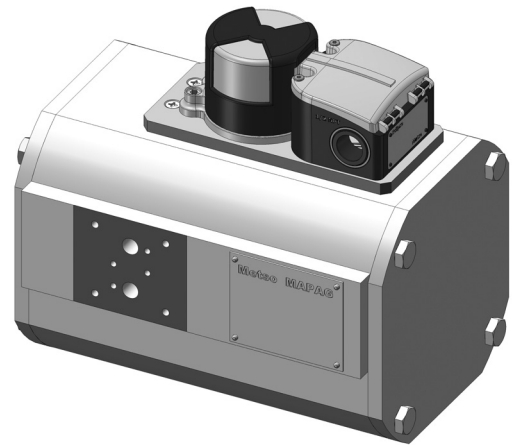


Neles™ actuator type F1

The Neles rack and pinion type actuator is designed to be used in demanding high cycle applications. Due to the working principle the actuator has a compact and symmetrical design allowing easy attachments of valves and accessories based on ISO5211, Namur and VDI/VDE3845 standards. The torque range cover torques from 30 Nm to 25 000 Nm for maximum supply pressure of 10 bars¹⁾ and it is suitable to be used with all kind of rotary valves.

If a failure mode is required, the spring return Type F1F series should be selected. The actuator can be equipped with a spring to close or with a spring to open system. The operating torque can be modified with the amount of springs to be used.



Features

Versatility

- Modular designs with same body and mounting connections for double-acting and spring-return reduce the inventory. Springs can be added in the field to increase the torque requirement.
- To change the function of spring-to-close can be easily converted in the field to spring-to-open system.
- Actuator to valve attachments comply with ISO 5211/1 and EN 12116.
- Solenoid valve and accessory attachments comply with NAMUR VDI/VDE 3845.
- A wide range of optional accessories and control devices that include limit switches, solenoid valves and mechanical safety lockouts are available to satisfy virtually all automated valve requirements.

High life cycle

- Bearings on all sliding and rotating moving parts ensure long life. The actuator is greased for life to expand the already long life time even more.
- Option of ideally formed dual pistons to minimize the dead air volume. This increases the operation speed and makes the actuator pneumatically stiffer improving the control capabilities.
- Hard-anodized extruded aluminum body with honed internal surface for strength and lower coefficient of friction.
- Machined teeth on piston racks and pinions for excellent rack and pinion engagement and maximum efficiency.
- Extended temperature range option decreases cycle life.

Corrosion resistant

Hard-anodized aluminium body, aluminium end caps, and coated helical compression springs, along with internal and external stainless steel fasteners, provide corrosion resistance in a variety of difficult applications and environments.

Reliability

Safety-contained multi-spring design with preloaded and heavy-duty coated springs for simpler range versatility, greater safety, and corrosion resistance.

Specifications

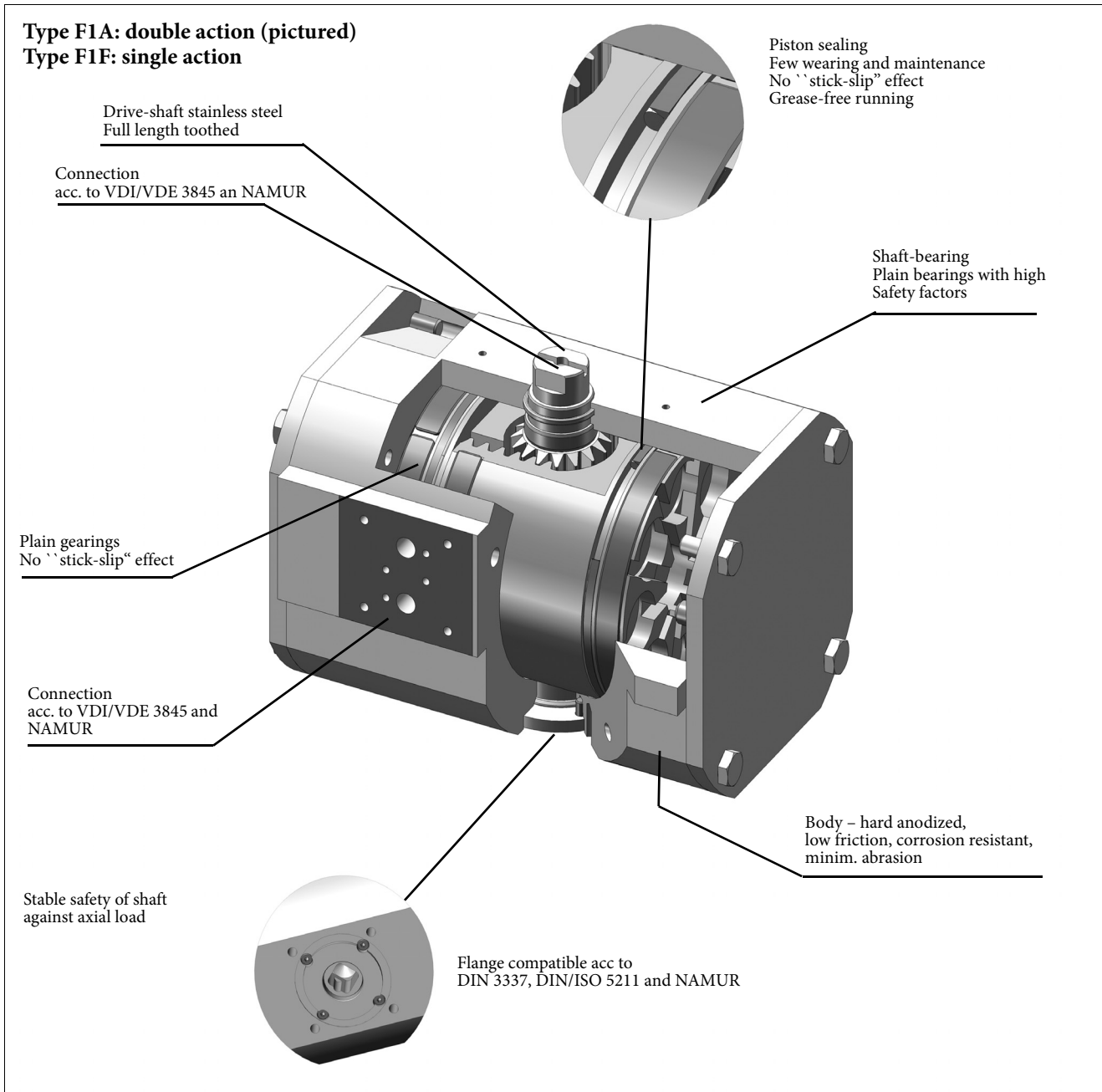
- Maximum supply range: (10 bar¹⁾) 116 psi
- Temperature range:
Standard -20 °C to +80 °C
Options -40 °C to +80 °C
- Rotation adjustment:
- Close options HBA / HBI
- Open options HBA / HBI
- Supply media: Air

