

4 PISTON PNEUMATIC ACTUATOR



KV CONTROLS

Control & Isolation Valves

46 Mercury Street
Naledi Industrial Park
Vaalpark
Tel: +27 (0) 16 100 4592
www.kvcontrols.co.za

KV Controls (PTY) Ltd. Reg No: 2016/378940/07

Technical Data

Weight Spring Return (Full Spring set)	SIZE	C15	C20	C25	C30	C35	C45	C60	C75
	Kg	1.1	1.9	3.5	5.0	9.0	15	35	64
Lb	2	4	8	11	20	33	78	142	
Weight Double Acting	Kg	0.9	1.5	2.8	4.4	7.1	11	26	51
	Lb	2.1	3.3	6.2	9.7	16	24	57	112
Air Consumption per stroke	ccw	0.07	0.12	0.25	0.44	0.74	1.33	3.20	5.76
	cw	0.09	0.15	0.33	0.54	0.80	1.33	3.20	5.76
Actual Volume - Litre	Total	0.16	0.27	0.58	0.98	1.54	2.66	6.40	11.52
	ccw	4.3	7.3	15	27	45	81	195	351
Air Consumption per stroke	cw	5.5	9.2	20	33	49	81	195	351
	Total	9.8	16.5	35	60	94	162	391	703
Stroke Time with S.V. with 2.4 Orifice at 80 psi	Sec.	0.2	0.4	0.7	0.8	1.0	1.5	2.5	4.0

Pressure Range:
20-120 PSI (1.5 - 8 bar) for DA actuators
30-120 PSI (2- 8 bar) for SR actuators

Operating Temperature:
Buna N: -20°C to 80°C (-4°F to 176°F)
Viton: -20°C to 120°C (-4°F to 250°F)
EPDM: -40°C to 80°C (-40°F to 176°F)

Spring Combinations



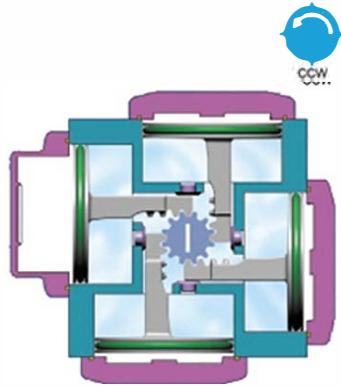
C15 ONLY

CODE	Spring Combinations
1B	
1B2	
2	

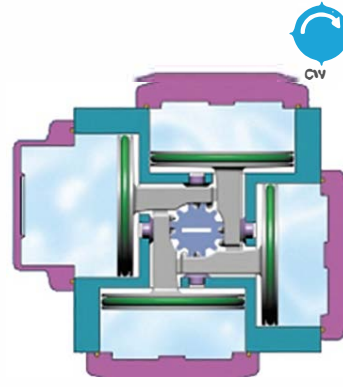
C20-C75

CODE	Spring Combinations
2A	
2A2B	
2B	
2A3	
2C	
2C3	
3	

Double Acting

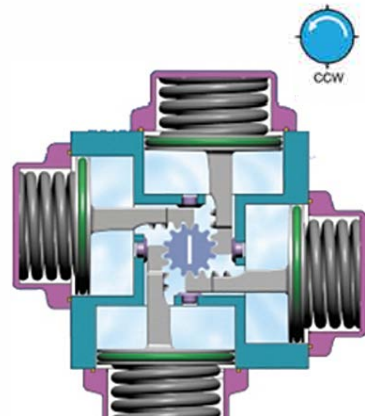


Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward.
Pinion rotates counter clockwise.

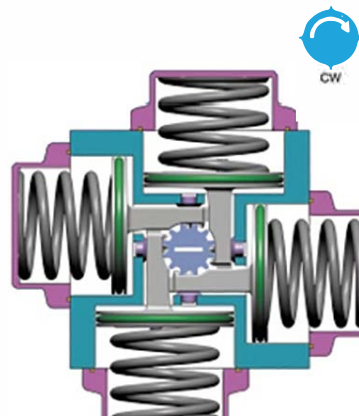


Pressure entering Port B to close:
Outside chambers pressurized. Pistons move inward.
Pinion rotates clockwise.

