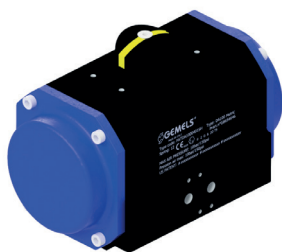




# ACTUATORS

Edition. 21.4

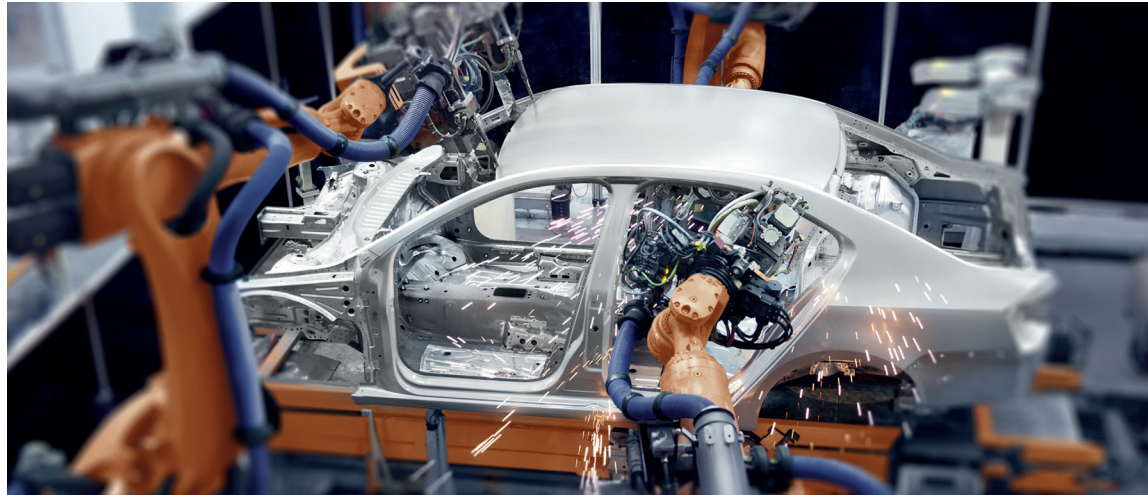
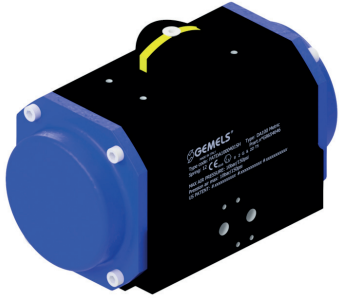
## PNEUMATIC



**RACK&PINION  
PNEUMATIC  
ACTUATORS DA**



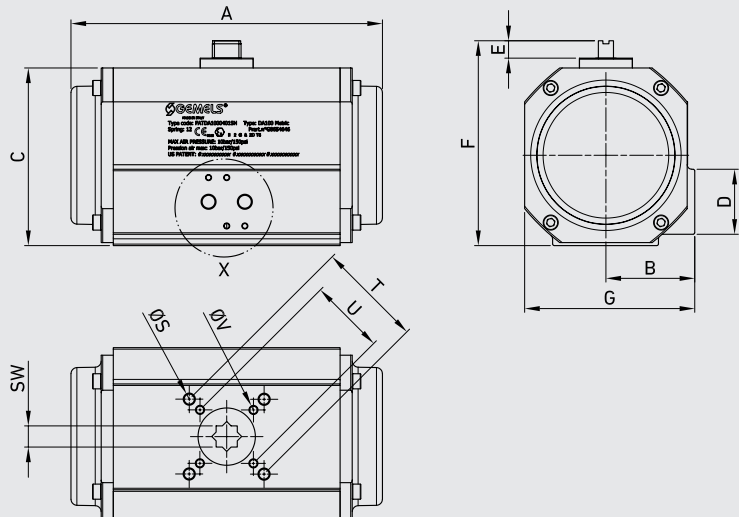
**RACK&PINION  
PNEUMATIC  
ACTUATORS SR**



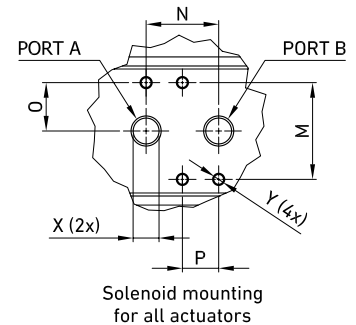
**RACK&PINION  
PNEUMATIC  
ACTUATORS DA**

- Port "A" Air to open (anti clockwise)
- Port "B" Air to close (clockwise)
- Air supply: 6 bar; maximum 7 bar
- Drive Medium = Air (Dry or lubricated); not corrosive Gas; light hydraulic oil
- Temperature= Buna nitrile o'seals -40° to 80°C or -40 to 176° F
- Standard indicator position
- Basic Operating Details

- ATEX certification



TYPE	AIR SUPPLY	Nm	lbf-ft
DA25	MPa 0,6	23,7	17,48
	Psi 87		
DA40	MPa 0,6	41,6	30,68
	Psi 87		
DA100	MPa 0,6	101,5	74,86
	Psi 87		
DA200	MPa 0,6	201,9	148,91
	Psi 87		
DA375	MPa 0,6	374	275,85
	Psi 87		
DA825	MPa 0,6	824	607,75
	Psi 87		

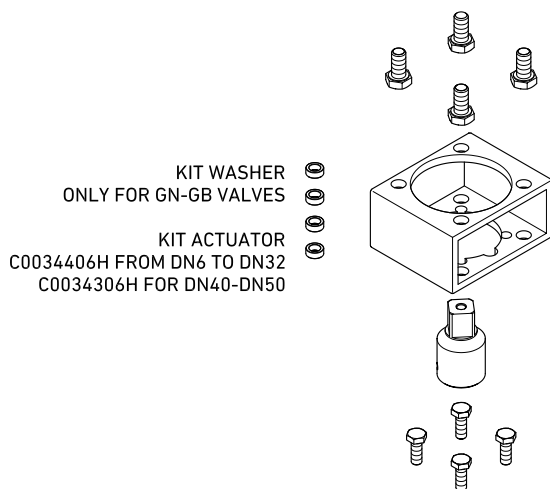


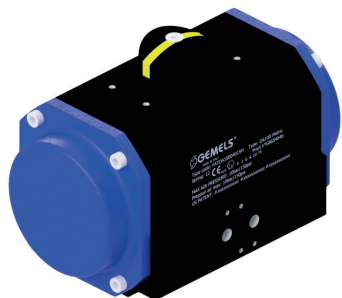
## DA ACTUATORS (double acting)

