FLOWSERVE

Automax SuperNova Series
Pneumatic Rack & Pinion Actuators

Experience In Motion

*The Flowserve **S Series** SuperNova pneumatic actuator is the latest development of the product, which has won worldwide praise for its **reliability**, **versatility** and **safety**.*

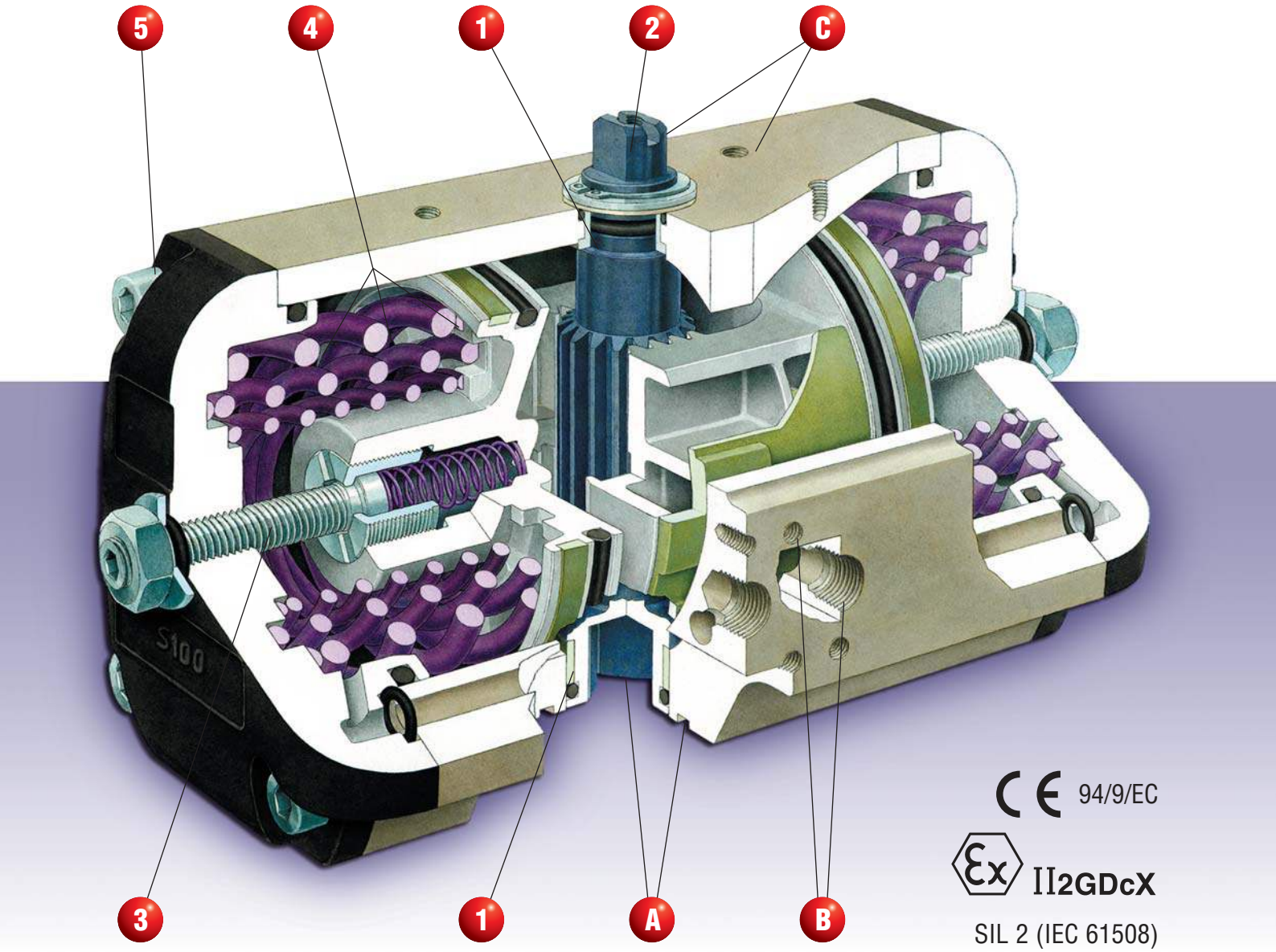
Rugged, yet compact construction, combined with new technical solutions make this product extremely reliable in the severest of operating conditions. Furthermore, an entire range of accessories manufactured by Flowserve Automax, enables users to rely on a single partner for all their valve automation system components.

The Automax actuator's prime function is to generate a torque output to turn valves or other rotary equipment. As such it is not deemed a pressure vessel or machine. Pneumatic actuators of these sizes are not governed by the demands of the PED.

1. Top and bottom pinion bearings designed to withstand the toughest working conditions.
2. Steel pinion with ultra resistant Nitride surface treatment.
3. Adjustable open & closed travel-stops.
4. Concentric springs with over 10 years of proven reliability.
5. Stainless steel fastenings throughout, for long-term corrosion resistance.

- A ISO 5211/DIN 3337 for valve connection (STAR DRIVE).
- B NAMUR (VDI/VDE 3845) for solenoid valve connection.
- C NAMUR (VDI/VDE 3845) for limit switch, positioner and other accessories.

