PROTACT

## MANUAL- AND MAINTENANCE GUIDELINES


## PNEUMATIC ACTUATORS

# PR Series

Dokumentnr.: BWA.PR.201001| Issued: 03/2023

## Notes

## Contents:

# Chapter 1: Preparation

**Content:**



## 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 interventionwerden.**

**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 valve 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

**Content:**

- Design description
- Intended use
- Technical information
- Type code

## 2.1 Design description

Actuators of the PR 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 PR offers 18 sizes with a torque range of 3-13000 Nm (double acting) and 4-4200 Nm (single acting). 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 PR 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 | |
| **Materials** | See chapter „Parts and materials“ in product brochure | |
| **Temperature range** | Standard | -20°C...+80°C |
| | Low temperature variant | -40°C...+80°C |
| | High temperature variant | -10°C...+150°C |
| **Control pressure** | 2,5...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 | |
| **Mounting direction** | Any | |
| **Nominal rotation angle** | 90° resp. 180°<br>Adjustable in both end positions +/-5°<br>Serial stroke adjustment for switched position up to -20°<br>(optional 100% stroke adjustment) | |
| **Torque range** | double-acting: 3 ... 13000Nm<br>single-acting: 4 ... 4200Nm | |
| **Standards** | Interface actuator/control-unit | VDI/VDE 3845 resp. NAMUR |
| | Interface actuator/control media supply | VDI/VDE 3845 resp. NAMUR |
| | Interface actuator/valve | ISO 5211 and DIN 3337 |

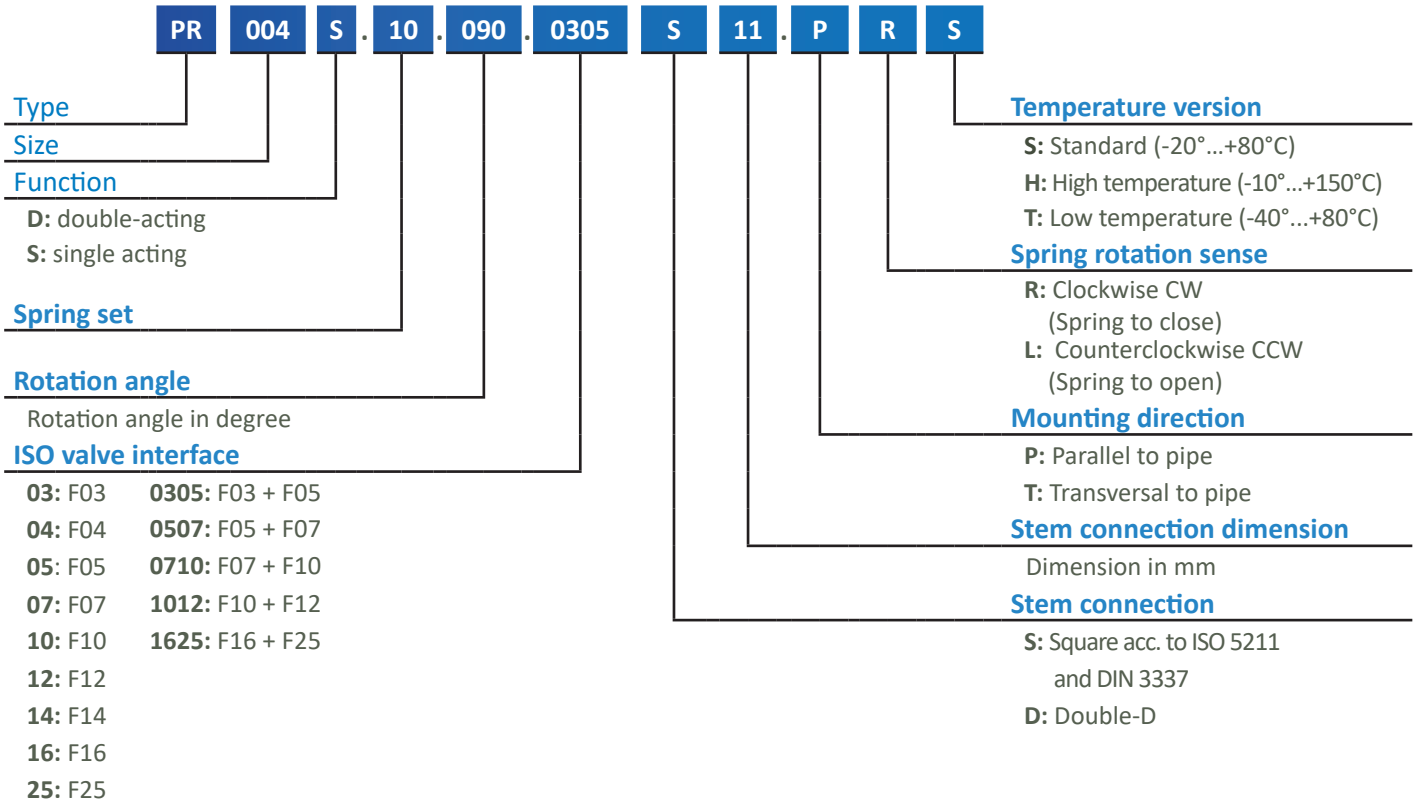
## 2.4 Air volumes

| | | Actuator size | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **002** | **003** | **004** | **007** | **010** | **015** | **023** | **033** | **052** |
| **Volume (l)** | double-acting | 0,09 | 0,19 | 0,28 | 0,44 | 0,64 | 0,90 | 1,37 | 1,83 | 3,0 |
| | single-acting | - | - | 0,12 | 0,21 | 0,30 | 0,43 | 0,64 | 0,95 | 1,6 |
| | | **088** | **134** | **216** | **263** | **387** | **587** | **763** | **1143** | **1628** |
| **Volume (l)** | double-acting | 4,7 | 6,9 | 11,3 | 15,0 | 20,0 | 31,0 | 53,5 | 81,4 | 108,6 |
| | single-acting | 2,5 | 3,7 | 5,9 | 7,5 | 11,0 | 17,0 | 23,8 | 35,1 | 52,6 |

