

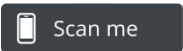


PNEUMATIC ACTUATOR





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PAC SERIES PNEUMATIC ACTUATOR



DESCRIPTION

Air actuators in general are known in the industry to be very rugged, reliable and durable. Convolve quarter turn air actuators are prelubricated and tested to a minimum one million operations. Actuators are available in double acting and spring return models. They meet international ISO 5211 standards for easy valve mounting and replacement. Position confirmation switches and valve positioners can be easily mounted to the actuator with the standard VDI/VDE-3845 top mounting pad. Rotation adjustment +/- 5% in both open and closed position. Visual position indicator will monitor the open and closed position.

FEATURES

- Rack and pinion quarter turn (90°) rotation
- Double acting and spring return models
- Prelubricated and tested to minimum 1 million operations
- Direct valve mounting per ISO5211
- Visual valve position indicator
- Extruded aluminum body with 50 micron hard anodizing
- Corrosion resistance - 500 hour minimum salt spray test
- Spring return models use pre compressed spring cartridges
- Female double square output drive
- Standard VDI/VDE 3845 mounting for top mount accessories

APPLICATION

Convolve air actuators are typically used to operate quarter turn ball valves, butterfly valves and plug valves. They can also be applied virtually anywhere a 90 degree rotation is required such as dampers. Quick and easy to install with standard ISO5211/DIN 3337 mounting dimensions and a double square female output drive. The operating temperature range of the actuator is -20 to 80°C.

OPERATION

Double acting actuators require air pressure to open and air pressure to close. Spring return actuators require air pressure to open and utilize springs to close for failsafe operation. Typically 4-way pilot valves are used to control a double acting actuator and 3-way pilot valves for spring return models. Pilot air should be filtered, dry or lubricated. Output drive rotates counter-clockwise to open when viewed from top of actuator.

