

# VAG ZETA<sup>®</sup> Knife Gate Valve

## PA/Pneumatic Actuator Version

### FESTO COPAC DLP / DFPI Brand



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# 1 General

## 1.1 Safety



These operation and maintenance Instructions must be observed and applied at all times along with the general „VAG Installation and Operation Instructions for Valves“.

Arbitrary alterations of this product and of the parts and accessories supplied with it are not allowed. VAG does not assume any warranty or liability for consequential damage arising from non-compliance with these instructions.

When using this valve, the generally acknowledged rules of technology have to be observed (e.g. DIN standards, DVGW data sheets, VDI directives, etc.). Installation may only be carried out by qualified staff.

These operation and maintenance Instructions do not represent a supplement to the use of FESTO COPAC brand pneumatic cylinders and apply only in combination with KAT-B1 2410 (ZETA/handwheel)!

In principle, the operating instructions supplied by the drive manufacturer must also be observed.

For further technical information such as dimensions, materials or applications, please refer to the respective documentation (KAT-A 2410).

## 1.2 Proper use

The VAG ZETA® Knife Gate Valve is a valve for installation into the pipeline, either as wafer type, fitted between flanges, or for end-of-line applications.

In its standard version, this valve is designed for the shut-off of pressurised pipelines. For technical data concerning the operating limits such as operating pressure, medium or temperature, please refer to document KAT-A 2410.

Any deviating operating conditions and applications require the manufacturer's prior written consent!



The valve has been designed for operation in liquids. If it is operated temporarily in dry media, increased operating forces as well as increased wear of the lateral seal and the U-profile seal are to be expected. Permanent dry operation is impermissible for technical reasons!

# 2 Transport and Storage

## 2.1 Transport

For transportation to its installation site, the complete fitting must be packed in stable packaging material suitable for the size of the valve. The container also needs to ensure that the valve is protected against weather influences and damage.

When the valve is transported over long distances (e.g. overseas) and exposed to special climatic conditions, it needs to be protected by sealing it in plastic wrapping and adding a desiccant.

When actuators are mounted, the safe storage of the actuators

must be ensured, which prevents the joints from being exposed to transverse loads.

The factory-applied corrosion protection coating must be especially well protected at all times.

## 2.2 Storage

Store the VAG ZETA® Knife Gate Valve with the knife in the closed position. Protect the elastomeric parts (gaskets) against direct sunlight; failure to do this may deteriorate the gaskets and thus affect proper and long-term function.

Store in a dry and well-aerated place. Protect the valve from direct radiator heat.

Protect any assembly units important for the function such as the knife or the piston rod of the pneumatic cylinder against dust and other dirt by adequate covering.

# 3 Product and function description

## 3.1 Features and function description

The VAG ZETA® Knife Gate Valve is a gate valve in full-flange design, and can thus be applied either as wafer type in-between two flanges or for pipeline-end installation without additional counter flange at full operating pressure. Due to its bi-directional sealing arrangement, any installation position is possible. The knife slides in a U-profiled gasket made of elastomer between the two body parts. Sealing in flow direction is pressure-supported and soft sealing.

The sealing of the knife at the outlet of the body is realised by a defined and elastically pre-stressed lateral seal. This seal can be readjusted during operation and be easily replaced without dismantling the valve from the pipeline.



**Warning!** Ensure the pipeline is depressurised first! In case of suspended installation of the valve, knife must be field-secured against falling out.

The lateral seal is factory-adjusted (pre-tensioned) with a sealing force equal to the rated pressure (PN). In order to reduce the operating forces and the wear of the lateral seal, this pre-tension may later be adjusted to the actual operating pressure. To do this, slightly loosen the screws holding the thrust piece.

The pneumatic cylinder is installed directly onto the valve. The connecting dimensions between the cylinder and valve adapter are in accordance with DIN ISO 5210.



The dimensioning of the pneumatic cylinder is done on the basis of a minimum operating air pressure of 6 bar. Malfunctions may occur when opening or closing the valve if the operating pressure falls below this! The maximum permissible operating air pressure is 10 bar.

## 3.2 Field of application

Due to the NBR elastomer used in the seal the standard version of the VAG ZETA® Knife Gate Valve can be used with the following media:

- Water, raw water, cooling water,

- municipal waste water,
- grease- and oil-containing media
- weak acids and bases

Contact the manufacturer in the event of divergent operating conditions and areas of application.

### 3.3 Proper and improper mode of operation

Avoid the exertion of excessive force caused by using extensions on the operating instruments, as this may damage the valve due to overload.

The VAG ZETA® Knife Gate Valve with FESTO COPAC DLP pneumatic cylinder is suitable for "OPEN/CLOSE operation" only.

Special regulating tasks require special designs such as the ZETA control with regulating diaphragm and the FESTP COPAC DFPI pneumatic regulating cylinder.

The maximum operating temperatures and pressures specified in the technical documentation must not be exceeded. Do not expose the closed knife gate valve to pressures exceeding the maximum admissible nominal pressure (see Table 3).



The valve has been designed for operation in liquids. If it is operated temporarily in dry media, increased operating forces as well as increased wear of the lateral seal and the U-profile seal are to be expected. Permanent dry operation is impermissible for technical reasons!

## 4 Installation into the pipeline

### 4.1 Site requirements

When installing the valve between two pipeline flanges, these must be coplanar and in alignment. If the pipes are not in alignment, they must be aligned before installation of the valve, as otherwise this may result in impermissibly high loads acting onto the valve body during operation and eventually even lead to fracture.

The valve is to be installed tensionless into the pipeline. No pipeline forces must be transmitted from the pipeline onto the valve.

