HABONIM
Industrial Valves & Actuators

Inspired By Challenge

Pneumatic actuator

Introduction

Proven advantage

The COMPACT actuator is a quarter-turn rack & pinion pneumatic actuator that doubles the torque of standard pneumatic actuators. The superior performance is achieved by Habonim's patented four piston design, which generates torque around a centrally located piston. This translates into double the power for the same size actuator or half the size for the same amount of power.

Space saving, fast acting

The COMPACT has four small cylinders, each located on one of the four sides of the cube.
The smaller pinion and shorter travel distance of the pistons in the COMPACT require less air pressure than a larger double-piston actuator to produce the same torque output. The end result is faster response times for emergency shutdown, lower air pressure for operation and reduced maintenance.

Technical summary

Pressure range	20-120 PSI (1.5 - 8 bar) for Double Acting (DA) actuators 30-120 PSI (2- 8 bar) for Spring Return (SR) actuators		
Size range	C15, C20, C25, C30, C30M, C35, C35M, C45, C45M, C60, C60M, C75, C75M		
Operating temperature	NBR	-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)
	NBR FX428	-53 °C to 100 °C	(-63 °F to 213 °F)
Compressed gas	Air, Nitrogen, CO_2, Natural gas (sweet)		

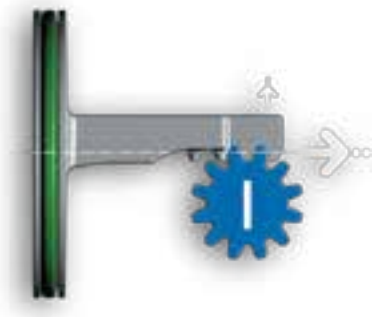
Standards of compliance

Factory certification	ISO 9001-2008	Quality management system
Actuator design	ISO 5211	Industrial valves - part-turn actuator attachments
	VDI/VDE 3845 (NAMUR)	Industrial process control - pneumatic control valves - Interfaces of valves and auxiliary equipment
Certifications	ATEX 94/9/EC	equipment and protective systems intended for use in potentially explosive atmospheres
	DNV	Rules of classification of ships 'Det Norske Veritas' offshore standards
	IEC 61508-2 SIL 2/3	Safety integrity level - functional safety of electrical/ electronic/programmable electronic safety-related systems (optional for actuated unit only)
Documentation	EN 10204 2.2 / 3.1 / 3.2	Metallic materials - types of inspection documents

Main pneumatic actuator features

Balanced forces

The cube-shaped configuration positions the pistons in a way that allows each piston to develop thrust along its own axis with zero side load. This efficient design eliminates the use of guide rods and thrust bearings. The result is less stress on the seals than off-axis piston thrust, which is caused by the piston side loading that is inherent in the geometry of traditional actuator configurations.



Less air consumption

Fast action is one of the most attractive features of the COMPACT 4-piston actuator. The distinctive four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel and response time.

Less wear

The COMPACT's unique 4-piston design achieves a more uniform load distribution than standard single- or double-piston actuators, therefore greatly reducing the wear on gears at the points of contact between rack and pinion. The force-balanced, shorter-stroke piston prevents uneven wear of O-rings, gears and pistons. This design eliminates the need for bearings and guiding rods and reduces the number of soft parts, thereby resulting in longer maintenance schedules and lower cost of repair kits. The surface of the four cylinders is hardened by an anodizing treatment, which protects their high surface finish.

Fast action

Fast action is one of the most attractive features offered by the COMPACT 4-piston actuator. The unique four-piston design allows for a smaller diameter actuator pinion that significantly shortens piston travel, resulting in a shorter response time.

Superior corrosion resistance

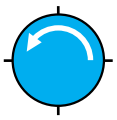
The body and covers are anodized internally and externally to protect against corrosive atmospheres tested to more than 336 hours of life in a salt spray bath. An external epoxy base layer and a second layer of polyurethane paint provide additional protection against aggressive environments. Optional: Electroless-Nickel (EN) coating of body, covers and pistons.

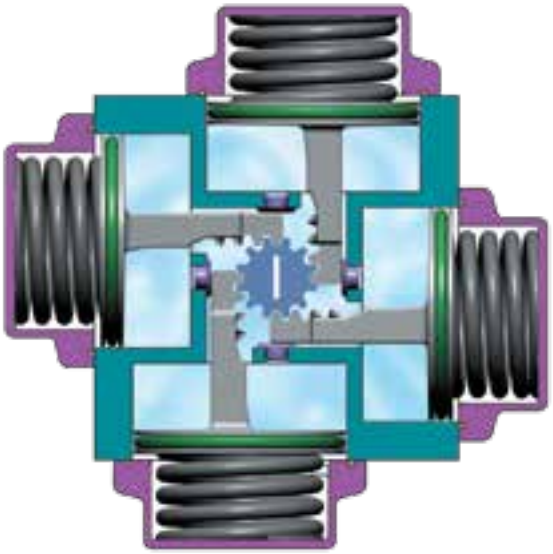
Spring return and double acting configurations

The COMPACT can be configured for either spring return or double-action operation. In both cases the air supply to drive the pistons flows into Port A of the NAMUR cover. Port A is connected to the center chamber, and Port B is connected to the four outside chambers.

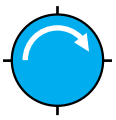
Spring return (fail-safe)

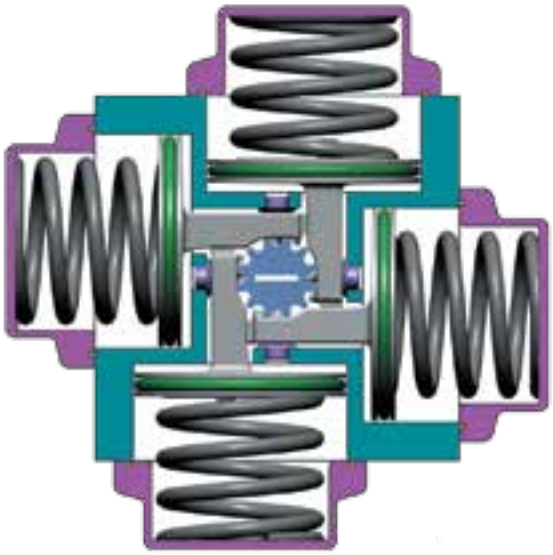
Pressure entering Port A to open:
Center chamber is pressurized and pistons move outward
Springs are compressed
Pinion rotates counterclockwise





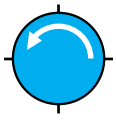
Pressure exiting Port A to close:
Air released from center chamber
Springs drive pistons inward
Pinion rotates clockwise

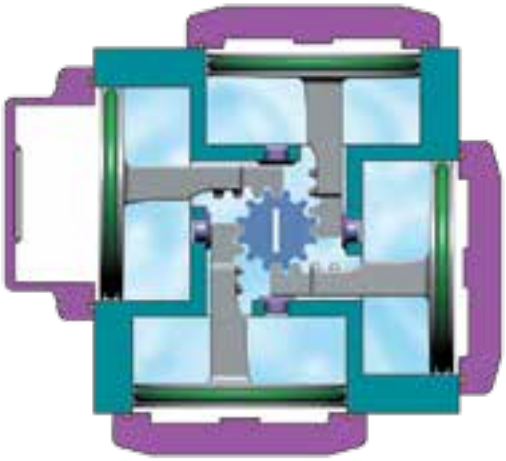




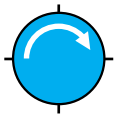
Double action (increased torque)

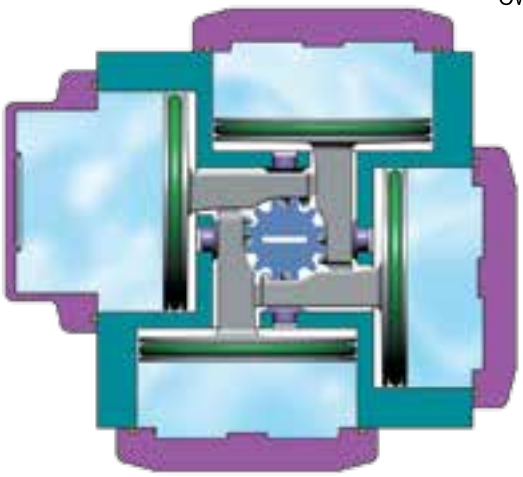
Pressure entering Port A to open:
Center chamber is pressurized
Pistons move outward
Pinion rotates counterclockwise





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





Main pneumatic actuator components

Pinion

The pinion has a double-square female drive on its bottom plane that complies with ISO 5211 standard. The top plane has the NAMUR slot for attachment to switches or positioners. There is a machined flat below the NAMUR interface to enable manual operation of the actuator with a wrench. The pinion is made from carbon steel with Electroless-Nickel (EN) plating that results in a hard-wearing surface with added protection against corrosive environments.

