



BR 31a · PFEIFFER Rotary Actuator Edition 2010

Single and double acting piston actuator

Application

Single-acting or double-acting piston actuators for butterfly valves, ball valves and other final control elements with rotary closure members. Particularly suitable for high process requirements in chemical plants:

- **Opening angle 90°**
- **Supply pressure up to 10 bar**
- **Temperatures -40°C to +80°C**

The pneumatic rotary actuators are suitable for throttling or on/off service. Special features include:

- Wide adjustment range of the limit stops (+5°/-15°)
- Square drive either diagonal or parallel
- Position indicator can be adjusted as required (in steps of 45°)
- No special tools needed for mounting and conversion
- Various spring cartridges
- Power transmission without clearance thanks to involute gearing
- Direction of rotation can be reversed without additional components
- Special surface treatment method (Kesternich and salt spray testing)
- Standardized mounting of accessories acc. to VDI/VDE 3845
- Simple attachment according to ISO 5211

Versions

Type **SRP** and **DAP** in sizes from 15 to 10000

- **Type SRP**
Single-acting rotary actuator with spring-return mechanism
- **Type DAP**
Double-acting rotary actuator without spring-return mechanism



Fig. 1: BR 31a Rotary Actuator (showing adjustment screws for limit stops)



Fig. 2: BR 31a Rotary Actuator (showing NAMUR interface)

Special versions

- For continuous operation at temperatures from -15 to +150°C due to the use of FPM (FKM) O-rings
- For continuous operation at temperatures from -55 to +80°C due to the use of silicone seals
- With opening angles of 120° and 180°
- Dosage actuator with adjustable mid position
- Three-position actuator
- With hydraulic rotating speed adjuster
- Stainless steel rotary actuator
- Extendable limit stops between 0° and 90° implemented by internal or external limit stops
- Special version with slotted screws and glued centering ring

Additional equipment and mounting parts

The following accessories are available (separately or in combination):

- Positioner
- Limit switches
- Solenoid valves
- Air pressure reducing station
- Pressure gauge mounting blocks
- Restrictors
- Pneumatic volume booster
- Quick exhaust valves

Further accessories are available on request to meet customer specifications.

Principle of operation

The supply pressure p_{st} generates a force at the piston surface which is balanced either by the compression springs in the actuator (single-acting version) or by a corresponding counterpressure (double-acting version).

The force generated at the pistons is converted into a rotary motion by the pinion shaft.

The adjustable limit stops for OPEN and CLOSED position allow the end positions to be finely adjusted to $\pm 5^\circ / -15^\circ$.

In the single-acting version, the spring return torque and the required supply pressure are determined by the number of springs.

Fail-safe position

- The **Type SRP Rotary actuator** offers two possible fail-safe actions (rotary motions) in case the supply air fails or the pistons are relieved of pressure.
The rotation directions apply when looking from the actuator towards the valve.
- **Springs turn clockwise:**
The springs rotate clockwise when the pressure drops.
- **Springs turn counterclockwise:**
The springs rotate counterclockwise when the pressure drops.
- The **Type DAP rotary actuator** is designed without springs. The actuator does not move to a defined end position when the supply air fails.