The space between the flanges should be wide enough to pre-

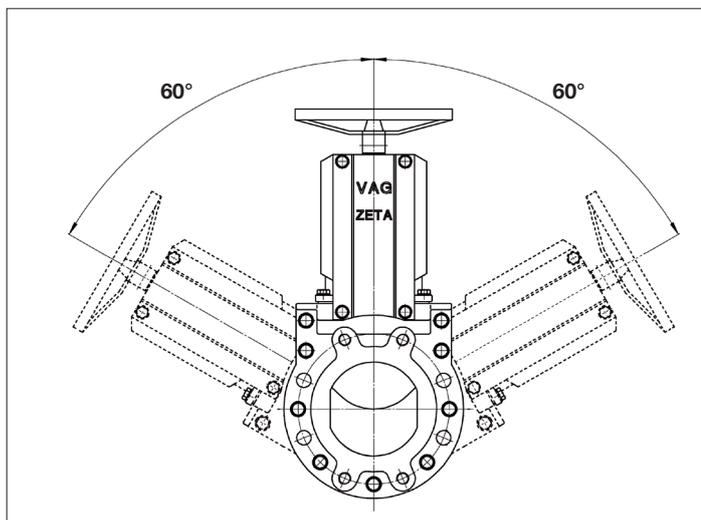


Figure 1: Installation Position VAG ZETA® Knife Gate Valve

vent damage to the coating of the flange gasket frames during installation.

In case of works around the valve causing dirt (e.g. painting, masonry or working with concrete), the valve must be protected by adequate covering.

### 4.2 Place of Installation

The installation location of the valve must provide enough space for operation, later function tests and maintenance works (e.g. re-adjusting the lateral seal).

If the valve is to be installed outside, it has to be protected by adequate covering against direct weather influences such as icing.

If the valve is mounted as an overflow installation, higher operation forces and higher wear and tear of the relatively moving parts must be expected. This fact is to be taken into account when determining the maintenance intervals.



If the valve is to be installed at pipeline end, make sure that the free outlet is absolutely inaccessible for anybody.

**Warning!!** The nominal pressure on the closed valve must not be exceeded (see document KAT-A 2410). In case of a pressure test in the pipeline using higher pressures than the admissible nominal pressure, close the gate valve with a cover and slightly open the knife during the test.

### 4.3 Position of installation

If the valve is to be installed in a horizontal pipeline and if the media conveyed contain solid particles (e.g. sand, etc.), the valve should not be inclined more than 60° from the vertical position (see Fig. 1). This allows the continuous flushing of the operating area and reliable guiding of the knife.

In different installation positions, especially if the valve is suspended or installed horizontally in a vertical pipeline, increased deposition of solids on the knife cannot be avoided. This increases the risk of malfunction (e.g. wear of the lateral seal, increased operating forces, etc.) and requires more frequent maintenance.



**Attention:** To ensure its proper function at all times, the valve should not be installed outside the permissible range. In case of deviating installation positions, always contact the manufacturer for technical coordination, providing precise information about the installation position, operating conditions and quality of the medium (especially about its solids content).

If assembly and maintenance work are carried out on valves with a suspended installation position, the knife must be secured on site against falling out when the lateral seal is being replaced.

**Attention! Exception!** VAG ZETA® control valve with VAG control orifice. The ZETA® control Valve must be installed in a vertical position as otherwise its function may be affected by the accumulation of dirt upstream of the control orifice. Concerning the installation direction of the ZETA® control Valve, the following instructions must be observed:

- The control orifice must be positioned in flow direction downstream of the knife!

- The control orifice must be positioned in pressure direction (direction of action of the differential pressure after closing) downstream of the knife!

The pipeline must in no case be pulled towards the valve. If the gap between the valve and the flange is too wide, this should be compensated by thicker gaskets.

#### 4.4 Assembly instructions, fittings

The valve is bi-directional and therefore can be installed in any installation position.

Check the valve for any possible transport or storage damage before installation. Protect the valve against dirt on site by adequate covering until installation.

When the valve is being installed, the functional parts such as the stem, stem nut, gasket and knife must be free from dust and dirt.

For the installation of the VAG ZETA® Knife Gate Valve you will need adequate load suspension devices (e.g. ring bolt in the blind hole) as well as transport and lifting equipment. Lifting the valve for example at the handwheel may lead to damage and impairment of its function.

When repainting the valve, make sure that no functional parts such as the stem, stem nut, gasket, knife or piston rod are covered by the paint.

When installing an extension rod to the valve, mount it perpendicularly to the stem axis above the fixing point.



When connecting the valve to the pipeline flanges with through-holes, use hexagon head screws and nuts with washers on both sides from flange to flange.

When connecting the valve to the pipeline flanges with blind thread holes, use stud bolts with washers and nuts for a safe and reliable installation (see example 3 at Fig. 2). Screw the stud bolts completely to the ground of the blind thread holes of the valve. This guarantees an optimum connection, as the threads are used over their whole effective depth. Then align the valve with the flange by using the stud screws as orientation pins. Using hexagon head screws in case of blind thread holes can lead to leaky connections (see example 1 and 2 at Fig. 2).

Fasten the screws carefully and evenly crosswise, thus preventing unnecessary tensions and cracks or fractures.

We recommend steel-reinforced rubber gaskets according to DIN EN 1514-1 shape IBC for sealing. If the flanges are crimped, these gaskets must be used.

For the kind and the sizes of the required connection parts for each kind of installation (as wafer type in-between two flanges or for pipeline end installation), see the following tables (Table 1 and Table 2).

