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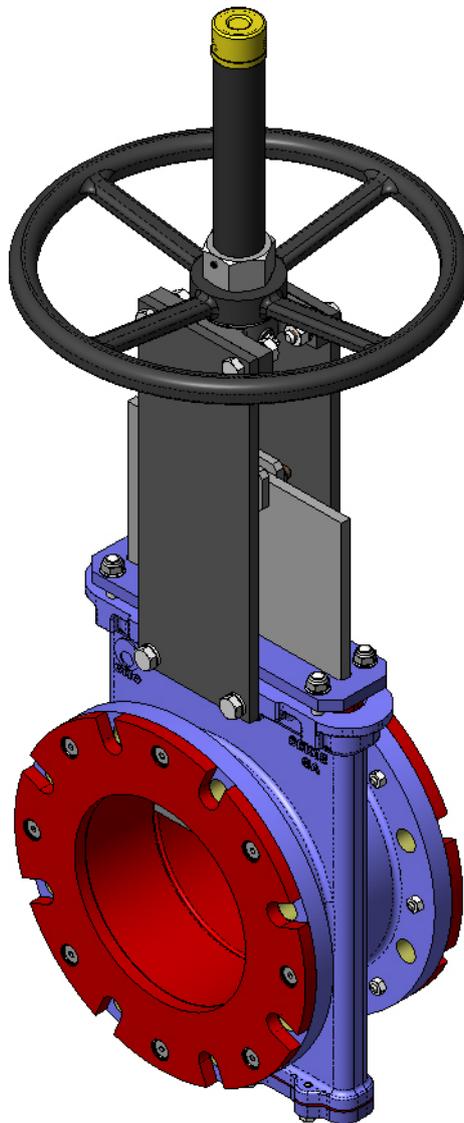
KNIFE GATE VALVE

GA SERIES

13/01/2014

INSTRUCTIONS AND MAINTENANCE MANUAL

SERIES: GA



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ASSEMBLY

THE GL VALVE COMPLIES WITH THE FOLLOWING:

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

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

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

The **GA** valve complies with the Directive on Equipment and Protective Systems for Potentially Explosive Atmospheres. In these cases the logo will appear in 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

Pay special attention to the following points when handling the equipment:

- **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 seal is located in this area. If the valve is held and lifted by this area it can damage the surface of 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 CMO 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 in order to prevent deformations. In the case of dispatch 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.



INSTALLATION

In order to avoid personal harm and other types of damage (to the facilities, the valve, etc.), we recommend following these instructions:

- The staff responsible for the installation or operation of the equipment must be qualified and trained.
- Use suitable Personal Protective Equipment (PPE) (gloves, safety boots, goggles, etc.).
- Shut off all lines which affect the valve and put up a warning sign to inform about the work being carried out.
- Completely isolate the valve from the whole process. Depressurise the process.
- Drain all the line fluid through the valve.
- Use non-electric hand tools during installation and maintenance, in accordance with **EN13463-1(15)**.



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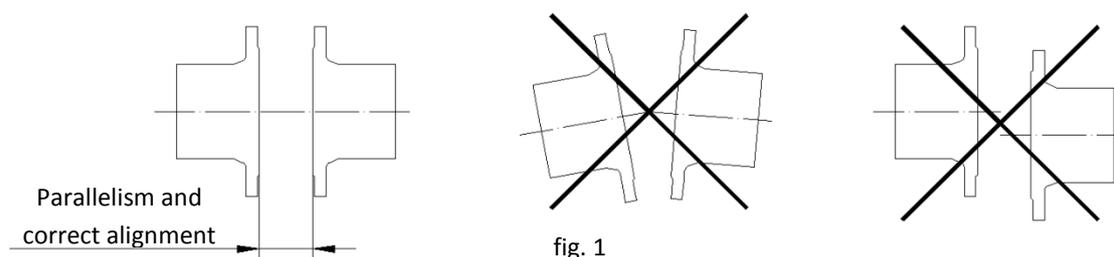
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Before installation, inspect the valve to ensure no damage has occurred during transport or storage. Make sure that the inside of the valve body and, in particular, the seal area are clean. Inspect the installation's pipes and flanges to make sure they are clean.

