

VAG ZETA® Knife Gate Valve

Version with handwheel



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We reserve the right to make technical changes and use similar or higher-quality materials. Drawings are non-binding.

1 General

1.1 Safety



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

Arbitrary alterations of the products or parts supplied are not allowed. VAG will not assume any liability for consequential damage due to 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.). The installation must only be carried out by qualified engineers. For further technical information such as dimensions, materials or range of application, please refer to document KAT 2410-A.

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 2410-A.

Alternative operating conditions and applications need to be approved by the manufacturer in writing.



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

The transportation of the valve to the installation location must be undertaken in suitable and stable packing corresponding to the valve's size. The packing must guarantee protection against weather influences and damage from external forces.

In some cases, e.g. overseas transport, with specific climatic influences, the valves must be protected by wrapping them in plastic film and adding a desiccant.

In case of pre-mounted drives or actuators, these have to be stored in a safe way which prevents the connection areas 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 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 seals and thus affect proper and long-term function.

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

Protect any assembly units important for the function such as the stem, stem nut, gaskets or knife 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 before performing any replacement works! 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.

3.2 Range of application

In its standard version, the VAG ZETA® Knife Gate Valve with NBR sealing material can be used for the following media:

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

For alternative conditions and applications, please contact the manufacturer.

3.3 Proper and improper mode of operation

The valve can be operated by

- handwheel
- chain-wheel
- stem square cap
- hand lever (as quick-closing valve)

Due to the geometry of the operating elements, safe and non-destructive operation can be guaranteed in case of manual operation with the adequately dimensioned handwheel or chainwheel or when using the operation key.

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

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 ma-

ximum admissible nominal pressure. Upon delivery, the tight sealing of the valve is only guaranteed up to its maximum permissible operating overpressure.



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 prevent 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 Installation location

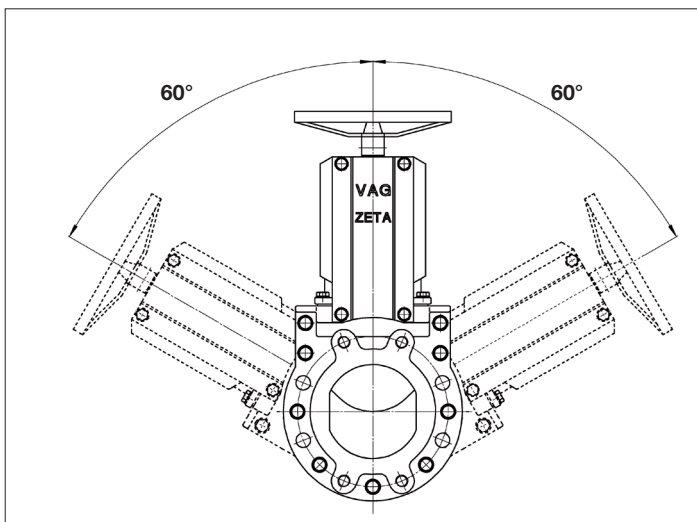
The installation location of the valve must provide enough space for operation, later function tests and maintenance works (e.g. re-adjusting the lateral seal). If the valve is to be installed outside, it has to be protected by adequate covering against direct weather influences such as icing. If the 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.

In case of external installation, the valve (especially stem, stem nut and knife plate) must be protected against the effects of the environment such as sand and dust.



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 2410-A). In



Picture 1: Installation Position VAG ZETA® Knife Gate Valve

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!

4.4 Assembly instructions, fittings

The valve is bidirectional 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 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