#### Connection parts for flange connection;

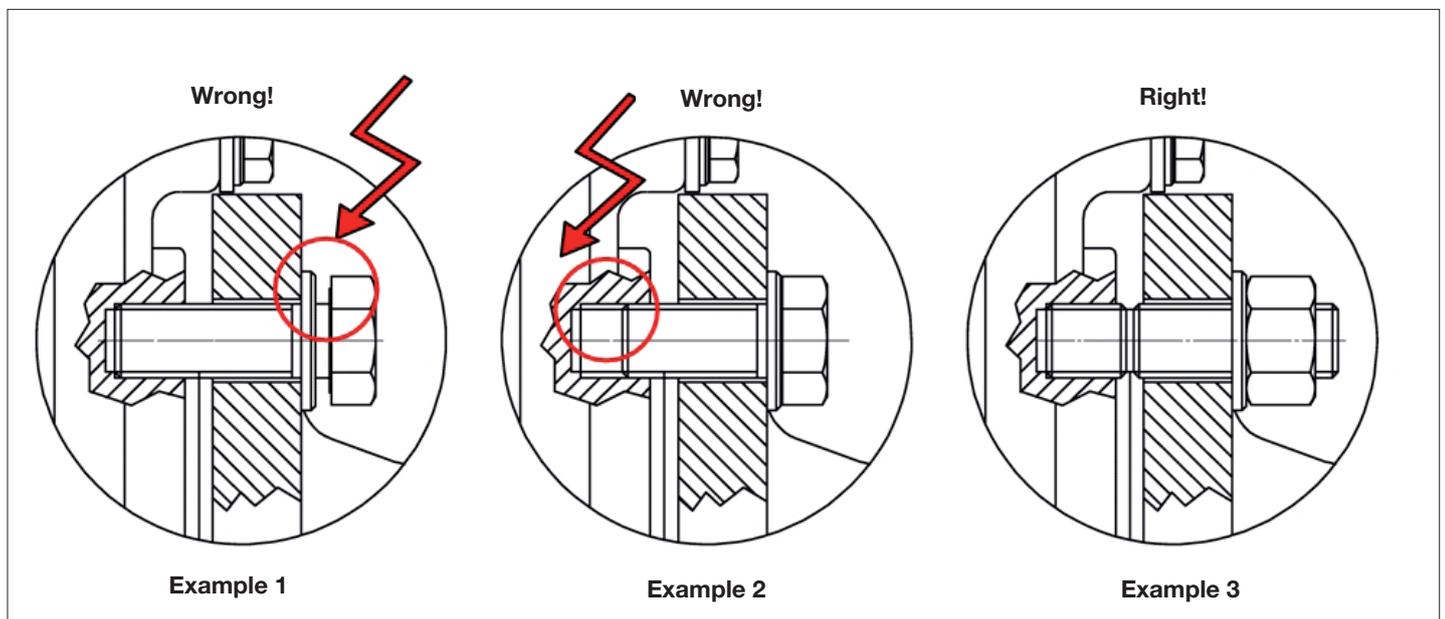
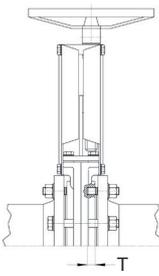


Figure 2: Assembly of the VAG ZETA® Knife Gate Valve

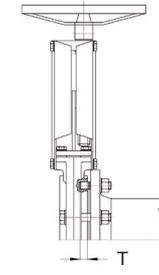
## wafer type

| DN 50...600<br> | Flanges  |                  |                           |                      | Wafer type           |           |                        |      |                                    |           |                        |      |
|--|--|------------------|---------------------------|----------------------|----------------------|-----------|------------------------|------|------------------------------------|-----------|------------------------|------|
|  | Connecting dimensions acc. to<br>DIN EN 1092-1 Type 11 |                  |                           |                      | Blind thread hole ●  |           |                        |      | Through hole ○                     |           |                        |      |
|  | DN   | Bolt<br>circle Ø | flange<br>connection<br>Ø | depth of<br>thread T | Threaded pin DIN 939 |           | Hexagon nut<br>DIN 939 |      | Hexagon head screw<br>DIN EN 24014 |           | Hexagon nut<br>DIN 934 |      |
|  |  |                  |                           |                      | qty                  | dimension | qty                    | size | qty                                | dimension | qty                    | size |
| 50   | 125  | 165              | 10                        | 8                    | M 16 x 35            | 8         | M 16                   | -    | -                                  | -         | -                      |      |
| 65   | 145  | 185              | 12                        | 8                    | M 16 x 35            | 8         | M 16                   | -    | -                                  | -         | -                      |      |
| 80   | 160  | 200              | 12                        | 8                    | M 16 x 40            | 8         | M 16                   | 4    | M 16 x 120                         | 4         | M 16                   |      |
| 100  | 180  | 220              | 14                        | 8                    | M 16 x 40            | 8         | M 16                   | 4    | M 16 x 130                         | 4         | M 16                   |      |
| 125  | 210  | 250              | 15                        | 8                    | M 16 x 45            | 8         | M 16                   | 4    | M 16 x 130                         | 4         | M 16                   |      |
| 150  | 240  | 285              | 15                        | 8                    | M 20 x 45            | 8         | M 20                   | 4    | M 20 x 130                         | 4         | M 20                   |      |
| 200  | 295  | 340              | 15                        | 8                    | M 20 x 45            | 8         | M 20                   | 4    | M 20 x 150                         | 4         | M 20                   |      |
| 250  | 350  | 395              | 17                        | 16                   | M 20 x 50            | 16        | M 20                   | 4    | M 20 x 160                         | 4         | M 20                   |      |
| 300  | 400  | 445              | 22                        | 16                   | M 20 x 55            | 16        | M 20                   | 4    | M 20 x 170                         | 4         | M 20                   |      |
| 350  | 460  | 505              | 22                        | 20                   | M 20 x 55            | 20        | M 20                   | 6    | M 20 x 170                         | 6         | M 20                   |      |
| 400  | 515  | 565              | 26                        | 20                   | M 24 x 60            | 20        | M 24                   | 6    | M 24 x 200                         | 6         | M 24                   |      |
| 500  | 620  | 670              | 30                        | 28                   | M 24 x 65            | 28        | M 24                   | 6    | M 24 x 220                         | 6         | M 24                   |      |
| 600  | 725  | 780              | 32                        | 28                   | M 27 x 70            | 28        | M 27                   | 6    | M 27 x 260                         | 6         | M 27                   |      |
| 700  | 840  | 895              | 27                        | 32                   | M 27 x 80            | 32        | M 27                   | 8    | M 27 x 300                         | 8         | M 27                   |      |
| 800  | 950  | 1015             | 30                        | 32                   | M 30 x 90            | 32        | M 30                   | 8    | M 30 x 320                         | 8         | M 30                   |      |
| 900  | 1050   | 1115             | 30                        | 36                   | M 30 x 90            | 36        | M 30                   | 10   | M 30 x 340                         | 10        | M 30                   |      |
| 1000   | 1160   | 1230             | 33                        | 36                   | M 33 x 100           | 36        | M 33                   | 10   | M 33 x 360                         | 10        | M 33                   |      |

