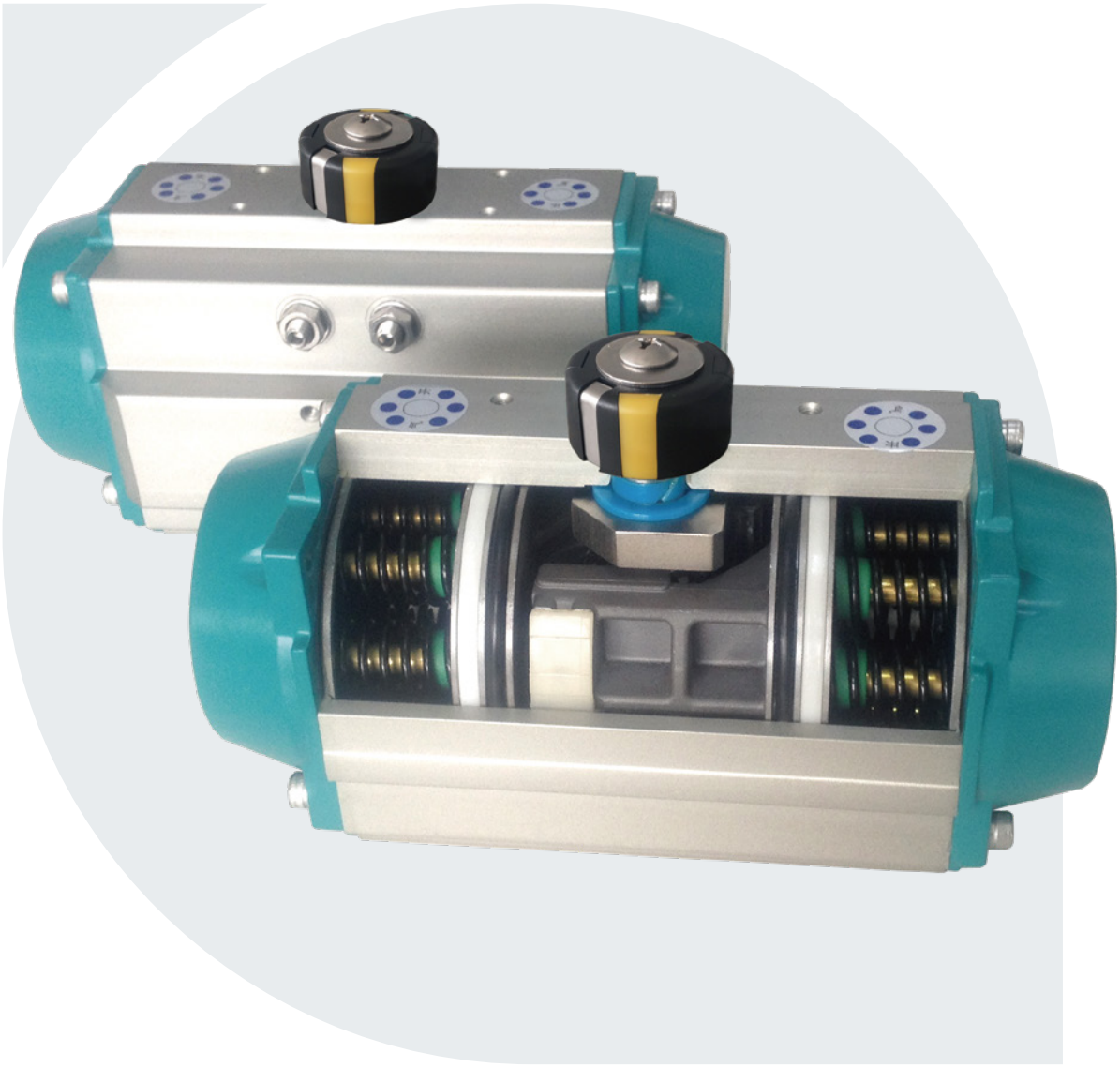
Coreline

Rack & Pinion pneumatic actuator

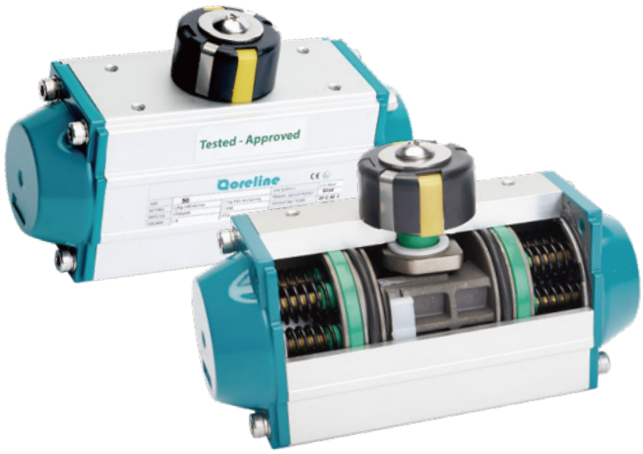
Fig.540N : Air/Air
Fig.541N : Air/Spring



www.coreline.dk

General specifications

Specifications



The Coreline Fig.540N/541N pneumatic actuators, have been designed and tested to obtain the highest cycling life and the most reliable performance with minimum maintenance and service. Specifications of Coreline pneumatic actuators follow international standards convenient for faster mounting. CE approval and ATEX certification provide guarantee for safety and reliability. A wide product range, permits a more economical sizing.

Model:	Fig.540N air/air, Fig.541N air/spring
Operating media:	Dry or lubricated air, non-corrosive gas
Operating temperature:	–20°C~+80°C : Standard (NBR O-ring)
	–40°C~+80°C : Low temperature (Silicone O-ring)
	–20°C~+150°C : High temperature (FPM O-ring)
Enclosure:	IP67
Travel adjustment:	Adjustable +4°/-4° by 0° and 90° position
Air supply pressure:	2.5bar~8bar
Lubrication:	Pre-lubricated for life of actuator on assembly under normal operating conditions

CE Ex **SIL3** ATEX, CE and SIL3 approval for all Coreline pneumatic actuators.

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page 4 ..... Part list and material specification

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page 6 ..... Operating principle

page 7 ..... Double acting - Sizing and output torque

page 8 ..... Spring return - Sizing

page 9-11 ..... Spring return - Output torque

page 12 ..... Actuator interface for valve automation

page 13 ..... Technical data

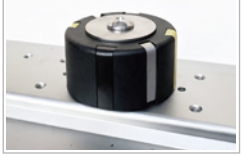
page 14 ..... Pneumatic accessories

page 15-16 ..... Installation guide

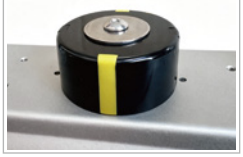
Design features

Visual position indicator
Position indicator makes it easy to see position of valve and protect turning point against dirt and ambient. Fastened by stainless steel screw/washer. Built-in signal generator, prepared for inductive sencor. (Plastic position indicator for actuator sizes 160-270.)

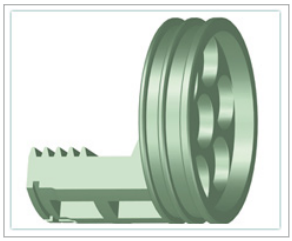
Sizes: 40-140, 300-400



Sizes: 160-270

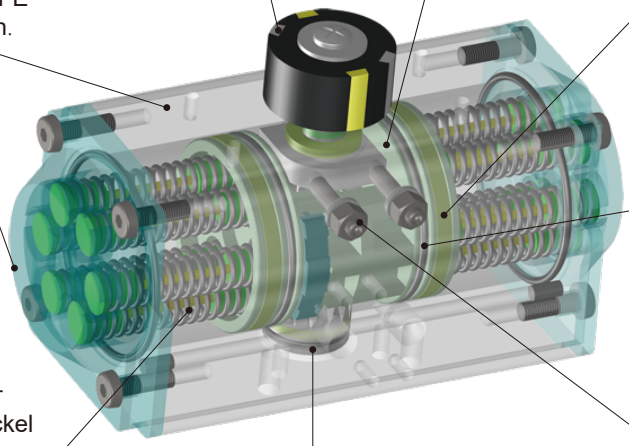


Pistons with precision-machined racks
Twin rack pistons in hard anodized die-cast aluminum. Rack teeth are die-cast and precision machined for improved gear tooth accuracy and consistent full-width engagement.Balanced rack and pinion with reinforced tooth support ensures smooth operation and long cycle life. Linear torque curve for stable and precise performance.

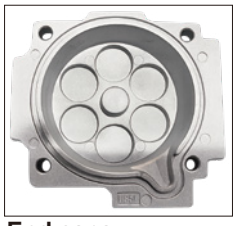


Polished actuator body
Standard body in hard anodised aluminium (40 µ) and polished for better corrosion resistance and less friction on internal parts for better performance. Epoxy&polyester painting, PTFE or nickel plated body as option.

Bearings and guides
Made from low friction,long-life composite material, provide maximum protection against wear. The maintenance and replacement are easy and convenient.

