

ECON RACK & PINION PNEUMATIC ACTUATORS

Spring Return • Double Acting





ABOUT CNC FLOW CONTROL

Founded in 2017, CNC Flow Control is new only in name. Headquartered in Houston, this single business entity unifies several trusted valve and flow line brands from across industry, creating an experienced, collaborative and diverse team. From extensive, long range projects to same-day delivery of commodity valves, our team is dedicated to understanding customers' needs in order to ensure exceptional service and the best solutions.

A full service Valve Repair & Modification Shop is on site at the manufacturing facility as well as an in-house engineering team for technical assistance and expertise. Product brands in the CNC Flow Control family include C&C, SMITH, Diamond Gear, Econ and Force.



ABOUT ECON

Econ® is a leading provider of actuators designed to meet or exceed today's standards and agency requirements. All actuators have added features which make them suitable for a wide range of applications.

CONTENTS

ECON ACTUATORS	03
FEATURES	04
DESIGN SPECIFICATIONS	04
ACTUATOR ANATOMY	05
TRAVEL STOPS. PRESSURE, OPTIONS TEMPERATURE	06
ENGINEERING DATA	07
STANDARD MATERIALS OF CONSTRUCTION	08
EXPLODED DIAGRAM	09
ECON DIMENSIONS (IMPERIAL UNITS)	10, 11
ISO 5211 - DETAILS & DIMENSIONS	12, 13
TORQUE OUTPUT FOR SPRING RETURN ACTUATOR (IMPERIAL UNITS)	14, 15
TORQUE OUTPUT FOR DOUBLE ACTING ACTUATOR (IMPERIAL UNITS)	15
TORQUE OUTPUT FOR SPRING RETURN ACTUATOR (METRIC UNITS)	16, 17
TORQUE OUTPUT FOR DOUBLE ACTING ACTUATOR (METRIC UNITS)	17
CONTACT DETAILS	

econ®



Econ Actuators

Product offerings include rack and pinion aluminum housed actuators with torque values up to 56,831 in-lb (6421 Nm). Econ products offer reliable and dependable automation for quarter turn valves.

Engineered and built to withstand most applications and environmental conditions, the precision design and quality of our actuators provide long and safe performance for valve control.

Econ engineers and recognized distributors are happy to help you with your automation demands.

Up To Date Product Features

The Econ brand of products are designed around today's standards and expectations that come from various agencies and customer groups. Throughout its extensive product offering, Econ products have added features, which make them suitable for a wide spectrum of applications.

Proven Quality

Quality is the driving force behind Econ actuators. Throughout the manufacturing process, a team of Quality Inspectors are on site to guarantee that high quality standards are always met.

Econ products are known for low cost to value ratio, ensuring that every actuator is not only cost competitive, but also performs as well or better than more expensive brands.





ESR - Models 7901/7921



EDA - Models 7902/7922

FEATURES

- Rack and pinion design in 14 different sizes
- Linear torque output in double acting actuators
- Double acting output torque up to 56,831 in-lb (6421 Nm)
- Angle of rotation is $90^{\circ} \pm 5^{\circ}$ by means of external travel stops
- Lightweight and compact design
- Anti-friction sliding bearings provide long life without maintenance
- Captured springs = Safe maintenance
- Stainless steel external bolting
- Serialized body numbering for traceability
- End caps denote spring return or double acting set up
- Multifunction position indicator suitable for mechanical limit switches or proximity indicators
- ISO 9001:2008 Quality Assurance
- Anti-blowout pinion design

Options on request:

- Fast acting
- Stroke limiters
- Epoxy coated body
- Electroless nickel plated body and end caps
- Special construction for high temperature service
- Safety lockout

DESIGN SPECIFICATIONS

- Classified for use in potentially explosive atmospheres as Group II, Category 2, suitable for Zones 1, 2, 21 and 22 in accordance with Annex VIII of Directive 94/9/CE (ATEX), ASTM D1654-D8
- Anti-corrosive coatings according to EN 15714-3
- Air supply and top flange connection according to NAMUR VDI/VDE 3845
- Safety Integrity Rating IEC 61508 SIL 3
- Solenoid and accessories direct assembly according to NAMUR VDI/VDE 3845
- Mounting and drive connections to ISO 5211



GUARANTEED FOR 1,000,000 CYCLES!

Ask us about our million cycle free replacement.

ACTUATOR ANATOMY

1 BODY
The aluminium body is hard anodized inside and out to provide maximum resistance to abrasion and corrosion.

2 PINION
Hardened electroless nickel plated carbon steel shaft is blowout proof and corrosion resistant, teeth are machined for accuracy.

3 ADJUSTMENT STROKE
External stainless steel stroke adjustment bolts provide $90^{\circ} \pm 5^{\circ}$ stroke rotation limits.

4 PISTONS
Pistons are specially coated for corrosion resistance with low backlash specially machined teeth. Pistons have a 3-point guiding system to ensure low friction operation along with another integrally machined guide between the pinion and the pistons.

5 POSITION INDICATOR
Top mounted position indicator is mechanically configurable for triggering mechanical or inductive limit switches without additional components.

6 SPRINGS
Springs are positively contained and designed to release all compression before the end cap screws disengage from the body. This safety feature prevents the accidental release of the springs and eliminates the possibility of personal harm.

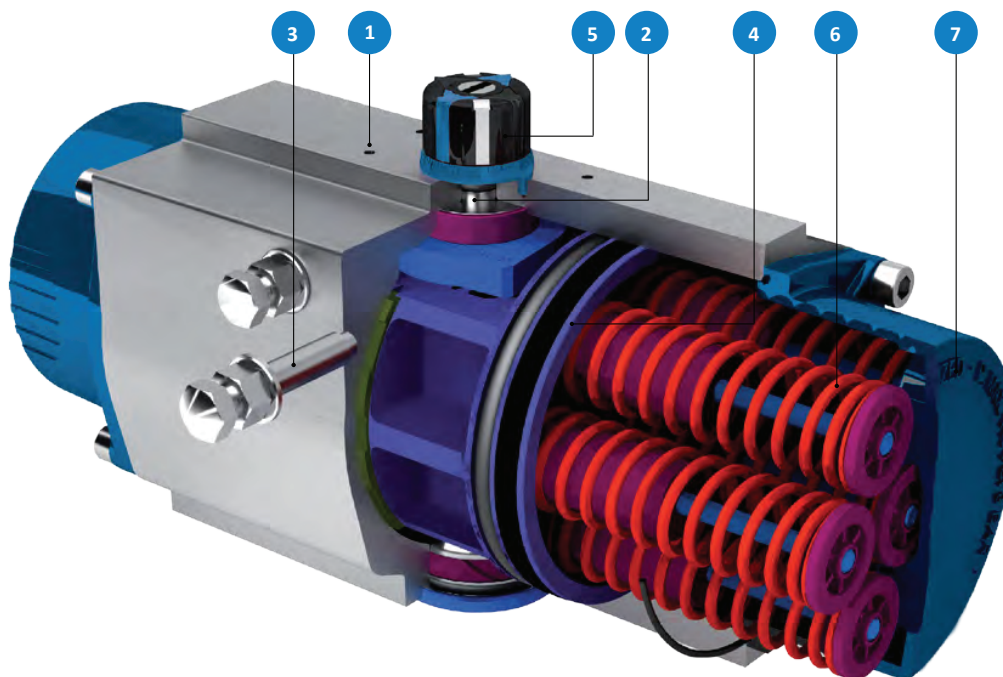
7 END CAPS
End caps are epoxy coated to protect them from environmental corrosion. Double acting and spring return end caps are visibly different in order to allow quick determination of actuator type without having to look at the identification label.