Lengths of screws are for pre-welded flanges acc. to DIN EN 1092-1, PN 10 type 11, washers acc. to DIN 125 (ISO 7090). DN 50...600: Flat gaskets acc. to DIN EN 1514-1 / PN 10 / shape IBC, thickness 3 mm; DN 700...1000: Flat gasket according to DIN EN 1514-1 / PN 6 / shape IBC, thickness 8 mm, (flange sealing face PN 6)

**Table 1: Connection parts for flange connection, wafer type**

## Connection parts for flange connection; end of pipe installation

| DN 50...600<br> | Flanges  |                  |                           |                      | end of pipe installation |           |                        |      |                                    |           |                        |      |
|--|--|------------------|---------------------------|----------------------|--------------------------|-----------|------------------------|------|------------------------------------|-----------|------------------------|------|
|  | Connecting dimensions acc. to<br>DIN EN 1092-1 Type 11 |                  |                           |                      | Blind thread hole ●      |           |                        |      | Through hole ○                     |           |                        |      |
|  | DN   | Bolt<br>circle Ø | flange<br>connection<br>Ø | depth of<br>thread T | Threaded pin DIN 939     |           | Hexagon nut<br>DIN 939 |      | Hexagon head screw<br>DIN EN 24014 |           | Hexagon nut<br>DIN 934 |      |
|  |  |                  |                           |                      | qty                      | dimension | qty                    | size | qty                                | dimension | qty                    | size |
| 50   | 125  | 165              | 10                        | 4                    | M 16 x 35                | 4         | M 16                   | -    | -                                  | -         | -                      |      |
| 65   | 145  | 185              | 12                        | 4                    | M 16 x 35                | 4         | M 16                   | -    | -                                  | -         | -                      |      |
| 80   | 160  | 200              | 12                        | 4                    | M 16 x 40                | 4         | M 16                   | 4    | M16 x 90                           | 4         | M 16                   |      |
| 100  | 180  | 220              | 14                        | 4                    | M 16 x 40                | 4         | M 16                   | 4    | M16 x 90                           | 4         | M 16                   |      |
| 125  | 210  | 250              | 15                        | 4                    | M 16 x 45                | 4         | M 16                   | 4    | M 16 x 100                         | 4         | M 16                   |      |
| 150  | 240  | 285              | 15                        | 4                    | M 20 x 45                | 4         | M 20                   | 4    | M 20 x 100                         | 4         | M 20                   |      |
| 200  | 295  | 340              | 15                        | 4                    | M 20 x 45                | 4         | M 20                   | 4    | M 20 x 110                         | 4         | M 20                   |      |
| 250  | 350  | 395              | 17                        | 8                    | M 20 x 50                | 8         | M 20                   | 4    | M 20 x 120                         | 4         | M 20                   |      |
| 300  | 400  | 445              | 22                        | 8                    | M 20 x 55                | 8         | M 20                   | 4    | M 20 x 130                         | 4         | M 20                   |      |
| 350  | 460  | 505              | 22                        | 10                   | M 20 x 55                | 8         | M 20                   | 6    | M 20 x 130                         | 6         | M 20                   |      |
| 400  | 515  | 565              | 26                        | 10                   | M 24 x 60                | 10        | M 24                   | 6    | M 24 x 140                         | 6         | M 24                   |      |
| 500  | 620  | 670              | 30                        | 14                   | M 24 x 65                | 14        | M 24                   | 6    | M 24 x 160                         | 6         | M 24                   |      |
| 600  | 725  | 780              | 32                        | 14                   | M 27 x 70                | 14        | M 27                   | 6    | M 27 x 180                         | 6         | M 27                   |      |
| 700  | 840  | 895              | 27                        | 16                   | M 27 x 80                | 16        | M 27                   | 8    | M 27 x 260                         | 8         | M 27                   |      |
| 800  | 950  | 1015             | 30                        | 16                   | M 30 x 90                | 16        | M 30                   | 8    | M 30 x 280                         | 8         | M 30                   |      |
| 900  | 1050   | 1115             | 30                        | 18                   | M 30 x 90                | 18        | M 30                   | 10   | M 30 x 300                         | 10        | M 30                   |      |
| 1000   | 1160   | 1230             | 33                        | 18                   | M 33 x 100               | 18        | M 33                   | 10   | M 33 x 320                         | 10        | M 33                   |      |

Lengths of screws are for pre-welded flanges acc. to DIN EN 1092-1, PN 10 type 11, washers acc. to DIN 125 (ISO 7090). DN 50...600: Flat gaskets acc. to DIN EN 1514-1 / PN 10 / shape IBC, thickness 3 mm; DN 700...1000: Flat gasket according to DIN EN 1514-1 / PN 6 / shape IBC, thickness 8 mm, (flange sealing face PN 6)