TYPE	ISO5211	A	B	C	D	E	F	G	M	N	O	P	ØS	T	ØV	U	X	Y	SW	WEIGHT	ITEM CODE	
DA25	F03-F05	mm	160	38	70	40	20	90	69,5	32	24	16	12	M6	50	M5	36	G1/8	M5X8	9	kg 1	FATDA0250401SH
		inch	6,30	1,50	2,76	1,57	0,79	3,54	2,74	1,26	0,94	0,63	0,47		1,97		1,42	x 12		0,35	lb 2,20	
DA40	F05	mm	138,5	47,5	90,5	41	20	110,5	87,5	32	24	16	12	-	-	M6	50	G1/8	M5X8	11	kg 1,8	FATDA0400401SH
		inch	5,45	1,87	3,56	1,61	0,79	4,35	3,44	1,26	0,94	0,63	0,47				1,97	x 12		0,43	lb 3,97	
DA100	F05-F07	mm	222,5	59	118	43	20	138	113	32	24	16	12	M8	70	M6	50	G1/8	M5X8	14	kg 2,8	FATDA1000401SH
		inch	8,76	2,32	4,65	1,69	0,79	5,43	4,45	1,26	0,94	0,63	0,47		2,76		1,97	x 12		0,55	lb 6,17	
DA200	F05-F07	mm	238	72	140,5	43	20	160,5	136,5	32	24	16	12	M8	70	M6	50	G1/4	M5X8	17	kg 7	FATDA2000401SH
		inch	9,37	2,83	5,53	1,69	0,79	6,32	5,37	1,26	0,94	0,63	0,47		2,76		1,97	x 12		0,67	lb 15,43	
DA375	F07-F10	mm	286	78	166,5	43	30	196,5	156	32	24	16	12	M10	102	M8	70	G1/4	M5X8	22	kg 10,5	FATDA3750401SH
		inch	11,26	3,07	6,56	1,69	1,18	7,74	6,14	1,26	0,94	0,63	0,47		4,02		2,76	x 12		0,87	lb 23,15	
DA825	F10-F12	mm	360	95,5	207,5	43	30	237,5	191	32	24	16	12	M12	125	M10	102	G1/4	M5X8	27	kg 22,4	FATDA8250401SH
		inch	14,17	3,76	8,17	1,69	1,18	9,35	7,52	1,26	0,94	0,63	0,47		4,92		4,02	x 12		1,06	lb 49,38	

## DA ACTUATORS KITS

TYPE	BALL VALVES	DN	MATERIAL	ISO5211	WEIGHT	ITEM CODE
AK6	GE-GHP-GR-SB	06-10-13	CARBON STEEL	F03-F05	kg 0,25	K0C00AK61X
					lb 0,55	
AK6S	GN	06-10	CARBON STEEL	F03 F05-F03 F05	kg 0,30	K0C00AK6S1X
					lb 0,66	
AK6S2	GM1-GN	06-10-13	CARBON STEEL	F03-F05	kg 0,25	K01A00194AAA0H
					lb 0,55	
AK13	GE-GHP-GR	13	CARBON STEEL	F03 F05-F03 F05	kg 0,31	K0C00AK131X
					lb 0,68	
AK20	GE-GB-GHP GN-GR-SB	20-25	CARBON STEEL	F05 F07-F05	kg 0,52	K0C00AK201X
					lb 1,15	
AK32	SB	32-40	CARBON STEEL	F05 F07-F05	kg 0,60	K0C00AK321X
					lb 1,32	
AK40	GB-GHP-G GR-SB	32-40	CARBON STEEL	F05 F07-F05	kg 0,67	K0C00AK401X
					lb 1,48	
AK50	GB-GHP-GN GR-SB	50	CARBON STEEL	F05 F07-F05	kg 0,71	K0C00AK501X
					lb 1,57	
AK65	SB	65-80	CARBON STEEL	F05 F07-F05	kg 0,74	K0C00AK651X
					lb 1,63	
AK100	GR-SB	100-125	CARBON STEEL	F10 F12-F12	kg 2,05	K0C00AK1001X
					lb 4,52	

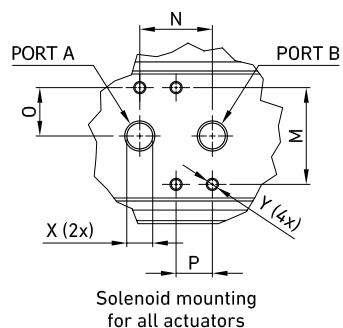
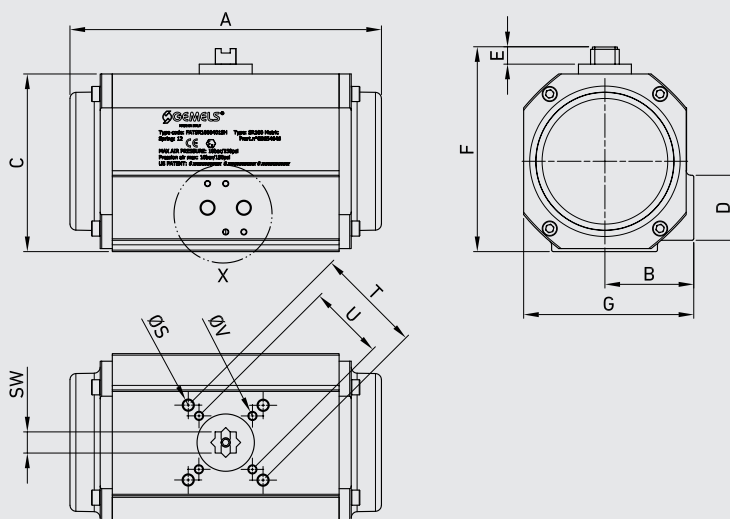