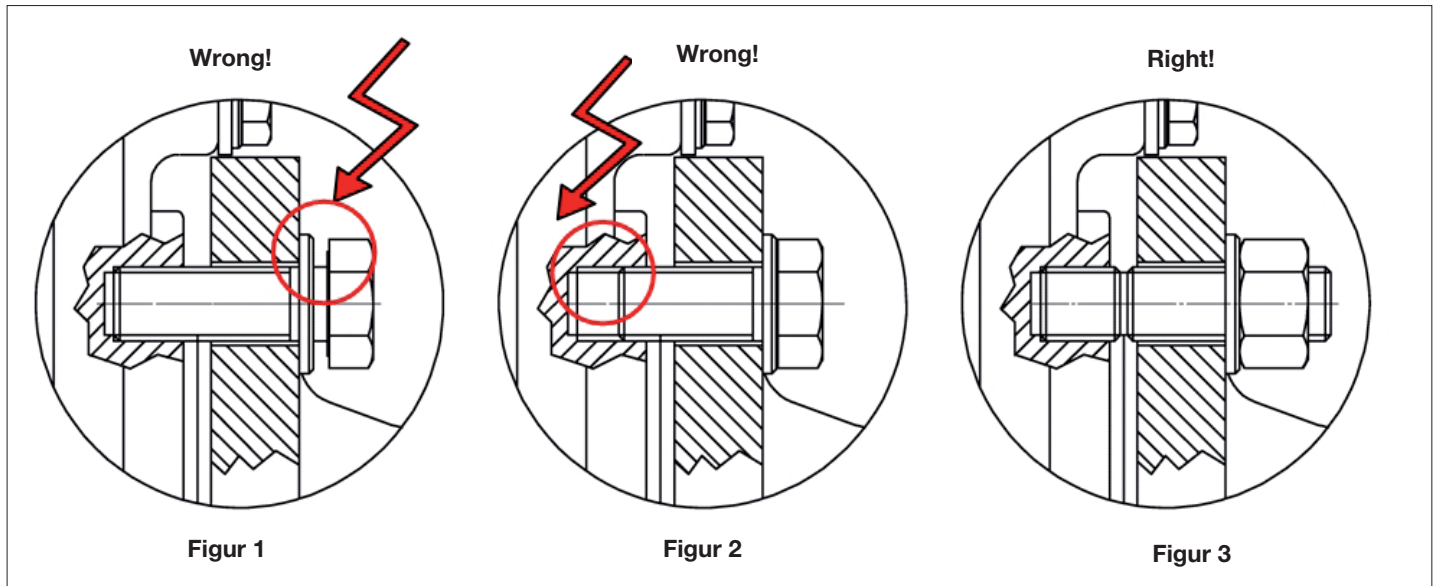
example 1 and 2 at Fig. 2).

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

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 to be compensated by thicker gaskets.

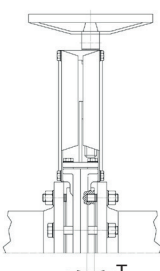
We recommend steel-reinforced rubber gaskets according to DIN EN 1514-1 shape IBC for sealing. If the flanges are crimped, these gaskets must be used.

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).



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

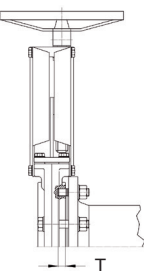
Connection parts for flange connection, wafer type

DN 50...600 	Flanges				Wafer-type							
	Connecting dimensions acc. to DIN EN 1092-1 Typ 11				Blind thread hole ●				Through hole ○			
	DN	bolt circle Ø	flange outside Ø	thread height T	Threaded pin DIN 939		Hexagon nut DIN 939		Hexagon head screw DIN EN 24014		Hexagon nut 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	
1200	1380	1455	36	48	M36x110	48	M 36	8	M36 x 440	8	M 36	
1400	1590	1675	39	52	M39x120	52	M 39	10	M39x500	10	M39	

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...1400: Flat gasket according to DIN EN 1514-1 / PN 6 / shape IBC, thickness 8 mm, (flange sealing face PN 6)