TESTING

Every actuator is performance tested before being assigned a unique serial number for traceability.

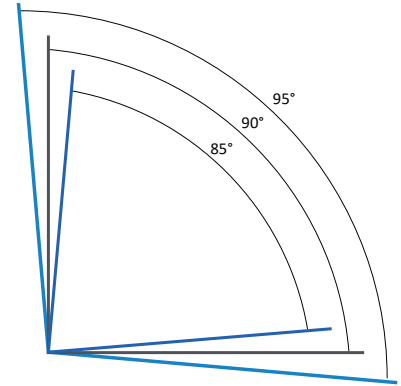
ACCESSORIES

Mounting of limit switches, positioners, or indicators is accomplished via a NAMUR VDI/VDE 3845 mounting arrangement. Additionally, the height of the pinion shaft above the top of the actuator body is identical on all models, thereby simplifying the mounting arrangement for any NAMUR design accessory.



BIDIRECTIONAL TRAVEL STOPS

Econ pneumatic actuators are provided with bidirectional pinion travel stops. Side located stops allow a full $\pm 5^\circ$ travel adjustment between 85° and 95° . These travel stops are designed to absorb the maximum rated torque of the actuator and maximum impact loads associated with recommended travel speeds. Adjustment of the counterclockwise and clockwise rotation limits is accomplished by unscrewing the locking nuts, turning the respective left and right studs to reduce or increase the travel angle and retightening the locking nuts.



AVAILABLE OPTIONS

- Stainless steel pinion (Grade 304 and 316)
- Fast acting actuators
- Actuators with 100% travel adjustment stroke
- Fireproof Actuators (K-mass, blanket, other options)

WORKING TEMPERATURE

- Standard Construction: -22°F to $+212^\circ\text{F}$ (-30°C to $+100^\circ\text{C}$)
- FKM O-Rings (High temperature execution): $+5^\circ\text{F}$ to $+302^\circ\text{F}$ (-15°C to $+150^\circ\text{C}$)
- Silicone O-Rings (Low temperature execution - Models 7921 & 7922): -40°F to $+176^\circ\text{F}$ (-40°C to $+80^\circ\text{C}$)
- Silicone O-Rings & 316 Pinion (Extreme low temperature): -67°F to $+176^\circ\text{F}$ (-55°C to $+80^\circ\text{C}$)

MAXIMUM WORKING PRESSURE

- 120 psig (8 bar); Except Double Acting (EDA) Size 10 at 145 psig (10 bar)



ENGINEERING DATA

ECON DOUBLE ACTING AND SPRING RETURN ACTUATORS

IMPERIAL UNITS

SIZE	MAX PRESSURE (psi)	ROTATION	SCREW STROKE ADJUSTMENT	PISTON DIAMETER (In)	AIR VOLUME (In ³)		STROKE TIME (sec)			
					OPENING	CLOSING	DOUBLE ACTING ACTUATORS (EDA)		SPRING RETURN ACTUATORS (ESR)	
							OPENING	CLOSING	OPENING	CLOSING
10	145	90°±2°	-	1.3	2.1	1.7	0.03	0.07	-	-
20	120	90°±5°	For 1° need 1/3 turn	1.8	7.9	5.5	0.04	0.09	0.12	0.18
40	120	90°±5°	For 1° need 1/3 turn	2.4	16.5	14.0	0.08	0.08	0.2	0.29
80	120	90°±5°	For 1° need 1/4 turn	3.2	39.1	28.7	0.11	0.1	0.27	0.4
130	120	90°±5°	For 1° need 1/4 turn	3.6	47.0	46.4	0.15	0.15	0.32	0.5
200	120	90°±5°	For 1° need 1/4 turn	4.1	72.6	73.2	0.15	0.22	0.5	0.6
300	120	90°±5°	For 1° need 1/3 turn	4.7	119.6	105.6	0.3	0.4	0.7	0.85
500	120	90°±5°	For 1° need 1/4 turn	5.5	180.0	167.2	0.4	0.5	0.9	1.1
850	120	90°±5°	For 1° need 1/3 turn	6.3	286.8	235.6	0.8	0.9	2.2	2.6
1200	120	90°±5°	For 1° need 1/3 turn	7.1	424.1	283.2	1.2	1.5	2.3	2.8
1750	120	90°±5°	For 1° need 1/3 turn	8.3	598.0	567.5	1.8	2	2.8	3.2
2100	120	90°±5°	For 1° need 1/3 turn	9.3	707.9	622.4	2.3	2.6	3.3	3.7
2500	120	90°±5°	For 1° need 1/3 turn	11.8	1525.6	1952.8	2.8	3.1	3.8	4.2
4000	120	90°±5°	For 1° need 1/3 turn	13.4	2026.0	1678.2	3	3.5	4.3	5

METRIC UNITS

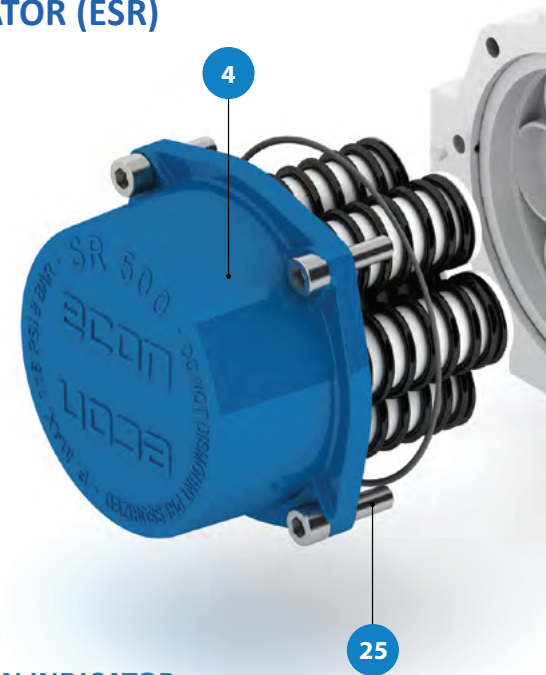
SIZE	MAX PRESSURE (Bar)	ROTATION	SCREW STROKE ADJUSTMENT	PISTON DIAMETER (mm)	AIR VOLUME (L)		STROKE TIME (SEC)			
					OPENING	CLOSING	DOUBLE ACTING ACTUATORS (EDA)		SPRING RETURN ACTUATORS (ESR)	
							OPENING	CLOSING	OPENING	CLOSING
10	10	90° ±2°	-	32	0.035	0.028	0.03	0.07	-	-
20	8	90° ±5°	For 1° need 1/3 turn	45	0.13	0.09	0.04	0.09	0.12	0.18
40	8	90° ±5°	For 1° need 1/3 turn	60.2	0.27	0.23	0.08	0.08	0.2	0.29
80	8	90° ±5°	For 1° need 1/4 turn	80	0.64	0.47	0.11	0.1	0.27	0.4
130	8	90° ±5°	For 1° need 1/4 turn	90.5	0.77	0.76	0.15	0.15	0.32	0.5
200	8	90° ±5°	For 1° need 1/4 turn	104.6	1.19	1.20	0.15	0.22	0.5	0.6
300	8	90° ±5°	For 1° need 1/3 turn	120.5	1.96	1.73	0.3	0.4	0.7	0.85
500	8	90° ±5°	For 1° need 1/4 turn	140.2	2.95	2.74	0.4	0.5	0.9	1.1
850	8	90° ±5°	For 1° need 1/3 turn	160	4.70	3.86	0.8	0.9	2.2	2.6
1200	8	90° ±5°	For 1° need 1/3 turn	180	6.95	4.64	1.2	1.5	2.3	2.8
1750	8	90° ±5°	For 1° need 1/3 turn	210	9.80	9.30	1.8	2	2.8	3.2
2100	8	90° ±5°	For 1° need 1/3 turn	237	11.60	10.20	2.3	2.6	3.3	3.7
2500	8	90° ±5°	For 1° need 1/3 turn	300	25.00	32.00	2.8	3.1	3.8	4.2
4000	8	90° ±5°	For 1° need 1/3 turn	340	33.20	27.50	3	3.5	4.3	5