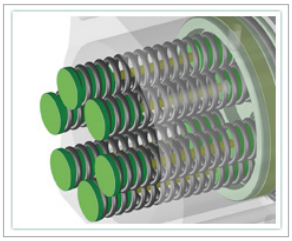


O-rings
NBR O-rings provide trouble-free operation as standard. By high or low temperature, FPM or Silicone are optional.

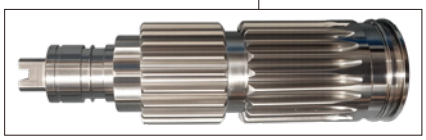


End caps
Die-casting aluminum, powder polyester painted. PTFE or nickel plated as option.

Travel adjustment
The two independent travel stop adjustment bolts can adjust ±4°at both open and close directions, easily and precisely.



Preloaded springs
High performance springs in Fig.541: Single acting. Coated springs for corrosion resistance and preloaded for safe maintenance.

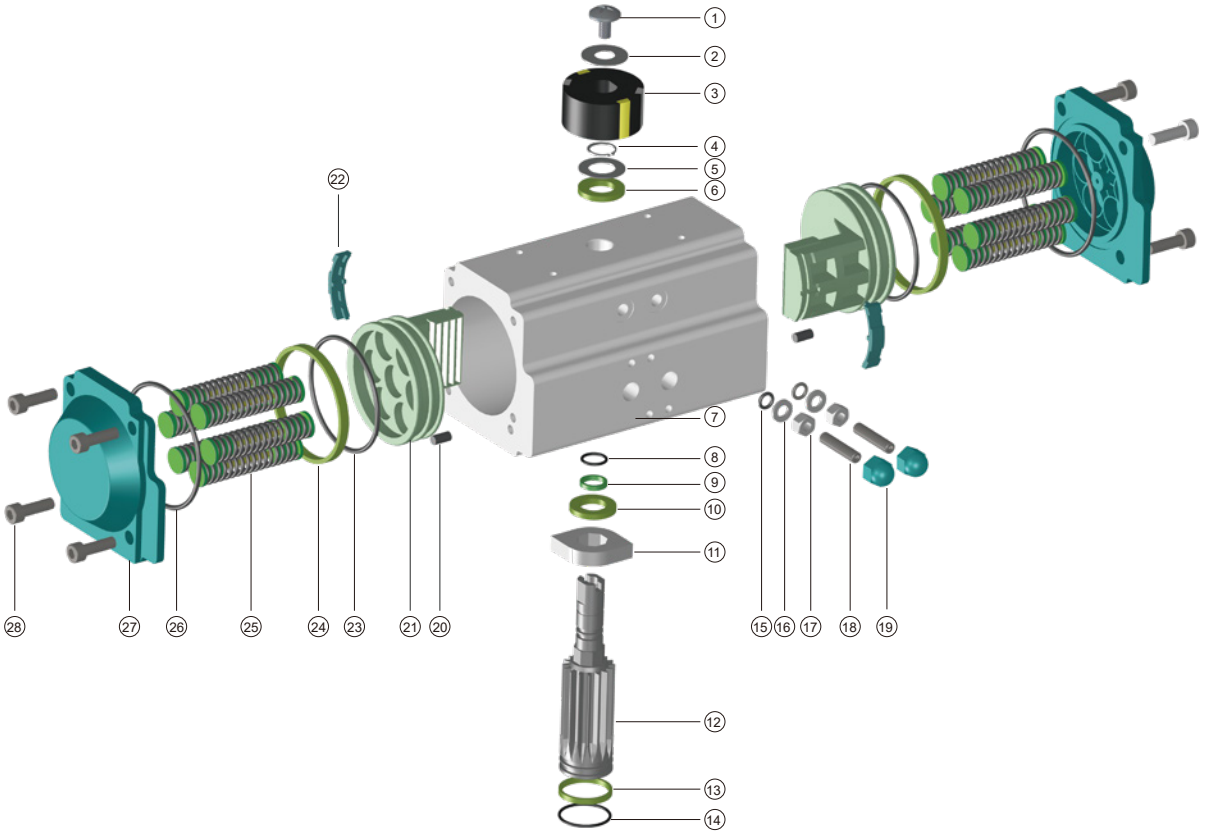


Pinion
High-precision pinion made from nickel alloy steel and with full width pinion/piston engagement for greater operational life.



Stop cam
The internal stop cam interface has been upgraded from an octagonal to a Torx (star-shaped) design for improved strength.
Machined from solid bar stock instead of casting, it provides greater contact area, reduced impact, easier installation, and longer service life.

Part list and material specification

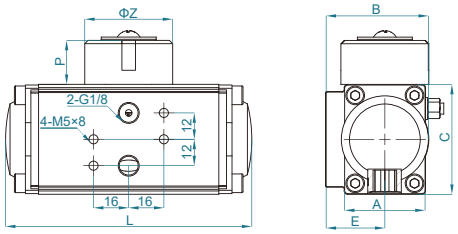


No.	Part name	Qty	Standard material	Protection	Optional material
1	Cap screw (Indicator)	1	Stainless steel(304)		
2	Washer (Indicator)	1	Stainless steel(304)		
3	Position indicator	1	Polyoxymethylene		
4	Spring clip (Pinion)	1	Stainless steel(304)		
5	Thrust washer	1	Stainless steel(304)		
6	Thrust bearing (Pinion)	1	Polyoxymethylene		
7	Body	1	Extruded aluminum alloy(6005-T5)	Hard anodized and polished *	
8	O-ring (Pinion top)	1	NBR		FPM/Silicone
9	Bearing (Pinion top)	1	Polyoxymethylene		
10	Thrust bearing (Pinion)	1	Polyoxymethylene		
11	OCTI Cam (Stop arrangement)	1	Alloy steel(45#)		
12	Pinion	1	Alloy steel(45#)	Nickel plated	Stainless steel
13	Bearing (Pinion bottom)	1	Polyoxymethylene		
14	O-ring (Pinion bottom)	1	NBR		FPM/Silicone
15	O-ring (Adjust screw)	2	NBR		FPM/Silicone
16	Washer (Adjust screw)	2	Stainless steel(304)		
17	Nut (Adjust screw)	2	Stainless steel(304)		
18	Adjust screw	2	Stainless steel(304)		
19	Nut cover (Adjust screw)	2	Plastic (ABS)		
20	Plug	2	NBR		FPM/Silicone
21	Piston	2	Cast aluminum/casting(101A)	Anodized	Stainless steel
22	Plate (Piston)	2	Polyoxymethylene		
23	O-ring (Piston)	2	NBR		FPM/Silicone
24	Bearing (Piston)	2	Polyoxymethylene		
25	Spring	0~12	Spring steel	Dip coating	
26	O-ring (End cap)	2	NBR		FPM/Silicone
27	End cap	2	Cast aluminum(ADC12)	Powder polyester painted etc	
28	Cap screw	8	Stainless steel(304)		

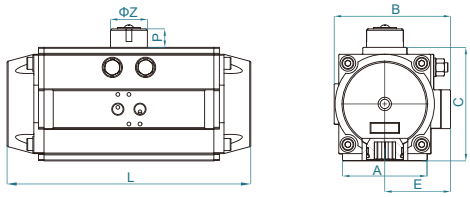
* PTFE or Nickel plated.