Spring Return Version



CE 94/9/EC

Ex II2GDcX

SIL 2 (IEC 61508)

MAIN FEATURES

- Aluminium alloy body, internally and externally hard anodised.
- End caps, oven-treated with ultra-thick epoxy coating.
- Fully field reversible for altering spring failure mode.
- Piston guide bearings with wide contact surfaces, increased efficiency and cycle life.
- Independent open and closed adjustment (standard across S050-S200) is indispensable where finite adjustment or limited rotation is required.
- Working temperatures to cover from -50°C to +150°C. Standard -20°C to +80°C.
- The unique design also allows for operation with non-lubricated air.
- Maintanable on site without the need for any special tools.
- Valve and accessory connections according to the latest international standards:

Double Acting Version

THE PRODUCT RANGE INCLUDES THE FOLLOWING OPTIONS:

- Temperatures from -50°C to +80°C (Low temperature), -20°C to +150°C (High temperature).
- Stainless steel pinion.
- Body with dual ISO 5211 mounting connections.
- 180° rotation plus options up to 250°. (technical and dimension data available on request)
- Fast acting version with G½ ports on body / end caps.
- MaxGuard™ - special coating for corrosive and aggressive applications

Spring Configurations

MODEL S050 SPRING CHART				
Spring Set	Spring Combination # 1 Spring (inner)	# 2 Spring (low rate outer)	# 3 Spring (high rate outer)	Standard Configurations (air supply)
04	1	1		
05		2		3 bar
06	2	1		4 bar
07	1	2		5 bar
08	2	2		5.5 bar
09	2		2	

Spring markings: #1 Spring = 1 colour code dot
#2 Spring = 2 colour code dots
#3 Spring = 3 colour code dots

MODEL S063-S200 SPRING CHART				
Spring Set	Spring Combination # 1 Spring (inner)	# 2 Spring (low rate outer)	# 3 Spring (high rate outer)	Standard Configurations (air supply)
04		2		
05		1	1	3 bar
06			2	
07	1		2	4 bar
08	2		2	5 bar
09	1	1	2	
10		2	2	5.5 bar
11	1	2	2	
12	2	2	2	

Torque Outputs (Nm) - Spring Return Actuator (S050 - S200)

Model / Bore	Springs			Air Supply Pressure (bar)													
	Spring Set	Spring Torque		2.5		3		4		5		5.5		6		7	
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
S050S__	04	5	3	4	2	6	4										
	05	6	4			5	3	8	6								
	06	7	5					7	5	10	8						
	07	8	6					6	4	9	7	11	8				
	08	10	7							8	4	10	6	11	7		
	09	12	8									8	4	10	5	13	8
S063S__	05	10	6	8	4	11	7										
	06	12	8			9	5	15	11								
	07	13	9			8	3	14	9	19	15						
	08	15	10					12	7	18	13	21	16				
	10	19	13							15	9	18	12	21	14		
	12	23	15											19	11	24	16
S085S__	05	20	13	16	9	22	15										
	06	24	16			19	11	31	23								
	07	28	19			16	7	28	19	40	31						
	08	32	21					26	14	38	26	44	32				
	10	40	27							32	18	38	24	44	30		
	12	48	32											38	22	50	34
S100S__	05	37	25	29	17	40	28										
	06	44	29			35	20	57	42								
	07	51	34			30	12	52	34	74	56						
	08	59	39					47	27	69	49	80	60				
	10	74	49							59	33	70	44	81	55		
	12	88	59											71	40	93	62
S115S__	05	61	40	49	28	67	46										
	06	73	49			59	33	96	70								
	07	85	57			50	21	87	57	124	94						
	08	97	65					79	49	115	81	134	100				
	10	121	81							98	56	117	74	135	93		
	12	146	97											118	66	154	103
S125S__	05	86	57	70	40	96	66										
	06	103	69			84	48	136	100								
	07	120	80			72	30	124	82	176	134						
	08	138	92					112	63	164	115	190	141				
	10	172	115							139	80	165	106	191	132		
	12	207	138											167	95	219	147
S150S__	05	155	103	126	71	173	118										
	06	186	124			151	86	244	179								
	07	217	145			129	53	222	147	316	240						
	08	248	165					201	114	295	208	342	254				
	10	310	207							251	143	297	189	344	236		
	12	372	248											301	171	395	265
S175S__	05	235	152	189	102	259	172										
	06	285	181			228	119	368	259								
	07	328	214			194	74	333	214	473	353						
	08	378	243					303	161	442	301	512	370				
	10	471	305							377	203	447	273	517	342		
	12	563	367											452	246	591	385
S200S__	05	331	200	269	152	368	252										
	06	397	264			322	183	522	382								
	07	464	309			275	112	475	312	675	512						
	08	529	353					429	244	628	444	728	543				
	10	662	441							536	304	636	404	736	504		
	12	794	529											643	365	843	565

NOTES:

__ = Spring Set Number [ ] = Spring / Air Torque Balanced

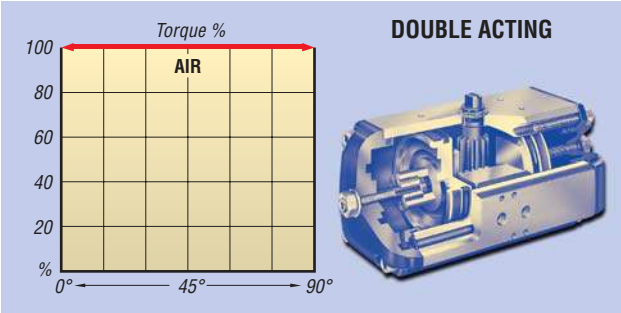
Torque Outputs (Nm) - Spring Return Actuator (SN250 - SN300)