Limit stop

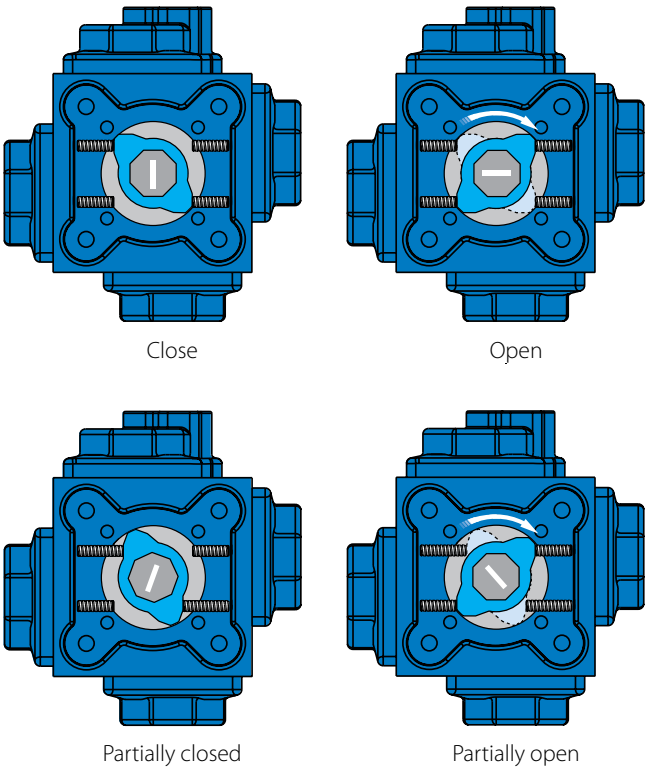
The pinion and stop rotation can be adjusted by four large-diameter, diametrically-opposed adjustable set-screws that are threaded into the actuator body.
Each opposing pair of screws exerts simultaneous and equal force on opposite sides of the stop when the rotation limit is reached, thus preventing the generation of off-center forces.
The stop screws allow for +/-5° rotation adjustment in both directions of travel. Larger span 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 stainless steel for better wear and corrosion resistance.

Indicator & puck

A highly visible indicator with flow direction arrows is snapped on to the pinion, to provide easy identification of the valve position. These indicator arrows allow true positioning of any type of valve porting. The modular design makes it easy to change the indicator to match various flow pattern.

Safety features

The COMPACT's built-in safety features ensure secure and safe operation.
Assembly and dismantling of the actuator are simple tasks. Long cover-bolts for spring return actuators relieve the spring load before they disengage from their threads. Before the pistons can be removed, the stop screw must be released and the pinion removed thus ensuring that any trapped and potentially hazardous pressure in the body will escape.

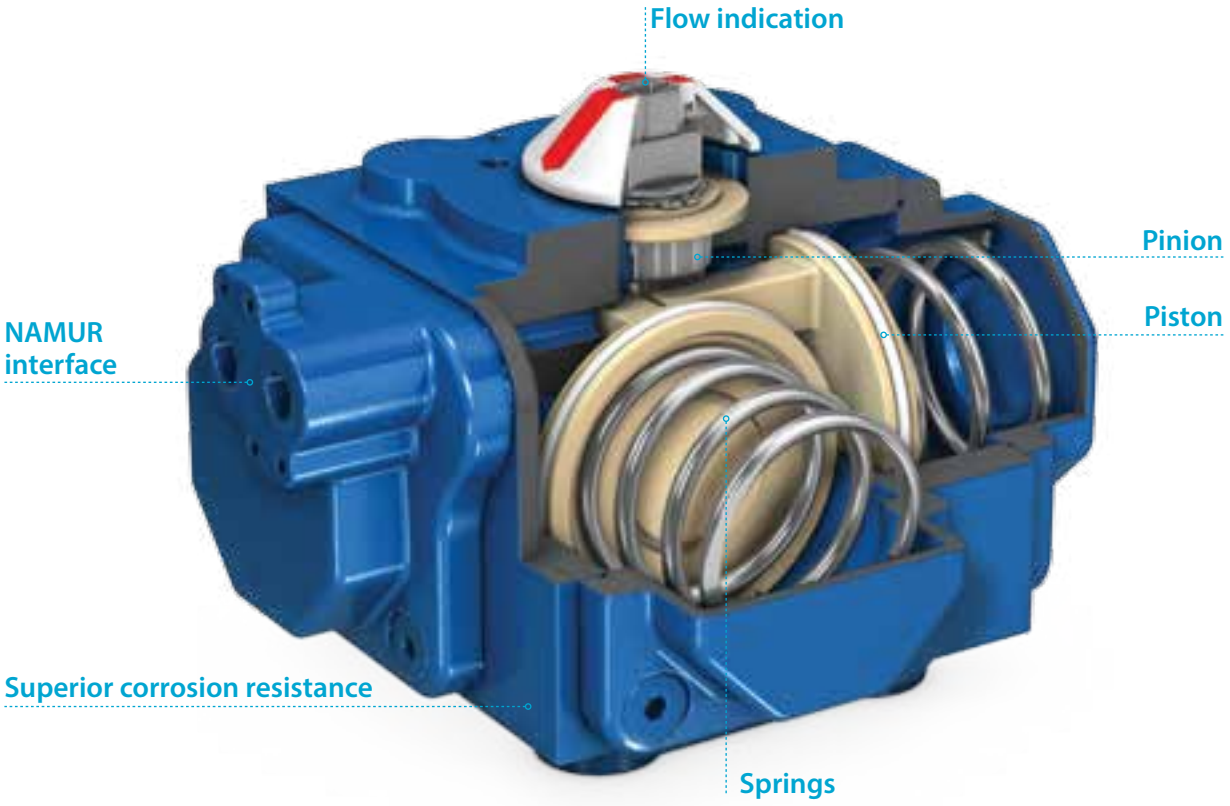


Nested springs

The COMPACT can be used with up to three different spring sizes for the spring that, in each of the four cylinders, is nested between the cover and the piston and aligned by a centering ring. Each spring is wound in the opposite direction to its neighbor to avoid entanglement. All the springs act at the piston center axis so that no side load will occur if one spring fails to operate. By virtue of the four-cylinder design, there are many more spring combination possibilities than with double piston actuators, providing superior solutions for any air supply pressure required. Special painting of the springs provides higher corrosion resistance to the environment, resulting in more than 250 hours of life in a salt spray bath.

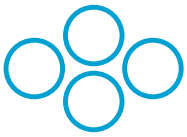
Spring cartridge

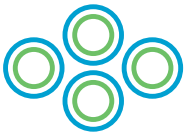
Using a modified spring set in a cartridge improves the torque characteristics of the COMPACT actuator. A spring cartridge is available only in the C30M, C35M, C45M, C60M and C75M actuators. Modifications include deeper covers to allow sufficient volume for the spring cartridge, thereby increasing the overall dimensions of the actuator. The spring cartridge is comprised of a shaped tube in which the extended springs have been preloaded and are held safely in place by two rigid discs. Changing a spring set configuration in this design requires changing the complete cartridge.

