



**MANUAL- AND
MAINTENANCE GUIDELINES**



PNEUMATIC ACTUATOR

PRD/PRE

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Chapter 1: Preparation

1.1 Marking of safety instructions



This symbol indicates safety instructions which can cause personal injury if not respected.



This symbol indicates an important note.

1.2 Safety fundamentals



Rotary actuators must be isolated both pneumatically and electrically before any intervention werden.



Failure to follow the safety basics can void the warranty claims

The installation, assembly, commissioning, maintenance and any other work on pneumatic actuators must be performed by qualified personnel.

This manual is part of the device and must be available for the operating personnel at all times. This manual must be read and understood before operation.

The device may only be operated in perfect condition. No safety devices are removed or deactivated. A rebuilding or modification of the device is strictly prohibited.



Installation, operation and maintenance of the products are strictly subject to the local safety and accident prevention regulations!

1.3 Transport, storage and packaging

The devices must be carefully handled, transported and stored.

The devices should be transported to the end destination in their original packaging and unpacked immediately before installation.

The actuators are to be stored in a clean, dry storage, which is neither exposed to excessive vibration nor to rapid temperature changes.

Prevent ingress of dirt or moisture into the actuator. Close or tighten both air connections.

Proper disposal of packaging is the customer's responsibility.



Failure to comply may void the warranty claims.

Chapter 2: Preliminary

2.1 Description

Actuators of the PRD/PRE series are pneumatic double-piston rotary actuators. They are generally used in two different modes: single acting and double-acting.

Double piston principle means that two pistons create two pressure chambers. By inflating one of these chambers the pistons are moved into opposite directions either towards or away from each other. The resulting force is provided to the central actuator pinion via toothed racks which are connected with the pistons and so creates a constant torque over the entire pivoting angle.

The actuator series PRD/PRE offers 18 sizes with a torque range of 3-15880 Nm. Standardized interfaces for mounting accessories (VDI / VDE3845, NAMUR, ISO5211, DIN3337) are available.

In the single acting type integrated springs ensure the closing or opening in the event of a failure of the control medium ("spring to close" or "spring to open").

2.2 Intended use

Actuators of the PRD/PRE series are primarily used for the automation of quarter-turn valves such as ball valves, butterfly valves or plug valves, but can also be used for other applications. Contact our qualified personnel where required.

The specified operating and limiting values for temperature, pressure, control medium, etc. must be observed.

In operation of valves high kinetic energies may arise, which are transmitted to the actuator. Make sure that the drive is protected from damage by complying with the minimum travel times safely. Control speed can be reduced by the use of choke valves, which can be purchased through our sales department.

For valve types with high flywheel mass and low torque requirements the operating conditions of the drive must be coordinated with us in advance.

The actuator may only be used:

- » in perfect condition
- » as stipulated
- » safety- and danger-conscious in consideration of the operating instructions
- » if all safety devices are in place and functioning

In particular faults which may affect safety are to be eliminated!



Any use not pre-approved by the manufacturer is considered improper!

2.3 Technical Data

Construction principle	Pneumatic double-piston rotary actuator in rack&pinion-design with self-centering pistons; double- and single-acting execution	
Temperature range	Standard	-50°C to +70°C (NBR)
	Hightemperature	-15°C to +160°C (Viton)
	Extended temperature	-60°C to +200°C (Silicone)
Control pressure	2...8 bar	
Pressure media	dry, filtered air or inert gases in respect of remaining oil-, dust and water-content according to DIN ISO 8573-1 / class 4, maximum particle diameter 30µm, dew point minimum 10°C below ambient temperature	
Nominal rotation angle	90°, 120°, 180° resp. 240°	
	Adjustable in one end position +/-5° (optional 100% stroke adjustment) Version BE: Adjustable in both end positions	
Torque range	up to 6.400 Nm (double-acting) up to 2.178 Nm (single-acting)	
Standards	ISO 5211, VDI/VDE 3845 resp. NAMUR	
Materials	Housing	Anodised aluminum ASTM 6083, UNI 4522
	Caps	Aluminum UNI 5076, epoxy resin coated
	Piston	Aluminum UNI 5076
	Pinion	Steel, nickel-plated (optional: stainless steel)
	Bearings	POM
	Sealings	NBR, optional: FKM or silicone