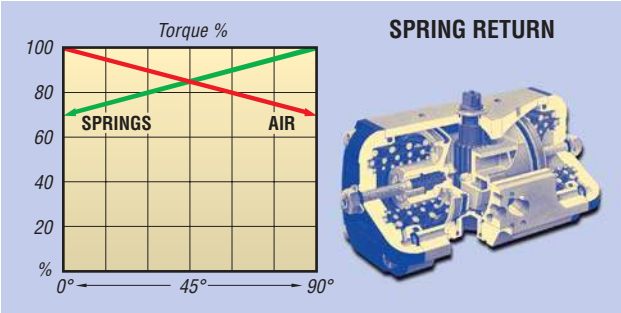
Model / Bore	Springs			Air Supply Pressure (bar)													
	Spring Set.	Spring Torque Start	Spring Torque End	2.5 Start	2.5 End	3 Start	3 End	4 Start	4 End	5 Start	5 End	5.5 Start	5.5 End	6 Start	6 End	7 Start	7 End
SN250S__	05	620	268	753	384												
	06	744	322	697	254	904	461										
	07	868	383			840	331	1254	745								
	08	991	445					1189	615								
	09	1115	510					1121	485								
	10	1239	576							1465	769						
	11	1363	645							1393	638	1600	845				
	12	1487	716							1319	508	1526	715	1733	922	2147	1336
SN300S__	05	1043	446	1062	435	1368	741										
	06	1252	535			1274	522										
	07	1460	636					1780	914								
	08	1669	740					1671	695								
	09	1878	848							2170	1088						
	10	2086	958							2055	869	2361	1175				
	11	2295	1072									2241	956	2547	1262		
	12	2504	1189											2423	1043	3035	1655

Torque Outputs (Nm) - Double Acting Actuator (S050 - SN300)

Model / Bore	Air Supply Pressure (bar)							
	2.5	3	4	5	5.5	6	7	8
S050D	8	9	13	16	17	19	22	25
S063D	15	18	24	29	32	35	41	47
S085D	31	37	49	61	67	73	86	98
S100D	56	68	90	113	124	135	158	180
S115D	94	112	150	187	206	225	262	300
S125D	133	160	213	266	292	319	372	425
S150D	239	287	383	478	526	574	670	765
S175D	375	428	570	713	784	856	998	1141
S200D	511	613	817	1021	1123	1225	1430	1634
SN250D	1058	1270	1693	2116	2328	2539	2962	3386
SN300D	1564	1877	2502	3128	3441	3754	4379	5005

The diagrams below show typical torque curves for *rack & pinion* actuators.

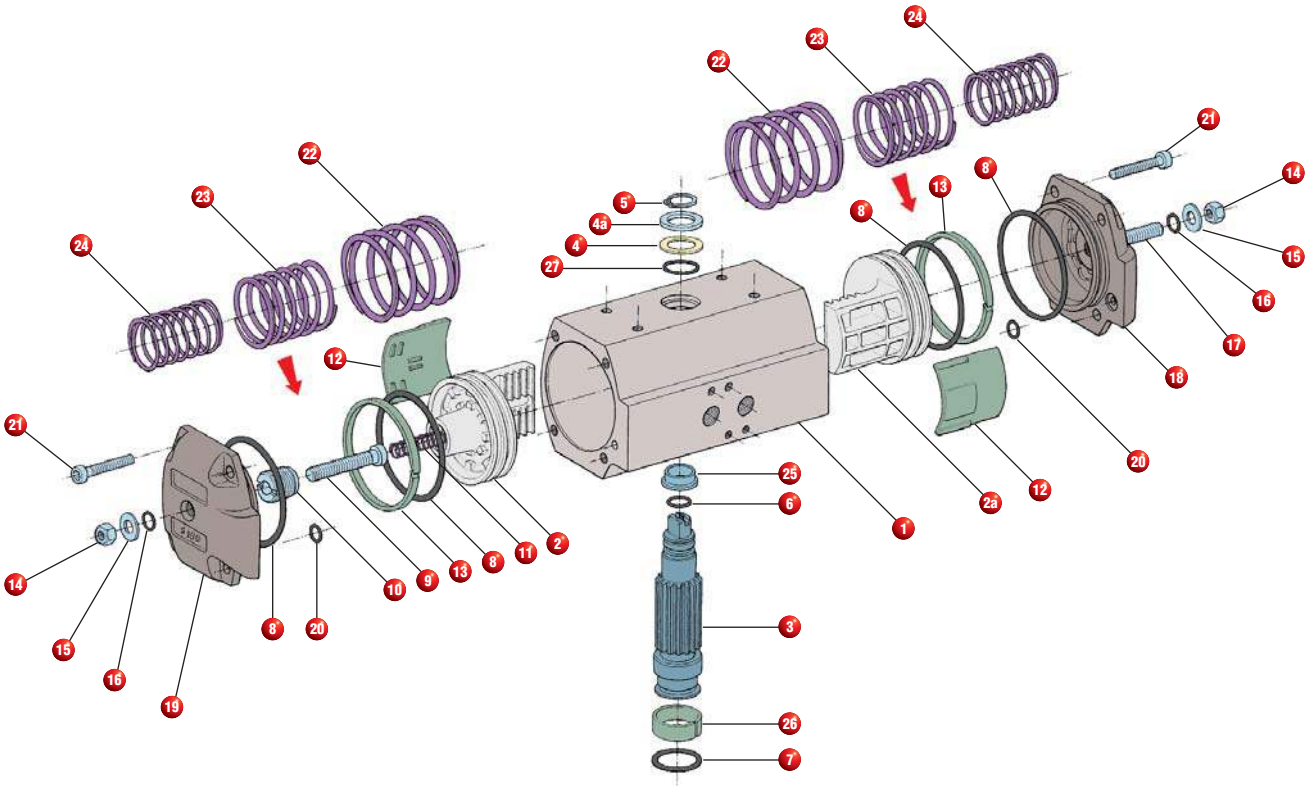




As seen in the graph, the **double acting actuator** has constant torque over the whole travel, so that all that needs to be known for sizing is the maximum static torque required by the valve, which is multiplied by a safety coefficient (usually between 25% and 50% depending on the type of valve). The value thus obtained is then compared with the figures in the minimum air pressure column in the torque table. Having found the same or nearest value (in excess), the suitable model can be read off the column to the left.