Dimensions

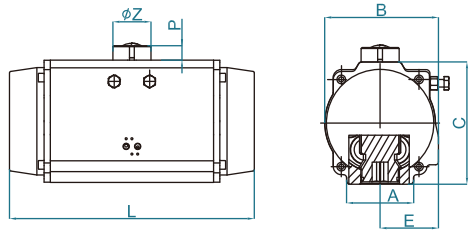
Size 32



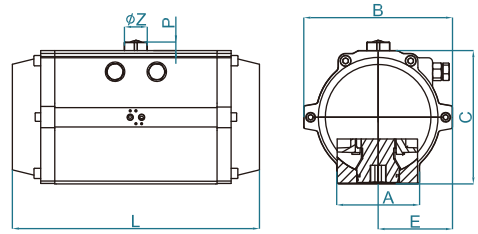
Size 40-270



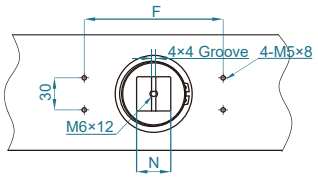
Size 300-350



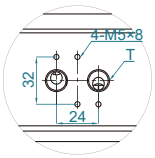
Size 400



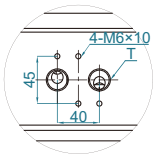
VDI/VDE 3845 Top connection



NAMUR air connection

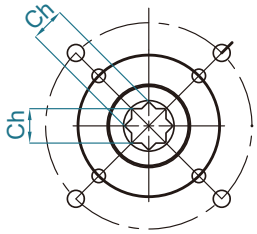


G1/4" : Size 40-210



G1/2" : Size 240-400

ISO5211 - DIN3337 Bottom view



Size	A	B	C	L	E	F	P	ϕ Z	N	ISO5211	Ch □	Air interface
* 32	37	47	50	110	27	50	20	40	10	F03, F04	9	G1/8"
40	60	65	60	128/144	36.5	50/80	20	40	10	F03+F05, F04	9, 11	G1/4"
50	46	71	70	151	41.5	80	20	40	10	F03+F05, F04	9, 11	G1/4"
65	64	84.5	89	168	46.5	80	20	40	10	F03+F05+F07, F04	9, 11, 14	G1/4"
75	68	98.8	100	182	55	80	20	40	14	F05+F07	9, 11, 14, 17	G1/4"
85	68	108.5	113	210	59.5	80	20	40	14	F05+F07	11, 14, 17	G1/4"
95	88	117.7	123	261.8	63	80	20	40	14	F05+F07, F10	14, 17	G1/4"
110	93	132	136	285.2	73	80	20	40	14	F07+F10	14, 17, 22	G1/4"
125	96	152	159	320	81	80/130	30	56	22	F07+F10	17, 22, 27	G1/4"
140	110	172	178	401	91	80/130	30	56	22	F10+F12	17, 22, 27	G1/4"
160	112	189	200	459	100	80/130	30	56	22	F10+F12	17, 22, 27	G1/4"
190	136	217	232	495	112	130	30	56	22	F10+F14, F12	22, 27, 36	G1/4"
210	140	236	255	529	122	130	30	80	32.5	F14, F12	22, 27, 36	G1/4"
240	160	268.5	292	618	139	130	30	80	32.5	F14, F12+F16	27, 36, 46	G1/2"
270	160	296	331	737	151	130	30	80	32.5	F16, F14	36, 46	G1/2"
300	180	335	354	784	173	130	30	80	32.5	F16	36, 46	G1/2"
350	270	385	410	845	195	130	30	80	32.5	F16+F25	46, 55	G1/2"
400	290	520	466	956	260	130	30	80	32.5	F25	46, 55	G1/2"

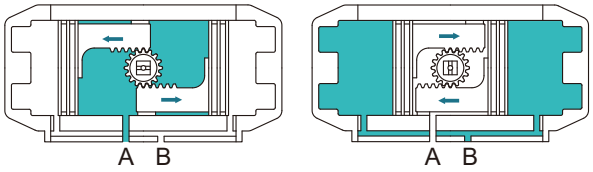
Notes:

1. Size 32: only available for double acting.

2. Length of actuator "L" size 40: 128mm for Fig.540N double acting; 144mm for Fig.541N spring return.

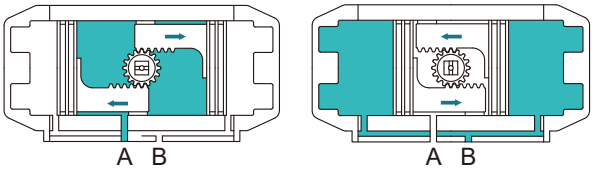
Principle of double acting actuators

Standard rotation (CCW)



Top View

Reverse rotation (CW)



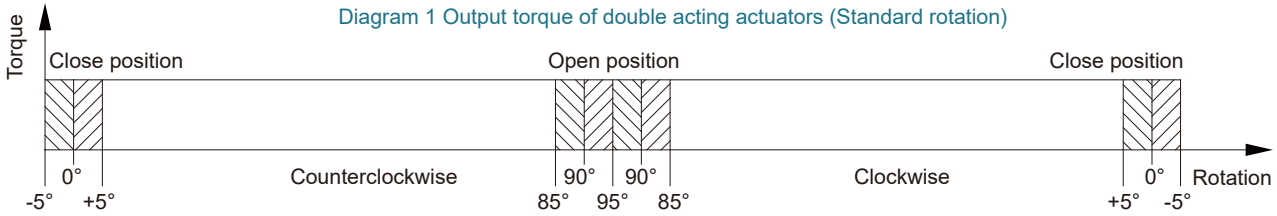
Air to Port A forces the pistons outwards, causing the pinion to turn counterclockwise while the air is being exhausted from Port B.

Air to Port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from Port A.

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 counterclockwise while the air is being exhausted from Port A.

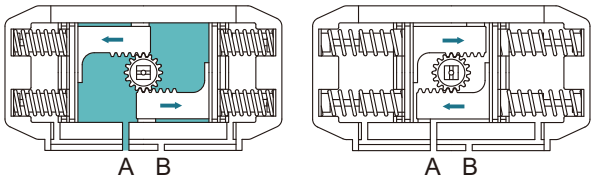
Diagram 1 Output torque of double acting actuators (Standard rotation)



With reference to diagram 1, it can be noticed that the double acting pneumatic actuator has constant torque over the whole stroke.

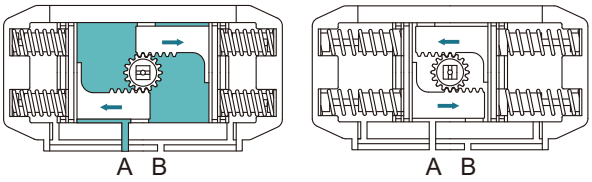
Principle of spring return actuators

Standard rotation (CCW)



Top View

Reverse rotation (CW)



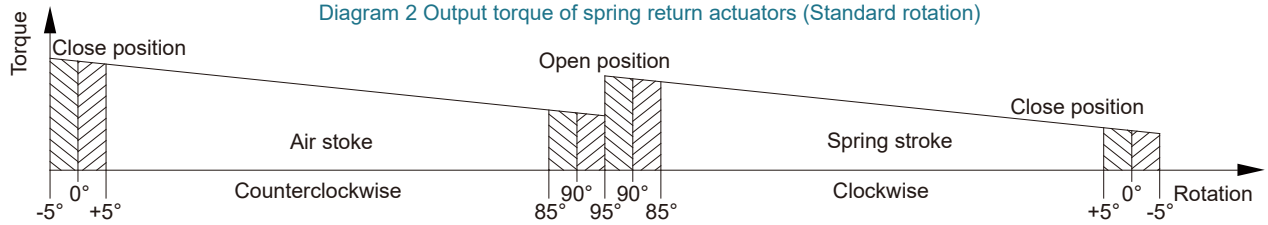
Air to port A forces the pistons outwards, causing the springs to compress, The pinion turns counterclockwise while air is being exhausted from port B.

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.

Air to port B forces the pistons outwards, causing the springs to compress, The pinion turns counterclockwise 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.

Diagram 2 Output torque of spring return actuators (Standard rotation)

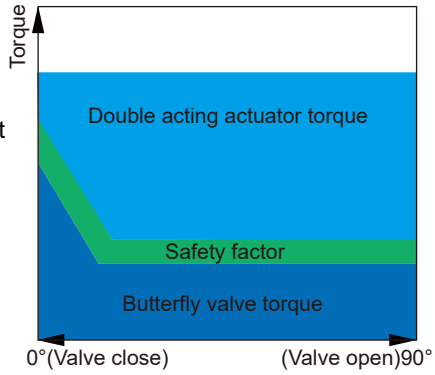


With reference to diagram 2, we can see that the output torque of spring return actuator is not constant but decreasing. This is because of the acting of springs that when compressed during air stroke counteract the piston movement and accumulate energy which will be available in a decreasing way during the rotation inversion.

Sizing - Double acting actuators

Double acting actuator has constant torque over the whole stroke, follow the below instructions to choose the actuator model for correct sizing.

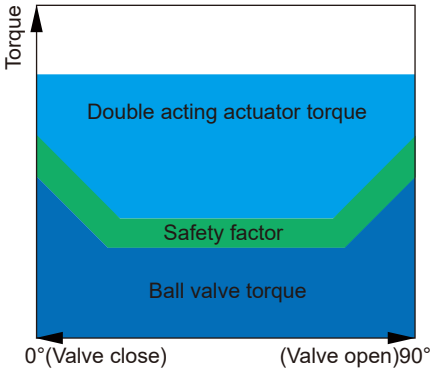
- Define the maximum torque of the valve.
- Multiply the valve torque with a safety factor according to the valve manufacturer advice. Safety factor depends on the valve type and working conditions.
- Look at the column below the actual air supply pressure to find a torque value exact to or exceeding the torque needed.
- Once the torque value is found, move to the left column “Size” to find the required actuator model.



