3-4V

CMO VALVES

Rev. 2 / 15-06-2023

INSTALLATION AND MAINTENANCE INSTRUCTIONS MANUAL

PURPOSE AND SCOPE

This document sets out the installation, operation and maintenance instructions for **CMO Valves** multi-way valves. This valve is suitable for liquids with dry matter content, products with a concentration of 4% and over. Any other uses must be consulted and approved in writing by **CMO Valves**. **CMO Valves** shall not be liable for any damage arising from applications deviating from the intended use and/or as a result of improper installation, commissioning or operation of the multi-way valve.

The manual describes general and generic instructions for 3-4V Series multi-way valves; this documentation is supplemented by the technical information for the valve sales order (approval drawings, technical descriptions, specifications, etc.).

As part of its ongoing product and service improvement process, **CMO Valves** reserves the right to alter the data and content of this document at its discretion at any time without notice.

SAFETY ASPECTS

This manual provides essential information on installing, commissioning and maintaining 3-4V Series multi-way valves. It is essential to follow all the indicated recommendations, codes of good practice, standards, applicable legislation, and directives related to work safety, risk prevention and technical aspects.

Individuals operating this equipment must possess technical training and be well acquainted with all warnings and cautions outlined in these instructions. Failure to observe the warnings and cautions may result in personal injury and damage to property. Be sure to read and fully understand this manual before installing, operating or maintaining the multi-way valve.

Altering or modifying this product without written consent from **CMO Valves** may lead to incorrect operation, critical failures or damage, thereby voiding the warranty.

APPLICATION OF EUROPEAN DIRECTIVES

Information on the directives applicable to multi-way valves can be found at the website **www.cmovalves.com**, in the multi-way valves product section.

Upon request, the 3-4V Series multi-way valve can comply with the directive on equipment and protective systems for use in potentially explosive atmospheres (ATEX Directive). In these cases, the multi-way valve will be identified and marked with a nameplate for use in such zones according to the ATEX directive. This label indicates the exact classification of the zone and the parameters where the valve can be used. The user will be responsible for any other use in other conditions or areas.

Supplementary information is provided for such applications (ATEX) concerning the risks associated with environments that have potentially explosive atmospheres (ignition hazards).

TRANSPORT AND HANDLING

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

- **SAFETY WARNING:** Before handling the multi-way valve or its parts, ensure the lifting and handling equipment (e.g. cranes) are appropriately sized to manage its weight and the weight of the components.
- Do not lift the valve or hold it by the drive. Lifting the valve by the actuator can lead to damage to the equipment as the drives are not designed to withstand the valve's weight.
- Do not lift the valve by holding/handling it in the fluid passage area. The valve's sealing joint is located in this area. If the valve is held/handled and lifted by this area, it can damage the surface and the sealing joint and lead to leakage problems while the valve is operating.
- To prevent damage, especially to the anticorrosive protection, it is recommended to use soft straps or belts to lift **CMO Valves** 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 handling them. If 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, ensure they are correctly supported to prevent any deformations. For dispatches by sea, we recommend using vacuum bags inside the boxes to protect the equipment from contact with sea water.

STORAGE

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

While not advised, if stored outside, the multi-way valve must be covered to protect it from heat and direct sunlight, with good ventilation to prevent humidity and condensation.

The following aspects must be considered for storage purposes:

- The storage area 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. This is particularly important if the equipment is not protected with suitable packaging.
- This recommendation is even more important in areas with high humidity and saline environments. Wind can carry dust and particles that may come into contact with the valve's moving areas, leading to operating problems in the future; likewise, the drive system can be damaged due to the ingress of particles.
- The equipment must be stored on a flat surface to avoid any loss of shape.
- 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.