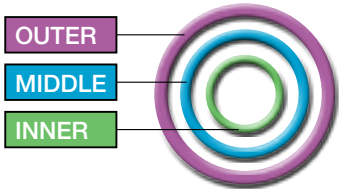


Spring combinations

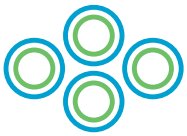
C15 only

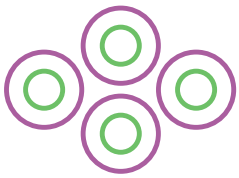
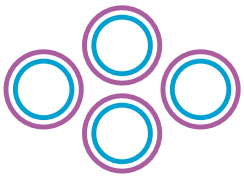
Code	Spring combinations
1A	
1B	

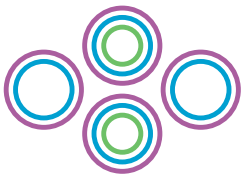
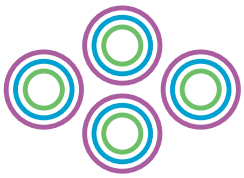
Code	Spring combinations
1B2	
2	



C20-C75M

Code	Spring combinations
2AB	
2A	
2A2B	

Code	Spring combinations
2B	
2A3	
2C	

Code	Spring combinations
2C3	
3	

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.

NAMUR output drive for limit switches and positioners

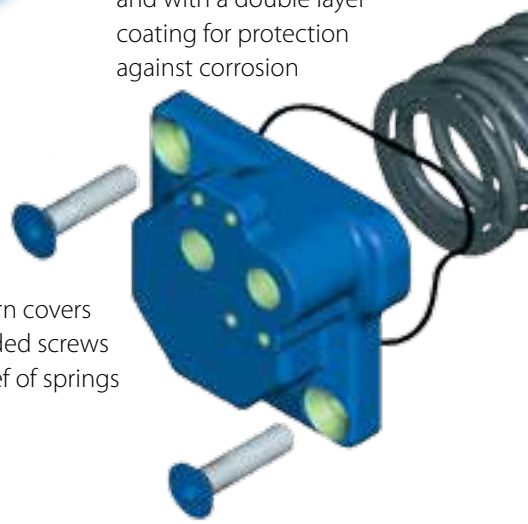
NAMUR VDI/VDE 3845 connection to limit switches

Springs painted for protection and fitted coaxially in a chamber. Various spring combinations are available to suit varying air pressure requirements

Smaller in the overall size compared to double piston actuators

Spring cartridge:
The modified spring set design improves the torque characteristics of the COMPACT actuator

Rugged body construction, anodized and with a double layer coating for protection against corrosion

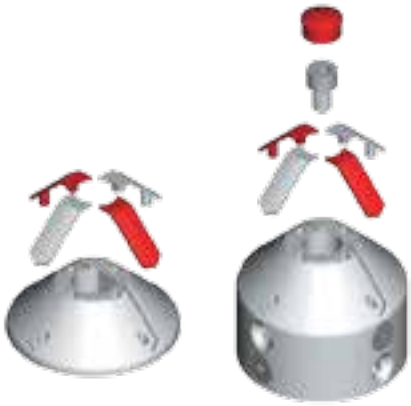


Spring return covers with extended screws for safe relief of springs

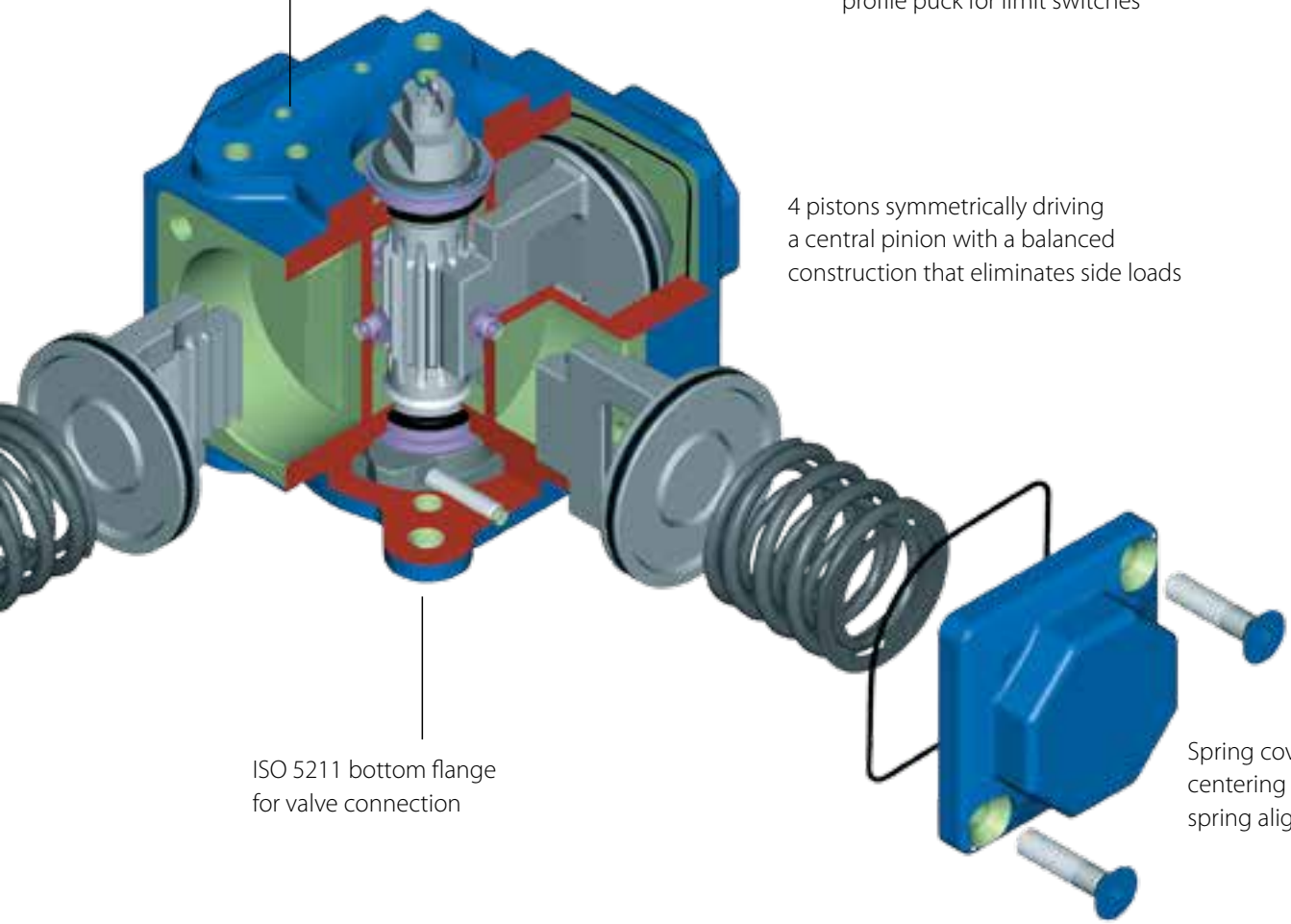
NAMUR interface for solenoid mounting

Limit stop for open-close and intermediate positions

General



Visible position indicator with colored arrows and a high profile puck for limit switches



4 pistons symmetrically driving a central pinion with a balanced construction that eliminates side loads

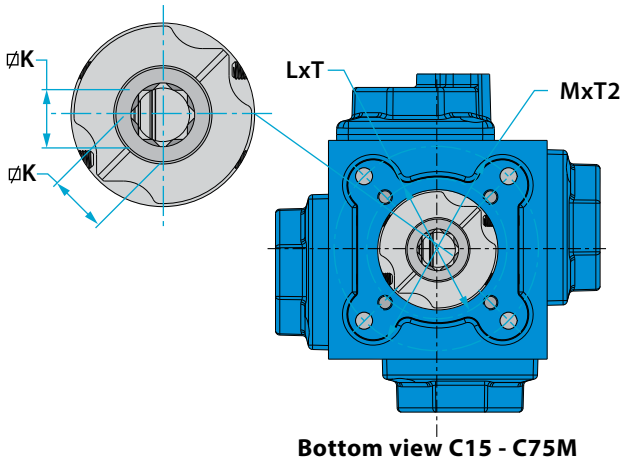
ISO 5211 bottom flange for valve connection