### RACK&PINION PNEUMATIC ACTUATORS SR

- Port "A" Air to open (anti clockwise)
- Port "B" Air to close (clockwise)
- Air supply: 6 bar; maximum 7 bar
- Drive Medium = Air (Dry or lubricated); not corrosive Gas; light hydraulic oil
- Temperature= Buna nitrile o'seals -40° to 80°C or -40 to 176° F
- Standard indicator position

- ATEX certification



Solenoid mounting for all actuators

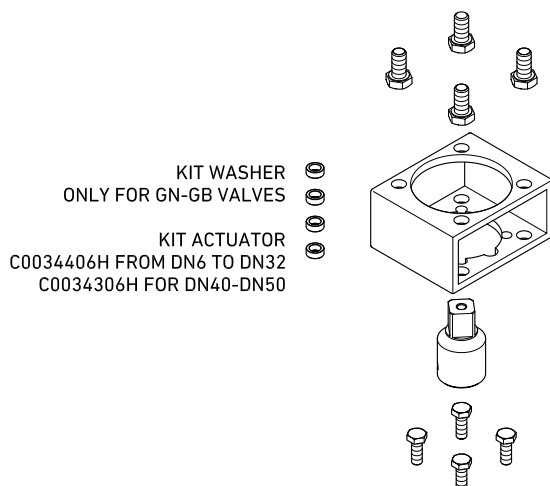
TYPE	AIR SUPPLY		AIR-START		AIR-END		SPRING-START		SPRING-END		N°SPRING
			Nm	lbf-ft	Nm	lbf-ft	Nm	lbf-ft	Nm	lbf-ft	
SR35/(18)	MPa	0,6	32,7	24,12	18,1	13,35	32,64	24,07	18	13,28	12
	Psi	87									
SR60/(40)	MPa	0,6	61,4	45,29	40,1	29,58	61,3	45,21	40	29,50	12
	Psi	87									
SR130/(72)	MPa	0,6	130,33	96,13	71,73	52,91	130,2	96,03	71,6	52,81	4X4
	Psi	87									
SR240/(132)	MPa	0,6	241,54	178,15	132,98	98,08	241,2	177,90	132,64	97,83	4X4
	Psi	87									
SR385/(210)	MPa	0,6	385,2	284,11	212,1	156,44	384,6	283,67	211,5	155,99	4X4
	Psi	87									
SR530/(290)	MPa	0,6	533	393,12	294	216,84	531	391,64	292	215,37	4X4
	Psi	87									

**SR ACTUATORS (SPRING RETURN)**

TYPE	ISO5211	A	B	C	D	E	F	G	M	N	O	P	ØS	T	ØV	U	X	Y	SW	WEIGHT	ITEM CODE	
SR35/(18)	F05-F07	mm	203	49	87	40	20	107	90,5	32	24	16	12	M8	70	M6	50	G1/8x12	M5x8	11	kg 1,9	FATSR0500401SH
		inch	7,99	1,93	3,43	1,57	0,79	4,21	3,56	1,26	0,94	0,63	0,47		2,76		1,97			0,43	lb 4,19	
SR60/(40)	F05-F07	mm	222,5	59	118	43	20	138	113	32	24	16	12	M8	70	M6	50	G1/8x12	M5x8	14	kg 2,8	FATSR1000401SH
		inch	8,76	2,32	4,65	1,69	0,79	5,43	4,45	1,26	0,94	0,63	0,47				2,76			1,97	0,55 lb	
SR130/(72)	F07-F10	mm	238	72	140,5	43	20	160,5	136,5	32	24	16	12	M8	102	M6	70	G1/4x12	M5x8	17	kg 7	FATSR2000401SH
		inch	9,37	2,83	5,53	1,69	0,79	6,32	5,37	1,26	0,94	0,63	0,47		4,02		2,76			0,67	lb 15,43	
SR240/(132)	F07-F10	mm	286	78	166,5	43	30	196,5	156	32	24	16	12	M10	102	M8	70	G1/4x12	M5x8	22	kg 10,5	FATSR3750401SH
		inch	11,26	3,07	6,56	1,69	1,18	7,74	6,14	1,26	0,94	0,63	0,47		4,02		2,76			0,87	lb 23,15	
SR385/(210)	F10-F12	mm	334	95,5	207,5	43	30	237,5	191	32	24	16	12	M12	125	M10	102	G1/4x12	M5x8	27	kg 20,6	FATSR6000401SH
		inch	13,15	3,76	8,17	1,69	1,18	9,35	7,52	1,26	0,94	0,63	0,47		4,92		4,02			1,06	lb 45,42	
SR530/(290)	F10-FL2	mm	360	95,5	207,5	43	30	237,5	191	32	24	16	12	M12	125	M10	102	G1/4x12	M5x8	27	kg 22,4	FATSR8250401SH
		inch	14,17	3,76	8,17	1,69	1,18	9,35	7,52	1,26	0,94	0,63	0,47		4,92		4,02			1,06	lb 49,38	

**SR ACTUATORS KITS**

TYPE	BALL VALVES	DN	MATERIAL	ISO5211	WEIGHT	ITEM CODE
AK6	GE-GHP-GR-SB	06-10-13	CARBON STEEL	F03-F05	kg 0,25	K0C00AK61X
					lb 0,55	
AK6S	GN	06-10	CARBON STEEL	F03 F05-F03 F05	kg 0,30	K0C00AK6S1X
					lb 0,66	
AK6S2	GM1-GN	06-10-13	CARBON STEEL	F03-F05	kg 0,25	K01A00194AAA0H
					lb 0,55	
AK13	GE-GHP-GR	13	CARBON STEEL	F03 F05-F03 F05	kg 0,31	K0C00AK131X
					lb 0,68	
AK20	GE-GB-GHP GN-GR-SB	20-25	CARBON STEEL	F05 F07-F05	kg 0,52	K0C00AK201X
					lb 1,15	
AK32	SB	32-40	CARBON STEEL	F05 F07-F05	kg 0,60	K0C00AK321X
					lb 1,32	
AK40	GB-GHP-G GR-SB	32-40	CARBON STEEL	F05 F07-F05	kg 0,67	K0C00AK401X
					lb 1,48	
AK50	GB-GHP-GN GR-SB	50	CARBON STEEL	F05 F07-F05	kg 0,71	K0C00AK501X
					lb 1,57	
AK65	SB	65-80	CARBON STEEL	F05 F07-F05	kg 0,74	K0C00AK651X
					lb 1,63	
AK100	GR-SB	100-125	CARBON STEEL	F10 F12-F12	kg 2,05	K0C00AK1001X
					lb 4,52	