Sizing example - Double acting actuators

Butterfly valve torque including safety factor: = 67.6Nm (52Nm + 30% safety)
Air supply pressure: = 5bar
Size 85 produces a minimum output torque of 81.7Nm

Ball valve torque including safety factor: = 728Nm (560Nm + 30% safety)
Air supply pressure: = 6bar
Size 160 produces a minimum output torque of 802.2Nm



Output torque of double acting actuators

Size	Air supply pressure (bar) ±8%									
	2.5	3	3.5	4	4.5	5	5.5	6	7	8
	Output torque - Fig.540N Double Acting (Nm)									
540N032	2.9	3.4	4.0	4.6	5.3	5.9	6.5	7.1	8.3	9.5
540N040	5.7	6.9	8.1	9.4	10.6	11.8	13.0	14.3	16.7	19.2
540N50	9.4	11.3	13.2	15.1	17.0	18.8	20.7	22.6	26.4	30.2
540N65	19.1	22.9	26.7	30.6	34.4	38.2	42.0	45.9	53.5	61.2
540N75	25.2	30.2	35.3	40.3	45.3	50.4	55.4	60.4	70.5	80.6
540N85	40.8	49.0	57.2	65.4	73.5	81.7	89.9	98.1	114.4	130.7
540N95	61.2	73.5	85.7	100.0	110.2	122.5	134.7	147.0	171.5	196.0
540N110	83.1	99.7	116.4	133.0	149.6	166.2	182.9	199.5	232.7	266.0
540N125	132.5	159.0	185.5	212.0	238.6	265.1	291.6	318.1	371.1	424.1
540N140	219.3	263.2	307.1	351.0	394.9	438.7	482.6	526.4	614.2	702.0
540N160	334.2	401.1	468.0	534.8	601.7	668.5	735.4	802.2	935.9	1069.6
540N190	505.0	606.0	707.0	808.0	909.0	1010.0	1111.0	1212.0	1414.0	1616.1
540N210	658.0	789.7	921.3	1052.9	1184.5	1316.1	1447.8	1579.4	1842.6	2105.8
540N240	967.0	1160.3	1353.7	1547.1	1740.5	1934.0	2127.3	2320.7	2707.5	3094.3
540N270	1468.6	1762.3	2056.0	2349.7	2643.4	2937.2	3230.9	3524.6	4112.0	4699.5
540N300	1678.6	2029.4	2379.3	2729.2	3079.1	3429.0	3778.9	4128.8	4828.5	5528.3
540N350	2492.5	3011.8	3531.1	4050.4	4569.6	5088.9	5608.2	6127.5	7166.0	8204.6
540N400	3798.1	4589.4	5380.7	6172.0	6963.3	7754.5	8545.8	9337.1	10919.7	12502.2

Sizing - Spring return actuators

Spring return actuator has four different torque values: Air torques at 0° and 90° when pressurized. Spring torques at 90° and

0° when air pressure is discharged. Follow the below instructions to choose the actuator model for correct sizing.

- Define the maximum torque of the valve.
- Multiply the valve torque with a safety factor according to the valve manufacturer advice. Safety factor depends on the valve

  type and working conditions.
- Look at the column below the actual air supply pressure and column for spring torque and find a size where both torque

  values are exact to or exceeding the torque needed. It is the lowest torque value which counts for both air and spring torque.

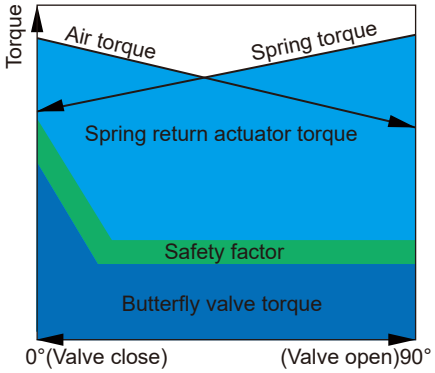
  Note there is different torque development for ball valves and butterfly valves.
- Once the torque value is found, move to the left column “Size” to find the required actuator model.

Sizing example - Spring return actuators

Butterfly valve sizing

OBS: Butterfly valve torque is 100% by 0° to 6° angle and 33% from 7° to 90° angle.

Butterfly valve torque including safety factor:	= 67.6Nm (52Nm + 30% safety)
Torque by 0° to 6°:	= 67.6Nm
Torque by 7° to 90°:	= 22.3Nm
Air supply pressure:	= 5bar

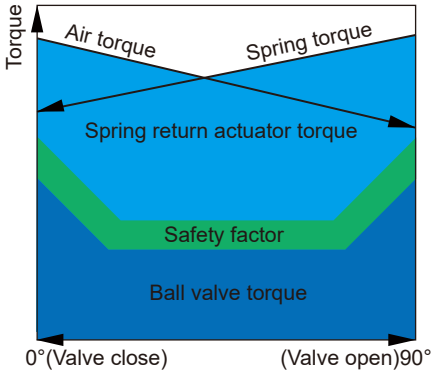


Size 110 S11 produces minimum required torque as follows:

Air stroke 0°:	= 90.1Nm > 67.6Nm
Air stroke 90°:	= 45.6Nm > 22.3Nm
Spring stroke 90°:	= 120.6Nm > 22.3Nm
Spring stroke 0°:	= 76.1Nm > 67.6Nm

Ball valve sizing

Ball valve torque including safety factor:	= 273Nm (210Nm + 30% safety)
Air supply pressure:	= 6bar

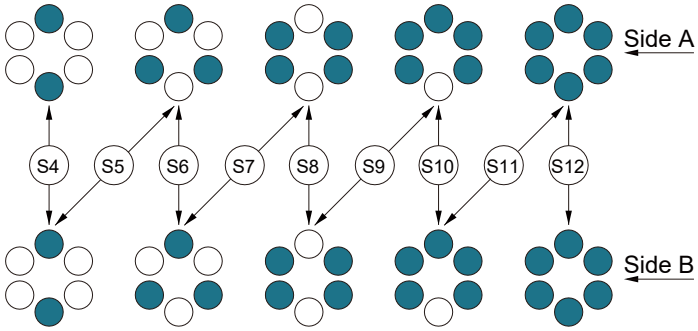


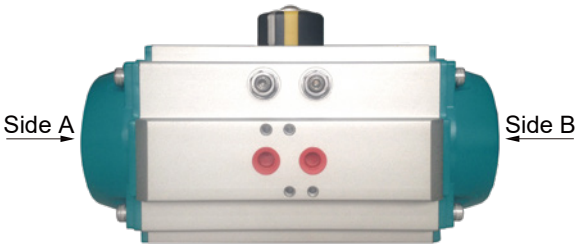
Size 160 S12 produces minimum required torque as follows:

Air stroke 0°:	= 455.9Nm > 273Nm
Air stroke 90°:	= 275.2Nm > 273Nm
Spring stroke 90°:	= 527Nm > 273Nm
Spring stroke 0°:	= 346.3Nm > 273Nm

Spring return - Spring set configuration and output torque

Spring set configuration





Output torque of spring return actuators

Size	Spring torque (Nm)	Air supply pressure (bar) ±8%																					
		2.5		3		3.5		4		4.5		5		5.5		6		7		8			
		Output torque - Fig.541N Spring Return (Nm)																					
	90°	0°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
541N050S05	5.7	3.6	5.8	3.7	7.7	5.6	9.6	7.5	11.5	9.4	13.4	11.3	15.2	13.1	17.1	15.0	19.0	16.9	22.8	20.7	26.6	24.5
541N050S06	6.8	4.3	5.1	2.6	7.0	4.5	8.9	6.4	10.8	8.3	12.7	10.2	14.5	12.0	16.4	13.9	18.3	15.8	22.1	19.6	25.9	23.4
541N050S07	8.0	5.0			6.3	1.4	8.2	5.2	10.1	7.1	12.0	9.0	13.8	10.8	15.7	12.7	17.6	14.6	21.4	18.4	25.2	22.2
541N050S08	9.1	5.8					7.4	4.1	9.3	6.0	11.2	7.9	13.0	9.7	14.9	11.6	16.8	13.5	20.6	17.3	24.4	21.1
541N050S09	10.3	6.5							8.6	4.8	10.5	6.7	12.3	8.5	14.2	10.4	16.1	12.3	19.9	16.1	23.7	19.9
541N050S10	11.4	7.2									9.8	5.6	11.6	7.4	13.5	9.3	15.4	11.2	19.2	15.0	23.0	18.8
541N050S11	12.5	7.9											10.9	6.3	12.8	8.2	14.7	10.1	18.5	13.9	22.3	17.7
541N050S12	13.7	8.6													12.1	7.0	14.0	8.9	17.8	12.7	21.6	16.5
541N065S05	11.2	7.2	11.9	7.9	15.7	11.7	19.5	15.5	23.4	19.4	27.2	23.2	31.0	27.0	34.8	30.8	38.7	34.7	46.3	42.3	54.0	50.0
541N065S06	13.4	8.6	10.2	5.7	14.3	9.5	18.1	13.3	22.0	17.2	25.8	21.0	29.6	24.8	33.4	28.6	37.3	32.5	44.9	40.1	52.6	47.8
541N065S07	15.7	10.1			12.8	7.2	16.6	11.0	20.5	14.9	24.3	18.7	28.1	22.5	31.9	26.3	35.8	30.2	43.4	37.8	51.1	45.5
541N065S08	17.9	11.5					15.2	8.8	19.1	12.7	22.9	16.5	26.7	20.3	30.5	24.1	34.4	28.0	42.0	35.6	49.7	43.3
541N065S09	20.2	13.0							17.6	10.4	21.4	14.2	25.2	18.0	29.0	21.8	32.9	25.7	40.5	33.3	48.2	41.0
541N065S10	22.4	14.4									20.0	12.0	23.8	15.8	27.6	19.6	31.5	23.5	39.1	31.1	46.8	38.8
541N065S11	24.6	15.8											22.4	13.6	26.2	17.4	30.1	21.3	37.7	28.9	45.4	36.6
541N065S12	26.9	17.3													24.7	15.1	28.6	19.0	36.2	26.6	43.9	34.3
541N075S05	16.1	9.2	16.0	9.1	21.0	14.1	26.1	19.2	31.1	24.2	36.1	29.2	41.2	34.3	46.2	39.3	51.2	44.3	61.3	54.4	71.4	64.5
541N075S06	19.3	11.0	14.2	5.9	19.2	10.9	24.3	16.0	29.3	21.0	34.3	26.0	39.4	31.1	44.4	36.1	49.4	41.1	59.5	51.2	69.6	61.3
541N075S07	22.5	12.9			17.3	7.7	22.4	12.8	27.4	17.8	32.4	22.8	37.5	27.9	42.5	32.9	47.5	37.9	57.6	48.0	67.7	58.1
541N075S08	25.8	14.7					20.6	9.5	25.6	14.5	30.6	19.5	35.7	24.6	40.7	29.6	45.7	34.6	55.8	44.7	65.9	54.8
541N075S09	29.0	16.6							23.7	11.3	28.7	16.3	33.8	21.4	38.8	26.4	43.8	31.4	53.9	41.5	64.0	51.6
541N075S10	32.2	18.4									26.9	13.1	32.0	18.2	37.0	23.2	42.0	28.2	52.1	38.3	62.2	48.4
541N075S11	35.4	20.2											30.2	15.0	35.2	20.0	40.2	25.0	50.3	35.1	60.4	45.2
541N075S12	38.6	22.1													33.3	16.8	38.3	21.8	48.4	31.9	58.5	42.0
541N085S05	26.0	15.0	25.8	14.8	34.0	23.0	42.2	31.2	50.4	39.4	58.5	47.5	66.7	55.7	74.9	63.9	83.1	72.1	99.4	88.4	115.7	104.7
541N085S06	31.2	18.0	22.8	9.6	31.0	17.8	39.2	26.0	47.4	34.2	55.5	42.3	63.7	50.5	71.9	58.7	80.1	66.9	96.4	83.2	112.7	99.5
541N085S07	36.4	21.0			28.0	12.6	36.2	20.8	44.4	29.0	52.5	37.1	60.7	45.3	68.9	53.5	77.1	61.7	93.4	78.0	109.7	94.3
541N085S08	41.6	24.0					33.2	15.6	41.4	23.8	49.5	31.9	57.7	40.1	65.9	48.3	74.1	56.5	90.4	72.8	106.7	89.1
541N085S09	46.8	27.0							38.4	18.6	46.5	26.7	54.7	34.9	62.9	43.1	71.1	51.3	87.4	67.6	103.7	83.9
541N085S10	52.0	30.0									43.5	21.5	51.7	29.7	59.9	37.9	68.1	46.1	84.4	62.4	100.7	78.7
541N085S11	57.2	33.0											48.7	24.5	56.9	32.7	65.1	40.9	81.4	57.2	97.7	73.5
541N085S12	62.4	36.0													53.9	27.5	62.1	35.7	78.4	52.0	94.7	68.3