Spring covers with centering rings for spring alignment

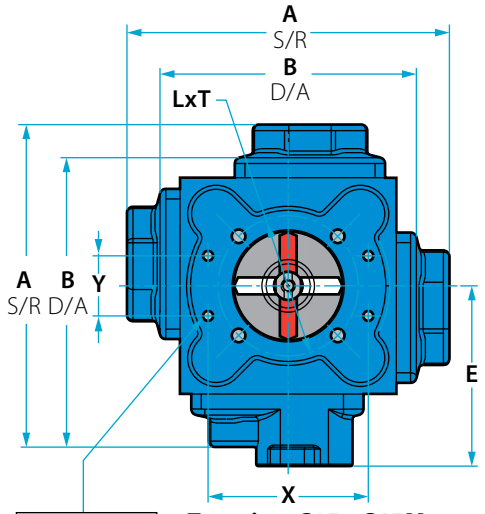
Patented 4-piston actuator provides double the torque output of a double piston actuator

Compact size with flat covers for double acting applications and minimum air consumption

Actuator dimensions

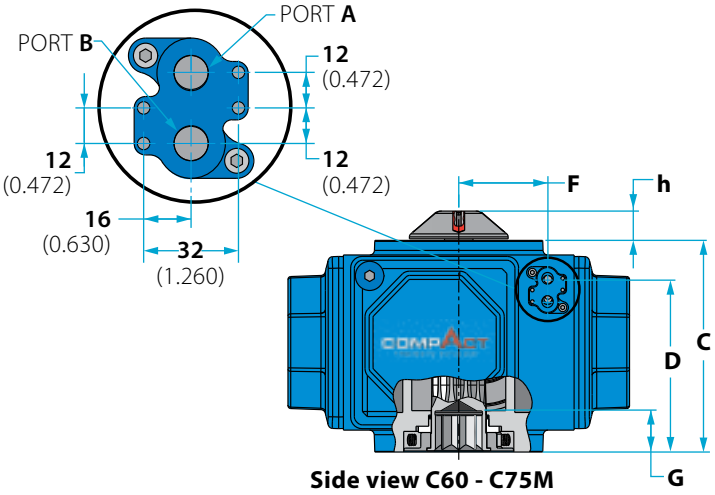


Bottom view C15 - C75M

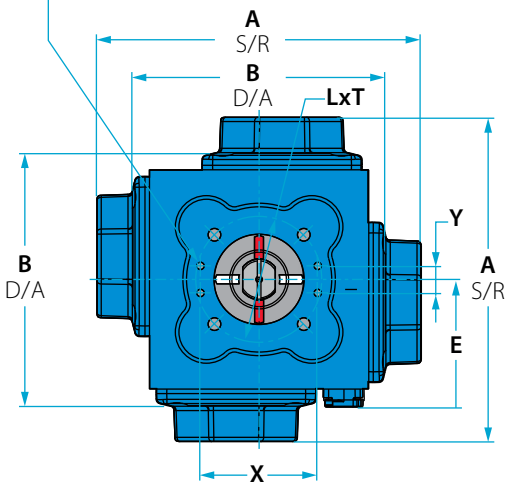


Top view C15 - C45M

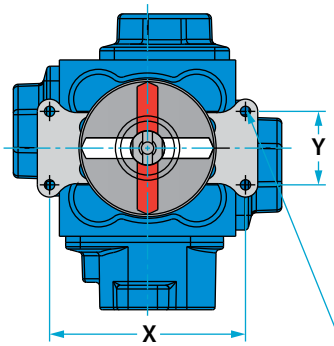
M5 (for metric)
10/24 UNC
(for imperial)



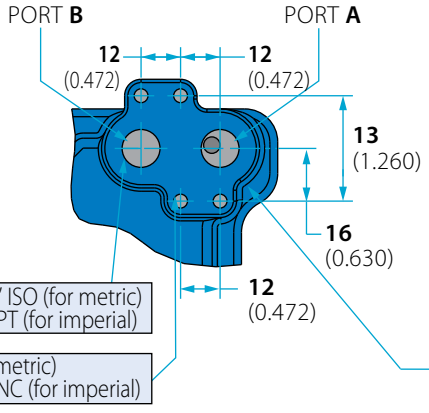
Side view C60 - C75M

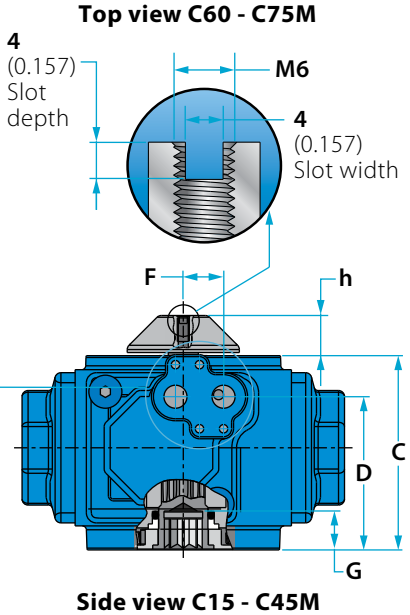


Top view C60 - C75M



Top view C15 only
VDI/VDE brackets on request





Side view C15 - C45M

VDI / VDE 3845	
Sizes	**X x Y x h**
C15 - C45M	80 x 30 x 20
C60 - C75M	130 x 30 x 30

Port **A** is connected to the center chamber
Port **B** is connected to the outside chambers