Spring Return



Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward. Springs are compressed. Pinion rotates counter clockwise.



Pressure exiting Port A to close:
Air released from center chamber. Springs drive pistons inward. Pinion rotates clockwise.

Sizing a spring return actuator requires that the torque output at the start and end of both the spring and air drive strokes is greater than the valve torque at that position.

Double Acting

SIZE	Operating Pressure (bar)							
	3.0	4.0	5.0	5.5	6.0	7.0	8.0	8.5
C15	10	14	17	19	21	24	27	30
C20	18	25	32	35	38	45	51	57
C25	39	52	65	72	79	92	105	118
C30	62	84	107	119	130	153	175	197
C35	114	151	190	208	226	265	304	343
C45	222	297	371	408	445	519	593	667
C60	527	703	879	967	1,055	1,230	1,405	1,580
C75	974	1,299	1,624	1,786	1,948	2,273	2,598	2,923

TORQUE METRIC CHART (Nm)

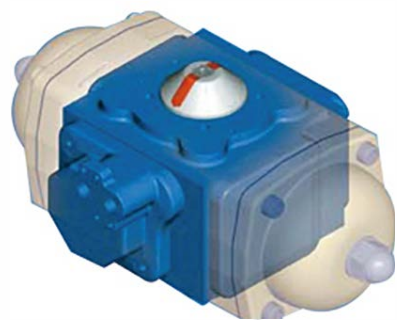
Spring Return

Size	Spring set	Air Stroke - bar (psi)																Spring Stroke	
		3.0(44)		4.0(58)		5.0(73)		5.5(80)		6.0(87)		7.0(102)		8.0(116)					
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End		
C15	1A	7	4	10	7	13	11	15	12	17	14	20	17	24	21	6	3		
	1B			8	4	12	8	13	10	15	11	18	14	22	18	9	5		
	1B2			10	5	10	5	12	7	13	9	16	11	20	15	12	7		
C20	2																		
	2AB	10	5	17	12	24	18	27	22	30	25	37	31	43	37	12	7		
	2A			16	10	22	16	26	19	29	22	35	29	41	35	15	9		
	2A2B			14	7	20	13	24	16	27	19	33	26	39	32	18	11		
	2B					18	10	22	13	25	17	31	23	38	29	21	13		
	2A3					17	9	20	12	23	15	30	22	36	28	22	15		
C25	2C																		
	2C3																		
	3																		
	2AB	25	15	38	27	51	40	58	47	65	53	78	66	90	78	23	13		
	2A	23	11	36	23	49	36	55	42	62	49	75	62	88	74	28	16		
	2A2B			33	19	46	32	53	39	60	45	73	58	86	70	32	18		
C30	2B					43	27	50	34	57	41	70	53	83	66	36	21		
	2A3					41	22	47	29	54	36	67	48	80	61	42	24		
	2C					38	18	45	24	52	31	64	44	77	56	47	27		
	2C3							43	19	50	25	63	38	75	50	52	29		
	3									47	21	60	34	73	46	57	31		
	2AB	40	26	62	47	84	70	96	81	107	92	130	114	152	136	35	21		
C35	2A	36	19	57	40	80	62	91	73	102	84	125	107	148	129	42	26		
	2A2B			52	30	75	52	86	63	98	74	120	96	143	118	53	31		
	2B			48	18	70	43	81	54	93	65	115	87	138	109	62	36		
	2A3					66	36	77	47	89	58	111	80	134	103	69	40		
	2C					64	25	73	39	85	50	107	72	130	94	78	44		
	2C3									80	40	102	62	125	85	88	49		
C45	3									75	33	98	55	120	77	96	54		
	2AB	81	50	118	86	156	123	174	141	192	158	230	195	268	232	62	32		
	2A	75	39	111	74	150	112	168	129	186	147	224	184	262	221	74	38		
	2A2B	64	26	100	62	139	99	157	117	175	134	213	171	251	208	87	49		
	2B			92	44	130	82	148	99	166	117	204	154	242	191	105	58		
	2A3					123	67	141	84	159	102	197	139	235	176	121	65		
C60	2C									151	86	189	123	227	160	137	73		
	2C3									143	75	181	112	219	149	149	82		