## 2.5 Air consumption

| Size | Function | Air consumption for pivoting angle 90° at control pressure in bar (g) in litres/cycle | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 | 3,5 | 4 | 4,5 | 5 | 5,5 | 6 | 7 | 8 |
| 002 | double-acting | 0,27 | 0,32 | 0,36 | 0,41 | 0,45 | 0,50 | 0,54 | 0,63 | 0,72 |
| | single-acting | - | - | - | - | - | - | - | - | - |
| 003 | double-acting | 0,57 | 0,67 | 0,76 | 0,86 | 0,95 | 1,05 | 1,14 | 1,33 | 1,52 |
| | single-acting | - | - | - | - | - | - | - | - | - |
| 004 | double-acting | 0,84 | 0,98 | 1,12 | 1,26 | 1,40 | 1,54 | 1,68 | 1,96 | 2,24 |
| | single-acting | 0,36 | 0,42 | 0,48 | 0,54 | 0,60 | 0,66 | 0,72 | 0,84 | 0,96 |
| 007 | double-acting | 1,32 | 1,54 | 1,76 | 1,98 | 2,20 | 2,42 | 2,64 | 3,08 | 3,52 |
| | single-acting | 0,63 | 0,74 | 0,84 | 0,95 | 1,05 | 1,16 | 1,26 | 1,47 | 1,68 |
| 010 | double-acting | 1,92 | 2,24 | 2,56 | 2,88 | 3,20 | 3,52 | 3,84 | 4,48 | 5,12 |
| | single-acting | 0,90 | 1,05 | 1,20 | 1,35 | 1,50 | 1,65 | 1,80 | 2,10 | 2,40 |
| 015 | double-acting | 2,70 | 3,15 | 3,60 | 4,05 | 4,50 | 4,95 | 5,40 | 6,30 | 7,20 |
| | single-acting | 1,29 | 1,51 | 1,72 | 1,94 | 2,15 | 2,37 | 2,58 | 3,01 | 3,44 |
| 023 | double-acting | 4,11 | 4,80 | 5,48 | 6,17 | 6,85 | 7,54 | 8,22 | 9,59 | 10,96 |
| | single-acting | 1,92 | 2,24 | 2,56 | 2,88 | 3,20 | 3,52 | 3,84 | 4,48 | 5,12 |
| 033 | double-acting | 5,49 | 6,41 | 7,32 | 8,24 | 9,15 | 10,07 | 10,98 | 12,81 | 14,64 |
| | single-acting | 2,85 | 3,33 | 3,80 | 4,28 | 4,75 | 5,23 | 5,70 | 6,65 | 7,60 |
| 052 | double-acting | 9,00 | 10,50 | 12,00 | 13,50 | 15,00 | 16,50 | 18,00 | 21,00 | 24,00 |
| | single-acting | 4,80 | 5,60 | 6,40 | 7,20 | 8,00 | 8,80 | 9,60 | 11,20 | 12,80 |
| 088 | double-acting | 14,10 | 16,45 | 18,80 | 21,15 | 23,50 | 25,85 | 28,20 | 32,90 | 37,60 |
| | single-acting | 7,50 | 8,75 | 10,00 | 11,25 | 12,50 | 13,75 | 15,00 | 17,50 | 20,00 |
| 134 | double-acting | 20,7 | 24,2 | 27,6 | 31,1 | 34,5 | 38,0 | 41,4 | 48,3 | 55,2 |
| | single-acting | 11,1 | 13,0 | 14,8 | 16,7 | 18,5 | 20,4 | 22,2 | 25,9 | 29,6 |
| 216 | double-acting | 33,9 | 39,6 | 45,2 | 50,9 | 56,5 | 62,2 | 67,8 | 79,1 | 90,4 |
| | single-acting | 17,7 | 20,7 | 23,6 | 26,6 | 29,5 | 32,5 | 35,4 | 41,3 | 47,2 |
| 263 | double-acting | 45,0 | 52,5 | 60,0 | 67,5 | 75,0 | 82,5 | 90,0 | 105,0 | 120,0 |
| | single-acting | 22,5 | 26,3 | 30,0 | 33,8 | 37,5 | 41,3 | 45,0 | 52,5 | 60,0 |
| 387 | double-acting | 60,0 | 70,0 | 80,0 | 90,0 | 100,0 | 110,0 | 120,0 | 140,0 | 160,0 |
| | single-acting | 33,0 | 38,5 | 44,0 | 49,5 | 55,0 | 60,5 | 66,0 | 77,0 | 88,0 |
| 587 | double-acting | 93,0 | 108,5 | 124,0 | 139,5 | 155,0 | 170,5 | 186,0 | 217,0 | 248,0 |
| | single-acting | 51,0 | 59,5 | 68,0 | 76,5 | 85,0 | 93,5 | 102,0 | 119,0 | 136,0 |
| 763 | double-acting | 160,5 | 187,3 | 214,0 | 240,8 | 267,5 | 294,3 | 321,0 | 374,5 | 428,0 |
| | single-acting | 71,4 | 83,3 | 95,2 | 107,1 | 119,0 | 130,9 | 142,8 | 166,6 | 190,4 |
| 1143 | double-acting | 244,2 | 284,9 | 325,6 | 366,3 | 407,0 | 447,7 | 488,4 | 569,8 | 651,2 |
| | single-acting | 105,3 | 122,9 | 140,4 | 158,0 | 175,5 | 193,1 | 210,6 | 245,7 | 280,8 |
| 1628 | double-acting | 325,8 | 380,1 | 434,4 | 488,7 | 543,0 | 597,3 | 651,6 | 760,2 | 868,8 |
| | single-acting | 157,8 | 184,1 | 210,4 | 236,7 | 263,0 | 289,3 | 315,6 | 368,2 | 420,8 |

## 2.6 Typecode


PR 004 S . 10 . 090 . 0305 S 11 . P R S
Type
Size
Function
D: double-acting
S: single acting
Spring set
Rotation angle
Rotation angle in degree
ISO valve interface
03: F03
04: F04
05: F05
07: F07
10: F10
12: F12
14: F14
16: F16
25: F25
0305: F03 + F05
0507: F05 + F07
0710: F07 + F10
1012: F10 + F12
1625: F16 + F25
Temperature version
S: Standard (-20°...+80°C)
H: High temperature (-10°...+150°C)
T: Low temperature (-40°...+80°C)
Spring rotation sense
R: Clockwise CW
(Spring to close)
L: Counterclockwise CCW
(Spring to open)
Mounting direction
P: Parallel to pipe
T: Transversal to pipe
Stem connection dimension
Dimension in mm
Stem connection
S: Square acc. to ISO 5211
and DIN 3337
D: Double-D

# Kapitel 3: Funktion

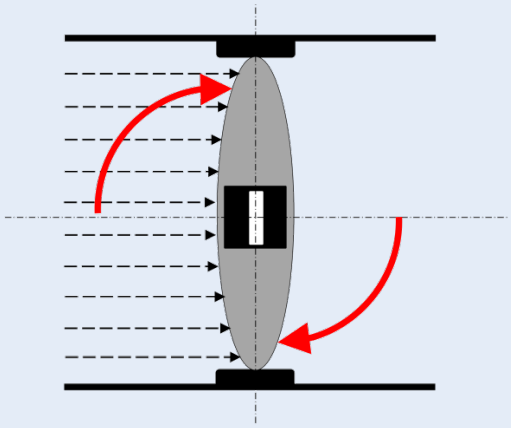
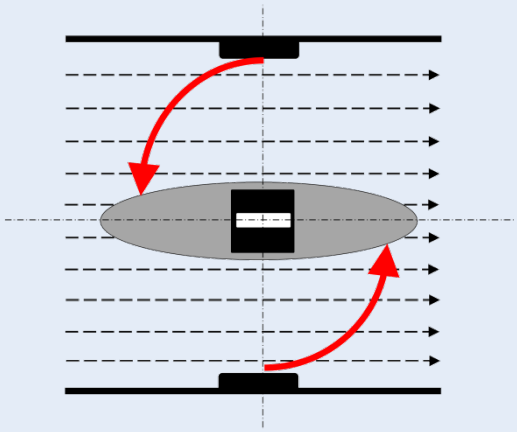
**Inhalte:**



## 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 the following passage 3.2 are based on this rule and have to be taken into account accordingly.