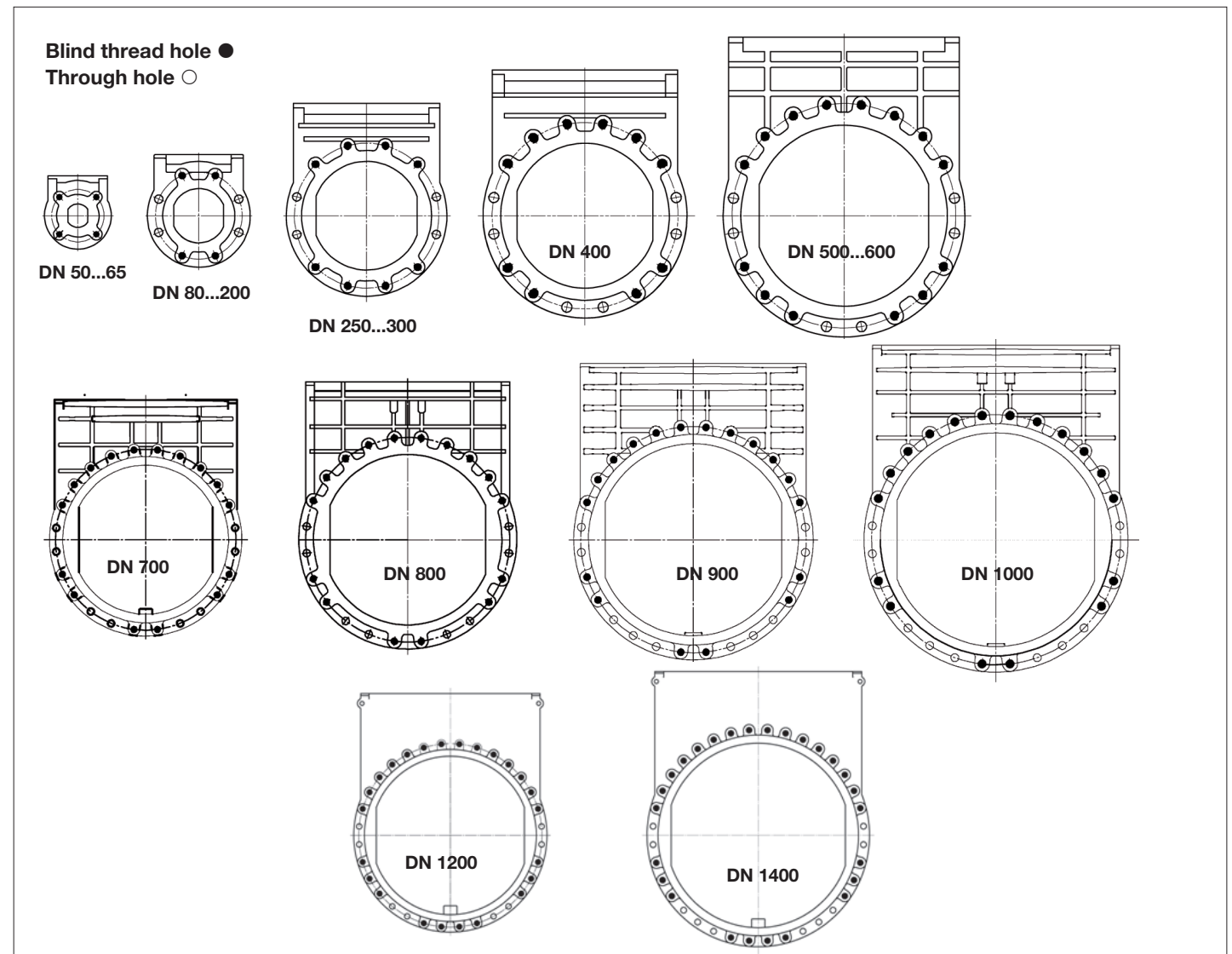
Table 1: Connection parts for flange connection, wafer type

Connection parts for flange connection, pipeline end installation

DN 50...600 	Flanges			Pipeline end installation								
	Connecting dimensions acc. to DIN EN 1092-1 Typ 11			Gewindesackloch ●				Durchgangsloch ○				
	DN	bolt circle ∅	flange outside ∅	thread height T	Threaded pin DIN 939		Hexagon nut DIN 939		Hexagon head screw DIN EN 24014		Hexagon nut 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	
1200	1380	1455	36	24	M36x110	24	M36	8	M36x380	8	M 36	
1400	1590	1675	39	26	M39x120	26	M39	10	M39x420	10	M 39	

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...1400: 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, pipeline end installation



Picture 3: Blind thread hole and through hole

5 Putting the valve into operation

5.1 Visual check of the valve

Before taking the valve and the plant into operation for the first time, visually check all functional parts.

Thoroughly clean all parts important for the function like the stem, stem nut, gaskets, bearings 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 seals: Fuchs Chemplex Si 2; Fuchs Notropeen Si 1; Klüber Unisilikon L 641
- Stem and stem nut: KLÜBERPLEX BE 31-502 for electric drives Manufacturer: Klüber Lubrication München AG, Germany

5.2 Functional check

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, the maximum admissible working over pressure / nominal pressure PN (see Table 3) of the valve must not be exceeded.

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

The lateral seal of the valve is factory-adjusted to the maximum working pressure / nominal pressure PN in the body (see Table 3). For pressure tests with higher pressures (up to the maximum test pressure for resistance in the body according to Table 3) the lateral seal can be re-tensioned on site by turning the screws on the cover plate clockwise.

In general, 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. It also increases the useful life of the valve and reduces maintenance work on the lateral seal.

6 Maintenance and service

6.1 General safety instructions



Before starting any repair or maintenance works on the valve or on any connected elements, shut off the pressurised pipeline, relieve the pressure and make sure that it cannot be taken into operation unintentionally.

