bürkert
FLUID CONTROL SYSTEMS

Flu-Tech
Flu-tech co.,ltd
Authorized Distributor in Thailand

Type 2051

Pneumatic rotary actuator
Pneumatischer Schwenkantrieb
Entraînement pivotant pneumatique

Operating Instructions

Bedienungsanleitung
Manuel d'utilisation

Pneumatic rotary actuator Type 2051

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1. OPERATING INSTRUCTIONS

The operating instructions describe the entire life cycle of the device. Keep these instructions in a location which is easily accessible to every user and make these instructions available to every new owner of the device.

The operating instructions contain important safety information!

Failure to observe these instructions may result in hazardous situations.

- The operating instructions must be read and understood.

1.1. Symbols

DANGER!

Warns of an immediate danger!

- Failure to observe the warning may result in a fatal or serious injury.

WARNING!

Warns of a potentially dangerous situation!

- Failure to observe the warning may result in serious injuries or death.

CAUTION!

Warns of a possible danger!

- Failure to observe this warning may result in a moderately severe or minor injury.

NOTE!

Warns of damage to property!

- Failure to observe the warning may result in damage to the device or the equipment.

Designates additional significant information, tips and recommendations.

Refers to information in these operating instructions or in other documentation.

→ designates a procedure which you must carry out.

2. INTENDED USE

Incorrect use of the pneumatic rotary actuator Type 2051 may be dangerous to people, nearby equipment and the environment.

- The pneumatic rotary actuator Type 2051 is designed for the actuation of rotary valves, such as ball or butterfly valves. It can be used indoors as well as outdoors, in compliance with the permissible operating conditions.
- The pneumatic rotary actuator Type 2051 may be used only in conjunction with third-party devices and components recommended and authorised by Bürkert.
- During use observe the permitted data, the operating conditions and conditions of use specified in the contract documents and operating instructions, as described in chapter 6.Technical Data.
- Correct transportation, correct storage and installation and careful use and maintenance are essential for reliable and problem-free operation.
- Use the pneumatic rotary actuator type only as intended.

2.1. Restrictions

If exporting the system/device, observe any existing restrictions.

2.2. Possible errors in use

The pneumatic rotary actuator type 2051 may not be operated with corrosive gases, water or hydraulic oil (for applications with these media, please contact your Bürkert sales office).

- Do not introduce any aggressive, flammable, corrosive or explosive media into the systems media connections.
- Do not introduce any liquids into the media connections.
- Do not put any loads on the housing (e.g. by placing objects on it or standing on it).
- Do not make any external modifications to the device housings. Do not paint the housing parts or screws!

3. BASIC SAFETY INSTRUCTIONS

These safety instructions do not make allowance for any:

- Contingencies and events which may arise during the installation, operation and maintenance of the devices,
- Local safety regulations; the operator is responsible for observing these regulations, also with reference to the installation personnel.

DANGER!

Danger - high pressure!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

WARNING!

General hazardous situations.

To prevent injury, ensure that:

- The system cannot be activated unintentionally.
- Installation and repair work may be carried out by authorised technicians only and with the appropriate tools.
- After an interruption in the power supply or pneumatic supply, ensure that the process is restarted in a defined or controlled manner.
- The device may be operated only when in perfect condition and in consideration of the operating instructions.
- The general rules of technology apply to application planning and operation of the device.

The pneumatic rotary actuator type 2051 was developed with due consideration given to the accepted safety rules and is state-of-the-art. However, dangers can still arise.

Failure to observe this operating manual and its operating instructions as well as unauthorized tampering with the device release us from any liability any also invalidate the warranty covering the devices and accessories!

4. GENERAL INFORMATION

4.1. Scope of supply

Check immediately upon receipt of the delivery that the contents are not damaged and that the type and scope agree with the delivery note and packing list.

If there are any discrepancies, please contact us immediately.

4.2. Contact address

Germany

Bürkert Fluid Control Systems
Sales Center
Christian-Bürkert-Str. 13-17
D-74653 Ingelfingen
Tel. + 49 (0) 7940 - 10 91 111
Fax + 49 (0) 7940 - 10 91 448
E-mail: info@de.buerkert.com

International

Contact addresses can be found on the final pages of the printed operating instructions.

