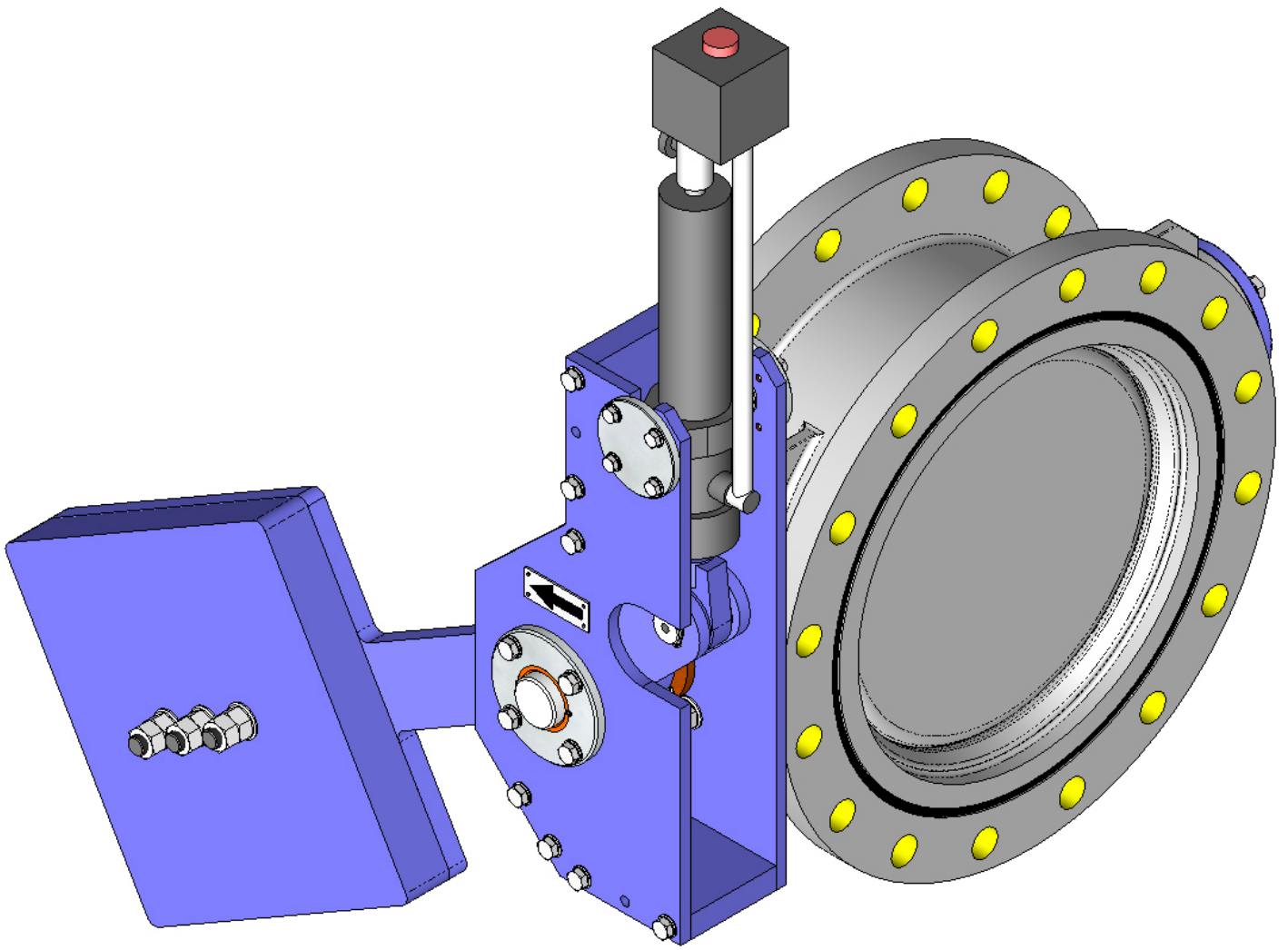




05/11/2015

INSTRUCTIONS AND MAINTENANCE MANUAL

SERIES: RT



ASSEMBLY

THE RT VALVE COMPLIES WITH THE FOLLOWING:

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

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

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

The **RT** valve complies with the Directive on Equipment and Protective Systems for Potentially Explosive Environments. 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.
- To prevent damage, especially to the anti-corrosive protection, we recommend using soft straps to lift **C.M.O.**'s **RT** retention valves. These belts must be secured in the holes fitted for this purpose in the body reinforcements.
- 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. This is where the valve's machined sealing ring is located. If the valve is secured and lifted in this area, the seal ring surface may become damaged, leading to leakage problems whilst the valve is operating.
- 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. If two or more valves are packaged together in a single box, these must be positioned with support so as to avoid loss of shape. Moreover, elements must be envisaged to separate and secure them in order to prevent movements, banging and contact during transport. In the case of dispatches by sea we recommend the use of vacuum bags, even inside the wooden 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 loss of shape in the equipment. For this purpose we recommend the use of mounts or stands.



INSTALLATION

In order to avoid personal injury 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 manual non-electric tools during installation and maintenance, in accordance with EN **13463-1(15)**.