**Table 2: Connection parts for flange connection, end of pipe installation**

Blind thread hole ●  
Through hole ○

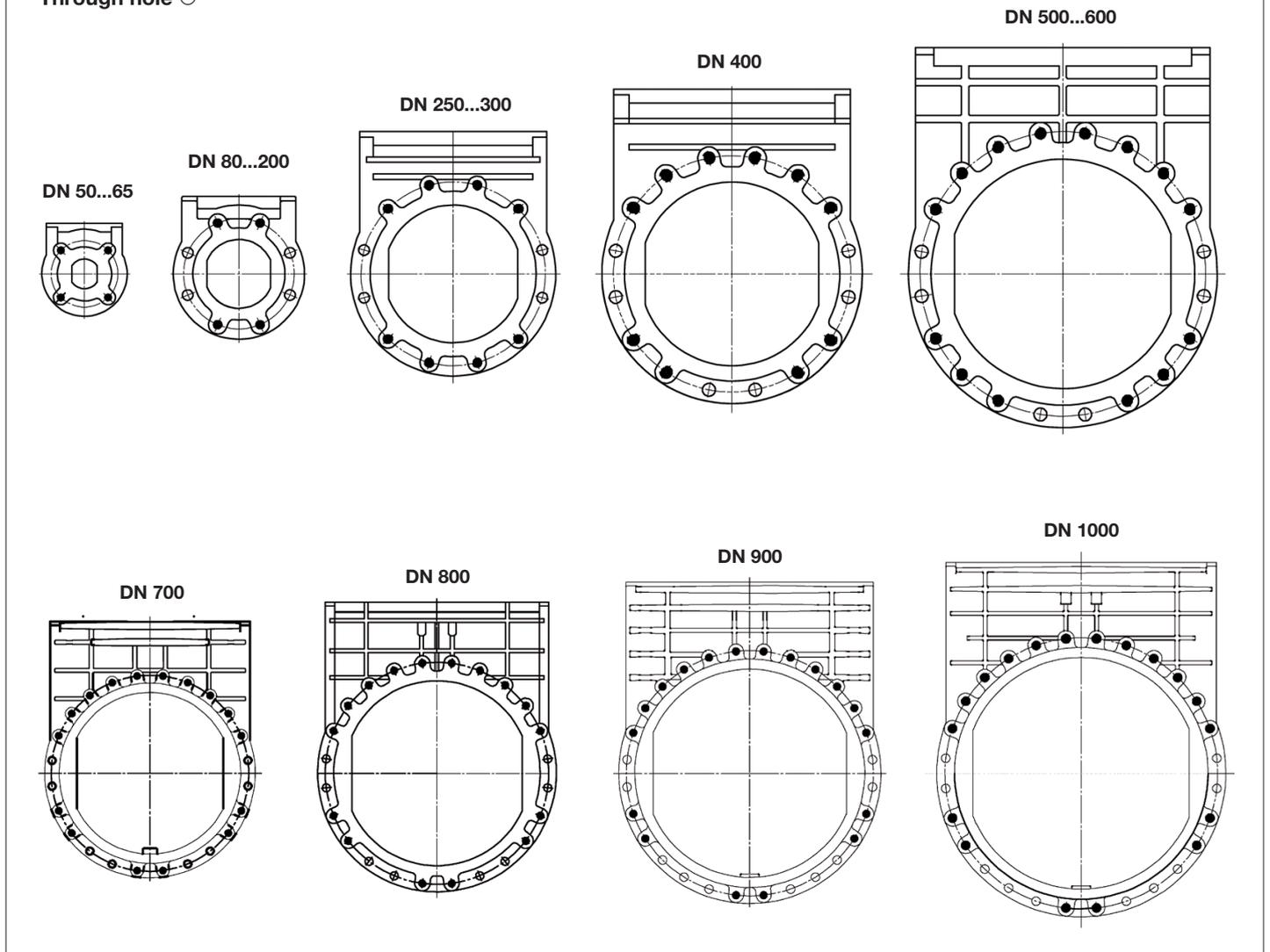


Figure 3: Blind thread hole and Trough hole

## 5 Putting the valve into operation

### 5.1 Visual inspection

Before putting the valve and pneumatic cylinder into operation, perform a visual inspection of all functional parts.

Thoroughly clean all parts important for the function such as the piston rod, bearings, gaskets and knife from dirt.

VAG does not assume any liability for consequential damage caused by dirt, residue of shot blasting particles or welding beads on the knife.

The valves are thoroughly lubricated at the factory to ensure trouble-free transport, storage and installation. However, it might be necessary to lubricate them again when taking them into operation.

Recommended lubricants:

- Knife and gaskets
  - Fuchs Chemplex Si 2; Fuchs Notropeen Si 1; Klüber Unisilikon L 641

### 5.2 Connection requirement for pneumatically-operated valves



**Connection of working medium for pneumatic cylinder**

- Compressed air of at least quality class 5 according to ISO 8573-1
- The use of liquids and gasses is not permitted
- Minimum operating air pressure on the cylinder of 6 bar must be available

Maintain the consistency of the air pressure working medium throughout the entire period of use. E.g. non-oiled compressed air, constant non-oiled compressed air

If possible, control valves should be installed near the cylinder.

Adjust the widths of pneumatic lines to the required air volume.

Secure the pneumatic lines in such a way that they cannot be inadvertently damaged or torn off.

### 5.3 Initial operation



Before putting it into operation, check the easy movement of the valve by driving it at least once over the whole stroke, closing and opening the valve completely.

If the pipeline has to undergo a pressure test with water, when the knife is open the maximum admissible working pressure (see Table 3/test pressure in body) of the valve must not be exceeded.

Do not load a closed valve beyond the maximum admissible operating pressure (see Table 3).

The pneumatic cylinder must be supplied with compressed air to keep the knife in open or closed end position!

The lateral seal of the valve is factory-adjusted to the maximum working pressure in the body (see Table 3). Adjustment prior to pressure testing the pipeline is not necessary.

After the pressure test the lateral seal can be de-stressed according to the actual operating pressure (see Section 3.1). This will reduce the wear of the seal as well as the operating forces when the valve is in operation.

Pneumatically operated gate knife valves may not be closed abruptly, because this poses the risk of pressure surges occurring in the pipeline.

Use the throttle valves to adjust the piston speed (standard value 300 mm/minute closing speed). Close the existing throttle valves prior to initial operation and open them to adjust the desired piston speed.

In terms of open and closed end positions, the pneumatic cylinder is delivered with the following settings:

- a) Open end position/metallic terminal contact of the piston in the cylinder body.
- b) Closed end position/when the knife gate valve is closed the piston has at least 5 mm of residual stroke available before reaching the metallic end position.