Spring return - Output torque

Size	Spring torque (Nm)		Air supply pressure (bar) ±8%																			
			2.5		3		3.5		4		4.5		5		5.5		6		7		8	
			Output torque - Fig.541N Spring Return (Nm)																			
	90°	0°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
541N095S05	36.7	24.5	36.7	24.5	49.0	36.8	61.2	49.0	75.5	63.3	85.7	73.5	98.0	85.8	110.2	98.0	122.5	110.3	147.0	134.8	171.5	159.3
541N095S06	44.0	29.4	31.8	17.2	44.1	29.5	56.3	41.7	70.6	56.0	80.8	66.2	93.1	78.5	105.3	90.7	117.6	103.0	142.1	127.5	166.6	152.0
541N095S07	51.4	34.3			39.2	22.1	51.4	34.3	65.7	48.6	75.9	58.8	88.2	71.1	100.4	83.3	112.7	95.6	137.2	120.1	161.7	144.6
541N095S08	58.7	39.2					46.5	27.0	60.8	41.3	71.0	51.5	83.3	63.8	95.5	76.0	107.8	88.3	132.3	112.8	156.8	137.3
541N095S09	66.1	44.1							55.9	33.9	66.1	44.1	78.4	56.4	90.6	68.6	102.9	80.9	127.4	105.4	151.9	129.9
541N095S10	73.4	49.0									61.2	36.8	73.5	49.1	85.7	61.3	98.0	73.6	122.5	98.1	147.0	122.6
541N095S11	80.7	53.9											68.6	41.8	80.8	54.0	93.1	66.3	117.6	90.8	142.1	115.3
541N095S12	88.1	58.8													75.9	46.6	88.2	58.9	112.7	83.4	137.2	107.9
541N110S05	54.8	34.6	48.5	28.3	65.1	44.9	81.8	61.6	98.4	78.2	115.0	94.8	131.6	111.4	148.3	128.1	164.9	144.7	198.1	177.9	231.4	211.2
541N110S06	65.8	41.5	41.6	17.3	58.2	33.9	74.9	50.6	91.5	67.2	108.1	83.8	124.7	100.4	141.4	117.1	158.0	133.7	191.2	166.9	224.5	200.2
541N110S07	76.7	48.4			51.3	23.0	68.0	39.7	84.6	56.3	101.2	72.9	117.8	89.5	134.5	106.2	151.1	122.8	184.3	156.0	217.6	189.3
541N110S08	87.7	55.4					61.0	28.7	77.6	45.3	94.2	61.9	110.8	78.5	127.5	95.2	144.1	111.8	177.3	145.0	210.6	178.3
541N110S09	98.6	62.3							70.7	34.4	87.3	51.0	103.9	67.6	120.6	84.3	137.2	100.9	170.4	134.1	203.7	167.4
541N110S10	109.6	69.2									80.4	40.0	97.0	56.6	113.7	73.3	130.3	89.9	156.6	123.1	196.8	156.4
541N110S11	120.6	76.1											90.1	45.6	106.8	62.3	123.4	78.9	156.6	112.1	189.9	145.4
541N110S12	131.5	83.0													99.9	51.4	116.5	68.0	149.7	101.2	183.0	134.5
541N125S05	78.6	54.0	78.5	53.9	105.0	80.4	131.5	106.9	158.0	133.4	184.6	160.0	211.1	186.5	237.6	213.0	264.1	239.5	317.1	292.5	370.1	345.5
541N125S06	94.3	64.8	67.7	38.2	94.2	64.7	120.7	91.2	147.2	117.7	173.8	144.3	200.3	170.8	226.8	197.3	253.3	223.8	306.3	276.8	359.3	329.8
541N125S07	110.0	75.6			83.4	49.0	109.9	75.5	136.4	102.0	163.0	128.6	189.5	155.1	216.0	181.6	242.5	208.1	295.5	261.1	348.5	314.1
541N125S08	125.8	86.4					99.1	59.7	125.6	86.2	152.2	112.8	178.7	139.3	205.2	165.8	231.7	192.3	284.7	245.3	337.7	298.3
541N125S09	141.5	97.2							114.8	70.5	141.4	97.1	167.9	123.6	194.4	150.1	220.9	176.6	273.9	229.6	326.9	282.6
541N125S10	157.2	108.0									130.6	81.4	157.1	107.9	183.6	134.4	210.1	160.9	263.1	213.9	316.1	266.9
541N125S11	172.9	118.8											146.3	92.2	172.8	118.7	199.3	145.2	252.3	198.2	305.3	251.2
541N125S12	188.6	129.6													162.0	103.0	188.5	129.5	241.5	182.5	294.5	235.5
541N140S05	122.9	85.5	133.8	96.4	177.7	140.3	221.6	184.2	265.5	228.1	309.4	272.0	353.2	315.8	397.1	359.7	440.9	403.5	528.7	491.3	616.5	579.1
541N140S06	147.5	102.6	116.7	71.8	160.6	115.7	204.5	159.6	248.4	203.5	292.3	247.4	336.1	291.2	380.0	335.1	423.8	378.9	511.6	466.7	599.4	554.5
541N140S07	172.1	119.7			143.5	91.1	187.4	135.0	231.3	178.9	275.2	222.8	319.0	266.6	362.9	310.5	406.7	354.3	494.5	442.1	582.3	529.9
541N140S08	196.6	136.8					170.3	110.5	214.2	154.4	258.1	198.3	301.9	242.1	345.8	286.0	389.6	329.8	477.4	417.6	565.2	505.4
541N140S09	221.2	153.9							197.1	129.8	241.0	173.7	284.8	217.5	328.7	261.4	372.5	305.2	460.3	393.0	548.1	480.8
541N140S10	245.8	171.0									223.9	149.1	267.7	192.9	311.6	236.8	355.4	280.6	443.2	368.4	531.0	456.2
541N140S11	270.4	188.1											250.6	168.3	294.5	212.2	338.3	256.0	426.1	343.8	513.9	431.6
541N140S12	295.0	205.2													277.4	187.6	321.2	231.4	409.0	319.2	496.8	407.0
541N160S05	219.6	144.3	189.9	114.6	256.8	181.5	323.7	248.4	390.5	315.2	457.4	382.1	524.2	448.9	591.1	515.8	657.9	582.6	791.6	716.3	925.3	850.0
541N160S06	263.5	173.2	161.0	70.7	227.9	137.6	294.8	204.5	361.6	271.3	428.5	338.2	495.3	405.0	562.2	471.9	629.0	538.7	762.7	672.4	896.4	806.1
541N160S07	307.4	202.0			199.1	93.7	266.0	160.6	332.8	227.4	399.7	294.3	466.5	361.1	533.4	428.0	600.2	494.8	733.9	628.5	867.6	762.2
541N160S08	351.4	230.9					237.1	116.6	303.9	183.4	370.8	250.3	437.6	317.1	504.5	384.0	571.3	450.8	705.0	584.5	838.7	718.2
541N160S09	395.3	259.7							275.1	139.5	342.0	206.4	408.8	273.2	475.7	340.1	542.5	406.9	676.2	540.6	809.9	674.3
541N160S10	439.2	288.6									313.1	162.5	379.9	229.3	446.8	296.2	513.6	363.0	647.3	496.7	781.0	630.4
541N160S11	483.1	317.5											351.0	185.4	417.9	252.3	484.7	319.1	618.4	452.8	752.1	586.5
541N160S12	527.0	346.3													389.1	208.4	455.9	275.2	589.6	408.9	723.3	542.6
541N190S05	310.0	196.0	309.0	195.0	410.0	296.0	511.0	397.0	612.0	498.0	713.0	599.0	814.0	700.0	915.0	801.0	1016.0	902.0	1218.0	1104.0	1420.1	1306.1
541N190S06	372.0	235.2	269.8	133.0	370.8	234.0	471.8	335.0	572.8	436.0	673.8	537.0	774.0	638.0	875.8	739.0	976.8	840.0	1178.8	1042.0	1380.9	1244.1
541N190S07	434.0	274.4			331.6	172.0	432.6	273.0	533.6	374.0	634.6	475.0	735.6	576.0	836.6	677.0	937.6	778.0	1139.6	980.0	1341.7	1182.1
541N190S08	496.0	313.6					393.4	211.0	494.4	312.0	595.4	413.0	696.4	514.0	797.4	615.0	898.4	716.0	1100.4	918.0	1302.5	1120.1
541N190S09	558.0	352.8							455.2	250.0	556.2	351.0	657.2	452.0	758.2	553.0	859.2	654.0	1061.2	856.0	1263.3	1058.1
541N190S10	620.0	392.0									517.0	289.0	618.0	390.0	719.0	491.0	820.0	592.0	1022.0	794.0	1224.1	996.1
541N190S11	682.0	431.2											578.8	328.0	679.8	429.0	780.8	530.0	982.8	732.0	1184.9	934.1
541N190S12	744.0	470.4													640.6	367.0	741.6	468.0	943.6	670.0	1145.7	872.1