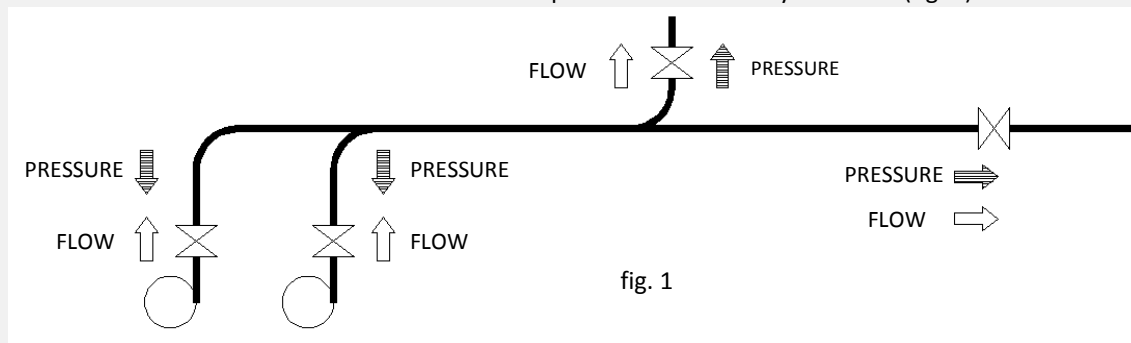
RETENTION VALVE

RT SERIES

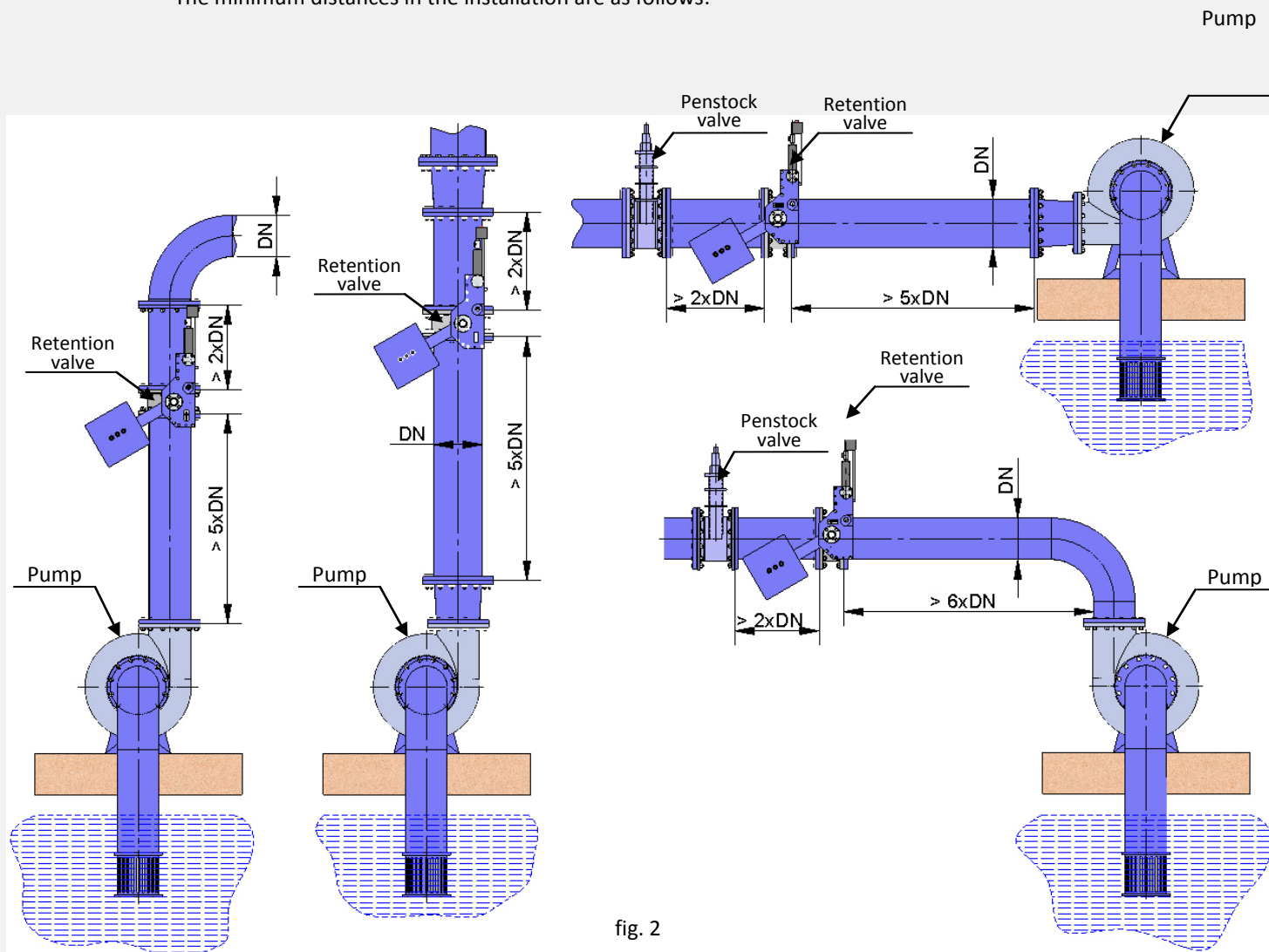
Before installation, inspect the valve to ensure no damage has occurred during transport or storage. Make sure that the inside of the valve body and, in particular, the seal area are clean. Inspect the installation's pipes and the flanges to make sure they are also clean.

ASPECTS TO BE CONSIDERED DURING ASSEMBLY

The RT valve is unidirectional and has an arrow marked on the body indicating the flow direction. Please note that the direction of the fluid and the pressure do not always coincide (fig. 1).



The minimum distances in the installation are as follows:



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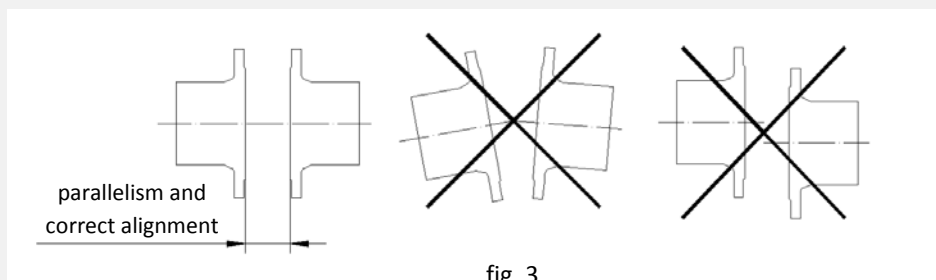
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page 3

RETENTION VALVE

RT SERIES

- Special care must be taken to respect the correct distance between the flanges and ensure they are correctly aligned and parallel (fig. 3).
The incorrect position or installation of the flanges can cause loss of shape on the valve's 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 to prevent leakages and avoid loss of shape. Try to assemble the valve in closed position.