## INTRODUCTION

### STANDARDS

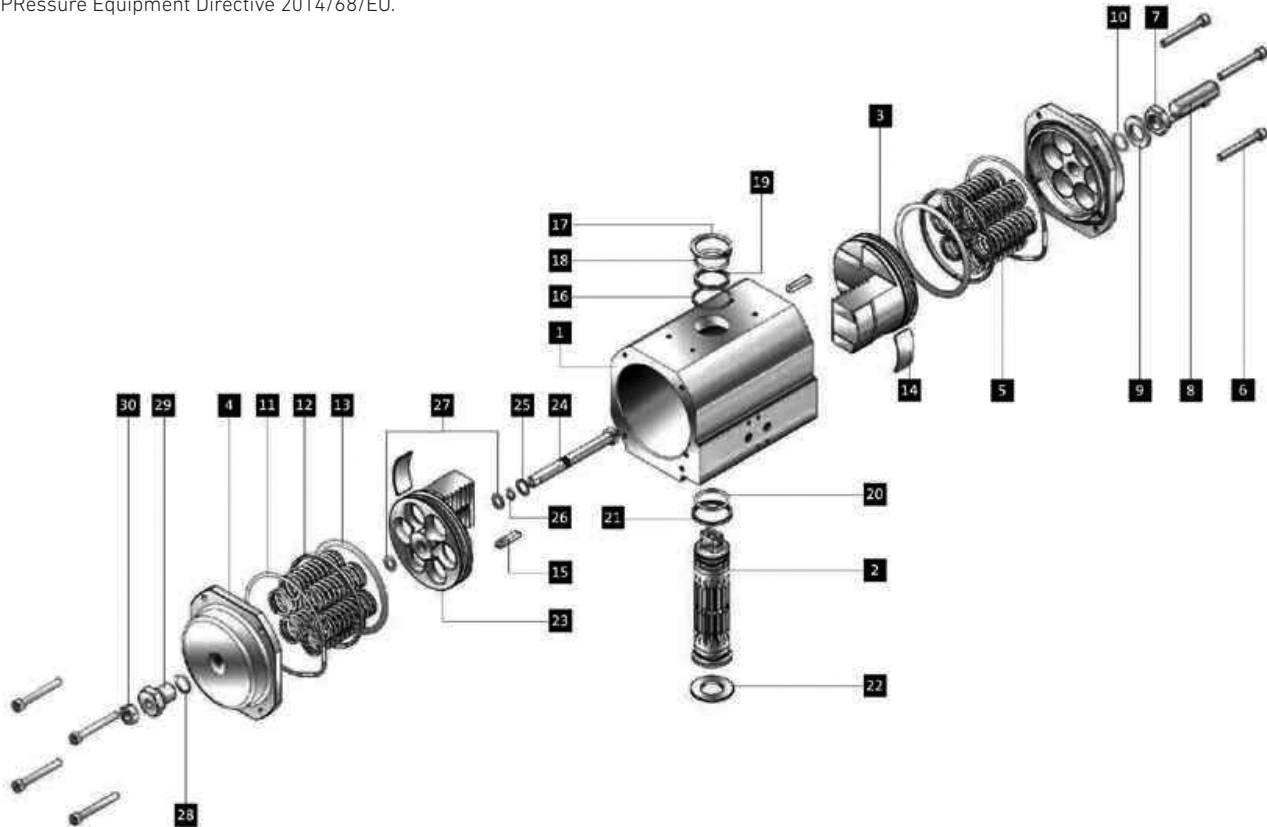
Gemels actuators are designed and in compliance with the following standards:

**ISO5211:** Orientation of actuator to valve mounting flange (i.e.F05,F07....)

**VDI/VDE 3845:** Namur mounting for accessories such as switchboxes, solenoid valves and positioners.

**ATEX:** Directive 2014/34/UE.

**PED:** PResure Equipment Directive 2014/68/EU.



REF NO	DESCRIPTION	QTY	MATERIAL STD UNIT	COMMENTS
1	Body	1	Aluminium Anod.	-
2	Driveshaft	1	Steel	Alt. CNI 425
3	Piston	2	Aluminium	Alt. Hard Anodized/PTFE
4	Endcap with Stop Adj.	2	Aluminium Anod.	-
5	Spring	12 max	SiCr	S1 Double Acting only
6	Endcap Bolt	8	Stainless Steel	-
7	Open Stop Adj. Bolt	1	Stainless Steel	-
8	Open Stop Adj. Nut	1	Stainless Steel	-
9	Open Stop Adj. Washer	1	Polyethylene	-
10	Open Stop Adj.'O'Ring	1	Buna Nitrile	Alt. Viton/Silicone/EPDM
11*	Endcap 'O'Ring	2	Buna Nitrile	Alt. Viton/Silicone/EPDM
12*	Piston Back-up Bearing	2	POM Delrin	-
13*	Piston 'O'Ring	2	Buna Nitrile	Alt. Viton/Silicone/EPDM
14*	Piston Wearpad	2	POM Delrin	-
15*	Piston Guidebar	2	Steel	-