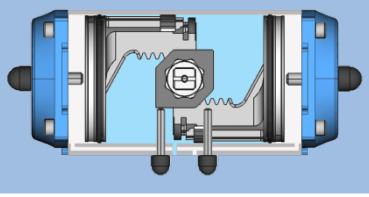
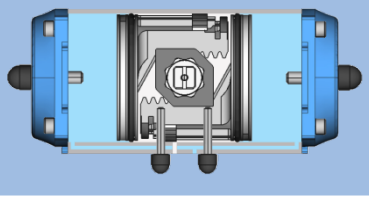
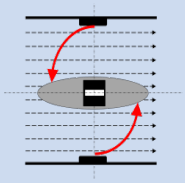
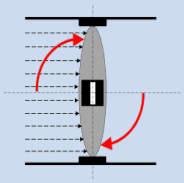
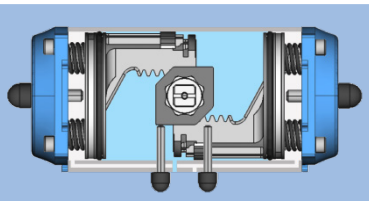
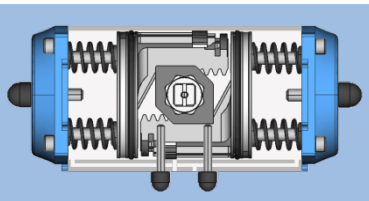
| | |
|---|---|
| **Closing process clockwise (CW)** |  |
| **Opening process counter-clockwise (CCW)** |  |

## 3.2 Mounting versions – valve closing clockwise

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.

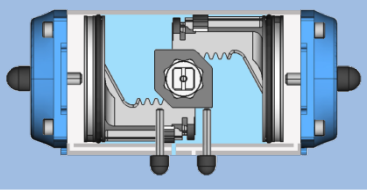
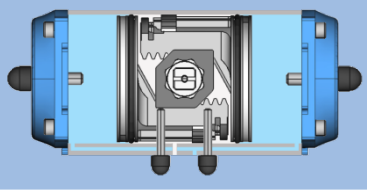
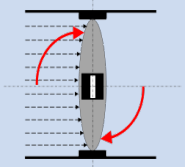
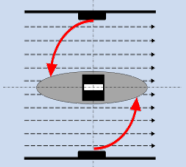
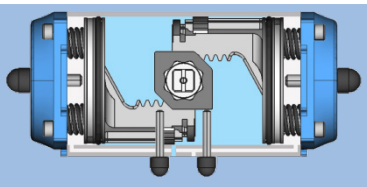
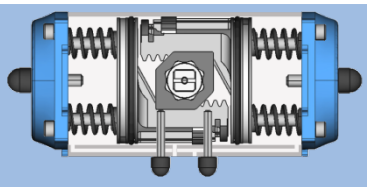
## Mounting version PR

**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 inital 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 inital position 0°, valve closes |

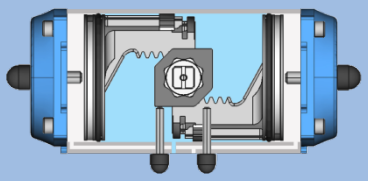
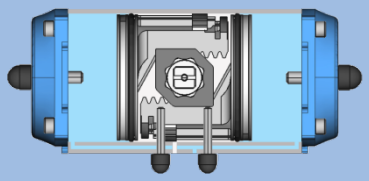
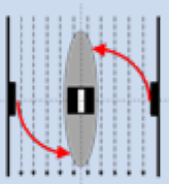
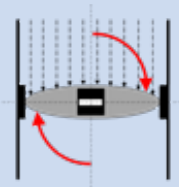
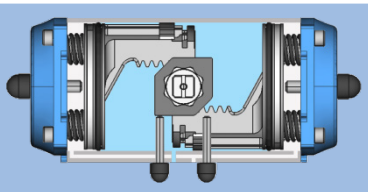
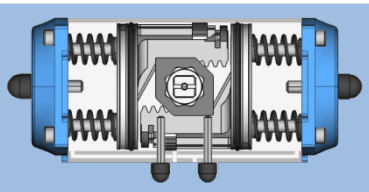
## Mounting version PL

**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 inital 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 inital position 0°, valve opens |

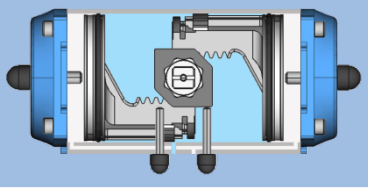
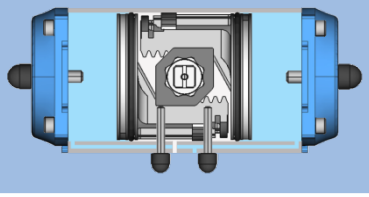
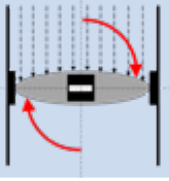
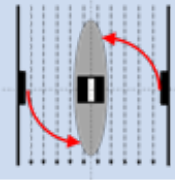
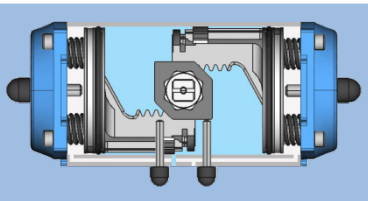
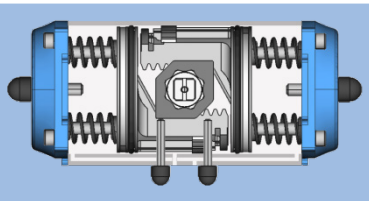
## Mounting version TR

**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 inital position 0°, valve closes  |
| **Valve position** |  |  |
| **Single-acting** |  Port "A" pressurized, actuator moves in switched position 90°, valve opens |  Port "AB" vented, actuator moves in inital position 0°, valve closes |

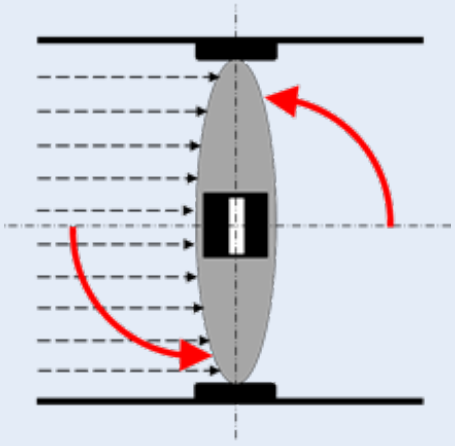
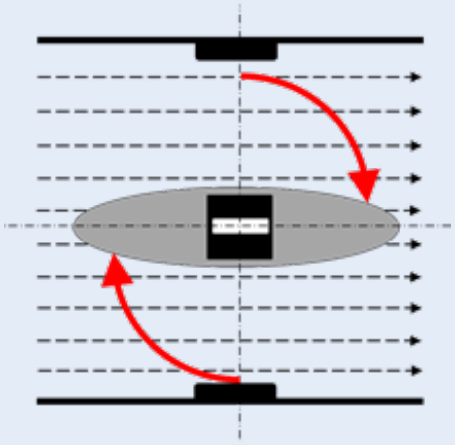
## Mounting version TL

**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 inital 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 inital position 0°, valve opens |

## 3.3 Exceptional case: valve closing counter-clockwise

Apart from the general rule some valves are closed counter-clockwise (CCW) and opened clockwise (CW). The angle of view is to be understood as „from the top onto the valve shaft.“ All statements in the following passage 3.4 are based on this condition and have to be taken into account accordingly.

