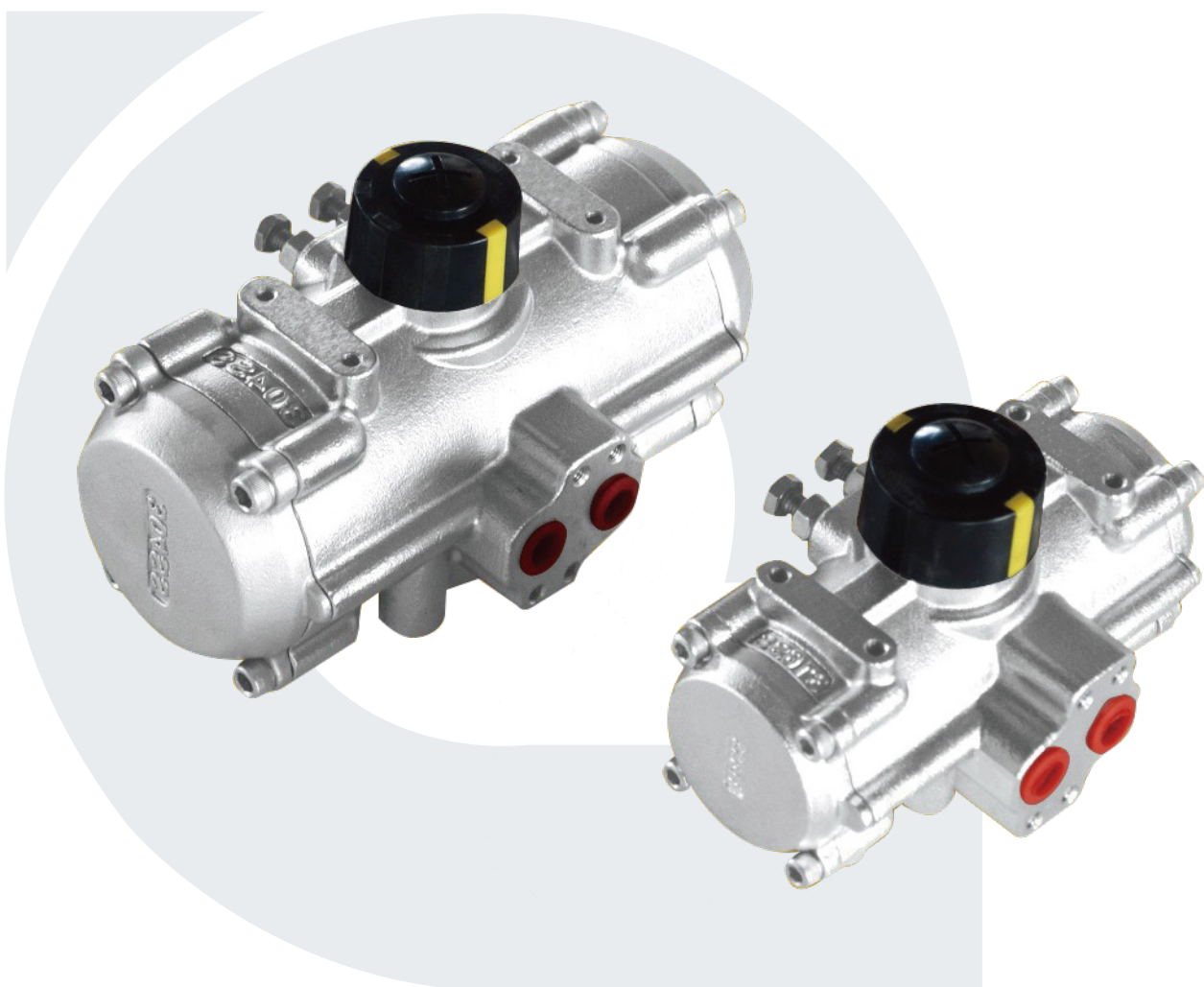


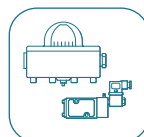
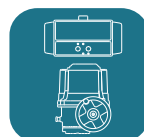
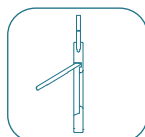
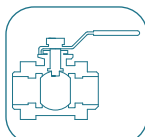
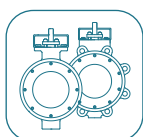
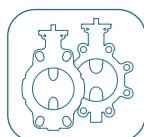
Stainless Steel Pneumatic actuator