The **spring return** actuator, on the other hand, has four torques: *spring break*, *pneumatic break* (usually the same) *pneumatic end* and *spring end* (usually the same). Choice of actuator here depends on various factors (valve type, normally open or closed) and the method is usually the same as that of double acting models, except that the value must be compared with the lower of *spring* and *pneumatic end*. The value of the springs can in any case be modified to adapt the actuator's torque to the value required by the valve.

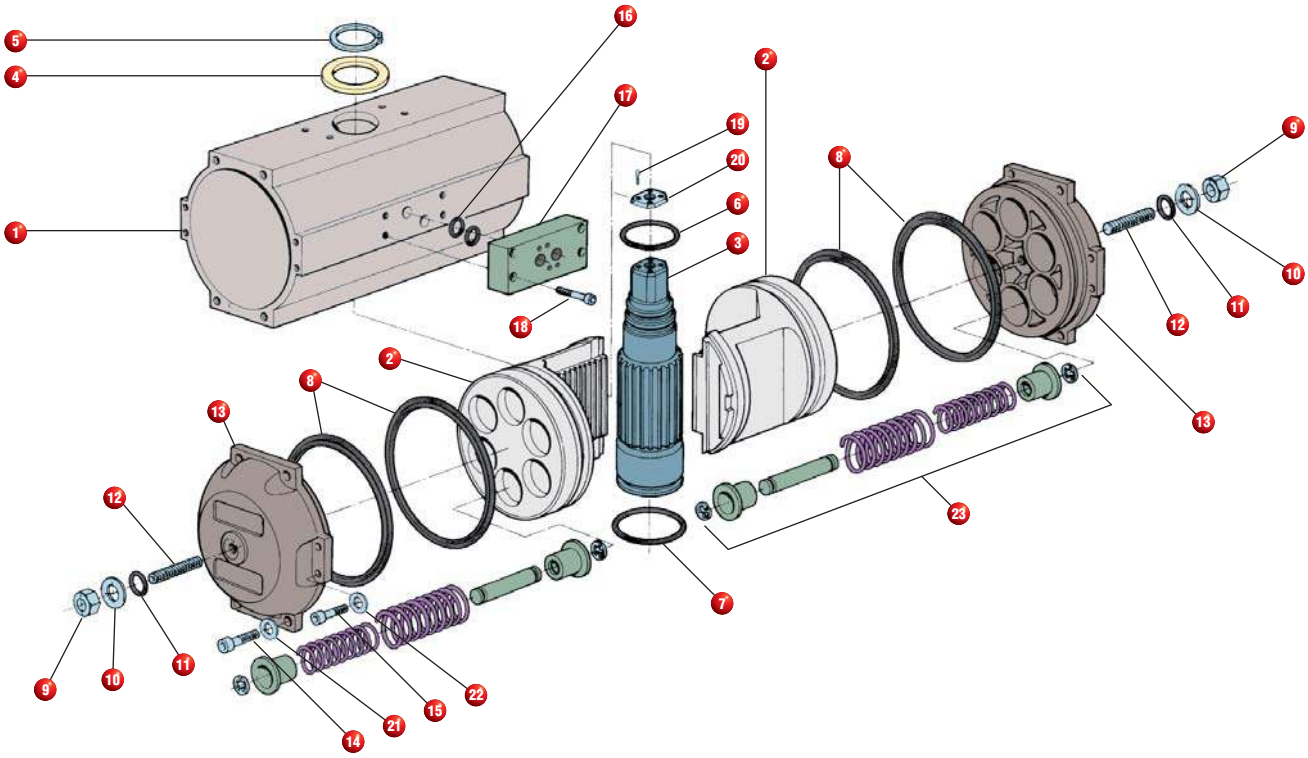
Parts & Materials Lists S050 - S200



Item	Description	Standard Materials	Quantity	
			D.A.	S.R.
1	*Body*	*Hard Anodised Aluminium*	*1*	*1*
2	*Left Piston*	*Aluminium*	*1*	*1*
2a	*Right Piston*	*Aluminium*	*1*	*1*
3	*Pinion*	*Nitride Coated Steel*	*1*	*1*
4 *	*Pinion Washer*	*Nylon*	*1*	*1*
4a *	*Steel Pinion Washer*	*Stainless Steel*	*1*	*1*
5 *	*Pinion Circlip*	*Steel / Plated*	*1*	*1*
6 *	*Upper Pinion O-Ring*	*Nitrile Rubber*	*1*	*1*
7 *	*Lower Pinion O-Ring*	*Nitrile Rubber*	*1*	*1*
8 *	*Piston & End Cap O-Ring*	*Nitrile Rubber*	*4*	*4*
9	*Inward Stop Bolt (left)*	*Stainless Steel*	*1*	*1*
10	*Inward Travel Retaining Insert*	*Carbon Steel*	*1*	*1*
11	*Inward Travel Spring*	*Stainless / Plated*	*1*	*1*
12 *	*Piston Guide*	*Nylon & Molybdenum Disulphide*	*2*	*2*
13 *	*Piston Guide Band*	*Nylon & Molybdenum Disulphide*	*2*	*2*
14	*Stop Bolt Retaining Nut*	*Stainless Steel*	*2*	*2*
15	*Stop Bolt Washer*	*Stainless Steel*	*2*	*2*
16 *	*Stop Bolt O-Ring*	*Nitrile Rubber*	*2*	*2*
17	*Outward Stop Bolt (right)*	*Stainless Steel*	*1*	*1*
18	*Right End Cap*	*Aluminium / Epoxy*	*1*	*1*
19	*Left End Cap*	*Aluminium / Epoxy*	*1*	*1*
20 *	*End Cap Supply O-Ring*	*Nitrile Rubber*	*2*	*2*
21	*End Cap Screw*	*Stainless Steel*	*8*	*8*
22	*Outer Spring*	*Spring Steel Coated*	*-*	*2 max.*
23	*Middle Spring*	*Spring Steel Coated*	*-*	*2 max.*
24	*Inner Spring*	*Spring Steel Coated*	*-*	*2 max.*
25 *	*Top Pinion Bearing*	*Hard Anodised Aluminium*	*1*	*1*
26 *	*Bottom Pinion Bearing*	*PEEK*	*1*	*1*
27 *	*Top Bearing O-Ring*	*Nitrile Rubber*	*1*	*1*

