

reliable actuators
to **Fit**
& **Forget**



EL MaticTM

Pneumatic Rack & Pinion Actuators



Pneumatic Rack & Pinion Actuators

Fit & Forget

EL-O-Matic continues to be the industry standard with innovative features and greater customer benefits from Emerson's portfolio of rack & pinion actuators.

Built upon 40 years of proven service from millions of applications, EL-O-Matic actuators remain second to none in dependability, providing the optimum "Fit & Forget" performance in a wide range of process industry applications such as Chemicals, Refining, Power Generation, Pulp & Paper, Pharmaceuticals and Food & Beverage. Designed and produced according to standards for high engineering accuracy, in manufacturing sites certified to ISO 9000:2008, assure a long cycle life.



Valve drive adaptors makes the EL-O-Matic's installation quick and reliable.

"Fit & Forget" Means Reliability

Product reliability is key to customer satisfaction. EL-O-Matic actuators are quick and easy to install and function faultlessly throughout their long working life.

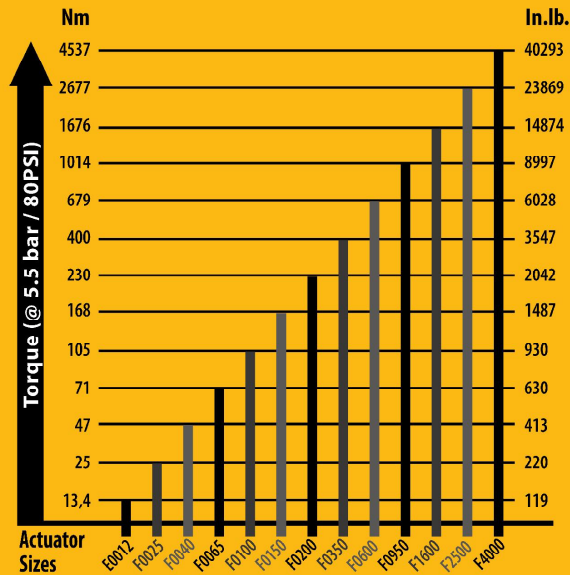
Rugged, cast aluminum bodies and advanced powder coated finishing provide corrosion protection even in the harsh environments. Modular construction, interchangeable components, dual drilled mounting holes and pinion inserts provide the widest range of mounting options. Drive pinions of aircraft grade ASTM 7075 T6 aluminum alloy ensure the ultimate combination of strength/weight ratio and additional protection against galvanic corrosion. Stainless steel external fasteners complete the corrosion protection specification and combine to provide greater cost savings and better long-term value.

Cast aluminum with two part coating with powder coating provides superior corrosion protection.



designed to improve Operations and Easy Maintenance

EL-O-Matic F-Series - 13 Sizes



Valve Types:

Ball: 1/2" / DN12 12" / DN300

Butterfly: 2" / DN50 30" / DN750

Actuator Temperature Ranges

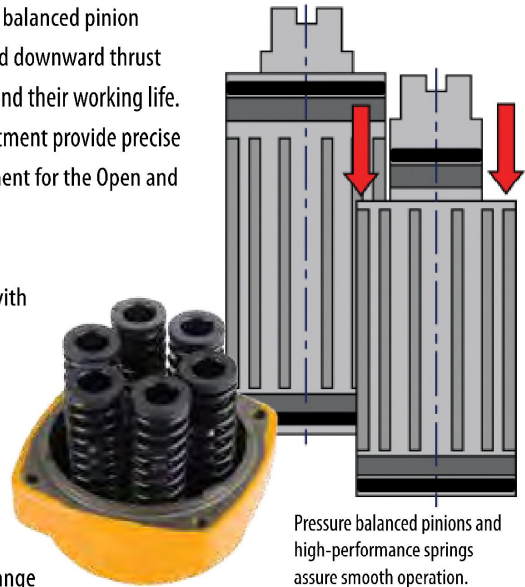
Standard -20 °C to +80 °C (-4 °F to +176 °F)

High Temperature -20 °C to +120 °C (-4 °F to +248 °F)

Low Temperature -40 °C to +80 °C (-40 °F to +176 °F)

EL-O-Matic actuators' pressure balanced pinion eliminates "endwise" forces and downward thrust from internal pressures to extend their working life. EL-O-Matic's dual stroke adjustment provide precise intuitive end of stroke adjustment for the Open and Closed valve position.