Fig.540S : Air / Air

Fig.541S : Air / Spring



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General specifications

Specifications

Fig.540S/541S stainless steel pneumatic actuator applies innovative rack and pinion drive mechanism, integrating the latest pneumatic actuator technology and materials. This model is designed as per extensive field mounting and application experience with following product strengths:

- ☆ Body in corrosion resistant and high strength SS316 or SS304.
- ☆ High performance and high reliability.
- ☆ Fully compliant with the latest international standards and regulations.
- ☆ 100% factory pressure and leak tested and externally marked with dedicated serial number for traceability.
- ☆ 100% individually boxed with suitable cardboard carton for protection and appropriately labeled in detail for identification.

Housing material:	SS304, SS316
Operating media:	Dry or lubricated air, non-corrosive gas
Operating temperature:	-18°C~+80°C : Standard (NBR O-ring) -40°C~+80°C : Low temperature (Silicone O-ring) -18°C~+150°C : High temperature (FPM O-ring)
Travel adjustment:	Adjustable +5°/-5° 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 SIL

ATEX, CE and SIL approval for all Coreline pneumatic actuators.

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Design features

Integrate and compact design utilizes the same body and end caps for the same double acting and spring return models. It also benefits less spare parts inventory and is greatly convenient for customers' field application by adding or removing spring cartridges.

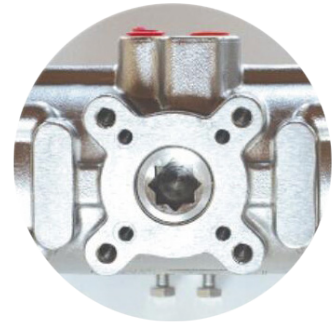
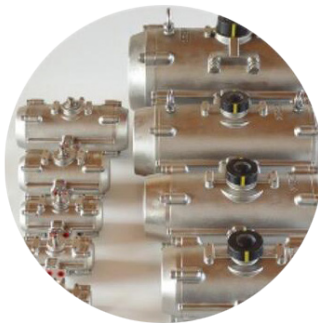
Fully compliant with the latest international standards including ISO5211, DIN3337 and VDI/VDE3845, etc. Fully compliant with NAMUR standard and interchange ability, convenient to replace or mount accessories including solenoid valves, limit switches.

Dual independent travel stoppers can be conveniently and precisely implement $\pm 5^\circ$ adjustments externally in two directions, allowing actuators in alignment with valve on both the opening and closing phases of the stroke.

The composite bearings and guides on pinion and piston ensure precise operation, low friction and high life cycle, preventing output shaft from fractures.

Rack and pinion teeth in high precision is designed in outstanding tooth profile ratio to realize less clearance, accurate drive and high output power.

Modularized preload spring cartridges with special coating is applicable to a wide range of scenarios with high security and anti-corrosion.



Apply rack and pinion with double pistons in advantages of compact structure, high cycle life, and swift operation. The piston tooth surface processed by CNC machining center performs with optimized gearing efficiency and transmission precision, as well as stable operation and reliable performance. It is convenient to switch rotation direction only by inverting the pistons for symmetrical mounting position design.