If the pneumatic cylinder is dismantled for maintenance or repair work during operation, ensure that the piston stroke is correctly adjusted after reassembly.

Attach the pneumatic line of the pneumatic cylinder. Switch on control air, close, piston rod extends to its limit stop. The cylinder rises upwards (1).

In order for the knife to reliably close during operation, a distance of 5 mm between the cylinder and the adapter flange must be present as the adjustment measure (2).

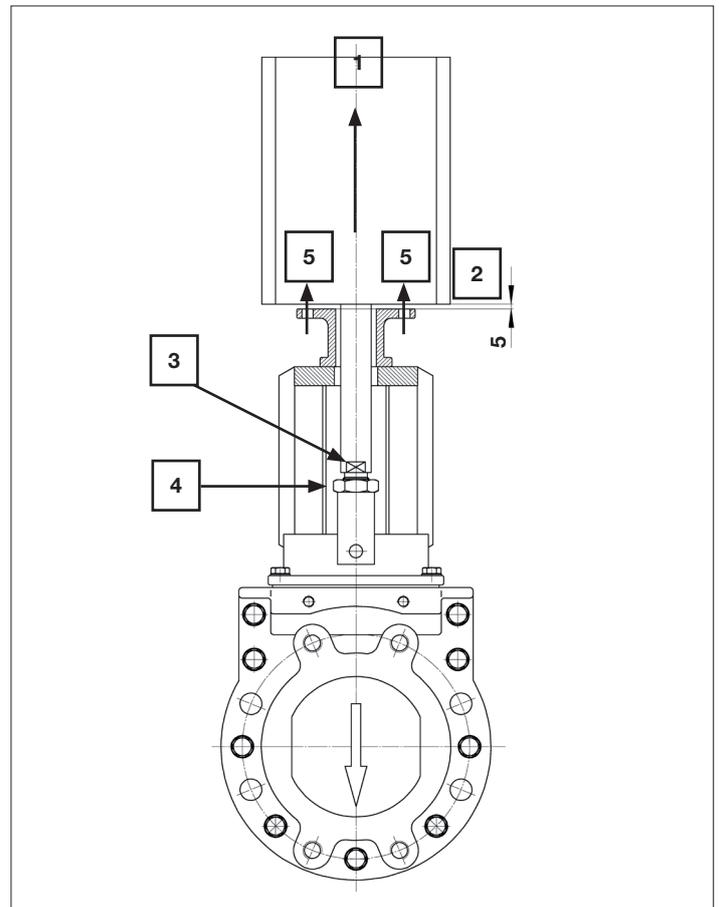
To precisely set the adjustment measure carry out the following installation steps:

- Switch off control air and depressurize cylinder
- Turn the piston rod (3) according to the required correction until 5 mm are reached
- Switch on control air and check distance of 5 mm; correct again if required
- Tighten locking nut (4)

Switch off control air and fasten cylinder to adapter flange (5) with the screws provided.

Reassemble retaining plate.

Finally, test run of the valve.



| Factory test of the valve according to DIN EN 12266-1 |    |  |  |                          |         |
|---|----|--|--|--------------------------|---------|
| DN  | PN | max. admissible operating overpressure<br>PS | Admissible operating temperature<br>for water, waste water and sewage sludge | Test pressure with water |         |
|   |    |  |  | in body                  | in seat |
| mm  |    | bar  | ° C  | bar                      | bar     |
| 50 - 300  | 10 | 10   | 50   | 15                       | 10      |
| 400   | 10 | 8  | 50   | 12                       | 8       |
| 500-600   | 10 | 6  | 50   | 9                        | 6       |

Table 3: Factory test of the valve according to DIN EN 12266-1

## 6 Servicing, maintenance

### 6.1 General safety instructions



Prior to the performance of inspection and maintenance work on the valve or its assemblies, shut-off the pressurised pipeline, depressurise it and secure it against inadvertent activation.

Depending on the kind and dangerousness of the operating medium, comply with all required safety regulations.

After completing maintenance work and before resuming operation, check all connections for proper fastening and tightness.

Perform the steps described for initial set-up as described in Section 5.

### 6.2 Inspection and operation intervals

Due to its operation mode the valve should be driven over the whole stroke at least four times a year. Check the proper function of the individual components at the same time.

In case of extreme operating conditions or extremely soiled media, these maintenance intervals should, based on the experience of the operator, be carried out more often.

### 6.3 Maintenance work and replacement of parts

#### 6.3.1 Testing for easy movement

According to the recommended maintenance intervals, the valve should be driven over the whole stroke. In case of difficult movement, clean and lubricate the knife.

#### 6.3.2 Repairing a leak at the outlet of the knife

After longer shut-down periods, leaks may occur at the lateral seal. If these leaks persist after operating the valve several times, the lateral seal (part 10) can be easily readjusted without dismantling any parts. Tighten the screws of the thrust piece (1) evenly by approximately  $\frac{1}{2}$  turn until the sealing function is restored. If this action of refastening the thrust piece (2) by refastening the screws does not achieve the desired result, the entire unit 1 of the lateral seal (10, 11) has to be replaced.

Any required adjustment to the lateral seal is system-specific depending on the degree of soiling by the medium or operating conditions and does not represent a material defect.

#### 6.3.3 Repairing a leak at the knife passage

If there is a leak at the knife passage, this is usually caused by damage or irreparable wear of the U-profiled gasket (9). Completely replace all parts of unit 2. This can only be undertaken when the valve is dismantled.

#### 6.3.4 Visual inspection of the pneumatic cylinder

Check the piston rod for integrity (no score marks) and cleanliness (no firmly adhering lubricant residues or soiling). An acoustic

check for leaks and compressed air should also be carried out.

#### 6.3.5 Cleaning, lubrication

The knife gate valve should be cleaned and lightly relubricated commensurate with the conditions of use.

