

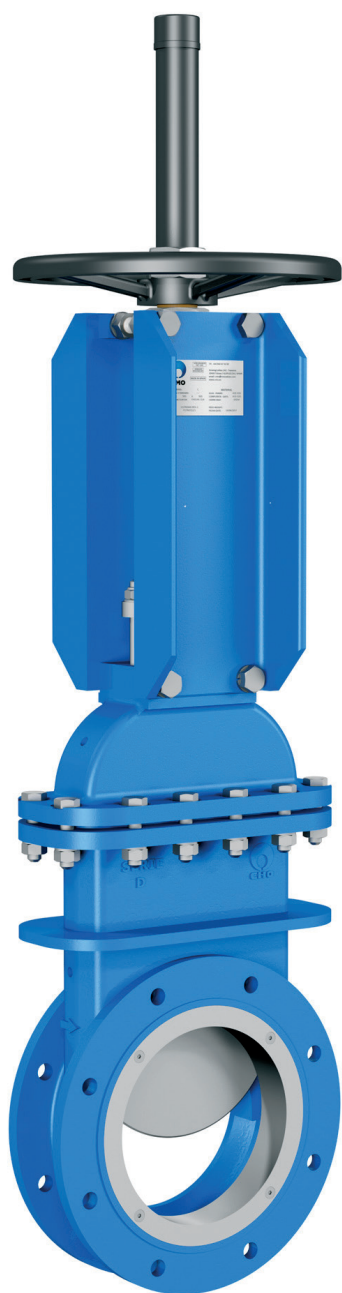
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## INSTRUCTIONS AND MAINTENANCE MANUAL

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# INSTRUCTIONS AND MAINTENANCE MANUAL

## ASSEMBLY

### APPLICATION OF EUROPEAN DIRECTIVES

See document of European Directives applicable to **CMO Valves**.

The **D valve** complies with the Directive on Equipment and Protective Systems for Use in 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:

- **SAFETY WARNING:** Before handling the valve check that the crane to be used is capable of bearing its weight.
- 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 by holding it in 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.
- To prevent damage, especially to the anticorrosive protection, it is recommended to use soft straps to lift the knife gate valves. These straps must be fitted around the top of body.
- Packing in wooden boxes: If the equipment is packed in wooden boxes these must be provided with clearly marked holding areas where the slings will be placed when securing them. In the event that two or more valves are packed together, separation and securing elements must be provided between them to prevent possible movements, knocks and friction during transport. When storing two or more valves in the same box you must ensure they are correctly supported to prevent deformations. In the case of dispatches by sea we recommend the use of vacuum bags inside the boxes to protect the equipment from contact with sea water.
- Pay special attention to maintaining the correct levelling of the valves during loading and unloading as well as during transport to prevent deformations in the equipment. For this purpose we recommend the use of mounts or trestles.

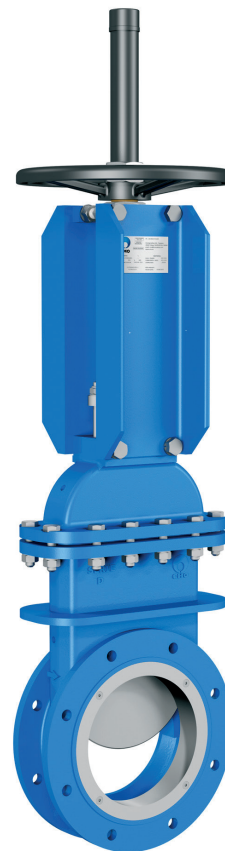


Fig. 1

### 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 according to current regulations.

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.



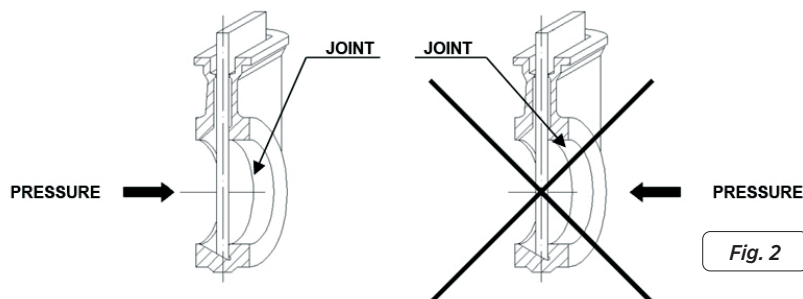
The valve is unidirectional and an arrow is marked on the body indicating the flow direction. The word SEAT is also marked on one side of the body (near the packing gland) to indicate the side where the sealing joint is located.

