tart	0° EndS	0° tart	90°9 EndS	0° tart	0° End
D52SR	55	.7	3.87	.6	5.7											6.24	.3
	64	.9	2.56	.9	4.5	10.98	.5									7.45	.0
	74	.0	1.36	.0	3.39	.8	7.3	14.0	10.48							.6	5.9
	85			.2	2.09	.2	6.0	13.29	.1	17.2	14.19					.9	6.7
	94			.3	0.88	.3	4.8	12.37	.9	16.3	12.8	20.3	16.81			1.17	.6
	10					7.43	.6	11.5	6.7	15.5	11.6	19.5	15.6			12.48	.5
	11					6.62	.3	10.65	.4	14.6	10.4	18.6	14.3	22.6	18.3	13.69	.3
	12							9.74	.2	13.89	.1	17.8	12.2	21.8	17.1	14.8	10.2
D63SR	57	11.4	.7	15.0	11.4	22.3	14.9									10.46	.8
	6	10.15	.7	13.69	.3	20.9	16.6	28.3	23.9							12.58	.2
	78	.6	3.6	12.57	.2	19.5	14.5	26.8	21.9							14.69	.6
	8			10.95	.1	18.2	12.4	25.5	19.8	32.8	27.0	40.1	34.3			16.7	10.9
	9					16.8	10.4	24.1	17.7	31.4	24.9	38.7	32.2			18.8	12.3
	10					1.48	.2	22.8	15.6	30.0	22.8	37.3	30.1	44.7	37.4	20.9	13.7
	11							21.5	13.5	28.7	20.7	36.0	28.0	43.3	35.3	22.9	15.0
	12							20.0	11.4	27.3	18.6	34.6	25.9	41.9	33.3	25.0	16.4

Output Torque - Spring return [Nm]