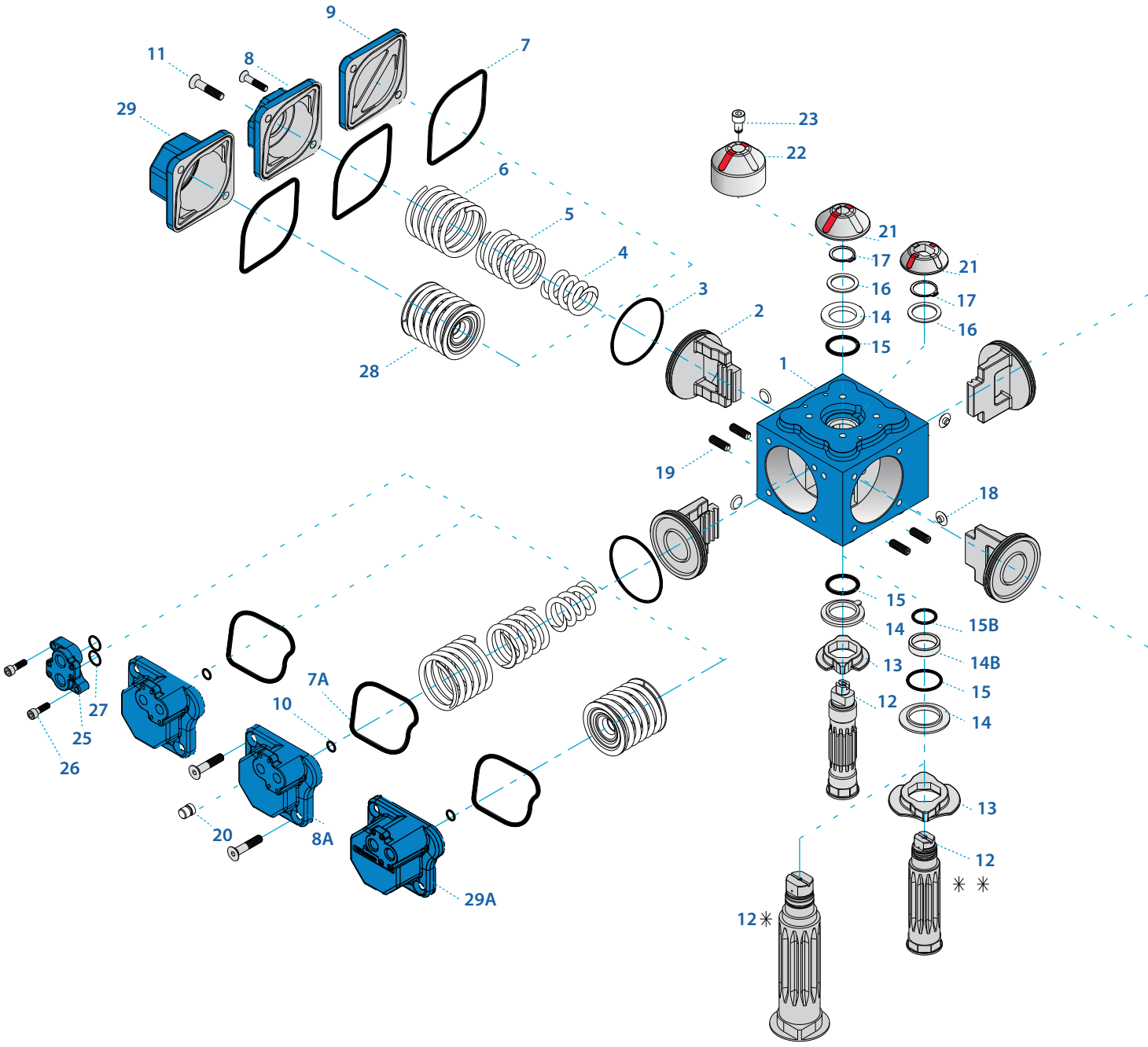
Size	A S/R		B D/A		B1 D/A		C		D		E		F		G		Øk		L PCD		T Thread		M PCD (2)		T2	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
C15	110	4.31	86	3.39	97.8	3.85	68.8	2.71	50.8	2.00	66.0	2.60	16.0	0.63	13.5	0.53	9	0.35	50 (F05)	1.97 (F05)	M6x8	¼"X0.314	-	-	-	-
C20	131	5.17	102	4.03	117.0	4.6.0	80.5	3.17	61.5	2.42	77.2	3.04	16.5	0.65	15.0	0.59	11	0.43	50 (F05)	1.97 (F05)	M6x8	¼"X0.314	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43
C25	161	6.34	132	5.24	147.0	5.79	97.0	3.82	76.5	3.01	90.0	3.54	20.0	0.79	19.5	0.77	14	0.55	70 (F07)	2.76 (F07)	M8x9	5⁄16"X0.354	102 (F10)	4.02 (F10)	M10X11	3⁄8"X0.43
C30	186	7.33	151	5.94	169.0	6.64	116.0	4.58	93.4	3.68	105.0	4.15	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43	102 (F10)	4.02 (F10)	M10X12	3⁄8"X0.47
C30M	216	8.50	-	-	-	-	116.0	4.58	93.4	3.68	120.0	4.72	22.3	0.88	22.0	0.87	17	0.67	70 (F07)	2.76 (F07)	M8x11	5⁄16"X0.43	102 (F10)	4.02 (F10)	M10X12	3⁄8"X0.47
C35	222	8.74	182	7.15	202.0	7.94	135.0	5.31	102.0	4.02	114.0	4.48	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3⁄8"X0.51	-	-	-	-
C35M	256	10.07	-	-	-	-	135.0	5.31	102.0	4.02	131.0	5.15	22.5	0.89	26.0	1.02	22	0.87	102 (F10)	4.02 (F10)	M10x13	3⁄8"X0.51	-	-	-	-
C45	269	10.59	221	8.70	245.0	9.65	164.0	6.46	127.0	5.00	147.0	5.79	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	½"X0.59	102* (F10)	4.02* (F10)	M10X15	3⁄8"X0.59
C45M	303	11.93	-	-	-	-	164.0	6.46	127.0	5.00	164.0	6.45	31.0	1.22	33.0	1.30	27	1.06	125 (F12)	4.92 (F12)	M12x15	½"X0.59	102* (F10)	4.02* (F10)	M10X15	3⁄8"X0.59
C60	360	14.17	285	11.22	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C60M	390	15.35	-	-	-	-	218.0	8.58	180.0	7.09	141.0	5.57	94.0	3.70	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C75	437	17.20	342	13.46	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-
C75M	467	18.38	-	-	-	-	270.0	10.63	223.0	8.76	166.0	6.54	110.0	4.33	43.0	1.69	36	1.42	140 (F14)	5.51 (F14)	M16x18	5⁄8"X0.71	-	-	-	-

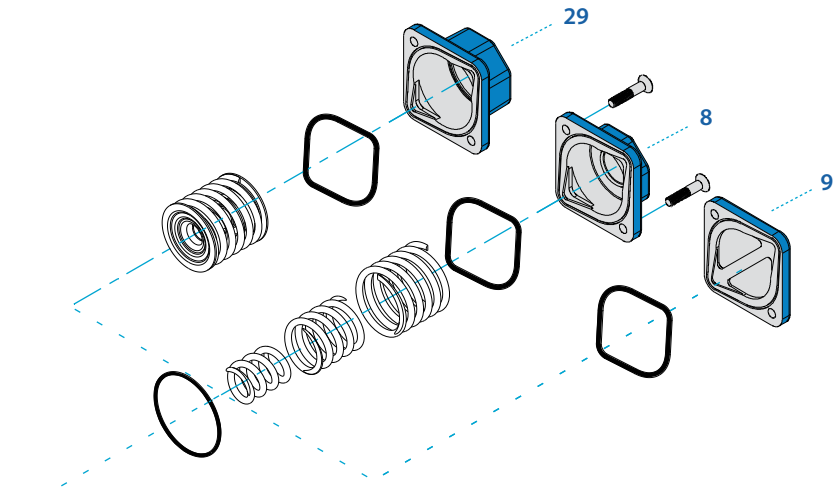
* The C45 bottom PCD can be either F12 or F10, but not both. The standard is F12. When ordering C45 with F10, you must add it to the code.