REF NO	DESCRIPTION	QTY	MATERIAL STD UNIT	COMMENTS
16*	Driveshaft Washer	1	Polyethylene	-
17*	Driveshaft Circlip	1	Steel	-
18*	Driveshaft Upper 'O'Ring	1	Buna Nitrile	Alt. Viton/Silicone/EPDM
19*	Driveshaft Upper Bearing	1	POM Delrin	-
20*	Driveshaft Lower 'O'Ring	1	Buna Nitrile	Alt. Viton/Silicone/EPDM
21*	Driveshaft Lower Bearing	1	POM Delrin	-
22	Centralization Ring	1	POM Delrin	-
23 (G10)	Piston (Closed Stop Adj.)	1	Aluminium	Alt. Hard Anodized/PTFE
24 (G10)	Closed Stop Adj. Bolt	1	Stainless Steel	-
25 (G10)	Closed Stop Adj. Damper	1	POM Delrin	-
26 (G10)	Stop Bolt 'O' Ring	1	Buna Nitrile	Alt. Viton/Silicone/EPDM
27 (G10)	Piston Stop Bolt 'O' Ring	2	Buna Nitrile	Alt. Viton/Silicone/EPDM
28 (G10)	Stop Bolt Retainer 'O'Ring	1	Buna Nitrile	Alt. Viton/Silicone/EPDM
29 (G10)	Stop Bolt Retainer	1	Stainless Steel	-
30 (G10)	Closed Stop Adj. Nut	1	Stainless Steel	-



### ACTUATOR OPERATION

#### Maximum Operating Time Per Second (0.55 MPaG / 80 PSIG)

Actuator Size	FATDA0500401SH FATSR0500401SH	FATDA1000401SH FATSR1000401SH	FATDA2000401SH FATSR2000401SH	FATDA3750401SH FATSR3750401SH	FATDA6000401SH FATSR6000401SH	FATDA8250401SH FATSR8250401SH
DA open	<1	<1	2	2,5	3,5	4
DA close	<1	<1	2	2,5	3,5	4
SR open	<1	<1	2	2,5	3,5	4
SR close	<1	<1	1,5	2	3	3

#### Air Consumption per Stroke

Actuator Size	FATDA0500401SH FATSR0500401SH	FATDA1000401SH FATSR1000401SH	FATDA2000401SH FATSR2000401SH	FATDA3750401SH FATSR3750401SH	FATDA6000401SH FATSR6000401SH	FATDA8250401SH FATSR8250401SH
Port 'A' to open (liters)	0,18	0,38	0,9	1,69	2,8	3,05
Port 'B' to close (liters)	0,24	0,5	1	1,9	3,4	3,7
Port 'A' to open (cubic inch)	10,98	23,18	54,92	103,13	170,86	186,12
Port 'B' to close (cubic inch)	14,65	30,52	61,02	115,95	207,47	225,79

#### Overall Actuator Weight

Actuator Size	3	10	35	70
DA Kilograms (kg)	1.0	2.8	10.4	20.2
SR Kilograms (kg)	1.1	2.9	11.9	23.9
DA pounds (lbs)	2.2	6.2	22.8	44.4
SR pounds (lbs)	2.4	6.4	26.1	52.5

#### Minimum Recommended Solenoid Valve Cv

Actuator Size	3	10	35	70
Solenoid Cv	0.2	0.2	0.5	0.8

#### TECHNICAL DATA

**GDA** = DoubleActing

**DA Port 'A'** = Air To Open (Anti-Clockwise)

**DA Port 'B'** = Air To Close (Clockwise)

**Fail Safe Open** = Rotate Pistons 180° About Own Axis

**Drive Medium** = Air (Dry or Lubricated); Non Corrosive

Gas; Light Hydraulic Oil

**GSR** = SpringReturn

**SR Port 'A'** = Air To Oper (Anti-Clockwise compressing Springs)

**SR Port 'B'** = Spring To Close (Clockwise)

#### Temperature:

- Buna Nitrile 'O' Seals

-40 to +100°C  
or -40 to +212°F

- Viton 'O' Seals

-25 to +250°C  
or -13 to +482°F



## DOUBLE ACTING



### OPENING STROKE

- Looking at the front of the Actuator, PORT 'A' is on the left and PORT 'B' is on the right.
- To open the Actuator, connect the air supply to PORT 'A' to fill the central chamber of the Actuator.
- The two opposing Pistons will open and rotate the driveshaft in a counter-clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the open position.



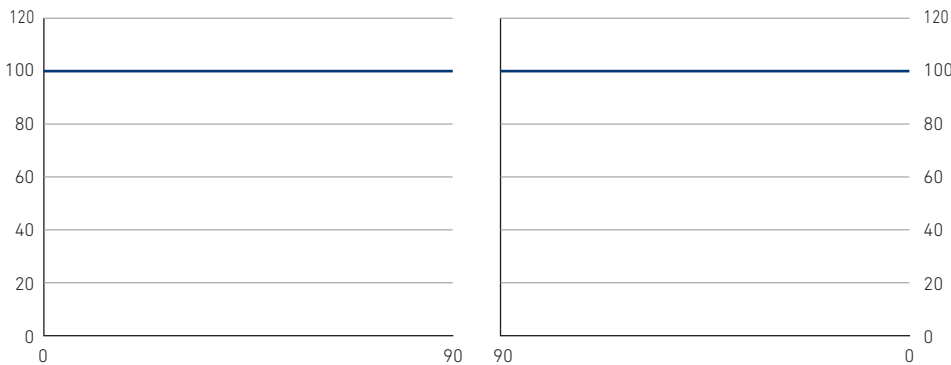
### CLOSING STROKE

- Looking at the front of the Actuator, PORT 'A' is on the left and PORT 'B' is on the right.
- To close the Actuator, connect the air supply to PORT 'B' to fill the outer chambers of the Actuator.
- The two opposing Pistons will close and rotate the actuator driveshaft in a clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the closed position.

## TORQUE VALUE GEMELS ACTUATORS

### TORQUE DIAGRAM DOUBLE ACTING ACTUATOR

With reference to the above diagram, it is possible to note that the torque of a double acting actuator remain constant throughout the complete action.