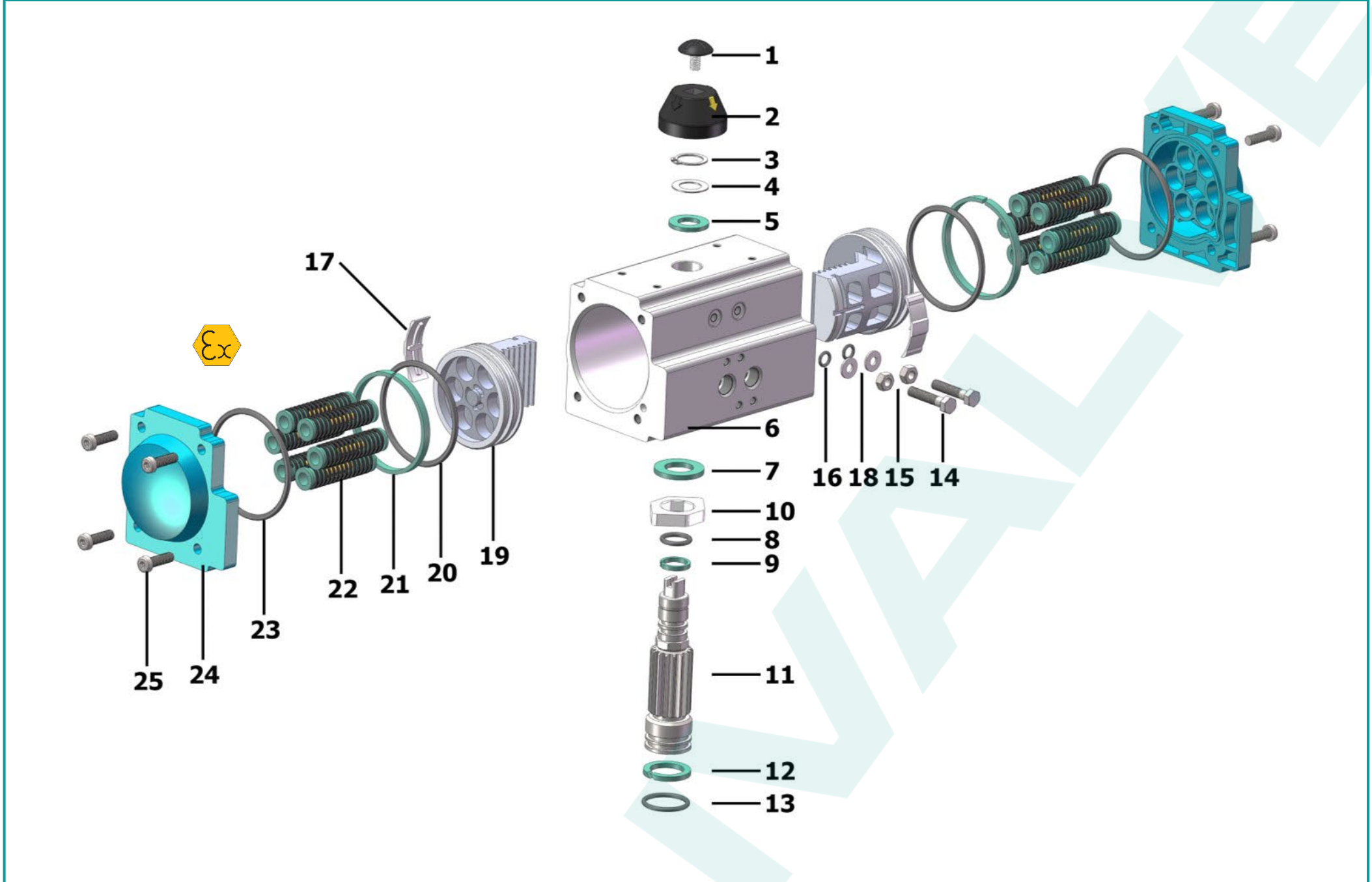
OPTIONS

- Direct mount solenoid valves
- Monitor/Position confirmation limit switches
- Electro-Pneumatic positioner 4-20mA input
- Pneumatic positioners 3-15 PSI input

CONSTRUCTION

BODY	Extruded aluminum alloy (6005-T5)
END COVERS	ASTM B179 die-cast aluminium, 60-80 micron polyester coating
DRIVE SHAFT	Carbon steel, 20 micron nickel plated
POSITION INDICATOR	Glass filled polyamide
SEALS	NBR
SPRINGS (SPRING RETURN MODEL)	Pre-compressed cartridges, 60-80 micron polyester coating
PISTONS	ASTM B179 die-casted aluminium alloy 15 micron anodizing
PILOT AIR CONNECTION	1/4" BSP plus standard Namur solenoid mounting pad
FASTENERS	304 stainless steel