¹⁾ Actuator sizes F1A/F1F 15 – 500 max.
supply pressure 10 bar
Actuator sizes F1A/F1F 1000 – 5000 max.
supply pressure 6 bar

Standards

- Actuator to valve mounting: EN12116 ISO 5211/1
- Actuator to solenoid mounting:
Namur, VDI/VDE3845
- Actuator to accessory mounting:
Namur, VDI/VDE3845

Dual piston quarter actuators



Dual piston turn actuators

Our rack and pinion actuators have a proven record of success in control and safety drive applications. They are especially used for high safety specifications. Neles dual piston actuators work "stick-slip" free and manage a high number of turnings even under extreme climatic and operating conditions.

Rugged design coupled with adequate spare capacity, together with the use of tried and tested materials guarantee high load cycling life and high reliability.

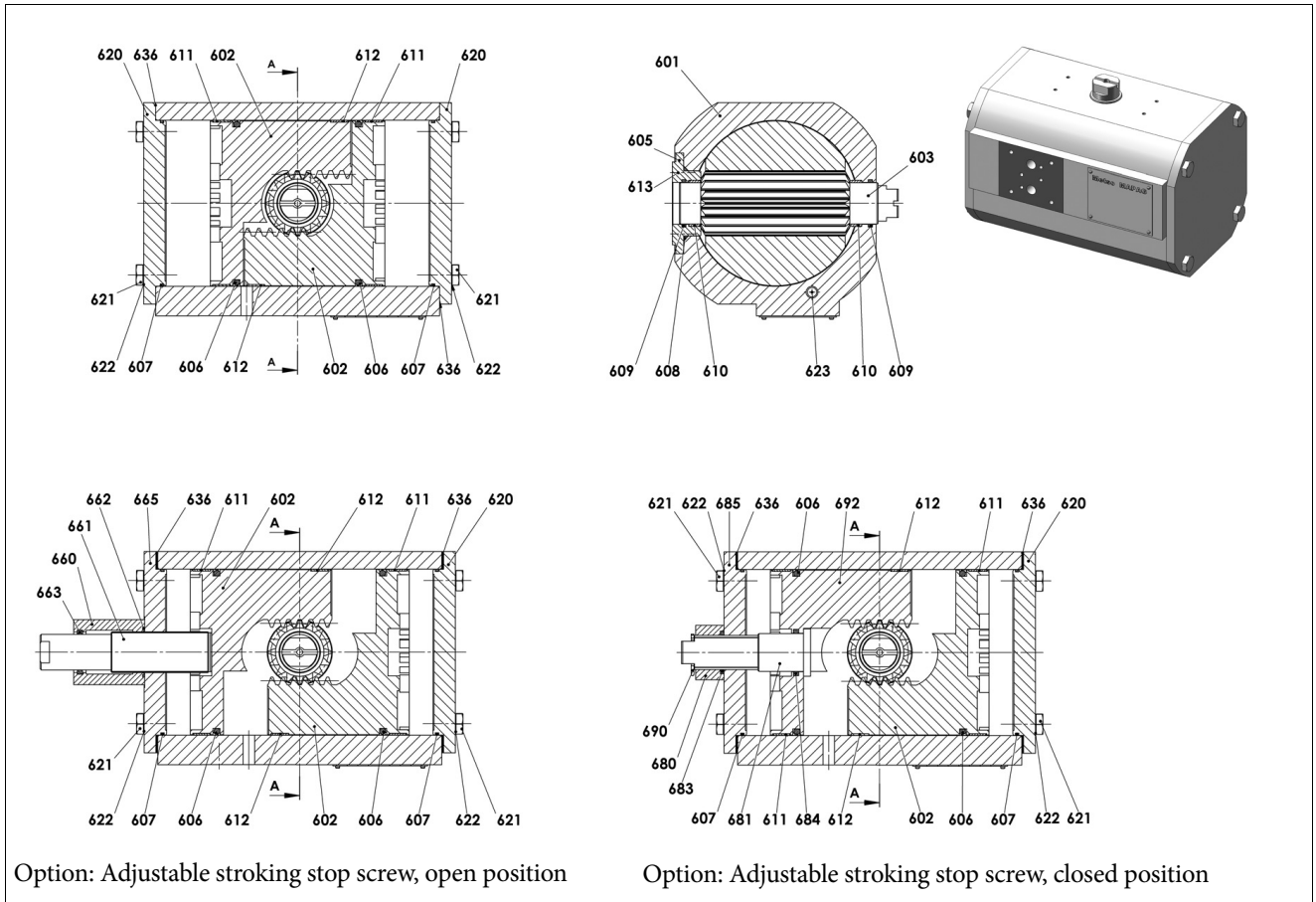
On the double-acting turn actuator Type F1A both pistons receive pressure via the outer chambers in moving towards each other or via the inner chamber in moving away from each other. Axial movement of the pistons is transmitted via the gearing to the drive shaft.