	3									135	63	173	100	211	137	161	89		
	2AB	148	86	222	158	295	229	331	264	367	300	440	371	513	442	133	72		
	2A	134	60	208	132	280	203	317	239	353	275	426	346	499	417	159	86		
	2A2B			197	113	269	184	306	219	342	255	415	326	488	397	179	97		
C75	2B			179	82	252	153	288	188	325	224	398	295	471	366	212	115		
	2A3					238	127	274	163	311	198	383	269	456	340	239	130		
	2C					223	102	260	137	296	173	369	244	442	315	265	144		
	2C3									283	147	355	218	428	289	292	158		
	3									268	122	341	193	414	264	318	173		
	2AB	359	216	532	385	706	554	792	639	879	723	1,052	891	1,225	1,060	302	162		
C60	2A	328	160	501	329	675	498	762	583	848	667	1,021	835	1,194	1,004	360	194		
	2A2B			478	285	651	454	738	538	824	623	997	791	1,170	960	406	218		
	2B			442	221	615	390	702	475	789	559	961	727	1,134	896	473	254		
	2A3					580	327	667	411	754	495	926	663	1,099	832	539	290		
	2C					548	268	635	352	721	437	894	605	1,067	774	600	323		
	2C3									688	378	861	546	1,034	715	661	356		
C75	3									657	322	830	490	1,003	659	720	388		
	2AB	672	443	992	755	1,312	1,067	1,472	1,223	1,631	1,378	1,951	1,690	2,270	2,000	512	292		
	2A	614	345	935	657	1,255	969	1,414	1,124	1,574	1,280	1,894	1,592	2,212	1,902	615	350		
	2A2B			891	582	1,211	894	1,370	1,049	1,530	1,205	1,850	1,517	2,168	1,827	693	395		
	2B			820	461	1,140	773	1,299	928	1,459	1,084	1,779	1,396	2,097	1,706	819	467		
	2A3					1,082	674	1,242	830	1,401									



Proven Advantage

Is a quarter turn rack&pinion pneumatic actuator that is **patented** worldwide. The superiority of the actuator over single and double rack & pinion actuator designs, results from the four pistons which generate torque around a centrally located pinion, thereby giving more than double the torque achieved by these other designs. The increased number of pistons in the actuator allows their diameter to be reduced while maintaining its high torque. This also allows the overall size of the actuator to be reduced and become more compact.



Space Savi actuator Fast Acting

The actuator has four small cylinders, each located on one of the four sides of a cube. At a given air pressure, the actuator can produce the same torque output as double piston actuators, using smaller diameter pistons and a narrower pinion. A narrower pinion results in a shorter piston travel, which permits a compact, space saving mechanism and fast acting travel from one position to the next.

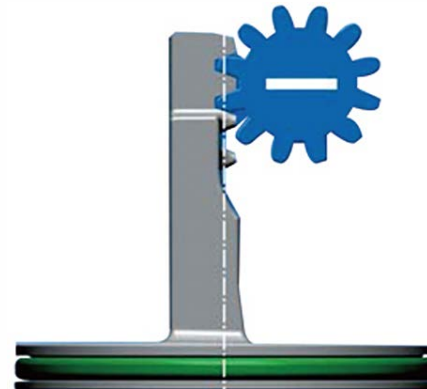
Superior Corrosion Resistance

The body and covers are anodized internally and externally, providing protection against ingress of corrosive atmosphere. An external epoxy base layer and a second polyurethane paint provides additional protection against aggressive environments. Optional Electroless Nickel Coating of body, covers and stop.