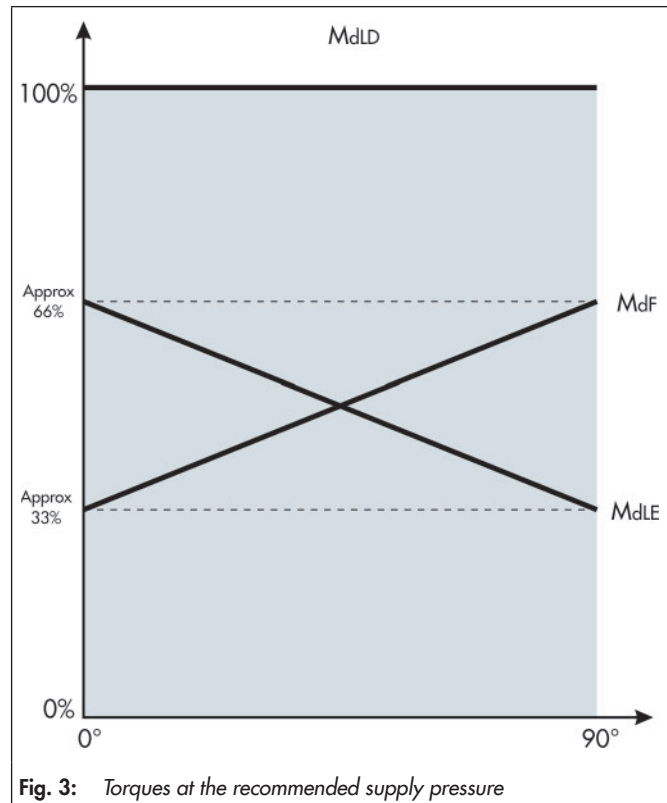
Torques for air strokes

Fig. 3 shows the usable air strokes (torques)

- M_{dLE} for the single-acting version
- M_{dLD} for the double-acting version

and the usable spring stroke M_{dF} depending on the opening angle.

The torque graph applies to the supply pressure assigned to the recommended number of springs (highlighted by a gray background and printed in bold in the torque tables).



Useful new features

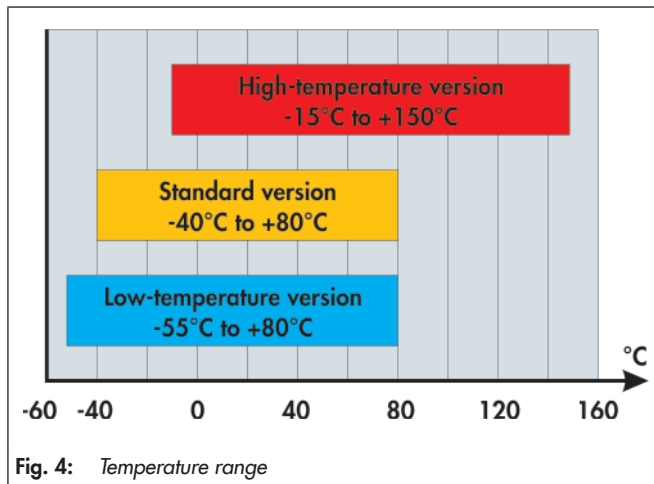
The Pfeiffer rotary actuators benefit from a series of technical improvements and useful new features. The actuators were developed according to the latest edition of the ISO 5211 standard.

- **Temperature range**

The temperature range of the standard actuators has been extended down to -40°C with new and improved sealing materials.

This allows the actuators with the standard temperature range to be used at ambient temperatures down to -40°C .

Additionally, the low-temperature version for -55 to $+80^{\circ}\text{C}$ and the high-temperature version suitable for temperatures from -15 to $+150^{\circ}\text{C}$ are still available.

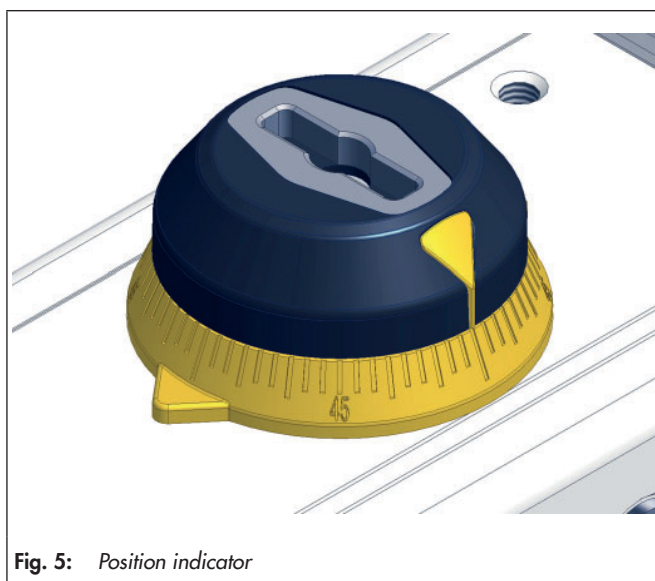


- **Position indicator**

The position indicator on the actuator makes it easy to read off the opening angle at the actuator.

The degree reading can be mounted offset in steps of 45° .

Control and signal units can pick up the rotary motion of the actuator at a metal tag.