STANDARD MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIAL
1	Body	Anodized Hard Aluminum
2	Piston	Aluminum
3	Pinion	Nickle Plated Carbon Steel
4	End Caps	Epoxy Coated Aluminum
5	Soft Pinion Washer ¹	Polyamide PA 6.6
6	Slide Piston ¹	Polyamide PA 6.6 + 30% G.F.
7	Lug ²	Nickle Plated Carbon Steel
8	Pinion Washer	Stainless Steel
9	Upper Pinion Bearing ³	Polyamide PA 6.6 / PEEK ⁴
10	Stop	ASTM A 105
11	Spring's Long Support	Polyamide PA 6.6
12	Spring's Short Support	Polyamide PA 6.6
13	Leveling Screw	Stainless Steel
14	Bolt	Stainless Steel
15	Spring	DIN 2076 • D-5.6
16	Position Indicator	Polypropylene
17	Cam	Polypropylene
18	Inserts	Stainless Steel
19	Centering Ring	Nickle Plated Carbon Steel
20	Slide Guide	Polyamide PA 6.6 + 30% G.F.
21	Lower Pinion Bearing ¹	Polyamide PA 6.6
22	O-Ring (Piston) ¹	NBR
23	O-Ring (Lower Pinion) ¹	NBR
24	O-Ring (Upper Pinion) ¹	NBR
25	Bolt	Stainless Steel
26	O-Ring (End Cap) ¹	NBR
27	O-Ring ¹	NBR
28	Washer	Stainless Steel
29	Slip Washer ¹	Stainless Steel
30	Nut	Stainless Steel
31	Nut	Stainless Steel

1 Recommended spare parts
 2 Only for sizes 2500 & 4000
 3 Size 500 and greater in Reinforced Br.
 4 PEEK material in Models 7921 & 7922

SPRING RETURN ACTUATOR (ESR)