And also on the Internet at:

www.burkert.com → Bürkert → Company → Locations

4.3. Warranty

This document contains no promise or guarantee. Please refer to our general terms of sales and delivery. The warranty is only valid if the device type 2051 is used as intended in accordance with the specified application conditions.

The warranty extends only to defects in the pneumatic rotary actuator type 2051 and its components.

We accept no liability for any kind of collateral damage which can occur due to failure or malfunction of the device.

4.4. Information on the Internet

The operating instructions and data sheets for type 2051 can be found on the Internet at:

www.buerkert.com → Documentation → Type 2051

5. SYSTEM DESCRIPTION

5.1. Designated application area

The pneumatic rotary actuator type 2051 is designed for the actuation of rotary valves, such as ball or butterfly valves.

5.2. General description

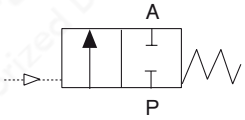
Fig. 1: Pneumatic rotary actuator

The pneumatic rotary actuator Type 2051 consists of a single or double-acting linear actuator with an internal coupling to a rotary piece and an universal interface as per ISO 5211. During the linear movements of the pistons through the pressure force of the control air and the force of the resetting springs, the drive shaft is turned via the coupling. This rotary movement can be used for the actuation of respective control elements, such as ball or butterfly valves.

5.2.1. Operating principle

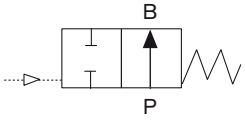
Control function A

Single-acting actuator; resetting by spring force; activation e.g. with pilot valve.



Control function B (on request)

Single-acting actuator; resetting by spring force.



Schematic representation of control function A (B)

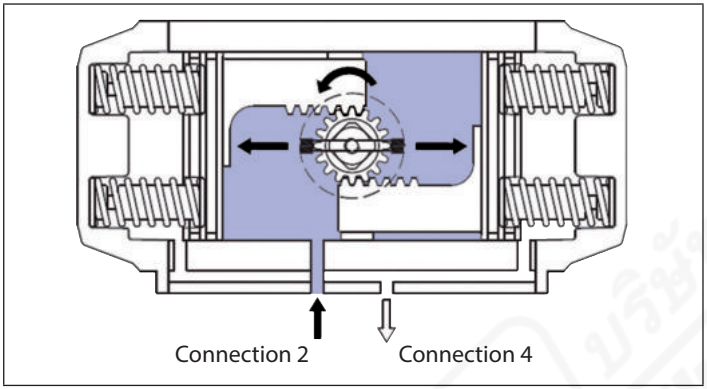


Fig. 2: Counterclockwise rotation
(Control function B: Clockwise rotation)

Control air on connection 2 moves the pistons in the direction of the actuator covers, the springs are tensioned. Rotation is anti-clockwise. Exhaust air via connection 4.

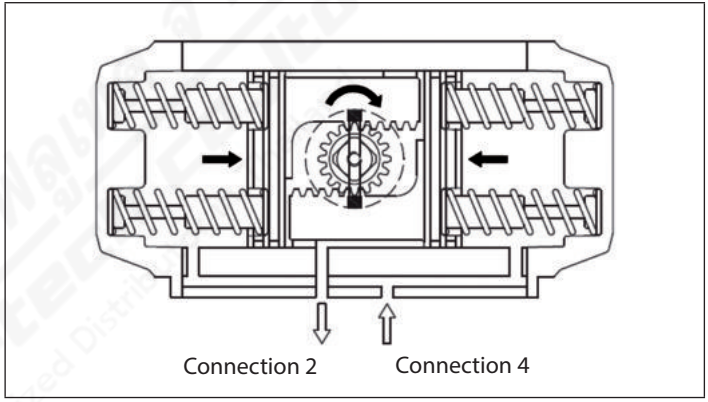
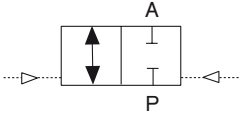


Fig. 3: Clockwise rotation
(Control function B: Counterclockwise rotation)

Pressure loss or compressed-air failure on connection 2 allows the springs to move the pistons inwards. Rotation is clockwise. Exhaust air via connection 2.

Control function I

Double-acting actuator; activation e.g. with pilot valve.