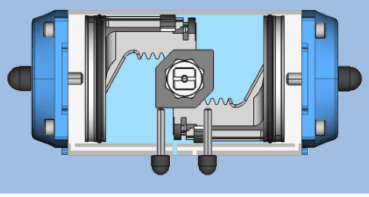
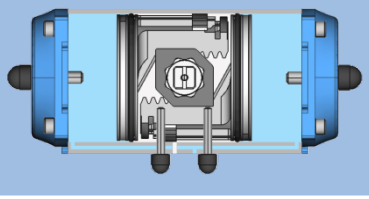
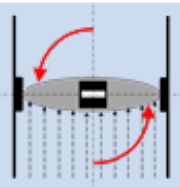
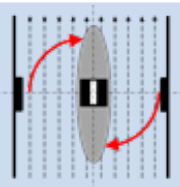
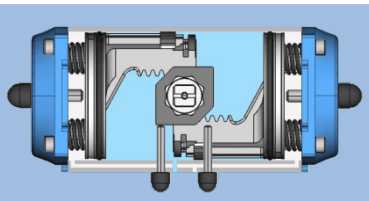
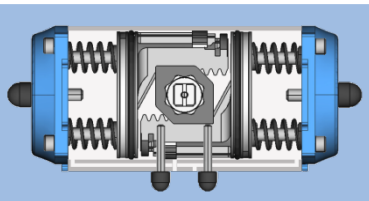
| | |
|---|---|
| **Closing process counter-clockwise (CCW)** |  |
| **Closing process counter-clockwise (CCW)** |  |

## 3.4 Mounting versions – valve closing counter-clockwise

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.

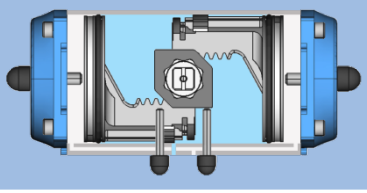
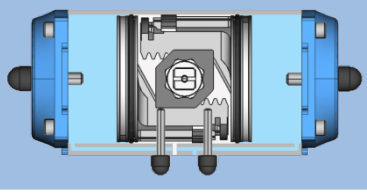
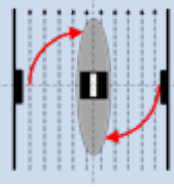
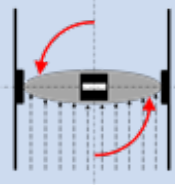
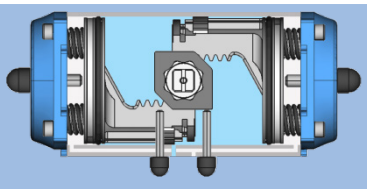
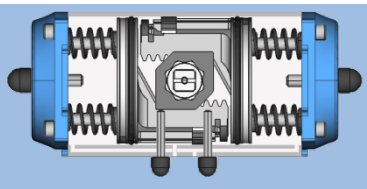
## Mounting version PR

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

| | | |
|---|---|---|
| **Double-acting** | Port "A" pressurized, actuator moves in switched position 90°, valve closes  | Port "B" pressurized, actuator moves in inital 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 inital position 0°, valve opens |

## Mounting version PL

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

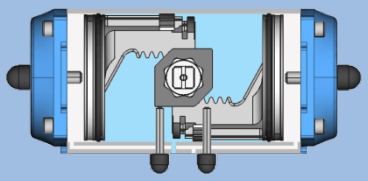
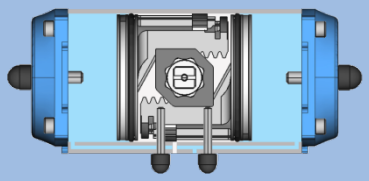
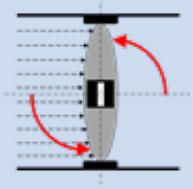
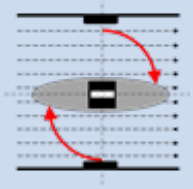
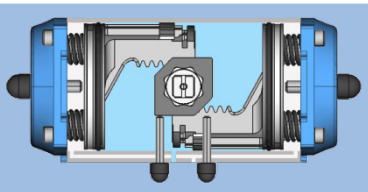
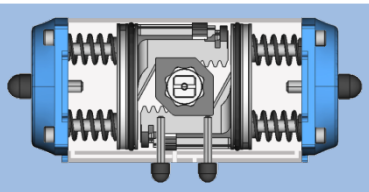
| | | |
|---|---|---|
| **Double-acting** | Port "A" pressurized, actuator moves in switched position 90°, valve opens  | Port "B" pressurized, actuator moves in inital position 0°, valve closes  |
| **Valve position** |  |  |
| **Single-acting** |  Port "A" pressurized, actuator moves in switched position 90°, valve opens |  Port "A" vented, actuator moves in inital position 0°, valve closes |

!!! EXCEPTIONAL CASE – VALVE CLOSING COUNTER-CLOCKWISE !!!

!!! EXCEPTIONAL CASE – VALVE CLOSING COUNTER-CLOCKWISE !!!

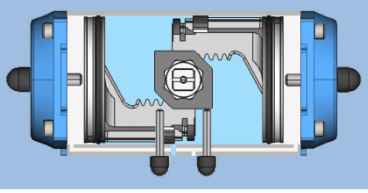
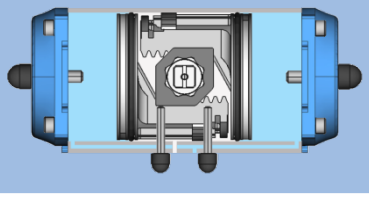
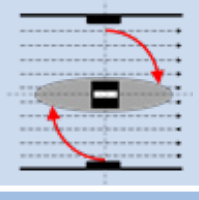
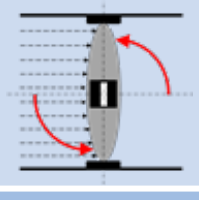
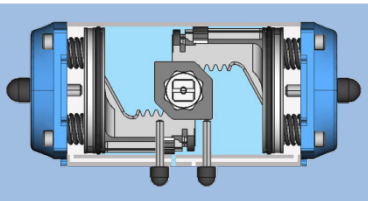
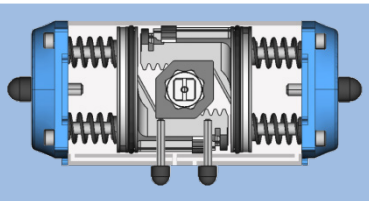
## Mounting version TR

