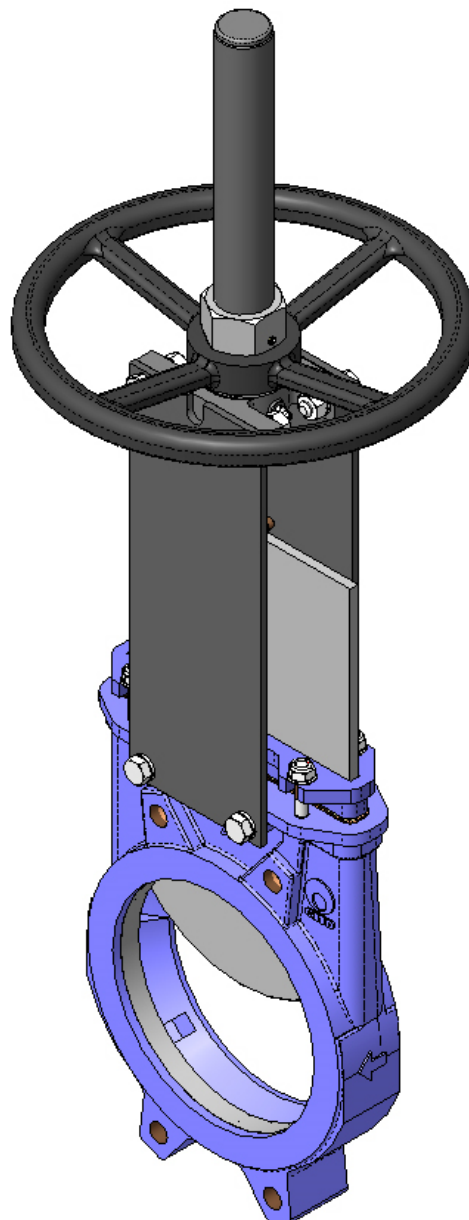




15/04/2016

# INSTRUCTIONS AND MAINTENANCE MANUAL

## SERIES: A



C.M.O.

Amategui Aldea 142, 20400 Txarama-Tolosa (SPAIN)

MAN-A.EN03

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Page 1

# KNIFE-GATE VALVES

# A SERIES

## ASSEMBLY

### DESCRIPTION

Machinery Directive: **DIR 2006/42/EC (MACHINERY)**

Pressure Equipment Directive: **DIR 97/23/EC (PED) ART.3, P.3**

Potential Explosive Atmospheres Directive: **DIR 94/9/CE (ATEX) CAT.3 ZONE 2 and 22 GD.**

Valve A complies with the Directive on Equipment and Protective Systems for Potentially Explosive Atmospheres. In these cases the logo will appear on the identification label. This label shows the exact classification of the zone in which the valve can be used. The user is responsible for its use in any other zone.



### HANDLING

When handling the equipment please pay special attention to the following points:

- To prevent damage, especially to the anticorrosive protection, it is recommended to use soft straps to lift the **C.M.O.** knife gate valves. These straps must be fitted to the top of valve, around its body.
- Do not lift the valve or hold it by the actuator. Lifting the valve by the actuator can lead to operating problems as it is not designed to withstand the valve's weight.
- Do not lift the valve or hold it by the flow passage area. The valve's O-ring seal is located in this area. If the valve is held and lifted by this area it can damage the surface and the O-ring seal and lead to leakage problems whilst the valve is operating.
- **SAFETY WARNING:** Before handling the valve check that the crane to be used is capable of bearing its weight.



### INSTALLATION

In order to avoid personal harm and other type of damage (to property, the plant, etc.) please follow these recommendations:

- The staff responsible for the handling and maintenance of the equipment must be qualified and trained in operations with this type of equipment.
- Use appropriate personal protection (gloves, safety boots, goggles, helmet, reflective vest...).
- Shut off all operating lines to the valve and put up a warning sign.
- Completely isolate the valve from the whole process.
- Depressurise the process.
- Drain all the line's fluid through the valve.
- Use hand tools not electric tools during the installation and maintenance, in accordance with EN13463-1(15).



Before installation, inspect the valve body and components for any possible damage occurred during transport or storage.

Make sure that the valve's inside cavities are clean. Inspect the pipes and the flanges to make sure they contain no foreign material and are clean.

The valve is unidirectional and an arrow is marked on the body indicating the flow direction.

The word SEAT is also marked on one side of the body (near the packing gland) to indicate the side where the sealing joint is located.

As a rule, when the valve operates with clean liquids or with low solid content it is recommended to install it so that the pressure pushes the gate against the seat. That way, the fluid direction will be the same as the direction indicated by the arrow on the body (Fig. 1).