**IMPORTANT:** The valve must always be installed in the OPEN position.

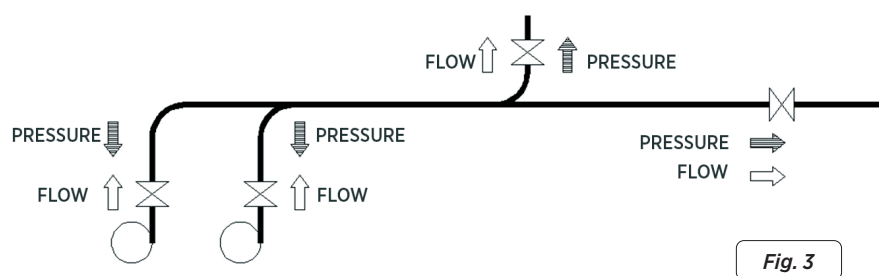
## ADVANTAGE

### ASPECTS TO BE CONSIDERED DURING ASSEMBLY

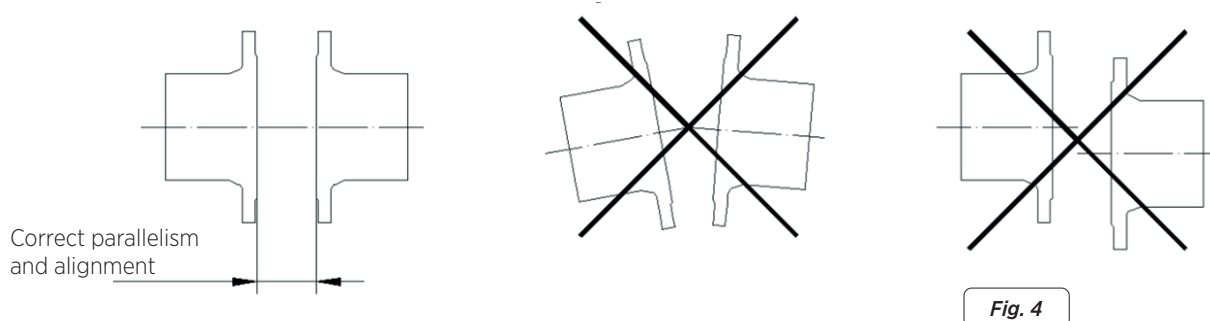
As a rule, when the valve operates with clean liquids or with low solid content it is recommended to install it so that the pressure pushes the gate against the seat. That way, the fluid direction will be the same as the direction indicated by the arrow on the body (fig. 2).



Please note that the direction of the fluid and the pressure do not always coincide (fig. 3).



Special care must be taken to maintain the correct distance (gap) between the flanges and ensure they are correctly aligned and parallel (fig. 4). The incorrect position or installation of the flanges can cause deformations on the valve's body which can cause difficulties during operation.