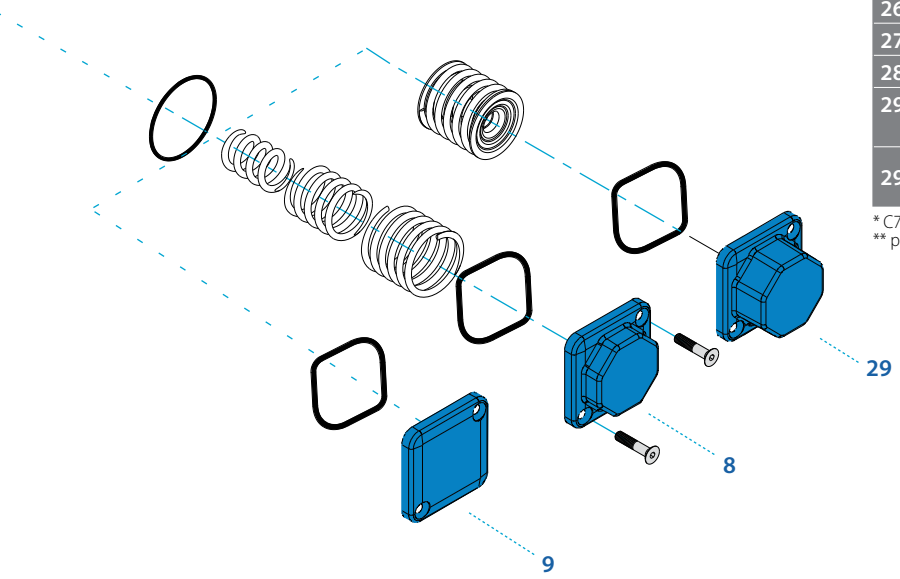
Technical Data

Actuator size		Unit	C15	C20	C25	C30	C30M	C35	C35M	C45	C45M	C60	C60M	C75	C75M
Weight Spring return		kg	1.10	1.90	3.50	5.00	6.10	9.00	10.40	15.00	16.70	35.00	39.40	64.00	72.00
		lb	2.40	4.20	7.70	11.00	13.40	19.80	22.00	33.10	37.40	77.20	86.00	141.10	158.00
Weight Double acting		kg	0.90	1.50	2.60	4.40	-	7.10	-	11.00	-	26.00	-	51.00	-
		lb	1.98	3.30	62.00	9.70	-	15.70	-	24.30	-	57.30	-	112.40	-
Air consumption per stroke actual volume	CCW	liter	0.07	0.12	0.25	0.44	0.44	0.74	0.74	1.33	1.33	3.20	3.2	5.76	5.76
	CW		0.09	0.15	0.33	0.54	-	0.80	-	1.33	-	3.20	-	5.76	-
	Total		0.16	0.27	0.58	0.98	-	1.54	-	2.66	-	6.40	-	11.52	-
Air consumption per stroke actual volume	CCW	in^3	4.30	7.30	15.00	27.00	27.00	45.00	45.00	81.00	81.00	195.00	195	351.00	351.00
	CW		5.50	9.20	20.00	33.00	-	49.00	-	81.00	-	195.00	-	351.00	-
	Total		9.80	16.50	35.00	60.00	-	94.00	-	162.00	-	391.00	-	703.00	-
Stroke time with S.V. with 0.9 Cv at 80 psi	D/A	sec.	0.10	0.13	0.20	0.24	-	0.40	-	0.75	-	1.50	-	2.50	-
	S/R Open		0.10	0.15	0.23	0.29	0.30	0.54	0.60	1.00	1.10	2.20	2.4	3.70	4.00
	S/R Close		0.15	0.15	0.23	0.28	0.28	0.48	0.50	0.77	0.80	1.60	1.6	2.90	2.90

Actuator components & materials







Item	Description	Material specifications	Qty.
1	Body	AL 356-T6	1
2	Piston	AL 356/380	4
3	Piston O-ring	NBR. Viton, EPDM, NBR FX428	4
4	Inner spring	Spring steel, painted	4
5	Middle spring	Spring steel, painted	4
6	Outer spring	Spring steel, painted	4
7	Cover O-ring	NBR, Viton, EPDM, NBR FX428	3
7a	NAMUR cover O-ring	NBR, Viton, EPDM, NBR FX428	1
8	Spring return cover	AL 380	3
8a	NAMUR cover	AL 380	1
9	Double acting cover	AL 380	3
10	Air supply O-ring	NBR, Viton, EPDM, NBR FX428	1
11	Cover screw	Stainless steel	8-16
12	Pinion	Steel ENP	1
13	Stop plate	Stainless steel CF8M	1
14	Thrust washer	Delrin, CF PTFE, UHMWPE	2
14B	Bearing	Delrin, CF PTFE, UHMWPE	1
15	Pinion O-ring	NBR. Viton, EPDM, NBR FX428	2
15B	Top pinion O-ring	NBR. Viton, EPDM, NBR FX428	1
16	Disc bearing	Stainless steel / Delrin	1
17	Circlip	Stainless steel, spring steel zinc plated	1
18	Pad	Delrin, CF PTFE, UHMWPE	4
19	Stroke adjustment screw	Stainless steel	4
20	Exhaust plug (silencer)	Delrin, brass	1
21	Indicator	Plastic ABS, red & white	1
22	Puck	Plastic ABS, red & white	1
23	Indicator screw	Stainless steel	1
24	Tag (not shown)	Stainless steel	4
25	NAMUR insert	AL 380	1
26	Insert screw	Stainless steel	2
27	NAMUR insert O-ring	NBR, Viton, EPDM, NBR FX428	2
28	Spring cassette	Spring steel, painted	4
29	Spring return cover for M series	AL 380	3
29A	NAMUR cover for M series	AL 380	1

* C75 & C75M Pinion (12) and stop (13) are one pcs
** pinion assembly for actuators C35 and above

Torque chart (Nm)

Double acting

Size	Operating pressure (bar)						
	3.0	4.0	5.0	5.5	6.0	7.0	8.0
C15	10	14	17	19	21	24	27
C20	18	25	32	35	38	45	51
C25	39	52	65	72	79	92	105
C30	62	84	107	119	130	153	176
C35	114	151	190	208	226	265	304
C45	222	297	371	408	445	519	593
C60	527	703	879	967	1,055	1,230	1,406
C75	974	1,299	1,624	1,786	1,948	2,273	2,596

Spring return single acting

Size	Spring set	Air pressure - bar (psi)														Spring torque	
		3.0 (44)		4 (58)		5 (73)		5.5 (80)		6 (87)		7 (102)		8 (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	**12**	**7**	**13**	**9**	16	11	20	15	12	7
	2									11	6	**14**	**8.5**	**18**	**12**	15	9
C20	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
	2C							19	10	22	13	**28**	**19**	35	25	25	16
	3									19	9	24	15	**30**	**21**	29	19
C25	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
	2B					**43**	**27**	50	34	57	41	70	53	83	66	36	21
	2C					38	18	**45**	**24**	**52**	**31**	64	44	77	56	47	27
	3									47	21	**60**	**34**	**73**	**46**	57	31
C30	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
	2C					64	25	**73**	**39**	**85**	**50**	107	72	130	94	78	44
	3									75	33	**98**	**55**	**120**	**77**	96	54
C30M	2A	**27**	**19**	48	40	70	62	81	73	92	84	113	106	135	128	42	34
	2A2B	21	12	**42**	**33**	64	55	75	67	85	77	107	99	129	121	49	40
	2B			36	26	**57**	**48**	69	60	79	70	101	92	123	114	56	46
	2C					48	36	**59**	**47**	**69**	**58**	91	80	113	102	69	57
	3									58	44	**80**	**66**	**102**	**88**	83	68
C35	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
	2C							**133**	**68**	**151**	**86**	189	123	227	160	137	73
	3									135	63	**173**	**100**	**211**	**137**	161	89
C35M	2A	**54**	**42**	89	77	126	114	143	131	160	148	197	185	234	223	70	57
	2A2B	43	28	**78**	**63**	115	110	132	117	149	134	186	171	223	209	85	69
	2B			67	49	**104**	**86**	121	103	139	120	176	157	213	195	99	80
	2C					86	65	**103**	**82**	**120**	**99**	157	136	194	173	122	100
	3									102	76	**139**	**114**	**176**	**151**	146	119
C45	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
	2B			179	82	**252**	**153**	288	188	325	224	398	295	471	366	212	115
	2C					223	102	**260**	**137**	**296**	**173**	369	244	442	315	265	144
	3									268	122	**341**	**193**	**414**	**264**	318	173
C45M	2A	**90**	**60**	162	131	232	201	267	236	302	271	373	342	443	412	134	107
	2A2B	110	83	**181**	**154**	251	225	286	260	321	295	392	365	462	436	160	127
	2B			142	107	**213**	**177**	248	213	283	248	353	318	424	388	184	147
	2C					180	136	**215**	**171**	**250**	**206**	321	277	391	347	228	182
	3									216	163	**286**	**234**	**357**	**304**	273	218
C60	2A	**328**	**160**	501	329	675	498	762	583	848	667	1021	835	1194	1004	360	194
	2A2B			**478**	**285**	651	454	738	538	824	623	997	791	1170	960	406	218
	2B			442	221	**615**	**390**	702	475	789	559	961	727	1134	896	473	254
	2C					548	268	**635**	**352**	**721**	**437**	894	605	1067	774	600	323
	3									657	322	**830**	**490**	**1003**	**659**	720	388
C60M	2A	**212**	**148**	379	315	546	483	630	566	714	650	880	816	1047	983	371	304
	2A2B	259	203	**426**	**370**	593	537	677	621	760	704	927	871	1094	1038	314	255
	2B			333	261	**500**	**428**	583	512	667	595	833	762	1000	929	429	353
	2C					411	321	**495**	**404**	**578**	**488**	744	654	912	821	542	447
	3									502	393	**668**	**559**	**835**	**726**	642	527
C75	2A	**614**	**345**	935	657	1255	969	1414	1124	1574	1280	1894	1592	2212	1902	615	350
	2A2B			**891**	**582**	1211	894	1370	1049	1530	1205	1850	1517	2168	1827	693	395
	2B			820	461	**1140**	**773**	1299	928	1459	1084	1779	1396	2097	1706	819	467
	2C					1025	576	**1184**	**632**	**1344**	**887**	1664	1199	1982	1509	1024	584
	3									1229	691	**1549**	**1003**	**1867**	**1313**	1229	700
C75M	2A	**480**	**360**	789	668	1098	977	1252	1131	1406	1285	1714	1594	2021	1900	596	468
	2A2B	406	269	**715**	**578**	1024	887	1177	1041	1331	1195	1640	1503	1947	1810	691	547
	2B			641	488	**949**	**797**	1103	951	1257	1104	1566	1413	1873	1720	786	624
	2C					799	606	**953**	**760**	**1107**	**913**	1415	1222	1722	1529	986	783
	3									959	726	**1268**	**1035**	**1575**	**1342**	1184	938