OUTPUT TORQUE OF C SERIES PNEUMATIC ACTUATOR WITH SPRING RETURN(Unit:Nm)																	
Model	Spring Q.TY	Air pressure(Bar)														Springs' output	
		2.5		3		4		5		6		7		8			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
D75SR	5	14.5	10.6	19.4	15.5	29.5	25.7									14.5	10.5
	6	12.4	7.6	17.3	12.6	27.4	22.7	37.5	32.8							17.4	12.7
	7	10.4	4.8	15.2	9.7	25.3	19.9	35.4	29.9							20.3	14.8
	8			13.1	6.8	23.1	16.9	33.3	27.0	43.2	37.0	53.3	47.0			23.2	16.9
	9					21.0	14.1	31.2	24.1	41.1	34.1	51.2	44.2			26.1	19.0
	10					19.0	11.1	28.8	21.2	39.0	31.2	49.1	41.2	59.1	51.2	29.0	21.1
	11							27.0	18.3	37.0	28.3	47.0	38.4	57.0	48.4	31.9	23.2
	12							24.9	15.4	34.9	25.4	44.9	35.4	54.9	45.4	34.7	25.3
D83SR	5	23.3	16.1	31.1	24.0	46.8	39.7									23.0	15.8
	6	20.1	11.5	28.0	19.3	43.7	35.1	59.4	50.7							27.6	19.0
	7	17.0	6.9	24.8	14.8	40.5	30.5	56.2	46.2							32.2	22.1
	8			21.7	10.1	37.4	25.8	53.1	41.5	68.8	57.2	84.5	72.9			36.8	25.3
	9					34.2	21.3	49.9	37.0	65.6	52.6	81.2	68.3			41.4	28.5
	10					31.0	16.6	46.7	32.3	62.4	48.0	78.1	63.7	93.8	79.3	46.0	31.6
	11							43.6	27.7	59.3	43.4	75.0	59.1	90.6	74.8	50.6	34.8
	12							40.4	23.2	56.1	38.9	71.7	54.5	87.4	70.2	55.2	38.0
D92SR	5	33.1	22.0	44.2	33.2	66.8	55.9									34.4	23.3
	6	28.4	15.2	39.6	26.4	62.2	49.0	84.8	71.6							41.2	28.0
	7	23.8	8.2	34.9	19.4	57.5	42.1	80.2	64.7							48.1	32.7
	8			31.3	12.6	52.9	35.2	75.5	57.9	98.1	80.5	120.7	103.0			55.0	37.3
	9					48.2	28.4	70.9	51.0	93.5	73.6	116.0	96.1			61.9	42.0
	10					43.6	21.5	66.2	44.1	88.8	66.7	111.3	89.2	134.0	111.8	68.7	46.7
	11							61.5	37.2	84.1	59.9	106.6	82.4	129.2	105.0	75.6	51.4
	12							56.8	30.4	79.4	53.0	101.9	75.5	124.5	98.1	82.5	56.0
D105SR	5	51.0	33.4	67.5	49.9	100.6	83.0									49.2	31.6
	6	44.7	23.5	61.1	40.0	94.2	73.2	127.3	106.2							59.1	38.0
	7	38.4	13.7	54.9	30.3	87.9	63.4	121.0	96.4							68.9	44.3
	8			48.5	20.4	81.6	53.5	114.7	86.5	147.7	119.6	180.8	152.7			78.7	50.6
	9					75.3	43.7	108.4	76.8	141.5	109.8	174.5	142.9			88.6	56.9
	10					68.9	33.4	102.0	66.5	135.1	99.6	168.2	132.6	201.2	165.7	98.4	63.3
	11							95.7	57.0	128.7	90.1	161.8	123.1	194.8	156.2	108.3	69.6
	12							89.4	47.5	122.5	80.6	155.5	113.6	188.6	146.7	118.1	75.9
D125SR	5	73	47	98	72	148	122									79	52
	6	63	31	88	56	138	107	188	157							94	63
	7	52	15	77	40	127	90	178	141							110	73
	8			67	25	117	75	167	125	217	176	268	226			125	84
	9					107	59	157	109	207	159	257	210			141	94
	10					96	44	146	94	196	144	247	194	297	245	157	105
	11							136	78	186	128	236	178	286	228	173	115
	12							125	63	176	113	226	163	276	213	188	125
D140SR	5	128	85	171	127	256	213									129	86
	6	111	59	154	102	239	187	325	273							155	103
	7	94	33	137	76	222	162	308	247							181	120
	8			120	50	205	136	291	221	376	307	462	392			206	137
	9					187	110	273	196	358	281	444	367			232	155
	10					170	84	256	169	341	255	427	340	512	426	258	172
	11							238	143	324	229	409	314	495	400	284	189
	12							221	118	307	203	392	289	478	374	310	206
D160SR	5	193	124	259	191	392	324									208	140
	6	165	83	232	149	365	282	498	415							250	168
	7	137	41	203	107	336	240	469	373							292	196
	8			176	66	309	199	442	237	575	465	708	598			333	223
	9					280	157	413	290	546	423	679	556			375	251
	10					253	115	386	248	519	381	652	514	785	647	417	279
	11							358	207	491	340	624	473	757	606	458	307
	12							330	165	463	298	596	431	729	564	500	335
D190SR	5	332	222	438	329	651	542									309	200
	6	292	161	398	267	611	480	824	693							371	240
	7	252	99	358	205	571	418	784	631							433	280
	8			318	143	531	356	744	569	957	782	1169	995			495	320
	9					491	295	704	507	917	720	1130	933			557	360
	10					451	233	664	446	877	658	1090	871	1302	1084	618	400
	11							624	384	837	597	1050	809	1263	1022	680	440
	12							584	322	797	535	1010	748	1223	960	742	480
D210SR	5	390	285	523	418	789	684									380	275
	6	335	209	468	342	734	608	1000	874							456	330
	7	280	133	413	266	679	532	945	798							532	385
	8			358	190	624	456	890	722	1156	988	1422	1254			608	440
	9					569	380	835	646	1101	912	1367	1178			684	495
	10					514	304	780	570	1046	836	1312	1102	1578	1368	760	550
	11							725	494	991	760	1257	1026	1523	1292	836	605
	12							670	418	936	684	1202	950	1468	1216	912	660

Output Torque - Spring return [Nm]

OUTPUT TORQUE OF C SERIES PNEUMATIC ACTUATOR WITH SPRING RETURN(Unit:Nm)																	
Model	Spring Q.TY	Air pressure(Bar)														Springs' output	
		2.5		3		4		5		6		7		8			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
D240SR	5	552	409	744	600	1129	985									554	410
	6	470	297	662	489	1047	874	1432	1259							665	492
	7	388	187	580	379	964	764	1349	1149							775	575
	8			498	268	883	653	1267	1037	1652	1422	2037	1807			886	656
	9					800	542	1185	926	1569	1311	1954	1696			998	739
	10					718	431	1103	816	1488	1201	1872	1586	2257	1970	1108	821
	11							1021	705	1406	1090	1791	1474	2176	1859	1219	903
	12							939	594	1323	979	1708	1363	2093	1748	1330	985
D270SR	5	903	675	1195	968	1779	1552									787	560
	6	790	519	1083	811	1667	1396	2252	1981							943	672
	7	679	361	972	654	1556	1238	2141	1823							1101	783
	8			860	497	1444	1081	2029	1666	2614	2252	3199	2836			1258	895
	9					1332	923	1917	1509	2502	2094	3087	2678			1416	1007
	10					1220	767	1805	1352	2390	1937	2974	2521	3560	3107	1572	1119
	11							1693	1194	2278	1779	2862	2364	3448	2949	1730	1231
	12							1582	1037	2167	1623	2751	2207	3336	2792	1887	1342
D300SR	5	1097	729													1061	730
	6	935	494	1316	875											1273	876
	7	772	258	1153	639	1916	1402									1485	1022
	8			991	403	1754	1166	2517	1929							1697	1168
	9					1592	930	2355	1693	3118	2456					1909	1314
	10					1430	695	2193	1458	2956	2221	3719	2984	4482	3747	2122	1460
	11							2030	1222	2793	1985	3556	2748	4319	3511	2334	1606
	12							1868	986	2631	1749	3394	2512	4157	3275	2546	1752
D350SR	5	1533	964													1702	1173
	6	1292	586	1863	1157											2043	1408
	7	1031	208	1602	779	2745	1922									2383	1640
	8			1341	401	2484	1544	3626	2686							2724	1877
	9					2224	1165	3366	2307	4508	3449					3064	2112
	10					1963	787	3105	1929	4247	3071	5390	4214	6532	5356	3405	2346
	11							2844	1551	3986	2693	5129	3836	6271	4978	3745	2581
	12							2584	1172	3726	2314	4869	3457	6011	4599	4086	2816