- The flange bores are usually flat through-holes, meaning the bolts go beyond the flange and are bolted with washers and nuts.
The flange drilling standard is defined by the customer in accordance with requirements. Many different standards are available, although the most common one is for the valve flange to be drilled in accordance with Standard EN 1092-2 PN10. The following table (table 1) shows the metric of the bolt and the required torque to be applied with this drilling standard.

DN	150	200	250	300	350	400	450	500	600	700	800	900	1000	1200	1400	1600	1800	2000
Metric	M20	M20	M20	M20	M20	M24	M24	M24	M27	M27	M30	M30	M33	M36	M39	M45	M45	M45
TORQUE (Nm)	88	88	88	88	88	152	152	152	223	223	303	303	412	529	685	1414	1414	1414

 **NOTE:** These values are for the flange drilling standard we consider most common, namely EN 1092-2 PN10.

table 1

- The equipment must be firmly installed in the duct. The joint to the installation will be bolted.
- The bolts 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 bolts and nuts must be tightened diametrically.
The torque to apply to the fastening bolts and nuts must be correct according to the applicable standard; we recommend carrying out the initial assembly with a low tightening torque and applying the final torque once all the bolts are in place.
- 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, ensure that there are no interior or exterior elements which can interfere with the movement of the valve disc.
- Make the relevant connections (electric, hydraulic, etc.) in the equipment's drive system following the instructions and cabling 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.).
- Follow the safety recommendations indicated in this dossier when operating the equipment.



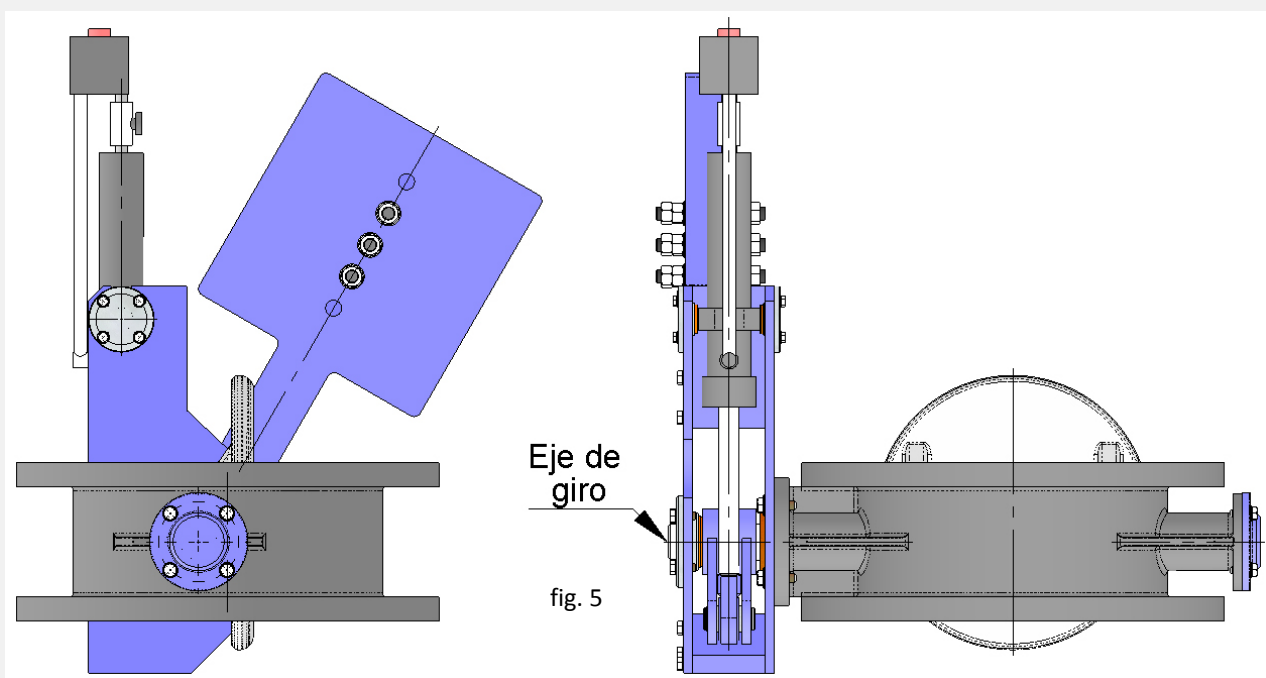
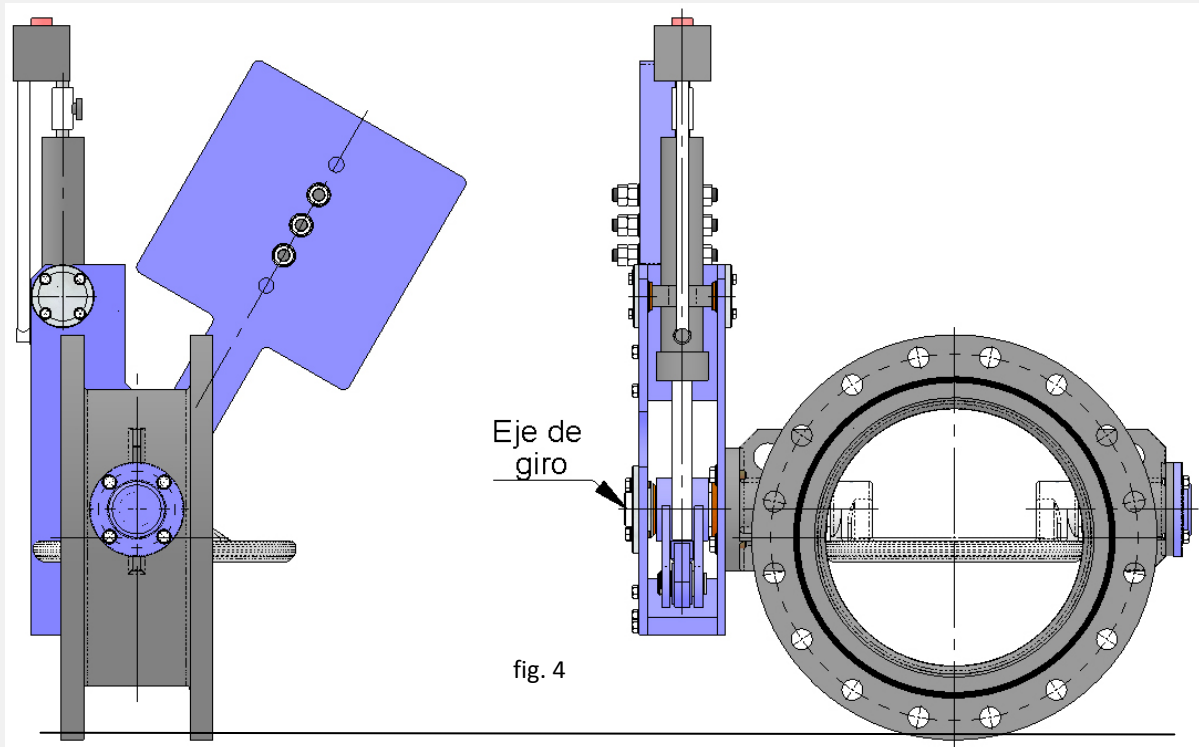
RETENTION VALVE