*** Parts Included in Repair Kit**

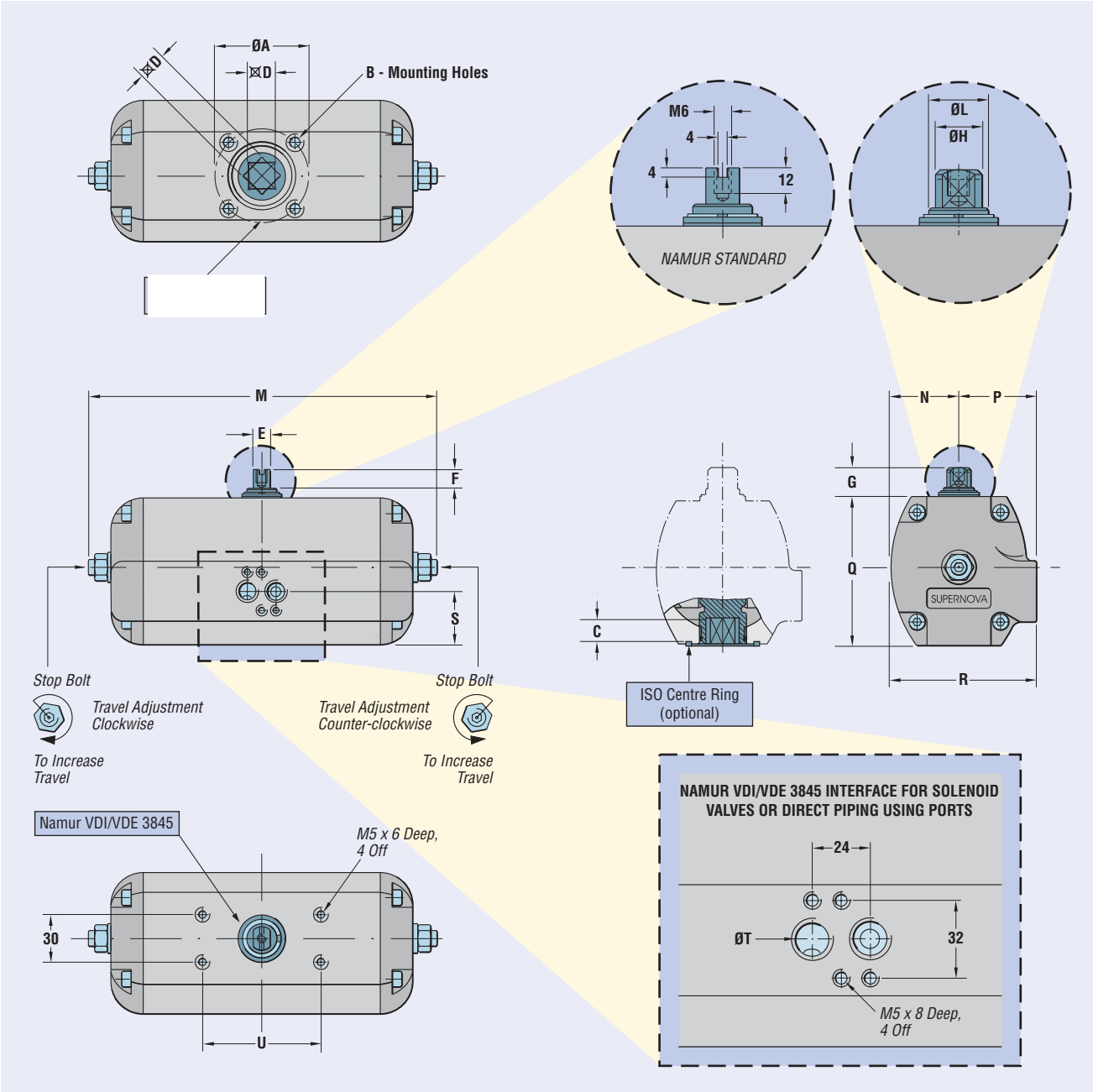
Parts & Materials List SN250 - SN300



Item	Description	Standard Materials	Quantity	
			D.A.	S.R.
1	*Body*	*Hard Anodised Aluminium*	*1*	*1*
2	*Piston*	*Aluminium / PTFE insert*	*2*	*2*
3	*Pinion*	*Nitride Coated Steel*	*1*	*1*
4 *	*Pinion Washer*	*Nylon*	*1*	*1*
5 *	*Pinion Circlip*	*Steel / Plated*	*1*	*1*
6 *	*Upper Pinion O-Ring*	*Nitrile Rubber*	*1*	*1*
7 *	*Lower Pinion O-Ring*	*Nitrile Rubber*	*1*	*1*
8 *	*Piston & End Cap O-Ring*	*Nitrile Rubber*	*4*	*4*
9	*Stop Bolt Retaining Nut*	*Stainless Steel*	*2*	*2*
10 *	*Stop Bolt Washer*	*Stainless Steel*	*2*	*2*
11	*Stop Bolt O-Ring*	*Nitrile Rubber*	*2*	*2*
12	*Stop Bolt*	*Steel / Plated*	*1*	*1*
13	*End Cap*	*Aluminium / Epoxy*	*2*	*2*
14	*End Cap Screw*	*Stainless Steel*	*8*	*8*
15	*End Cap Screw*	*Stainless Steel*	*8*	*8*
16 *	*Base O-Ring*	*Nitrile Rubber*	*2*	*2*
17	*Namur Block*	*Hard Anodised Aluminium*	*1*	*1*
18	*Namur Block Screw*	*Stainless Steel*	*4*	*4*
19	*Adaptor Plate Screw*	*Stainless Steel*	*4*	*4*
20	*Adaptor Plate*	*Hard Anodised Aluminium*	*1*	*1*
21	*Washer*	*Stainless Steel*	*8*	*8*
22	*Washer*	*Stainless Steel*	*8*	*8*
23	*Spring Cartridge*	*Steel / Plated*	*0*	*12 max.*