Schematic representation of control function I

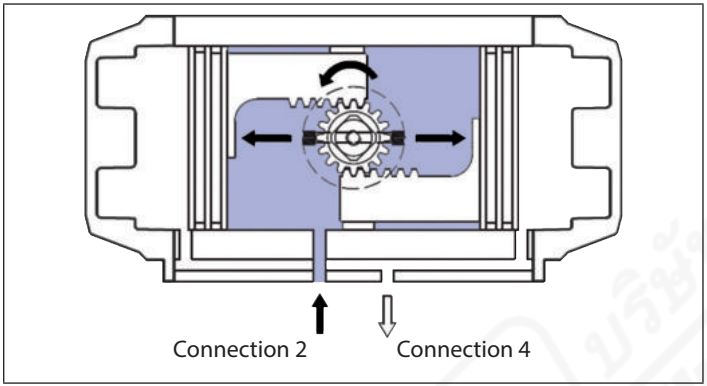


Fig. 4: Counterclockwise rotation

Control air on connection 2 moves the pistons in the direction of the actuator covers. Rotation is anti-clockwise. Exhaust air via connection 4.

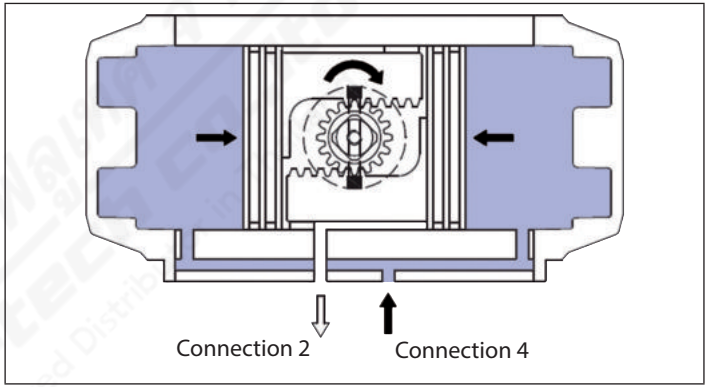


Fig. 5: Clockwise rotation

Control air on connection 4 moves the pistons inwards. Rotation is clockwise. Exhaust air via connection 2.

6. TECHNICAL DATA

6.1. Operating conditions

Temperature

Seal material	Ambient temperature
NBR Spezial	-40 ... +80 °C
FKM	-15 ... +150 °C

6.2. Conformity with the following standards

CE - mark conforms to EN 1127-1 EN 13463-1

6.3. General technical data

6.3.1. Mechanical data

Weight: depending on actuator design (see data sheet)

Housing material: coated, extruded aluminum alloy

Sealing material: NBR-Special, FKM on request

6.3.2. Pneumatic data

Control medium: Compressed air (max. Particle size 30 µm) dry or oiled

Pressure range: 3 to 8 bar single-acting actuator
2.5 to 8 bar double-acting actuator

Air rate: depending on actuator size (see data sheet)

Connections: depending on actuator size (see data sheet)

6.3.3. Dimensions

Dimensions: See data sheet

7. ASSEMBLY / INSTALLATION

7.1. Safety instructions

DANGER!

Danger - high pressure in the equipment!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

WARNING!

Risk of injury from improper assembly / installation!

- Installation may be carried out by authorised technicians only and with the appropriate tools!

Risk of injury from unintentional activation of the system and an uncontrolled restart!

- Secure system from unintentional activation.
- Following assembly, ensure a controlled restart.

7.2. Installation

During the installation, please observe the operating instructions of the respective fitting.

7.3. Pneumatic Installation

The rotary actuator can be installed in any position.

Before installation:

→ Make sure that the mechanical connection of the rotary actuator neatly fits with the fitting to prevent friction.

→ Connect the pipes for the control air the connections provided for this purpose on the rotary actuator.

8. START-UP

8.1. Safety instructions

WARNING!

Risk of injury from pressure discharge!

Under pressure, poorly connected control air lines can come loose.

- Make sure the line connections of the control air are securely connected with the respective connections of the rotary actuator.

Risk of injury from improper operation!

Improper operation may result in injuries as well as damage to the device and the area around it.

- Before start-up, ensure that the operating personnel are familiar with and completely understand the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may operate the equipment / the device.

9. OPERATION AND FUNCTION

9.1. Safety instructions

WARNING!

Danger due to improper operation!