On the single-acting actuator Type F1F drive shaft movement results from both pistons receiving pressure to move away from each other or on a pressure drop by springs causing the pistons to move towards each other.

It is also possible to operate a single acting actuator Type F1F with air to open and closing (spring is only for fail position).

Dimensions

Neles Double acting actuator, type F1A 15 - 500

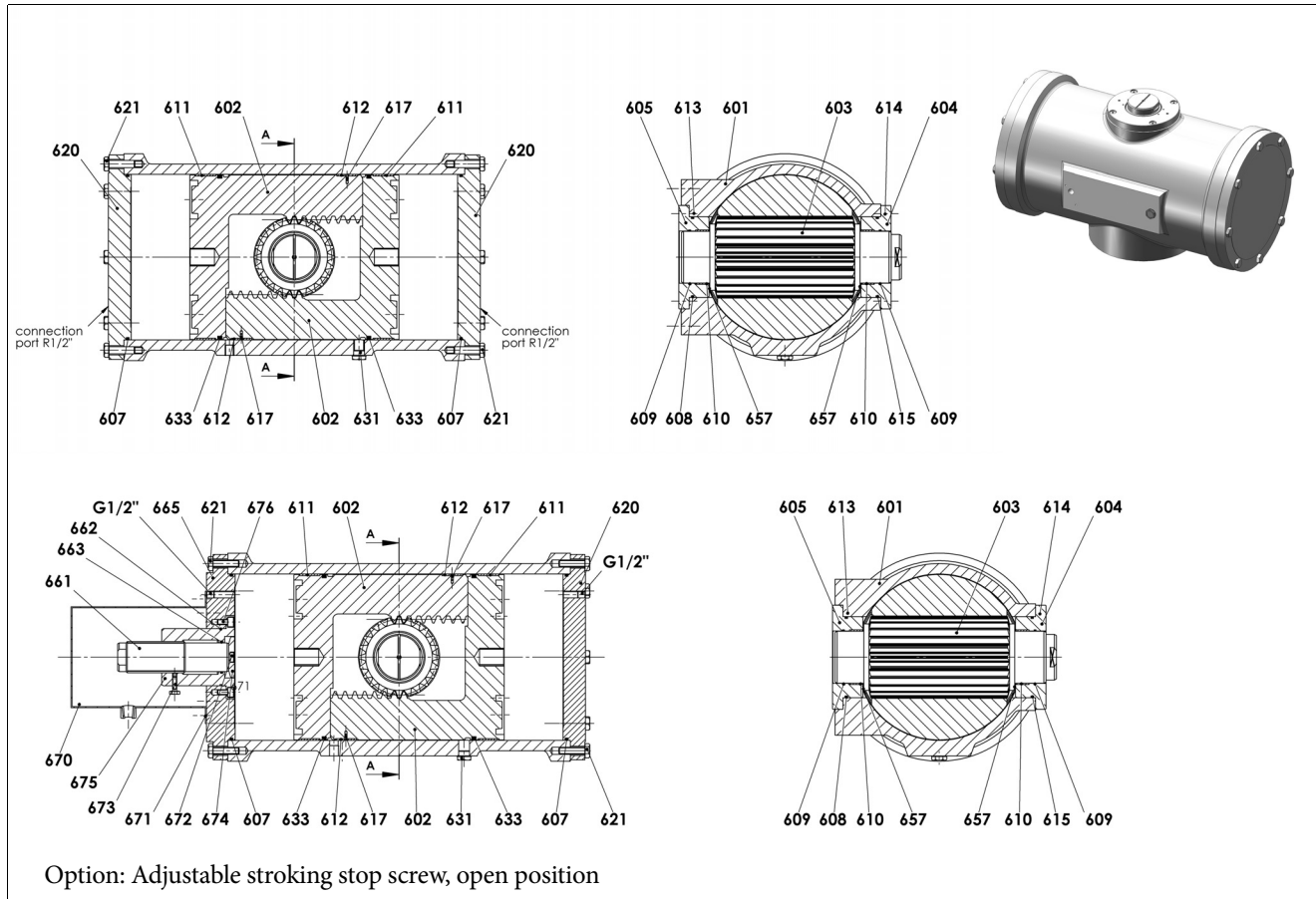


Bill of materials / Parts list type F1A

Pos	Qty.	Description	Material
601	1	Body	Aluminium 3.3206
602	2/1**	Piston	Aluminium 3.2381.62
603	1	Shaft	1.4021
605	1	Bearing flange	3.2315-E
606	2	Keilpac	PTFE/NBR
607	2	O-ring	NBR
608	1	O-ring	NBR
609	2	O-ring	NBR
610	2	Bearing bushing	DU
611	2	Bearing bushing	DU
612	2	Bearing pad	DU
613	4	Cylinder head screw	A4-70
620	2/1*/1**	End cap	3.2381.02-E
621	8	Hexagon head screw	A2-70
622	8	Retaining plate	A2
623	2	Threaded pin	45H
636 ¹⁾	12	Distance plate	A2
660*	1	Lock nut/** Hexagonal nut	1.0037 coated
661*	1	Stop pin/** Bolt	1.0037 coated
662*	1	O-ring	FKM
663*	1	O-ring	NBR
665*	1	End cap	3.3547-E
680**	1	Hexagonal nut	A2-70
681**	1	Bolt	1.4021
683**	1	O-ring	FKM
684**	1	O-ring	NBR
685**	1	End cap	3.3547
690**	1	Split pin	Steel
692**	1	Piston	3.2381.62

* HBA = External stroke limit
 ** HBI = Internal stroke limit
 1) only at special devices