POSITION INDICATOR

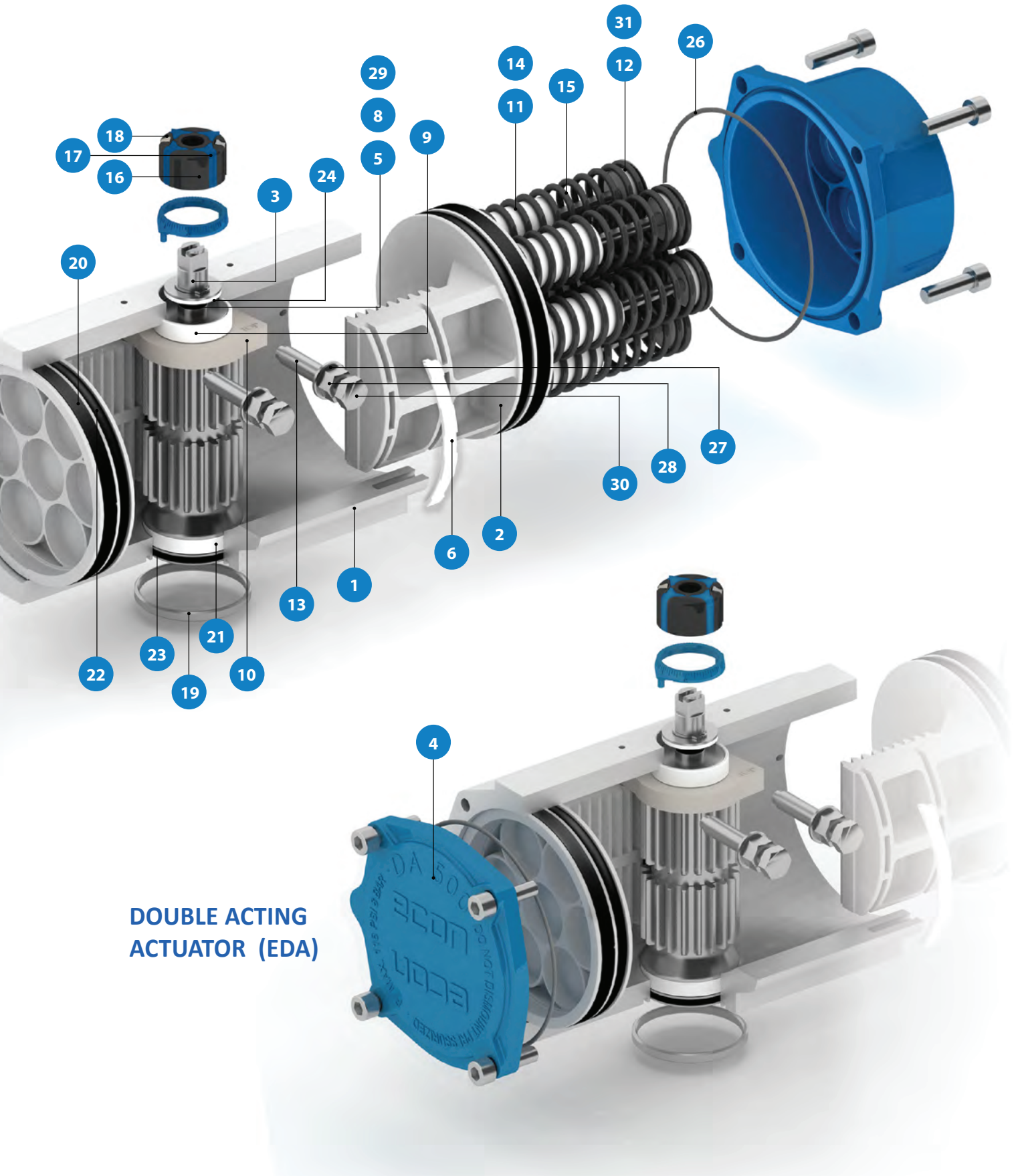
From Size 20 to 850

From Size 1200 to 4000



Inserts
 Stainless Steel
Position Indicator & Cams
 Polypropylene

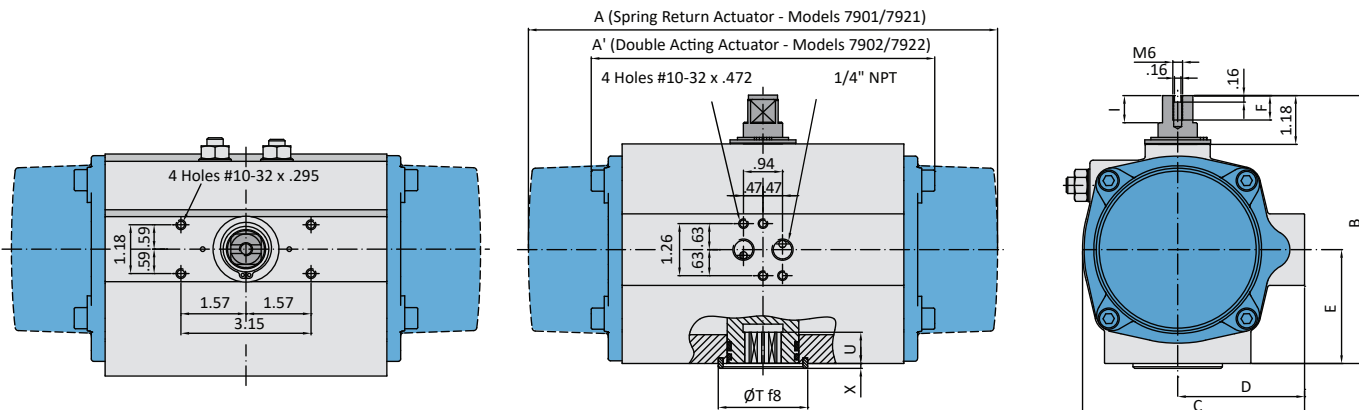
EXPLODED DIAGRAM



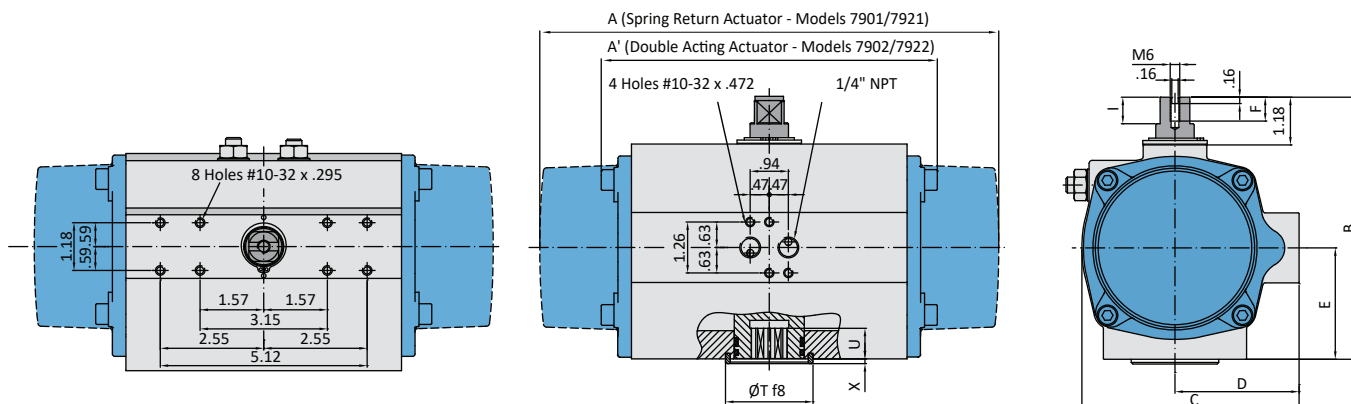
**DOUBLE ACTING
ACTUATOR (EDA)**

ECON DIMENSIONS IMPERIAL UNITS (in)

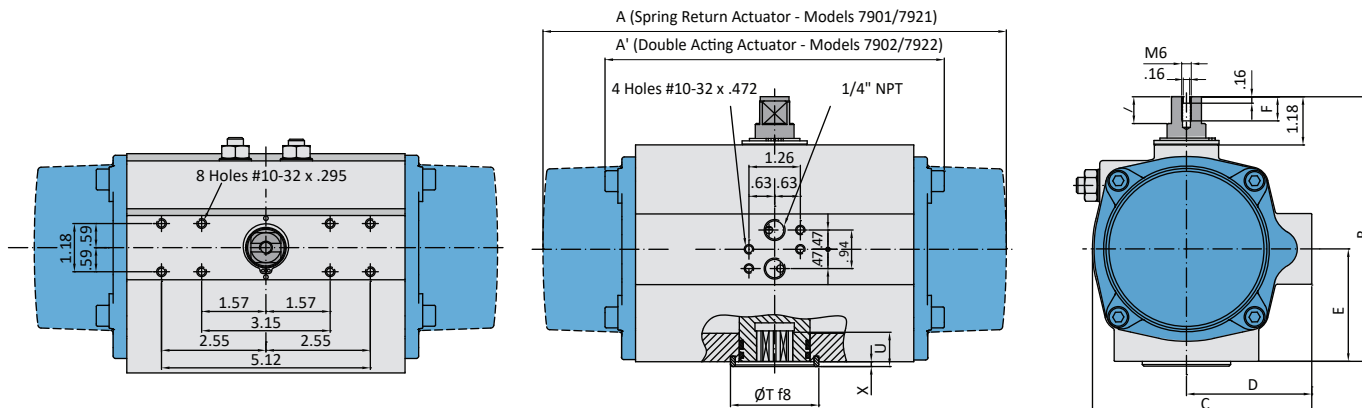
SIZES 10 | 20 | 40 | 80 | 130 | 200 | 300 | 500 | 850