Improper operation may result in injuries as well as damage to the device and the area around it.

- The operating personnel must know and have understood the contents of the operating instructions.
- Observe the safety instructions and intended use.
- Only adequately trained personnel may operate the equipment / the device.

9.2. Operation of the rotary actuator

Depending on the function, the pneumatic rotary actuator is activated by means of compressed air (up to 8 bar). The control air can be fed directly or via attached control valves into the respective connections on the rotary actuator.

9.3. Functions

For functional principles, refer to chapter 5.System Description.

10. MAINTENANCE, TROUBLESHOOTING

10.1. Safety instructions

DANGER!

Danger - high pressure in the equipment!

- Before loosening the lines and valves, turn off the pressure and vent the lines.

WARNING!

Risk of injury from improper maintenance!

- Maintenance may be carried out by authorised technicians only and with the appropriate tools!

Risk of injury from unintentional activation of the system and uncontrolled restart!

- Secure system from unintentional activation.
- Following maintenance, ensure a controlled restart.

10.2. Maintenance work

It is recommended to perform maintenance after every 500 000 to 1 000 000 circuit connections to guarantee a long service life of rotary actuators. If necessary, the respective sealing elements must be replaced (see the following chapter 10.3.Replacing of the sealing elements).

For long-term operation or rough ambient conditions, we recommend relubrication of the moving parts (e.g. pistons, gear racks) in the actuator with silicone-free grease.

A prerequisite for a long service life is the operation of the rotary actuator with filtered compressed air.

10.3. Replacing of the sealing elements

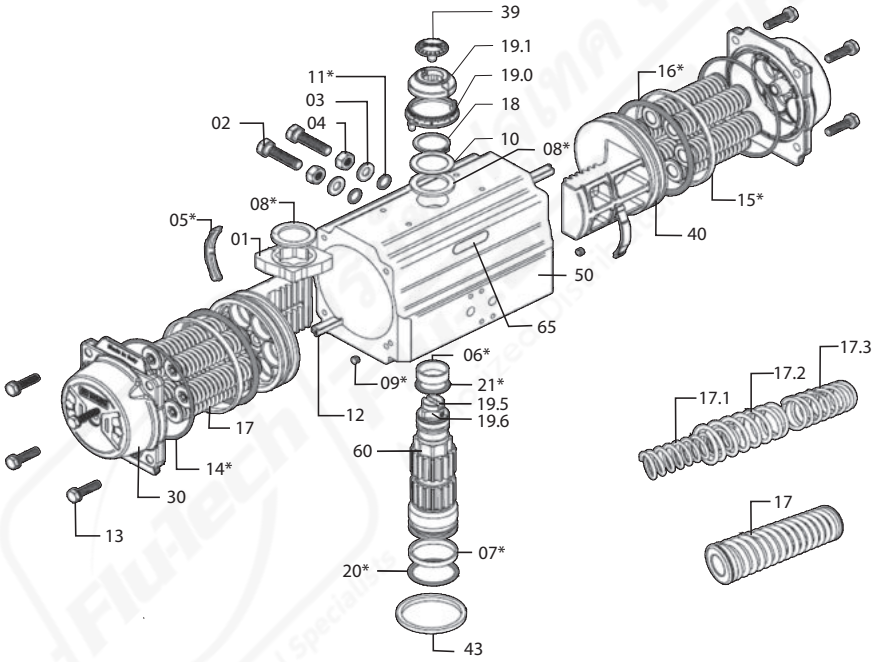


Fig. 6: Component overview

Legend:

Position	Number	Description
01	1	Cam (end position setting)
02	2	Stop cap screw
03	2	Washer
04	2	Lock nut (Stop screws)
05*	2	Piston guide jaws
06*	1	Shaft bearing sleeve (top)
07*	1	Shaft bearing sleeve (bottom)
08*	2	Thrust washer
09*	2	Plug
09.1*	2	Sealing ring (for AT801U)
10	1	Support washer
11*	2	Seal (adjusting screw)
12	2	Piston guide
13	8/12/16	Cover screw
14*	2	Cover seal
15*	2	Piston guide band
16*	2	Piston seal
17	min. 5 / max. 12	Pressure spring cartridge
17.1	max. 2	Spring (for AT045U + AT051U)
17.2	max. 2	Spring (for AT045U + AT051U)
17.3	max. 2	Spring (for AT045U + AT051U)
18	1	Retaining ring (shaft)
19	1	Position indicator (for AT051U + AT101U)
19.0	1	Graduated ring
19.1	1	Position indicator
19.5	1	Adaptor (top)
19.6	2	Hexagon socket head screw
20*	1	Shaft seal (top)
21*	1	Shaft seal (bottom)
30	2	Cover
39	1	Screw (position indicator)
40	2	Piston
43	1	Centering (on request)
50	1	Housing
60	1	Shaft
65	1	Plastic insert