- **Wider adjustment range of the limit stops**

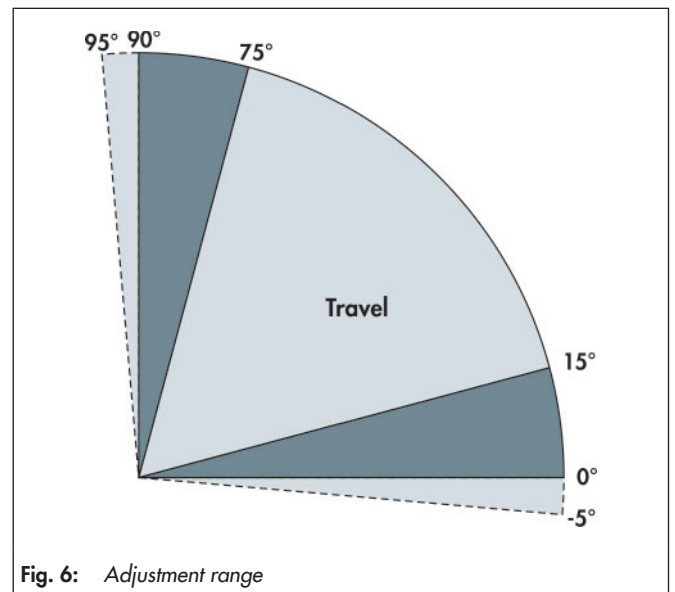
The adjustment range of the limit stops has been considerably increased.

The anti blowout screws can be adjusted within a range of 20° at both ends. This allows the adjustment of the limit stops between -5° and $+15^{\circ}$ as well as between 75° and 95° .

Risk of injury while turning the adjustment screws in the pressurized state is ruled out since the screws are installed from the inside to be blowout proof.

To easily identify tampering, the screws are sealed with anti-tampering paint.

The adjustment screws are located at the back of the actuator to prevent accidental contact with the pneumatic unit and to make them easily accessible.



- **Flat end cap design**

The new end cap design makes it easier and safer to perform maintenance on the actuator. The actuator can simply be rested on one end without the risk of it tipping over since the end is flat.



General technical data

Table 1: Technical Data

Version	Single-acting	Double-acting
Max. perm. supply pressure	10 bar ¹⁾	
Sizes	15 • 30 • 60 • 100 • 150 • 220 • 300 • 450 • 600 • 900 • 1200 • 2000 • 3000 • 4000 • 5000 • 10000	
Perm. temperature range	-40°C to 80°C in continuous operation	
Connection interface (Valve)	DIN ISO 5211	
Interface for positioners or signal transmitters	Type 15 - 150	VDI VDE 3845, size 1
	Type 220 - 600	VDI VDE 3845, size 2
	Type 900 - 5000	VDI VDE 3845, size 4
	Type 10000	VDI VDE 3845, size 5
Connection for solenoid valves	VDI VDE 3845	



¹⁾ Note:
Contact PFEIFFER for torques for 10 bar.