RT SERIES

ASSEMBLY POSITIONS

C.M.O.'s RT retention valves are designed for assembly with the turn shaft in horizontal position. They are fitted with self-lubricated radial bushing for easier shaft turning. The turn shaft should be in horizontal position for optimal distribution of weights and correct operation.

The valve is designed to work both in horizontal pipes (fig. 4) and vertical pipe (fig. 5), provided the horizontal position of the turn shaft and the fluid direction is respected.



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page 5



RETENTION VALVE

RT SERIES

Check with **C.M.O.** before installing the **RT** retention valve in another position, since the valve design can be modified on request in line with each specific case.

Once the valve has been installed, check that all the bolts and nuts have been correctly tightened and that the whole valve drive system has been correctly adjusted (electric connections, hydraulic connections, instruments, etc.). If the valve has electrical accessories or you are in an ATEX zone, earth connections must be made before operating it.

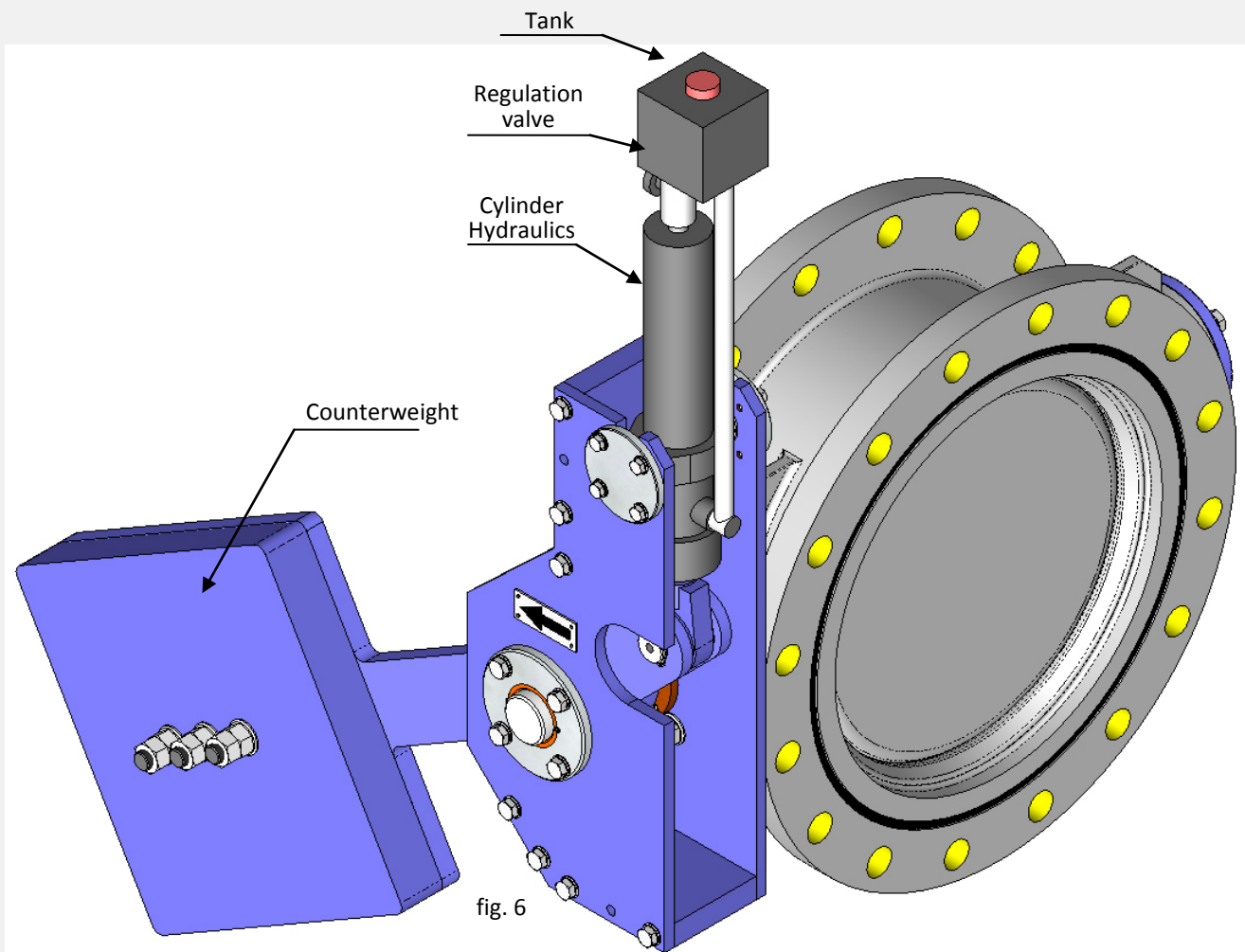


In an ATEX zone, check the continuity between the valve and the pipe (EN 12266-2, annex B, points B.2.2.2. and B.2.3.1.). Check the pipe's earth connection and the conductivity between the outlet and inlet pipes.