SIZES 1200 | 1750

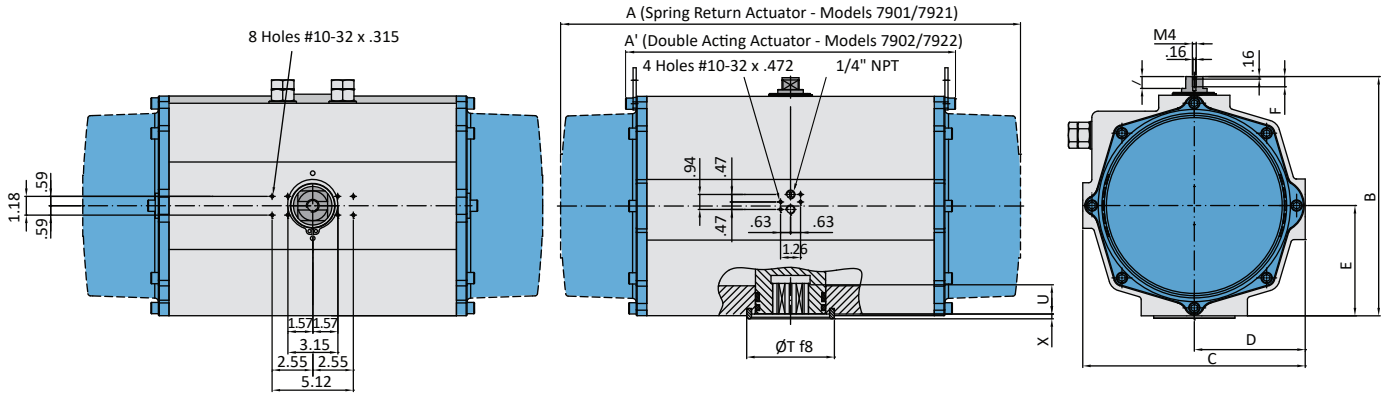


SIZES 2100

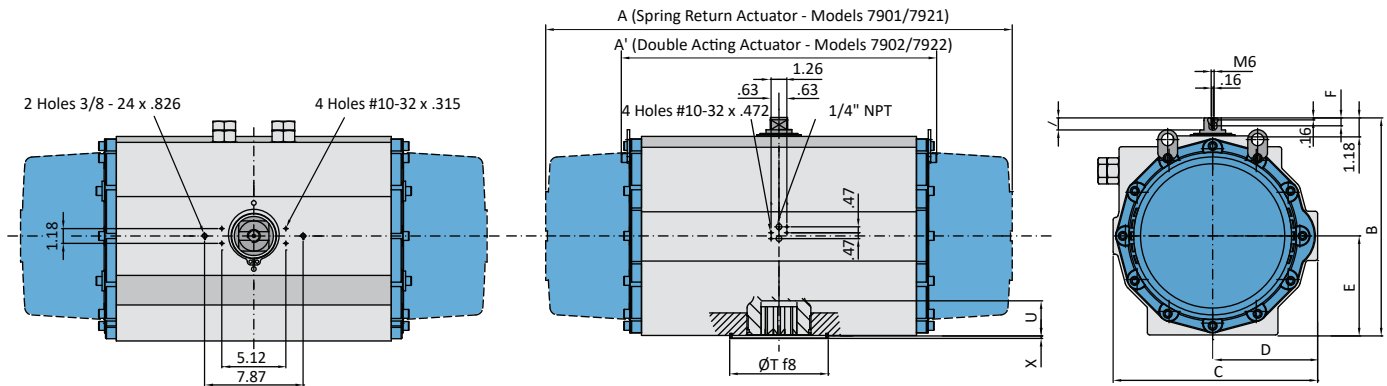


ECON DIMENSIONS IMPERIAL UNITS (in)

SIZES 2500



SIZES 4000

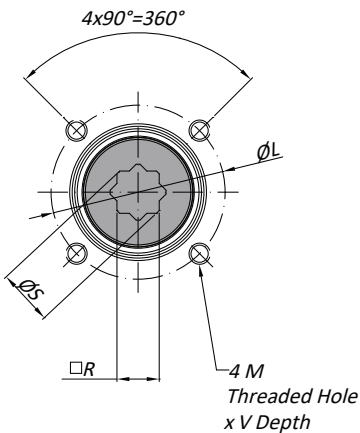


SIZE	SPRING RETURN & DOUBLE ACTING ACTUATORS - DIMENSIONS IN INCHES (in)										
	A	A'	B	C	D	E	F	I	ØT	X	U
10	-	3.94	2.99	2.20	1.30	0.91	0.35	0.24	0.43	0.08	0.47
20	6.42	5.71	3.78	2.99	1.89	1.34	0.35	0.49	0.98	0.08	0.39
20	6.42	5.71	3.78	2.99	1.89	1.34	0.35	0.49	1.38	0.12	0.47
40	7.68	6.22	4.53	3.58	2.20	1.77	0.35	0.49	1.38	0.12	0.47
80	8.54	6.97	5.39	4.37	2.60	2.17	0.47	0.49	2.17	0.12	0.75
130	10.16	7.72	5.79	4.80	2.80	2.36	0.47	0.49	2.17	0.12	0.87
200	11.77	8.86	6.50	5.33	3.07	2.76	0.47	0.49	2.17	0.12	0.91
300	13.72	10.75	7.17	6.00	3.39	3.15	0.47	0.49	2.76	0.12	0.94
500	15.63	11.97	7.83	6.81	3.78	3.35	0.47	0.49	2.76	0.12	1.26
850	18.62	14.65	8.70	7.54	4.17	3.86	0.47	0.49	3.35	0.12	1.54
1200	22.05	17.28	9.80	8.37	4.57	4.49	0.63	0.73	3.94	0.16	1.89
1750	23.66	18.15	11.02	9.55	5.16	5.12	0.63	0.73	3.94	0.16	1.97
2100	27.64	20.08	12.32	10.89	5.83	5.79	0.63	0.73	5.12	0.16	1.97
2500	29.06	20.39	15.08	14.02	6.99	6.95	0.63	0.73	5.12	0.16	2.28
4000	37.01	24.80	17.09	16.34	8.39	7.91	0.63	0.73	7.87	0.16	2.36

A' = Double Acting

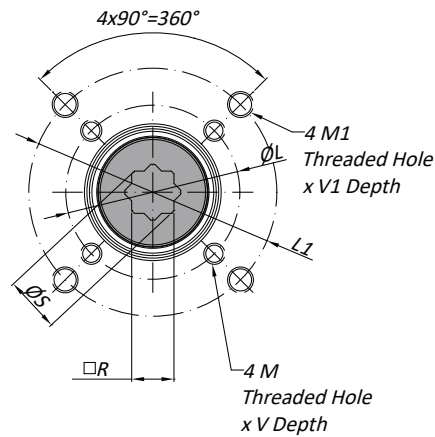
ISO 5211 - DETAILS & DIMENSIONS

**SIZES 10 | 20 |
40 | 500 | 1750 |
2100 | 2500**



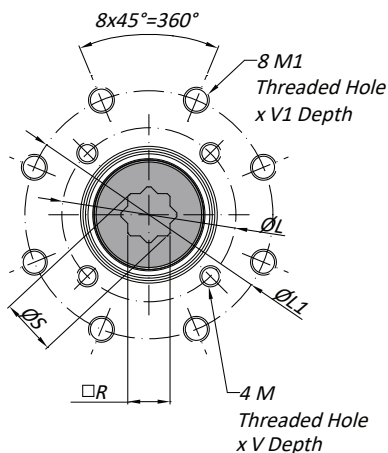
SIZE	ACTUATORS ISO 5211 DETAILS IN IMPERIAL UNITS (in)							
	□R	ISO 1	ØL	MxV	ISO 2	ØL1	M1xV1	ØS
10	0.35	F03	1.42	10-24 UNC x 0.315	-	-	-	0.49
20	0.35	F03	1.42	10-24 UNC x 0.394	F05	1.97	1/4"-20 UNC x 0.394	0.49
20	0.55	F05	1.97	1/4"-20 UNC x 0.394	-	-	-	0.71
20	0.55	F04	1.65	10-24 UNC x 0.394	-	-	-	0.71
40	0.55	F04	1.65	10-24 UNC x 0.394	-	-	-	0.71
40	0.55	F05	1.97	1/4"-20 UNC x 0.394	-	-	-	0.71
80	0.67	F05	1.97	1/4"-20 UNC x 0.394	F07	2.76	5/16"-18 UNC x 0.669	0.89
130	0.67	F05	1.97	1/4"-20 UNC x 0.394	F07	2.76	5/16"-18 UNC x 0.669	0.89
200	0.67	F07	2.76	5/16"-18 UNC x 0.669	F10	4.02	3/8"-16 UNC x 0.669	0.89
300	0.87	F07	2.76	5/16"-18 UNC x 0.669	F10	4.02	3/8"-16 UNC x 0.669	1.12
500	0.87	F10	4.02	3/8"-16 UNC x 0.669	-	-	-	1.12
850	1.06	F10	4.02	3/8"-16 UNC x 0.669	F12	4.92	1/2"-13 UNC x 0.787	1.44
1200	1.42	F10	4.02	3/8"-16 UNC x 0.669	F14	5.51	5/8"-11 UNC x 1.024	1.91
1750	1.42	F14	5.51	5/8"-11 UNC x 1.024	-	-	-	1.91
2100	1.81	F16	6.5	3/4"-10 UNC x 1.181	-	-	-	2.37
2500	1.81	F16	6.5	3/4"-10 UNC x 1.181	-	-	-	2.37
4000	2.17	F16	6.5	3/4"-10 UNC x 1.181	F25	10	5/8"-11 UNC x 1.181	2.85