Actuator torque is optimized with high-performance springs, designed to deliver a torque range suitable for a wide range of applications. Six separate spring sets allow proper sizing to all quarter-turn valve types with a wide range of supply pressures. Maximum safety and ease of conversion are accomplished with pre-assembled springs.



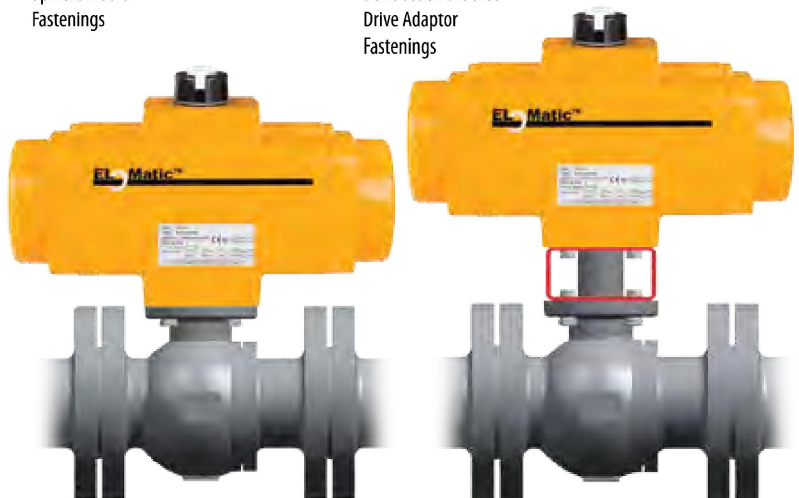
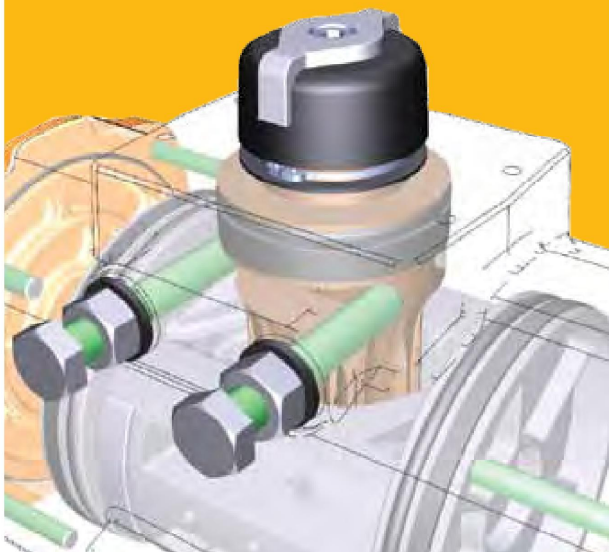
EL-O-Matic actuators' wide torque ranges meet all cycle speed demands through 13 sizes with a torque output ranging from 13.4 to 4537 Nm (119 to 40293 lbf.in) for ball valves from 1/2" to 12" and butterfly valves to 30." Cycle speeds are maximized by the use of large internal air ports. Optional "super-fast" and reduced speed versions are also available.