Double acting actuator, type F1A 1000 - 5000

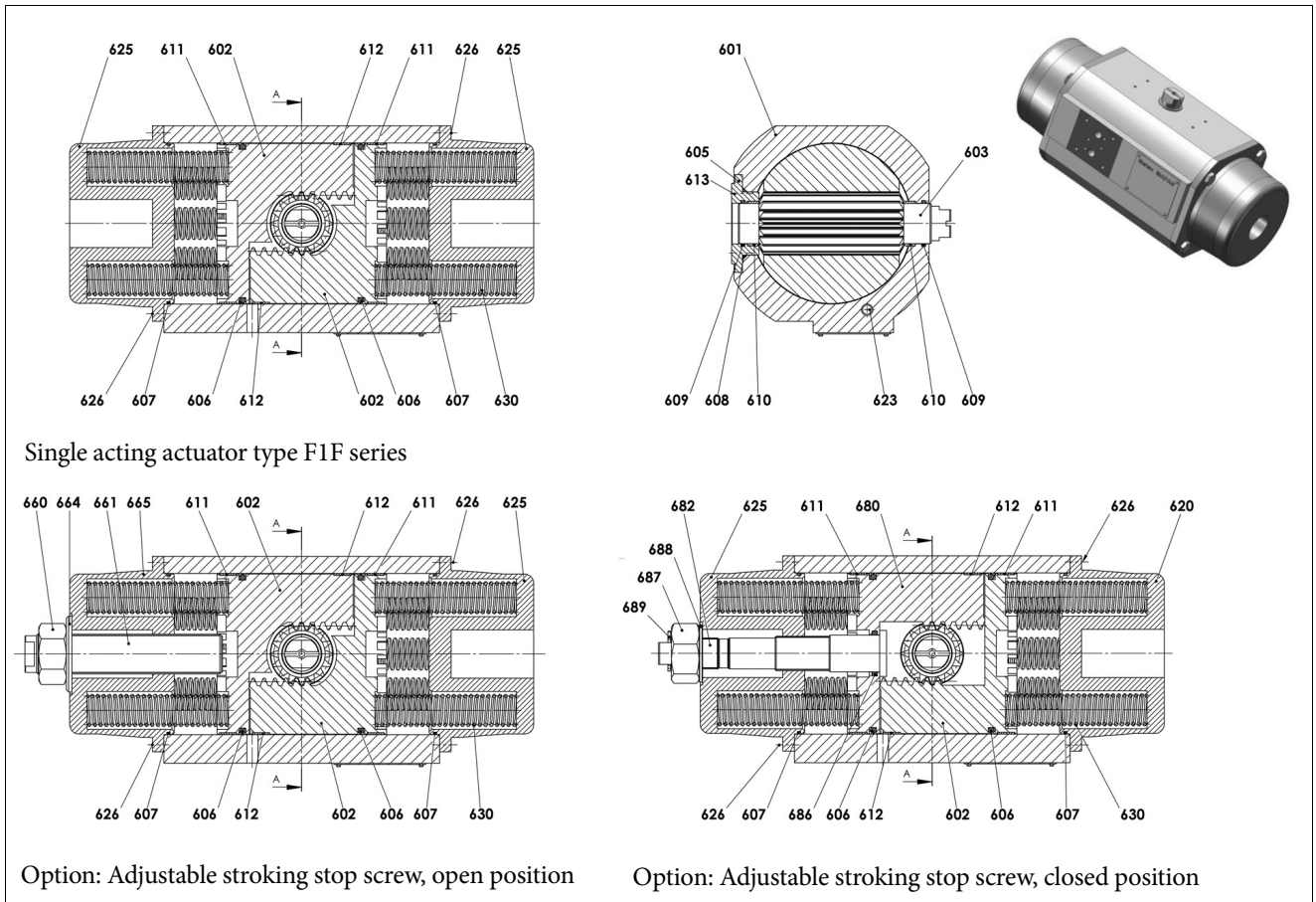


Bill of materials / Parts list type F1A

Pos	Qty.	Description	Material
601	1	Body	0.6025+0,15C
602	2	Piston	0.6025+0,15C
603	1	Shaft	1.4021
604	1	Bearing flange	0.6025
605	1	Bearing flange	0.6025
607	2	O-ring	NBR
608	1	O-ring	NBR
609	2	O-ring	FKM
610	2	Bearing bushing	DU
611	2	Bearing bushing	DU
612	2	Bearing pad	DU
613	4	Cylinder head screw	A4-70
614	4	Cylinder head screw	A4-70
615	1	O-ring	NBR
617	2	Countersunk screw	4.8 coated
620	2/1*	End cap	1.0037 coated
621	16	Hexagon head screw	8.8 coated
631	1	Plug screw	5.8 coated
633	2	O-ring	NBR
657	2	Thrust bearing	DU
661*	1	Bolt	1.4057
662*	1	O-ring	FKM
663*	1	O-ring	FKM
665*	1	End cap	1.0037 coated
670*	1	Protective cap	1.4301
671*	4	Hexagon head screw	A2-70
672*	1	Cylinder head screw	A2-70
673*	1	Hexagon head screw	A2-70
674*	1	Stop plate	1.4021
675*	1	Bearing bushing	2.0966F64
676*	4	Cylinder head screw	A2-70