**TORQUES (Nm) ACTUATOR GEMELS DOUBLE ACTING**

MODEL	AIR SUPPLY						
	Mpa	0,3	0,4	0,5	0,55	0,6	0,7
	PSI	43,5	58	72,5	79,75	87	101,5
DA 25	Nm	11,9	15,8	19,8	21,7	23,7	27,7
	lbf-ft	8,78	11,65	14,60	16,01	17,48	20,43
DA40	Nm	20,8	27,7	34,6	38,1	41,6	48,5
	lbf-ft	15,34	20,43	25,52	28,10	30,68	35,77
DA 50	Nm	25,4	33,8	42,3	46,5	50,7	59,2
	lbf-ft	18,73	24,93	31,20	34,30	37,39	43,66
DA 100	Nm	50,7	67,6	84,5	93	101,4	118,3
	lbf-ft	37,39	49,86	62,32	68,59	74,79	87,25
DA 200	Nm	101	134,6	168,3	185,1	201,9	235,6
	lbf-ft	74,49	99,28	124,13	136,52	148,91	173,77
DA 375	Nm	187	249	312	343	374	437
	lbf-ft	137,92	183,65	230,12	252,98	275,85	322,31
DA 580	Nm	298	398	497	547	597	696
	lbf-ft	219,79	293,55	366,57	403,45	440,32	513,34
DA 825	Nm	412	550	687	756	825	962
	lbf-ft	303,87	405,66	506,70	557,60	608,49	709,53

## SPRING RETURN



### OPENING STROKE

- Looking at the front of the Actuator, PORT 'A' is on the left and PORT 'B' is on the right.
- To open the Actuator, connect the air supply to PORT 'A' to fill the central chamber of the Actuator.
- The two opposing Pistons will open, compressing the springs in the outer chambers and rotate the driveshaft in a counter-clockwise direction.
- When the pistons reach the end of their travel, the springs will be fully compressed and the actuator driveshaft will be in the open position.



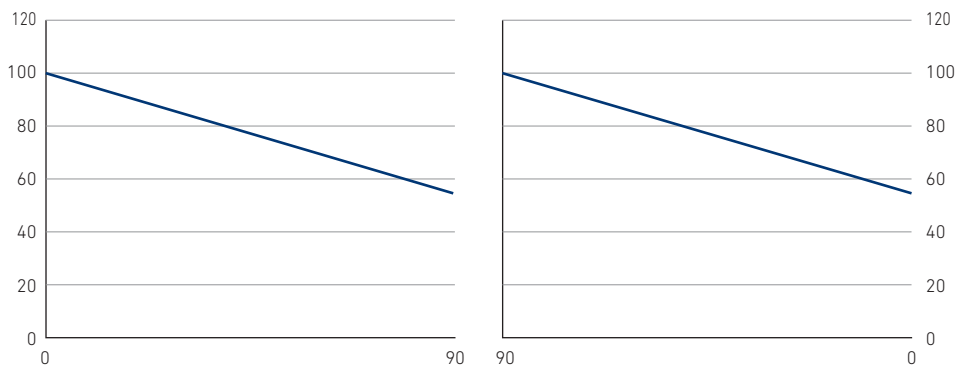
### CLOSING STROKE

- Looking at the front of the Actuator, PORT 'A' is on the left and PORT 'B' is on the right.
- To close the Actuator, disconnect the air supply from PORT 'A'. This will allow the compressed springs to push the pistons back to their starting position.
- As the springs decompress the two opposing Pistons will close and rotate the actuator driveshaft in a clockwise direction.
- When the pistons reach the end of their travel, the actuator driveshaft will be in the closed position.

## TORQUE VALUE GEMELS ACTUATORS

### TORQUE DIAGRAM DOUBLE ACTING ACTUATOR

With reference to the above diagram the torque of a Spring Return actuator is not constant but decreasing. This is due to the action of the springs.



### TORQUES (Nm) ACTUATOR GEMELS SPRING RETURN

**Note:** For a continuous improvement, Gemels reserves the right to operate changes without prior notice. For the values highlighted, or are missing, or with a minus sign (-), it is reported that with the number of standard springs, at 3 bar, the actuator is not able to overcome the force of the internal springs, therefore the actuator can not to perform one complete rotation. Therefore with air supply of 3 Bar, it will be necessary evaluate the reduction of the number of springs or buy a bigger model.