Direct Mounting

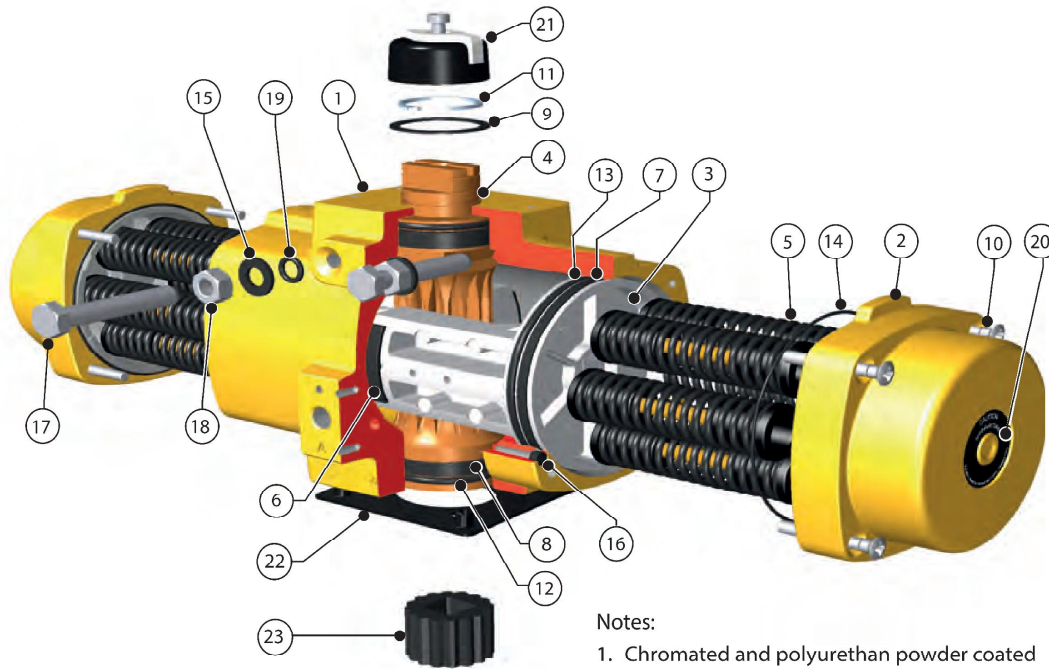
Spindle Insert
Fastenings

Indirect Mounting

Box Section Bracket
Drive Adaptor
Fastenings



Construction, Parts and Materials



Notes:

1. Chromated and polyurethan powder coated
2. Chromated and polyurethan powder coated
3. Hard anodized
4. Electrophoretic coated
5. Deltatone™ coated

Pos.	Qty	Description	Material	Notes
1	1	House	Cast Aluminium alloy	1
2	2	End cap	Cast Aluminium alloy	2
3	2	Piston	Cast Aluminium alloy	
4	1	Pinion	High grade aluminium	3
5	Max. 12	Spring cartridge	Spring steel	4
6	2	* Bearing strip piston rack	POM	
7	2	* Bearing piston	PTFE 25% carbon filled	
8	2	* Bearing pinion	POM	
9	1	* Thrust washer	POM, black UV stabilized	
10	8	End cap screw	Stainless Steel	
11	1	* Circlip	Spring steel	5
12	2	* O-ring seal pinion	Nitrile rubber	
13	2	* O-ring seal piston	Nitrile rubber	
14	2	* O-ring seal end cap	Nitrile rubber	
15	2	* O-ring seal limit stop	Nitrile rubber	
16	2	* B-port seal	Silicon rubber	
17	2	Limit stop screw	Stainless steel	
18	2	Limit stop nut	Stainless steel	
19	2	Limit stop washer	PA66	
20	2	Warning sticker	Polyester	
21	1	Indicator assembly	ABS + stainless steel screw	
22	1	Center plate (option)	Nylon PA6, Black	
23	1	Insert drive	Aluminium alloy	