* Type F1A1000-HBA

Single acting actuator, type F1F 15 - 500



Bill of materials / Parts list type F1F

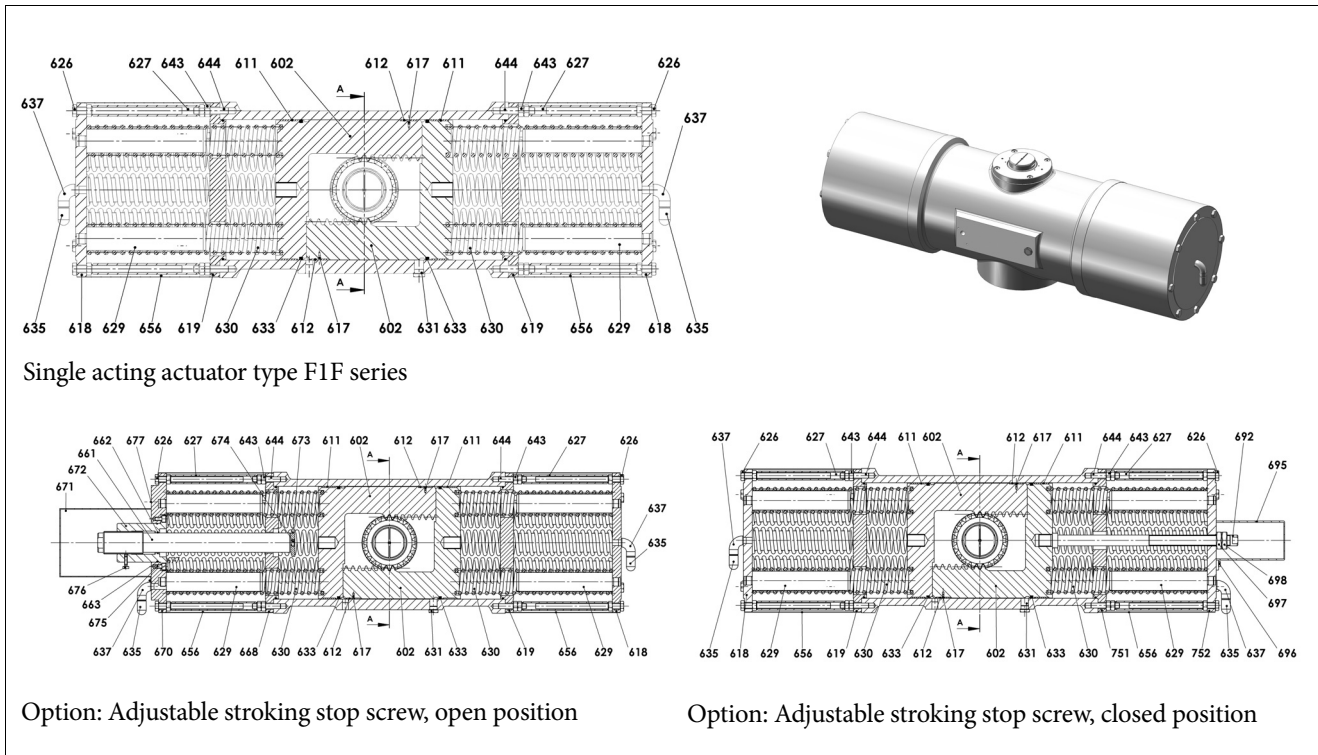
Pos	Qty.	Description	Material
601	1	Body	0.6025+0,15C
602	2	Piston	0.6025+0,15C
603	1	Shaft	1.4021
604	1	Bearing flange	0.6025
605	1	Bearing flange	0.6025
608	1	O-ring	NBR
609	2	O-ring	FKM
610	2	Bearing bushing	DU
611	2	Bearing bushing	DU
612	2	Bearing pad	DU
613	4	Cylinder head screw	A4-70
614	4	Cylinder head screw	A4-70
615	1	O-ring	NBR
617	2	Countersunk screw	4,8 coated
618	2/1*/1**	Spring cap	1.0037 coated
619	2/1*/1**	Spring cap	1.0037 coated
626	16	Hexagon head screw	8.8 coated
627	16	Clamping screw	1.0570 coated
629	10*/12*/12**	Spring guiding	3.2315
630	10*/12*/12**	Helicalcompression spring	Spring steel
631	1	Screw plug	5.8 coated
633	2	O-ring	NBR
635	2	Silencer	G1/2"
637	2	Fitting-elbow	Malleable cast iron

Pos	Qty.	Description	Material
643	16	Hexagonal nut	8 coated
644	16	Threaded bolt	8.8 coated
656	2	Protective plate	1.0037 coated
657	2	Back up ring	DU
661*	1	Bolt	1.4057
662*	1	O-ring	FMK
663*	1	O-ring	FMK
668*	1	Guiding plate	1.0037 coated
670*	1	Spring plate	1.0037 coated
671*	1	Protective cap	1.4301
672*	1	Bearing bushing	2.0966F64
673*	1	Stop plate	1.4021
674*	1	Cylinder head screw	A2-70
675*	4	Cylinder head screw	8.8 coated
676*	1	Hexagon head screw	A2-70
677*	4	Hexagon head screw	A2-70
692**	1	Bolt	1.4057
695**	1	Protective cap	1.0037 coated
696**	4	Hexagon head screw	A2-70
697**	1	Hexagonal nut	A2-70
698**	1	Hexagonal nut	8
751**	1	Spring cap	1.0037 coated
752**	1	Spring plate	1.0037 coated

* Type F1F1000-HBA

** Type F1F1000-HBI

Single acting actuator, type F1F 1000 - 5000



Bill of materials / Parts list type F1F

Pos	Qty.	Description	Material
601	1	Body	Aluminium 3.3206
602	2	Piston	Aluminium 3.2381.62/3.2371.61*
603	1	Shaft	1.4021
605	1	Bearing flange	3.2315-E
606	2	Keilpac	PTFE/NBR
607	2	O-ring	NBR
608	1	O-ring	NBR
609	2	O-ring	NBR
610	2	Bearing bushing	DU
611	2	Bearing bushing	DU
612	2	Bearing pad	DU
613	4	Cylinder head screw	A4-70
620**	1	End cap	3.2371.61-E
625	2/1*/1**	End cap	3.2371.61-E
626	8	Hexagon head screw	A2-70
628	2	Sealing	Rubber
630	10/12*/16**	Helicalcompression spring	Spring steel
660*	1	Hexagonal nut	coated
661*	1	Stroke limitation shaft	1.0037 coated
664*	1	Disc	1.4021
665*	1	End cap	3.2371.61
680**	1	Piston	3.2371.61
682**	1	Bolt	1.4021
686**	1	O-ring	NBR
687**	1	Hexagon nut	8 coated
688**	1	Thrust bearing	1.4021
689**	1	Eyebolt	steel