SIZES 20 | 80 | 130 | 200 | 300 | 850 | 1200



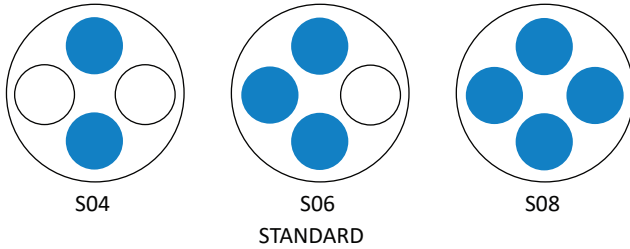
SIZE	ACTUATORS ISO 5211 DETAILS IN METRIC UNITS (mm)							
	□R	ISO 1	ØL	MxV	ISO 2	ØL1	M1xV1	ØS
10	9	F03	36	M5x8	-	-	-	12.5
20	9	F03	36	M5x8	F05	50	M6x10	12.5
20	14	F05	50	M6x10	-	-	-	18.1
20	14	F04	42	M5x10	-	-	-	18.1
40	14	F04	42	M5x10	-	-	-	18.1
40	14	F05	50	M6x10	-	-	-	18.1
80	17	F05	50	M6x10	F07	70	M8x16	22.5
130	17	F05	50	M6x10	F07	70	M8x16	22.5
200	17	F07	70	M8x16	F10	102	M10x16	22.5
300	22	F07	70	M8x16	F10	102	M10x16	28.5
500	22	F10	102	M10x16	-	-	-	28.5
850	27	F10	102	M10x16	F12	125	M12x20	36.5
1200	36	F10	102	M10x16	F14	140	M16x26	48.5
1750	36	F14	140	M16x26	-	-	-	48.5
2100	46	F16	165	M20x30	-	-	-	60.2
2500	46	F16	165	M20x30	-	-	-	60.2
4000	55	F16	165	M20x30	F25	254	M16x30	72.5

SIZES 4000

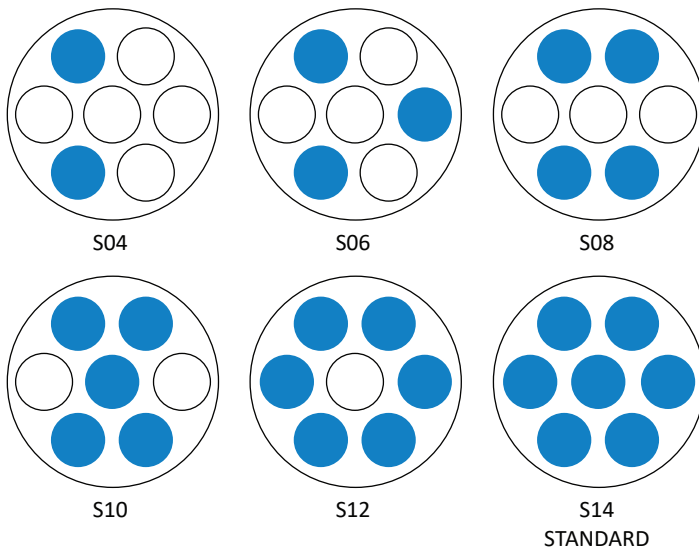


ISO 5211 DETAILS

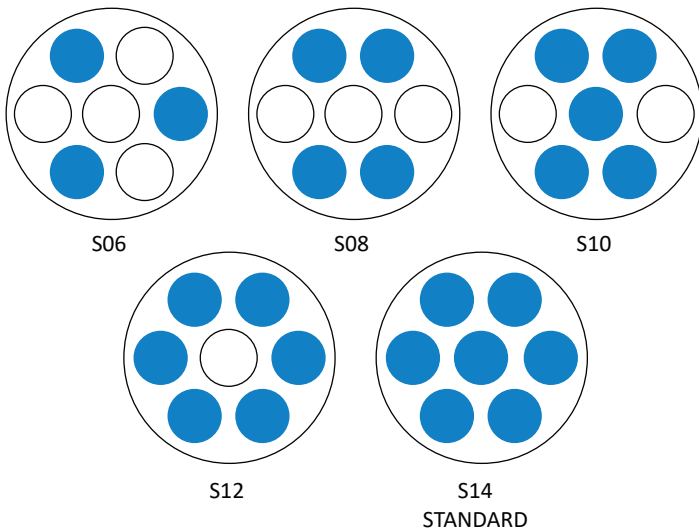
The Size 20 spring return actuator uses a minimum of two springs and maximum of four springs on each side according to the diagram below.



Size 40 and 80 spring return actuators use a minimum of two springs and maximum of seven springs on each side according to the diagram below.



Sizes 130 to 4000 spring return actuators use a minimum of three springs and maximum of seven springs on each side according to the diagram below.



Spring Combinations for ESR - Models 7901/7921

Pre-stressed springs offer more torque and different options for their positioning. This system allows us to easily fit the necessary torque to close or open the valve, offering a total safety replacement and manipulation.

Spring Return Actuators (ESR) use a maximum of seven springs on each side, always using the same type of spring regardless of the spring combination specified. The quantity of springs is identified as follows:

Ex: S14 - Where S stands for springs and 14 is the total number of springs assembled in the actuator.

For torque output based on spring combinations and actuator size, please see pages 14 through 17.

SIZE (ESR)	SPRING COMBINATIONS					
	S04	S06	S08	S10	S12	S14
20	A	S	A	-	-	-
40	A	A	A	A	A	S
80	A	A	A	A	A	S
130	-	A	A	A	A	S
200	-	A	A	A	A	S
300	-	A	A	A	A	S
500	-	A	A	A	A	S
850	-	A	A	A	A	S
1200	-	A	A	A	A	S
1750	-	A	A	A	A	S
2100	-	A	A	A	A	S
2500	-	A	A	A	A	S
4000	-	A	A	A	A	S