* Recommended spare parts

10.3.1. Removal procedure

If the actuator has to be removed for maintenance, first remove the actuator from the fitting.

NOTE!

Before removal, ensure that:

- The actuator is not under pressure and that the springs are in the end position,
- The connections 2 and 4 are not under pressure and are free from any accessories or devices.

If the actuator is single-acting, ensure that:

- The actuator is in the home position and that the pistons are all the way in.

Removing position indicator and graduated ring (Pos. 19, 19.0, 19.1):

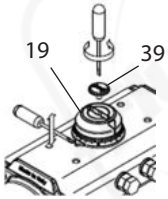


Fig. 7: Removing position indicator

→ Remove screw (Pos. 39) if fitted,

→ Remove position indicator (Pos. 19 or 19.1) from shaft end. If required, use a screwdriver as a lever,

→ Remove graduated ring (Pos. 19.0) from housing. If required, use a screwdriver as a lever.

Removing the adjusting screws (Pos. 02):

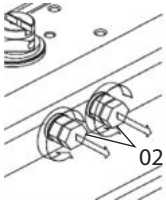


Fig. 8: Removing the adjusting screws

→ Remove adjusting screws together with nuts (Pos. 04) and washers (Pos. 03),

→ Remove seals (Pos. 11) from the adjusting screws and dispose of (if all sealing rings are replaced).

Removing the covers (Pos. 30):

WARNING!

Risk of injury when removing the covers!

When removing a single-acting actuator, loosen the cover screws alternately. If force is still applied to the covers when the screws have been undone, this may indicate that a spring cartridge is damaged or that the pistons have moved all the way in. Continued removal of the covers may result in serious injuries to the maintenance personnel.

- Stop removal immediately.
- Send actuator back to the supplier.

Unscrew cover screws in the sequence:

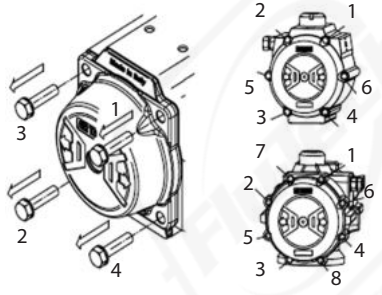


Fig. 9: Installation of the covers

Removing covers from the single-acting actuator (remove one cover after another):

→ Unscrew the cover screws (Pos. 13) until the covers are no longer under spring force,

→ Unscrew the screws completely,

→ Remove covers and the springs.

Removing covers from the double-acting actuator (remove one cover after another):

→ Unscrew the cover screws until the screws are completely unscrewed and the covers are loose,

→ Remove the O-rings using a screwdriver,

→ Dispose of sealing rings (if these are being replaced).

Removing the pistons (Pos. 40):

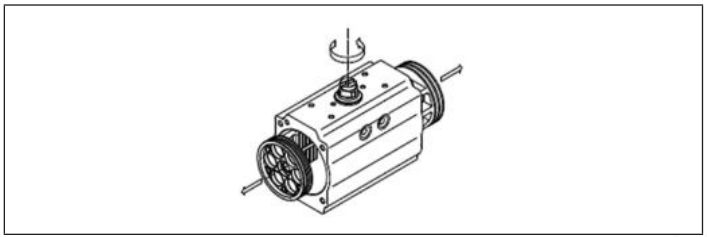


Fig. 10: Removing the pistons

WARNING!

Risk of injury due to bullet effect!

- Do not use compressed air to remove the pistons.

→ Secure the housing (Pos. 50) with a vice or similar device,

→ Rotate the shaft until the pistons are released,

→ Remove the O-rings (Pos. 16) using a screwdriver,

→ Remove the piston guide jaws (Pos. 05) and the piston guide belts (Pos. 15),

→ Dispose of the belts and jaws.