Torque chart (in-lb)

Double acting

Size	Operating pressure (psi)						
	40	60	70	80	90	100	120
C15	81	125	149	172	188	207	244
C20	146	229	271	311	351	390	468
C25	317	476	555	639	723	802	961
C30	505	769	914	1,052	1,190	1,334	1,611
C35	928	1,382	1,624	1,848	2,073	2,311	2,780
C45	1,807	2,719	3,170	3,622	4,074	4,525	5,429
C60	4,289	6,436	7,511	8,585	9,659	10,725	12,872
C75	7,926	11,893	13,877	15,856	17,834	19,819	23,767

Spring return single acting

Size	Spring set	Air pressure - psi (bar)														Spring torque	
		40 (2.8)		60 (4.1)		70 (4.8)		80 (5.5)		90 (6.2)		100 (6.9)		120 (8.3)			
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
C15	1A	**56**	**32**	92	64	110	93	133	106	156	128	174	148	220	192	53	27
	1B			**73**	**37**	**102**	**68**	115	89	137	101	156	121	201	165	80	44
	1B2					85	42	**106**	**62**	**119**	**82**	139	95	183	137	106	62
	2									101	55	**121**	**74**	**165**	**110**	133	80
C20	2A			**146**	**92**	187	136	230	168	266	201	304	252	375	320	133	80
	2A2B			128	64	**170**	**110**	212	142	247	174	286	226	357	293	159	97
	2B					153	85	**195**	**115**	**229**	**156**	269	200	348	266	186	115
	2C							168	89	201	119	**243**	**165**	320	229	221	142
	3									174	82	208	130	**275**	**192**	257	168
C25	2A	**185**	**89**	330	211	416	306	487	372	568	449	651	538	806	677	248	142
	2A2B			**302**	**174**	390	272	469	345	549	412	633	503	787	641	283	159
	2B					**365**	**229**	443	301	522	375	607	460	760	604	319	186
	2C					322	153	**398**	**212**	**476**	**284**	555	382	705	513	416	239
	3									430	192	**521**	**295**	**668**	**421**	504	274
C30	2A	**290**	**153**	522	366	679	526	805	646	934	769	1085	928	1355	1181	372	230
	2A2B			**476**	**275**	636	441	761	558	897	677	1041	833	1309	1080	469	274
	2B			439	165	**594**	**365**	717	478	851	595	998	755	1263	998	549	319
	2C					543	212	**646**	**345**	**778**	**458**	928	625	1190	861	690	389
	3									687	302	**850**	**477**	**1099**	**705**	850	478
C30M	2A	**217**	**153**	439	366	594	526	717	646	842	769	980	920	1236	1172	372	301
	2A2B	169	97	**385**	**302**	543	467	664	593	778	705	928	859	1181	1108	434	354
	2B			330	238	**484**	**407**	611	531	723	641	876	798	1126	1044	496	407
	2C					407	306	**522**	**416**	**632**	**531**	790	694	1035	934	611	504
	3									531	403	**694**	**573**	**934**	**806**	735	602
C35	2A	**603**	**314**	1016	677	1273	950	1487	1142	1703	1346	1944	1596	2399	2023	655	336
	2A2B	515	209	**916**	**568**	1180	840	1389	1035	1602	1227	1848	1484	2298	1904	770	434
	2B			842	403	**1103**	**696**	1310	876	1520	1071	1770	1336	2216	1749	929	513
	2C							**1177**	**602**	**1382**	**787**	1640	1067	2078	1465	1212	646
	3									1236	577	**1501**	**868**	**1932**	**1254**	1425	788
C35M	2A	**434**	**338**	815	705	1069	967	1266	1159	1465	1355	1709	1605	2142	2042	620	504
	2A2B	346	225	**714**	**577**	976	933	1168	1035	1364	1227	1614	1484	2042	1913	752	611
	2B			613	449	**883**	**730**	1071	912	1273	1099	1527	1362	1950	1785	876	708
	2C					730	552	**912**	**726**	**1099**	**906**	1362	1180	1776	1584	1080	885
	3									934	696	**1206**	**989**	**1611**	**1382**	1292	1053
C45	2A	**1078**	**483**	1904	1208	2376	1723	2805	2115	3232	2518	3696	3002	4568	3818	1407	761
	2A2B			**1804**	**1035**	2283	1561	2708	1938	3131	2335	3601	2829	4468	3635	1584	858
	2B			1639	751	**2139**	**1298**	2549	1664	2975	2051	3453	2560	4312	3351	1876	1018
	2C					1892	866	**2301**	**1212**	**2710**	**1584**	3202	2117	4047	2884	2345	1274
	3									2454	1117	**2959**	**1675**	**3790**	**2417**	2814	1531
C45M	2A	**724**	**483**	1483	1199	1969	1706	2363	2089	2765	2481	3236	2967	4056	3772	1186	947
	2A2B	885	668	**1657**	**1410**	2130	1909	2531	2301	2939	2701	3401	3167	4230	3992	1416	1124
	2B			1300	980	**1808**	**1502**	2195	1885	2591	2270	3063	2759	3882	3552	1628	1301
	2C					1528	1154	**1903**	**1513**	**2289**	**1886**	2785	2403	3580	3177	2018	1611
	3									1978	1492	**2481**	**2030**	**3268**	**2783**	2416	1929
C60	2A	**2639**	**1287**	4587	3012	5728	4226	6744	5160	7764	6107	8859	7245	10931	9192	3186	1717
	2A2B			**4376**	**2609**	5525	3853	6531	4761	7544	5704	8650	6863	10712	8789	3593	1929
	2B			4047	2023	**5219**	**3310**	6213	4204	7223	5118	8338	6308	10382	8203	4186	2248
	2C					4650	2274	**5620**	**3115**	**6601**	**4001**	7757	5249	9769	7086	5310	2859
	3									6015	2948	**7201**	**4251**	**9183**	**6033**	6372	3434
C60M	2A	**1706**	**1191**	3470	2884	4634	4099	5576	5009	6537	5951	7635	7080	9585	9000	3283	2690
	2A2B	2084	1633	**3900**	**3387**	5032	4557	5991	5496	6958	6445	8043	7557	10016	9503	2779	2257
	2B			3049	2390	**4243**	**3632**	5160	4531	6107	5447	7228	6611	9155	8505	3797	3124
	2C					3488	2724	**4381**	**3575**	**5292**	**4468**	6455	5674	8350	7516	4797	3956
	3									4596	3598	**5796**	**4850**	**7645**	**6647**	5682	4664
C75	2A	**4940**	**2776**	8560	6015	10650	8223	12514	9947	14410	11719	16433	13813	20251	17413	5443	3098
	2A2B			**8157**	**5328**	10277	7587	12125	9284	14007	11032	16051	13162	19848	16727	6133	3496
	2B			7507	4221	**9674**	**6560**	11496	8213	13357	9924	15435	12112	19198	15619	7248	4133
	2C					8698	4888	**10478**	**5593**	**12305**	**8121**	14438	10403	18146	13815	9062	5168
	3									11252	6326	**13440**	**8703**	**17093**	**12021**	10877	6195
C75M	2A	**3862**	**2896**	7223	6116	9318	8291	11080	10009	12872	11764	14871	13830	18503	17395	5275	4142
	2A2B	3266	2164	**6546**	**5292**	8690	7527	10416	9213	12186	10940	14229	13041	17825	16571	6115	4841
	2B			5868	4468	**8054**	**6764**	9762	8416	11508	10107	13587	12260	17148	15747	6956	5522
	2C					6781	5143	**8434**	**6726**	**10135**	**8359**	12277	10603	15765	13998	8726	6930
	3									8780	6647	**11002**	**8980**	**14419**	**12286**	10478	8301

Emergency Shut-Down system (ESD)

Short response time

A short response time is essential for valves operating in Emergency Shut Down (ESD) systems such as in refineries, power stations, mining and other applications where Safety Integrity Level (SIL) loops are a mandatory requirement.
The values in the table below indicate the closing time (seconds) of an unloaded actuator and a loaded actuator with torque values simulating real-life situations. The stroke time measures the actual movement of the actuator without a solenoid or any other accessory delay.