All **C.M.O.** valves are tested at its facilities.

ACTUATOR

This type of valve incorporates a drive system comprising a counterweight and hydraulic cylinder, although these are designed solely for the closing operation.



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page 6



RETENTION VALVE

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The most peculiar characteristic of the **RT** valves is their bi-eccentric design, thanks to which it is the flow itself which opens the valve when passing through it. As soon as the fluid changes direction, if the indication arrow of the body coincides, the same fluid tends to close the valve and the counterweight contributes in carrying out this operation. The hydraulic cylinder is designed to work as a damper and is fitted with damping in the last 10% of the closing run. The purpose is for the valve to make the final close gently, avoiding any hammer effect in the pipe.

This hydraulic cylinder is fitted with an oil tank to carry out a closed circuit. This circuit is fitted with a regulation valve, which can be used to adjust the closing time or speed by limiting the passage of hydraulic oil between the tank and the cylinder.

One of the main advantages of this actuator is that it does not require any type of electrical supply, and is therefore highly suited for use as a safety valve in emergency situations. For this reason it must be taken into account that, given the design of the valve and the type of drive fitted, the disc cannot be stopped in intermediate positions.

MAINTENANCE

C.M.O. will not be liable if the valves suffer any damage due to improper handling or without proper authorisation. The valves should not be modified unless expressly authorised by **C.M.O.**

The following instructions should be followed in order to avoid personal injury 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 for this type of valve is to change the O-ring seals of the turn shaft and the gasket (if fitted).

It is recommended to regularly check the seals every 12 months, however their working life will depend on the valve's working conditions, such as: pressure, temperature, number of operations, fluid composition, among others.

IMPORTANT SAFETY ASPECTS

- In order to work under ideal safety conditions, maintenance personnel must be up to date with the safety regulations and work can only start under orders from the site's safety personnel.



RETENTION VALVE

RT SERIES

- 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 valve disc.
- In this type of equipment, both the counterweight and the disc should be mechanically locked in order to access the moving parts without any type of risk. They will only be released once the maintenance work is complete.
- Its great importance means you should check that the penstock's shaft has no load before disassembling the drive system.

Taking into account the recommendations indicated, below are the maintenance operations most commonly carried out in this type of equipment:

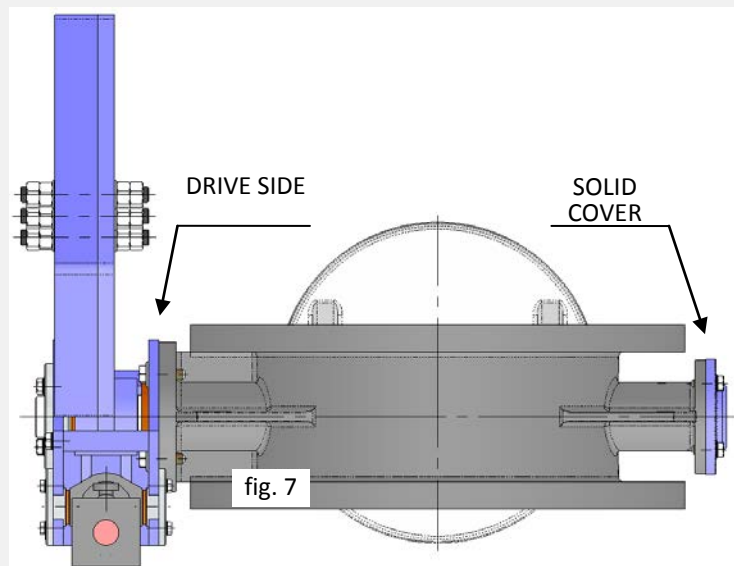
REPLACING THE O-RINGS

Regularly check the shaft O-rings, replacing them in the event of deterioration or absence of watertight integrity.

It is not necessary to remove the duct valve, since the change can be carried out with the valve mounted in the facility.

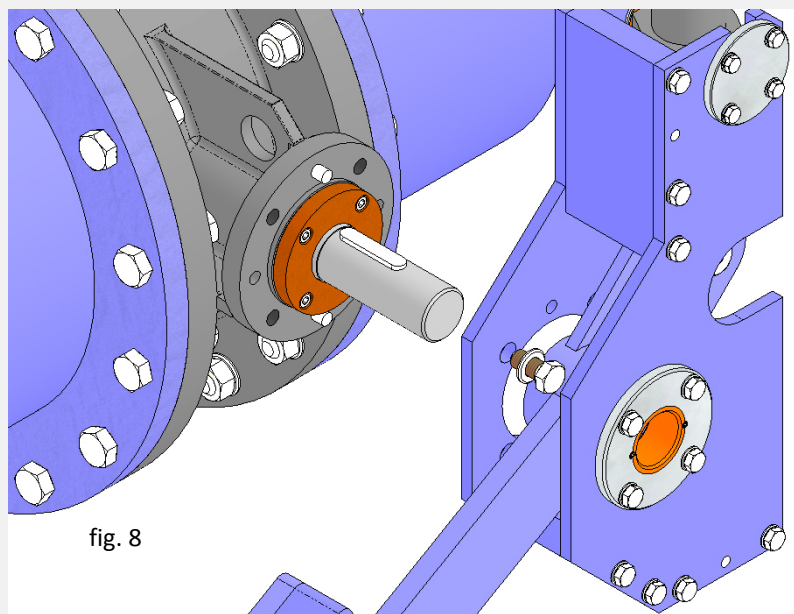
This valve has O-ring seals on both shafts, although the procedure to change them is different.