Removing the shaft (Pos. 60):

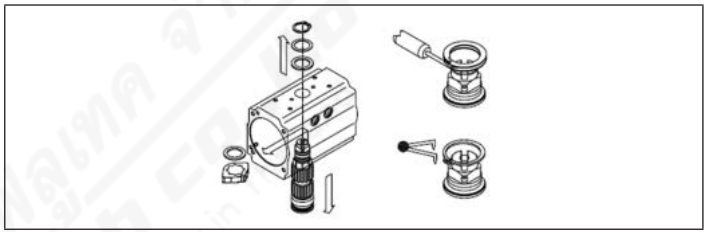


Fig. 11: Removing the shaft

→ Carefully remove graduated collar using a screwdriver and remove the circlip using circlip pliers,

→ Remove washer and the outer thrust washer,

→ Apply light pressure to the upper side of the shaft (Pos. 60) until the inner thrust washer (Pos. 08) and the cams can be removed,

→ Remove the shaft from the housing. If the shaft does not come out freely, carefully tap the upper shaft end using a plastic hammer,

→ Remove the upper (Pos. 06) and lower (Pos. 07) shaft bearing bushes and upper (Pos. 20) and lower (Pos. 21) shaft seals,

→ Dispose of and replace the sockets (Pos. 06 and 07), inner and outer thrust washers and sealing rings (if required, also replace the plugs (Pos. 09)).

All removed components which are not replaced must be cleaned and checked for wear before re-installation.

10.3.2. Installation procedure

NOTE!

Before installation, ensure that:

- all components are clean and in perfect condition,
- the spare parts and the grease are suitable for the operating temperature of the actuator,
- the lubricants are suitable for the different operating temperatures.

Installing the shaft (Pos. 60):

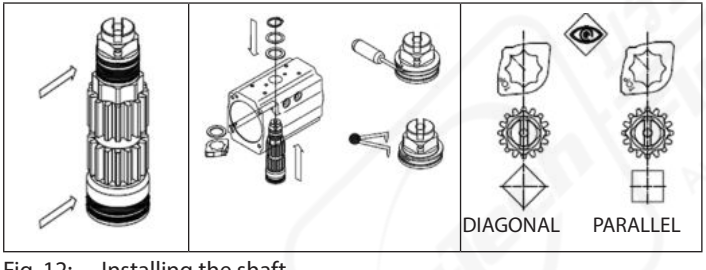


Fig. 12: Installing the shaft

→ Install the shaft bearing bushes above (Pos. 06) and below (Pos. 07), grease the lower (Pos. 20) and upper (Pos. 21) sealing rings and insert on the shaft,

→ Grease the surface of the shaft above and below,

→ Insert the shaft partly into the housing (Pos. 50), install the cam (Pos. 01) in the required position, referring to the upper and lower end of the shaft and the direction of rotation of the actuator during operation. Insert the inner thrust washer (Pos. 08). Insert the shaft all the way into the housing,

→ Fit the outer thrust washer (Pos. 08), the support washer (Pos. 10) and the outer circlip (Pos. 18) using circlip pliers.

Installing the pistons (Pos. 40):

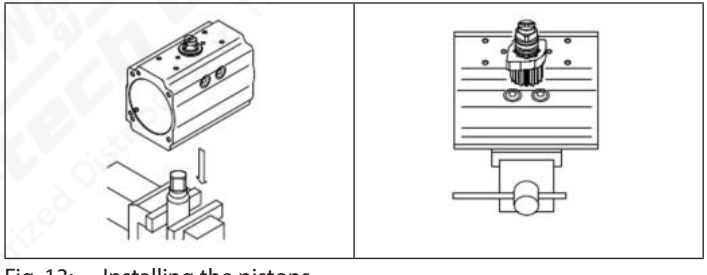


Fig. 13: Installing the pistons

→ Grease and fit O-rings (Pos. 16), piston guide jaws (Pos. 05) and piston guide belt (Pos. 15),

→ Grease the inner surface of the housing (Pos. 50) and the gear racks of the pistons (Pos. 40),

→ Place the shaft socket (Pos. 60) on an adequately attached coupling,

→ Ensure that the cam is in the correct position (see Fig. 13:),

→ If installation is in the standard direction of rotation, design ST (closing clockwise), rotate the housing (Pos. 50) by 40-45° clockwise (see Fig. 14:),