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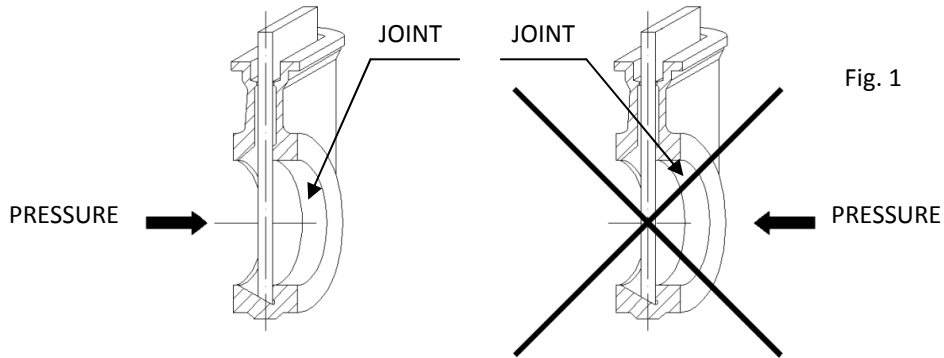
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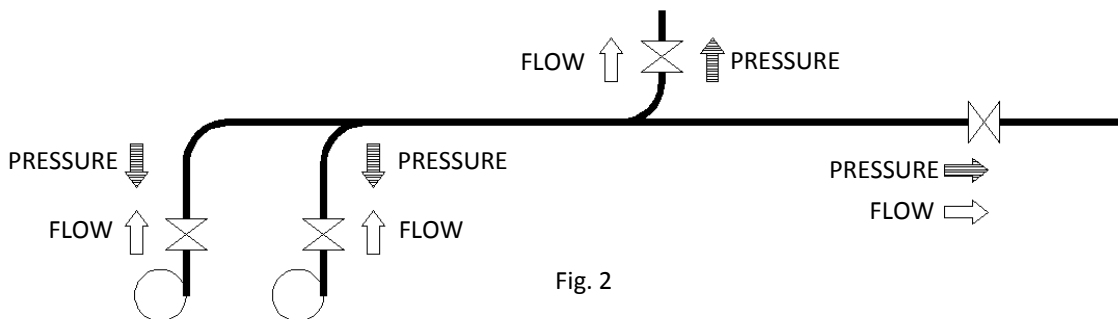
Page 2

# KNIFE-GATE VALVES

# A SERIES

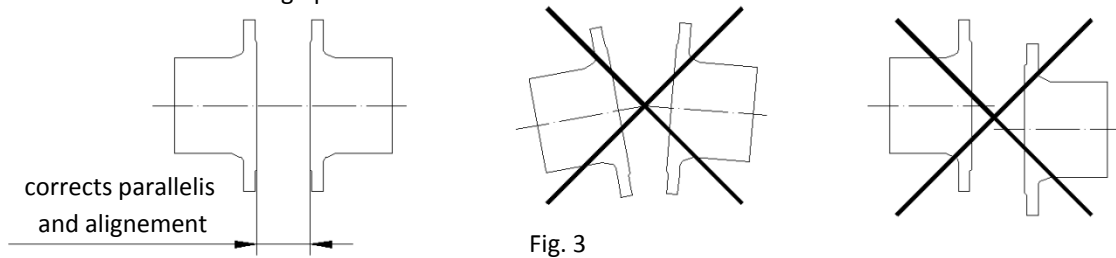


Please note that the direction of the fluid and the pressure do not always coincide (Fig. 2).



Special care must be taken to maintain the correct distance (gap) between the flanges and ensure they are correctly aligned and parallel (Fig. 3).

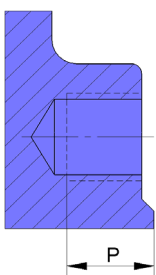
The incorrect position or installation of the flanges can cause deformations on the valve's body which can cause difficulties during operation.



It is very important to make sure that the valve is correctly aligned and parallel to the flanges to prevent leakages and avoid deformations.

The screws in the tapped blind holes will have a maximum depth and will never reach the bottom of the hole.

The following table (Table 1) shows the maximum thread depth in the holes and the maximum torque to be applied to the screws when the valve is installed between flanges:



ND	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200
P	8	8	9	9	9	10	10	12	12	21	21	22	22	22	22	22	20	20	22
TORQUE (Nm)	45	45	45	45	45	88	88	88	88	88	152	152	152	223	223	303	303	412	529

Table 1

C.M.O.