S - Standard Combination
A - Available Combination

TORQUE OUTPUT FOR SPRING RETURN ACTUATOR

IMPERIAL UNITS

SIZE	SPRING COMBO	TORQUE OUTPUT FOR SPRING RETURN IN INCH POUNDS (In-Lb)										SPRING STROKE		WEIGHT (Lb)
		40 Psi		60 Psi		80 Psi		100 Psi		120 Psi		END	START	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	
20	S04			80	62	124	106	168	150	195	177	35	62	3.3
	S06 A					106	80	150	115	177	150	62	97	3.4
	S08					89	44	133	89	159	124	80	133	3.4
40	S04	142	124	204	177	292	266	381	363	443	416	44	71	4.8
	S06	124	89	186	150	274	239	363	327	425	389	62	106	4.9
	S08			168	124	257	212	345	301	407	363	89	142	4.9
	S10					239	177	327	266	389	327	106	177	5.0
	S12					221	150	310	239	372	301	133	212	5.1
	S14 A					204	115	292	212	354	266	150	248	5.1
80	S04	274	239	389	354	558	522	726	690	841	805	80	115	7.2
	S06	239	186	354	301	522	469	699	646	814	761	115	177	7.4
	S08			327	257	496	425	664	593	779	708	150	239	7.6
	S10					460	372	628	540	743	655	195	292	7.7
	S12					425	319	602	496	717	611	230	354	7.9
	S14 A					398	274	566	443	682	558	266	416	8.1
130	S06	381	319	549	496	814	752	1071	1018	1248	1186	168	239	9.7
	S08			504	425	761	682	1027	947	1195	1124	230	319	9.9
	S10			451	354	717	620	974	876	1151	1053	283	398	10.1
	S12					664	549	929	814	1097	982	345	478	10.4
	S14 A					620	478	876	743	1053	912	398	566	10.6
200	S06	540	434	797	690	1186	1080	1575	1469	1832	1726	274	407	14.3
	S08			717	575	1106	965	1496	1345	1752	1611	372	540	14.8
	S10			637	460	1027	850	1416	1230	1673	1496	460	682	15.2
	S12					947	735	1336	1115	1593	1381	558	814	15.4
	S14 A					876	620	1257	1000	1522	1266	646	947	16.1
300	S06	903	664	1336	1089	1974	1735	2620	2381	3045	2806	451	735	21.3
	S08			1204	885	1850	1531	2487	2168	2921	2602	602	982	21.9
	S10			1080	673	1717	1319	2363	1965	2788	2390	752	1221	22.5
	S12					1593	1115	2239	1752	2664	2186	903	1469	23.2
	S14 A					1460	903	2106	1549	2540	1974	1053	1708	23.8
500	S06	1345	1053	1983	1690	2947	2646	3903	3602	4540	4248	673	1018	29.4
	S08	1159	761	1797	1398	2753	2363	3708	3319	4355	3956	894	1354	30.5
	S10			1602	1115	2567	2071	3523	3027	4160	3664	1115	1699	31.6
	S12					2372	1779	3328	2744	3974	3381	1345	2036	32.7
	S14 A					2186	1496	3142	2452	3779	3089	1567	2372	33.9
850	S06	2301	1850	3363	2903	4948	4496	6541	6080	7594	7143	1027	1567	43.4
	S08	2009	1407	3071	2461	4655	4054	6249	5638	7311	6700	1372	2089	44.8
	S10			2779	2018	4372	3611	5957	5195	7019	6257	1708	2611	46.1
	S12					4080	3169	5664	4753	6727	5815	2053	3124	47.6
	S14 A					3788	2717	5372	4310	6434	5372	2399	3647	48.9
1200	S06	3301	2558	4833	4089	7134	6390	9435	8683	10966	10214	1513	2399	66.4
	S08	2876	1885	4408	3416	6709	5709	9001	8010	10532	9541	2027	3195	68.6
	S10	2443	1204	3974	2735	6275	5036	8576	7328	10108	8860	2531	3992	71.0
	S12			3549	2053	5841	4355	8143	6647	9674	8178	3036	4788	73.2
	S14 A					5417	3673	7709	5974	9240	7505	3540	5585	75.6

TORQUE OUTPUT FOR SPRING RETURN ACTUATOR

IMPERIAL UNITS CONTINUED

SIZE	SPRING COMBO	TORQUE OUTPUT FOR SPRING RETURN IN INCH POUNDS (In-Lb)										SPRING STROKE		WEIGHT (Lb)
		40 Psi		60 Psi		80 Psi		100 Psi		120 Psi		END	START	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	
1750	S06	4222	3089	6302	5169	9435	8293	12559	11426	14639	13506	2390	3726	86.6
	S08	3540	2027	5629	4116	8753	7240	11878	10364	13966	12453	3186	4974	90.4
	S10			4948	3054	8072	6187	11205	9311	13285	11391	3992	6213	94.1
	S12					7399	5125	10524	8258	12612	10338	4788	7461	97.9
	S14 A					6718	4071	9851	7196	11931	9284	5585	8700	101.4
2100	S06	6213	4505	9417	7709	14223	12515	19029	17321	22233	20525	3399	5107	132.3
	S08	5080	2797	8284	6001	13090	10807	17896	15613	21100	18817	4532	6815	136.7
	S10			7151	4301	11957	9107	16763	13913	19967	17117	5664	8514	141.1
	S12					10824	7399	15630	12205	18834	15409	6797	10214	145.5
	S14 A					9692	5700	14498	10506	17701	13710	7930	11922	149.9
2500	S06	11497	9249	16604	14356	24260	22012	31916	29668	37023	34775	4496	7134	189.4
	S08	10223	7222	15329	12329	22985	19985	30641	27650	35748	32748	5992	9515	197.1
	S10			14055	10311	21711	17967	29376	25623	34474	30730	7488	11895	204.8
	S12			12780	8284	20445	15949	28101	23605	33208	28703	8984	14276	212.5
	S14 A					19171	13922	26827	21578	31933	26685	10479	16657	220.2
4000	S06	15604	11170	22711	18277	33367	28933					6709	11931	349.9
	S08	13710	7789	20808	14896	31464	25552	42121	36208	44856	38934	8948	15905	363.1
	S10			18905	11515	29561	22171	40218	32827	42953	35553	11187	19879	376.6
	S12					27659	18790	38315	29446	41050	32181	13418	23862	390.0
	S14 A					25765	15409	36421	26065	39147	28800	15657	27836	403.2

A=Standard

TORQUE OUTPUT FOR DOUBLE ACTING ACTUATOR

IMPERIAL UNITS

SIZE	TORQUE OUTPUT FOR DOUBLE ACTING IN INCH POUNDS (In-Lb)						WEIGHT (Lb)
	40 Psi	60 Psi	80 Psi	100 Psi	120 Psi	145 Psi	
	0° to 90°	0° to 90°	0° to 90°	0° to 90°	0° to 90°	0° to 90°	
10	27	40	58	73	81	97	1.4
20	86	115	158	204	230	-	3.1
40	180	240	330	416	478	-	4.6
80	341	454	624	797	912	-	6.6
130	523	697	959	1221	1390	-	8.4
200	779	1036	1425	1814	2071	-	12.3
300	1283	1717	2363	3000	3434	-	18.7
500	1921	2558	3514	4470	5107	-	24.7
850	3177	4240	5824	7408	8470	-	37.3
1200	4594	6125	8426	10718	12249	-	56.9
1750	6257	8337	11462	14595	16675	-	71.6
2100	9612	12816	17622	22428	25632	-	109.5
2500	15312	20419	28075	35739	40837	-	153.4
4000	21313	28411	39067	49723	56831	-	285.3