DN mm	PN	max. admissible operating overpressure PS bar	Admissible operating temperature for water, waste water and sewage sludge °C	Test pressure in bar with water Resistance ¹⁾ in body	Leak-freeness in seat
50...300	10	10	50	15	10
350...400	10	8	50	12	8
500...600	10	6	50	9	6
700...800	10	4	50	6 (4)*	4
900...1000	10	2,5	50	3,75 (2,5)*	2,5
1200, 1400	10	2	50	3,0	2,0

* Guaranteed resistance 1.5 x PN, leak-freeness only up to PN

¹⁾ In delivery condition, the leak-freeness of the valve is guaranteed only up to its maximum admissible operating pressure.

Table 3: Field of use

Take all necessary safety precautions with respect to the kind and danger of the medium conveyed!

After finishing the maintenance works and before taking the installation into operation again, check whether all connections are tight and leakproof.

Follow the same steps as those described under Section 5 for the initial start up.

6.2 Intervals for inspection and operation

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 different parts at the same time.

In case of extreme operating conditions or extremely soiled media, these maintenance works should be carried out more often.

6.3 Maintenance works and replacement of spare 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 stem and 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 readjusted easily without dismantling any parts. Refasten the screws (part 19) evenly by approximately ½ turn until the sealing function is restored. If this action of refastening the thrust piece (part 2) by refastening the screws does not achieve the desired result, the entire unit 1 of the lateral seal (parts 10 and 11) has to be replaced.

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 (part 9). Completely replace all parts of unit 2. This can only be undertaken when the valve is dismantled.

6.3.4 Cleaning and lubricating

The stem and stem nut have to be free of any dirt and always well lubricated. Clean and lubricate the knife according to the operating conditions.

Recommended lubricants:

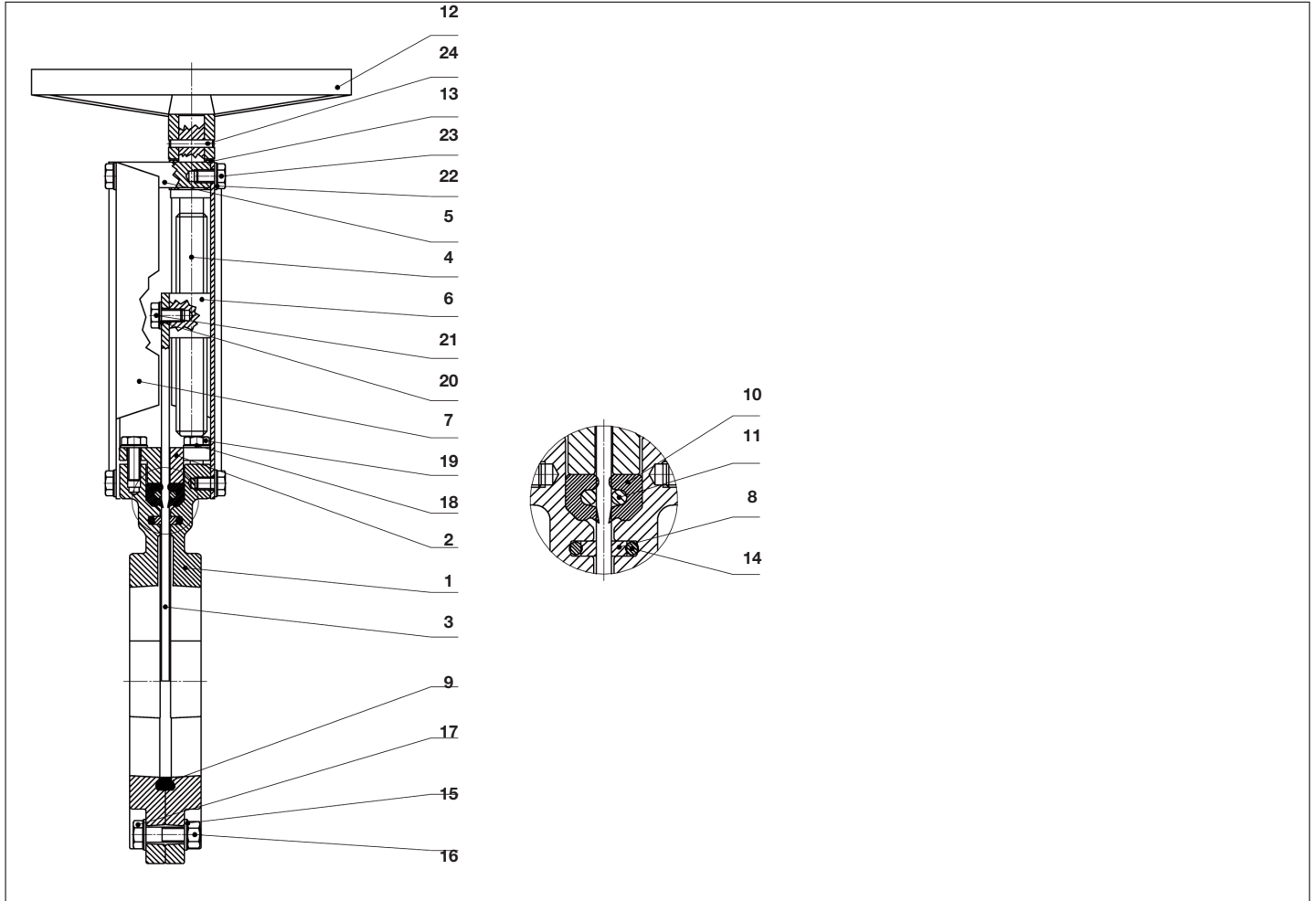
- Knife and seals: Fuchs Chemplex Si 2; Fuchs Notropeen Si 1; Klüber Unisilikon L 641
- Stem and stem nut: KLÜBERPLEX BE 31-502 for electric drives Manufacturer: Klüber Lubrication München AG, Germany