2.4 Type code

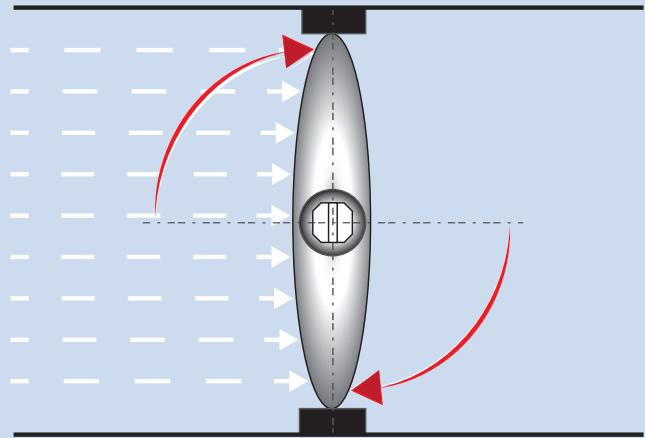
		PR	D	058	/	090	08	V	14	F	BE		
Type												Option	
Function												Mounting direction	
D: double-acting												E: transversal to pipe, spring direction CW	
E: single-acting												F: parallel to pipe, spring direction CW	
Size												G: transversal to pipe, spring direction CCW	
Rotation angle												H: parallel to pipe, spring direction CCW	
Spring set												Stem connection dimensions	
Stem connection												Dimension in mm	
V: Square acc. to ISO 5211 and DIN 3337													
Z: Double D													

Chapter 3: Function

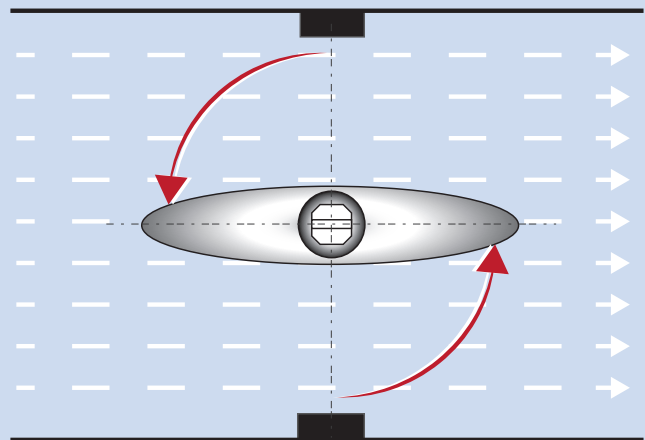
3.1 Fundamentals

General rule is that valves are closed clockwise (CW) and opened counterclockwise (CCW). The angle of view is to be understood as “from the top onto the valve shaft.” All statements in this manual are based on this rule and have to be taken into account accordingly

Closing process clockwise (CW)

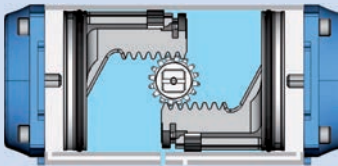
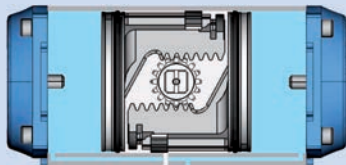
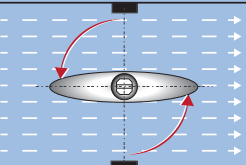
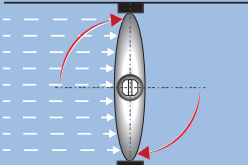
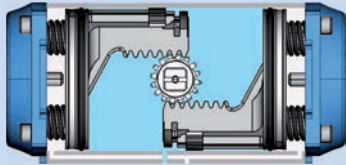
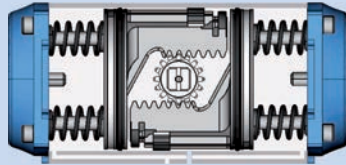
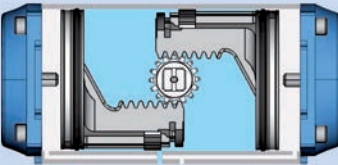
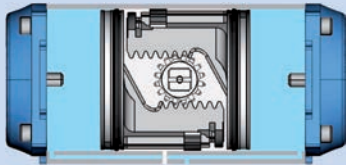
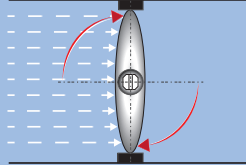
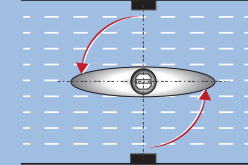
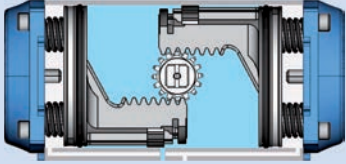
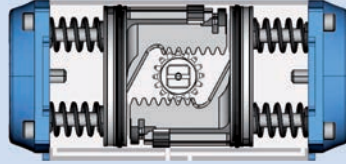