Less Air Consumption

The actuator gives maximum torque for minimum air consumption. It is both compact in size and energy efficient, creating a fast-responding, trouble-free, high cycle lifespan. The cube shape of the actuator and the short piston travel serve to minimize excess space. This is space which is not swept by piston travel and which must be pressurized before the piston motion begins; therefore, reducing the pressurization of excess space and resulting in reduced energy requirements.

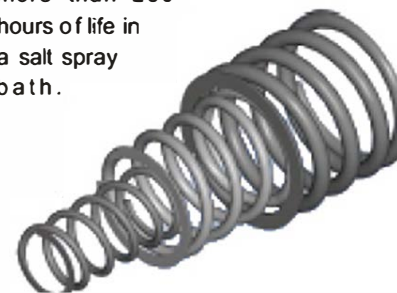


Balanced Forces

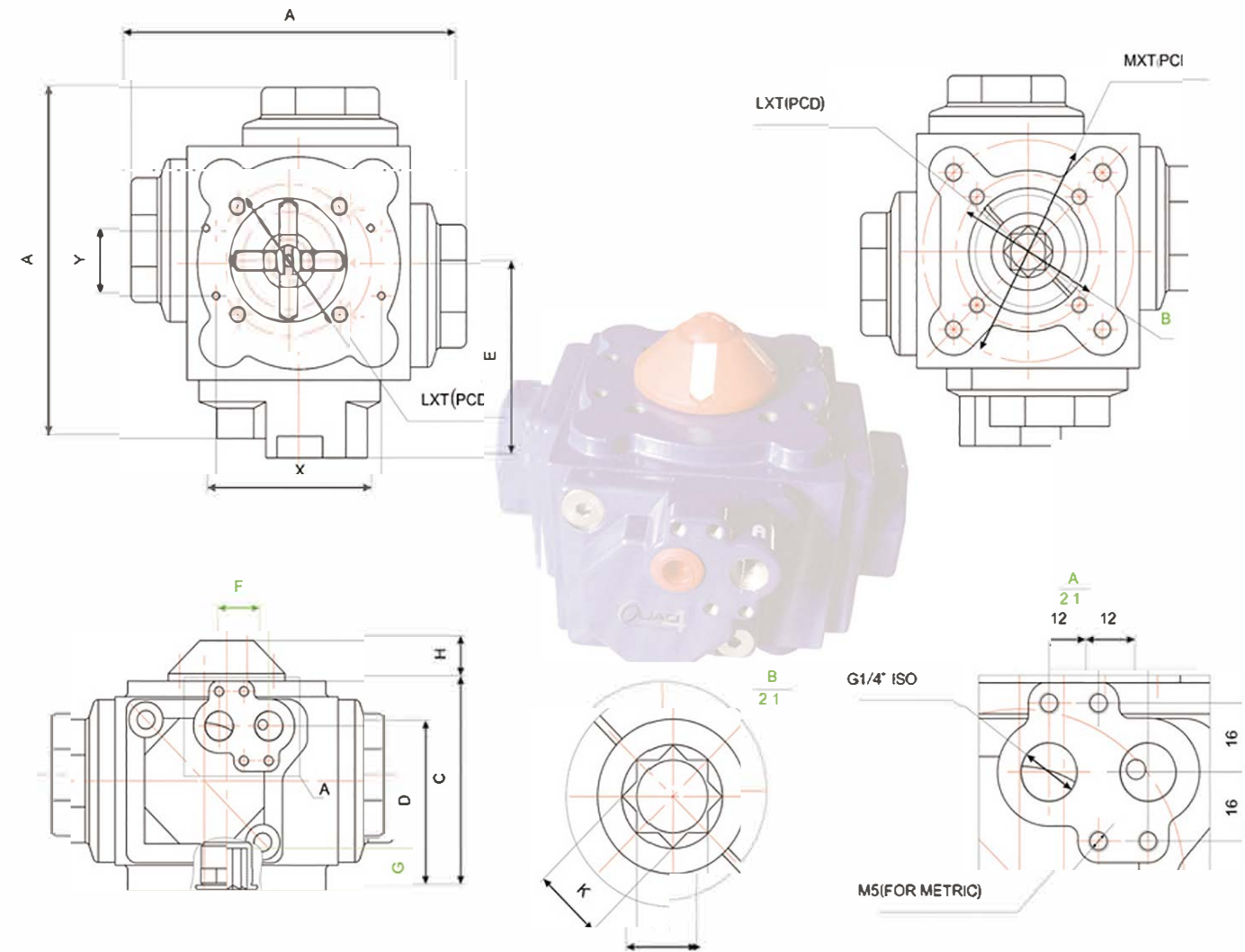
The cube-shaped configuration of the actuator positions the pistons so that each piston develops thrust along its own axis, rather than the off-axis thrust, that results from the geometry of most other actuator configurations. Piston side loading, caused by off-axis thrust, does not occur, thus resulting in less stress on the seals.