Recommended lubricants:

- Knife and gaskets
  - Fuchs Chemplex Si 2; Fuchs Notropeen Si 1; Klüber Unisilikon L 641

#### 6.3.6 Recommendation for the replacement of parts

Recommendations for spare parts see table 4 and 5 (spare part list, spare part sets) as well as the corresponding figure 4 and 5.

- Replace lateral seal Set 1 every 2 years
- Replace U-profiled gasket and scraper Set 2 every 4 years
- Replace cylinder parts subject to wear Set 4 as required

Under extreme operating conditions it may be necessary to shorten these recommended replacement intervals.

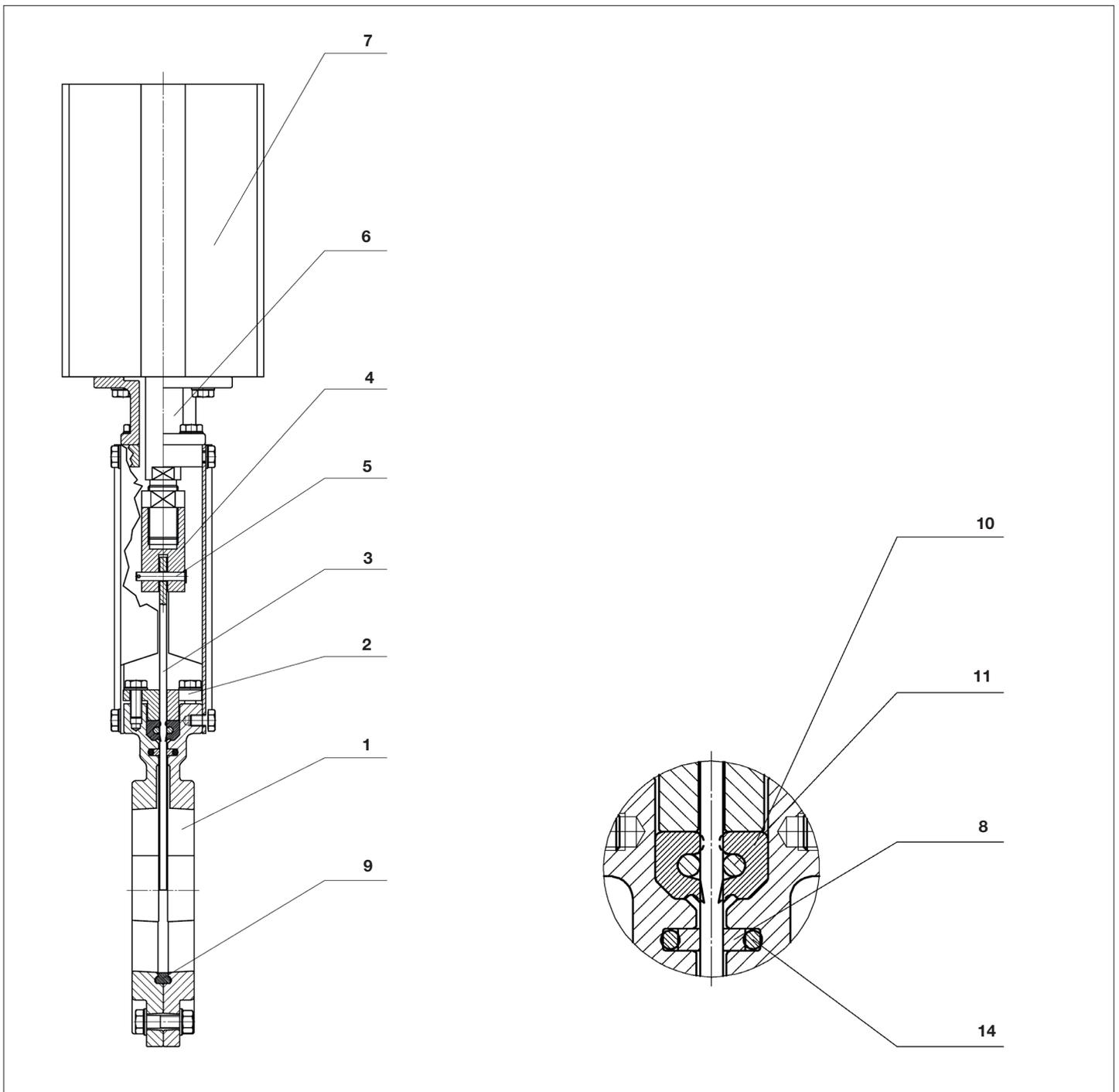


Figure 4: Single components

| Item. | Name                           | SET 1 | SET 2 |
|-------|--------------------------------|-------|-------|
| 1     | Body                           |       |       |
| 2     | Thrust piece                   |       |       |
| 3     | Knife                          |       |       |
| 4     | Forked part, locking nut       |       |       |
| 5     | Bolt, washer, split pin        |       |       |
| 6     | Adapter part                   |       |       |
| 7     | FESTO COPAC pneumatic cylinder |       |       |
| 8     | Scraper profile                |       | X     |
| 9     | U-profiled gasket              |       | X     |
| 10    | Lateral seal                   | X     | X     |
| 11    | Guiding rod                    | X     | X     |
| 14    | Thrust profile                 |       | X     |