ASPECTS TO BE CONSIDERED DURING ASSEMBLY

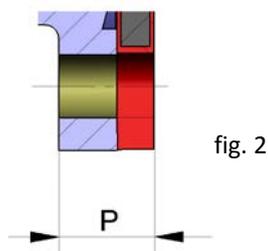
- As the **GA** valve is bidirectional, the direction of the fluid does not matter; it works correctly in both directions.
- Special care must be taken to respect the correct distance between the flanges and ensure they are correctly aligned and parallel (fig. 1).

The incorrect position or installation of the flanges can cause deformations in the valve body and this could lead to operating problems.



It is very important to make sure that the valve is correctly aligned and parallel to the flanges in order to prevent leakages and avoid loss of shape. Ensure the valve is assembled in open position.

- The thickness of the flange to secure the valve has thickness "P" (fig. 2), as specified in Table 1. This table also shows the tightening torque values necessary to assemble the valve.



DN	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900	1000	1100	1200	1300	1400	1500
P	32	32	32	32	32	32	33	35	37	37	41	45	46	49	56	58	59	62	69	72	74	80	81	82
TORQUE (Nm)	45	45	45	45	45	88	88	88	88	88	152	152	152	223	223	303	303	303	412	412	529	529	685	1414

Table 1

- The equipment must be firmly installed in the conduit. It will be screwed to the conduit.
- The screws and nuts to be fitted must also be suitable for the operating conditions and their measurements must be in accordance with the approved plans. The screws and nuts must be fitted diametrically.

The torque to apply to the fastening screws and nuts must be correct according to the applicable standard, we recommend the initial assembly be carried out with a low tightening torque and, after all the screws are in place, the final torque applied.



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- As regards scaffolding, ladders and other auxiliary elements to be used during assembly, follow the safety recommendations indicated in this dossier.
- Once the equipment has been assembled, make sure that there are no elements, whether interior or exterior, which can interfere with the movement of the knife gate.
- Make the relevant connections (electrical, pneumatic, hydraulic) in the equipment's actuator system following the instructions and wiring diagrams supplied with it.
- The operation of the equipment must be coordinated with the site's control and safety staff and no modifications are permitted in the equipment's external indication elements (limit switches, positioners, etc.).
- When operating the equipment, follow the safety recommendations indicated in this dossier.

ASSEMBLY POSITIONS (horizontal pipe)

In horizontal pipes we recommend installing CMO valves in vertical position, although other assembly positions are possible.

Position number 1: This is the most advisable position.

Position number 8: The valve can be installed in this position, but you are advised to contact CMO if this is necessary.

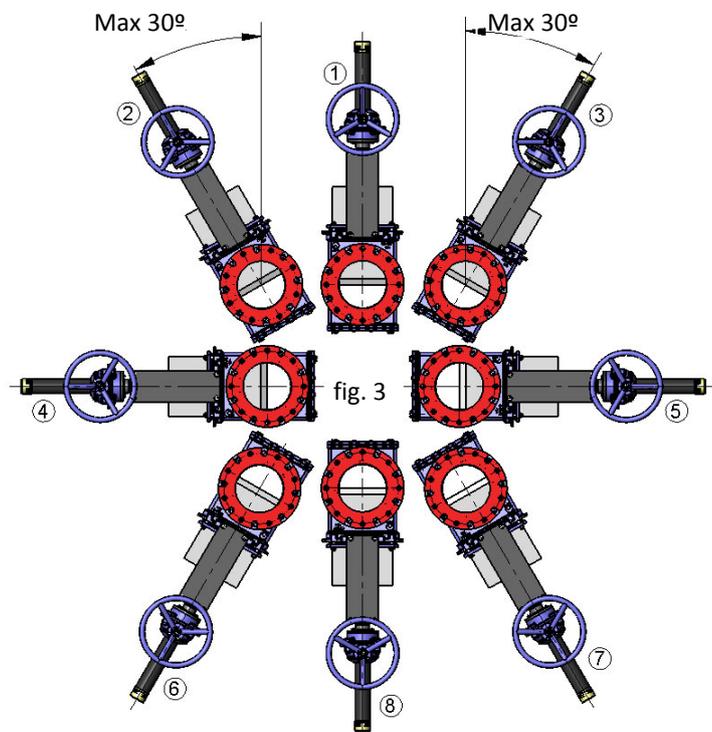
Positions 2, 3, 6 and 7: For large valves (over DN300), the maximum angle with the installation vertical is 30°. For smaller sizes the angle can be increased up to 90° (positions nº 4 and 5).