Do not use sharp tools during this process.



ACTUATOR SIDE

1. Make sure there is absolutely no pressure or fluid in the facility.
2. Check that the valve is closed, with the counterweight and the disc idle.
3. Before releasing any part, always mark its original position.
4. Release the actuator unit (fig. 8).
5. Remove the actuator cotters (17) (fig. 9).
6. Release the guide cover (22) and remove it from the shaft (fig. 10).
7. Remove the deteriorated O-rings (20) (fig. 10).



RETENTION VALVE

RT SERIES

8. Clean the O-ring housing.
9. Position the new O-rings (20) on the guide cover.
10. Insert the guide cover (22) in the shaft and return to the original location.

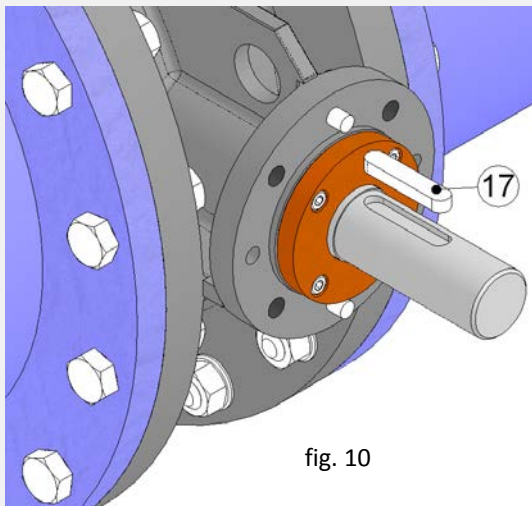
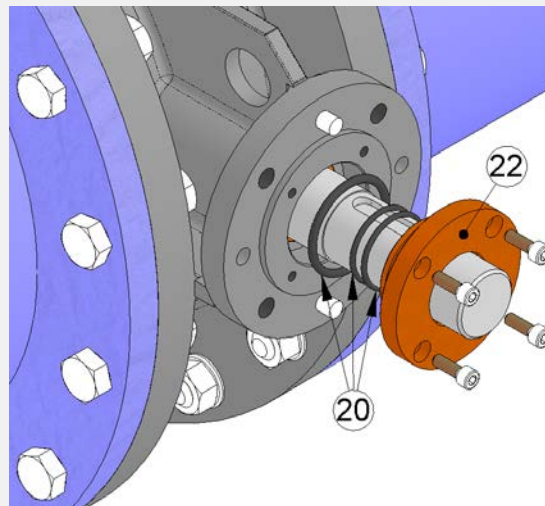



fig. 9

fig. 10



11. Bolt the guide cover (22) diametrically.

12. Position the cotters (17) on the drive shaft.
13. Mount the drive unit in its original position.
14. Using a lifting means, raise and lower the counterweight system, carrying out opening and closing operations with the valve while empty. Check the correct operation of the entire system.
15. Pressurise the valve in the line and check there are no leakages around the shaft.

 **Note:** The numbers in brackets refer to the image in figure 9 and 10.

SOLID COVER SIDE

1. Make sure there is absolutely no pressure or fluid in the facility.
2. Check that the valve is closed, with the counterweight and the disc idle.
3. Before releasing any part, always mark its original position.
4. Release the solid cover (21) and remove it from the valve.
5. Remove the deteriorated O-ring (20).
6. Clean the O-ring housing.
7. Position the new O-ring (20) on the solid cover (21).
8. Position the solid cover (21) in its original valve location.

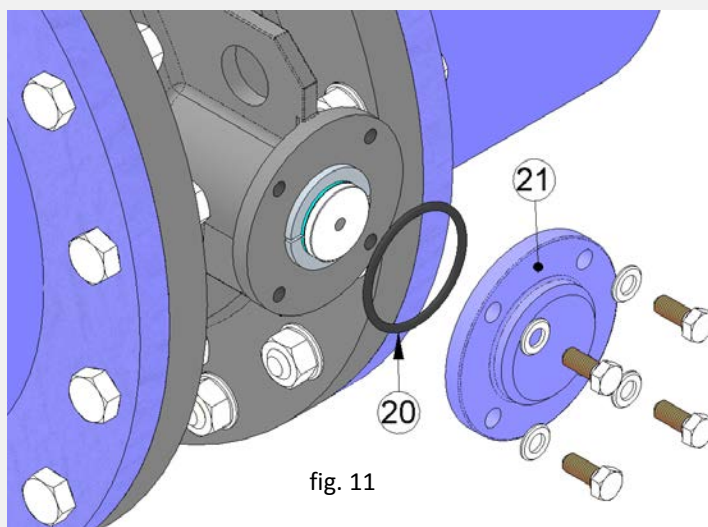


fig. 11

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page 9

RETENTION VALVE

RT SERIES

9. Bolt the solid cover (21) diametrically.
10. Pressurise the valve in the line and check there are no leakages through the solid cover (21).

 **Note:** The numbers in brackets refer to the image in figure 11.

REPLACING THE GASKET (when fitted)

Regularly check sealing gaskets and seats, replacing them in the event of deterioration or absence of watertight integrity, and replace the elastomer profiles.

1. Make sure there is absolutely no pressure or fluid in the facility.
2. Check that the valve is closed, with the counterweight and the disc idle.
3. Before releasing any part, always mark its original position.
4. Remove the valve, the pipe (not necessary when over DN-800).
5. With the help of lifting equipment and a sling, attach the arm of the counterweight and raise until the disc is completely open (fig. 12).