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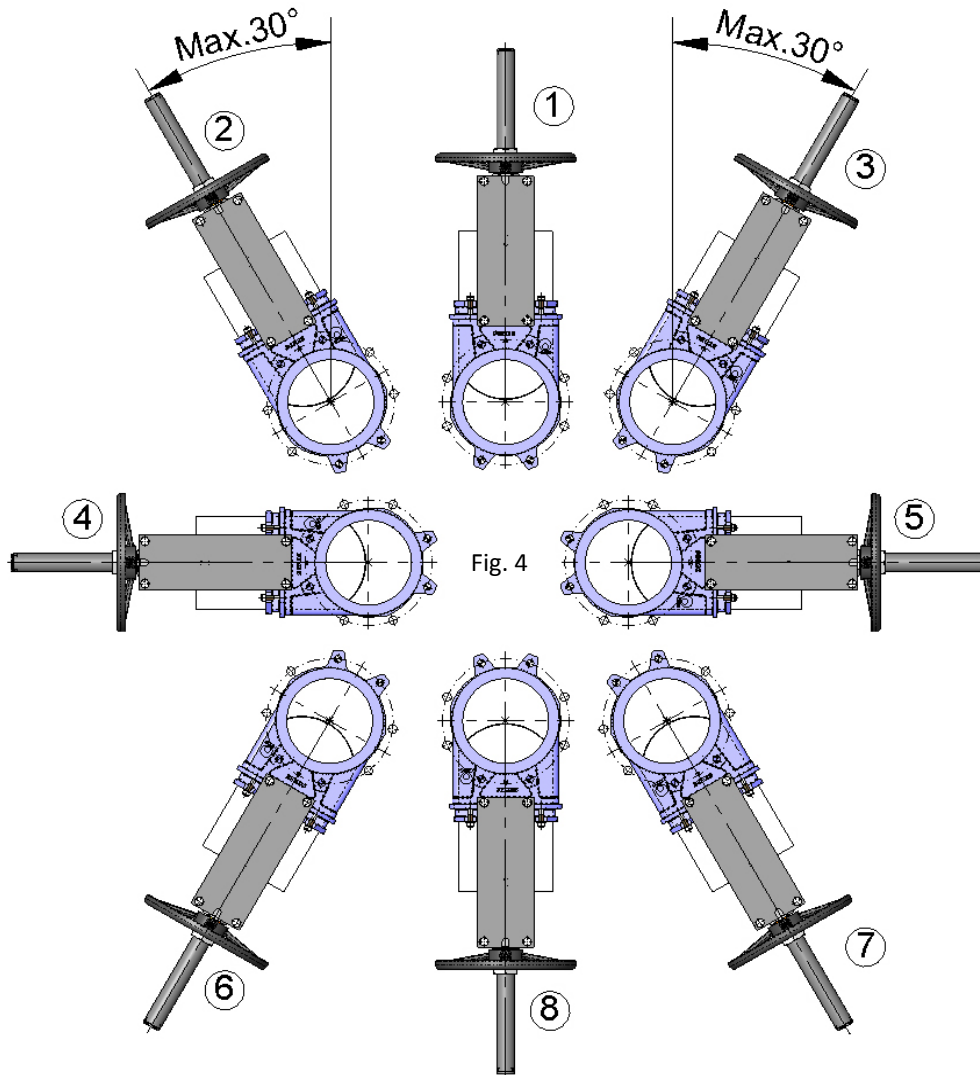
## KNIFE-GATE VALVES

## A SERIES

### ASSEMBLY POSITIONS (Horizontal Pipe)

C.M.O. valves can be assembled in all positions; however, recommendations do exist for some of them.

**Position 1:** This is the most advisable position.



**Position 8:** The valve can be installed in this position but you are advised to contact C.M.O. if this is necessary.

**Positions 2, 3, 6 and 7:** For standard valves larger than ND200 and maximum angle permitted with the vertical of 30°. For sizes smaller than ND250 the angle can be increased up to 90°.

This knife gate valve has no gate guides on the sides and the larger the valve the heavier the gate. In these positions, the gate can rub against the body during operation and stop it. For that reason it is a very important point to consider.

To install valves larger than ND200 in any of these positions please contact C.M.O..

In these positions it is recommended to secure the actuator to prevent the shaft from bending due to the weight of the actuator. If this is not carried out it could lead to operating problems.

## KNIFE-GATE VALVES

## A SERIES

**Positions 4 and 5:** For valves larger than ND200 please contact **C.M.O.**. For sizes smaller than ND250 the valves can be installed in these positions.

This knife gate valve has no gate guides on the corners and the larger the valve the heavier the gate. In these positions, the gate can rub against the body during operation and stop it. For that reason it is a very important point to consider.

To install valves larger than ND200 in any of these positions please contact **C.M.O.**.

In all these positions it is recommended to secure the actuator to prevent the shaft from bending due to the weight of the actuator. If this is not taken into account, it can lead to problems during the valve's operation.

### ASSEMBLY POSITIONS (Vertical/Inclined Pipe)

**C.M.O.** valves can be assembled in all positions; however, recommendations do exist for some of them.

**Positions 1, 2 and 3:** In these positions it is recommended to secure the actuator as its weight can cause the shaft to bend. If this is not taken into account, it can lead to problems during operation.

Once the valve has been installed, check that all the screws and nuts have been correctly tightened and that the whole valve action system has been correctly adjusted (electrical connections, pneumatic connections, instruments...).

Even if the valve has been assembled and tested at **C.M.O.**'s facilities, during the handling and transport the screws on the packing gland tend to come loose and must be re-tightened.