Opening process counter-clockwise (CCW)



3.2 Mounting versions

Depending on the orientation of the actuator to the pipeline (parallel or transverse) and the switching function (clockwise or counterclockwise), there are 4 resulting mounting versions which need to be differentiated.

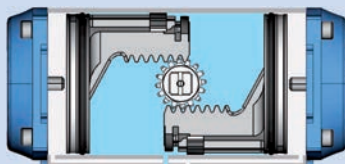
Mounting version F		
Actuator parallel to pipeline Spring rotation sense clockwise (CW) SPRING TO CLOSE		
Double-acting	Port „A“ pressurized, actuator moves in switched position 90°, valve opens	Port „B“ pressurized, actuator moves in initial position 0°, valve closes
		
		
Single-acting	Port „A“ pressurized, actuator moves in switched position 90°, valve opens	Port „A“ vented, actuator moves in initial position 0°, valve closes
		
Mounting version H		
Actuator parallel to pipeline Spring rotation sense counter-clockwise (CCW) SPRING TO OPEN		
Double-acting	Port „A“ pressurized, actuator moves in switched position 90°, valve closes	Port „B“ pressurized, actuator moves in initial position 0°, valve opens
		
		
Single-acting	Port „A“ pressurized, actuator moves in switched position 90°, valve closes	Port „A“ vented, actuator moves in initial position 0°, valve opens
		

Mounting version E

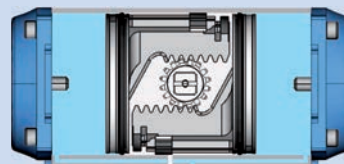
Actuator transversal to pipeline
Spring rotation sense clockwise (CW)
SPRING TO CLOSE

Double-acting

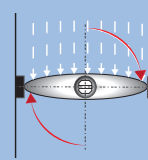
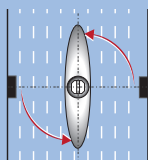
Port „A“ pressurized, actuator moves in switched position 90°, valve opens



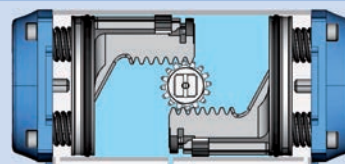
Port „B“ pressurized, actuator moves in initial position 0°, valve closes



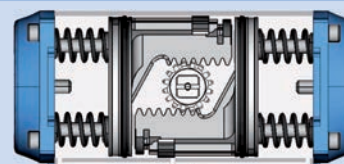
Valve position



Single-acting



Port „A“ pressurized, actuator moves in switched position 90°, valve opens



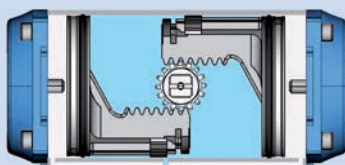
Port „A“ vented, actuator moves in initial position 0°, valve closes

Mounting version G

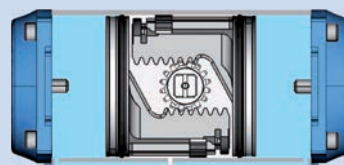
Actuator transversal to pipeline
Spring rotation sense counter-clockwise (CCW)
SPRING TO OPEN

Double-acting

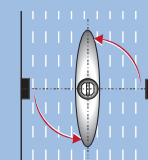
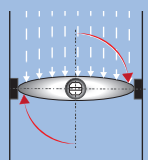
Port „A“ pressurized, actuator moves in switched position 90°, valve closes



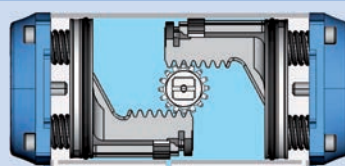
Port „B“ pressurized, actuator moves in initial position 0°, valve opens