INSTALLATION

In order to avoid personal harm and/or material damage (to the facilities, the valve, drive, etc.) please follow these instructions:

- Before installation, inspect the multi-way valve to ensure no damage has occurred during transport or storage.
- All staff responsible for installing or operating the equipment must be qualified and trained.
- Use suitable personal protective equipment (PPE) (gloves, safety boots, goggles, etc.).
- Shut off all lines that affect the valve and put up a warning sign about the work.
- Completely isolate the valve from the whole process. Depressurise the process.
- Drain all the line fluid through the valve.
- For 3-4V Series multi-way valves to be used in potentially explosive atmospheres (ATEX), 'Ex' approved hand tools must be used during installation and maintenance, according to current regulations.
- Make sure that the inside of the valve body and, in particular, the seal area are clean. Inspect the pipes and the flanges to make sure they are clean and free of impurities, foreign bodies, etc.

ASSEMBLY

ASPECTS TO BE CONSIDERED DURING ASSEMBLY

Special care must be taken to respect the correct distance between the flanges and ensure they are correctly aligned and parallel (fig. 1). Incorrect positioning or installation of the flanges can cause deformation in the valve body, leading to operating problems.

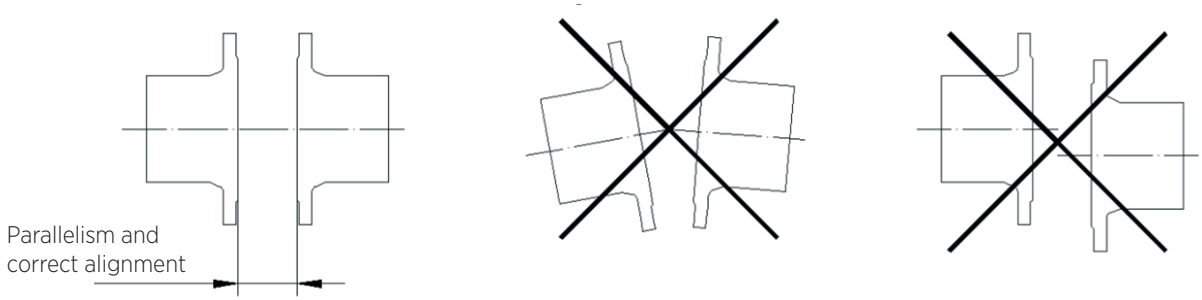


Fig. 1

It is very important to ensure that the multi-way valve is correctly aligned and parallel to the flanges in order to prevent external leaks due to deformations, problems with the flange gaskets, etc. In the case of blind flanges, the bolts in the threaded boreholes will have a maximum depth and will never reach the bottom of the threaded hole.

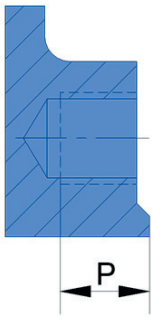


Fig. 2

- The equipment must be firmly installed in the duct where it is mounted. The joint to the duct can be bolted or welded.
- Whenever the joint is bolted to the duct, a watertight seal must be positioned between the duct and the multi-way valve in order to prevent any leakages. The seal to be installed will be selected in line with the working conditions inside the duct (temperature, pressure, fluid, etc.). The nuts and bolts to be fitted must also be suitable for the operating conditions, and their size must be in accordance with the approved drawings. The nuts and bolts should be assembled according to good practice codes, applying the tightening torque progressively and crosswise.
- As for scaffolding, ladders and other auxiliary elements to be used during assembly, follow the safety recommendations provided by their manufacturers, as well as the safety instructions in this manual.
- Once the equipment has been assembled, make sure that there are no objects inside or outside that may interfere with the movement of the distributor.
- Make the corresponding drive connections (electrical, pneumatic, etc.) following the instructions set out in the manufacturers' manuals and in the wiring/operation diagrams supplied with the actuators.
- Assembly of the equipment must be coordinated with site control and safety personnel. No modifications to the multi-way valve's external elements, such as limit switches, positioners, signalling boxes, etc., are allowed.
- Operate the equipment according to the safety recommendations in this dossier and in the drive manufacturers' installation and maintenance manuals.