PART LIST AND MATERIAL SPECIFICATION

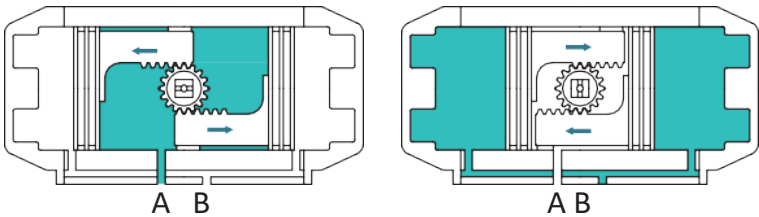


NO.	PART NAME	QTY	STANDARD MATERIAL	PROTECTION	OPTIONAL MATERIAL
1	Cap screw (Indicator)	1	Stainless steel(304)		
2	Position indicator	1	Polyoxymethylene		
3	Spring clip (Pinion)	1	Stainless steel(304)		
4	Thrust washer	1	Stainless steel(304)		
5	Thrust bearing (Pinion)	1	Polyoxymethylene		
6	Body	1	Extruded aluminum alloy(6005-T5)	Hard anodized and polished *	
7	Thrust bearing (Pinion)	1	Polyoxymethylene		
8	O-ring (Pinion top)	1	NBR		FPM/Silicone
9	Bearing (Pinion top)	1	Polyoxymethylene		
10	OCTI Cam (Stop arrangement)	1	Forged Steel		
11	Pinion	1	Alloy steel(45#)	Nickel plated	Stainless steel
12	Bearing (Pinion bottom)	1	Polyoxymethylene		
13	O-ring (Pinion bottom)	1	NBR		FPM/Silicone
14	Adjust screw (Round Type)	2	Stainless steel(304)		
15	Nut (Adjust screw)	2	Stainless steel(304)		
16	O-ring (Adjust screw)	2	NBR		FPM/Silicone
17	Piston Skate	2	Polyoxymethylene		
18	Washer (Adjust screw)	2	Stainless steel(304)		
19	Piston	2	Cast aluminum/casting(101A)	Anodized	Stainless steel
20	O-ring (Piston)	2	NBR		FPM/Silicone
21	Bearing (Piston)	2	Polyoxymethylene		
22	Spring	0~12	Spring steel	Dip coating	
23	O-ring (End cap)	2	NBR		FPM/Silicone
24	End cap	2	Cast aluminum(ADC12)	Powder polyester painted etc	
25	Cap screw	8	Stainless steel(304)		

OPERATING PRINCIPLE

PRINCIPLE OF DOUBLE ACTING ACTUATORS

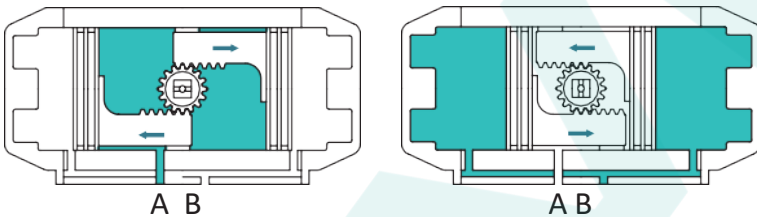
Standard rotation (CCW)



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

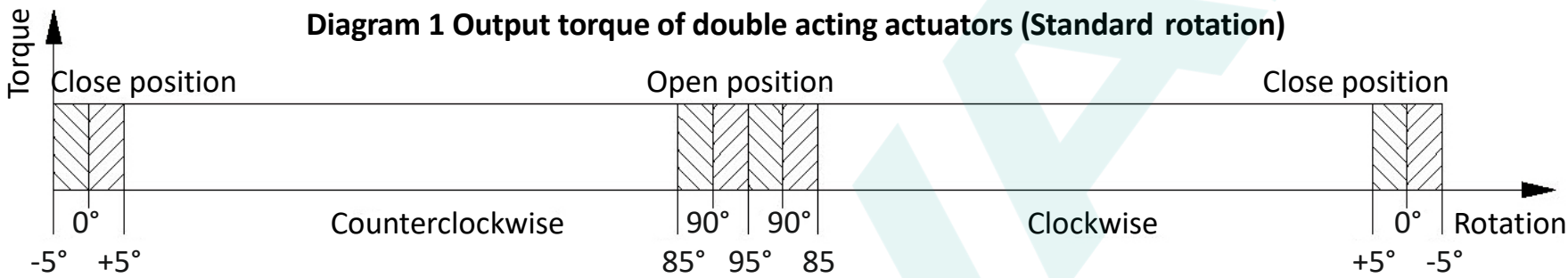
Air to Port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from Port A.

Reverse rotation (CW)



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

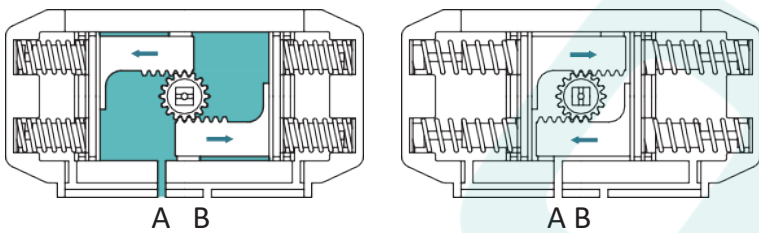
Air to Port B forces the pistons inwards, causing the pinion to turn counterclockwise while the air is being exhausted from Port A.