* HBA = External stroke limit
 ** HBI = Internal stroke limit

Technical specifications including torque graphs

Constant torques M_d [Nm] double-acting turn actuators for both rotary directions									
Operating pressure bar	TYPE								
	15	30	60	120	250	500	1000	2500	5000
2	31	65	125	262	516	1000	1968	5000	10000
3	46	97	188	392	774	1500	2952	7500	15000
4	62	129	251	523	1032	2000	3936	10000	20000
5	77	162	314	654	1290	2500	4920	12500	25000
6	92	194	377	785	1550	3000	5900	15000	30000
8	123	258	502	1046	2064	4000			
10	154	323	628	1308	2580	5000			

TYPE: MDA $M_d = 150000$ Nm

Minimum and maximum spring torques $M_{d_{Fmin}} \dots M_{d_{Fmax}}$ [Nm]												
$M_{d_{Fmin}}$ relieved			< - - - Springs - - - >				Tensioned $M_{d_{Fmax}}$				Pressure range	
n	15	30	60	120	250	500	1000	n	2500	n		5000
16	36...54	72...108	145...216	290...432	600...900	1200...1800	2400...3600	32	4800...7200	36	10000...15000	2.40...3.60
14	31.5...47	63...94	127...190	256...384	525...787	1050...1575	2100...3150	28	4200...6300	28	7500...11250	2.10...3.15
12	27...40	54...81	109...163	220...330	450...675	900...1350	1800...2700	24	3600...5400	27		1.80...2.70
10	22.5...33.5	45...67	91...135	181...270	375...562	750...1125	1500...2250	10	3000...4500	10		1.50...2.25
8	18...27	36...54	73...108	145...216	300...450	600...900	1200...1800	16	2400...3600	18	5000...7500	1.20...1.80
6	13.5...20	27...41	55...81	109...162	225...337	450...675	900...1350	12	1800...2700			0.90...1.35
4	9...13.5	18...27	37...54	73...108	150...225	300...450	604...900	8	1200...1800	9	2500...3750	0.60...0.90
2	4.6...6.7	9...13.5	18...27	36...54	75...112	150...225	302...450	4	600...900			0.30...0.45

n = Number of springs

Effective torque for single-acting actuators =

Torque of double-acting actuators minus

torque of springs (tensioned / relieved springs)

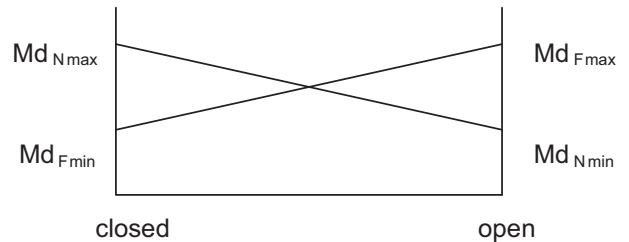
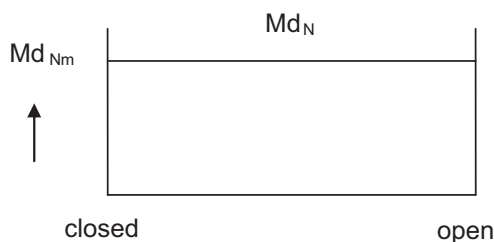
Springs relieved; $M_{d_{Nmax}} = M_d - M_{d_{Fmin}}$