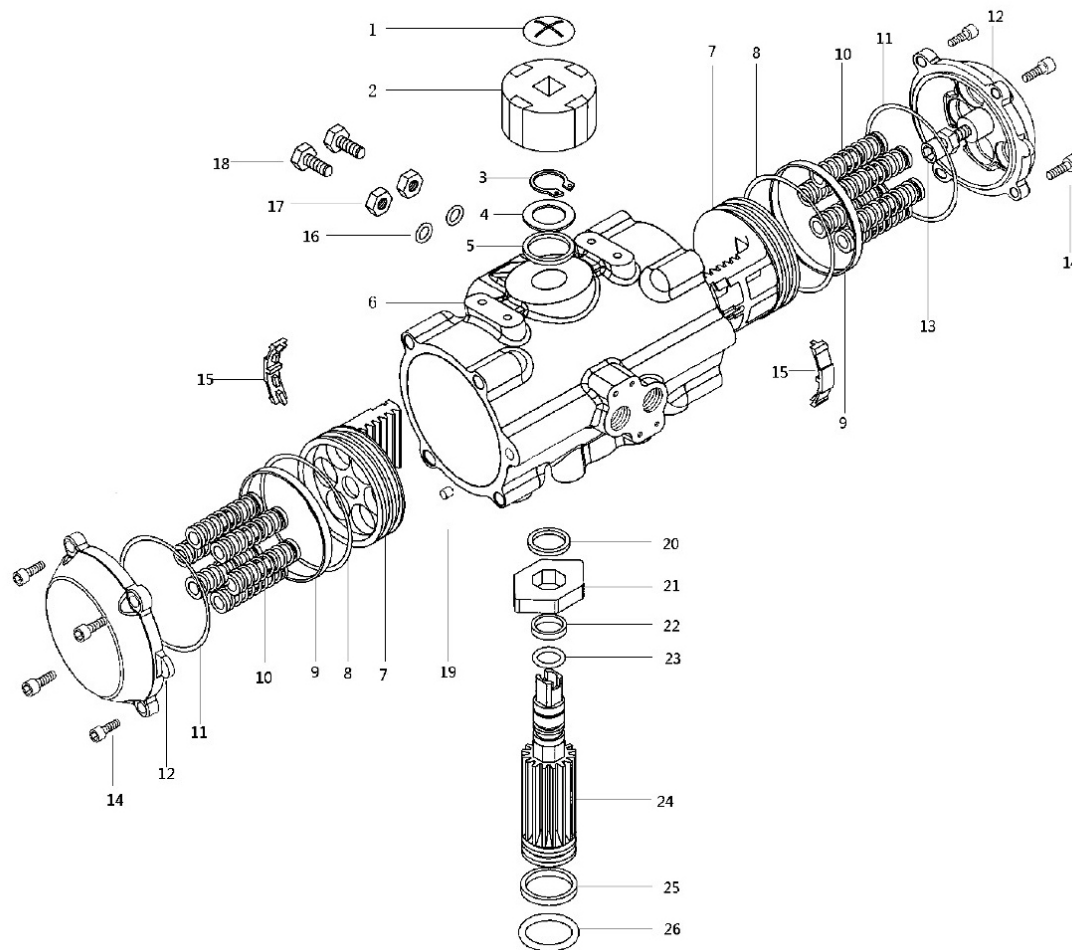
Under normal operating conditions, the safety factor of 20%-30% increase of valve torque should be considered when selecting double-acting actuators.

Under normal operating conditions, the safety factor of 30%-50% increase of valve torque should be considered when selecting single-acting actuators.

High-quality bearings are of reliable sealing, low friction, high cycle life and wide range of application temperature.

Multifunctional position indicator with slot in compliance with NAMUR standard offers simplicity and clarity for visual indication. Connection to a variety of standard and common sensors can be easily realized.

Material part list



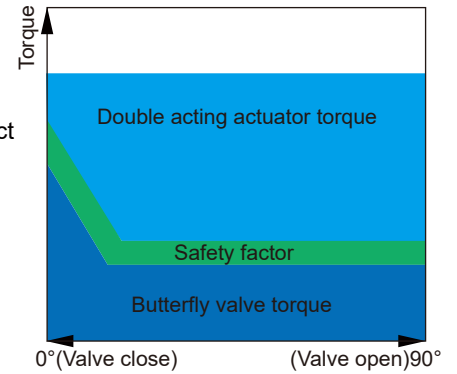
No.	Part name	Qty	Material	No.	Part name	Qty	Material
1	Indicator screw	1	Plastic	14	End cap stop screw	8	Stainless steel
2	Indicator	1	Plastic	15	Guide piston	2	Nylon 66
3	Spring clip	1	Stainless steel	16	O-ring (Adjust screw)	2	NBR
4	Washer	1	Stainless steel	17	Nut (Adjust screw)	2	Stainless steel
5	Washer	1	Plastic	18	Adjust screw	2	Stainless steel
6	Body	1	Stainless steel	19	Plug	2	NBR
7	Piston	2	Stainless steel	20	Washer	1	Plastic
8	Piston O-ring	2	Viton/NBR	21	Cam	1	Stainless steel
9	Piston bearing	2	Plastic	22	Bearing top	1	Plastic
10	Spring	0-12	Spring steel	23	O-ring top	1	Viton/NBR
11	End cap O-ring	2	Viton/NBR	24	Pinion	1	Stainless steel
12	End cap	2	Stainless steel	25	Bearing bottom	1	Plastic
13	Stop screw	2	Stainless steel	26	O-ring bottom	1	Viton/NBR