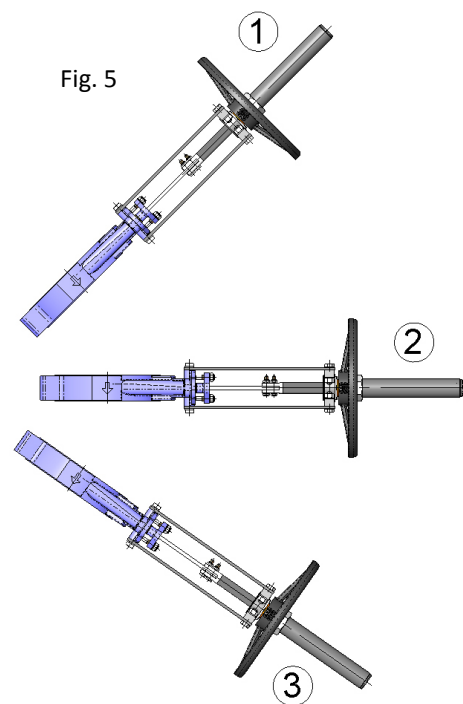
Once the valve is installed in the pipeline and it has been pressurised, it is very important to check for any leakages from the packing gland to the atmosphere.

In the event of a leakage, tighten the screws on the packing gland crosswise until the leakage stops, ensuring that there is no contact between the packing gland and the gate.

A very high tightening torque on the packing gland's screws can lead to problems, such as an increase in the valve's torque, reduction in the packing's working life, or the breaking of the packing gland. The tightening torques are indicated in the following table (Table 2):

Tightening torques for packing gland screws	
ND50 to ND125	25 Nm
ND150 to ND300	30 Nm
ND350 to ND1200	35 Nm

Table 2



Once the valve is installed in its place, check that the flanges and electrical and pneumatic connections are secure. If electrical connections are present or you are in an ATEX zone, earth connections must be made before starting.



In an ATEX zone, check the continuity between the valve and the pipeline (EN 12266-2, annex B, points B.2.2.2. and B.2.3.1.). Check the pipeline's earth connection and the conductivity between the outlet and inlet pipelines.

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## KNIFE-GATE VALVES

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### ACTUATOR

#### HANDWHEEL (Rising or Non-Rising Stem and Stem with Gear Box)

To operate the valve: Turn the handwheel clockwise to close or anticlockwise to open.

#### CHAINWHEEL

To operate the valve pull one of the chain's vertical drops, taking into account that locking is carried out when the chainwheel turns clockwise.

#### LEVER

First loosen the position locking clamp located on the yoke. Once it is unlocked raise the lever to open or lower it to close. To complete the operation lock the lever again.

#### PNEUMATIC (double and single acting),

**C.M.O.** pneumatic actuators are designed to be connected to a 6 kg/cm<sup>2</sup> pneumatic network, although these cylinders support up to 10 kg/cm<sup>2</sup>.

The pressurised air used for the pneumatic actuator must be correctly filtered and lubricated.

This type of actuator does not require any adjustment, due to the fact that the pneumatic cylinder is designed for the exact stroke required by the valve.

#### HYDRAULIC (double and single acting)

**C.M.O.** hydraulic actuators are designed to work at a standard pressure of 135 kg/cm<sup>2</sup>.

This type of actuator does not require any adjustment, due to the fact that the hydraulic cylinder is designed for the exact stroke required by the valve.

#### MOTORISED (Rising or non-rising stem)

If the valve incorporates a motorised actuator it will be accompanied with the electric actuator supplier's instructions.