* = Included in repair kit

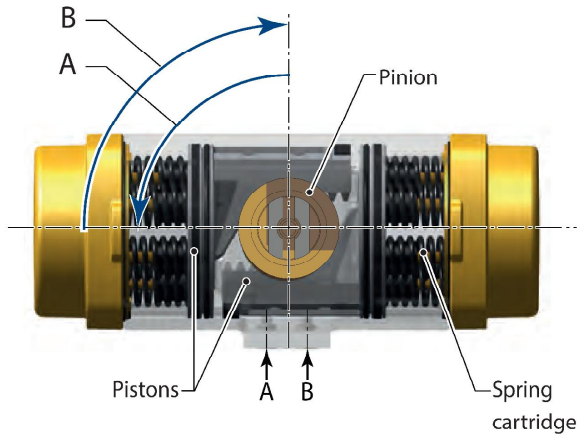
Assembly codes EL-O-Matic F actuators

Spring return actuators

Assembly code: CW

= Standard, Clock Wise-to-Close rotation

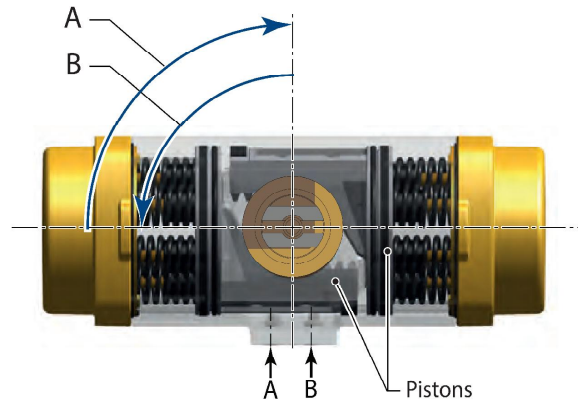
= Fail-to-Close



Assembly code: CC

= Reverse, Counter Clock Wise-to-Open

= Fail-to-Open

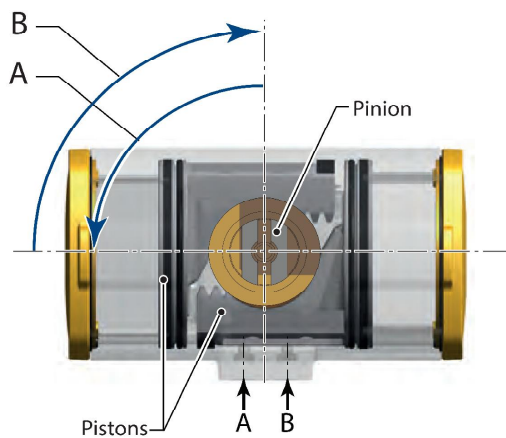


A = Central air chamber pressurized
 B = Spring stroke

Double acting actuators

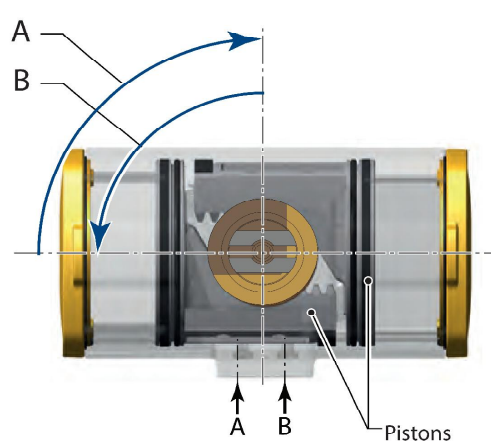
Assembly code: CW

= Standard, Clock Wise-to-Close rotation



Assembly code: CC

= Reverse, Counter Clock Wise-to-Open



A = Central air chamber pressurized
 B = End cap air chambers pressurized

All views are from above. Pistons are shown in inward position.