Double acting - Sizing and output torque

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)

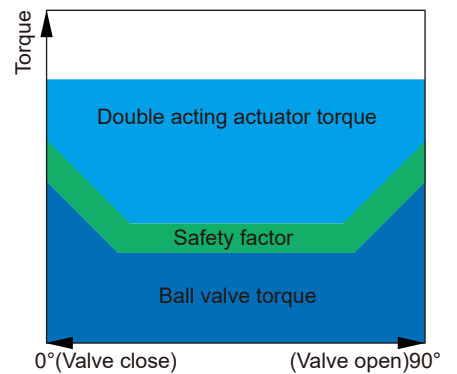
Air supply pressure: = 5bar

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

MODEL	Output torque - Double acting [Nm]									
	Air Supply [bar]									
	2.5	3	3.5	4	4.5	5	5.5	6	7	8
540S-65D	19.1	22.9	26.7	30.6	34.4	38.2	42	45.9	53.5	61.2
540S-75D	25.2	30.2	35.3	40.3	45.3	50.4	55.4	60.4	70.5	80.6
540S-85D	40.8	49	57.2	65.4	73.5	81.7	89.9	98.1	114.4	130.7
540S-95D	61.2	73.5	85.7	100	110.2	122.5	134.7	147	171.5	196
540S-110D	83.1	99.7	116.4	133	149.6	166.2	182.9	199.5	232.7	266
540S-125D	132.5	159	185.5	212	238.6	265.1	291.6	318.1	371.1	424.1
540S-140D	219.3	263.2	307.1	351	394.9	438.7	482.6	526.4	614.2	702
540S-160D	334.2	401.1	468	534.8	601.7	668.5	735.4	802.2	935.9	1069.6
540S-190D	505	606	707	808	909	1010	1111	1212	1414	1616.1
540S-210D	658	789.7	921.3	1052.9	1184.5	1316.1	1447.8	1579.4	1842.6	2105.8
540S-240D	967	1160.3	1353.7	1547.1	1740.5	1934	2127.3	2320.7	2707.5	3094.3
540S-270D	1468.6	1762.3	2056	2349.7	2643.4	2937.2	3230.9	3524.6	4112	4699.5

Spring return - Sizing

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

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: = 5.5bar

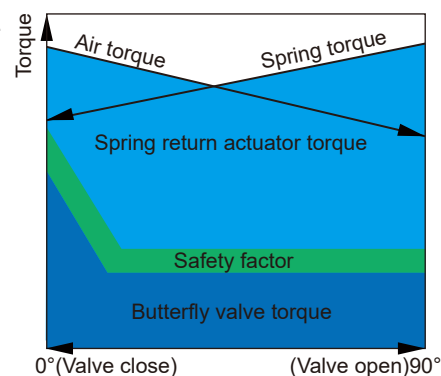
Size 110 S12 produces minimum required torque as follows:

Air stroke 0°: = 105.4Nm > 67.6Nm

Air stroke 90°: = 59.5Nm > 22.3Nm

Spring stroke 90°: = 123.4Nm > 22.3Nm

Spring stroke 0°: = 77.5Nm > 67.6Nm



Ball valve torque including safety factor: = 728Nm (560Nm + 30% safety)

Air supply pressure: = 6bar

Size 240 S10 produces minimum required torque as follows:

Air stroke 0°: = 1572.7Nm > 728Nm

Air stroke 90°: = 1134.5Nm > 728Nm

Spring stroke 90°: = 1186.2Nm > 728Nm

Spring stroke 0°: = 748Nm > 728Nm

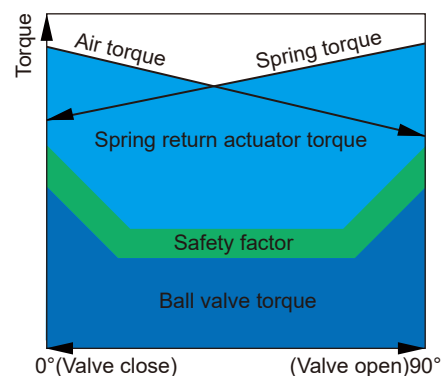
Size 240 S12 produces minimum required torque as follows:

Air stroke 0°: = 1423.1Nm > 728Nm

Air stroke 90°: = 897.3Nm > 728Nm

Spring stroke 90°: = 1423.4Nm > 728Nm

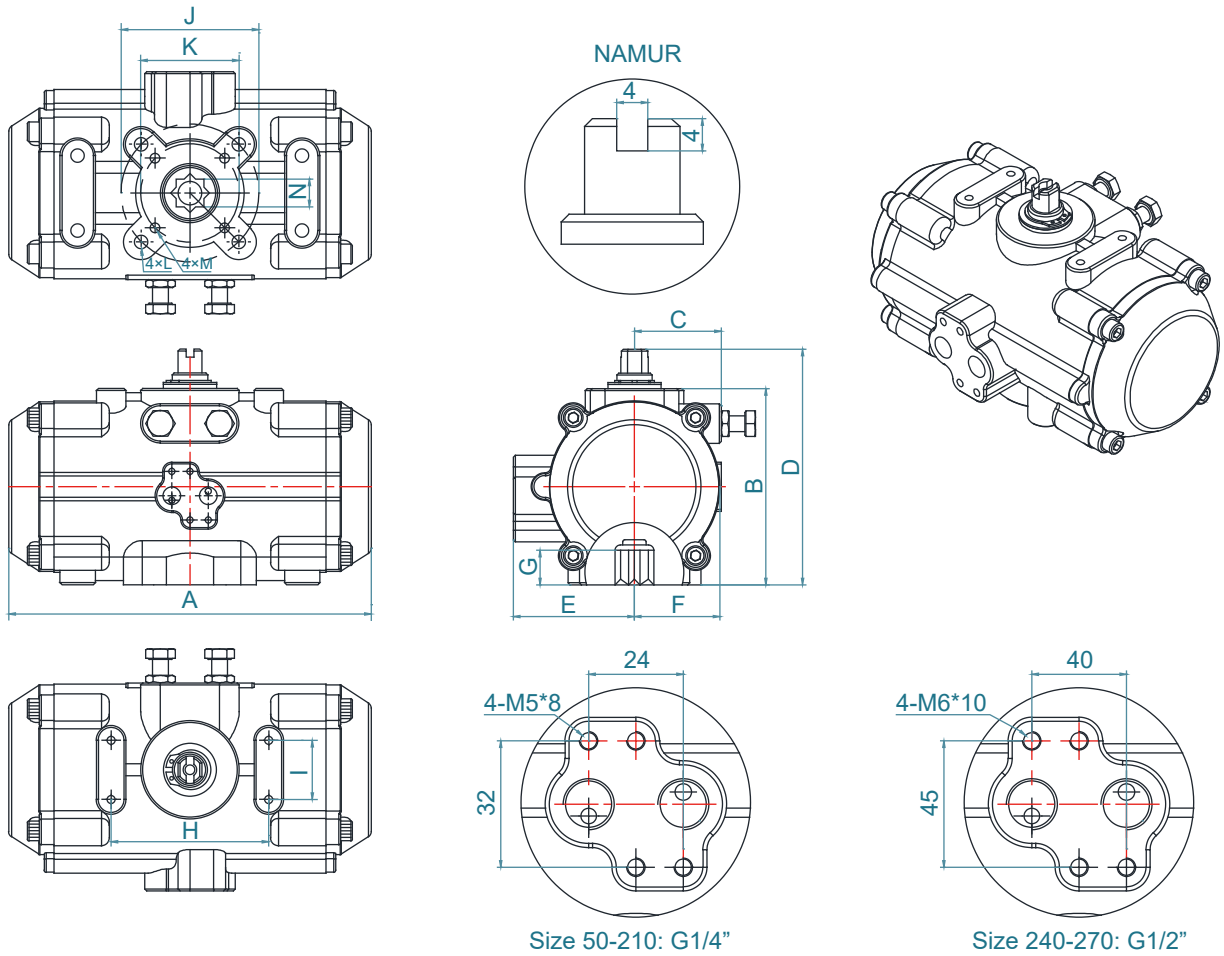
Spring stroke 0°: = 897.6Nm > 728Nm



Spring return - Output torque

Model	Output torque - Spring return [Nm]																					
	Air Supply [bar]																				Spring Return	
	2.5		3		3.5		4		4.5		5		5.5		6		7		8			
	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
541S-50S05	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	5.7	3.6
541S-50S06	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	6.8	4.3
541S-50S07			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	8.0	5.0
541S-50S08					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	9.1	5.8
541S-50S09							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	10.3	6.5
541S-50S10									9.8	5.6	11.6	7.4	13.5	9.3	15.4	11.2	19.2	15.0	23.0	18.8	11.4	7.2
541S-50S11											10.9	6.3	12.8	8.2	14.7	10.1	18.5	13.9	22.3	17.7	12.5	7.9
541S-50S12													12.1	7.0	14.0	8.9	17.8	12.7	21.6	16.5	13.7	8.6
541S-65S05	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	11.2	7.2
541S-65S06	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	13.4	8.6
541S-65S07			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	15.7	10.1
541S-65S08					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	17.9	11.5
541S-65S09							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	20.2	13.0
541S-65S10									20.0	12.0	23.8	15.8	27.6	19.6	31.5	23.5	39.1	31.1	46.8	38.8	22.4	14.4
541S-65S11											22.4	13.6	26.2	17.4	30.1	21.3	37.7	28.9	45.4	36.6	24.6	15.8
541S-65S12													24.7	15.1	28.6	19.0	36.2	26.6	43.9	34.3	26.9	17.3
541S-75S05	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	16.1	9.2
541S-75S06	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	19.3	11.0
541S-75S07			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	22.5	12.9
541S-75S08					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	25.8	14.7
541S-75S09							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	29.0	16.6
541S-75S10									26.9	13.1	32.0	18.2	37.0	23.2	42.0	28.2	52.1	38.3	62.2	48.4	32.2	18.4
541S-75S11											30.2	15.0	35.2	20.0	40.2	25.0	50.3	35.1	60.4	45.2	35.4	20.2