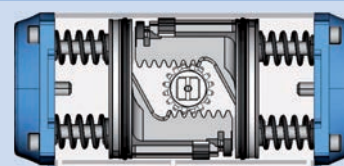
Valve position



Single-acting



Port „A“ pressurized, actuator moves in switched position 90°, valve closes



Port „A“ vented, actuator moves in initial position 0°, valve opens

Chapter 4: Installation

4.1 Attachment to a valve

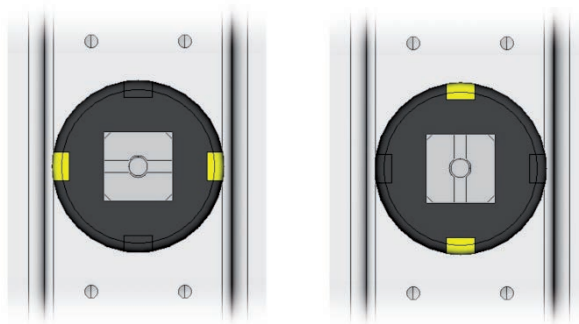


Perform any kind of installation work on rotary actuators exclusively when the device is fully vented!



Verify that the maximum actuator torque is below the maximum valve torque (MAST) to avoid further damage.

- » During the installation of the actuator the tap hole (with ball and plug valves) respectively the disc (butterfly valves) must correspond with the groove at the top of the drive pinion in order to ensure the proper function of further adapted signal- or control units. The groove (according to VDI / VDE 3845) symbolically represents the valve position.
- » After correct installation of the actuator to the valve ensure that the visual position indicator is also programmed correctly by adjusting the signal plates. These must correspond to the pinion groove and thus with the valve position.



- » Make sure that the valve shaft corresponds to the terminal in the actuator pinion in terms of shape and dimension. For direct mounting possible differences can usually be compensated by the use of reduction inserts. These can be ordered via our sales department separately.
- » Check whether valve and actuator have a corresponding adaption interface. If not, an additional mounting kit is required, which can be ordered via our sales department.
- » Secure the drive with screws on the valve. We recommend using stainless steel screws to ensure a corresponding corrosion resistance. The number of screws is relevant for the stability of the mounting and power transmission. Therefore, don't leave any fixation point unused. Take into account the tightening torques in section 5.3 when fixing the screws.