TYPE	Springs Q.ty	Spring Torque		AIR SUPPLY													
				Mpa		0,3		0,4		0,5		0,55		0,6		0,7	
				PSI		43,5		58		72,5		79,75		87		101,5	
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End		
SR35/(18)	1	2,72	1,50	Nm	23,90	22,60	32,30	31,10	40,80	39,50	45,00	43,80	49,20	48,00	57,70	56,40	
		2,01	1,11	lbf-ft	17,63	16,67	23,82	22,94	30,09	29,13	33,19	32,31	36,29	35,40	42,56	41,60	
	2	5,44	3,00	Nm	22,40	19,90	30,80	28,40	39,30	36,80	43,50	41,00	47,70	45,30	56,20	53,70	
		4,01	2,21	lbf-ft	16,52	14,68	22,72	20,95	28,99	27,14	32,08	30,24	35,18	33,41	41,45	39,61	
	3	8,16	4,50	Nm	20,90	17,20	29,30	25,60	37,80	34,10	42,00	38,30	46,20	42,50	54,70	51,00	
		6,02	3,32	lbf-ft	15,42	12,69	21,61	18,88	27,88	25,15	30,98	28,25	34,08	31,35	40,34	37,62	
	4	10,88	6,00	Nm	19,40	14,50	27,80	22,90	36,30	31,40	40,50	35,60	44,70	39,80	53,20	48,30	
		8,02	4,43	lbf-ft	14,31	10,69	20,50	16,89	26,77	23,16	29,87	26,26	32,97	29,35	39,24	35,62	
	5	13,60	7,50	Nm	17,90	11,80	26,30	20,20	34,80	28,70	39,00	32,90	43,20	37,10	51,70	45,60	
		10,03	5,53	lbf-ft	13,20	8,70	19,40	14,90	25,67	21,17	28,76	24,27	31,86	27,36	38,13	33,63	
	6	16,32	9,00	Nm	16,40	9,00	24,80	17,50	33,30	25,90	37,50	30,20	41,70	34,40	50,20	42,80	
		12,04	6,64	lbf-ft	12,10	6,64	18,29	12,91	24,56	19,10	27,66	22,27	30,76	25,37	37,03	31,57	
7	19,04	10,50	Nm	-	-	23,30	14,80	31,80	23,20	36,00	27,40	40,20	31,70	48,70	40,10		
	14,04	7,74	lbf-ft	-	-	17,19	10,92	23,45	17,11	26,55	20,21	29,65	23,38	35,92	29,58		
8	21,76	12,00	Nm	-	-	21,80	12,00	30,30	20,50	34,50	24,70	38,70	28,90	47,20	37,40		
	16,05	8,85	lbf-ft	-	-	16,08	8,85	22,35	15,12	25,45	18,22	28,54	21,32	34,81	27,58		
9	24,48	13,50	Nm	-	-	-	-	28,80	17,80	33,00	22,00	37,20	26,20	45,70	34,70		
	18,06	9,96	lbf-ft	-	-	-	-	21,24	13,13	24,34	16,23	27,44	19,32	33,71	25,59		
10	27,20	15,00	Nm	-	-	-	-	27,30	15,10	31,50	19,30	35,70	23,50	44,20	32,00		
	20,06	11,06	lbf-ft	-	-	-	-	20,14	11,14	23,23	14,23	26,33	17,33	32,60	23,60		
11	29,92	16,50	Nm	-	-	-	-	-	-	30,00	16,60	34,20	20,80	42,70	29,20		
	22,07	12,17	lbf-ft	-	-	-	-	-	-	22,13	12,24	25,22	15,34	31,49	21,54		
12	32,64	18,00	Nm	-	-	-	-	-	-	28,50	13,80	32,70	18,10	41,20	26,50		
	24,07	13,28	lbf-ft	-	-	-	-	-	-	21,02	10,18	24,12	13,35	30,39	19,55		
SR60/(40)	1	5,12	3,34	Nm	47,40	45,60	64,30	62,50	81,20	79,40	89,60	87,80	98,10	96,30	115,00	113,20	
		3,78	2,46	lbf-ft	34,96	33,63	47,43	46,10	59,89	58,56	66,09	64,76	72,35	71,03	84,82	83,49	
	2	10,24	6,68	Nm	44,00	40,50	60,90	57,40	77,80	74,30	86,30	82,70	94,70	91,20	111,60	108,10	
		7,55	4,93	lbf-ft	32,45	29,87	44,92	42,34	57,38	54,80	63,65	61,00	69,85	67,27	82,31	79,73	
	3	15,36	10,02	Nm	40,70	35,30	57,60	52,20	74,50	69,10	82,90	77,60	91,40	86,00	108,30	102,90	
		11,33	7,39	lbf-ft	30,02	26,04	42,48	38,50	54,95	50,97	61,14	57,23	67,41	63,43	79,88	75,89	
	4	20,48	13,36	Nm	37,30	30,20	54,20	47,10	71,10	64,00	79,60	72,50	88,00	80,90	104,90	97,80	
		15,11	9,85	lbf-ft	27,51	22,27	39,98	34,74	52,44	47,20	58,71	53,47	64,91	59,67	77,37	72,13	
	5	25,60	16,70	Nm	34,00	25,10	50,90	42,00	67,80	58,90	76,30	67,40	84,70	75,80	101,60	92,70	
		18,88	12,32	lbf-ft	25,08	18,51	37,54	30,98	50,01	43,44	56,28	49,71	62,47	55,91	74,94	68,37	
	6	30,72	20,04	Nm	30,70	20,00	47,60	36,90	64,50	53,80	72,90	62,20	81,40	70,70	98,30	87,60	
		22,66	14,78	lbf-ft	22,64	14,75	35,11	27,22	47,57	39,68	53,77	45,88	60,04	52,15	72,50	64,61	
	7	35,84	23,38	Nm	-	-	44,20	31,80	61,10	48,70	69,60	57,10	78,00	65,60	94,90	82,50	
		26,43	17,24	lbf-ft	-	-	32,60	23,45	45,06	35,92	51,33	42,11	57,53	48,38	69,99	60,85	
	8	40,96	26,72	Nm	-	-	40,90	26,60	57,80	43,50	66,20	52,00	74,70	60,40	91,60	77,30	
		30,21	19,71	lbf-ft	-	-	30,17	19,62	42,63	32,08	48,83	38,35	55,10	44,55	67,56	57,01	
	9	46,08	30,06	Nm	-	-	-	-	54,40	38,40	62,90	46,90	71,30	55,30	88,20	72,20	
		33,99	22,17	lbf-ft	-	-	-	-	40,12	28,32	46,39	34,59	52,59	40,79	65,05	53,25	
	10	51,20	33,40	Nm	-	-	-	-	51,10	33,30	59,60	41,80	68,00	50,20	84,90	67,10	
		37,76	24,63	lbf-ft	-	-	-	-	37,69	24,56	43,96	30,83	50,15	37,03	62,62	49,49	
	11	56,32	36,74	Nm	-	-	-	-	-	-	56,20	36,60	64,70	45,10	81,60	62,00	
		41,54	27,10	lbf-ft	-	-	-	-	-	-	41,45	26,99	47,72	33,26	60,18	45,73	
	12	61,44	40,08	Nm	-	-	-	-	-	-	52,90	31,50	61,30	40,00	78,20	56,90	
		45,32	29,56	lbf-ft	-	-	-	-	-	-	39,02	23,23	45,21	29,50	57,68	41,97	



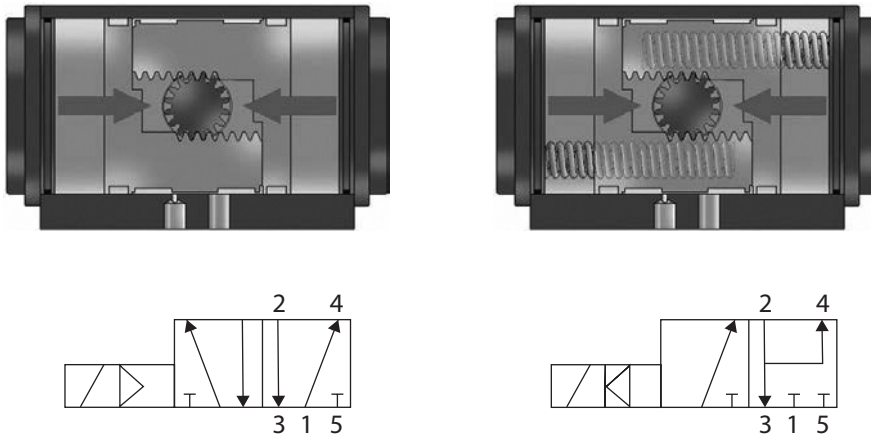




## SOLENOID VALVE MOUNTING: NAMUR TYPE

Please ensure you read the IOM manual that is supplied with the solenoid valve in order to ensure correct function. This section is a guide to the function of a solenoid valve in conjunction with a pneumatic quarter turn actuator. The solenoid valves mentioned here are "**namur mounted**" with a modular "**5/2 way / 3/2 way**" (meaning either mode is possible with the same valve). Certain facts need to be taken into consideration when mounting a namur solenoid valve to a quarter turn pneumatic actuator:

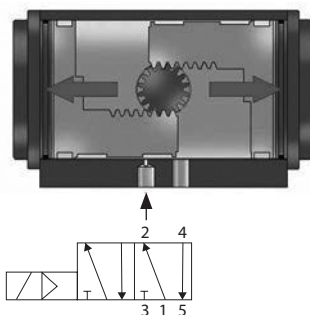
- Port "2" and "4" are always on the namur interface of the solenoid valve
- Port "2" and "4" are always connected to the namur interface of the quarter turn pneumatic actuator
- Port "1" is where instrument air is always connected to the solenoid valve
- Port "1" is always referred to as the air inlet or pressure port on a solenoid valve



The above diagrams show a double acting actuator with 5/2 way solenoid valve (10.1) and a spring return actuator with a 5/2 way valve set up to function as a 3/2 way valve (10.2). Both valves are shown in the de-energised state (coil inactive, no electrical current). In both cases the solenoid valves port "2" is connected to the actuators port "A" through which air will vent out of port "3". When connecting a namur solenoid valve, the pneumatic diagram will determine how to connect the ports. Only solenoid valve ports "2" and '4' can be connected to the actuator. Whichever of the two ports shows a vertical arrow pointing away from it, is the port that needs to be connected to the actuators central chamber, in this case port "A".

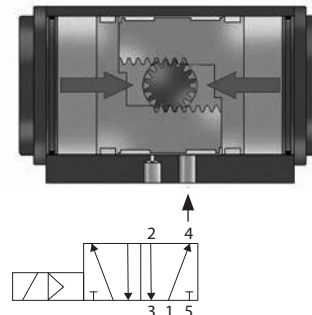
Please ensure you read the IOM manual that is supplied with the solenoid valve in order to ensure correct function. This section is a guide to the function of a solenoid valve in conjunction with a pneumatic quarter turn actuator. The solenoid valves mentioned here are “**namur mounted**” with a modular “**5/2 way / 3/2 way**” (meaning either mode is possible with the same valve).

## OPERATION WITH SOLENOID VALVES: DOUBLE ACTING



### SOLENOID COIL ENERGISED

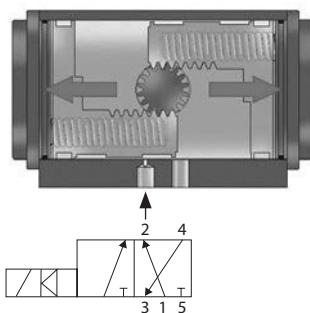
- This allows air to flow from solenoid inlet port “1” to solenoid port “2” which is connected to actuator port “A”.
- As the air enters the center chamber of the actuator, the pistons start to move towards the open position (as indicated by the large red arrows).
- Atmospheric air from the outer chambers will vent out of actuator port “B”, which is connected to solenoid port “4” and the exhausts via solenoid port “5”.
- Solenoid port “3” is not used.



### SOLENOID COIL DE-ENERGISED

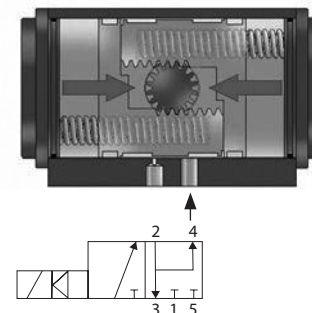
- This allows air to flow from solenoid inlet port “1” to solenoid port “4” which is connected to actuator port “B”.
- As the air enters the outer chambers of the actuator, the pistons start to move towards the closed position (as indicated by the large red arrows).
- Atmospheric air from the inner chamber will vent out of actuator port “A”, which is connected to solenoid port “2” and the exhausts via solenoid port “3”.
- Solenoid port “5” is not used.

## OPERATION WITH SOLENOID VALVES: SPRING RETURN



### SOLENOID COIL ENERGISED

- This allows air to flow from solenoid inlet port “1” to solenoid port “2” which is connected to actuator port “A”.
- As the air enters the center chamber of the actuator, the pistons start to move towards the open position and compressing the springs in the outer chambers (as indicated by the large red arrows).
- Atmospheric air from the outer chambers will vent out of actuator port “B”, which is connected to solenoid port “4” and then exhausts via solenoid port “3”.
- Solenoid port “5” is not used.



### SOLENOID COIL DE-ENERGISED

- This closes solenoid port “1” and stops inlet air from flowing.
- The springs in the outer chambers will move the pistons back to the closed position (as indicated by the large red arrows).
- Residual air from the inner chamber will vent out of actuator port “A”, which is connected to solenoid port “2” and the exhausts via solenoid port “3”.
- Solenoid port “5” is not used.
- Solenoid port “2” and port “4” are also connected in a loop so no dirty air may enter the actuator (this is available only on some solenoid valves).



## MOUNTING VARIATIONS

Below are the two common variations to mounting a 90 degree or 180 degree actuator to a valve. Mounting actuators in these varying positions is due to space constraints in the global assembly or simply due to consistency with prior assemblies already in existence. Please note how the indicator puck always correctly shows the position of the valve disc and hence showing the flowpath of the medium running through the pipe.



**13.1 in-line, closed position**

Mounted in-line or parallel to the pipe, the actuator and valve are in the standard closed position.



**13.2 in-line, open position**

Mounted in-line or parallel to the pipe, the actuator and valve are in the standard open position.



**13.3 crossmount, closed position**

Mounted crossmount or offset to the pipe, the actuator and valve are in the standard closed position.



**13.4 crossmount, open position**

Mounted crossmount or offset to the pipe, the actuator and valve are in the standard open position.