ASSEMBLY POSITIONS (horizontal pipe)

CMO Valves valves can be mounted in all positions, but the following indications must be taken into account:

Position number 1: Preferred, recommended position.

Positions numbers 1, 2, 3, 4, 5, 6, 7 and 8: The valve can be installed in this position, although in this case it is best to check with **CMO Valves** beforehand.

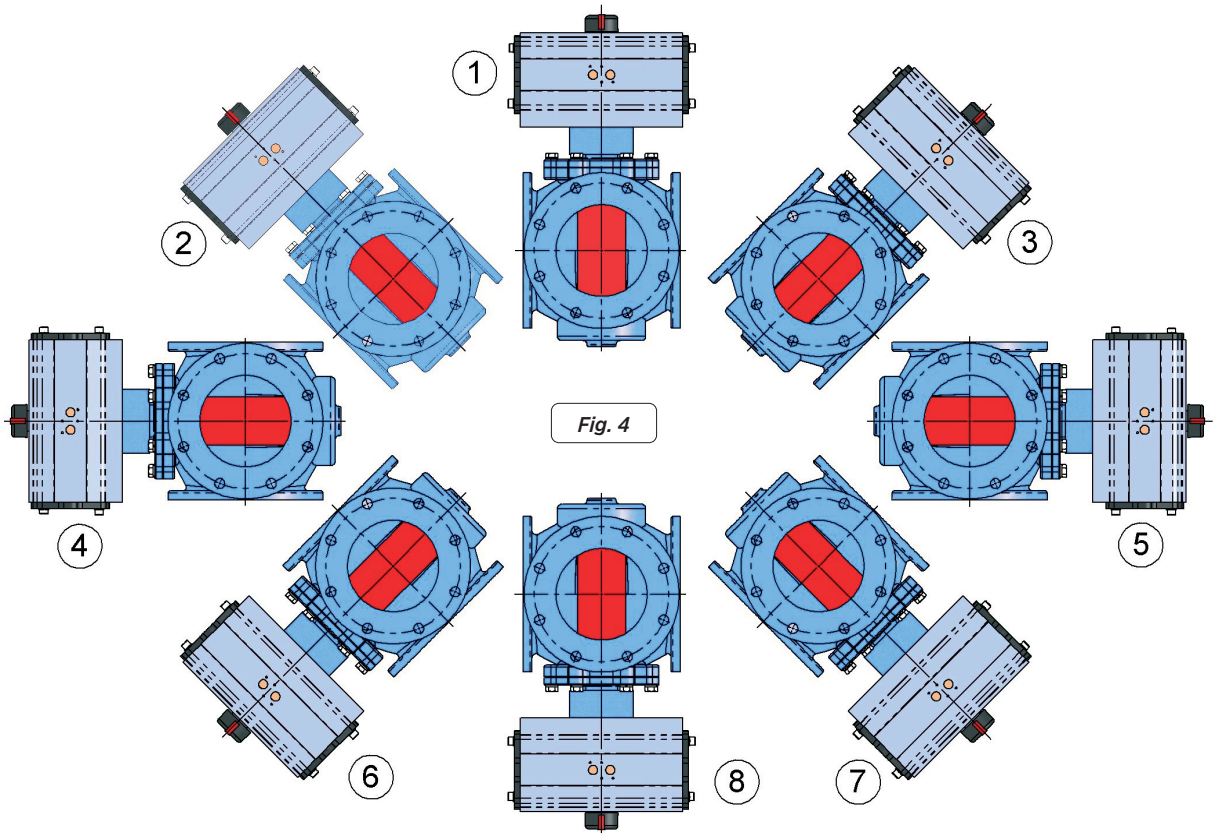


Fig. 4

ASSEMBLY POSITIONS (vertical /slanted pipe)

CMO Valves valves can be mounted in all positions, but the following indications must be taken into account:

Position numbers 1, 2 and 3: The valve can be installed in this position, although in this case it is best to check with **CMO Valves** beforehand.