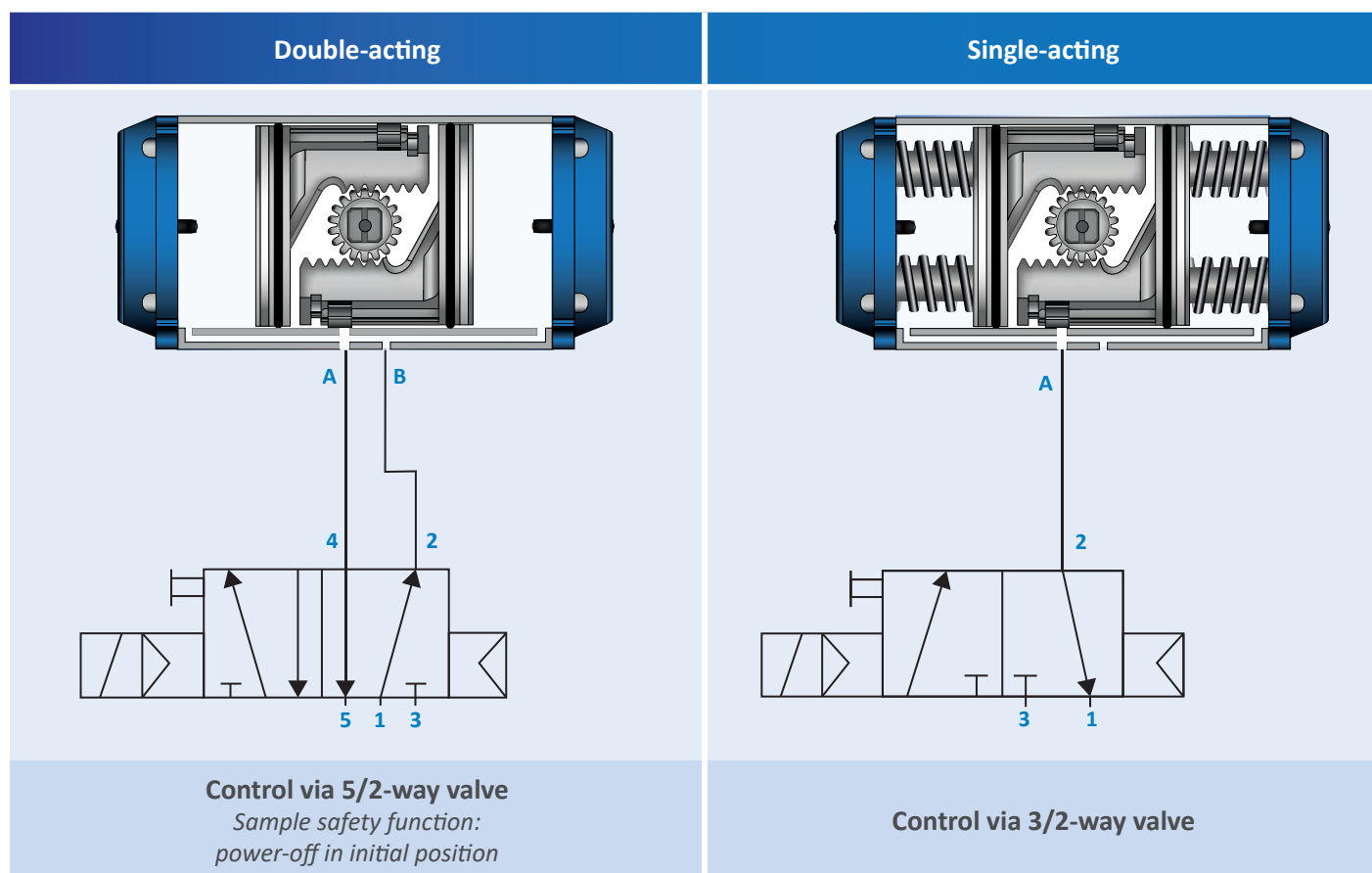
4.2 Pneumatic connection

Actuators of the PRD/PRE series can either be controlled via a rigid or flexible tube system, with the control valve mounted apart from the actuator, or by a control valve that is directly mounted to the NAMUR interface according to VDI/VDE3845 in the body of the actuator.

By the design and mounting direction of the control valve security functions for the event of a power failure can be preset in double acting applications. For spring return actuators, the initial position is in principle understood as a safety position in case of power failure or failure of the control media.

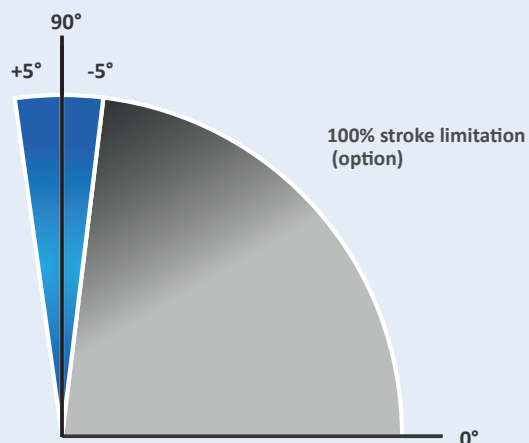
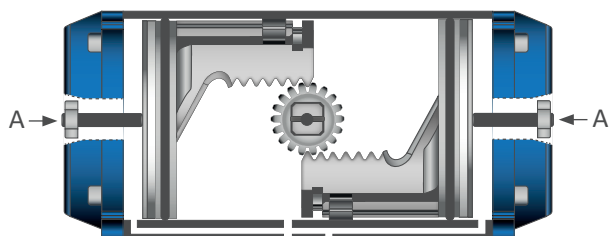
Single-acting actuators are factory wise equipped with a silencer in port "B". Prior to any installation of a directly mounted control valve that silencer is to be removed.