When it is necessary to install large valves in any of these positions, it is recommended to consult CMO, 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 larger valves (over DN300) in any of these positions, please contact CMO.

Given the weight of the actuator, in these cases a suitable support should be made in order to prevent loss of shape and operating problems in the valves.



ASSEMBLY POSITIONS (vertical/leaning pipe)

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

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Positions 1, 2 and 3: A suitable support should be made in these positions, since the weight of the actuator may lead to loss of shape, resulting in valve operation problems.

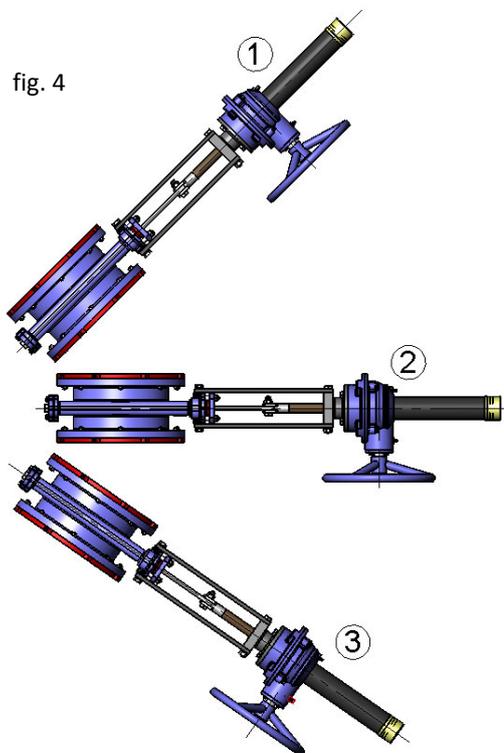
Once the valve has been installed, check that all the screws and nuts have been correctly tightened and that the whole valve action system has been correctly adjusted (electrical connections, pneumatic connections, instruments, etc).

All CMO valves are tested at its facilities, however, the screws on the packing gland can come loose during handling and transport and must be re-tightened.

Once the valve is installed in the pipeline and 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 crosswise until the leakage stops, ensuring that there is no contact between the packing gland and the through-conduit gate.

A very high tightening torque on the nuts of the packing gland nuts can lead to problems, such as an increase in the valve's torque, a reduction in the gasket's working life, or the breaking of the packing gland. The tightening torques are indicated in Table 2.



Tightening torques for packing gland screws	
DN50 to DN125	25 Nm
DN150 to DN300	30 Nm
DN350 to DN1400	35 Nm

Table 2

Once the valve is in place, check that the flanges and electrical and pneumatic connections are secure. If the valve has electrical accessories or you are in an ATEX zone, earth connections must be made before operating it.



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

ACTUATOR

HANDWHEEL (rising stem, non-rising stem and gearbox)

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



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CHAINWHEEL

To operate the valve pull one of the chain's vertical drops, taking into account that sealing is carried out when the wheel 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. Lock the lever again to finish the operation.

PNEUMATIC (double and single acting)

CMO pneumatic actuators are designed to be connected to a 6 kg/cm² pneumatic network, although these cylinders support up to 10 kg/cm².

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)

CMO hydraulic actuators are designed to work at a standard pressure of 135 kg/cm².

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, non-rising stem)

If the valve is fitted with a motorised actuator, the instructions of the supplier of the electric actuator will be included.