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

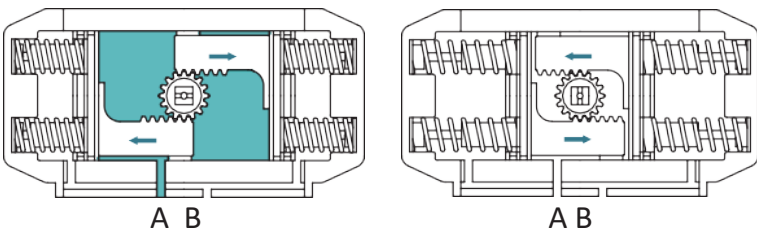
Standard rotation (CCW)



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.

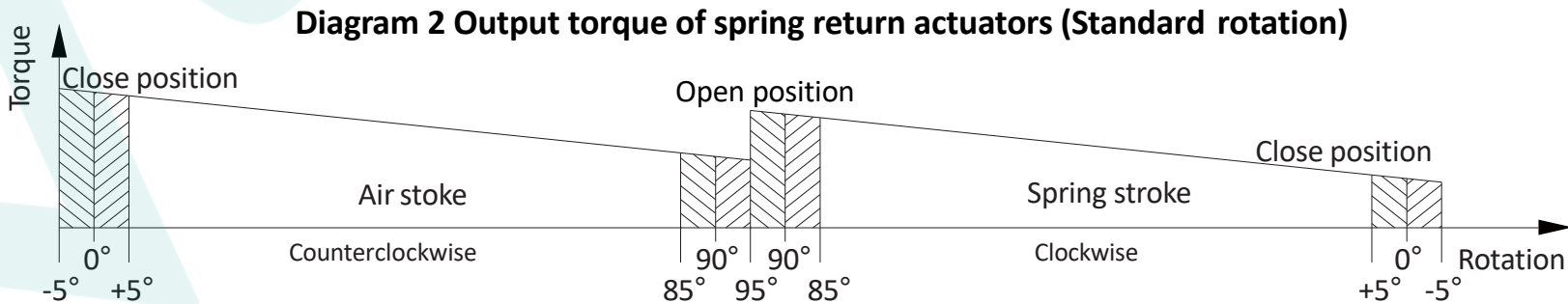
Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port A.

Reverse rotation (CW)



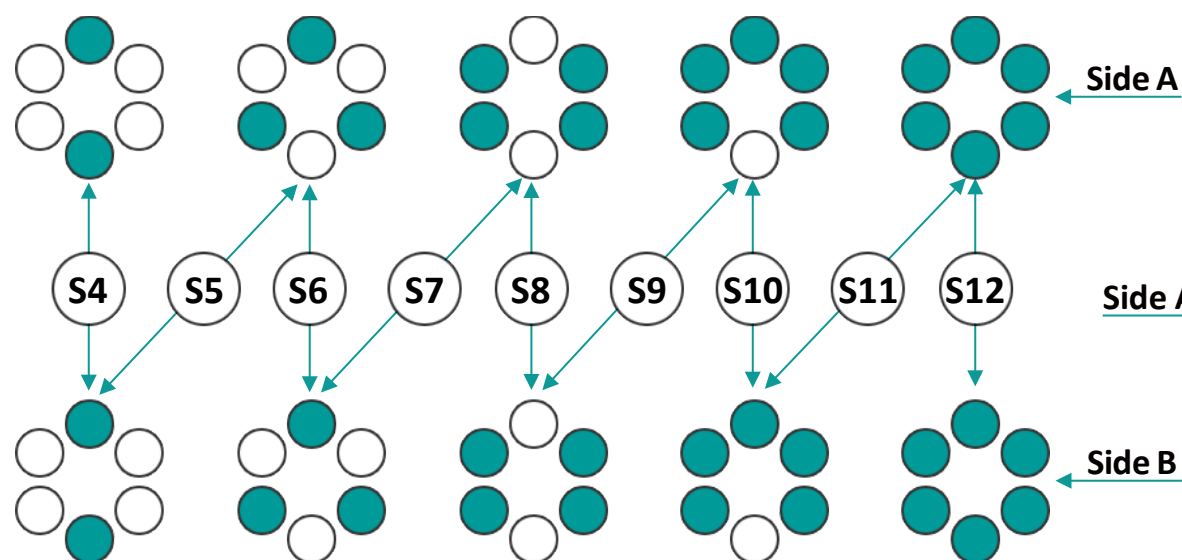
Air to port B forces the pistons outwards, causing the springs to compress. The pinion turns counterclockwise while air is being exhausted from port A.