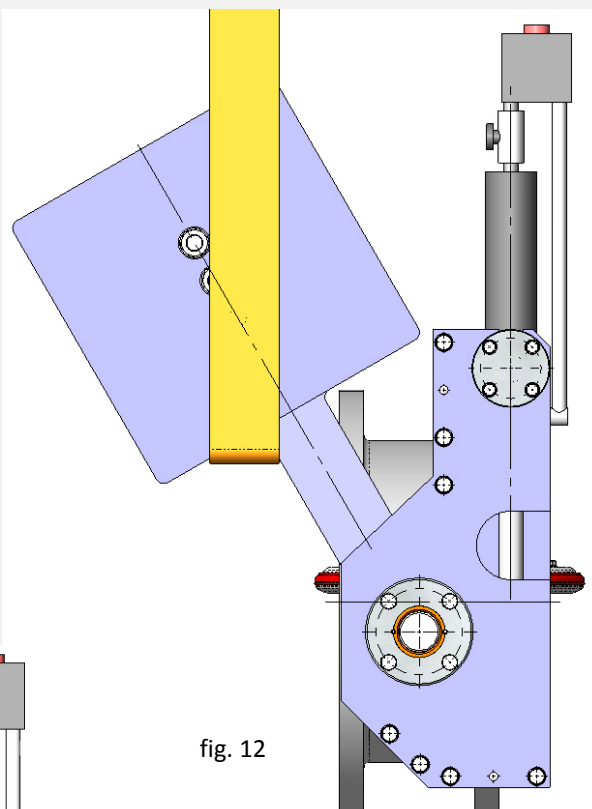


fig. 12

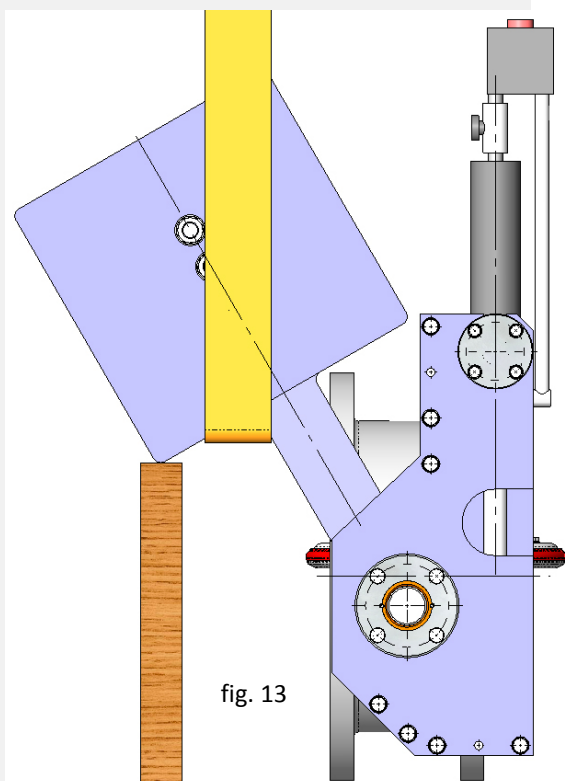


fig. 13

6. Position plugs on both the counterweight (fig. 13) and the disc (fig. 14) to assure the position and work safely.
7. Mark the original positions of the stainless steel seal flanges (4) which secure the seal (3) in the disc (2).
8. Release all the bolts (28, 29) which secure the flange (4).
9. Remove all the flange sectors (4).
10. Remove the deteriorated seal (3).
11. Clean the seal fittings for the disc (2) and seal flange (4).
12. Check that the dimensions of the new seal (3) are exactly the same as the replaced one.
13. Cut the new seal (3) with the required length.

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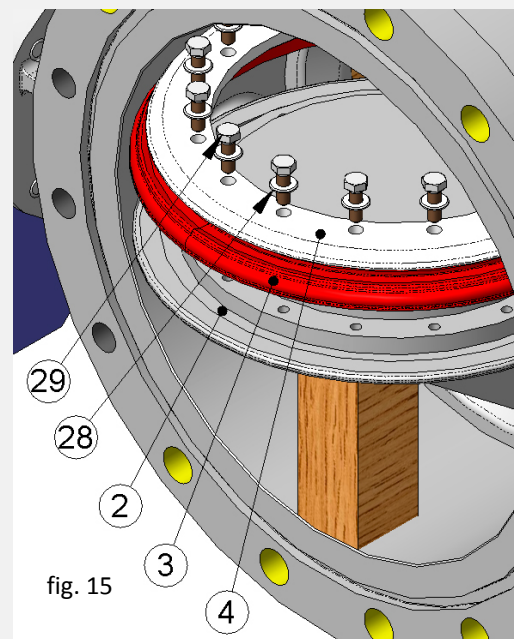
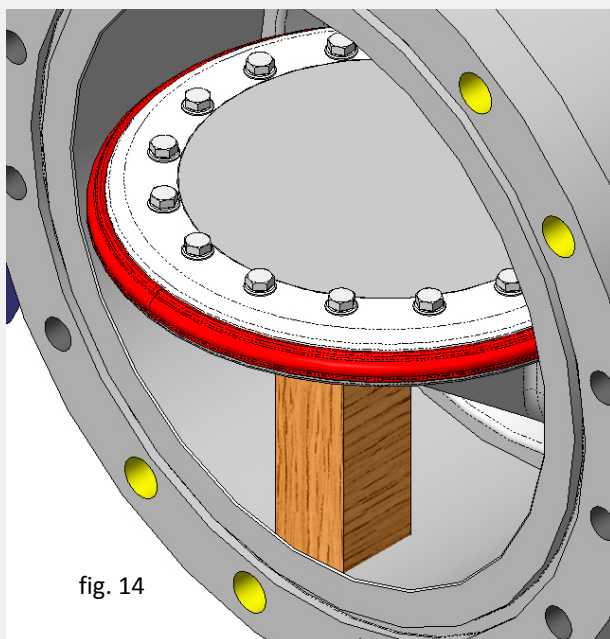
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page 10


RETENTION VALVE

RT SERIES



14. Before installing the seal (3) in the disc (2), glue the ends of the seal (3) together with high strength glue such as Loctite.
15. Position the new seal (3) on the disc (2).
16. Return the seal flange sectors (4) to the original position.
17. Bolt the seal flange diametrically (4).
18. Remove the plugs used to secure the position of the disc and the counterweight.
19. Using a lifting means, raise and lower the counterweight system, carrying out opening and closing operations with the valve while empty. Check the correct operation of the entire system.
20. Position the valve completely closed.
21. Reinstall the valve in the duct (whenever removed in point 4).
22. Pressurise the valve in the line and check watertight integrity.