Dimensions and weights

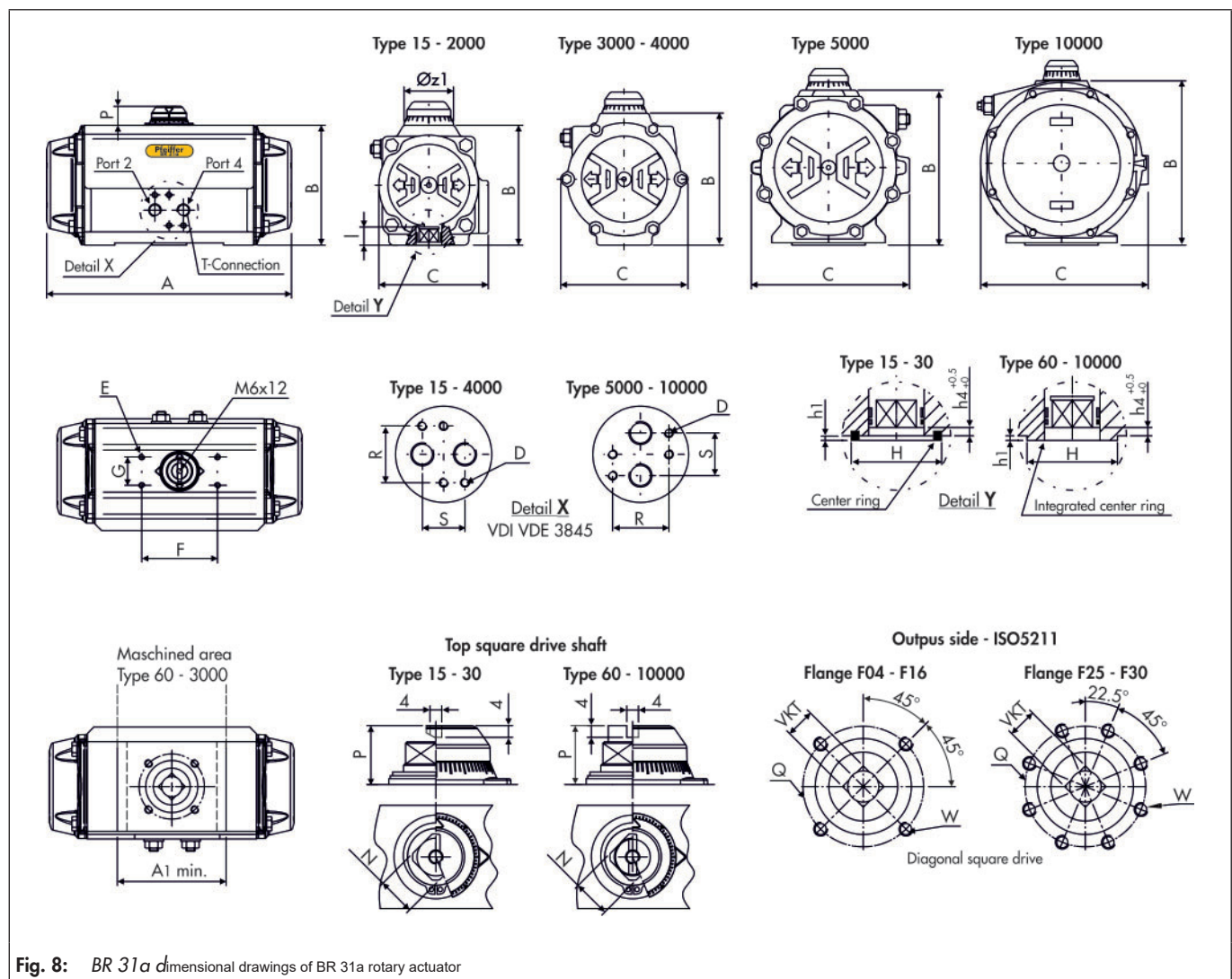


Fig. 8: BR 31a dimensional drawings of BR 31a rotary actuator

Table 2: Dimensions in mm and weights in kg

Type DAP/SRP	15	30	60	100	150	220	300	450	600	900	1200	2000	3000	4000	5000	10000
ISO 5211	F04	F05	F05	F07	F07	F10	F10	F12	F12	F14	F14	F16	F16	F16	F25	F30
VKT	11H9	14H9	14H9	17H9	17H9	22H9	22H9	27H9	27H9	36H9	36H9	46H9	46H9	46H9	55H9	75H9
A	135.5	153.5	203.5	241	259	304	333	394.5	422.5	474	528	605	710	812	855	950
A1	-	-	115	140	150	180	190	230	240	210	210	230	340	390	-	-
B	69	85	102	115	127	145	157	177	196	220.5	245	298.5	330	383	410	518
C	71	84.5	93	106	118.5	136	146.5	166	181	200	221.5	262	330	371	418	528
D	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M6x10	M6x10	M6x10	M6x10	M6x10
E	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M5x8	M6x10
F	80	80	80	80	80	80	80	80	80	130	130	130	130	130	130	200
G	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	50
N	11	11	17	17	17	27	27	27	27	36	36	36	36	36	36	36
P	20	20	20	20	20	30	30	30	30	50	50	50	50	50	50	80
R	32	32	32	32	32	32	32	32	32	32	32	45	45	45	45	45
S	24	24	24	24	24	24	24	24	24	24	24	40	40	40	40	40
T ISO 228	1/8"	1/8"	1/8"	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
Øz1	42	42	42	42	42	58	58	67.5	67.5	80	80	115	115	115	115	135
ØQ	42	50	50	70	70	102	102	125	125	140	140	165	165	165	254	298
W	M5	M6	M6	M8	M8	M10	M10	M12	M12	M16	M16	M20	M20	M20	M16	M20
ØH	30	35	35	55	55	70	70	85	85	100	100	130	130	130	200	230
h1	Min.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	1	1	1	1	1	1
	Nominal	1.5	2	1	1	1	1.2	1.2	1.2	1.2	1.7	1.7	2	2	2	2
	Max.	3	3	3	3	3	3	3	3	3	4	4	5	5	5	5
h4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
l min.	12	16	16	19	19	24	24	29	29	38	38	48	48	48	57	77
Weight DAP	1	1.6	2.7	3.8	5.4	8.4	10.2	14.5	19.8	25	35.5	53	83	118	134	171
Weight SRP with 6 springs	1.1	1.7	3.2	4.4	6.5	9.8	12.6	18.1	24	31.6	45.1	64.2	102.2	150	169	251