Nested Springs

four-spring chambers can use up to three different spring sizes, which are nested between the covers and pistons and are aligned by centering rings. Each spring is wound in the opposite direction to its neighbor to avoid entanglement. As there are four cylinders, there are many more spring combination possibilities than with double piston actuators. This results in better solutions for any air supply pressure required. Special painting of the springs provides higher corrosion resistance to the environment, giving more than 250 hours of life in a salt spray bath.



Structure



Dimensions

SIZE	A(SR. DA)	C	D	E	F	G	H	K	L	T	M	T2	X	Y
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
15	113	70.7	52.2	66.5	12.5	13.4	20	9	50	M6x8	70	M8x11	Need Mounting Bracket	
20	132.5	82.5	63.4	77.2	16	16	20	11	50	M6x8	70	M8x11	80	30
25	162	97.6	77	90	20.7	19.5	20	14	70	M8x11	102	M10x14	80	30
30	186	117	93.7	105.5	22.5	23	20	17	70	M8x11	102	M10x14	80	30
35	224	136	104.7	122	23	27	20	22	102	M10x14			80	30
45	272.6	164.5	128.5	146	34.5	33	20	27	102	M10x14	125	M12x18	80	30
60	361	218	180	141.5	93.5	43	30	36	140	M16x24			130	30
75	433	268	222	166	110	43	30	36	160	M20x30			130	30

Less Wear

With its unique 4-piston design, the achieves a more uniform load distribution than do single and double piston actuators, therefore greatly reducing gear wear at the points of contact between rack and pinion. The force-balanced piston with its shorter stroke prevents uneven wear of O-rings, gear and pistons. This eliminates the need for bearings and reduces the number of soft parts, thereby resulting in longer maintenance schedules and low cost of repair kits. The high surface finish of the four cylinder is protected from wear due to the hardened surface created by the anodizing treatment.