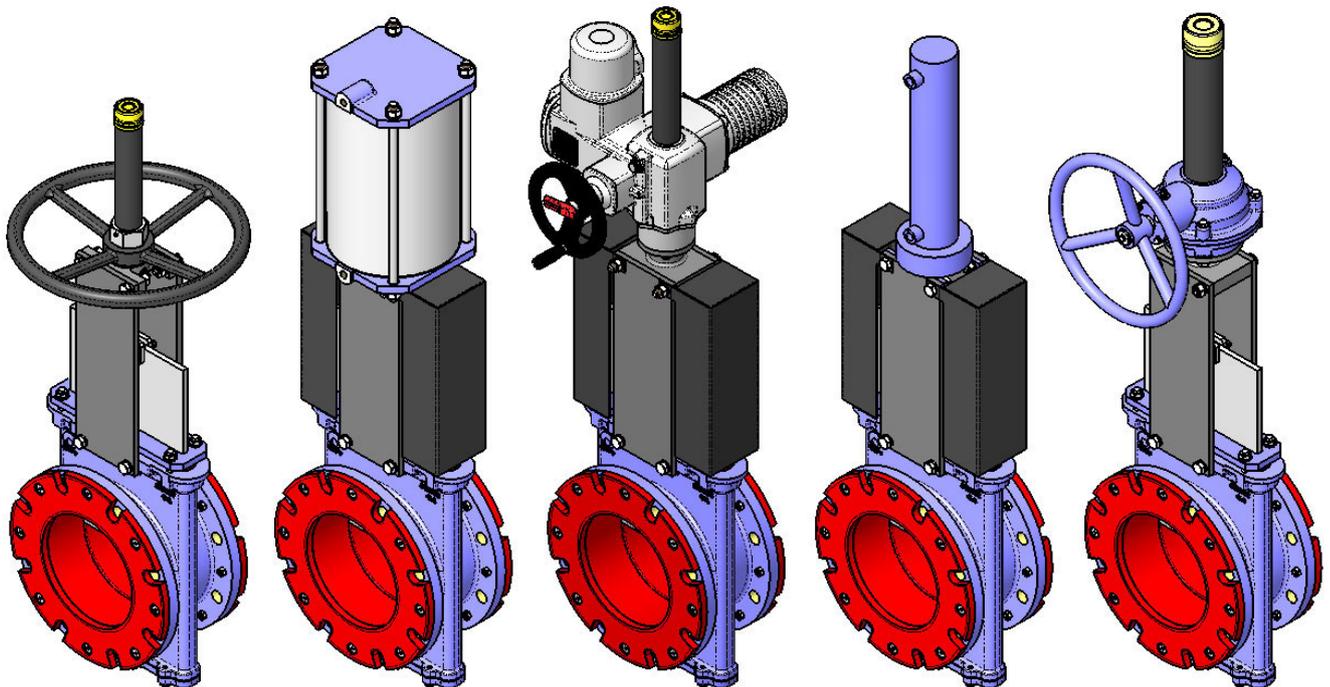


fig. 5



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MAINTENANCE

CMO 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.

The following instructions should be followed in order to avoid personal harm or material damage when carrying out maintenance tasks:

- 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, etc.).
- Shut off all lines which affect the valve and put up a warning sign to inform about the work being carried out.
- Completely isolate the valve from the whole process. Depressurise the process.
- Drain all the line fluid through the valve.
- Use non-electric hand tools during maintenance, in accordance with **EN13463-1 (15)**.



The only maintenance required in this type of valve is to change the gasket seal, the rubber sleeves and the sleeve retainers. It is recommended to carry out regular checks of the sleeves. The duration of these seals will depend on the valve's working conditions, such as: pressure, temperature, number of operations, type of fluid and others.



In an ATEX zone, electrostatic charges may be present inside the valve, which can cause a risk of explosion. The user will be responsible for carrying out the appropriate actions in order to minimise the risks.

The maintenance staff must be informed about the risks of explosion and ATEX training is recommended.



If the fluid transported constitutes an internal explosive atmosphere, the user must regularly check the correct sealtight integrity of the installation.

Regular cleaning of the valve to prevent accumulation of dust.

Assemblies are not permitted at the end of the line.

Avoid re-painting the products supplied.

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 must be clearly marked, avoiding the use of auxiliary equipment (ladders, scaffolding, etc.) in levers or moving parts, in order to produce the movement of the knife gate.
- In units fitted with spring return actuators, the knife gate valve must be mechanically locked and only unlocked when the actuator is pressurised.
- In units fitted with an electric actuator, it is recommended to disconnect it from the mains in order to access the moving parts without any risk.
- Its great importance means you should check that the penstock's shaft has no load before disassembling the actuator system.