**Actuator parallel to pipeline**
**Spring rotation sense clockwise (CW)**
**SPRING TO OPEN**

| | | |
|---|---|---|
| **Double-acting** | Port "A" pressurized, actuator moves in switched position 90°, valve closes  | Port "B" pressurized, actuator moves in inital position 0°, valve opens  |
| **Valve position** |  |  |
| **Single-acting** |  Port "A" pressurized, actuator moves in switched position 90°, valve closes |  Port "AB" vented, actuator moves in inital position 0°, valve opens |

## Mounting version TL

**Actuator parallel to pipeline**
**Spring rotation sense counter-clockwise (CCW)**
**SPRING TO CLOSE**

| | | |
|---|---|---|
| **Double-acting** | Port "A" pressurized, actuator moves in switched position 90°, valve opens  | Port "B" pressurized, actuator moves in inital 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 inital position 0°, valve closes |

# 4. Installation

**Content:**

- » Attachment to a valve
- » Pneumatic connection
- » End stop and stroke adjustment

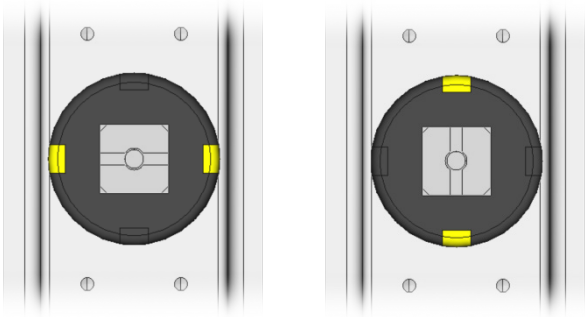
## 4.1 Attachment to a valve

**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.

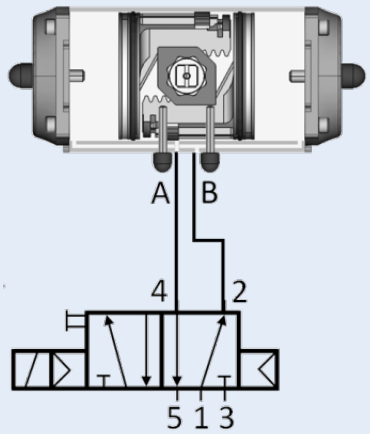
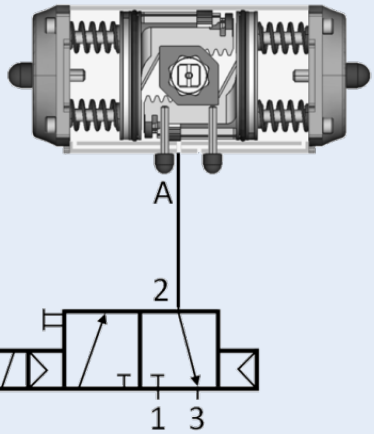
## 4.2 Pneumatic connection

Actuators of the PR 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.

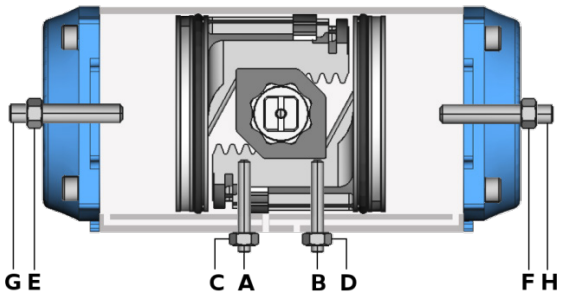
Single-acting actuators are factory wise equipped with a silencer in port „B“. Prior to any installation of a directly mounted control valve that silencer is to be removed.

### Pneumatic controls

| Double-acting | Single-acting |
|---|---|
|  |  |
| **Control via 5/2-way valve**<br>*Sample safety function:*<br>*power-off in initial position* | **Control via 3/2-way valve** |

## 4.3 End stop adjustment

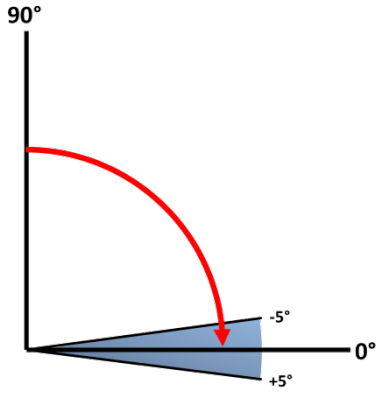
Actuators of the series PR are equipped with a double end-stop adjustment of +/- 5°.




**Perform any kind of adjustment on rotary actuators exclusively when the device is fully vented! Disconnect the compressed air supply before any setting.**

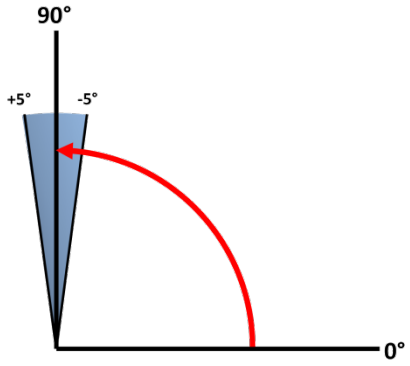
**Adjustment of the initial position:**

1. Rotate the actuator to its initial position:
   **single-acting**: vent port „A“.
   **double-acting**: pressurize port „B“ and vent it again.
2. Set the end position:
   - Mounting version PR and TR: Loosen lock nut „D“, set position by using adjustment screw „B“ and tighten lock nut again.
   - Mounting version PL and TL: Loosen lock nut „C“, set position by using adjustment screw „A“ and tighten lock nut again.
3. Pressurize port „B“ (only for double-acting) and check the setting.
   Repeat the setting if necessary.




**Adjustment of the switched position:**

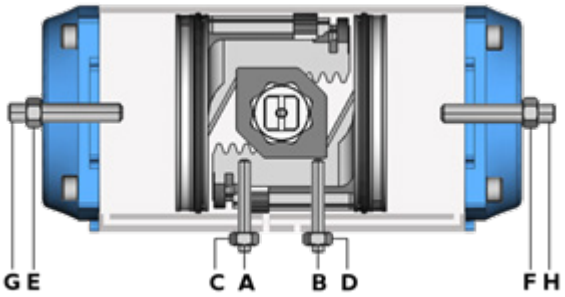
1. Rotate the actuator to its switched position by pressurizing port “A”
2. Check the rotation angle and vent the actuator again.
3. Set the end position:
   - Mounting version PR and TR: Loosen lock nut „C“, set position by using adjustment screw „A“ and tighten lock nut again.
   - Mounting version PL and TL: Loosen lock nut „D“, set position by using adjustment screw „B“ and tighten lock nut again.
4. Pressurize port „A“ and check the setting.
   Repeat the setting if necessary.