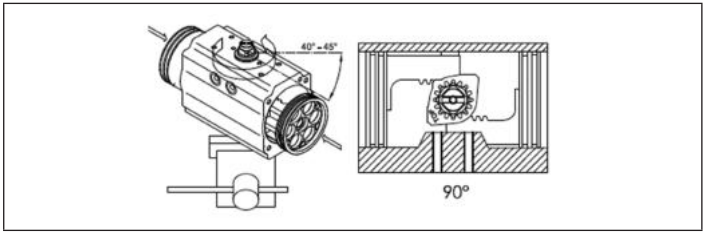


Fig. 14: Housing clockwise

→ Insert both pistons (Pos. 40) simultaneously into the housing (Pos. 50) and press in until the pistons engage, then rotate the housing anti-clockwise until the stroke is complete,

→ When the pistons have moved completely together, ensure that the obtained rotation with reference to the axis of the housing is slightly more than 0° and that dimension A is the same on both sides (see Fig. 15:).

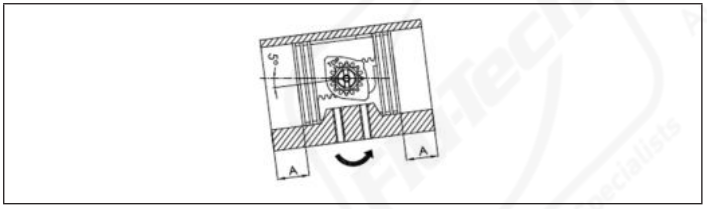


Fig. 15: Checking dimension A

Installing the covers (Pos. 30):

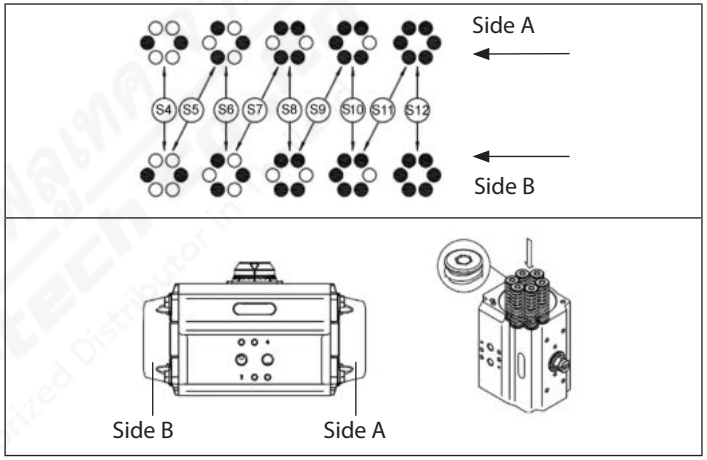


Fig. 16: Installation of the covers

→ Grease the housing,

→ For single-acting actuators, insert the springs into the cover according to the required configuration,

→ Insert cover seal (Pos. 14) into the groove,

→ Place the covers on the housing (Pos. 50) and check whether the O-rings stay in the groove,

→ Insert the cover screws (Pos. 13) and tighten according to the sequence (see Fig. 9:).

Installing the adjusting screws (Pos. 02):

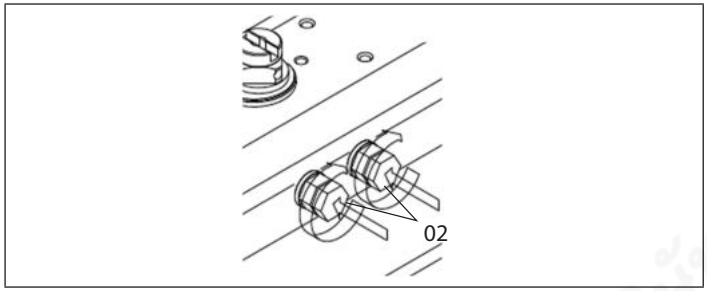


Fig. 17: Installing the adjusting screws

→ Insert the adjusting screws (Pos. 02), the nuts (Pos. 04), the washers (Pos. 03) and the O-rings,

→ Screw the adjusting screws (Pos. 02) into the housing.