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



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REPLACING THE SEALING JOINT

1. Make sure there is absolutely no pressure and fluid in the facility.
2. Remove the valve from the pipeline.
3. Place the through-conduit gate (2) in open position.
4. Loosen the screws which secure the sleeve retainers (8), in order to remove them and access the sleeves (7).
5. The sleeves (7) are replaced from outside the valve body (symmetrical two-piece seat). A drawing of the seat is shown below (fig. 6).
6. Thoroughly clean the housing once the sleeves have been removed.
7. Once they have been greased with petroleum jelly, insert the new sleeves (7) of the same dimensions as those old ones.
8. Replace the valve between the flanges, taking special care not to damage the sleeves.
9. Before starting up the installation, carry out various operations to open and close the valve.

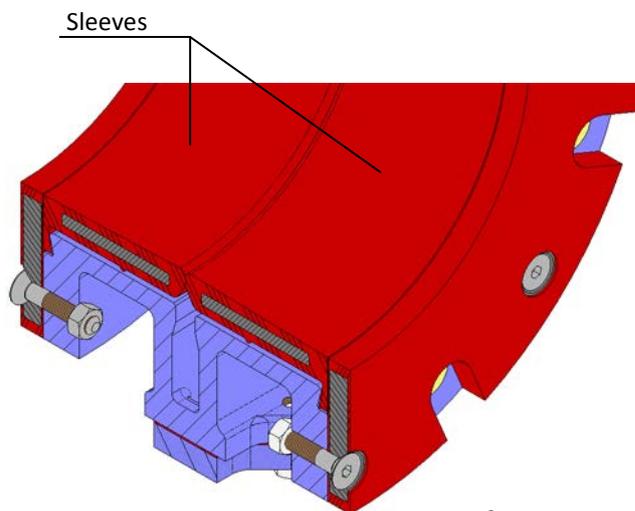


fig. 6

***Note:** The numbers in brackets refer to the components list in Table 5.

***Note:** During the assembly of the new sleeves it is recommended to apply “petroleum jelly” to the seal to facilitate the assembly process and the valve’s correct operation (do not use oil or grease); Table 3 shows details of the petroleum jelly used.

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 3

REPLACING THE GASKET SEAL

1. Make sure there is absolutely no pressure and fluid in the facility.
2. Place the valve in closed position.
3. Loosen the screws that connect the stem or rod to the through-conduit gate.
4. Release the connection between the support plates (9) and the body (1).
5. Release and remove the packing gland (3) and the safety guards where present.
6. Remove the old gasket seal (4) and greased gasket (5) using a pointed tool, taking care not to damage the surface of the gate (2).
7. Carefully clean the gasket and make sure that there are no residues anywhere so that the new greased gasket (5) and the gasket seal (4) fit correctly.
8. Insert the new greased gasket (5) and the new gasket seal (4) correctly greased, impregnating their inner cavities with plenty of petroleum jelly.



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9. Place the packing gland in its original position (step 5), making sure it does not touch the gate, carefully tighten all the nuts crosswise and make sure the same distance is left between the gate and the packing gland on both sides.
10. Screw down the support plates and the stem, in reverse order to that described in steps 3 and 4.
11. Carry out several manoeuvres with no load, checking the correct operation of the valve and ensuring the packing gland is correctly centred.
12. 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 5.