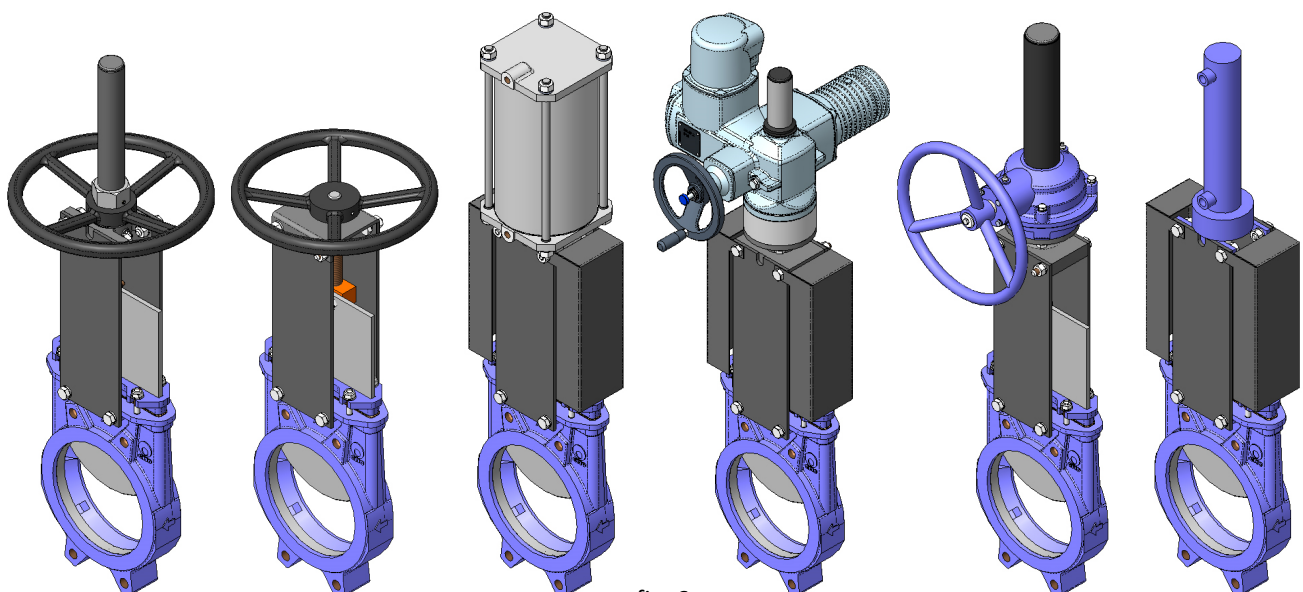


fig. 6

Handwheel  
with rising  
stem

Handwheel  
with NON-  
rising stem

Pneumatic  
actuator

Electric-motor  
actuator

Handwheel  
with gear box

Hydraulic  
actuator

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## KNIFE-GATE VALVES

## A SERIES

### MAINTENANCE

In order to avoid personal harm and other types of damage (to the plant, etc.) please follow these recommendations:



- The staff member responsible for the installation, operation and maintenance of the valves must be qualified and trained in the operation of similar valves.
- Appropriate personal protection must be used (gloves, safety boots, goggles, helmet...).
- Shut off all operating lines to the valve and put up a warning sign.
- Completely isolate the valve from the process.
- Fully depressurise the process.
- Drain all the line's fluid through the valve.
- Use hand tools not electric tools during the installation and maintenance, in accordance with **EN13463-1(15)**.

The only maintenance required in this type of valve is to change the seat's rubber joint (if soft seated valve is used) and the packing. It is recommended to check the seal every 6 months, however its working life will depend on the valve's operating conditions, such as: Pressure, temperature, number of operations, fluid composition, among others.



In an ATEX zone, electrostatic charges may be present inside the valve, which can cause explosions. The user is responsible for minimising the risks.

- The maintenance staff must consider the risks of explosion and ATEX training is recommended.



- If the fluid transported constitutes an internal explosive atmosphere, the user must regularly check the installation's correct watertight integrity.

- Regular cleaning of the valve to prevent accumulation of dust.

- Assemblies not permitted at the end of the line.

- Avoid painting the products supplied.

#### REPLACING THE SEAL (except metal/metal)

1. Make sure there is absolutely no pressure and fluid in the installation.
2. Remove the valve from the pipeline.
3. Remove the actuator and safety guards (if present) by unscrewing and removing the bolts connecting the stem to the gate and the support plate to the body.
4. Remove the packing gland (3).
5. Remove the old packing (12 and 13), taking care not to damage the packing rubber strip.
6. Remove the gate (2) carefully without losing the nylon slides (17).
7. Clean the inside surfaces of the valve.
8. Remove the ring (6) that secures the sealing joint (5). To this end, apply a few sharp knocks to the outside with a bronze object at the base of the ring until it comes out.
9. Remove the old sealing joint (5) and clean its housing.
10. Fit a new sealing joint (5) with the same dimensions as the old one or use the dimensions shown below (table 3).
11. Insert the retaining ring (6) in its original position as indicated:

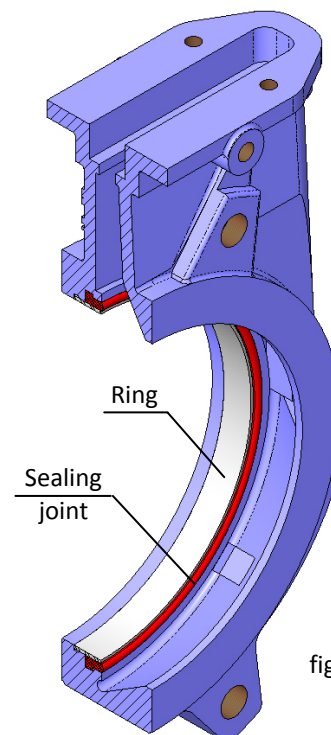



fig. 7

## KNIFE-GATE VALVES

## A SERIES


- Place the retaining ring (6) in perfect alignment parallel to the sealing joint.
- Push the ring (6) as a whole towards the base of the channel.