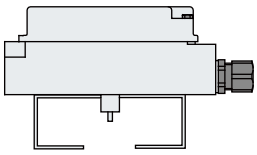
Spring return - Output torque

Size	Spring torque (Nm)		Air supply pressure (bar) ±8%																			
			2.5		3		3.5		4		4.5		5		5.5		6		7		8	
			Output torque - Fig.541N Spring Return (Nm)																			
	90°	0°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
541N210S05	380.0	278.0	380.0	278.0	511.7	409.7	643.3	541.3	774.9	672.9	906.5	804.5	1038.1	936.1	1169.8	1067.8	1301.4	1199.4	1564.6	1462.6	1827.8	1725.8
541N210S06	456.0	333.6	324.4	202.0	456.1	333.7	587.7	465.3	719.3	596.9	850.9	728.5	982.5	860.1	1114.2	991.8	1245.8	1123.4	1509.0	1386.6	1772.2	1649.8
541N210S07	532.0	389.2			400.5	257.7	532.1	389.3	663.7	520.9	795.3	652.5	926.9	784.1	1058.6	915.8	1190.2	1047.4	1453.4	1310.6	1716.6	1573.8
541N210S08	608.0	444.8					476.5	313.3	608.1	444.9	739.7	576.5	871.3	708.1	1003.0	839.8	1134.6	971.4	1397.8	1234.6	1661.0	1497.8
541N210S09	684.0	500.4							552.5	368.9	684.1	500.5	815.7	632.1	947.4	763.8	1079.0	895.4	1342.2	1158.6	1605.4	1421.8
541N210S10	760.0	556.0									628.5	424.5	760.1	556.1	891.8	687.8	1023.4	819.4	1286.6	1082.6	1549.8	1345.8
541N210S11	836.0	611.6											704.5	480.1	836.2	611.8	967.8	743.4	1231.0	1006.6	1494.2	1269.8
541N210S12	912.0	667.2													780.6	535.8	912.2	667.4	1175.4	930.6	1438.6	1193.8
541N240SO5	593.1	374.0	593.0	373.9	786.3	567.2	979.7	760.6	1173.1	954.0	1366.5	1147.4	1560.0	1340.9	1753.3	1534.2	1946.7	1727.6	2333.5	2114.4	2720.3	2501.2
541N240S06	711.7	448.8	518.2	255.3	711.5	448.6	904.9	642.0	1098.3	835.4	1291.7	1028.8	1485.2	1222.3	1678.5	1415.6	1871.9	1609.0	2258.7	1995.8	2645.5	2382.6
541N240S07	830.3	523.6			636.7	330.0	830.1	523.4	1023.5	716.8	1216.9	910.2	1410.4	1103.7	1603.7	1297.0	1797.1	1490.4	2183.9	1877.2	2570.7	2264.0
541N240S08	949.0	598.4					755.3	404.7	948.7	598.1	1142.1	791.5	1335.6	985.0	1528.9	1178.3	1722.3	1371.7	2109.1	1758.5	2495.9	2145.3
541N240S09	1067.6	673.2							873.9	479.5	1067.3	672.9	1260.8	866.4	1454.1	1059.7	1647.5	1253.1	2034.3	1639.9	2421.1	2026.7
541N240S10	1186.2	748.0									992.5	554.3	1186.0	747.8	1379.3	941.1	1572.7	1134.5	1959.5	1521.3	2346.3	1908.1
541N240S11	1304.8	822.8											1111.2	629.2	1304.5	822.5	1497.9	1015.9	1884.7	1402.7	2271.5	1789.5
541N240S12	1423.4	897.6													1229.7	703.9	1423.1	897.3	1809.9	1284.1	2196.7	1670.9
541N270S05	852.8	615.6	853.0	615.8	1146.7	909.5	1440.4	1203.2	1734.1	1496.9	2027.8	1790.6	2321.6	2084.4	2615.3	2378.1	2909.0	2671.8	3496.4	3259.2	4083.9	3846.7
541N270S06	1023.4	738.7	729.9	445.2	1023.6	738.9	1317.3	1032.6	1611.0	1326.3	1904.7	1620.0	2198.5	1913.8	2492.2	2207.5	2785.9	2501.2	3373.3	3088.6	3960.8	3676.1
541N270S07	1193.9	861.8			900.5	568.4	1194.2	862.1	1487.9	1155.8	1781.6	1449.5	2075.4	1743.3	2369.1	2037.0	2662.8	2330.7	3250.2	2918.1	3837.7	3505.6
541N270S08	1364.5	985.0					1071.0	691.5	1364.7	985.2	1658.4	1278.9	1952.2	1572.7	2245.9	1866.4	2539.6	2160.1	3127.0	2747.5	3714.5	3335.0
541N270S09	1535.0	1108.1							1241.6	814.7	1535.3	1108.4	1829.1	1402.2	2122.8	1695.9	2416.5	1989.6	3003.9	2577.0	3591.4	3164.5
541N270S10	1705.6	1231.2									1412.2	937.8	1706.0	1231.6	1999.7	1525.3	2293.4	1819.0	2880.8	2406.4	3468.3	2993.9
541N270S11	1876.2	1354.3											1582.9	1061.0	1876.6	1354.7	2170.3	1648.4	2757.7	2235.8	3345.2	2823.3
541N270S12	2046.7	1477.4													1753.5	1184.2	2047.2	1477.9	2634.6	2065.3	3222.1	2652.8
541N300S05	1031.9	691.1	987.5	646.7	1338.3	997.5	1688.2	1347.4	2038.1	1697.3	2388.0	2047.2	2737.9	2397.1	3087.8	2747.0	3437.7	3096.9	4137.4	3796.6	4837.2	4496.4
541N300S06	1238.3	829.3	849.3	440.3	1200.1	791.1	1550.0	1141.0	1899.9	1490.9	2249.8	1840.8	2599.7	2190.7	2949.6	2540.6	3299.5	2890.5	3999.2	3590.2	4699.0	4290.0
541N300S07	1444.7	967.5			1061.9	584.7	1411.8	934.6	1761.7	1284.5	2111.6	1634.4	2461.5	1984.3	2811.4	2334.2	3161.3	2684.1	3861.0	3383.8	4560.8	4083.6
541N300S08	1651.0	1105.8					1273.5	728.3	1623.4	1078.2	1973.3	1428.1	2323.2	1778.0	2673.1	2127.9	3023.0	2477.8	3722.7	3177.5	4422.5	3877.3
541N300S09	1857.4	1244.0							1485.2	871.8	1835.1	1221.7	2185.0	1571.6	2534.9	1921.5	2884.8	2271.4	3584.5	2971.1	4284.3	3670.9
541N300S10	2063.8	1382.2									1696.9	1015.3	2046.8	1365.2	2396.7	1715.1	2746.6	2065.0	3446.3	2764.7	4146.1	3464.5
541N300S11	2270.2	1520.4											1908.6	1158.8	2258.5	1508.7	2608.4	1858.6	3308.1	2558.3	4007.9	3258.1
541N300S12	2476.6	1658.6													2120.3	1302.3	2470.2	1652.2	3169.9	2351.9	3869.7	3051.7
541N350S05	1475.5	994.3	1498.2	1017.0	2017.5	1536.3	2536.8	2055.6	3056.1	2574.9	3575.3	3094.1	4094.6	3613.4	4613.9	4132.7	5133.2	4652.0	6171.7	5690.5	7210.3	6729.1
541N350S06	1770.5	1193.2			1818.6	1241.3	2337.9	1760.6	2857.2	2279.9	3376.4	2799.1	3895.7	3318.4	4415.0	3837.7	4934.3	4357.0	5972.8	5395.5	7011.4	6434.1
541N350S07	2065.6	1392.0			1619.8	946.2	2139.1	1465.5	2658.4	1984.8	3177.6	2504.0	3696.9	3023.3	4216.2	3542.6	4735.5	4061.9	5774.0	5100.4	6812.6	6139.0
541N350S08	2360.7	1590.9					1940.2	1170.4	2459.5	1689.7	2978.7	2208.9	3498.0	2728.2	4017.3	3247.5	4536.6	3766.8	5575.1	4805.3	6613.7	5843.9
541N350S09	2655.8	1789.7					1741.4	875.3	2260.7	1394.6	2779.9	1913.8	3299.2	2433.1	3818.5	2952.4	4337.8	3471.7	5376.3	4510.2	6414.9	5548.8
541N350S10	2950.9	1988.6							2061.8	1099.5	2581.0	1618.7	3100.3	2138.0	3619.6	2657.3	4138.9	3176.6	5177.4	4215.1	6216.0	5253.7
541N350S11	3246.0	2187.5							1862.9	804.4	2382.1	1323.6	2901.4	1842.9	3420.7	2362.2	3940.0	2881.5	4978.5	3920.0	6017.1	4958.6
541N350S12	3541.1	2386.3									2183.3	1028.5	2702.6	1547.8	3221.9	2067.1	3741.2	2586.4	4779.7	3624.9	5818.3	4663.5
541N400S05	2301.0	1576.0	2222.1	1497.1	3013.4	2288.4	3804.7	3079.7	4596.0	3871.0	5387.3	4662.3	6178.5	5453.5	6969.8	6244.8	7761.1	7036.1	9343.7	8618.7	10926.2	10201.2
541N400S06	2761.0	1891.0			2698.4	1828.4	3489.7	2619.7	4281.0	3411.0	5072.3	4202.3	5863.5	4993.5	6654.8	5784.8	7446.1	6576.1	9028.7	8158.7	10611.2	9741.2
541N400S07	3221.0	2206.0			2383.4	1368.4	3174.7	2159.7	3966.0	2951.0	4757.3	3742.3	5548.5	4533.5	6339.8	5324.8	7131.1	6116.1	8713.7	7698.7	10296.2	9281.2
541N400S08	3682.0	2522.0					2858.7	1698.7	3650.0	2490.0	4441.3	3281.3	5232.5	4072.5	6023.8	4863.8	6815.1	5655.1	8397.7	7237.7	9980.2	8820.2
541N400S09	4142.0	2837.0					2543.7	1238.7	3335.0	2030.0	4126.3	2821.3	4917.5	3612.5	5708.8	4403.8	6500.1	5195.1	8082.7	6777.7	9665.2	8360.2
541N400S10	4602.0	3152.0							3020.0	1570.0	3811.3	2361.3	4602.5	3152.5	5393.8	3943.8	6185.1	4735.1	7767.7	6317.7	9350.2	7900.2
541N400S11	5062.0	3467.0							2705.0	1110.0	3496.3	1901.3	4287.5	2692.5	5078.8	3483.8	5870.1	4275.1	7452.7	5857.7	9035.2	7440.2
541N400S12	5522.0	3782.0									3181.3	1441.3	3972.5	2232.5	4763.8	3023.8	5555.1	3815.1	7137.7	5397.7	8720.2	6980.2