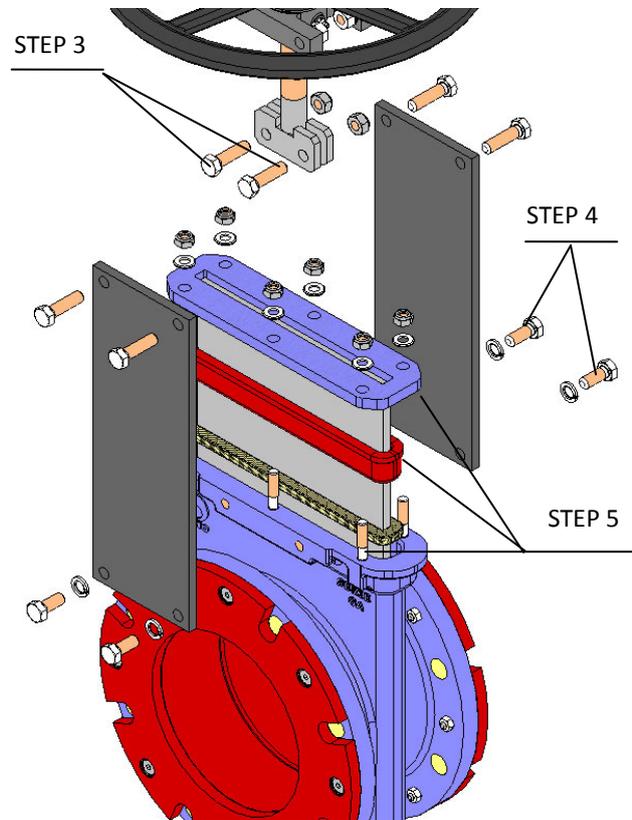


fig. 7

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PNEUMATIC ACTUATOR MAINTENANCE

The pneumatic cylinders in our valves are manufactured and assembled at our premises. The maintenance of these cylinders is simple, if you need to replace any elements or have any questions please check with CMO. 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, although pneumatic cylinders over $\varnothing 200$ mm are made of cast iron GJS-400.

The maintenance kit normally includes the bushing and its sealing joints and the scraper, and, if the customer wishes, the piston is also supplied. The steps to follow to replace these parts are shown below.

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

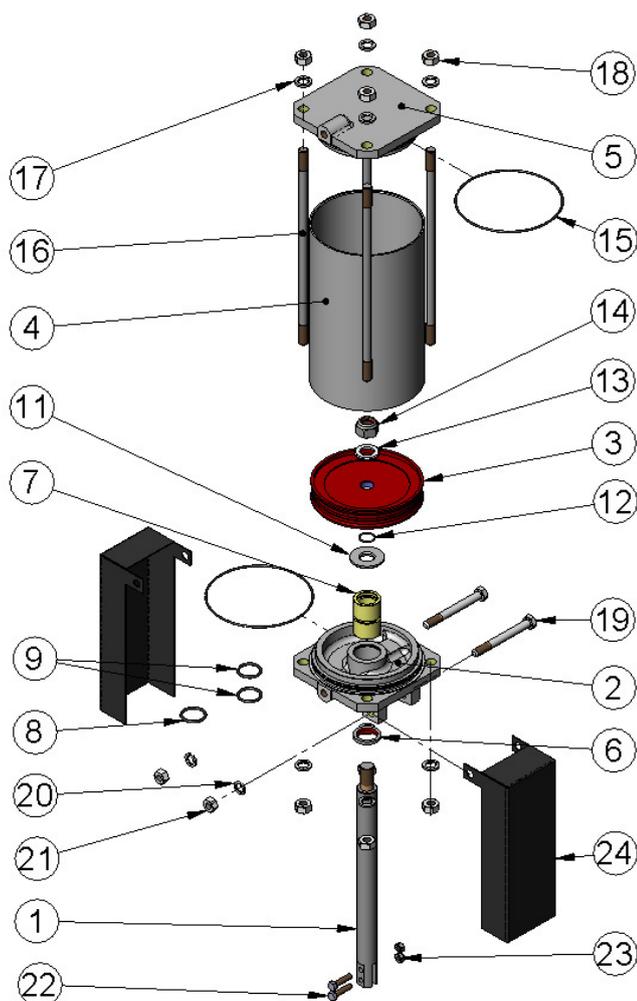


fig. 8

PNEUMATIC ACTUATOR		
POS.	DESCRIPTION	MATERIAL
1	ROD	AISI-304
2	SUPPORT COVER	ALUMINIUM
3	PISTON	S275JR + EPDM
4	CASING	ALUMINIUM
5	UPPER COVER	ALUMINIUM
6	SCRAPER	NITRILE
7	BUSHING	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 4

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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 maintenance in an ATEX zone, it is necessary to check the electrical continuity between the pipe and the rest of the valve's components, such as the body, gate, stem, etc. (Standard EN 12266-2, Annex B, points B.2.2.2. and B.2.3.1.)

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 moving 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 loss of shape.
- If the equipment is stored without suitable packaging it is important to keep the valve's moving parts greased, 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.
- Store the valves in open position to ensure the sleeves do not lose shape.