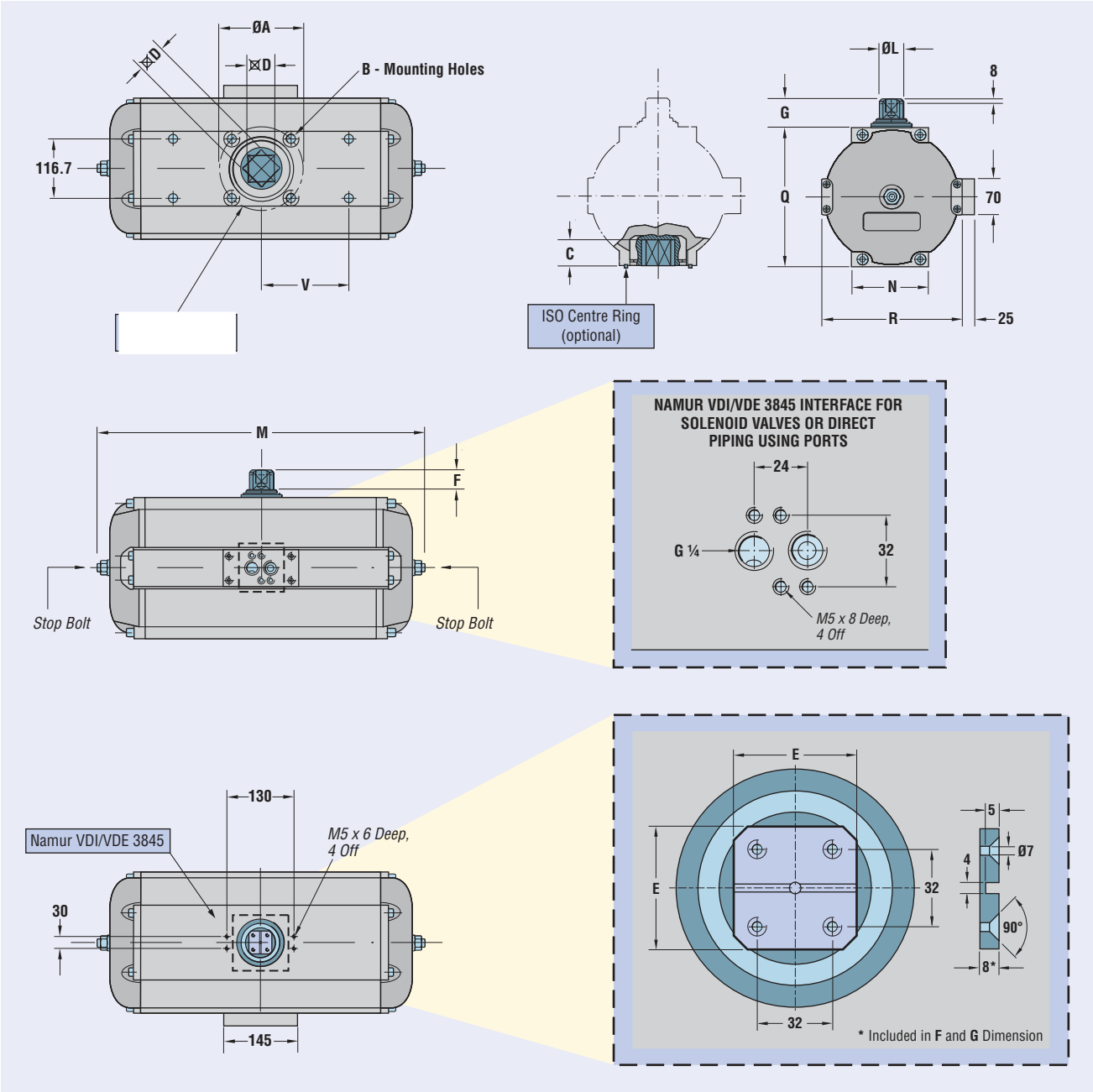
*** Parts Included in Repair Kit**

Dimensions S050 - S200



Model	ISO 5211 Mounting			Centre ring	Mounting							M		Overall Dimensions							Weight (Kg)		Volume (litres)	
	ISO	ØA	B	(Ø x H)	C	⊠D	E	F	G	ØH	ØL	90°	180°	N	P	Q	R	S	T	U	D.A.	S.R.	CW	CCW
S050	F04	42	M5x8.5	30 x 2	12	11	10	10	20	11.9	12	170	220	29	40	65	69	26	G1/8	80	1.2	1.4	0.134	0.088
S063	F05	50	M6x10	35 x 3	16	14	10	10	20	11.9	14	202	260	36	45	81	81	32	G1/8	80	1.7	2	0.260	0.163
S085	F07	70	M8x13	55 x 3	20	17	14	14	20	17.5	18	250	316	48	57	106	105	41	G1/8	80	3.4	4.2	0.550	0.327
S100	F07	70	M8x13	55 x 3	20	17	14	14	20	19.5	25	296	384	55	63	122	118	44	G1/4	80	5.2	6.6	0.910	0.622
S115	F10	102	M10x16	70 x 3	25	22	20	20	30	28	32	342	448	63	74	135	137	47	G1/4	130	8	10.2	1.530	1.060
S125	F10	102	M10x16	70 x 3	25	22	20	20	30	28	40	402	528	68	78	147	146	51	G1/4	130	11.5	13.7	2.090	1.470
S150	F12	125	M12x19	85 x 3	29	27	36	22.5	30	47.5	48	486	640	81	88	174	169	60	G1/4	130	19.5	23.2	3.660	2.600
S175	F14	140	M16x25	100 x 4	40	36	36	22.5	30	47.5	52	542	726	95	106	209	201	69	G1/4	130	31.9	35	5.740	3.800
S200	F14	140	M16x25	100 x 4	40	36	36	22.5	30	47.5	60	620	805	108	120	239	228	79	G1/4	130	41.5	53	8.300	5.430

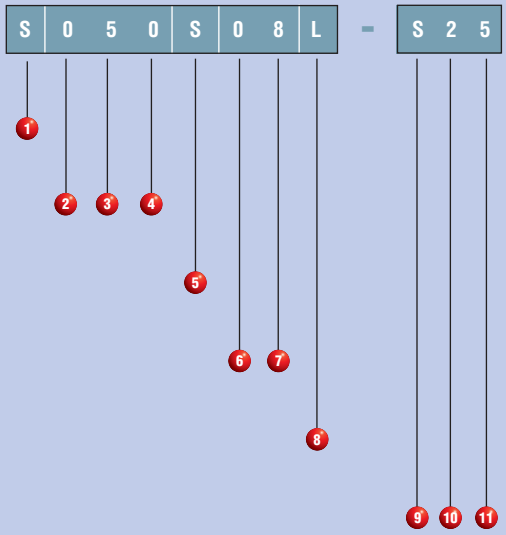
Dimensions SN250 - SN300



Model	ISO 5211 Mounting			Centre Ring	Mounting							M		Overall Dimensions						Weight (Kg)		Volume (litres)	
	ISO	ØA	B	(Ø x H)	C	⊠D	E	F	G	ØH	ØL	90°	180°	N	P	Q	R	S	V	D.A.	S.R.	CW	CCW