Torque for Rotary actuator BR 31a

Table 3: Torques for double-acting Type DAP Rotary Actuator

Type DAP	Air strokes (Nm) with a supply pressure from 2.5 to 8 bar													
	2.5 bar	3 bar	3.5 bar	4 bar	4.2 bar	4.5 bar	5 bar	5.5 bar	6 bar	6.5 bar	7 bar	7.5 bar	8 bar	
15	8.3	10.0	11.6	13.3	14.0	15.0	16.6	18.3	19.9	21.6	23.3	24.9	26.6	
30	14.7	17.6	20.5	23.5	24.6	26.4	29.3	32.0	35.2	38.1	41.0	44.0	46.9	
60	29.1	34.9	40.7	46.5	48.9	52.4	58.2	64.0	69.8	75.6	81.4	87.3	93.1	
100	45.8	54.9	64.1	73.2	76.9	82.4	91.5	101	110	120	128	138	146	
150	66.5	79.8	93.1	106	112	120	133	146	160	173	186	199	213	
220	107	129	150	172	181	193	215	236	258	279	301	322	344	
300	138	166	194	222	233	249	277	305	332	360	388	415	443	
450	217	261	304	348	365	391	435	478	522	565	609	652	696	
600	284	340	397	454	477	511	567	624	681	737	794	851	908	
900	383	459	536	613	643	689	766	842	919	996	1072	1149	1225	
1200	532	638	745	851	893	957	1064	1170	1276	1383	1489	1595	1702	
2000	893	1072	1251	1430	1501	1608	1787	1966	2144	2318	2502	2684	2859	
3000	1297	1556	1815	2075	2179	2334	2594	2853	3112	3372	3631	3890	4150	
4000	1795	2154	2513	2872	3015	3231	3590	3949	4308	4667	5026	5400	5744	
5000	2252	2703	3153	3604	3784	4054	4504	4955	5405	5855	6306	6756	7207	
10000	4169	5003	5837	6671	7005	7505	8339	9173	10007	10841	11674	-	-	