**The adjusting screws may only be unscrewed so far that the screw ends protrude a few millimeters beyond the locknuts and may only be screwed in so far that the adjusting screws still remain fully in the thread of the locknuts.**

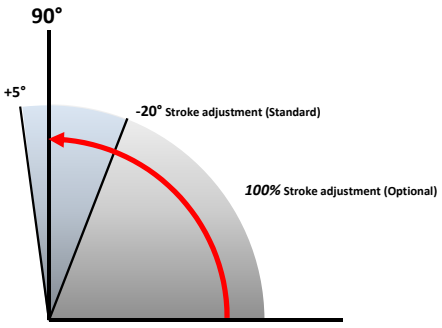
## 4.4 Stroke adjustment

In addition to the double end-stop adjustment all actuators of the PR series are equipped with stroke adjustment screws, which offer an extended setting range in the switched position of +5/-20 ° (standard), and optionally even for the entire rotation angle (100%).




**Perform any kind of adjustment on rotary actuators exclusively when the device is fully vented! Disconnect the compressed air supply before any setting.**

1. Rotate the actuator to its switched position by pressurizing port “A”.
2. Check the rotation angle and vent the actuator again.
3. Loosen the lock nuts „E“ and „F“, set position by using adjustment screw „G“ and tighten lock nut „E“ again.
4. Secure the drive pinion using a wrench on the pinion square, turn adjusting screw „H“ so far, until you feel an increase in the resistance to rotation and tighten lock nut „F“ again.
5. Pressurize port „A“ and check the setting.
   Repeat the setting if necessary.




**The adjustment screws may be turned in only so far that the adjustment screws fully remain in the lock nut threads.**

# 5. Maintenance

**Content:**



## 5.1 General

Actuators of the PR 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.**

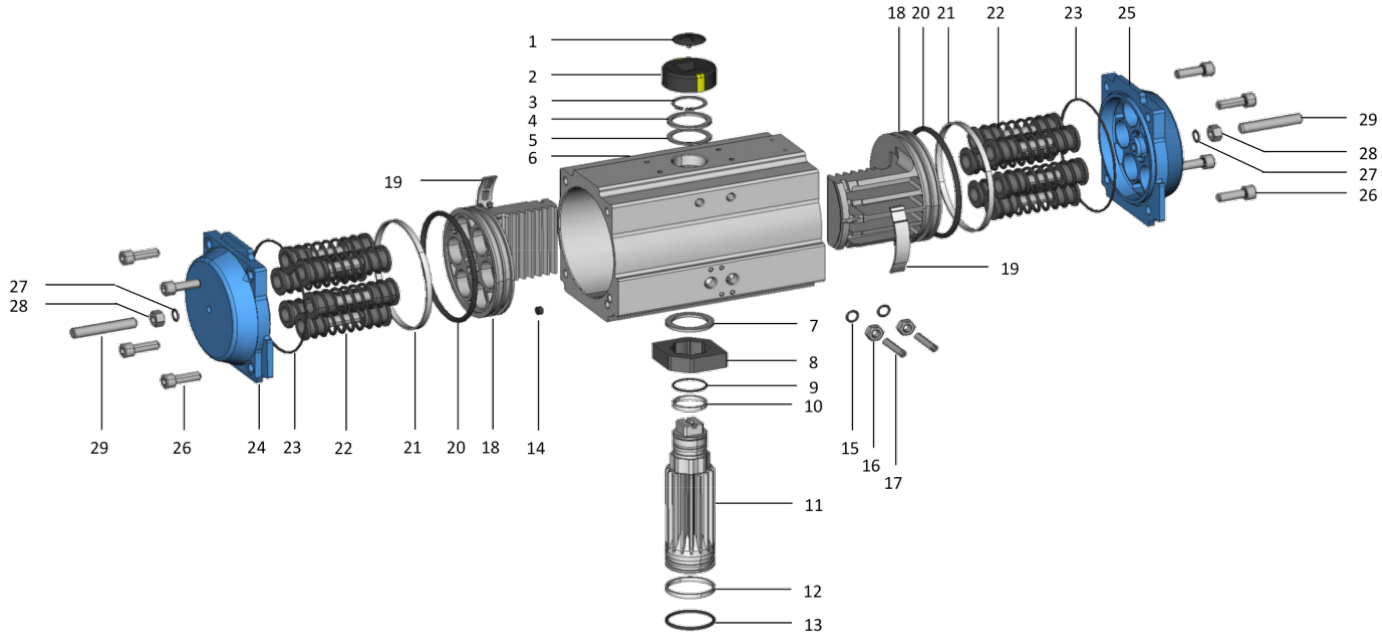
**Single acting actuators with incomplete spring stroke contain a high spring force that can trigger a sudden rotation during dismounting of the actuator. This can cause serious injuries or property damage.**

**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




For actuators of the PR series the following spare part kits are available:

Spare part 1: Seals and bearings
Spare part 2: Piston
Spare part 3: pinion

You can find an overview of all components and the contents of the respective sets of spare parts here:

| No. | Designation | Qty. | Spare kit 1 | Spare kit 2 | Spare kit 3 |
|---|---|---|---|---|---|
| 1 | Screw visual indicator | 1 | | | |
| 2 | Visual indicator | 1 | | | |
| 3 | Circlip | 1 | X | | X |
| 4 | Thrust washer | 1 | | | |
| 5 | Outside washer | 1 | X | | X |
| 6 | Body | 1 | | | |
| 7 | Inside washer | 1 | X | | X |
| 8 | Stop cam | 1 | | | |
| 9 | O-ring (pinion top) | 1 | X | | X |
| 10 | Bearing (pinion top) | 1 | X | | X |
| 11 | Pinion | 1 | | | X |
| 12 | Bearing (pinion bottom) | 1 | X | | X |
| 13 | O-ring (pinion bottom) | 1 | X | | X |
| 14 | Plug | 2 | | | |
| 15 | O-ring (end adjustment screw) | 2 | X | | |

| No. | Designation | Qty. | Spare kit 1 | Spare kit 2 | Spare kit 3 |
|---|---|---|---|---|---|
| 16 | Nut (end adjustment screw) | 2 | | | |
| 17 | End adjustment screw | 2 | | | |
| 18 | Piston | 2 | | X | |
| 19 | Guidance segment | 2 | X | X | |
| 20 | O-ring (piston) | 2 | X | X | |
| 21 | Guidance ring (piston) | 2 | X | X | |
| 22 | Safety spring | 0-12 | | | |
| 23 | O-ring (end cap) | 2 | X | | |
| 24 | End cap left | 1 | | | |
| 25 | End cap right | 1 | | | |
| 26 | Cap screw | 8 | | | |
| 27 | O-ring (stroke adjustment screw) | 2 | X | | |
| 28 | Nut (stroke adjustment screw) | 2 | | | |
| 29 | Stroke adjustment screw | 2 | | | |