Operating conditions

Media:	Dry pressurized air or non corossive gases with dewpoint minimum 10° below ambient temperature
Quality:	DIN/ISO 8573-1 Class3, max. 5µ
Supply pressure:	2,5 to 10 bar
Temperature:	NBR -20°C to +80°C LNBR -30°C to +80°C FKM -15°C to +150°C Silikone -35°C to +80°C
Adjustment:	+/-5° ved 0° og 90°
Installation:	Indoor/outdoor

Installation

The S10 and S11 pneumatic actuators feature an MODU Safe Mounting® square base and mounting holes in accordance with ISO 5211 standards. The MODU Safe Mounting® base allows the actuator to be mounted on valves with a 45° inclined stem. To mount the MODU Safe Mounting® base on valves with a parallel stem, the actuator must be configured accordingly. The actuators can be mounted either parallel to or perpendicular to the pipeline. Contact MODU Valves for further information.

1. Fit the square of the valve directly into the MODU Safe Mounting® of the actuator.
2. Bolt together through the valve ISO pad.
3. If necessary adjust the rotation angel of open and closed position by testing the assembly with pressurized air.

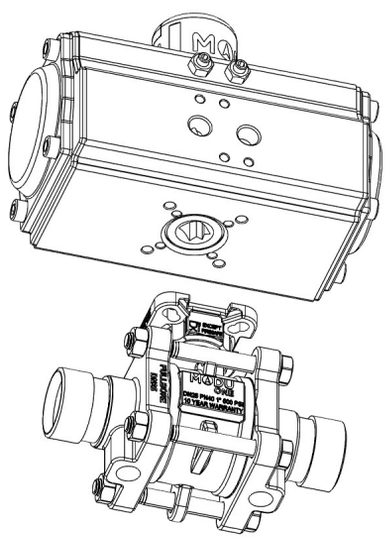
Following should be noted prior to assembly to valves:

- Determine the desired operation of the assembly, Normally closed valve NC, or Normally open NO.
- Check the correct positioning (alignment) of all the elements of the group,valve, connection piece, bracket and actuator.
- Assemble ensuring the mounting screws correctly distribute the effort inproportionally.
- Ensure all position indicators are correctly adjusted and show the correct position.
- If necessary adjust the rotation angel of open and closed position by testing the assembly with pressurized air.

DANGER: Never insert fingers, hand or other parts into the valves during testing with pressurized air.

Support of actuator in vertical installation
When actuator is installed on a vertical pipeline, please refer to below guideline according to support of the actuator.

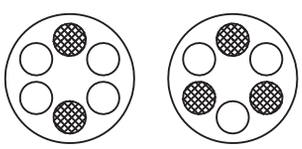
Actuator weight	Recommendation
< approx. 10–15 kg	Ok without additional support (small valves)
15–30 kg	Should be assessed - depends on valve and piping
> 30–50 kg	Should be supported (bracket)
> 50 kg	Support required



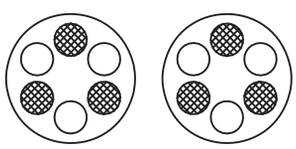
Spring mounting form

Pneumatic actuators are standard delivered with “full” spring package 12pcs. (2 x 6pcs.). It is possible to change the spring configuration according to below picture.

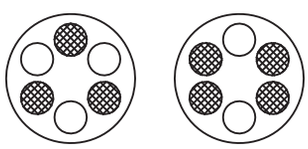
DANGER: Always de-pressurize the actuator and disconnect the supply before loosening the end caps. Springs have to be mounted with the actuator in vertical position.