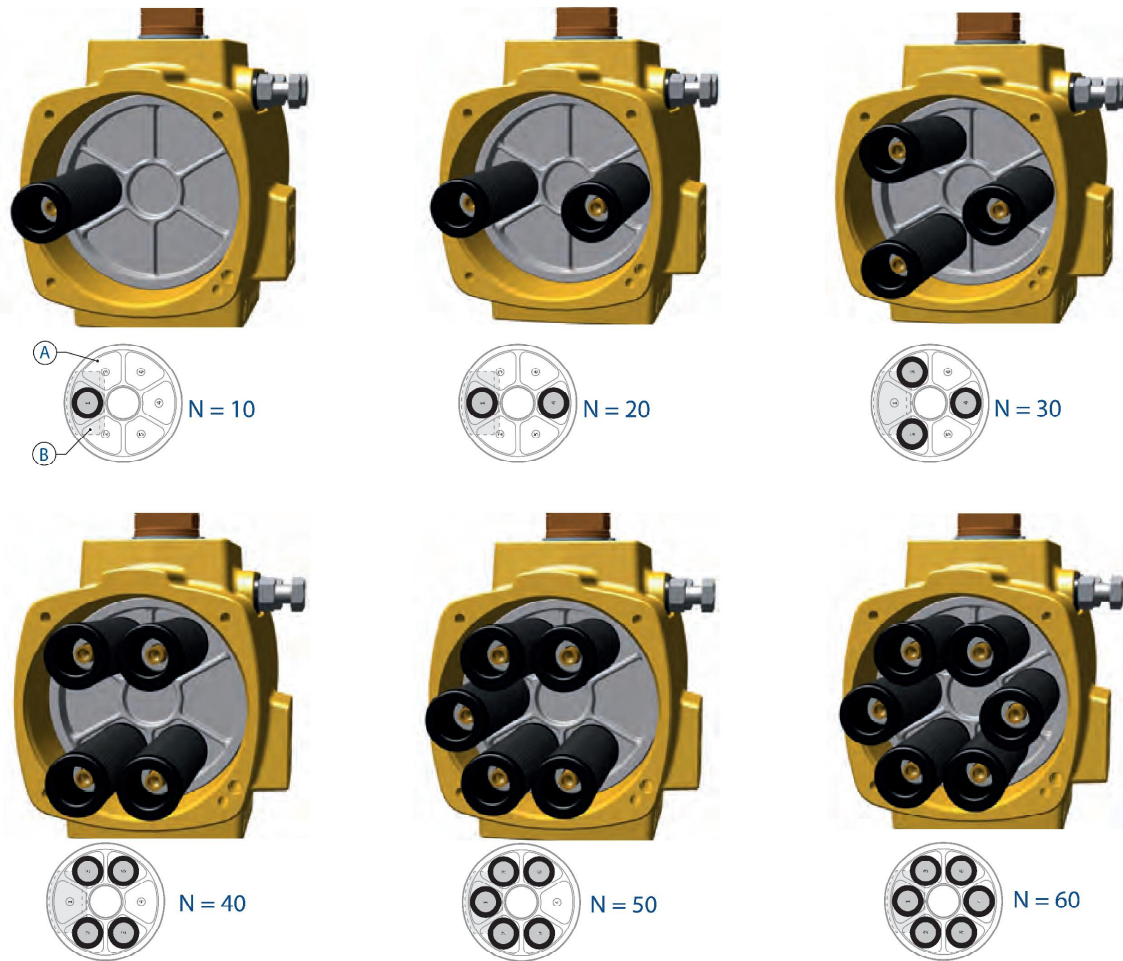
Spring cartridge placement

When replacing spring cartridges in a spring return actuator, ensure that the cartridges are replaced in their identical position from where they were removed.

Check below figure to see where to place the spring cartridges in case of spring set conversion.

Before assembling the spring cartridges and end caps, make sure that the pistons are completely inwards.

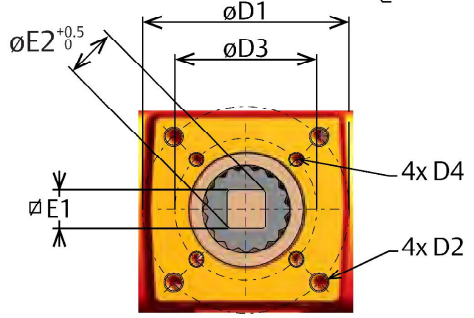
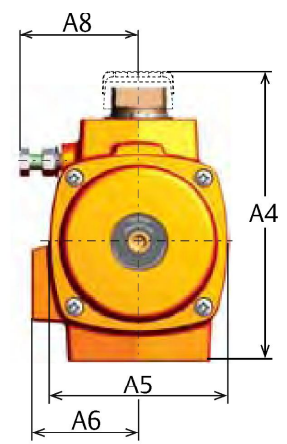
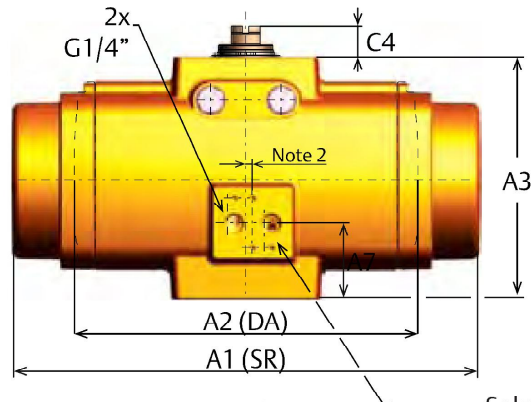
Figure 1. Spring cartridge placement



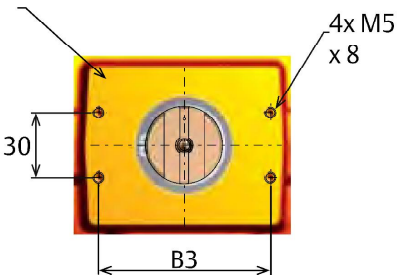
A = Piston top view
B = Position of piston gear rack

Metric Tables

Dimensions



Solenoid interface and Top mounting interface according VDI/VDE3845 (NAMUR)



Note:

1. DA = Double Acting, SR = Spring Return
2. The solenoid drilling pattern is shifted 4 mm for size 0025 and 2mm for size 0040 vs. the centerline of the actuator.