Springs tensioned; $M_{d_{Nmin}} = M_d - M_{d_{Fmax}}$

Definition of the torques for turn actuators

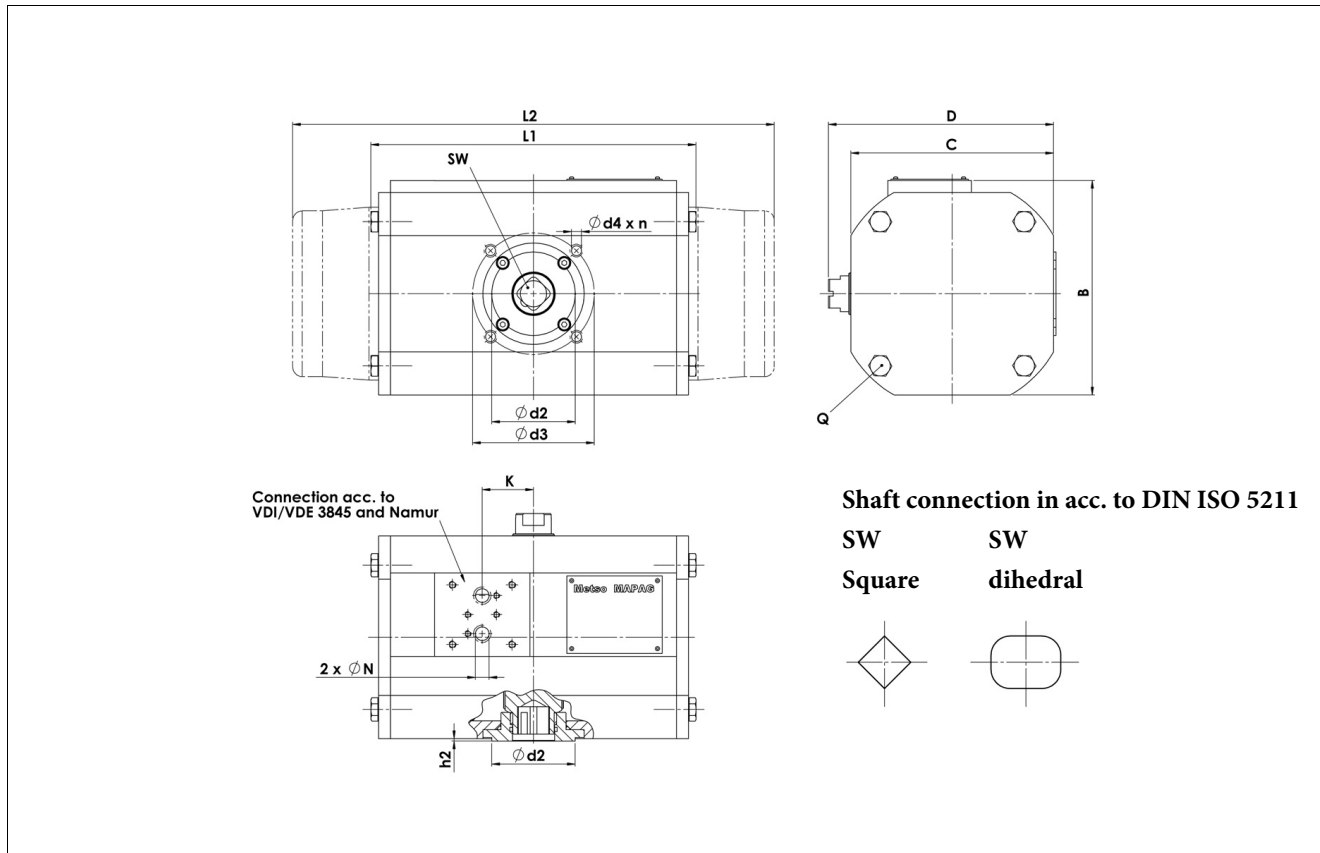
Type: A double action

Type: F single action



the torque M_{d_N} is constant over the total operating range

Main dimensions



Actuator size	FIA (double acting)	FIF (single acting)	FIA/FIF					FIAA	FIF	FIA	FIF
	L1*	L2*	B	C	D	K	N	Q	Weight kg		
15	223	351	100	100	120	36	G 1/8"	M8x20	M8x60	5.5	6.5
30	257	387	135	135	155	42	G 1/4"	M8x25	M8x70	11	14
60	280	405	170	170	190	43	G 1/4"	M10x25	M10x75	16	21
120	370	635	195	210	240	66	G 1/4"	M10x30	M10x110	28	56
250	410	720	260	275	310	77	G 1/4"	M12x35	M12x130	51	85
500	575	1050	290	305	345	110	G 1/4"	M16x40	M16x200	100	160
1000	750	1340	400	385	425	---	G 1/2"	---	---	420	580
2500	870	1450	570	580	630	---	G 1/2"	---	---	1050	1250
5000	930	1600	740	745	795	---	G 1/2"	---	---	1700	1900

Size	FIA/FIF						FIA/FIF		
	d2	d3	d4x1 l= depth of thread	n	h2	SW square	SW dihedral	Flange connection	Swept volume dm ³ / switching
15	35	50	M6x10	4	3	14	14	F05	0.28
30	55	70	M8x12	4	3	17	17	F07	0.60
60	70	102	M10x16	4	3	22	22	F10	1.16
120	85	125	M12x20	4	3	27	27	F12	2.42
250	100	140	M16x25	4	4	36	36	F14	4.80
500	130	165	M20x28	4	5	46	46	F16	9.25
1000	200	254	M16x25	8	5	55	55	F25	18.2
2500	230	298	M20x30	8	5	75	75	F30	46.7
5000	260	356	M30x44	8	5	70...90	70...90	F35	91.0

Options:

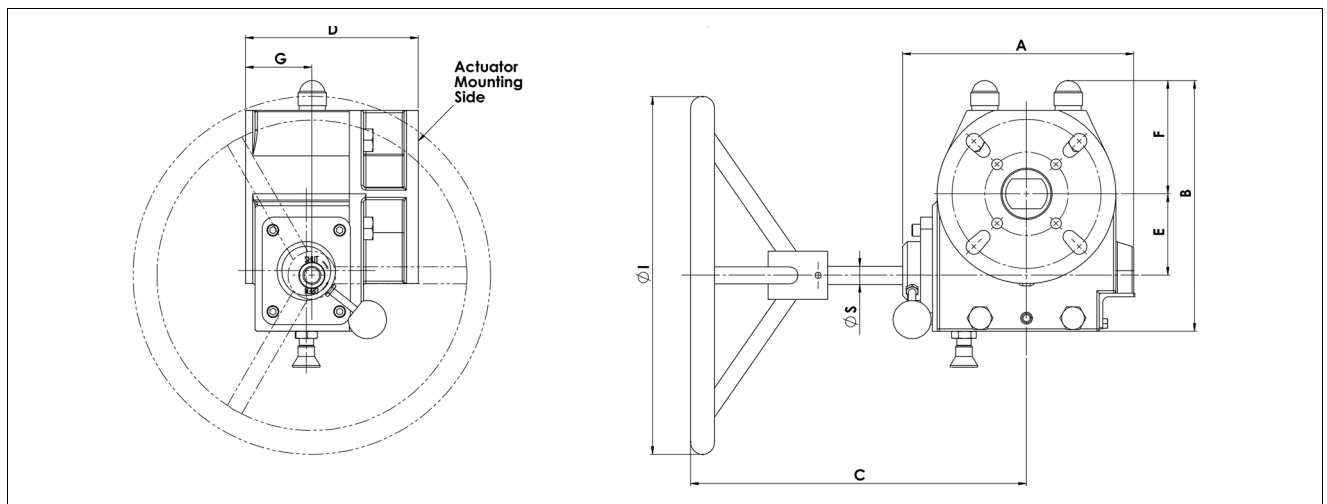
- Manual over ride

Declutchable manual override

A side-declutchable manual override is available for type F1A and F1F actuators. It consists of a manual gear actuator mounted between the actuator and the valve. The device is normally disengaged from the shaft. Upon engagement of the override clutch, overriding the actuator is done with ease, aided by the high-reduction ratio of the manual gear unit.