Loss of air pressure on port B, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port B.



Concerning 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.

OUTPUT TORQUE



AIR CONSUMPTION AND OPENING AND CLOSING TIME

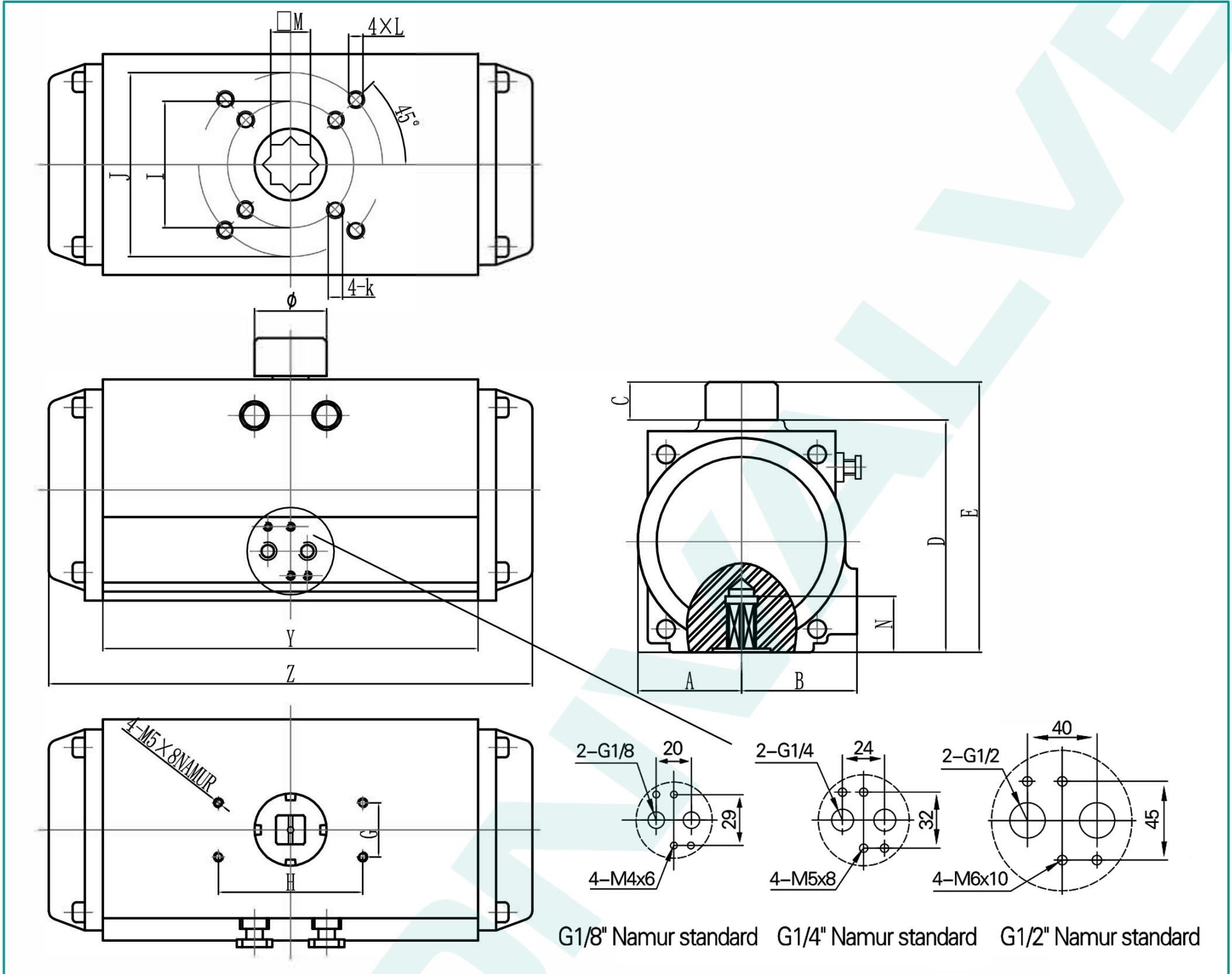
MODEL			PAC32	PAC40	PAC52	PAC63	PAC75	PAC83	PAC92	PAC105	PAC125
CYLINDER AIR VOLUME (L)	OPEN		0.04	0.08	0.1	0.2	0.3	0.5	0.7	1.2	1.5
	CLOSE		0.05	0.11	0.2	0.3	0.5	0.8	1.1	1.8	2.3
OPENING & CLOSING TIME (SECOND)	DA	OPEN	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.7	0.9
		CLOSE	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.1
	SR	OPEN	-	-	0.3	0.3	0.4	0.5	0.7	0.9	1.2
		CLOSE	-	-	0.3	0.4	0.5	0.6	0.9	1.1	1.4
MODEL			PAC140	PAC160	PAC190	PAC210	PAC240	PAC270	PAC300	PAC350	PAC400
CYLINDER AIR VOLUME (L)	OPEN		2.4	3.1	4.3	5.8	10.0	14.5	23.8	35.1	52.6
	CLOSE		3.8	4.9	6.9	9.5	15.2	21.4	29.7	46.3	69.4
OPENING & CLOSING TIME (SECOND)	DA	OPEN	1.2	1.5	2.0	2.7	3.5	4.0	8.0	10.0	10.0
		CLOSE	1.4	1.7	2.2	3.2	4.0	4.5	10.0	12.0	13.0
	SR	OPEN	1.5	1.8	2.4	3.5	4.1	4.5	7.0	8.0	8.0
		CLOSE	1.8	2.1	2.8	4.0	4.6	5.0	8.0	9.0	9.0