Dim In.	Actuator size											
mm	25	40	65	100	150	200	350	600	950	1600	2500	4000
A1	166	192	217	247	304	362	385	476	xxx	xxx	xxx	xxx
A2	166	192	217	247	223	256	269	336	xxx	xxx	xxx	xxx
A3	91	112	124	131	157	163	201	248	xxx	xxx	xxx	xxx
A4	119	139	151	158	185	191	230	292	xxx	xxx	xxx	xxx
A5	82	95	104	115	127	134	165	199	xxx	xxx	xxx	xxx
A6	49	55	58	64	69	72	85	102	xxx	xxx	xxx	xxx
A8	48	58	69	69	75	87	109	132	xxx	xxx	xxx	xxx
B3	80	80	80	80	80	80	80	130	130	130	130	130
C4	20	20	20	20	20	20	20	30	30	30	30	30
ISO 1	F05	F07	F07	F07	F10	F10	F10	F12	F14	F16	F16	F25
D1	50	70	70	70	102	102	102	125	125	165	165	254
D2	M6x10	M8x13	M8x13	M8x13	M10x15	M10x15	M10x15	M12x18	M12x18	M20x20	M20x20	M16x25
ISO 2	F03	F05	F05	F05	F07	F07	F07	F10	F10	F25*	F25*	F16
D3	36	50	50	50	70	70	70	102	102	-/-	-/-	165
D4	M5x8	M6x10	M6x10	M6x10	M8x13	M8x13	M8x13	M10x16	M10x16	-/-	-/-	M20x20
E1 Max.	11.08	14.08	14.08	19.08	19.08	22.10	27.11	27.11	36.16	46.16	46.16	55.24
E1 Min.	11.00	14.00	14.00	19.00	19.00	22.00	27.00	27.00	36.00	46.00	46.00	55.00
E2	14.1	18.1	18.1	25.2	25.5	28.2	36.2	36.2	58.2	60.2	60.2	72.2



Actuator Torque - Spring Return (Nm)