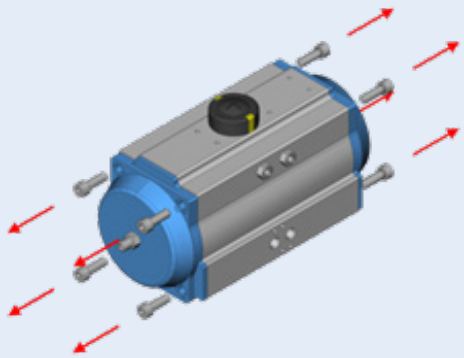
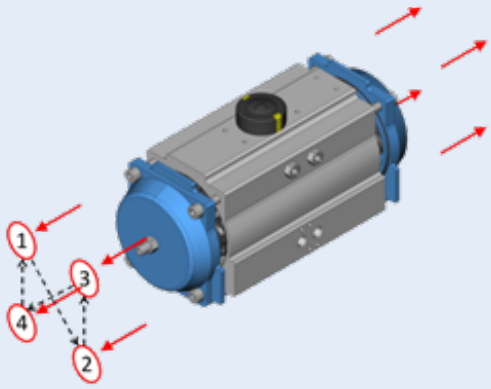
## 5.5 Dismounting from a valve

**Follow the safety instructions in chapter 5.2**

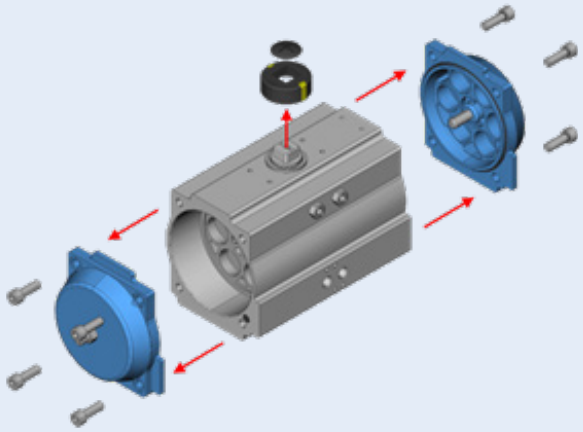
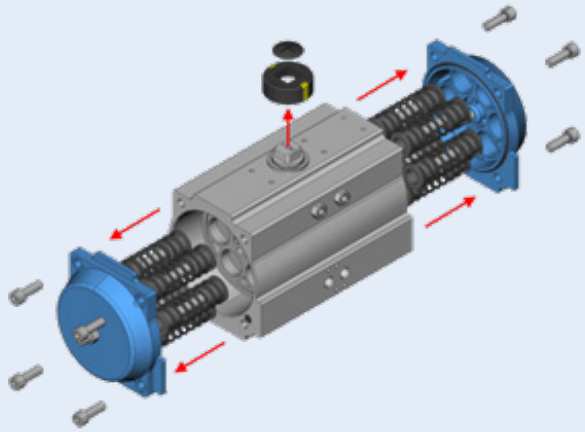
1. Make sure that the actuator is fully vented, if applicable remove the directly mounted control valve to prevent any pressure inclusions in the pressure chambers.
2. In case of single acting actuator ensure that after full depressurization the device is in initial position to avoid a sudden rotation during dismounting.
3. Remove any attached accessories.
4. Loosen the screw connection between the actuator and valve and remove the actuator from the valve. Store possibly applied reduction inserts and/or installation materials safely.

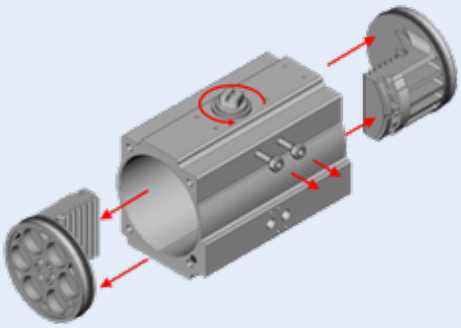
## 5.6 Disassembly

**Follow the safety instructions in chapter 5.2**

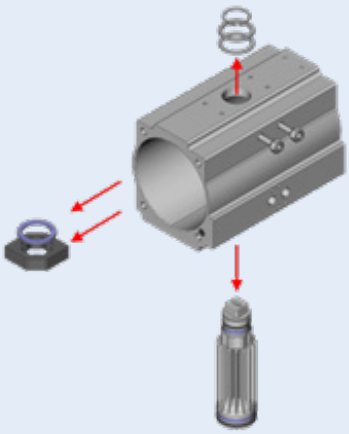
| Double-acting | Single-acting |
|---|---|
|  |  |
| Loosen the cap screws. | Loosen the cover screws carefully crosswise. |

**Just before the screws are fully unscrewed from the thread no spring load should appear on the cap any more. Should still a force to be felt, it might be caused by a defective spring restraint. In this case immediately stop dissasembly to avoid injury by ejected springs.**

| Double-acting | Single-acting |
|---|---|
|  |  |
| Remove the unfastened caps and dismantle the position indicator where applicable. | Remove the unfastened caps and springs and dismantle the position indicator where applicable. |



Turn the two adjustment screws out of the casing, so that only 3-4 thread turns remain in the thread.
Turn the top square of the drive pinion by a wrench to move the actuator pistons to the cylinder hole. Mark the angular position of the actuator pinion when the piston is aligned with the outer edge of the actuator housing. This simplifies later re-installation. Once the pistons protrude beyond the drive housing, you can remove them.



Loosen the circlip at the upper pinion end.

**Do not overstretch the circlip so that its function is guaranteed.**

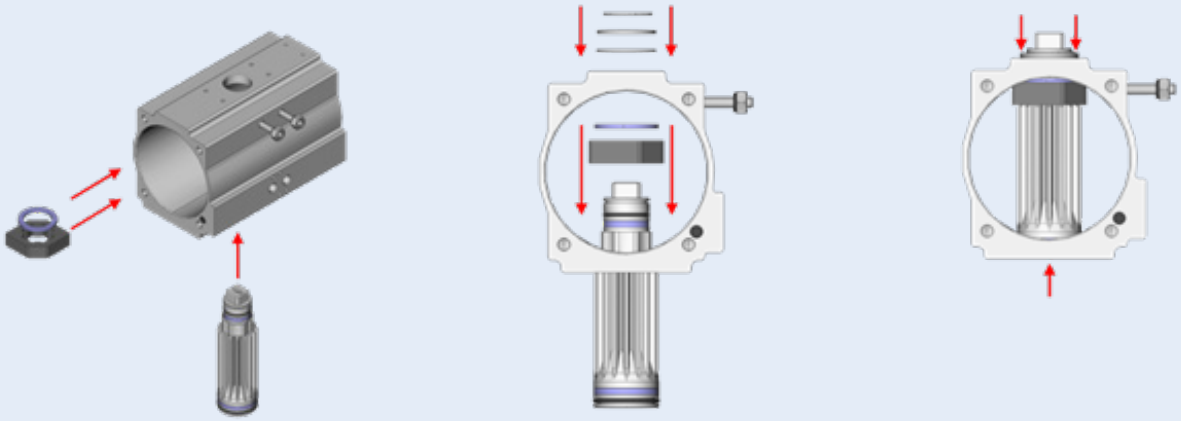
Remove the circlip, the outside washer and the thrust washer and store them safely.
Drag the pinion down from the actuator housing and remove the inner washer and the stop cam out of the zylinder.