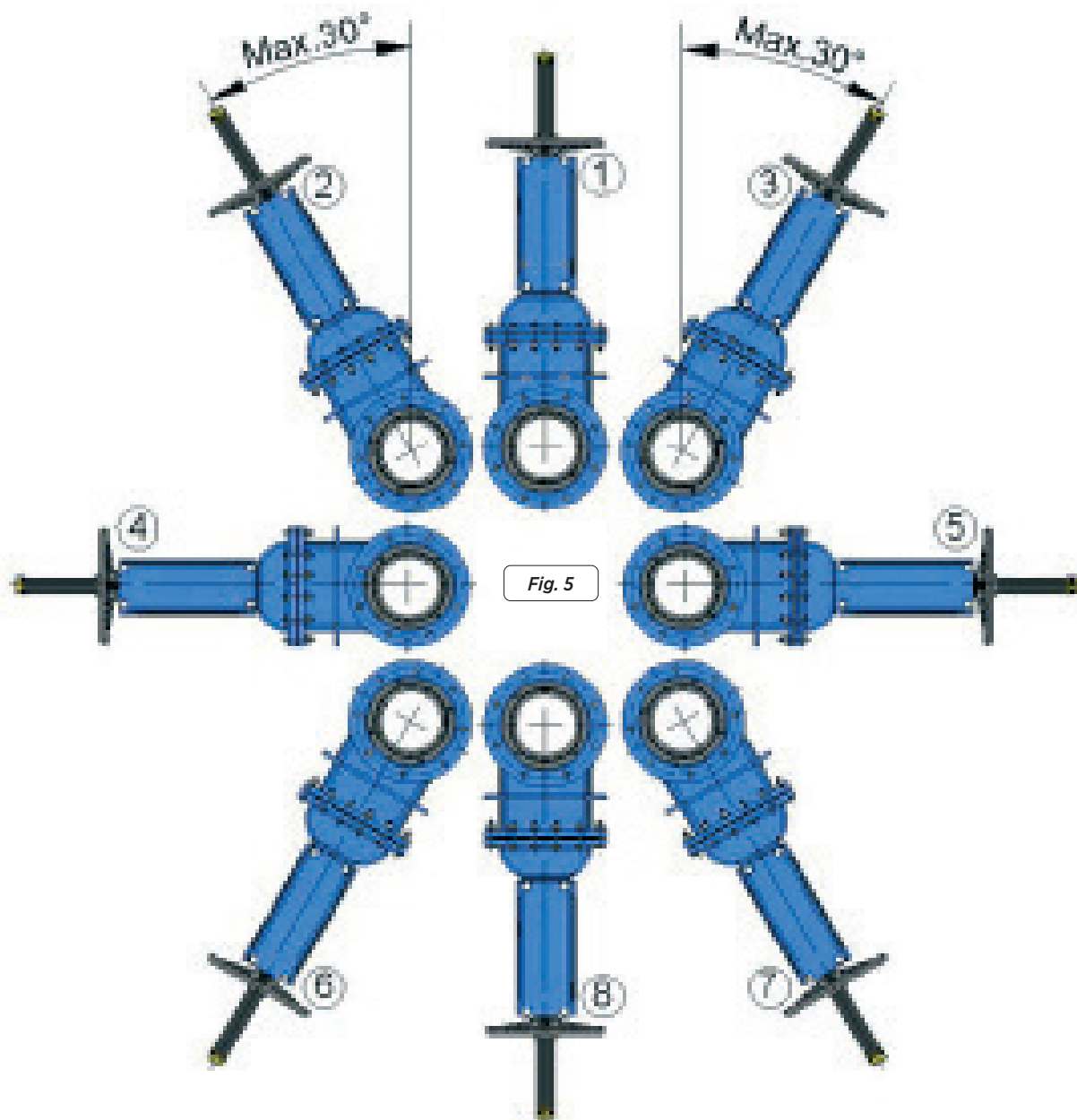


It is very important to make sure that the valve is correctly aligned and parallel to the flanges to prevent leakages and avoid deformations. The screws in the tapped blind holes will have a maximum depth and will never reach the bottom of the hole.

## ASSEMBLY POSITIONS (Horizontal Pipe)

The 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 **CMO Valves** if this is necessary.

**Positions 2, 3, 6 and 7:** For large valves (more than DN300), the maximum angle with the installation vertical is 30°. For smaller sizes the angle can be increased up to 90° (positions 4 and 5).

When it is necessary to install large valves in any of these positions, it is recommended to consult **CMO Valves**, as in these cases, due to the weight of the actuator, a suitable support must be made to prevent deformations and operating problems in the valves.

**Positions 4 and 5:** For smaller sized valves, the valves can be installed in these positions.

To install large valves (over DN300) in any of these positions, please contact **CMO Valves**.

In these cases, due to the weight of the actuator, a suitable support must be made to prevent deformations and operating problems in the valves.

## ASSEMBLY POSITIONS (Vertical/Inclined Pipe)

**CMO Valves** can be assembled in all positions; however, certain aspects must be taken into account:

**Positions 1, 2 and 3:** In these positions, it is recommended to make suitable support, because, due to the weight of the actuator, deformations may arise and this can lead to operating problems in the valve.

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, etc).

All **CMO Valves** are tested at its facilities, however, during handling and transport the screws on the packing gland can 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 nuts on the packing gland until the leakage stops, ensuring that there is no contact between the packing gland and the spindle.

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.