12. The valve assembly will be performed in exactly the opposite way to the disassembly.

 **Note:** The numbers in brackets refer to the components list in Table 7.

ND	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200
Length (mm)	190	250	290	370	445	530	690	845	1005	1175	1350	1520	1710	2020	2300	2680	3030	3367	3995

Table 3

 **Note:** During the assembly of the new sealing joint it is recommended to apply "Vaseline" to the seal to facilitate the assembly process and the correct operation of the valve (do not use oil or grease); table 4 below shows details of the Vaseline used by **C.M.O.**.

WHITE PETROLEUM JELLY		
Saybolt colour	ASTM D-156	15
Melting point (°C)	ASTM D-127	60
Viscosity at 100°C	ASTM D-445	5
Penetration 25°C mm/10	ASTM D-937	165
Silicone content	None	
Pharmacopeia BP	OK	

Table 4

### REPLACING THE SEALING JOINT (Teflon or PTFE)

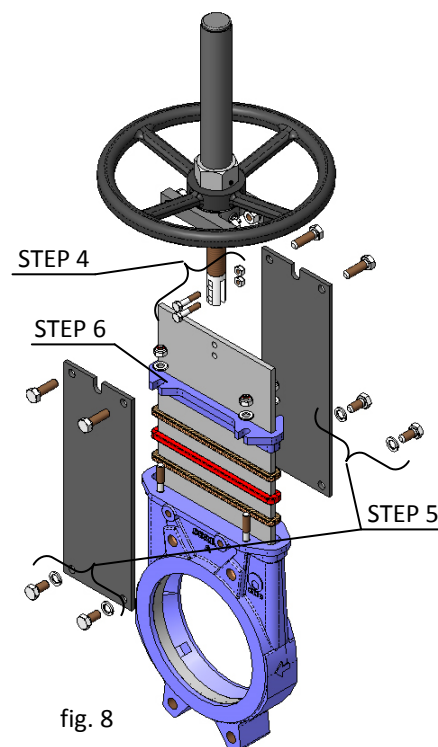
The following aspects must be considered:

- To obtain greater watertight integrity in the stainless steel bodies it is advisable to apply plastic glue to the joint housing. If the body is painted this is not necessary.
- With the rubber seal tab pointing outwards, make a circle and then form a heart shape.
- It is recommendable to insert the joint in the top part, press the arched part and insert the seal into the housing.

### REPLACING THE PACKING

1. Make sure there is absolutely no pressure and fluid in the installation.
2. Place the valve in open position.
3. If the valve has safety protections, remove them.
4. Loosen the screws that connect the stem or rod to the gate.
5. Release the connection between the support plates and the body, remove the actuator.
6. Loosen and remove the packing gland (4).
7. Remove the old packing (5 and 6) using a pointed tool, taking care not to damage the surface of the gate (2).
8. Carefully clean the packing and make sure there are no residues anywhere so that the new packing strips fit correctly.
9. Insert the new packing (5 and 6). During this operation it is very important for both ends to be perfectly joined. Below we show the packing dimensions (Table 5).

As standard, **C.M.O.** valve packing is composed of 3 lines (2 packing lines and 1 rubber joint line in the middle).



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## KNIFE-GATE VALVES


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10. Place the packing gland in its original position (step 6), making sure it does not touch the gate, carefully tighten all the screws crosswise and make sure the same distance is left between the gate and the packing gland on both sides.
11. Screw down the support plates and the stem, in reverse order to that described in steps 4 and 5.
12. Perform several manoeuvres with no load, checking the correct operation of the valve and ensuring the packing gland is correctly centred.
13. Pressurise the valve in the line and tighten the packing gland crosswise, enough to prevent leakages to the atmosphere.

 **Note:** The numbers in brackets refer to the components list in Table 7.

DIAMETER	PACKING	RUBBER RING
ND50	2 lines of 8 mm <sup>2</sup> x 204 mm.	1 line of 8 mm <sup>2</sup> x 204 mm.
ND65	2 lines of 8 mm <sup>2</sup> x 234 mm.	1 line of 8 mm <sup>2</sup> x 234 mm.
ND80	2 lines of 8 mm <sup>2</sup> x 264 mm.	1 line of 8 mm <sup>2</sup> x 264 mm.
ND100	2 lines of 8 mm <sup>2</sup> x 304 mm.	1 line of 8 mm <sup>2</sup> x 304 mm.
ND125	2 lines of 8 mm <sup>2</sup> x 356 mm.	1 line of 8 mm <sup>2</sup> x 356 mm.
ND150	2 lines of 8 mm <sup>2</sup> x 406 mm.	1 line of 8 mm <sup>2</sup> x 406 mm.
ND200	2 lines of 8 mm <sup>2</sup> x 516 mm.	1 line of 8 mm <sup>2</sup> x 516 mm.
ND250	2 lines of 10 mm <sup>2</sup> x 636 mm.	1 line of 10 mm <sup>2</sup> x 636 mm.
ND300	2 lines of 10 mm <sup>2</sup> x 740 mm.	1 line of 10 mm <sup>2</sup> x 740 mm.
ND350	2 lines of 10 mm <sup>2</sup> x 810 mm.	1 line of 10 mm <sup>2</sup> x 810 mm.
ND400	2 lines of 10 mm <sup>2</sup> x 928 mm.	1 line of 10 mm <sup>2</sup> x 928 mm.
ND450	2 lines of 10 mm <sup>2</sup> x 1,028 mm.	1 line of 10 mm <sup>2</sup> x 1,028 mm.
ND500	2 lines of 14 mm <sup>2</sup> x 1,144 mm.	1 line of 14 mm <sup>2</sup> x 1,144 mm.
ND600	2 lines of 14 mm <sup>2</sup> x 1,346 mm.	1 line of 14 mm <sup>2</sup> x 1,346 mm.