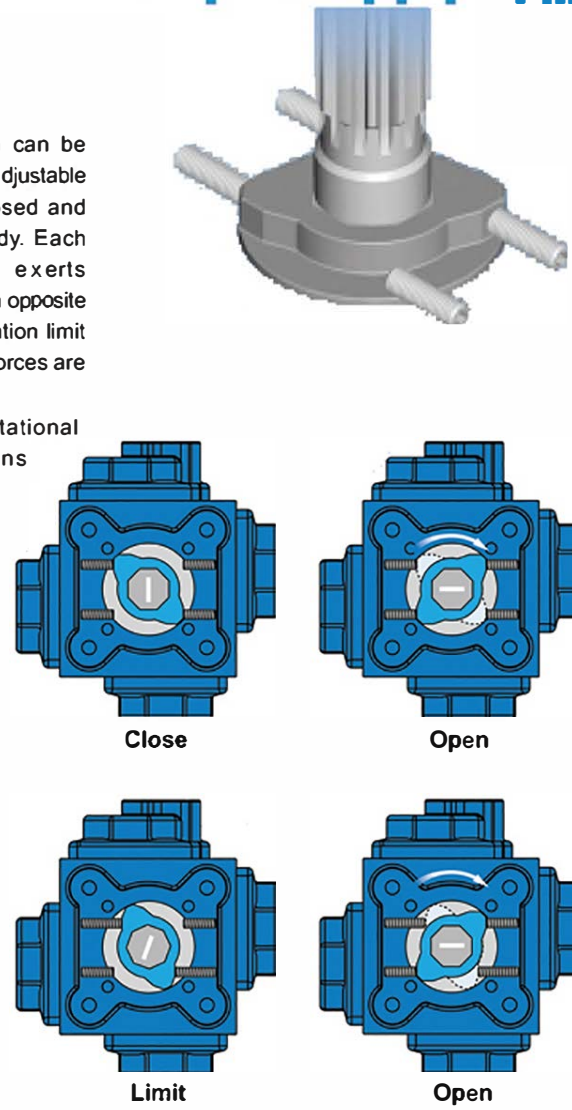
Indicator & Puck



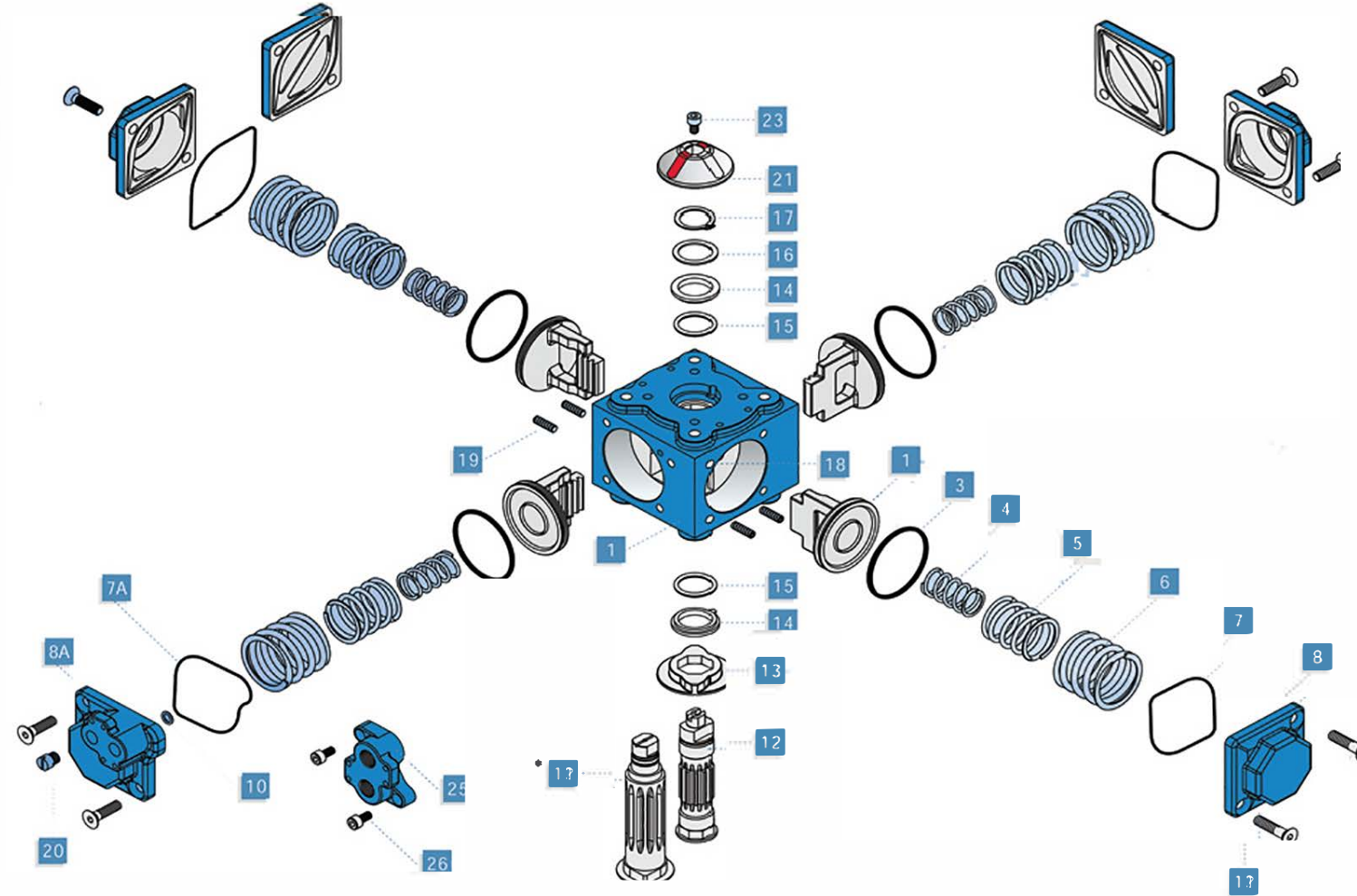
A highly visible indicator with flow direction arrows is snapped to the pinion providing easy identification of valve position. The indicator snap-on arrows allow true positioning of any type of valve porting. A puck with three position signaling inserts and a highly visible indicator with flow direction arrows is bolted to the pinion to provide a cost effective option for valve monitoring.