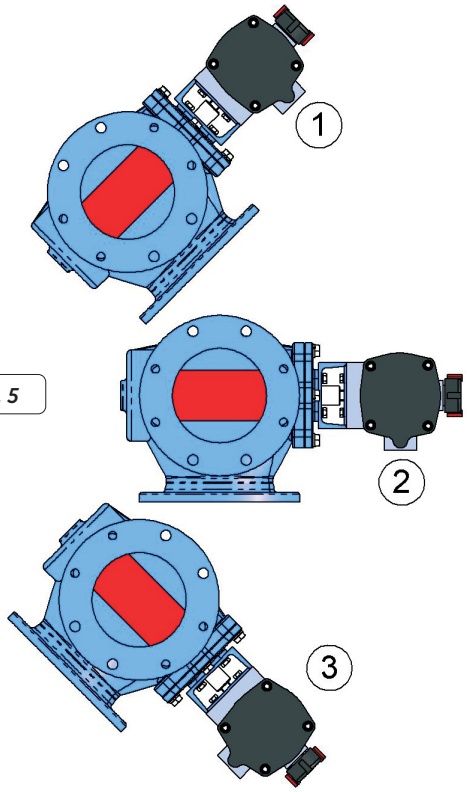


Fig. 5

START-UP

Once the multi-way valve has been installed, check that all the nuts and bolts have been correctly tightened and that the valve drive system has also been correctly assembled and adjusted (electrical connections, pneumatic connections, instrumentation, etc.) according to the manufacturer's manuals and the control schematics provided. All **CMO Valves** valves are tested and checked at our facilities, with actuators and drives also being adjusted at our plants.

If the valve has electrical accessories, or is in areas with potentially explosive atmospheres (ATEX), 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. and B.2.3.1.). Check the pipe's earth connection and the conductivity between the input and output pipes.

DRIVE

MANUAL GEARED MOTOR WITH HANDWHEEL (Fig. 6)

Turn the handwheel clockwise in order to operate (close) the multi-way valve. Turn the handwheel anti-clockwise to open.

The geared motors have a mechanical open-close position indicator disc showing the position of the valve. Moreover, the geared motors have two mechanical stoppers to limit the final travel positions; these positions are preset at the factory. Refer to the geared motor user manual for more information.

LEVER (Fig. 7)

First loosen the position locking clamp located on the yoke. Once unlocked, the lever can be operated to open or close it. Finally, lock the lever again.

GEARED MOTOR ACTUATOR

Fig. 6

HAND LEVER

Fig. 7

PNEUMATIC (double and single acting) (Fig. 8)

CMO Valves pneumatic drives are designed to connect to a 6-bar pneumatic grid. The pressurised air used for the pneumatic drive must be correctly filtered and lubricated. Correctly identify the equipment's pneumatic connection ports/inlets, and use fittings and connections suitable for their type and size.

This type of drive does not require any adjustment, since the pneumatic actuator is designed for the exact stroke of the valve (0-90º).

On request, pneumatic drive can have additional signalling and control elements, such as limit switch boxes, sensors, position transmitters, positioners, etc.

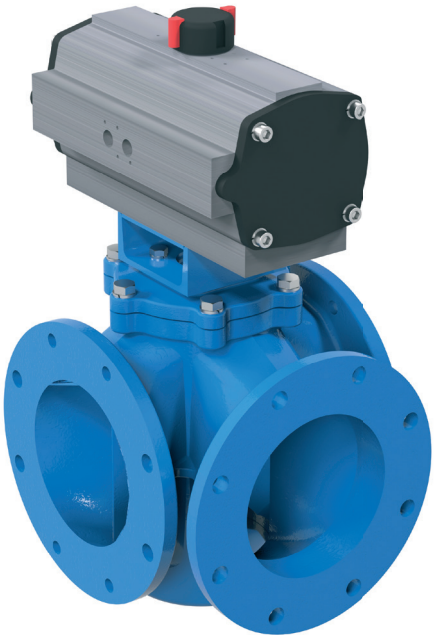
For further information, refer to the manufacturer's installation and maintenance manual or data sheet for the pneumatic actuator or any optional control and signalling elements.