 **Note:** The numbers in brackets refer to the image in figure 15.

 **Note:** During the assembly of the new gasket it is recommended to apply petroleum jelly 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 petroleum jelly 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 2

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page 11



RETENTION VALVE

RT SERIES

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 undercover.
- It is not recommended to store the equipment outdoors with direct exposure to adverse weather conditions, such as rain, wind, etc.
- 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 drive 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 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.

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COMPONENTS LIST

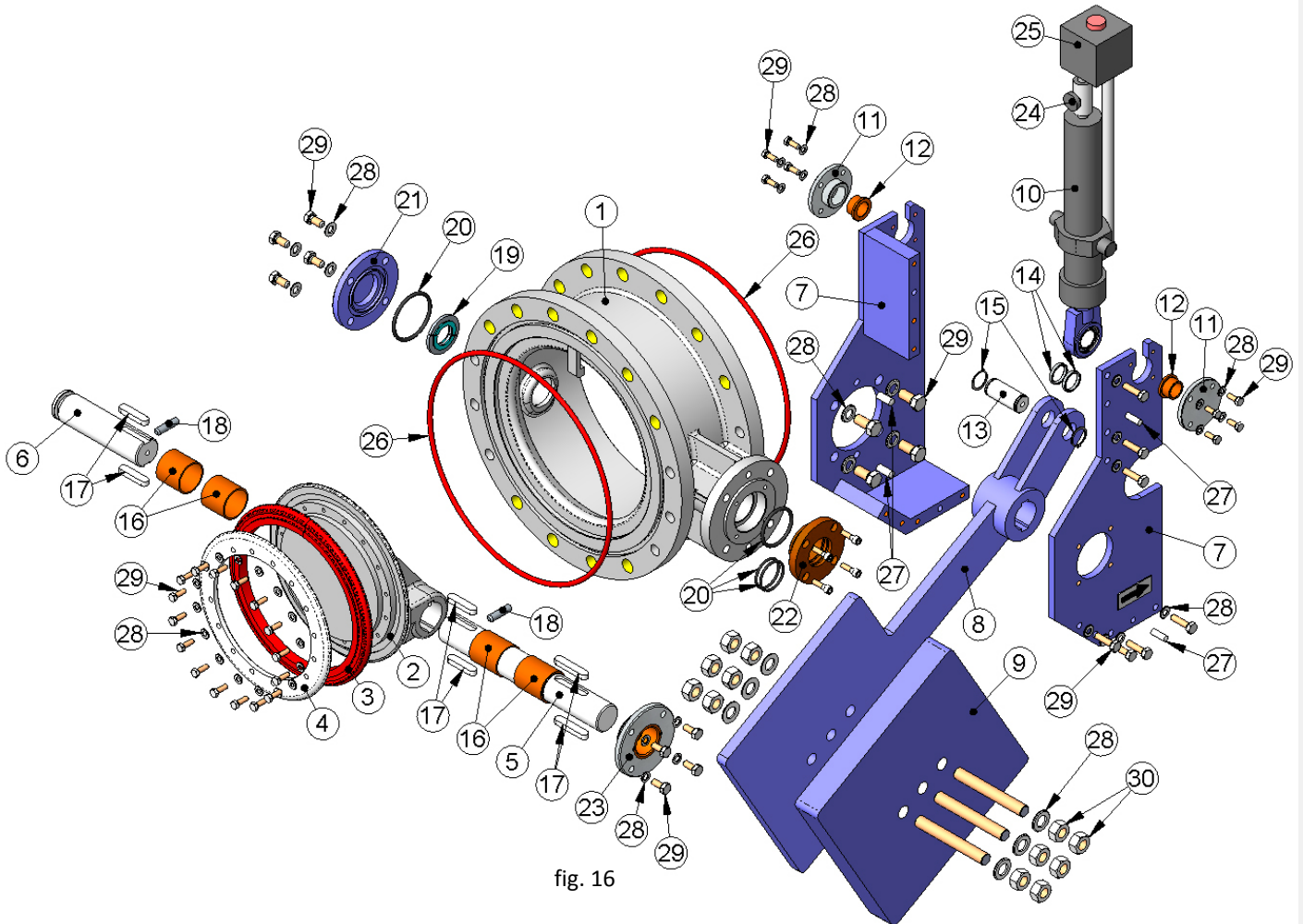


fig. 16

STANDARD COMPONENTS LIST			
POS.	COMPONENT	POS.	COMPONENT
1	BODY	16	BUSH BEARING
2	DISC	17	COTTER
3	SEAL	18	PIN
4	SEAL FLANGE	19	FRICION WASHER
5	DRIVE SHAFT	20	O-RING CORD
6	DRIVEN SHAFT	21	SOLID COVER
7	DRIVE SUPPORT	22	GUIDE COVER
8	COUNTERWEIGHT ARM	23	MOUNT COVER
9	COUNTERWEIGHT PLATE	24	THROTTLE VALVE
10	HYDRAULIC CYLINDER	25	OIL TANK
11	MOUNT COVER	26	O-RING CORD
12	BUSH BEARING	27	PIN
13	PIN	28	WASHER
14	DISTANCER BUSHING	29	BOLT
15	CIR-CLIP	30	NUT

table 3

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page 13