Table 5

 **Note:** If it is not possible to place a rubber joint in the middle another packing line should be used instead.

### LUBRICATION

It is recommended to lubricate the stem twice a year by removing the protection cap and filling it with grease up to half its volume.



After the maintenance and in an ATEX zone, you must check the electrical continuity between the pipe and the rest of the valve's components, such as the body, gate, stem, with EN 12266-2 Standard, annex B, points B.2.2.2. and B.2.3.1.

## KNIFE-GATE VALVES

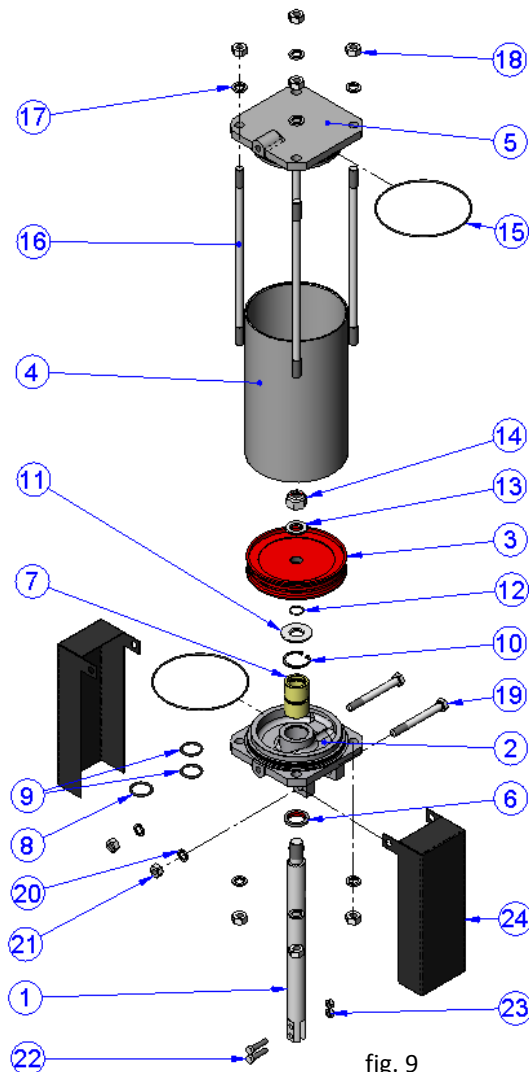
## A SERIES

### MAINTENANCE OF THE PNEUMATIC ACTUATOR

The pneumatic cylinders in our valves are manufactured and assembled at our premises. The maintenance of these cylinders is simple, if your need to replace any elements and you have any questions please consult **C.M.O.**. Below is an exploded diagram of the pneumatic actuator and a list of the cylinder's components. The top cover and the support cover are usually made of aluminium, but from pneumatic cylinders greater than  $\varnothing 200$  mm, they are made of cast iron GJS-400.

The maintenance kit normally includes: The socket and its joints and the scraper, and if the customer wishes the piston is also supplied. Below we show the steps to follow to replace these parts.

1. Position the valve in closed position and shut off the pneumatic circuit pressure.
2. Loosen the cylinder air input connections.
3. Release and remove the cylinder cap (5), the cylinder tube (4) and the tie rods (16).
4. Loosen the nut (14) which connects the piston (3) and the rod (1), remove the parts. Disassemble the cir-clip (10) and remove socket (7) with its joints (8,9) .
5. Release and remove the cylinder head (2), in order to remove the scraper (6).
6. Replace the damaged parts with new ones and assemble the actuator in the opposite order to that described for the disassembly.



PNEUMATIC ACTUATOR		
POS.	DESCRIPTION	MATERIAL
1	STEM	AISI-304
2	COVER SUPPORT	ALUMINIUM
3	PISTON	S275JR + EPDM
4	CASING	ALUMINIUM
5	UPPER COVER	ALUMINIUM
6	SCRAPER	NITRILE
7	SOCKET	NYLON
8	EXTERIOR O-RING	NITRILE
9	INTERIOR O-RING	NITRILE.
10	CIR-CLIP	STEEL
11	WASHER	ST ZINC
12	O-RING	NITRILE.
13	WASHER	ST ZINC
14	SELF-LOCKING NUT	5.6 ZINC
15	O-RING	NITRILE.
16	TIES	F-114 ZINC
17	WASHER	ST ZINC
18	NUT	5.6 ZINC
19	SCREW	5.6 ZINC
20	WASHER	ST ZINC
21	NUT	5.6 ZINC
22	SCREW	A-2
23	SELF-LOCKING NUT	A-2
24	PROTECTION	S275JR

Table 6

C.M.O.