MOTORISED (Fig. 9)

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

ELECTRIC ACTUATOR

Fig. 8



PNEUMATIC ACTUATOR

Fig. 9

MAINTENANCE

CMO Valves shall not be liable if the multi-way valve suffers damage due to incorrect or unauthorised handling or modification, or improper assembly and commissioning, thus voiding the warranty. Manipulating or modifying the multi-way valve is forbidden unless expressly authorised by **CMO Valves**. To prevent any personal or material damage during maintenance tasks, follow the safety instructions provided in this manual, as well as the following instructions:

- All personnel responsible for equipment maintenance or operation must be qualified, trained and familiar with the equipment and processes.
- It is mandatory to use appropriate personal protective equipment (PPE) (gloves, safety footwear, goggles, etc.).
- 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 line.
- Drain all the line fluid through the valve.
- For maintenance and commissioning, use tools suitable for the application and work area according to current regulations.
- In order to work under ideal safety conditions, 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 moving parts or levers.

Maintenance for this type of valve involves replacing the bushing and the seal (between body and bonnet) due to wear and tear. Seals should be checked every 6 months, although their working life will depend on the valve's working and service conditions, including pressure, temperature, number of operations and composition of the fluid.

In an ATEX zone, electrostatic charges may be present inside the valve, causing a risk of explosion. The user shall be responsible for implementing measures and actions to minimise risks.

- Maintenance personnel must be trained and informed about the risks of explosion and work in such areas, in accordance with current directives and regulations.
- If the fluid transported constitutes an internal explosive atmosphere, the user must regularly check the installation's sealtight integrity.
- 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.
- After maintenance in an ATEX zone, it is mandatory to check electrical continuity between the pipe and the rest of the valve's components, e.g. the body, knife gate, stem, etc., in accordance with Standard EN 12266-2, Annex B, Points B.2.2.2. and B.2.3.1.

IMPORTANT SAFETY ASPECTS

- To work under ideal safety conditions, the drives must be in idle position and disconnected from their power source (electric, pneumatic or hydraulic) with the air tanks depressurised. Drives with fail-safe position (spring return) must be in these safety positions or locked. Moreover, the electrical control cabinets must also be out of service and locked out. Maintenance staff must be up to date with the safety of all safety rules and regulations, and work can only start under orders from the site's safety personnel, who will be in charge of coordination.
- In single-acting spring-return drives, do not manipulate the drive as it contains high preload springs. Contact **CMO Valves.**
- The safety areas must be clearly marked and you must avoid placing auxiliary equipment (ladders, scaffolding, etc.) on levers or moving parts which may lead to the movement of the swing valve.
- In units fitted with spring return drives, the distributor must be mechanically locked and only unlocked when the drive is pressurised.
- In equipment with an electric drive, 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 valve's stem has no load before disassembling the drive system.

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

REPLACING THE BUSHING AND ITS O-RING SEALS (Fig. 10)

1. Make sure there is absolutely no pressure and fluid in the system.
2. Release the whole drive system. Release the yoke (3), leaving only the spindle (4) protruding from the bonnet (2).
3. Loosen all the bolts that join the body (1) to the bonnet (2).
4. Remove the bonnet (2) from the body (1).
5. Remove the bushing (5) and O-rings (6 and 7).
6. Replace the O-rings (6 and 7) and the bushing (5).
7. Before starting to assemble, we recommend applying petroleum jelly to the bushing (5) to facilitate the assembly and subsequent operation of the valve (do not use oil or grease); Table 2 (as mentioned above) shows the characteristics of the petroleum jelly used by **CMO Valves**.
8. Assembly will be performed in reverse order to disassembly.
9. Place the bushing (5) and O-rings (6 and 7) in their original position.
10. Return the bonnet (2) via the spindle (4), until it is back in its original position in the body (1).
11. Ensure that the seat gasket (8) between the bonnet (2) and the body (1) is not damaged (otherwise it will need to be replaced).
12. Carefully tighten the bolts (2) of the bonnet crosswise.
13. Mount the whole drive system.
14. Perform several operations with no load to check the valve is operating correctly.
15. Subject the valve to pressure in the line, checking that there are no leaks between the bonnet (2) and body (1), or between the spindle (4) and the bonnet (2).