Table 4: Parts list and recommended spare part sets

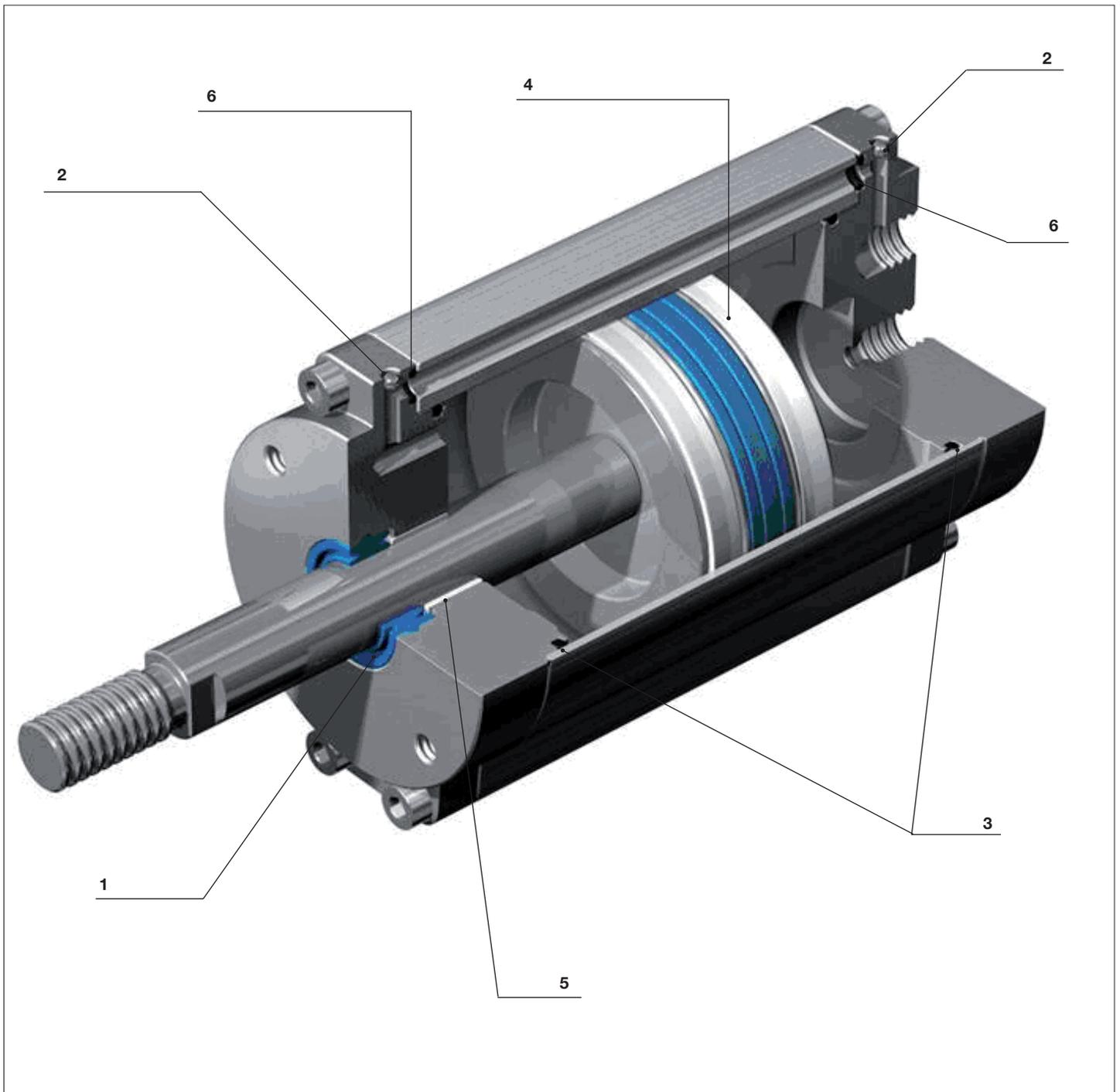


Figure 5: Wear part pneumatic cylinder

| Pos. | Name  | SET 4 |
|------|---|-------|
| 1    | Piston rod seal                                   | X     |
| 2    | O-ring  | X     |
| 3    | O-ring  | X     |
| 4    | Radial seal                                       | X     |
| 5    | Sliding ring                                      | X     |
| 6    | O-ring  | X     |
| 7    | LUB-KB2 Festo Special Grease silicone-free, 20 ml | X     |
| 8    | LOCTITE 243 threadlock adhesive                   | X     |

Order text: SET 4 DLP-xxx parts subject to wear

Table 5: Parts list of pneumatic cylinder parts subject to wear

## 7 Troubleshooting

For all repair and maintenance work, please observe the general safety instructions described in Section 6.1.

| Problem                           | Possible cause                                       | Remedial action   |
|-----------------------------------|--|---|
| The knife does not move/is jammed | Lateral seal is too tight                            | Evenly loosen the screws of the thrust piece  |
|                                   | Foreign matter stuck in seat area                    | Open the valve and close it again; repeat this action several times   |
|                                   | Knife is blocked by hardened particles in the medium | Loosen the thrust piece by removing the screws evenly, slightly hammer against the knife from above and from the side with a rubber mallet, and try to operate the valve.<br>If this does not solve the problem: dismantle the valve, dismantle the knife, clean it, lubricate it, replace damaged parts.<br>See Section 6.1. |
| High operating forces             | Knife is soiled<br>Dry run of the knife              | Open the valve, clean the knife, lubricate it   |
|                                   | Foreign matter stuck in seat                         | Open valve and close again:<br>Repeat this action several times;<br>remove stuck parts if required  |
| Leak at knife passage             | U-profiled gasket is damaged                         | Replace U-profiled gasket according to Section 6.3.3  |
| Leak at the outlet of the knife   | Leaking lateral seal                                 | Tighten the lateral seal according to Section 6.3.2<br>See Section 6.1.   |
|                                   | Lateral seal faulty                                  | Replace the lateral seal according to Section 6.3.2,<br>clean the knife and lubricate it<br>See Section 6.1.  |
|                                   | Knife is heavily soiled                              | Open the valve, clean the knife, lubricate it   |

## 8 How to contact us

### Head office

VAG-Armaturen GmbH  
 Carl-Reuther-Str. 1  
 68305 Mannheim  
 Germany  
 Phone: +49 (621) 749-0  
 Fax: +49 (621) 749-2153  
 info@vag-group.com  
 http://www.vag-group.com

### Service

Our service hotline can be reached 24/7 world-wide. In case of emergency, please contact us by phone.

Service hotline: +49 621 - 749 2222

Service by E-Mail: service@vag-group.com



[www.vag-group.com](http://www.vag-group.com)

[info@vag-group.com](mailto:info@vag-group.com)