541S-75S12													33.3	16.8	38.3	21.8	48.4	31.9	58.5	42.0	38.6	22.1
541S-85S05	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	26.0	15.0
541S-85S06	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	31.2	18.0
541S-85S07			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	36.4	21.0
541S-85S08					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	41.6	24.0
541S-85S09							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	46.8	27.0
541S-85S10									43.5	21.5	51.7	29.7	59.9	37.9	68.1	46.1	84.4	62.4	100.7	78.7	52.0	30.0
541S-85S11											48.7	24.5	56.9	32.7	65.1	40.9	81.4	57.2	97.7	73.5	57.2	33.0
541S-85S12													53.9	27.5	62.1	35.7	78.4	52.0	94.7	68.3	62.4	36.0
541S-95S05	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	36.7	24.5
541S-95S06	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	44.0	29.4
541S-95S07			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	51.4	34.3
541S-95S08					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	58.7	39.2
541S-95S09							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	66.1	44.1
541S-95S10									61.2	36.8	73.5	49.1	85.7	61.3	98.0	73.6	122.5	98.1	147.0	122.6	73.4	49.0
541S-95S11											68.6	41.8	80.8	54.0	93.1	66.3	117.6	90.8	142.1	115.3	80.7	53.9
541S-95S12													75.9	46.6	88.2	58.9	112.7	83.4	137.2	107.9	88.1	58.8
541S-110S05	50.8	31.7	67.4	48.3	84.1	65.0	100.7	81.6	117.3	98.2	133.9	114.8	150.6	131.5	167.2	148.1	200.4	181.3	233.7	214.6	51.4	32.3
541S-110S06	44.3	21.4	60.9	38.0	77.6	54.7	94.2	71.3	110.8	87.9	127.4	104.5	144.1	121.2	160.7	137.8	193.9	171.0	227.2	204.3	61.7	38.8
541S-110S07			54.5	27.7	71.2	44.4	87.8	61.0	104.4	77.6	121.0	94.2	137.7	110.9	154.3	127.5	187.5	160.7	220.8	194.0	72.0	45.2
541S-110S08					64.7	34.2	81.3	50.8	97.9	67.4	114.5	84.0	131.2	100.7	147.8	117.3	181.0	150.5	214.3	183.8	82.2	51.7
541S-110S09							74.9	40.5	91.5	57.1	108.1	73.7	124.8	90.4	141.4	107.0	174.6	140.2	207.9	173.5	92.5	58.1
541S-110S10									85.0	46.8	101.6	63.4	118.3	80.1	134.9	96.7	168.2	129.9	201.4	163.2	102.8	64.6
541S-110S11											95.1	53.1	111.8	69.8	128.4	86.4	161.6	119.6	194.9	152.9	113.1	71.1
541S-110S12													105.4	59.5	122.0	76.1	155.2	109.3	188.5	142.6	123.4	77.5