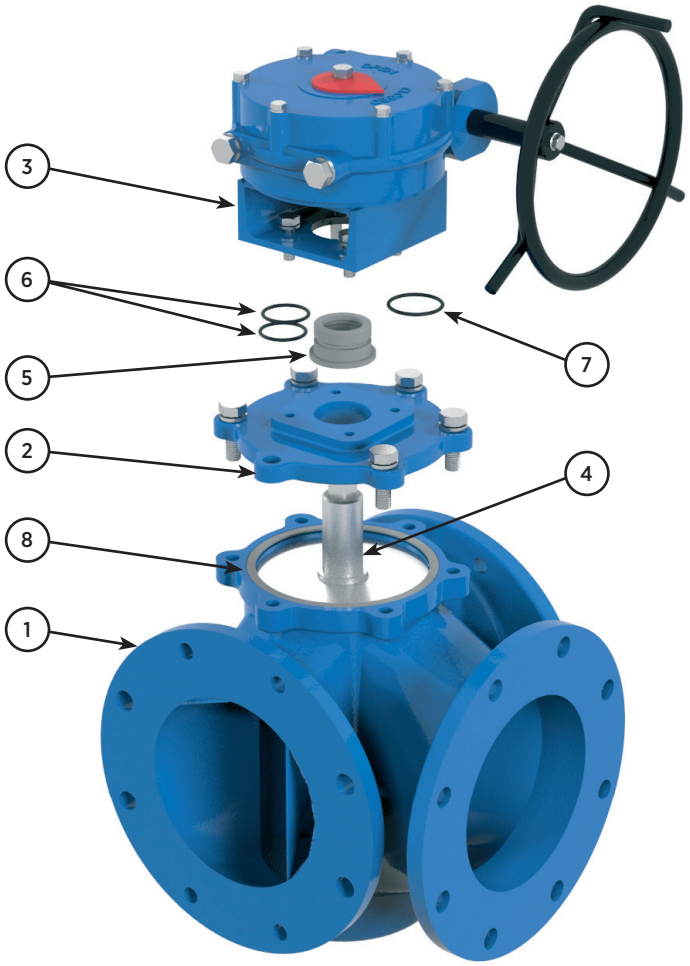


Fig. 10

Note:** When installing the new sealing joints, it is recommended to apply petroleum jelly to the bushing to ease assembly and ensure proper valve operation (do not use oil or grease); Table 1 below sets out details of the Vaseline used by **CMO Valves.

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

Table. 1

REPLACING THE SEAT GASKET (Fig. 11)

1. Make sure there is absolutely no pressure and fluid in the system.
2. Loosen all the bolts that join the body (1) to the bonnet (2).
3. Remove the drive bonnet (2) from the body (1).
4. Remove the seat gasket (8) between the bonnet (2) and the body (1) and clean its housing.
5. Position a new seat gasket (8) with the same dimensions as the one removed.
6. Assembly will be performed in reverse order to disassembly.
7. Make sure the seat gasket (8) is properly positioned between the bonnet (2) and the body (1), and insert the bonnet (2) and drive in the body (1).
8. Before starting to insert the bonnet into the spindle (4), we recommend applying petroleum jelly to the bushing (5) to facilitate the assembly and subsequent correct operation of the valve (do not use oil or grease); Table 2 (as mentioned above) shows the characteristics of the petroleum jelly used by **CMO Valves**.
9. Carefully continue to tighten all the bolts of the bonnet (2) crosswise.
10. Perform several operations with no load to check the valve is operating correctly.
11. Subject the valve to pressure in the line, checking that there are no leaks between the bonnet (2) and body (1), or between the spindle (4) and the bonnet (2).