TORQUE OUTPUT FOR SPRING RETURN ACTUATOR

METRIC UNITS

SIZE	SPRING COMBO	TORQUE OUTPUT FOR SPRING RETURN IN Nm										SPRING STROKE		WEIGHT (Kg)
		3 Bar		4 Bar		5.5 Bar		7 Bar		8 Bar		END	START	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	
20	S04			9	7	14	12	19	17	22	20	4	7	1.51
	S06 A					12	9	17	13	20	17	7	11	1.54
	S08					10	5	15	10	18	14	9	15	1.56
40	S04	16	14	23	20	33	30	43	41	50	47	5	8	2.17
	S06	14	10	21	17	31	27	41	37	48	44	7	12	2.2
	S08			19	14	29	24	39	34	46	41	10	16	2.23
	S10					27	20	37	30	44	37	12	20	2.26
	S12					25	17	35	27	42	34	15	24	2.29
	S14 A					23	13	33	24	40	30	17	28	2.32
80	S04	31	27	44	40	63	59	82	78	95	91	9	13	3.28
	S06	27	21	40	34	59	53	79	73	92	86	13	20	3.36
	S08			37	29	56	48	75	67	88	80	17	27	3.43
	S10					52	42	71	61	84	74	22	33	3.51
	S12					48	36	68	56	81	69	26	40	3.58
	S14 A					45	31	64	50	77	63	30	47	3.65
130	S06	43	36	62	56	92	85	121	115	141	134	19	27	4.4
	S08			57	48	86	77	116	107	135	127	26	36	4.5
	S10			51	40	81	70	110	99	130	119	32	45	4.6
	S12					75	62	105	92	124	111	39	54	4.7
	S14 A					70	54	99	84	119	103	45	64	4.8
200	S06	61	49	90	78	134	122	178	166	207	195	31	46	6.5
	S08			81	65	125	109	169	152	198	182	42	61	6.7
	S10			72	52	116	96	160	139	189	169	52	77	6.9
	S12					107	83	151	126	180	156	63	92	7
	S14 A					99	70	142	113	172	143	73	107	7.3
300	S06	102	75	151	123	223	196	296	269	344	317	51	83	9.65
	S08			136	100	209	173	281	245	330	294	68	111	9.92
	S10			122	76	194	149	267	222	315	270	85	138	10.2
	S12					180	126	253	198	301	247	102	166	10.5
	S14 A					165	102	238	175	287	223	119	193	10.8
500	S06	152	119	224	191	333	299	441	407	513	480	76	115	13.33
	S08	131	86	203	158	311	267	419	375	492	447	101	153	13.84
	S10			181	126	290	234	398	342	470	414	126	192	14.35
	S12					268	201	376	310	449	382	152	230	14.85
	S14 A					247	169	355	277	427	349	177	268	15.36
850	S06	260	209	380	328	559	508	739	687	858	807	116	177	19.7
	S08	227	159	347	278	526	458	706	637	826	757	155	236	20.3
	S10			314	228	494	408	673	587	793	707	193	295	20.9
	S12					461	358	640	537	760	657	232	353	21.6
	S14 A					428	307	607	487	727	607	271	412	22.2
1200	S06	373	289	546	462	806	722	1066	981	1239	1154	171	271	30.1
	S08	325	213	498	386	758	645	1017	905	1190	1078	229	361	31.1
	S10	276	136	449	309	709	569	969	828	1142	1001	286	451	32.2
	S12			401	232	660	492	920	751	1093	924	343	541	33.2
	S14 A					612	415	871	675	1044	848	400	631	34.3

TORQUE OUTPUT FOR SPRING RETURN ACTUATOR

METRIC UNITS CONTINUED

SIZE	SPRING COMBO	TORQUE OUTPUT FOR SPRING RETURN IN Nm										SPRING STROKE		WEIGHT (Kg)
		3 Bar		4 Bar		5.5 Bar		7 Bar		8 Bar		END	START	
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	
1750	S06	477	349	712	584	1066	937	1419	1291	1654	1526	270	421	39.3
	S08	400	229	636	465	989	818	1342	1171	1578	1407	360	562	41
	S10			559	345	912	699	1266	1052	1501	1287	451	702	42.7
	S12					836	579	1189	933	1425	1168	541	843	44.4
	S14 A					759	460	1113	813	1348	1049	631	983	46
2100	S06	702	509	1064	871	1607	1414	2150	1957	2512	2319	384	577	60.3
	S08	574	316	936	678	1479	1221	2022	1764	2384	2126	512	770	62.5
	S10			808	486	1351	1029	1894	1572	2256	1934	640	962	64.2
	S12					1223	836	1766	1379	2128	1741	768	1154	66.3
	S14 A					1095	644	1638	1187	2000	1549	896	1347	68
2500	S06	1299	1045	1876	1622	2741	2487	3606	3352	4183	3929	508	806	85.9
	S08	1155	816	1732	1393	2597	2258	3462	3124	4039	3700	677	1075	89.4
	S10			1588	1165	2453	2030	3319	2895	3895	3472	846	1344	92.9
	S12			1444	936	2310	1802	3175	2667	3752	3243	1015	1613	96.4
	S14 A					2166	1573	3031	2438	3608	3015	1184	1882	99.9
4000	S06	1763	1262	2566	2065	3770	3269					758	1348	158.7
	S08	1549	880	2351	1683	3555	2887	4759	4091	5068	4399	1011	1797	164.7
	S10			2136	1301	3340	2505	4544	3709	4853	4017	1264	2246	170.8
	S12					3125	2123	4329	3327	4638	3636	1516	2696	176.9
	S14 A					2911	1741	4115	2945	4423	3254	1769	3145	182.9

A=Standard

TORQUE OUTPUT FOR DOUBLE ACTING ACTUATOR

METRIC UNITS

SIZE	TORQUE OUTPUT FOR DOUBLE ACTING IN Nm						WEIGHT (Kg)
	3 Bar	4 Bar	5.5 Bar	7 Bar	8 Bar	10 Bar	
	0° to 90°	0° to 90°	0° to 90°	0° to 90°	0° to 90°	0° to 90°	
10	3	4.5	6.5	8.2	9.1	11	0.64
20	9.7	13	17.8	23	26	-	1.4
40	20.3	27.1	37.3	47	54	-	2.1
80	38.5	51.3	70.5	90	103	-	3
130	59.1	78.7	108.3	138	157	-	3.8
200	88	117	161	205	234	-	5.6
300	145	194	267	339	388	-	8.5
500	217	289	397	505	577	-	11.2
850	359	479	658	837	957	-	16.9
1200	519	692	952	1211	1384	-	25.8
1750	707	942	1295	1649	1884	-	32.5
2100	1086	1448	1991	2534	2896	-	49.7
2500	1730	2307	3172	4038	4614	-	69.6
4000	2408	3210	4414	5618	6421	-	129.4



U.S. - Headquarters

10350 Clay Road, Suite 250
Houston, TX 77041
Toll-Free: 844.398.6449
Fax: 713.466.1715

U.S. - Permian Basin

1100 W IH 20
Odessa, TX 79763
Main Line: 432-276-7640

CAN - Distribution Center

Unit 3, 2930 - 51st Ave. NW
Edmonton, AB T6P 0E1
Toll-Free: 866.723.4279
Main: 780.462.9166

U.S. Website: www.cncflowcontrol.com

local distributor/agent

CAN Website: www.cncflowcontrol.ca

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