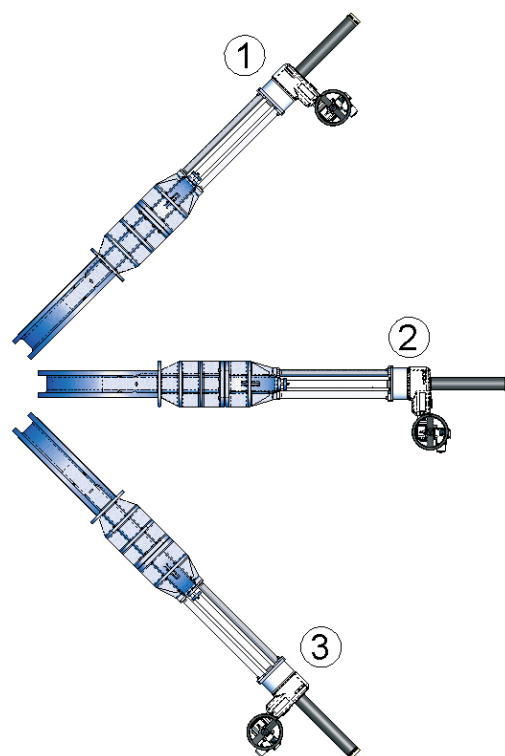


Fig. 6

## ACCIONAMIENTOS

### HANDWHEEL

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)

The pneumatic actuators are designed to be connected to a 6 bar pneumatic network, although these cylinders support up to 10 bar. 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

The hydraulic actuators are designed to work at a standard pressure of 135 bar. 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.



H/A = RISING STEM  
H/NA = NON-RISING STEM



Fig. 7

## MAINTENANCE

**CMO Valves** will not be liable if the valves suffer any damage due to improper handling or without proper authorisation. The valves must not be modified except under express authorisation from **CMO Valves**. In order to avoid personal or material damage when performing the maintenance tasks, it is recommended to follow these instructions:

- The staff responsible for the maintenance or operation of the equipment must be qualified and trained.
- Use suitable Personal Protective Equipment (PPE) (gloves, safety boots, goggles...).
- Shut off all lines that affect the valve and put up a warning sign to inform about the work being performed.
- Completely isolate the valve from the whole process. Depressurise the process.
- Drain all the line fluid through the valve.
- Use hand tools not electric tools during the installation and maintenance, in according to current regulations.

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

## 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

## IMPORTANT SAFETY ASPECTS

- In order to work under ideal safety conditions, the magnetic and electrical elements must be in idle mode and the air tanks depressurised. The electrical control cabinets must also be out of service. The maintenance staff must be up to date with the safety regulations and work can only start under orders from the site's safety staff.
- The safety areas should be clearly marked, whilst supporting auxiliary equipment (ladders, scaffolding, etc) on levers or moving parts in a way which may produce movement of the gate must be avoided.
- In equipment with spring return actuators, the gate must be mechanically locked and only unlocked when the actuator is pressurised.
- In equipment with electrical actuator, it is recommended to disconnect it from the mains in order to access the mobile parts without any risk.
- Due to its great importance, you must check that the valve shaft has no load before disassembling the actuator system.

Taking into account the recommendations indicated, below we indicate the maintenance operations carried out in this type of equipment:

## REPLACING THE SEALING JOINT (except metal/metal)

1. Make sure there is absolutely no pressure and fluid in the installation.
2. Remove the valve from the pipe.
3. Use the actuator to operate the valve, leaving it in open position.
4. Clean the inside surfaces of the valve.
5. Remove the ring (10) that secures the sealing joint (9). Then release the screws which secure the ring (10) to the body (1), located on the face of the valve clamp flange, and apply a few blows outward with a bronze object at the base of ring until it comes out.
6. Remove the old seal (9) and clean its housing.
7. Fit a new sealing joint (9) with the same dimensions as the old one or use the dimensions shown below (table 1).
8. Insert the retaining ring (10) in its original position as indicated:
  - Place the retaining ring (10) perfectly aligned parallel to the seal (9), ensuring that the ring clamp holes (10) and body clamp holes (1) are as aligned as possible.
  - Push the ring (10) as a whole towards the base of the channel. Screw the ring (10) to the body (1).
9. The valve assembly will be performed in reverse order to disassembly.