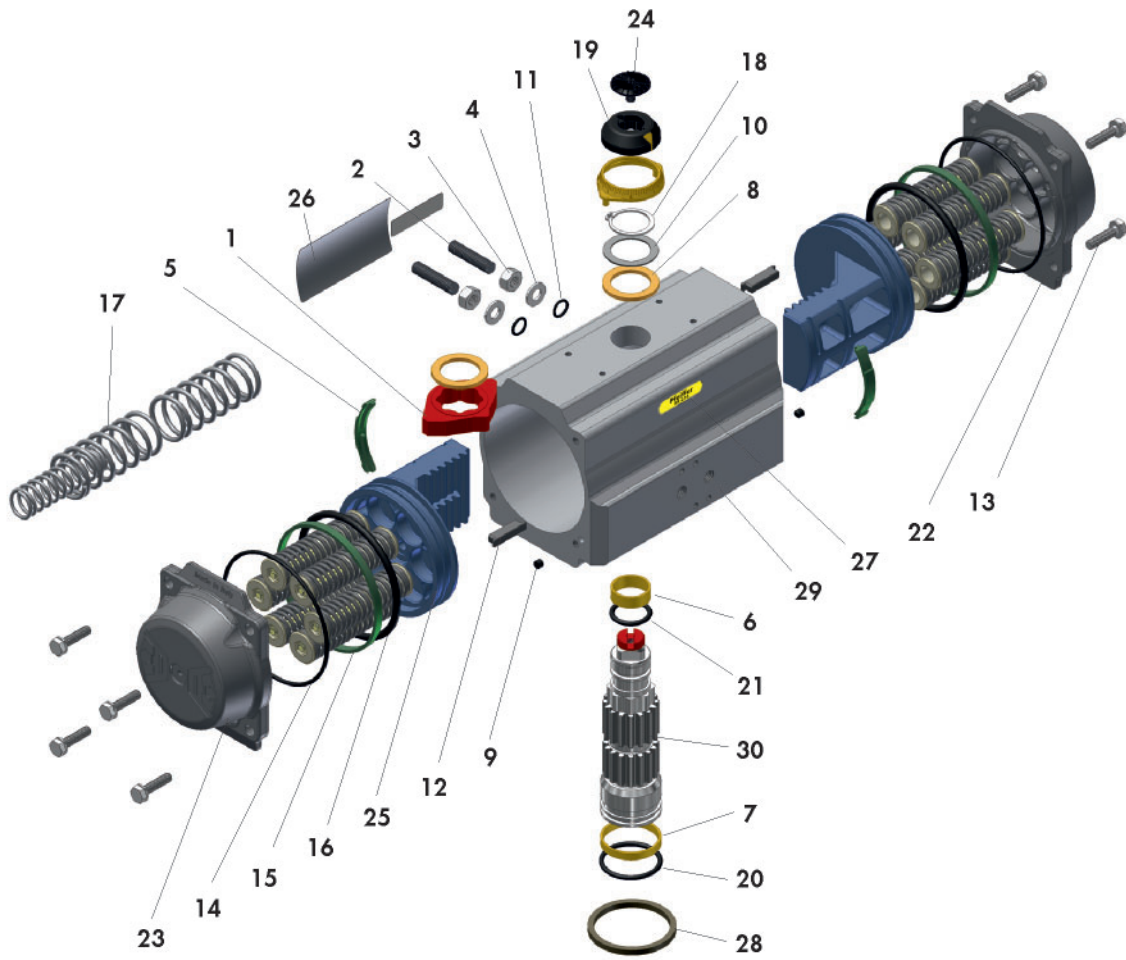


Fig. 9: Explosion view of Type 31a Rotary actuator

Table 6: Parts list

Item	Qty.	Designation	Material
1	1	Cam (end position adjustment)	GS400-15
2	2	Adjustment screw	A2-70
3	2	Lock nut	A2-70
4	2	Washer	A2
5	2	Piston guide jaw	Nylon 46
6	1	Shaft bearing bushing (top)	PA 46
7	1	Shaft bearing bushing (bottom)	PA 46
8	2	Thrust washer	Nylon 46
9	2	Stopper for air duct	NBR
10	1	Washer	1.4301
11	2	Seal (adjustment screw)	NBR
12	2	Supporting collar	Nylon 66 + 30% GF
13	8 / 12 / 16	Screw (end cap)	A2-70
14	2	Seal (end cap)	NBR
15	2	Piston ring	POM

Item	Qty.	Designation	Material
16	2	Piston gasket	NBR
17	4 - 12	Compression spring cartridge	SiCr spring steel
18	1	Retaining ring	C 75
19	1	Position indicator	PP + 30% GF
20	1	Shaft seal (bottom)	NBR
21	1	Shaft seal (top)	NBR
22	1	End cap (right)	GD-ALSi8.5Cu3.5Fe
23	1	End cap (left)	GD-ALSi8.5Cu3.5Fe
24	1	Screw (position indicator)	A2-70
25	2	Piston	GD-ALSi8.5Cu3.5Fe
26	1	Nameplate	Polyester/aluminium
27	2	Nameplate	Polyester/aluminium
28	1	Center ring	EN AW 6063
29	1	Housing	EN AW 6063
30	1	Shaft	C22

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