Actuator Size	Spring set nr.	Spring Stroke Torque (Nm)		Air Torque (Nm)																	
		Start	End	SUPPLY PRESSURE																	
				3.0 barg		3.5 barg		4.0 barg		4.5 barg		5.0 barg		5.5 barg		6.0 barg		7.0 barg		8.0 barg	
Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End		
FS 12	20	7	5	2	-1	4	1	5	2	6	3	8	5	9	6	10	7	13	10	15	12
FS 25	10	4	2	12	10	14	13	17	15	19	17	21	20	24	22	26	25	31	29	36	34
	20	7	4	9	6	12	9	14	11	16	13	19	16	21	18	24	21	28	25	33	30
	30	11	7	7	2	9	4	11	7	14	9	16	12	19	14	21	17	26	21	31	26
	40	14	9	-	-	-	-	9	3	11	5	14	8	16	10	18	12	23	17	28	22
	50	18	11	-	-	-	-	-	-	9	1	11	4	14	6	16	8	21	13	26	18
60	21	13	-	-	-	-	-	-	-	-	-	-	11	2	13	4	18	9	23	14	
FS 40	10	7	4	22	19	26	24	31	28	36	33	40	37	45	42	49	46	58	55	67	64
	20	13	8	17	12	22	16	26	21	31	25	35	30	40	34	44	39	53	48	62	57
	30	20	12	12	4	17	9	21	13	26	18	31	22	35	27	40	31	49	40	58	49
	40	26	17	-	-	12	1	17	6	21	10	26	15	30	19	35	24	44	33	53	42
	50	33	21	-	-	-	-	-	-	17	3	21	7	26	12	30	16	39	25	48	34
60	39	25	-	-	-	-	-	-	-	-	-	-	21	4	25	9	34	18	43	27	
FS 65	10	10	6	33	29	40	36	47	43	54	50	61	57	68	63	75	70	88	84	102	98
	20	20	13	26	17	33	24	40	31	47	38	53	45	60	52	67	59	81	72	95	86
	30	31	19	19	5	25	12	32	19	39	26	46	33	53	40	60	47	74	61	87	74
	40	41	26	-	-	-	-	25	8	32	14	39	21	46	28	52	35	66	49	80	63
	50	51	32	-	-	-	-	-	-	24	3	31	10	38	17	45	23	59	37	73	51
60	61	39	-	-	-	-	-	-	-	-	-	-	31	5	38	12	52	25	65	39	
FS 100	10	15	9	49	43	60	53	70	64	80	74	90	84	100	94	111	104	131	125	151	145
	20	30	19	39	26	49	36	59	47	69	57	79	67	90	77	100	87	120	108	141	128
	30	44	28	28	9	38	19	48	30	59	40	69	50	79	60	89	70	109	91	130	111
	40	59	37	-	-	27	2	38	13	48	23	58	33	68	43	78	53	99	74	119	94
	50	74	47	-	-	-	-	-	-	37	6	47	16	57	26	68	36	88	57	108	77
60	89	56	-	-	-	-	-	-	-	-	-	-	47	9	57	19	77	40	98	60	
FS 150	10	24	15	79	69	96	86	112	102	128	118	145	135	161	151	177	167	210	200	243	233
	20	47	30	62	42	79	59	95	75	111	91	128	108	144	124	160	140	193	173	226	206
	30	71	44	45	15	62	32	78	48	94	64	111	81	127	97	143	113	176	146	209	179
	40	94	59	-	-	45	5	61	21	77	37	94	54	110	70	126	86	159	119	192	152
	50	118	74	-	-	-	-	-	-	60	10	77	26	93	43	109	59	142	92	175	124
60	141	89	-	-	-	-	-	-	-	-	-	-	76	16	92	32	125	65	158	97	
FS 200	10	33	21	108	94	131	117	153	139	175	161	198	184	220	206	242	228	287	273	332	318
	20	65	41	85	57	107	79	129	102	152	124	174	146	196	169	219	191	263	236	308	280
	30	98	62	61	19	83	42	106	64	128	86	150	109	173	131	195	153	240	198	284	243
	40	131	82	-	-	-	-	82	26	104	49	127	71	149	93	171	116	216	161	261	205
	50	163	103	-	-	-	-	-	-	81	11	103	34	125	56	148	78	192	123	237	168
60	196	124	-	-	-	-	-	-	-	-	-	-	102	18	124	41	169	85	213	130	
FS 350	10	56	35	189	165	227	204	266	243	305	281	344	320	383	359	422	398	499	476	577	553
	20	112	70	148	101	187	139	226	178	265	217	303	256	342	295	381	334	459	411	537	489
	30	168	106	108	36	146	75	185	114	224	153	263	192	302	231	341	269	418	347	496	425
	40	224	141	-	-	106	11	145	50	184	89	222	127	261	166	300	205	378	283	455	360
	50	280	176	-	-	-	-	-	-	143	24	182	63	221	102	260	141	337	218	415	296
60	335	211	-	-	-	-	-	-	-	-	-	-	180	38	219	77	297	154	374	232	
FS 600	10	96	60	320	279	386	345	452	411	518	477	584	543	650	609	716	675	848	807	980	939
	20	192	121	251	169	317	235	383	301	449	367	515	433	581	499	647	565	779	697	911	829
	30	287	181	181	59	247	125	313	191	379	257	445	323	511	389	577	455	709	587	841	719
	40	383	241	-	-	178	15	244	81	310	147	376	213	442	279	508	345	640	477	772	609
	50	479	302	-	-	-	-	-	-	241	37	307	103	373	169	439	235	571	367	703	499
60	575	362	-	-	-	-	-	-	-	-	-	-	303	59	369	125	501	257	633	389	

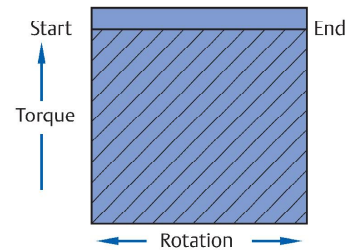
Actuator Torque - Double Acting (Nm)