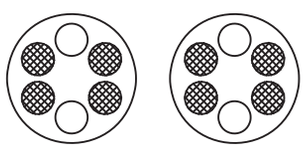
5 Springs



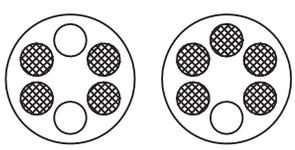
6 Springs



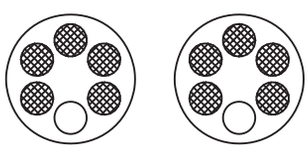
7 Springs



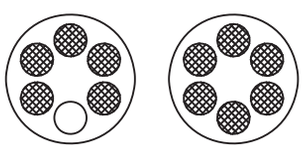
8 Springs



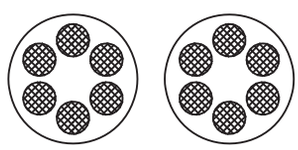
9 Springs



10 Springs



11 Springs



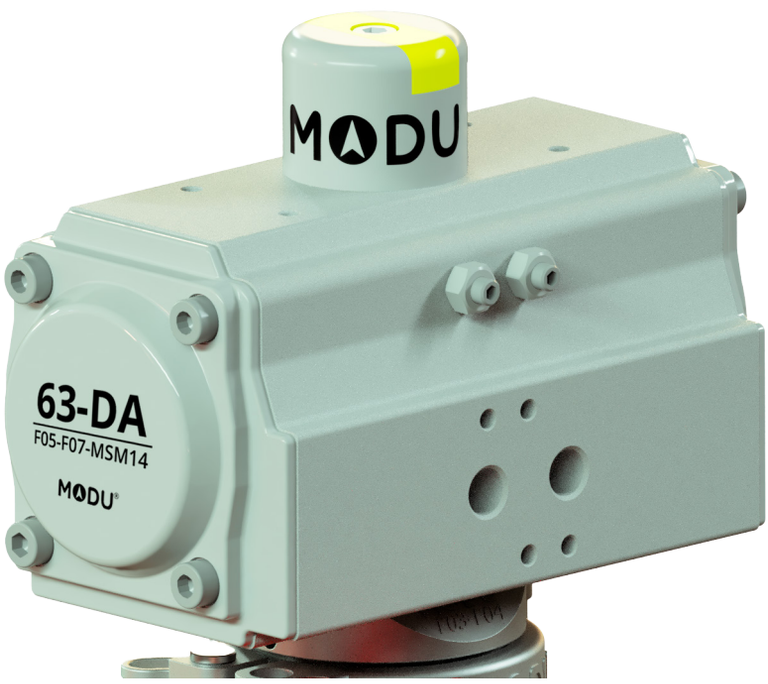
12 Springs

Adjustment of stop bolts

Normal rotation counter clockwise: Please adjust without air-pressure.

Adjustment of valve closing position is done by right side adjustment bolt. Loosen counter nut before bolt is adjusted. If the bolt is turned outwards the valve closes more. If the bolt is turned inwards the valve closes less.

Adjustment of valve opening position is done by left side adjustment bolt. Loosen counter nut before bolt is adjusted. If the bolt is turned outwards the valve opens more. If the bolt is turned inwards the valve opens less.



Maintenance

1. It is recommended that periodic checks be performed to make sure that all fasteners remain tight.
2. The actuator is supplied pre lubricated no further lubrication is required during normal life span.
3. Under certain working conditions (heavy duty, non-compatible operating media or abnormal operating conditions)internal seals should be checked periodically and replaced when necessary.
4. For spring return actuators please check and replace after 500.000 strokes spring should always be replaced in full sets.

CONTACT: If any questions please contact MODU Valves A/S

Storage and handling

Storage: Make sure the actuator is completely dry and free of water. Seal the control air pressure holes with the original or replacement plastic plugs. Protect the actuator from dirt, dust and damage by packing it in a box or plastic bag.

Handling: Pneumatic actuators can be lifted and mounted in sizes 32 to 160, for sizes larger than 190, the actuators are equipped with lifting eyes. Suitable lifting equipment should be used to avoid damage. The lifting eyes are only intended to lift the weight of the actuator and not a complete assembly. Then use a loop around the actuator or valve instead.

Double acting	Weight [kg]	Spring return	Weight [kg]
32DA	0.7	-	-
40DA	0.8	-	-
52DA	1.4	52SR	1.5
63DA	2.0	63SR	2.2
75DA	2.7	75SR	2.9
83DA	3.1	83SR	3.6
92DA	4.6	92SR	5.5
105DA	6.8	105SR	7.8
125DA	8.9	125SR	10.4
140DA	13.3	140SR	14.4
160DA	20.1	160SR	23.3
190DA	31.3	190SR	46.1
210DA	46.8	210SR	53.2
240DA	67.3	240SR	73.3
270DA	96.9	270SR	115.9
300DA	128.5	300SR	156.1
350DA	210.2	350SR	259.4
* With lifting eyes mounted			