DOUBLE ACTING ACTUATOR OUTPUT TORQUE (UNIT : NM)

MODEL	INPUT AIR SUPPLY PRESSURE (UNIT : BAR)						
	2	3	4	5	6	7	8
PAC32DA	3	5	6	8	9	11	12
PAC40DA	4,8	7,2	9,6	12	14,4	16,8	19,2
PAC52DA	8,5	12,7	17	21,2	25,5	29,7	34
PAC63DA	15	22,5	30	37,5	44,9	52,4	59,7
PAC75DA	21	31,8	42,4	53	63,6	74,2	84,8
PAC83DA	32,5	48,7	65	81,2	97,4	113,7	130
PAC92DA	46,5	69,8	93	116,3	140	162,9	186
PAC105DA	69,3	104	138,5	173,2	207,8	242,5	277
PAC125DA	108	162	216	270	324	378	432
PAC140DA	184,7	277	369,5	461,8	554	646,5	739
PAC160DA	281,5	422	563	704	844	985	1126
PAC190DA	453	680	907	1135	1361	1587	1814
PAC210DA	554	831	1108	1384	1662	1939	2216
PAC240DA	814	1221	1628	2035	2442	2849	3256
PAC270DA	1236	1854	2472	3090	3708	4326	4944

SPRING RETURN ACTUATOR OUTPUT TORQUE (UNIT : NM)