Dimensions



SIZE	A	B	C	D	E	F	G	H	I	N	J	K	L	M	Air connection
40	133	64	28	84	46	25	14	80	30	11	φ50	φ36	M6*10 (1/4"-20UNC)	M5*7.5 (#10-24UNF)	G1/4"
50	146	72	30	92	47	32	14	80	30	11	φ50	φ36	M6*10 (1/4"-20UNC)	M5*7.5 (#10-24UNF)	G1/4"
65	173	88	36	108	54	38	18	80	30	14	φ70	φ50	M8*13 (5/16"-18UNC)	M6*10 (1/4"-20UNC)	G1/4"
85	204	108	48	128	65.5	48	21	80	30	17	φ70	φ50	M8*13 (5/16"-18UNC)	M6*10 (1/4"-20UNC)	G1/4"
110	270	133	50	153	77	60	26	80	30	22	φ102	φ70	M10*16 (3/8"-16UNC)	M8*13 (5/16"-18UNC)	G1/4"
125	302	155	58	175	87	69.5	27.5	80	30	22	φ102	φ70	M10*16 (3/8"-16UNC)	M8*13 (5/16"-18UNC)	G1/4"
140	394	172	69	192	95.5	77	32	80	30	27	φ125	φ102	M12*20 (1/2"-12UNC)	M10*16 (3/8"-16UNC)	G1/4"
160	456	198	75	218	106	87	34	80	30	27	φ125	φ102	M12*20 (1/2"-12UNC)	M10*16 (3/8"-16UNC)	G1/4"
210	568	257	90	287	133	113	40	130	30	36	φ140		M16*24 (5/8"-11UNC)		G1/4"
240	618	292	135	322	130	139	50	130	30	46	φ165		M20×25		G1/2"
270	737	331	148	361	145	151	50	130	30	46	φ165		M20×25		G1/2"

Technical data

Working time, air consumption, weight

Size	Working time				Air consumption		Weight	
	DA		SR		DA / SR		DA	SR
	Open [s]	Close [s]	Open [s]	Close [s]	Open [L]	Close [L]	[kg]	[kg]
50	0.3	0.4	0.9	0.7	0.1	0.15	1.08	1.2
65	0.4	0.4	0.9	0.8	0.22	0.26	1.91	2.15
75	0.4	0.4	0.9	0.9	0.25	0.41	2.41	2.8
85	0.9	0.9	1.0	1.2	0.45	0.61	3.32	3.95
95	0.9	1.0	1.4	1.6	0.95	0.98	4.98	5.8
110	0.9	1.0	1.4	1.6	1.07	1.24	6.63	7.95
125	1.3	1.4	2.4	2.4	1.47	1.86	10.24	12.1
140	1.3	1.4	2.8	3.0	2.13	3.08	15.1	15.93
160	2.0	2.4	4.8	4.9	3.89	4.7	21.3	25.6
190	2.2	2.6	2.4	3.0	6.16	8.59	29.3	33.81
210	2.9	3.8	3.4	4.1	8.22	10.95	37.7	48.4
240	3.2	3.7	3.8	4.0	12.26	16.01	54.2	77.8
270	4.4	4.9	5.0	5.5	17.35	24.83	82	90.6

Notice:

(A) The operation time above are measured in following experimental conditions:

1.For model 50-160

(1)Room temperature

(2)Actuator stroke 90°

(3)Solenoid valve with orifice of 4 mm and a flow capacity Qn400L/min

(4)Inside pipe diameter 6 mm

(5) Neutral clean air

(6)Air supply pressure 5.5 bar

(7)Actuator without external resistance load

2.For model 190-270

(1)Room temperature

(2)Actuator stroke 90°

(3)Solenoid valve with orifice of 12 mm and a flow capacity Qn5100L/min

(4)Inside pipe diameter 8 mm

(5)Neutral clean air

(6)Air supply pressure 5.5 bar

(7)Actuator without external resistance load

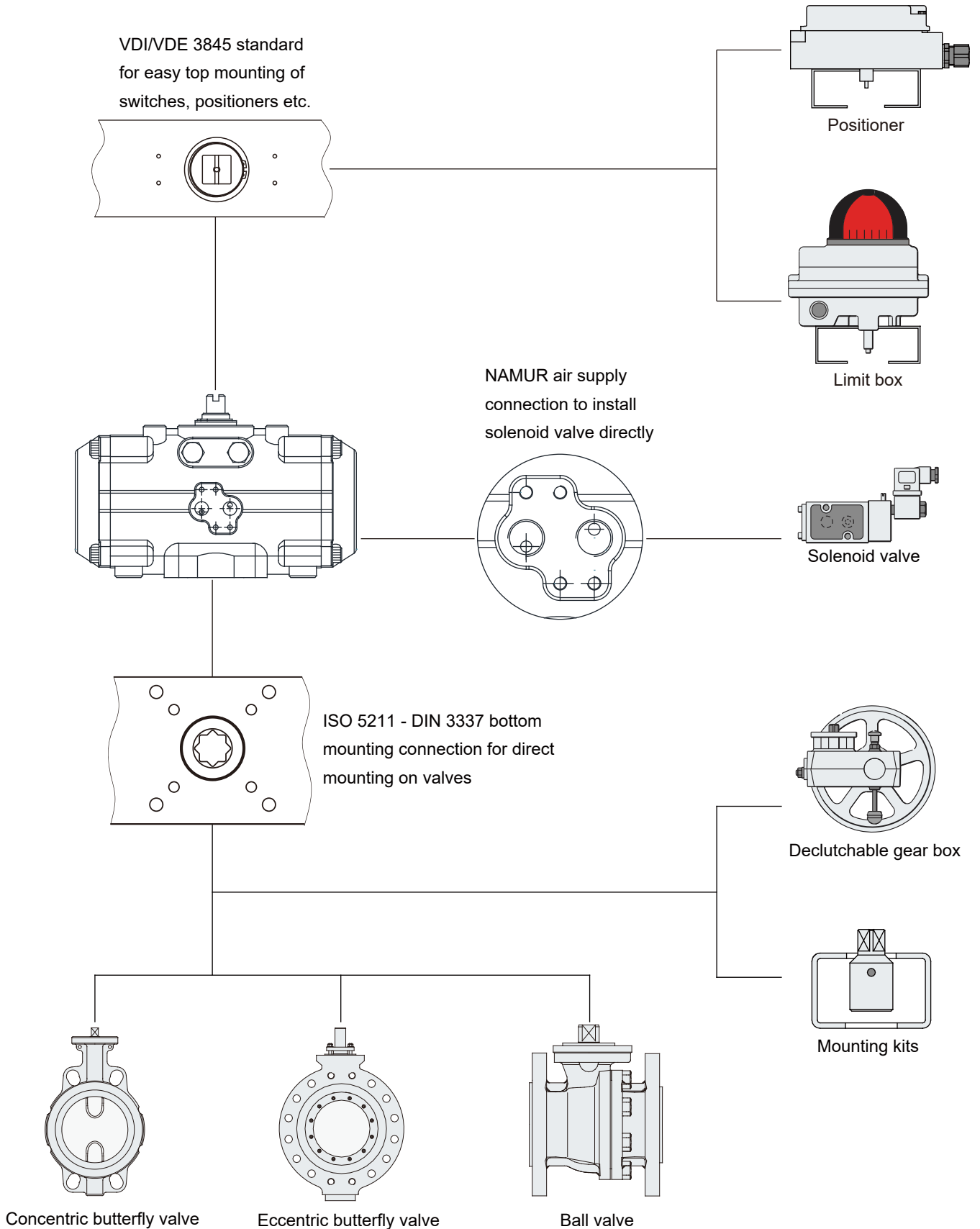
Cautions: Obviously on the field applications when one or more parameters are different from above, the operation time will be different. Air consumption rest with air supply, open/switch stroke, air volume and action cycle times.

To determine standard litre per minute use the following formula:

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

Actuator interface for valve automation

Actuator interface for valve automation and mounting standard





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 explosion-proof Exd II CT6.
- Extruded enclosure with weather proof IP66.
- 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

- Explosion-proof Exd II CT6 or Exd II BT6.
- 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.

Coreline

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