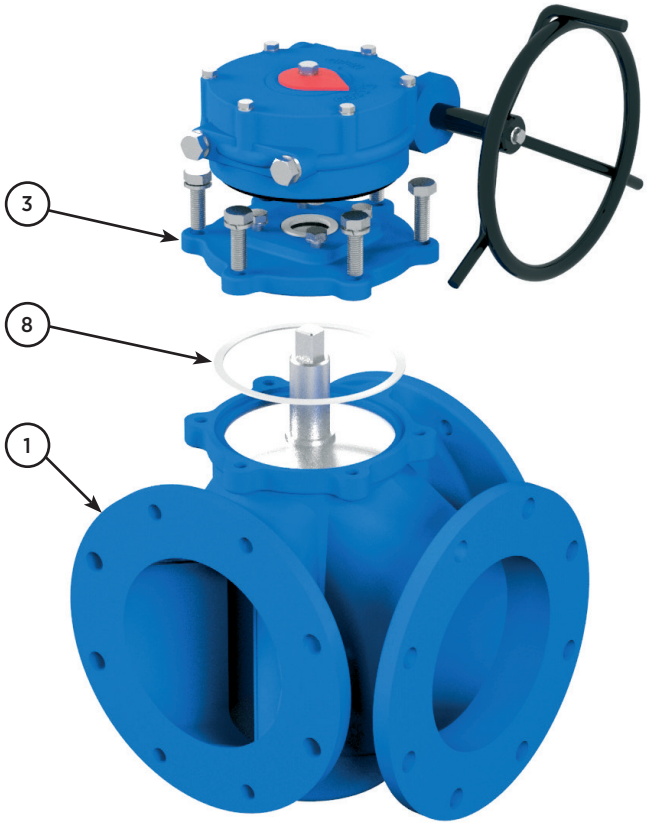


Fig. 11

DRIVE MAINTENANCE

For the maintenance of other types of drives mounted on the multi-way valve (e.g. manual geared motors, electric actuators and ¼ turn pneumatic actuators), follow the manufacturer's recommendations as set out in the user manual and technical sheets. This documentation is provided with the valve.