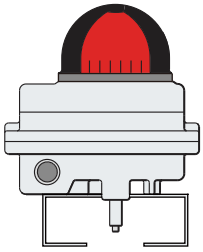
Actuator interface for valve automation and mounting standard

VDI/VDE 3845 standard
for easy top mounting of
switches, positioners etc.

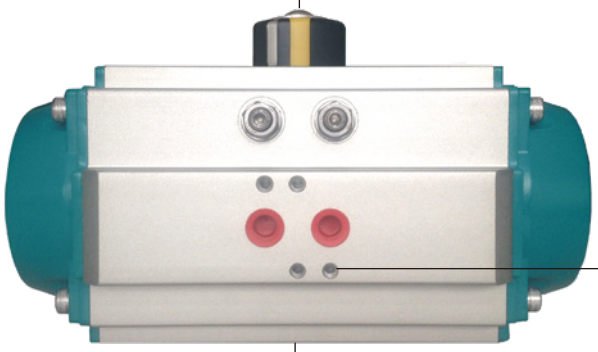




Positioner

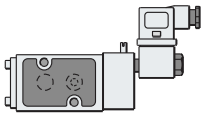


Limit box



NAMUR air supply
connection to install
solenoid valve directly

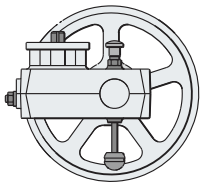




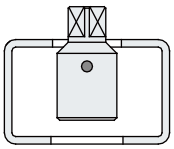
Solenoid valve



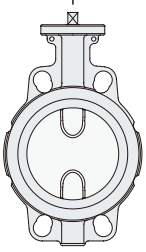
ISO 5211 - DIN 3337 bottom
mounting connection for direct
mounting on valves



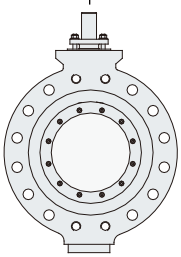
Declutchable gear box



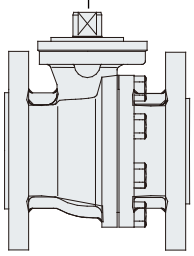
Mounting kits



Concentric butterfly valve



Eccentric butterfly valve



Ball valve

Working time, air consumption, weight

Size	Working time				Air consumption		Weight	
	Double acting		Spring return		Double acting & Spring return		Double acting	Spring return
	Open time [s]	Close time [s]	Open time [s]	Close time [s]	Open volume [L]	Close volume [L]	[kg]	[kg]
32	0.30	0.40	0.30	0.40	0.03	0.04	0.47	0.59
40	0.20	0.30	0.60	0.80	0.08	0.11	1.00	1.10
50	0.30	0.40	0.90	0.70	0.09	0.15	1.13	1.25
65	0.40	0.40	0.90	0.80	0.19	0.32	1.97	2.21
75	0.40	0.40	0.90	0.90	0.30	0.50	2.93	3.29
85	0.90	0.90	1.00	1.20	0.44	0.66	3.78	4.26
95	0.90	1.00	1.40	1.40	0.88	1.17	5.14	5.86
110	0.90	1.00	1.40	1.60	0.83	1.27	6.09	7.17
125	1.30	1.40	2.40	2.40	1.41	2.13	10.86	12.54
140	1.30	1.40	2.80	3.00	1.76	2.72	13.77	15.93
160	2.00	2.40	4.80	4.90	2.85	4.08	20.15	23.75
190	2.20	2.60	2.40	3.00	4.75	7.20	28.41	33.81
210	2.90	3.80	3.40	4.10	6.60	10.29	40.03	48.43
240	3.20	3.70	3.81	4.00	11.40	15.10	52.60	77.76
270	4.40	4.90	5.00	5.50	15.80	18.80	73.64	90.60
300	5.00	6.00	6.00	6.80	19.09	28.23	108.00	135.60
350	6.20	7.20	7.40	8.40	27.65	44.10	146.70	188.10
400	7.50	8.50	9.60	10.60	42.81	62.05	220.50	283.50

* Size 32 is only available for double acting type.