Actuator Size	Torque in Nm Supply Pressure (barg)										
	2	3	3.5	4	4.5	5	5.5	6	6.5	7	8
FD 12	4.8	7.3	8.5	9.7	10.9	12.2	13.4	14.6	15.9	17.1	19.6
FD 25	9	13	16	18	20	23	25	27	29	32	36
FD 40	17	25	29	34	38	42	47	51	55	59	68
FD 65	25	38	45	51	58	64	71	77	84	90	103
FD 100	38	57	66	76	86	95	105	115	124	134	153
FD 150	60	91	106	122	137	153	168	183	199	214	245
FD 200	82	124	146	167	188	209	230	251	272	293	335
FD 350	143	216	253	290	326	363	400	436	473	510	583
FD 600	243	368	430	492	554	617	679	741	804	866	991
FD 950	377	570	667	764	861	957	1054	1151	1247	1344	1537
FD 1600	617	934	1092	1250	1408	1567	1725	1883	2041	2200	2516
FD 2500	995	1505	1760	2015	2270	2525	2780	3036	3291	3546	4056
FD 4000	1592	2408	2816	3225	3633	4041	4449	4857	5265	5673	6490

Note:

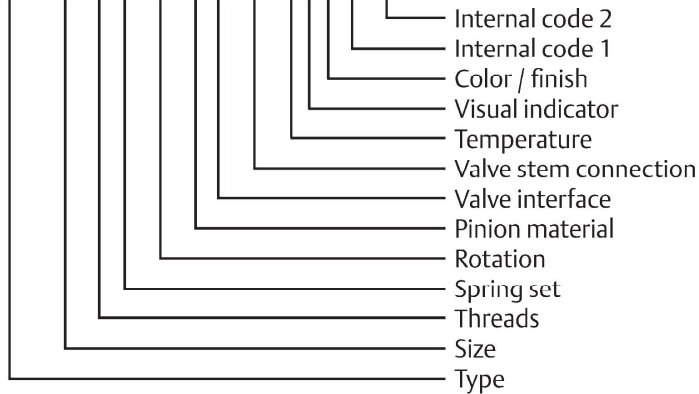
1. Emerson Process Management recommends that the valve manufacturer supply the maximum required torque values (Including any adjustments or suggested safety factors for valve service conditions or application).
2. Additionally, the valve manufacturer must identify at which position(s) and direction(s) of rotation (Counter Clock Wise or Clock Wise) these maximum requirements occur.
3. If in doubt, or you require any assistance with sizing actuators, do not hesitate to contact your nearest Emerson's Valve Automation Division representative.

Figure 1. Double acting torque diagram



Product configuration code

FS 0150 U 40 CW AL T NL17 S K A 00 XX



Type:	
FD	Double acting
FS	Spring return

Size:	
Body sizes: 0012, 0025, 0040, 0065, 0100, 0150, 0200, 0350, 0600, 0950, 1600, 2500 and 4000	

Threads:	
M	Metric - ISO 5211.
U	Imperial - ISO 5211 (UNC/NPT).

Spring set:	
00	For double acting (no springs)
10, 20, 30, 40, 50 or 60	For spring return

Rotation:	
CW	Spring to Close / Clock Wise
CC	Spring to Open / Counter Clock Wise

Pinion material:	
AL	Aluminium, hard anodized.

Valve Interface:	
T	Standard ISO 5211 - interface
S	Small interface with center plate DIN 3337
L	Large interface with center plate DIN 3337

Valve Stem connection (Insert Sizes):	
0000	No Insert

Parallel drive: □	Diagonal drive : ◇	Square:	Actuator size(s):
NL11	YD11	11mm / 0.433"	0025
NL14	YD14	14mm / 0.551"	0040 & 0065
NL19	YD17	17mm / 0.669" 19mm / 0.748"	0100 & 0150
NL22	YD22	22mm / 0.866"	0200
NL27	YD22	22mm / 0.866" 27mm / 1.063"	0350
NL27	YD27	27mm / 1.063"	0600
NL36	YD36	36mm / 1.417"	0950
NL46	YD46	46mm / 1.811"	1600 & 2500
NL55	YD55	55mm / 2.165"	4000

See data sheet EFG.05.01.EN for a more detailed overview of available inserts.

Drive insert designation is according ISO 5211.

Temperature Ranges:		
S	Standard:	-20°C to +80°C (-4°F to +176°F)
H	High Temperature:	-20°C to +120°C (-4°F to +248°F)
L	Low Temperature:	-40°C to +80°C (-40°F to +176°F)

Visual indicator:	
K	Standard (knob style)
N	No Visual indicator

Finish:	
A	Standard coating
C	CSR coating

Note: CSR coating not available for Size 2500 and 4000

Internal code 1:	
00	Standard

Internal code 2:	
XX	Standard