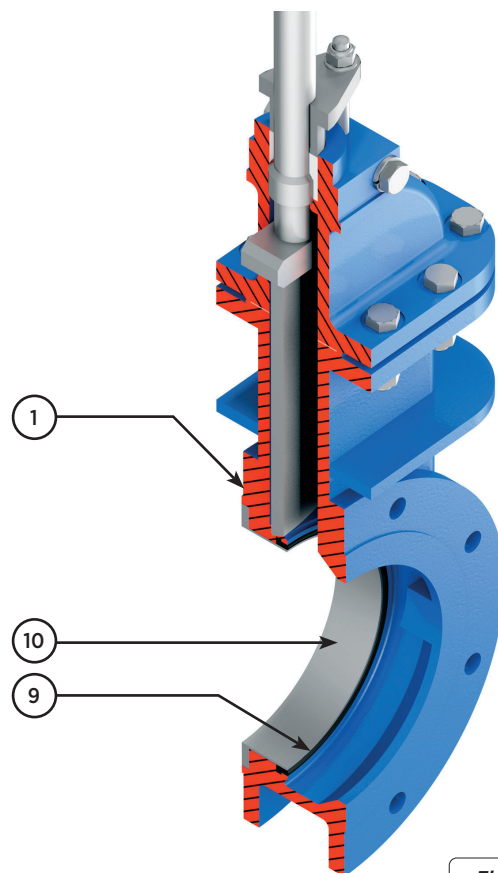


Fig. 8

DN	50	65	80	100	125	150	200	250	300	350
Length.	215	260	310	370	450	530	685	845	100	1165

DN	400	450	500	600	700	750	800	900	1000	1100	1200
Long.	1320	1485	1640	1955	2290	2445	2605	2915	3010	3325	3640

Table. 1

**\*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 2 below shows details of the Vaseline used.

PETROLEUM JELLY		
Saybolt colour	ASTM D-156	15
Melting point (°C)	ASTM D-127	60
Viscosity at 100°C	ASTM D-1445	5
Penetration 25°C mm/10	ASTM D-1937	165
Silicone content	No contiene	
Pharmacopeia BP	OK	

Table. 2

## REPLACING THE SEALING JOINT (Tefl on or PTFE)

You must follow the same operations that we have just described for the sealtight valves, but the following aspects must also be taken into account:

- 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 SEAT SEALING JOINT (Fig. 9)

1. Make sure there is absolutely no pressure and fluid in the installation
2. Place the valve in open position
3. Loosen all the screws which attach the body (1) to the bonnet (3).
4. Remove the actuator system, bonnet (3) and gate (2) of the body (1).
5. Once you have the gate (2), the bonnet (3) and the actuator out of the body (1), proceed to remove the seat seal between the bonnet (3) and the body (1).
6. Clean the accommodation of the seat sealing joint (18).
7. Fit a new seat sealing joint with the same dimensions as the old one.
8. The valve assembly will be performed in exactly the opposite way to the disassembly.
9. Make sure the seat sealing joint is properly positioned between the bonnet (3) and the body (1) and introduce the assembly of the gate (2), bonnet (3) and actuator system in the body (1).
10. Carefully tighten the screws of the bonnet (3) crosswise.
11. Perform several manoeuvres with no load, checking the correct operation of the valve.
12. Subject the valve to pressure in the line, checking that there are no leaks between the bonnet (3) and body (1), or between the rod (15) and the bonnet (3).