Dimensions



Actuator size	Gear box type	A/F									Flange connection	A	F
		os	ol	A	B	C	D	E	F	G		Weight in [kg]	
F1A/F1F 30	ILG/D200	15	200	155	165	216	122	53.2	61	46	F07	16	21
F1A/F1F 60	ILG/D600	15	300	194	210	283	145	64.5	94.5	56	F10	31	38
F1A/F1F 120	ILG/D600	15	300	194	210	283	145	64.5	94.5	56	F12	31	38
F1A/F1F 250	ILG/D1500	20	500	250	286	349	175	107.5	118.5	63	F14	84	110
F1A/F1F 500	ILG/D2400	25	500	280	327	356	194	127	123	72	F16	147	200
F1A/F1F 1000	ILG/D5000	25	600	345	386	388	209	155	150	82	F16/F25	500	660
F1A/F1F 1000	ILG/D5000	25	600	345	386	388	209	155	150	82	F25/F25	500	660
F1A/F1F 1000T	ILG/D5000	25	600	345	386	388	209	155	150	82	F25/F25	570	780

How to order F1 actuator

1.	2.	3.	4.	5.	6.	7.	8.
F1F	0120	A	A	4	S	10	S

Example for a standard single acting actuator F1A, size 120, outside stroke limitation, square profile connection, 10 springs, double action spring support to close operation.

1. sign	PRODUCT SERIES / DESIGN
F1A	Standard rack and pinion, double acting
F1F	Standard rack and pinion, single acting spring return / double action spring support
F1O	Standard rack and pinion, double acting for BO high cycling valve (note: only sizes 0060, 0120, 0250, 0500)

2. sign	Size of actuator
	0015, 0030, 0060, 0120, 0250, 0500; 1000; 2500; 5000
	Size = output torque of actuator in [Nm] per bar instrument air.

3. sign	Constructions
O	ordinary (O-ring)
K	(K) – Keilpac for sizes 0030 ... 0500
R	(RACY) with Keilpac; standard for LINDE PSA only (sizes: 0060; 0120; 0250)

OPTIONS		
G	(NG) – standard + Emergency lock off gear with hand operation (not for BDO type)	For sizes 0015 ... 1000 only
A	(HBA) standard + Outside stroke limitation	For sizes 0015 ... 0500 only
I	(HBI) standard + Inside stroke limitation	
AI	(HBAI) standard + Out- and inside stroke limitation	For sizes 2500 and 5000 only
H	(NH) Emergency hydraulic pump operating	
HA	(NH-HBA) Emergency hydraulic pump operating + Outside stroke limitation	
GI	(NG-HBI) Emergency lock off gear with hand operation + Inside stroke limitation	
GA	(NG-HBA) Emergency lock off gear with hand operation + Outside stroke limitation	
Y	Special design	

4. sign	CYLINDER AND HOUSING MATERIALS
A	Aluminum cylinder and aluminum housing hard coated (sizes <= 500)
S	GG25 cylinder and GG25 housing (sizes >= 1000)
Y	Special design
Bearing: DU, drive shaft: 13 % Cr steel	

5. sign	DRIVE SHAFT CONNECTION
4	Square profile (allvalves, incl. BO with actuator size 0060, excl. BAX)
6	Polygon profile (for BAX valve type only) P4C18x15 for size 0030
7	Polygon profile (for BAX valve type only) P4C25x21 for size 0030 or 0060
8	Polygon profile (for BAX valve type only) P4C32x27 for size 0060 or 0120
9	Polygon profile (for BAX valve type only) P4C35x30 for size 0250
0	Round shaft end with key (size: 0120, 0250, 0500 for BO valve type only)
Y	Special design

6. sign	Sealing rings / drive shaft material - temperature range
S	Standard temperature range (-20 °C ... +80 °C)
M	Cold temperature -40 °C
Y	Special, to be specified

7. sign	Number of springs (only for type F1F)	For actuator size
	02 - 04 - 06 - 08 - 10 - 12 - 14 - 16	15 / 30 / 60 / 120 / 250 500 / 1000
	02 - 04 - 06 - 08 - 10 - 12 - 14 - 16 - 18 - 20 - 22 - 24 - 26 - 28 - 30 - 32 - 34 - 36 - 38 - 40	2500
	09 - 18 - 27 - 36	5000

8. sign	Spring operating mode (only for type F1F)
C	Fail to close (CW - clock wise operation)
O	Fail to open (CCW - counter clock wise operation)
S	Double action spring support to close (CW - clock wise operation)
Y	Special, to be specified

Example:

F1A 120-K double-acting	Actuator size 120 and Keilpac
A 120-NG-K double-acting	Actuator size 120 with manual emergency actuation and Keilpac
A 120-NG-K-HBI double-acting	Actuator size 120 with manual emergency actuation and Keilpac
A 120-HBI-K double-acting	Actuator size 120 with internal stroke limit and Keilpac
F1F500/12-K Single-acting	Actuator size 500 with 12 springs and Keilpac
F500/12-NG-K Single-acting	Actuator size 500 with 12 springs And manual emergency actuation and Keilpac
F 500/12-NG-K Single-acting	Actuator size 500 with 12 springs manual emergency actuation and Keilpac
F 500/12-NG-K-HBA Single-acting	Actuator size 500 with 12 springs manual emergency actuation Keilpac and external stroke limit

Subject to change without prior notice.

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