## 5.7 Reassembly

**During all assembly operations make sure that seals and bearings are attached to the positions they belong and that during assembly no damage is caused by shearing or crushing them.**

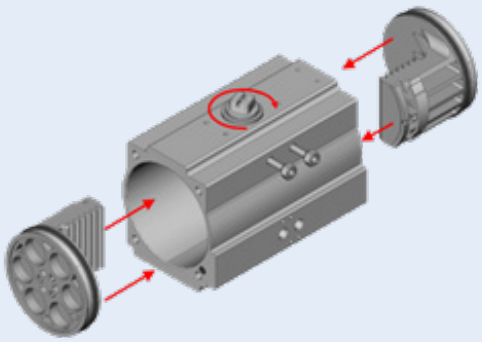
**All internal components, the cylinder surface, seals and bearings must be provided with sufficient pneumatic grease prior to assembly to reduce wear and to ensure the proper function of the seals.**

**For all assembly operations please pay attention to the tightening torques in Section 5.3**

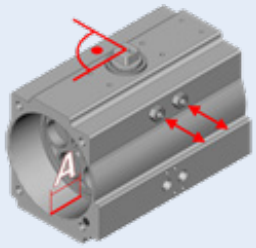


Pass the drive pinion through the bottom hole into the drive housing and place the stop cam and the inside washer on it. Pay attention to the correct position between the stop cam and pinion groove.
If necessary, ensure yourself via the schemes in section 3.2.
Slide the pinion on through the upper housing bore, place the outside washer, then the thrust washer (metal) and ultimately secure the pinion by means of the circlip.

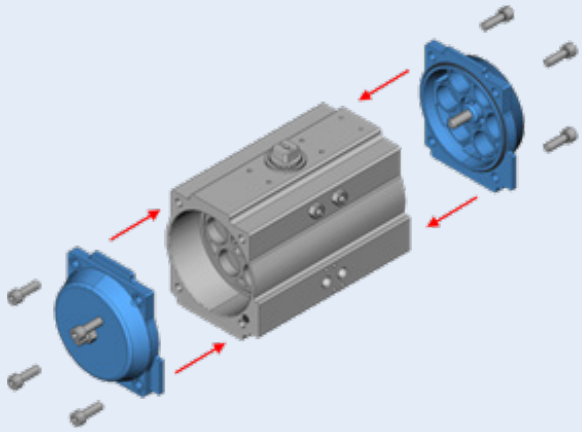
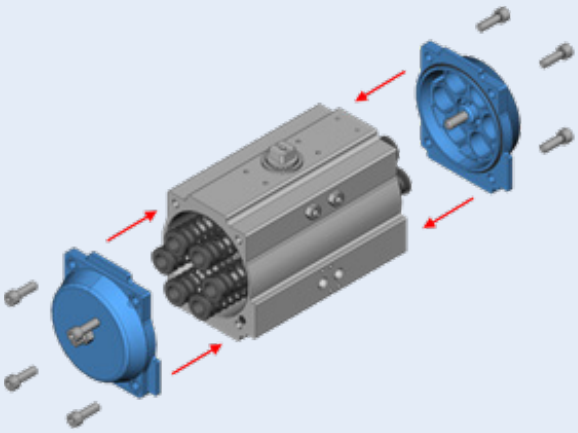
**Do not overstretch the circlip so that its function is guaranteed.**

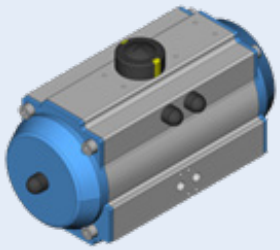


Set the pinion position in line with the marking made during disassembly and put the actuator pistons straight into the zylinder bores. Ensure the correct positioning of the piston racks.
If necessary, ensure yourself via the schemes in section 3.2.
Once the racks noticeably touch the actuator pinion, rotate the drive pinion to pull the pistons into the cylinder.



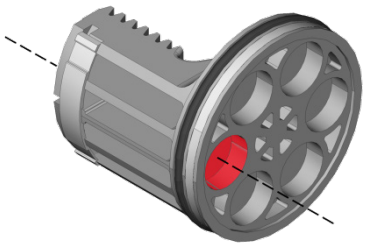

Make sure that both drive pistons have the same distance “A” to the housing´s outer edge. Should this not be the case, the pistons are installed offset from each other and the installation procedure must be repeated.
Rotate the drive in both initial as well as switched position and set both positions via the adjusting screws.

| Double-acting | Single-acting |
|---|---|
|  |  |
| Place the actuator caps on the body sealing surfaces and tighten the screws. | Insert the safety springs properly into the spring pockets of the actuator pistons (see section 5.8), place the actuator caps and tighten them carefully crosswise. |

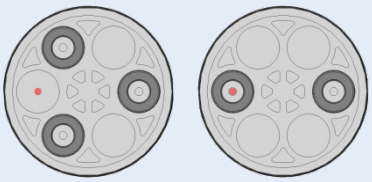
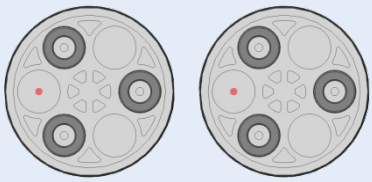
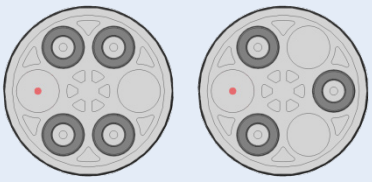
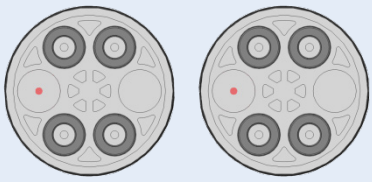
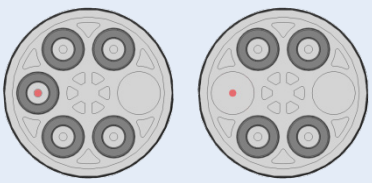
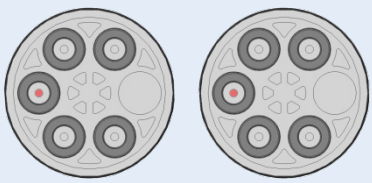
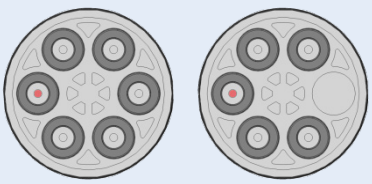
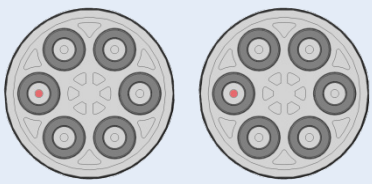


Install the position indicator and the screw covers where applicable.

## 5.8 Arrangement of safety springs



The actuator 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 |  |

## Notes

**ProtACT GmbH**
Märkerstraße 18
56307 Dernbach

Tel: +49 (0) 2605 96 25 19-0
Fax: +49 (0) 2605 96 25 19-6

Email: protact@protact-gmbh.de

**Website: www.protact-gmbh.de**