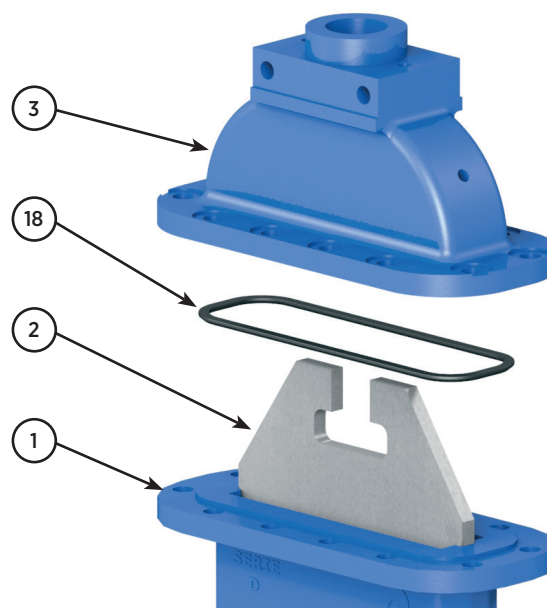


Fig. 9

## REPLACING THE PACKING (Fig. 10)

1. Make sure there is absolutely no pressure and fluid in the installation.
2. Place the valve in open position.
3. Although not essential, for more comfort and more space to work it is advisable to release a support plate (8).
4. Release the nuts and lift the packing flange (4) and the packing bushing (5) over the spindle (7).
5. Remove the old packing (6) using a pointed tool, taking care not to damage the surface of the spindle (7).
6. Carefully clean the packing, making sure there are no residues anywhere so the new packing strips (6) fit correctly.
7. Insert the new packing gland (6). During this operation it is very important for both ends of each ring to be perfectly joined.
8. Place the packing gland bushing (5) and packing gland flange (4) in their original position, making sure not to touch the spindle (7), carefully tighten all the screws crosswise and make sure the same distance is left between the packing flange (4) and the spindle (7) on both sides, then mount the support plate (8).
9. Perform several manoeuvres with no load, checking the correct operation of the valve and ensuring packing gland is correctly aligned.
10. Pressurise the valve in the line and tighten the packing gland crosswise, enough to prevent leakages to the atmosphere.

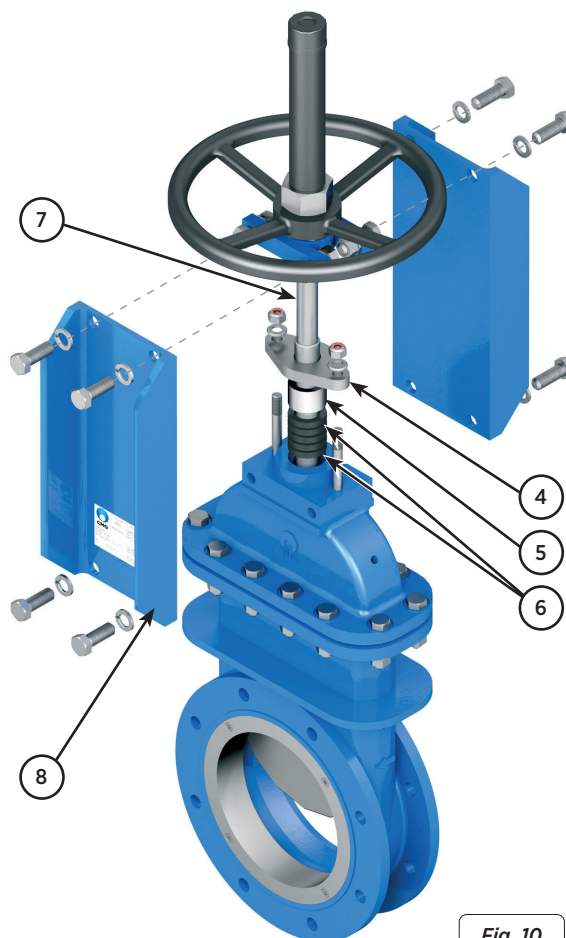


Fig. 10



## 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 **CMO Valves**. Below is an exploded diagram of the pneumatic actuator (fig 11) and a list of the cylinder's components (table 3). The top cover and the support cover are usually made of aluminium, but from pneumatic cylinders greater than Ø200 mm, they are made of cast ductile iron.

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.