** Spring quantity: S12.

Notes:

1. Operating times under no load, with air supply pressure 5.5bar. Time based on actual measurement.
2. Total time is defined as time required from switching solenoid valve to completion of 90 degree stroke.
3. 32-160: Diameter of solenoid valve 4mm with flow capacity 400L/min, air pipe diameter 6mm;
   190-400: Diameter of solenoid valve 12mm with flow capacity 5100L/min, air pipe diameter 8mm.
4. Stroke times can be decreased by using speed control.
5. Air Consumption:
   Litre shown in chart represent actual free air volume in either open or close direction.
   Air consumption will vary depending on air supply pressure, open/close volume and the number of strokes per minute .
   To determine standard litre per minute use the following formula:

$$\text{Air consumption (L/min)} = (\text{open+close volume.L}) \times \frac{\text{air supply pressure.Kpa+101.3}}{101.3} \times \text{strokes/min}$$



Solenoid valve

- 5/2 and 3/2 NC.
- Single coil and double coil.
- Wide range voltage both for DC and AC.
- Namur connection both for 1/4″ and 1/2″.



Explosion-proof solenoid valve

- Environmentally-protected structure with Atex explosion-proof.
- Extruded enclosure with weather proof IP67.
- F class coil of insulation protection.
- SS316 body material available on request.



Position switch box

- Compact design with visual indicator.
- Easy and safe adjustment of limit switch.
- Mechanical switches, proximity sensor.
- 4-20mA current feedback is available with multi-function type.



Explosion-proof position switch box

- Atex explosion-proof.
- Compact design with visual indicator.
- Easy and safe adjustment of limit switch.
- Mechanical switches, proximity sensor.



Intelligent positioner

- Full digital control, reliability, stability, small size and light weight.
- Convenient for adjustment by simple buttons.
- Simple function setting, convenient for the transform of positive action and counteraction, valve open and closing.
- Intelligent control. It can give analysis, alarm and optimization when medium fluctuates, span excesses, actuator leakage occurs.



Electron-pneumatic positioner

- High anti-vibration.
- Split-range operation by inputting electrical signals.
- Exquisite design.
- Putting in and out cam is available without disassembling feedback level.
- Convenient for ZREO and SPAN adjustments.
- Convenient for on-side maintenance.



Air pressure filter

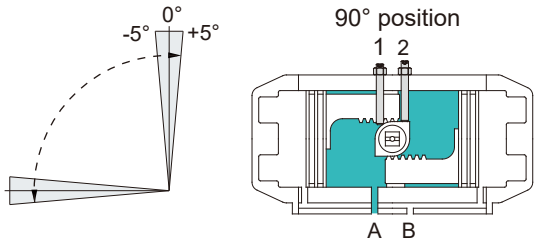
- Stable outlet pressure regardless of the fluctuation of inputting pressure or flow rate.
- Easy to install and maintain due to light weight and small size.
- To filter minuteness particle is available with 5 micron filter.
- Relief function which discharges to atmosphere if outlet pressure is higher that setting pressure.

Warning

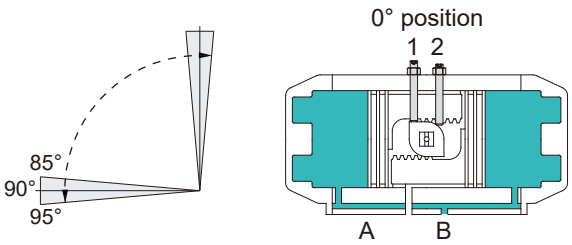
- Make sure only qualified person can carry out the mounting, assembly and disassembly of the actuators.
- Isolate the actuator from air supply before doing any adjusting, mounting or maintenance work.
- Do not operate the actuator over pressure limits: this could damage internal parts as well as cause damage to the housing and end caps.
- Never use the adjust screws to pressure against the operating pressure.

Setting the end positions

Adjustment of the end positions is performed via adjust screws.



When driving shaft turns counterclockwise:
Loosen the locknut and turn the end position adjust screw 2 inwards/outwards until the desired position is reached.
Secure the position by tightening the locknut.



When driving shaft turns clockwise:
Loosen the locknut and turn the end position adjust screw 1 inwards/outwards until the desired position is reached.
Secure the position by tightening the locknut.

Assembly of the valve



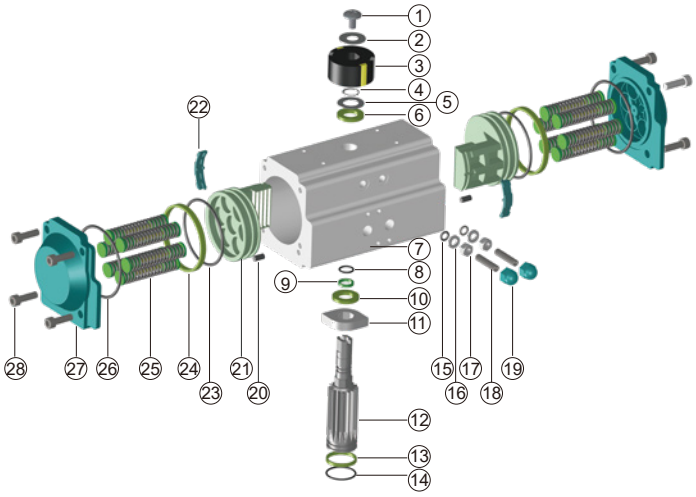
1. Determine the desired operation of assembly: Normally closed NC, or Normally open NO.
2. Make sure the supply air pressure is minimum same or higher than used by the calculation for sizing the actuator.
3. Make sure that the rotation direction and the position indicatior are in the correct position.
4. Ensure the mounting srews is proportianally fastened with correct torque.
5. Fit the stem of the valve directly into the square of the actuator. Use an additional adaptor if needed.
6. Bolt the valve and actuator together through the valve ISO pad. Make sure the force in proportionally distributed in circle.
7. When using a spring return actuator for fail safe operation, ensure that when air or electricity failure occurs the direction of rotation is correct for your application.
8. Ensure temperature is not higher than max. limit of actuator.
9. Ensure supply air quality is accordance with ISO8573 Part 1, Class 5 with the maximum particle size not exceeding 30µm.

Disassembly of the actuator

Before performing any disassembly operations, it is important to verify that the actuator is not pressurised. Relief air from actuator and then remove from the valve.

For spring return actuator, make sure that the actuator is in the failed position and with pistions completely inwards before disassembly.

1. Remove the indicator screw (1) and washer (2) if fitted, lift position indicator (3) off pinion, it may be necessary to pry gently with a screw-driver.
2. Remove the nut cover (19), unscrew both adjust screws (18) together with nut (17), washer (16) and O-ring (15).
3. Unscrew the end caps screw (28) and remove the end cap (27) and O-ring (26). Remember to disassemble one end cap at one time. For spring return type, then remove the springs (25).



No.	Part name	Qty	No.	Part name	Qty
1	Cap screw (Indicator)	1	15	O-ring (Adjust screw)	2
2	Washer (Indicator)	1	16	Washer (Adjust screw)	2
3	Position indicator	1	17	Nut (Adjust screw)	2
4	Spring clip (Pinion)	1	18	Adjust screw	2
5	Thrust washer	1	19	Nut cover (Adjust screw)	2
6	Thrust bearing (Pinion)	1	20	Plug	2
7	Body	1	21	Piston	2
8	O-ring (Pinion top)	1	22	Plate (Piston)	2
9	Bearing (Pinion top)	1	23	O-ring (Piston)	2
10	Thrust bearing (Pinion)	1	24	Bearing (Piston)	2
11	OCTI Cam (Stop arrangement)	1	25	Spring	0~12
12	Pinion	1	26	O-ring (End cap)	2
13	Bearing (Pinion bottom)	1	27	End cap	2
14	O-ring (Pinion bottom)	1	28	Cap screw	8

4. Holding the body (7), rotate the pinion until the pistons (21) are released.
5. Remove the spring clip (4), thrust washer (5) and bearing (6).
6. Exert a downwards force on top of the pinion to remove the pinion (12), cam (11), pinion top bearing (9) and O-ring (8), pinion bottom bearing (13) and O-ring (14).
7. Clean all the components of the actuators, inspect them for wear or damage and replace where necessary.

Assembly of the actuator

Before assembly, make sure that all the components are perfectly clean and in good condition. The spare parts and the lubricant used are suitable for the operating temperature of the actuator.

1. Install top (9) and bottom (13) bearings, grease and insert the top (8) and bottom (14) O-rings on to the pinion.
2. Refit the pinion (12) into the actuator body (7) ensuring the cam (11) correctly fit during assembly.
3. Fix the thrust bearing (6), washer (5) and spring clip (4) to the top of the pinion.
4. Install the piston plate (22) and bearing (24), grease and insert the O-ring (23) on to the piston.
5. Insert and press the two pistons (21) simultaneously inside the body (7) ensuring that the rack on each of the piston fit in with the rack of the pinion.
6. For standard rotation assembly, rotate the body about 40-45° clockwise from top view until the pistons are correctly reacted. Check that the pinion output end is square to the body is in the correctly aligned.
7. Fit the end cap O-ring (26) into the groove on both end caps (27).
8. For spring return actuators, insert the springs in each end cap according to the desired configuration.
9. Fit end caps onto the body and tighten the screws (28) proportionally with correct torque value.
10. Fit the stroke adjustment screw (18) with nut (17), washer (16) and O-ring (15).

Storage instructions

- Store the actuator in a dry and clean area.
- Protect the air supply entrances from dust by fitting in the original plastic cover.
- Packing the actuator in box or plastic bag to avoid dust, dirt and damage.

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