Limit Stop

The pinion and stop rotation can be adjusted by four large diameter adjustable set screws diametrically opposed and threaded into the actuator body. Each opposing pair of screws exerts simultaneous and equal forces on opposite sides of the stop when the rotation limit is reached, thus, no off-center forces are generated. The stop allows for +/-5° of rotational adjustment in both directions of travel. Any intermediate position can be achieved with a longer set of stop screws. This feature is built into the actuator stop mechanism and eliminates the need for additional plates and screws. The stop material is St.St. for better wear and corrosion resistance.



Parts List



Description	Qty	Material
1 Body	1	AL 356-T6
2 Piston	4	AL 356/380
3 Piston O-Ring	4	Buna N, Viton, EPDM
4 Inner Spring	4	Spring steel, Painted
5 Middle Spring	4	Spring steel, Painted
6 Outer Spring	4	Spring steel, Painted
7 Cover O-Ring	3	Buna N, Viton, EPDM
7a Namur Cover O-Ring	1	Buna N, Viton, EPDM
8 Spring Return Cover	3	AL 380
8a Namur Cover	1	AL 380
10 Air Supply O-Ring	1	Buna N, Viton
11 Cover Screw	8-16	ST. ST.
12 Pinion	1	Steel E.N.Coated

Description	Qty	Material
13 Stop	1	ST.ST 316
14 Thrust Washer	2	Delrin, NRG, UHMWPE
15 Pinion O-Ring	2	Buna N, Viton, EPDM
16 Disc Bearing	1	ST.ST / Delrin
17 Circlip	1	ST.ST
18 Pad	4	Delrin, NRG, UHMWPE
19 Stroke Adjustment Screw	4	ST. ST.
20 Exhaust Plug (Silencer)	1	Delrin, (Brass)
21 Indicator	1	Plastic (ABS), Red & White
22 Puck	1	Plastic (ABS), Red & White
24 Tag (not shown)	4	ST.ST
25 Namur insert	1	AL 380
26 Insert screw	2	ST.ST

*NOTE: C75 PINION (12) & STOP (13) ARE ONE PIECE