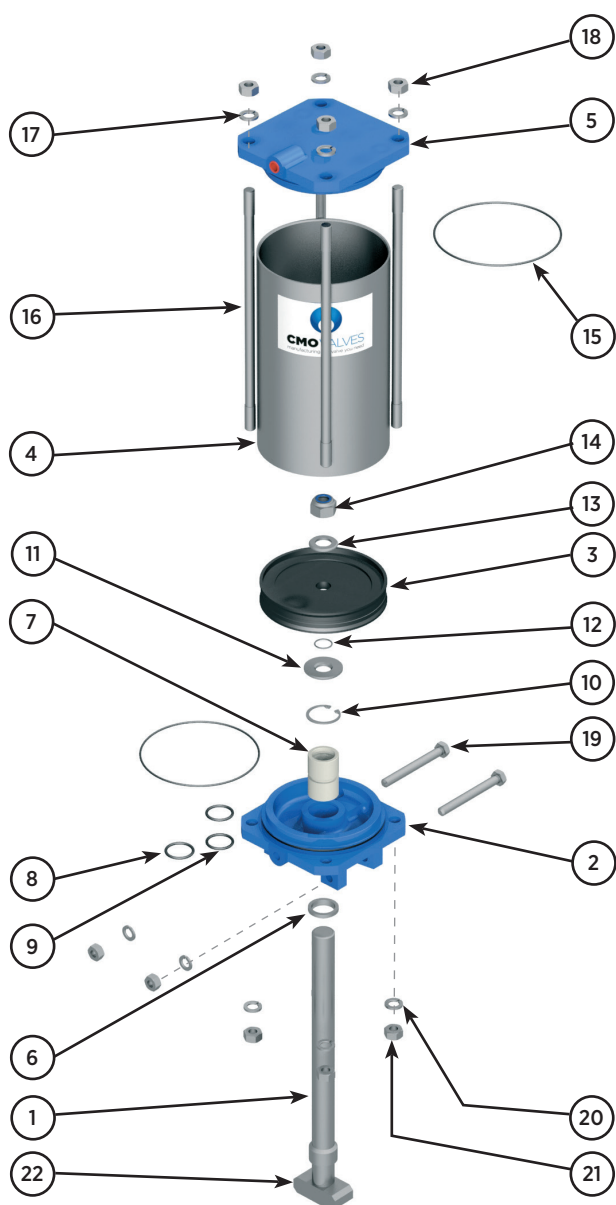


Fig. 11

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	PA6
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	ROD HEAD	A-2

Table. 3

## 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.

## COMPONENTS LIST

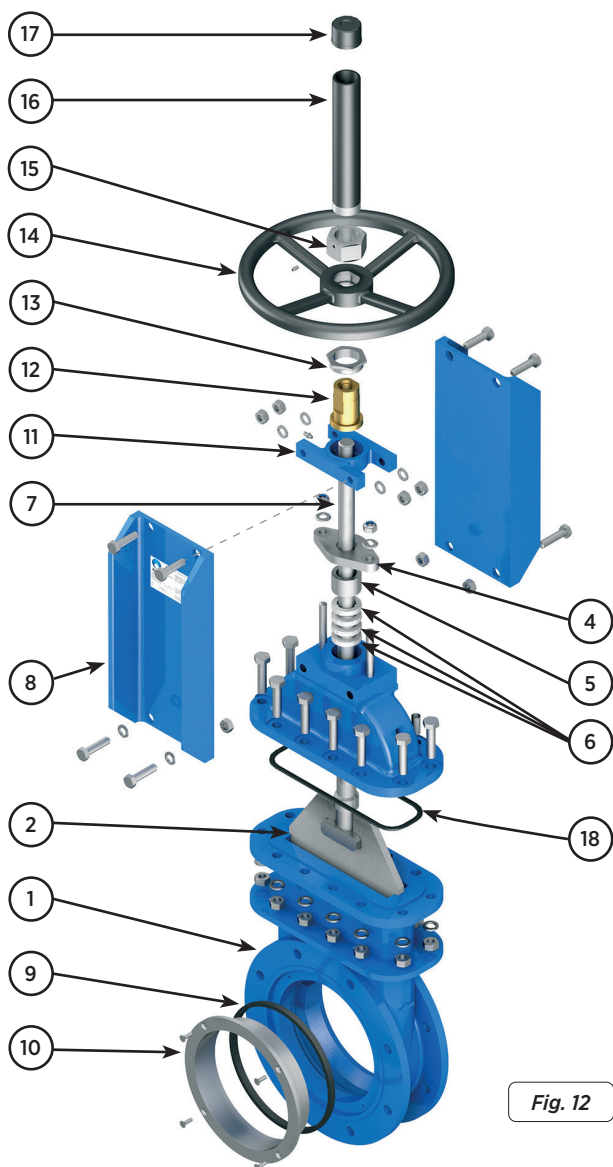


Fig. 12

HANDWHEEL DRIVE	
POS.	DESCRIPTION
1	BODY
2	GATE
3	BONNET
4	GLAND FLANGE
5	GLAND BUSHING
6	PACKING
7	STEM
8	SUPPORT PLATE
9	SEAL
10	RING
11	YOKE
12	STEM NUT
13	STOPPER NUT
14	HANDWHEEL
15	HOOD NUT
16	HOOD
17	PROTECTION CAP
18	SEAT SEALING JOINT

Tabla. 4



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QMS CERTIFIED BY LRQA  
Approval number ISO9001 0035593

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