COMPACT actuator stroking time (sec.)

¼" NAMUR solenoid valve

COMPACT Actuator for emergency Shut-down (ESD) systems		¼" NAMUR solenoid valve Cv = 0.9, 80 Psi instrument air pressure feed by 6 mm I.D. pipe			¼" Non- NAMUR solenoid valve, Cv = 1, 80 Psi Instrument air pressure feed by 6 mm I.D. pipe + ¼" quick exhaust
		Basic design		Basic design + Breather Block	
		Solenoid configuration			
Size	Load	3/2	5/2	3/2	3/2
C20-2C	0	0.09	0.08	0.05	0.05
	10 Nm / 89 in-lb	0.14	0.09	0.07	0.07
C25-2C	0	0.17	0.12	0.07	0.06
	22 Nm / 195 in-lb	0.35	0.15	0.17	0.15
C30-2C	0	0.26	0.20	0.12	0.10
	36 Nm / 319 in-lb	0.49	0.23	0.25	0.20
C35-2C	0	0.39	0.29	0.26	0.17
	60 Nm / 531 in-lb	0.58	0.35	0.41	0.27
C45-2C	0	0.71	0.52	0.43	0.30
	116 Nm / 1027 in-lb	1.23	0.64	0.76	0.57
C60-2C	0	1.79	1.30	1.21	0.73
	260 Nm / 2300 in-lb	2.36	1.38	1.73	1.13
C75-2C	0	2.78	2.00	1.86	1.08
	460 Nm / 4071 in-lb	3.90	2.42	2.91	1.75

½" Non-NAMUR solenoid valve

COMPACT Actuator for Emergency Shut-Down (ESD) systems		½" Non-NAMUR solenoid valve Cv = 3.5, 80 Psi instrument air pressure feed by 9.5 mm I.D. pipe			½" Non- NAMUR solenoid valve, Cv = 3.5, 80 Psi Instrument air pressure feed by 9.5 mm I.D. pipe + ½" quick exhaust
		Basic design		Basic design + Breather Block	
		Solenoid configuration			
Size	Load	3/2	5/2	3/2	3/2
C60-2C	0	0.71	0.49	0.99	0.53
	260 Nm / 2300 in-lb	1.22	0.60	1.50	0.80
C75-2C	0	1.12	-	-	1.04
	460 Nm / 4071 in-lb	1.79	-	-	1.52

NAMUR & ISO interface

An extensive range of accessories such as solenoids, positioners and limit switches are available for direct mounting to the COMPACT actuator. Any accessory whose connections comply with ISO 5211 and VDI/VDE 3845 (NAMUR) mounting can be connected to the actuator.

NAMUR VDI/VDE 3845

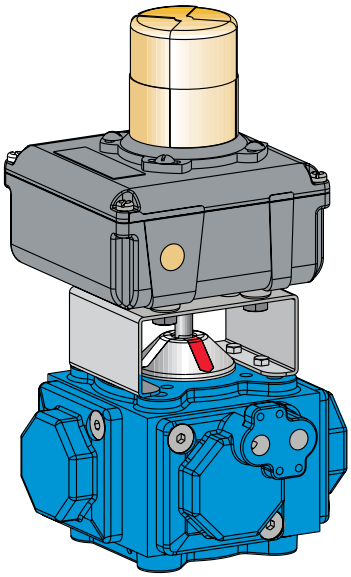
This standard provides for a range of accessories such as limit switches, pucks, indicators and positioners with a VDI/VDE interface so that they can be easily mounted onto the actuator top face.

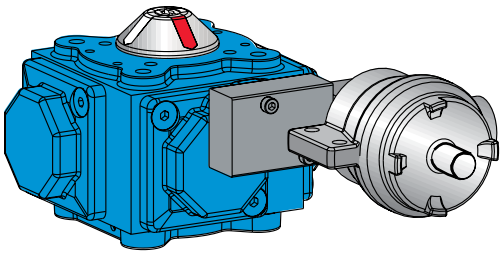
NAMUR solenoid mounting

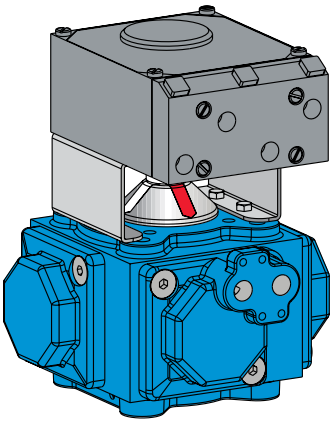
One of the four available actuator covers incorporates a pad for solenoid mounting according to the NAMUR international standard. Any solenoid that conforms to the NAMUR interface can be directly mounted to the actuators, thus simplifying the installation of solenoids and eliminating additional piping. It also allows quick actuation response as pressurized air supply is available at the port entrance.

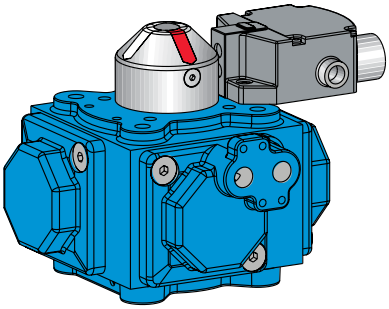
ISO 5211

The actuator bottom flange is in accordance with the ISO 5211 international standard and incorporates a star-shaped female drive to flexibly fit a variety of valve output shafts. The valve can be attached by a bracket or mounted directly onto the actuator, using one of the various ISO hole patterns.









Ordering code system

The HABONIM COMPACT identification code

Size
C15
C20
C25
C30
C30M
C35
C35M
C45
C45M
C60
C60M
C75
C75M

Type	
SR	Spring return
DA	Double acting

Springs set		
C15	C20 to C75M	
1A	2AB	2A3
1B	2A	2C
1B2	2A2B	2C3
2	2B	3

For more details of spring set combinations, see page 7

Threads	
I	Imperial

Indicator	
Default standard white with red arrows	
D	Red with white arrows
P	High profile

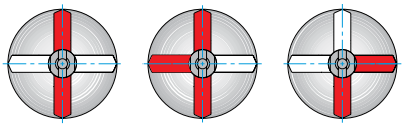
Flow	
Default straight	
T	3-Way
L	2-Way 90 deg

Options	
V	Viton O-rings
E	EPDM O-rings
N	Electroless nickel plating
U	UHMWPE
LT	FX428 special NBR compound for low temperature
RFS	Reverse fail safe for CCW rotation

Examples:
C35 SR 2C-N Size C35, spring return, 2C spring set, metric thread, standard indicator, electroless nickel coating.
C60 DA I-DT-LT Size C60, double acting, imperial thread, indicator red with white arrows, flow 3-way, FX428 O-rings.

In some applications the options described above are limited to specific sizes. Consult with Habonim for details.

Flow directions



Standard **T** (3-Way) **L** (2-Way 90º)

HABONIM
Industrial Valves & Actuators

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