SN250	*F16*	*165*	*M20x18*	*130 x 4*	*50*	*46*	*50*	*33*	*50*	*-*	*75*	*654*	*995*	*150*	*-*	*280*	*280*	*-*	*175.1*	*62*	*76.5*	*12.400*	*11.800*
SN300	*F16*	*165*	*M20x18*	*130 x 4*	*50*	*46*	*50*	*33*	*50*	*-*	*80*	*788*	*1118*	*160*	*-*	*340*	*340*	*-*	*190.5*	*99*	*131*	*23.000*	*16.700*

NOTE: For optional G½ Inlet Block, order separately using code 428132

Automax Actuator Coding



1	AUTOMAX ACTUATOR CODING
S	*European SuperNova **S**050-**S**200 (**SN**250 & **SN**300)*

2 3 4	SIZE
050, 063, 085, 100, 115, 125, 150, 175, 200, 250, 300	

5	OPERATION
D	*Double Acting, Standard*
S	*Spring Return, FCW (Fail Clockwise), Standard*
W	*Double Acting, CCW (Counter Clockwise Rotation), Reverse Action*
C	*Spring Return, FCCW (Fail Counter Clockwise), Reverse Action*
F	*Double Acting, 140° Rotation, Adjustment 135° (Special Body, Double Stroke Adjustment)*
M	*Double Acting, 180° Rotation*
T	*Double Acting, 120° Rotation*

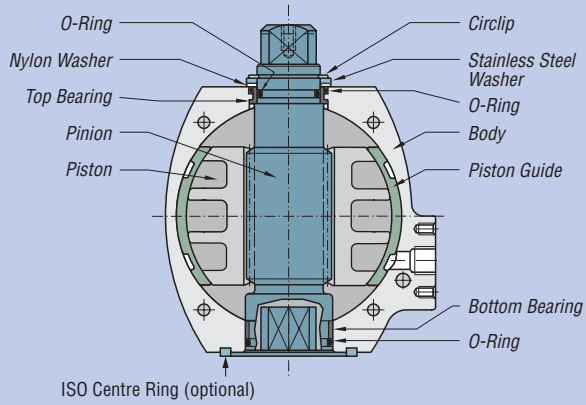
6 7	SPRING CONFIGURATION
04, 05, 06, 07, 08, 09, 10, 11, 12	

8	TEMPERATURE
Blank	*Standard Temperature, Nitrile 'O' Rings*
L	*Low Temperature, Fluorosilicon 'O' Rings*
H	*High Temperature, Viton 'O' Rings*

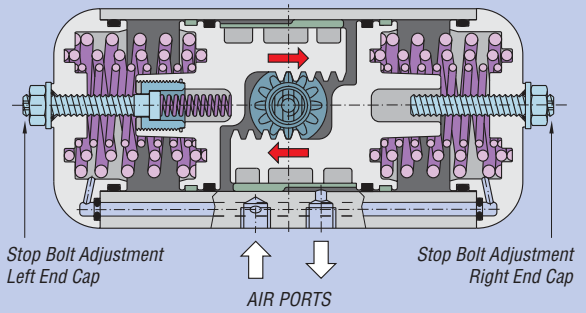
9 10 11	SPECIAL VERSIONS
Blank	*No Special Variation*
A	*ISO Centre Ring*
C	*Corrosive Environment, Stainless Steel Pinion and Circlip*
E	*Epoxy/Polyurethane Coated E01, E02, E03 etc*
R	*0 to 100% Stroke Adjustment*
S	*Special, please consult office S01, S02, S03 etc*