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COMPONENTS LIST	
POS	DESCRIPTION
1	BODY
2	THROUGH-CONDUIT GATE
3	PACKING GLAND
4	GASKET SEAL
5	GREASED GASKET
6	BOTTOM COVER
7	SLEEVE
8	RETAINER SLEEVE
9	SUPPORT PLATE
10	STEM
11	YOKE
12	STEM NUT
13	HANDWHEEL
14	STOPPER NUT
15	HOOD NUT
16	HOOD
17	PROTECTION CAP

Table 5

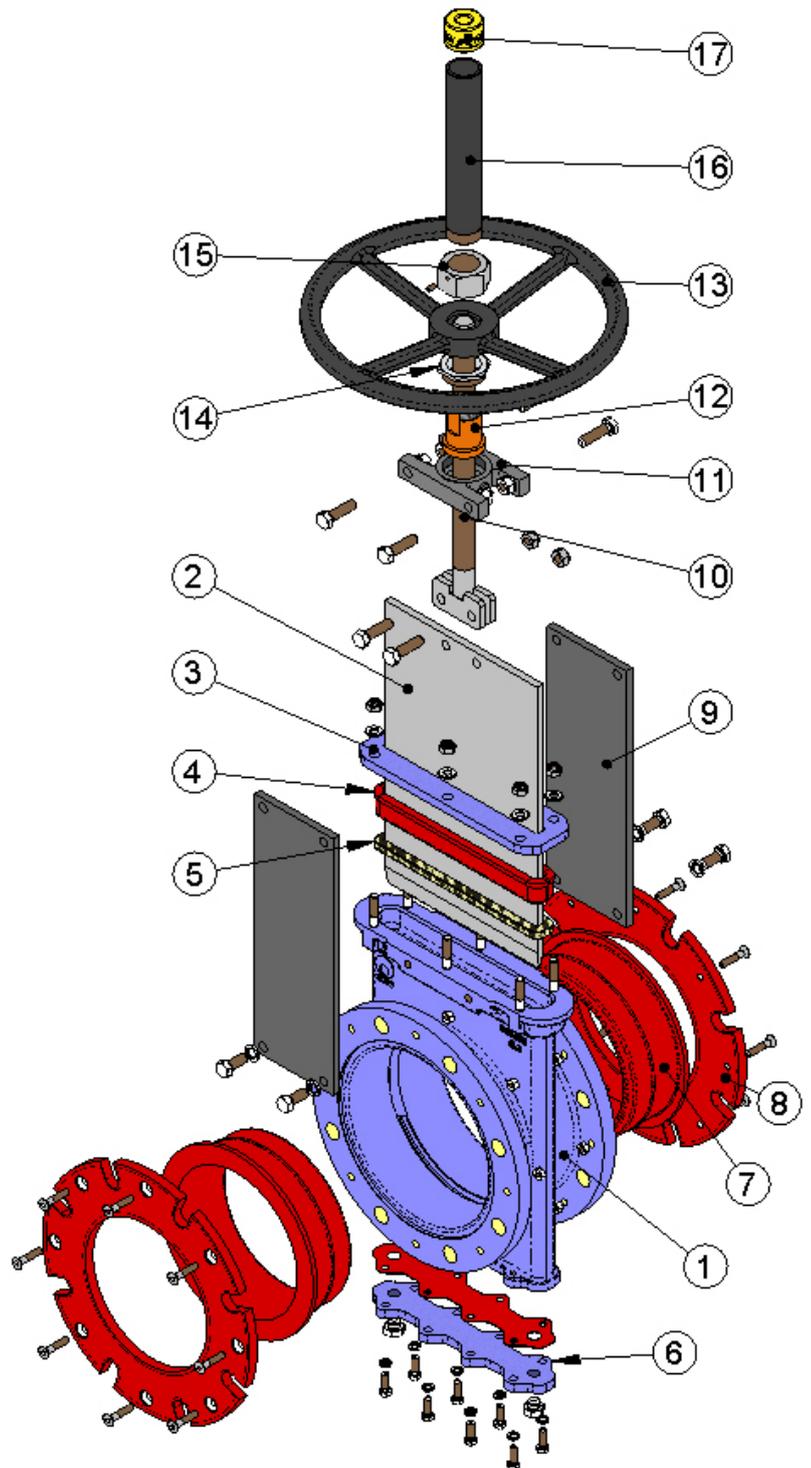


fig. 9