Pneumatic controls



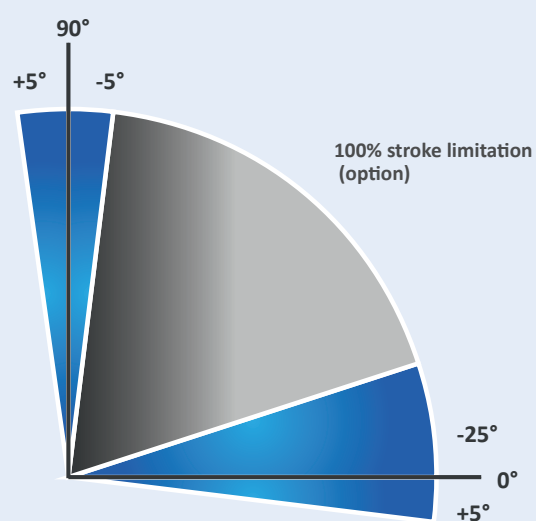
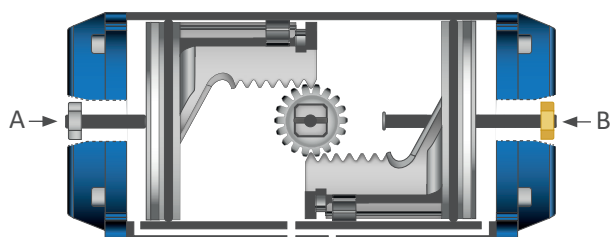
4.3 End stop adjustment

Version "Standard"



By turning the end-stop adjustment screws „A“, both end positions can be adjusted by $\pm 5^\circ$ for a precise setting of the final valve position. The according settings are secured by tightening the lock nuts.

Version "BE"



With the optional version "BE" both end positions can be independently adjusted by turning the adjustment screws "A" and "B".

5. Maintenance

5.1 General

Actuators of the PRD/PRE series are designed for “no need of maintenance” during the normal lifecycle and are supplied with sufficient lubrication for their normal span of duty. The normal span of duty depends on the actuator size and is subject to EN 15714-3.

Perform periodic inspections to ensure trouble-free operation. Check whether visible or audible defects are present. Regular replacement of the seals and bearings in the actuator extend the normal span of duty. Appropriate spare parts kit can be ordered via our sales department.

5.2 Safety instructions



Rotary actuators must be isolated both pneumatically and electrically before any work is performed.

Actuators and the connected valve can move when the control pressure and/or an electrical control signal is removed.

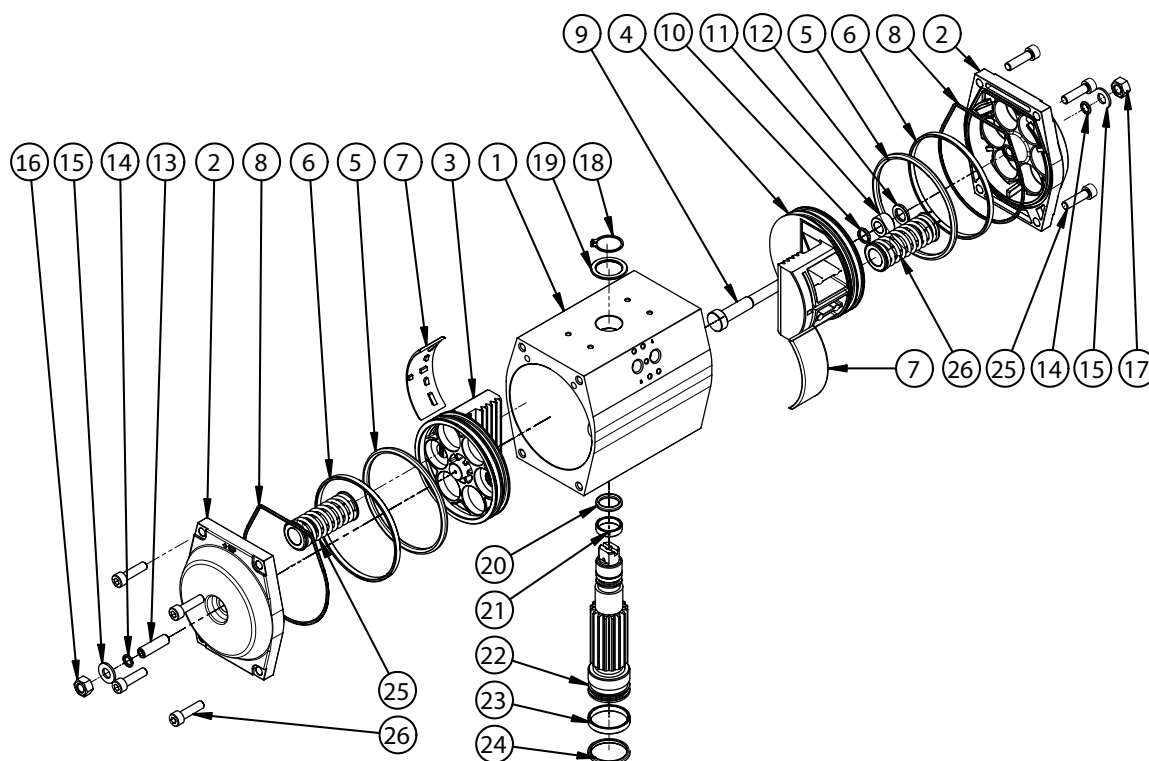
Single acting actuators with incomplete spring stroke contain a high spring force that can trigger a sudden rotation during dismounting of the actuator. This can cause serious injuries or property damage.