AIR SUPPLY PRESSURE		3 BAR		4 BAR		5 BAR		6 BAR		7 BAR		8 BAR		OUTPUT TORQUE SPRING	
MODEL	SPRING QTY	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END
PAC52SR	12	/	/	/	/	11.8	8.3	16	12.5	20.3	16.8	24.5	21	13	9.5
PAC63SR	12	/	/	/	/	21.1	13.5	28.6	21.0	36.1	28.5	43.6	36	23.9	16.3
PAC75SR	12	/	/	/	/	37.5	24.7	49.9	37.1	62.2	49.5	74.6	61.8	37.1	24.4
PAC83SR	12	/	/	/	/	45.5	29.5	61.8	45.8	78	62	94.2	78.2	51.6	35.6
PAC92SR	12	/	/	/	/	64	43.7	87.3	66.9	110.6	90.2	133.8	113.5	72.7	52.3
PAC105SR	12	/	/	/	/	78.9	62.4	113.5	97	148.1	131.6	182.8	166.3	110.8	94.3
PAC125SR	12	/	/	/	/	179	115	241	177	302	238	363	299	191	127
PAC140SR	12	/	/	/	/	248	142	341	234	433	327	525	419	320	214
PAC160SR	12	/	/	/	/	377	222	518	363	659	504	800	645	481	326
PAC190SR	12	/	/	/	/	577	297	804	524	1031	751	1258	978	837	557
PAC210SR	12	/	/	/	/	846	438	1158	750	1469	1062	1781	1373	1121	713
PAC240SR	12	/	/	/	/	1236	524	1725	1013	2213	1501	2702	1990	1919	1207
PAC270SR	12	/	/	/	/	1923	956	2610	1643	3297	2330	3985	3017	2480	1512



MODEL	A	B	C	D	E	G	H	I	J	K	L	M	N	Z	Y	Ø	AIR SUPPLY	WEIGHT (DA) (KG)	WEIGHT (SR) (KG)
PAC32	24	24	20	45	65	30	50	F03	-	M5x8	-	9x9	15	128	93	Ø40	NAMUR G1/8"	0.55	-
PAC40	24	34	26	60	86	30	50	F03	F05	M5x8	M6x10	9x9	15	124	93	Ø40	NAMUR G1/8"	0.66	-
PAC52	30	41	26	72	92	30	80	F03	F05	M5x8	M6x12	11x11	15	154	108	Ø40	NAMUR G1/4"	1.3	1.4
PAC63	36	46	26	89	109	30	80	F05	F07	M6x12	M8x15	14x14	18	172	125	Ø40	NAMUR G1/4"	2	2.16
PAC75	42	52	26	100	120	30	80	F05	F07	M6x12	M8x15	14x14	18	189	128	Ø40	NAMUR G1/4"	2.5	2.7
PAC83	46	57	26	109	129	30	80	F05	F07	M6x12	M8x15	17x17	18	216	152	Ø40	NAMUR G1/4"	3.2	3.6
PAC92	51	57.5	26	117	137	30	80	F05	F07	M6x12	M8x15	17x17	21	270	169	Ø46	NAMUR G1/4"	4.3	5
PAC105	58	64	26	134	154	30	80	F07	F10	M8x15	M10x16	22x22	26	279	189	Ø46	NAMUR G1/4"	5.7	6.5
PAC125	67.5	70	37	157	187	30	80	F07	F10	M8x15	M10x16	22x22	26	311	210	Ø60	NAMUR G1/4"	8.6	10
PAC140	76	77	37	174	204	30	130	F10	F12	M10x16	M12x20	27x27	31	405	268	Ø60	NAMUR G1/4"	12.8	15.2
PAC160	87.5	87.5	37	199	229	30	130	F10	F12	M10x16	M12x20	27x27	31	468	310	Ø60	NAMUR G1/4"	18.5	22
PAC190	103	103	40	233	263	30	130	-	F14	-	M16x24	36x36	40	528	380	Ø80	NAMUR G1/4"	30.6	35.8
PAC210	113	113	40	257	287	30	130	-	F14	-	M16x24	36x36	40	530	380	Ø80	NAMUR G1/4"	36.4	45.5
PAC240	130	131	40	293	323	30	130	-	F16	-	M20x24	46x46	50	606	425	Ø80	NAMUR G1/2"	51.5	64.4
PAC270	146	146	40	333	363	30	130	-	F16	-	M20x24	46x46	50	725	516	Ø80	NAMUR G1/2"	76	98
PAC300	162	172	40	355	395	30	130	-	F16	-	M20x24	46x46	50	778	540	Ø80	NAMUR G1/2"	103	143
PAC350	192.5	192.1	40	411	451	30	130	F16	F25	M16x24	M20x24	46x46	50	926	610	Ø80	NAMUR G1/2"	144	188