Operating Conditions

Pressure Limitation	*10 bar maximum working pressure.*
Media	*Air or non-corrosive fluid.* *The media should have a dew point at least 10°C below the ambient operating temperature.*
Temperature Range	*Standard -20°C to +80°C* *Low temperature variant -50°C to +80°C* *High temperature variant -20°C to +150°C*
Rotation ***(viewed from top)***	*Pinion rotates anti-clockwise when the centre chamber supply port (RHS) is pressurised. Reverse acting options available.*
Travel ***(all sizes)***	*Average 100° total travel to provide nominal 5° over travel clockwise and anti clockwise. SN250/SN300 models - travel stops in outward direction only.*
Extended Travel	*180°, 140°, 120°. For further options consult your local Flowserve sales operation.*
Adjustable Travel Stop	*Standard on all 90° versions.* *Optional on 140°.* *Open adjustment only on 180°.*



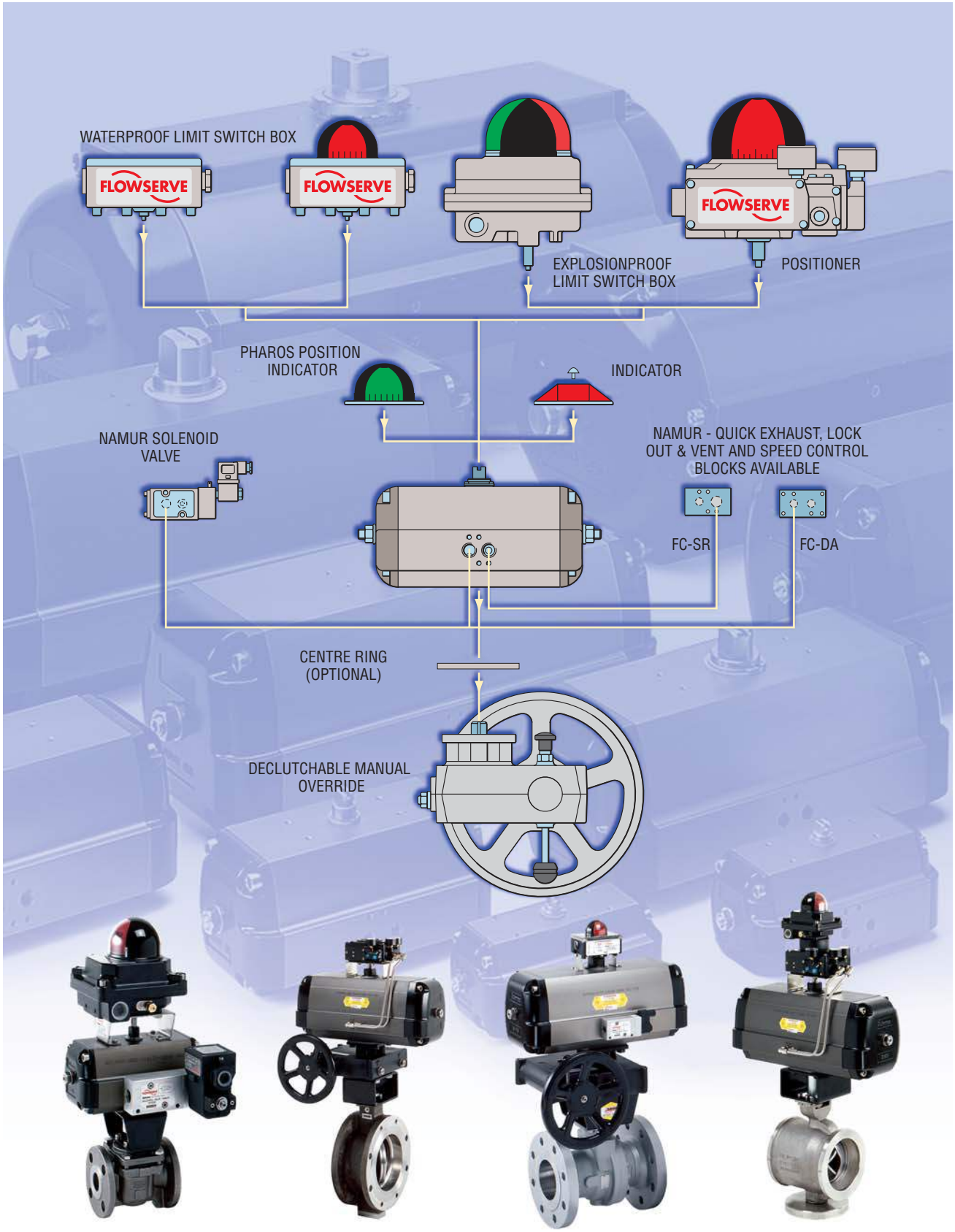
TRAVEL ADJUSTMENTS
TOP VIEW



Actuator Type	Fail Position	Clockwise (CW) CLOSED	Counterclockwise (CCW) OPEN
Double Acting		*Left end cap stop bolt*	*Right end cap stop bolt*
Spring Return	*(CW)*	*Left end cap stop bolt*	*Right end cap stop bolt*
Spring Return	*(CCW)*	*Right end cap stop bolt*	*Left end cap stop bolt*

Please consult I.O.M. for more information

Complete Valve Automation Systems



FCD AXEBR1001-05

To find your local Flowserve representative:

For more information about Flowserve Corporation,

Due to continuous development of our product range, we reserve the right to alter the dimensions and information contained in this leaflet as required.
Information given in this leaflet is made in good faith and based upon specific testing but does not, however, constitute a guarantee.

Automax Main Operations

Local Automax Offices