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### STORAGE

To ensure the valve is in optimum conditions of use after long periods of storage, it should be stored in a well-ventilated place at temperatures below 30°C.

It is not advisable, but if it is stored outside, the valve must be covered to protect it from heat and direct sunlight, with good ventilation to prevent humidity. The following aspects must be considered for storage purposes:

- The storage place must be dry and under cover.
- It is not recommended to store the equipment outdoors with direct exposure to adverse weather conditions, such as rain, wind, etc. Even less so if the equipment is not protected with packaging.
- This recommendation is even more important in areas with high humidity and saline environments. Wind can carry dust and particles which can come into contact with the valve's mobile parts and this can lead to operating difficulties. The actuator system can also be damaged due to the introduction of particles in the different elements.
- The equipment must be stored on a flat surface to avoid deformations.
- If the equipment is stored without suitable packaging it is important to keep the valve's mobile parts lubricated, for this reason it is recommended to carry out regular checks and lubrication.
- Likewise, if there are any machined surfaces without surface protection it is important for some form of protection to be applied to prevent the appearance of corrosion.



# KNIFE-GATE VALVES

# A SERIES

## COMPONENTS LIST (manual valve)

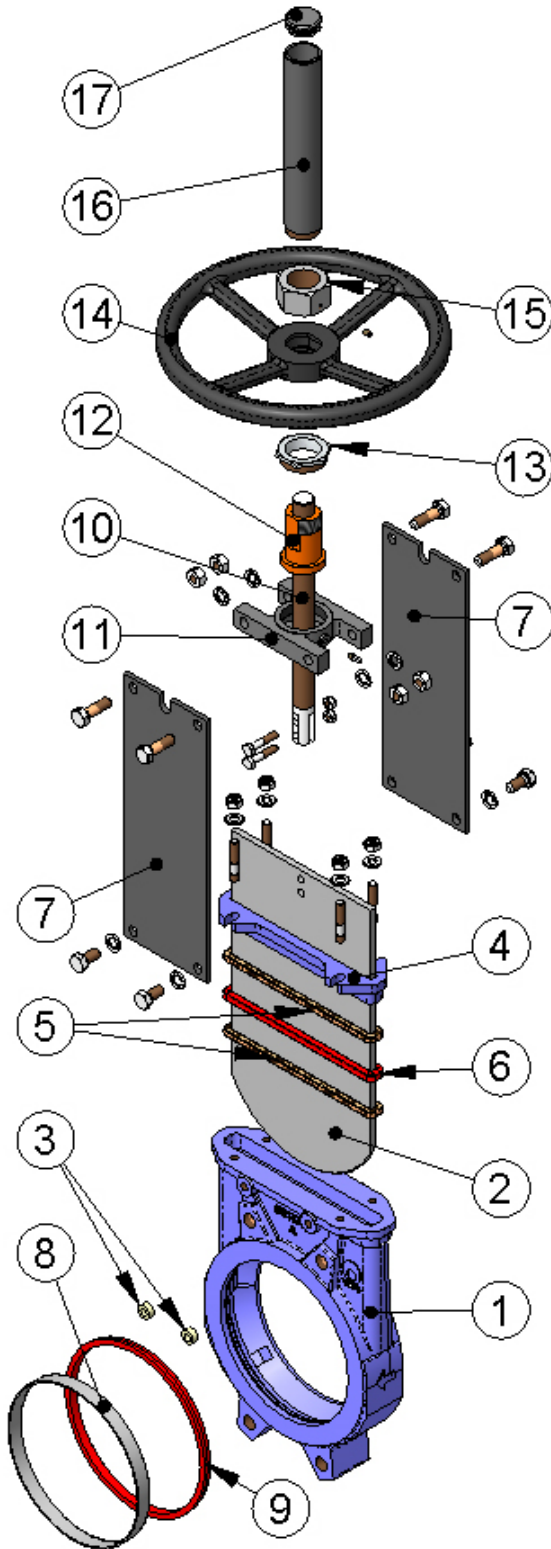


fig. 10

LISTADO DE COMPONENTES	
POS	DESCRIPCION
1	BODY
2	GATE
3	SLIDES
4	PACKING GLAND
5	PACKING
6	SEAL (PACKING)
7	SUPPORT PLATES
8	RING
9	SEAL
10	STEM
11	YOKE
12	STEM NUT
13	STOPPER NUT
14	HANDWHEEL
15	HOOD NUT
16	HOOD
17	PROTECTION CAP

Table 7