End position setting for the standard actuator (closing clockwise):

→ 0° (closing) end position setting, for actuator in closed position unscrew the right adjusting screw until the required end position is reached. Secure by tightening the nut (Pos. 04).

→ 90° (opening) end position setting, unscrew the left adjusting screw until the required end position is reached. Secure by tightening the nut (Pos. 04).

Installing the graduated collar and the position indicator (Pos. 19, 19.0, 19.1):

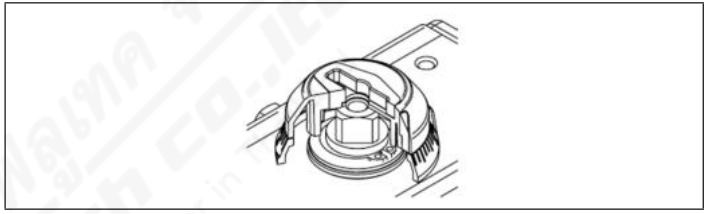


Fig. 18: Placing graduated collar on the housing

→ Place the graduated collar (Pos. 19.0) on the housing,

→ Align adapter (Pos. 19.5) and secure with suitable screws (Pos. 19.6),

→ Insert position indicator (Pos. 19 or 19.1),

→ Screw in the screw (Pos.39) for the position indicator.

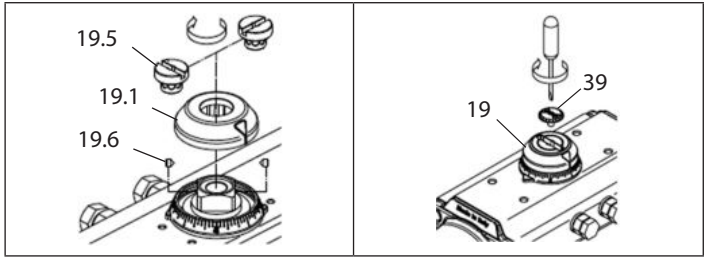


Fig. 19: Installing the graduated collar and the position indicator

10.4. Malfunctions

Blockage of the actuator:

→ Check whether the blockage is caused by the attached fitting. If necessary, remove the rotary actuator from the fitting for the inspection.

→ Check whether there is a blockage of the pistons in the actuator. Here too, it is recommended to remove the actuator from the fitting and to check the actuator separately. If necessary, replace the sealing elements in the actuator.

11. REPLACEMENT PARTS

CAUTION!

Risk of injury and / or damage by the use of incorrect parts!

Incorrect accessories and unsuitable replacement parts may cause injuries and damage the device and the surrounding area.

- Use only original accessories and original replacement parts from Bürkert.

Complete replacement parts kits are offered as replacement parts. Depending on the actuator size, they have the following order numbers.

Actuator size	Description	Order no.
15	Replacement part HD38 Special NBR	770 811
30	Replacement part HD38 Special NBR	770 812
60	Replacement part HD38 Special NBR	770 813
100	Replacement part HD38 Special NBR	770 814
150	Replacement part HD38 Special NBR	770 815
220	Replacement part HD38 Special NBR	770 816
300	Replacement part HD38 Special NBR	770 817
450	Replacement part HD38 Special NBR	770 810

Should the actuator size be unknown, please state the order number of the actuator when ordering spare parts kits.

Replacing the sealing elements, refer to chapter 10.Maintenance, Troubleshooting.

12. SHUTDOWN

12.1. Safety instructions

WARNING!

Risk of injury from improper disassembly!

- Installation may be carried out by authorised technicians only and with the appropriate tools!

12.2. Disassembly of the pneumatic rotary actuator

During the disassembly, please observe the operating instructions of the respective fitting.

13. PACKAGING, TRANSPORT

NOTE!

Transport damages!

Inadequately protected equipment may be damaged during transport.

- During transportation protect the device against wet and dirt in shock-resistant packaging.
- Avoid exceeding or dropping below the permitted storage temperature.

14. STORAGE

NOTE!

Incorrect storage may damage the device!

- Store the device in a dry and dust-free location!
- Storage temperature: -40…+40 °C.

15. DISPOSAL

→ Dispose of the device and packaging in an environmentally friendly manner.

NOTE!

Damage to the environment caused by device components contaminated with media.

- Observe applicable regulations on disposal and the environment.

Note:

Observe national waste disposal regulations.

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