6.3.5 Recommendations for replacing spare parts

Recommendations for replacing spare parts see table 4

- | | | |
|---|--------|----------------|
| a) Replacement of lateral seal | Unit 1 | every 2 years |
| b) Replacement of U-profiled seal and scraper | Unit 2 | when necessary |
| c) Replacement of stem, stem nut, slide bearing | Unit 3 | when necessary |

These recommended replacement intervals apply to standard operating conditions. In case of extreme operating conditions, they have to be shortened accordingly.



Picture 4: Parts, position

Pos.	Description	SET 1	SET 2	SET 3
1	body			
2	thrust piece			
3	knife			
4	stem			•
5	bearing plate			
6	stem nut			•
7	protection panels			
8	scraper profile		•	
9	U profiled gasket		•	
10	lateral seal	•		
11	guiding rod	•	•	
12	handwheel			
13	guiding disk			•
14	thrust profile		•	
15	washer DIN 125			
16	hexagonal nut DIN EN 24032 (ISO 4032)			
17	hexagon head screw DIN EN 24014 (ISO 4014)			
18	washer DN 125			
19	hexagon head screw DIN EN 24017 (ISO 4017)			
20	washer DN 125			•
21	hexagon head screw DIN EN 24017 (ISO 4017)			•
22	washer DN 125			
23	hexagon head screw DIN EN 24017 (ISO 4017)			
24	spring-type straight pins (ISO 8752)			

Table 4: Parts list and recommended spare part units

7 Troubleshooting

Observe Section „6.1 General safety instructions“ for all repair and maintenance works!

Problem	Cause	Remedial action
The knife does not move / is jammed	Lateral seal is too tight	Evenly unfasten the screws of the thrust piece
	Stem or stem nut is damaged	Check the stem for traces of jamming, clean and lubricate the parts, replace the parts if necessary!
	Foreign particle is jammed in the seat	Open the valve (up to 10 - 30% of the stroke) and close it again; repeat this action several times
	Knife is blocked by hardened particles in the medium	Unfasten the thrust piece by unfastening the screws evenly, slightly hammer against the knife from above and from the side with a rubber mallet, and try to operate the valve. If this does not solve the problem: dismantle the valve, dismantle the knife, clean it, lubricate it, replace damaged parts. See also Section 6.1!
High operating forces	Lateral seal is too tight	Evenly unfasten the screws of the thrust piece See also Section 6.1!
	Dirt sticks to the knife Dry run of the knife	Open the valve, clean the knife, lubricate it
	Stem and stem nut have run dry	Lubricate the parts
Leak at the knife passage	Foreign particle is jammed in the seat	Open the valve (up to 10 - 30% of the stroke) and close it again, repeat this action several times, remove jammed particle if possible
	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	Retighten the lateral seal according to Section 6.3.2 See also Section 6.1!
	Damaged lateral seal	Replace the lateral seal according to Section 6.3.2 Clean the knife and lubricate it See also Section 6.1!
	Knife is heavily soiled	Open the valve, clean the knife, lubricate it

8 How to contact us

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