Work on electrical installations must be carried out exclusively by suitably qualified persons. A disabled supply must be protected against accidental reconnection.

5.3 Tightening torques for screw connections

Tightening torques in Nm		
Nominal size	min.	max.
M5	4,9	6
M6	8	10
M8	20	25
M10	40	49
M12	69	86
M16	170	210
M18	235	290
M20	330	410

5.4 Components

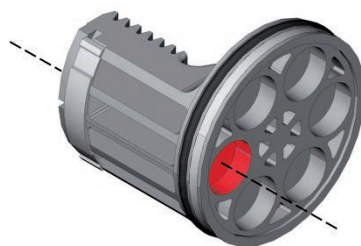


No.	Description	Quantity	Spare parts set							
			Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Set 7	Set 8
1	Actuator body	1	-	-	-	-	-	-	-	-
2	Actuator end cap	2	1	-	-	-	-	-	-	-
3	Blind piston	1	-	1	-	-	-	-	-	-
4	Drilled piston	1	-	-	1	-	-	-	-	-
5	Piston sealing O-Ring	2	-	1	1	-	-	-	2	-
6	Piston guide ring	2	-	1	1	-	-	-	-	2
7	Piston guide skate	2	-	1	1	-	-	-	-	2
8	End cap sealing O-Ring	2	1	-	-	-	-	-	2	-
9	Internal travel stop rod	1	-	-	-	-	1	-	-	-
10	Internal travel stop rod sealing O-Ring	1	-	-	-	-	1	-	1	-
11	Internal stop rod guide bush	1	-	-	-	-	1	-	-	-
12	Rod guide bush stop washer	1	-	-	-	-	1	-	-	-
13	External travel stop screw	1	1	-	-	-	-	1	-	-
14	Stop sealing O-Ring	2	1	-	-	-	-	1	2	-
15	O-Ring stop washer	2	1	-	-	-	-	1	-	-
16	External stop nut	1	1	-	-	-	-	1	-	-
17	Internal stop nut (yellow)	1	-	-	-	-	1	-	-	-
18	Pinion stop circlips	1	-	-	-	1	-	-	-	-
19	Upper pinion washer	1	-	-	-	1	-	-	-	1
20	Upper pinion O-Ring sealing	1	-	-	-	1	-	-	1	-
21	Upper pinion guide ring	1	-	-	-	1	-	-	-	1
22	Pinion	1	-	-	-	1	-	-	-	-
23	Lower pinion guide ring	1	-	-	-	1	-	-	-	1
24	Lower pinion O-Ring sealing	1	-	-	-	1	-	-	-	-
25	End cap screws	8	4	-	-	-	-	-	-	-
26	Spring cartridges	0 - 12	-	-	-	-	-	-	-	-

Set 1 = Cap, complete
Set 2 = Blind piston, complete
Set 3 = Drilled piston kit, complete
Set 4 = Shaft complete

Set 5 = Internal stop kit, complete
Set 6 = External stop kit, complete
Set 7 = Seal kit
Set 8 = Guide kit

5.5 Arrangement of safety springs



The drive pistons are not symmetrical due to the attached racks. In order to ensure optimal flow of force and minimize internal wear, the springs must be installed according to the following installation schemes.

Pay attention that in the following illustration the spring pocket, which is aligned with the piston, is highlighted with a point.

	Piston left/right		Piston left/right
5 springs		6 springs	
7 springs		8 springs	
9 springs		10 springs	
11 springs		12 springs	

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