COMPONENTS LIST

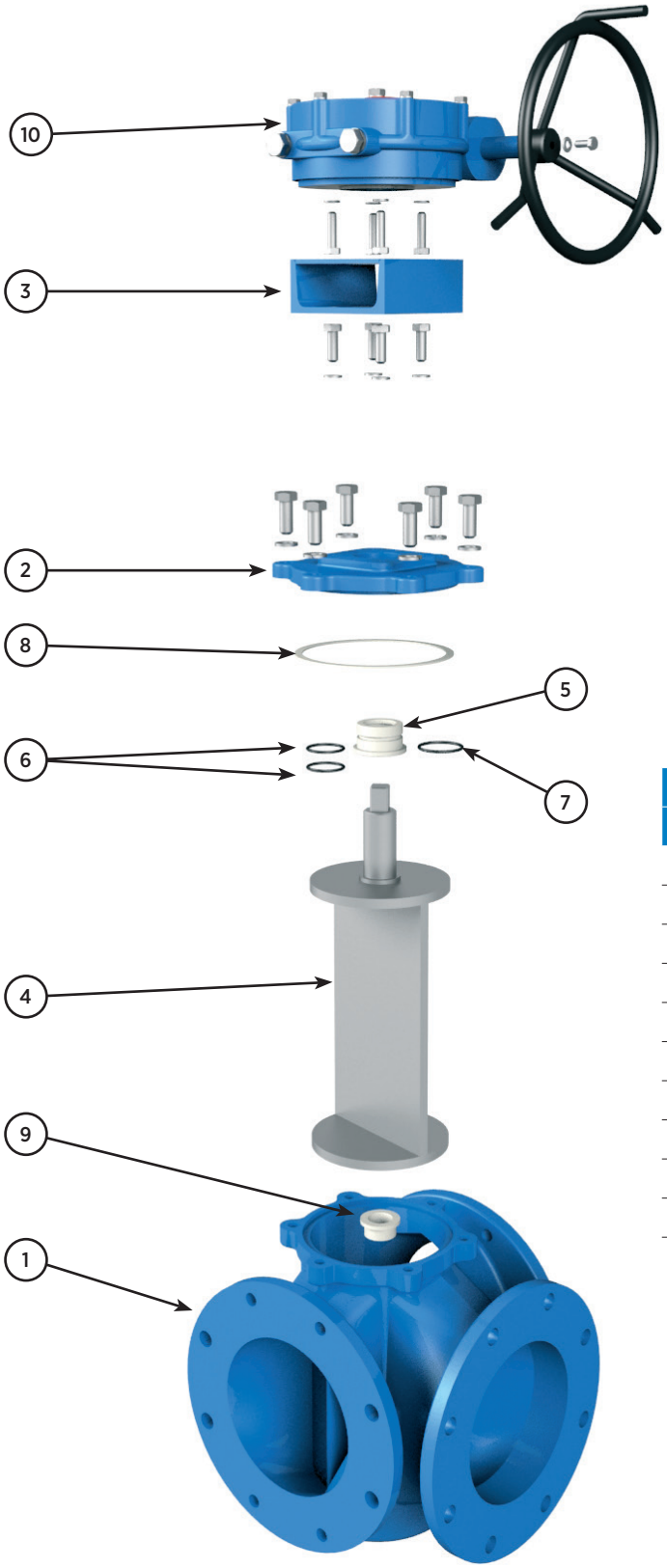


Fig. 12

HANDWHEEL DRIVE	
POS.	DESCRIPTION
1	BODY
2	BONNET
3	YOKE
4	DISTRIBUTOR
5	BUSHING
6	O-RING SEAL (INTERIOR)
7	O-RING SEAL (EXTERIOR)
8	SEAL
9	BUSHING
10	DRIVE

Table. 2

PARTS

All components and materials used to manufacture **CMO Valves** multi-way valves have been designed and selected according to the requirements and specifications of each project. Use only original spare parts.

For any request or inquiry, contact **CMO Valves** stating the material or component required and the order or project number. The chapter **COMPONENTS LIST** and the website **www.cmovalves.com** include catalogues and technical information that can help identify the parts and elements of the 3-4V Series valve.

ENVIRONMENTAL ASPECTS: DISPOSAL AND RECYCLABILITY

To minimise the environmental impact during the life cycle of the 3-4V Series multi-way valve, users are given the following environmental guidelines and should consult the relevant standards and directives before disposal;

- During transport, storage, assembly and commissioning: Materials used in packaging must be processed through the appropriate recycling channels.

- At the end of the product's (or component's) life cycle: The materials used to manufacture the valve can be recycled by specialist waste management companies, including:
  - **Metal:** steel, aluminium, cast iron, copper, bronze, etc.
  - **Plastic:** Sliders, rubbers and seals
  - **Oils and greases** require special treatment before disposal; be sure to use approved waste management companies for this task.
  - For optional items such as limit switches, sensors, etc., refer to the relevant manufacturer's instructions.

As part of its ongoing product and service improvement process, **CMO Valves** reserves the right to alter the data and content of this document at its discretion at any time without notice. The publication of the latest revision renders all previous documents invalid.

Latest version of the Installation and Maintenance Manual available at **www.cmovalves.com.**

www.cmovalves.com

CMO VALVES

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