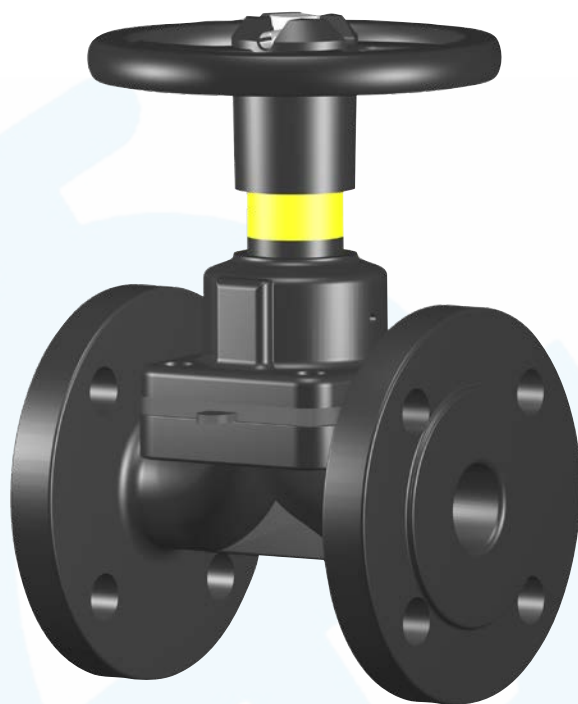


INSTALLATION, OPERATING AND MAINTENANCE MANUAL



DIAVAL® DIAPHRAGM VALVES

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1. GENERAL INFORMATION ON THE MANUAL

- This Manual provides information on safely using the product, being binding for preservation, storage, handling, transport, installation, commissioning, operation, maintenance, repair and disposal, and must be thoroughly observed at any step.
- Please contact the supplier or the manufacturer in case of issues which cannot be solved by reference to this Manual.
- Any deviation from this Manual and sound engineering practice or modification on the product shall be notified to manufacturer for advice or approval.
- In addition, regional safety requirements must be always applied and observed at any step.
- All the work related to the product must be carried out, supervised and inspected by specialist personnel. It is the owner's responsibility to define areas of responsibility and competence and to ensure the proper monitoring.
- This Manual is in accordance with Directive 2014/68/EU on Pressure Equipment (PED) and Machinery Directive 2006/42/EC.
- This Manual is in accordance with Pressure Equipment (safety) Regulation 2016.
- For ATEX applications, please refer to ATEX Specific instructions.
- The manufacturer reserves the right to make technical modifications at any time.

2. NOTES ON POSSIBLE DANGERS

2.1 Significance of symbols



Warning of general danger.

2.2 Explanatory notes on safety information

In this Manual dangers, risks and items of safety information are highlighted to attract special attention.

Information marked with the symbol above describes practices, which if fail to comply with, can result in serious injury or danger of death for users or third parties or in material damage to the system or the environment. It is vital to comply with these practices and to monitor compliance.

The rest of information not specifically emphasized in this Manual, along with Data Sheet and product marking, must also be observed and complied with for safely using the product.

3. PRESERVATION, STORAGE, HANDLING AND TRANSPORT



- *Protect against external force (impacts, vibrations, etc.).*
- *Allow only skilled personnel; suitable handling and lifting equipment must be used. See Data Sheet for weights or consult manufacturer.*
- *Always use suitable protection equipment, and minimize the use of human body force at any step to avoid injuries.*
- *During handling make sure that operating device is well attached to the valve or removed to avoid danger of detachment. Product parts such as handwheels or actuators must not be used to take up external forces that they are not designed for: e.g. do not use them as climbing aids, or as connecting points for lifting gear, etc.*
- *There is a risk of body member (hand, finger, arm...) crushed against any other solid element (wall, pipe, floor, etc.) during handling. Take this into account and handle with care.*
- *There is a risk of body member trapped between valve body and diaphragm during operation of the valve. Make sure no operation / supply to actuator disconnected if access to the interior of the valve.*
- *There is a risk of body member injury in case there is any exposed moving part between valve and actuator (special arrangements). Take appropriate measures and set warning notes when required.*
- *Check correct position of nameplate and handle with care to avoid personnel cuttings.*

- Use proper packing for transportation.
- Keep spare diaphragms in original packing and keep away from sunlight.
- Keep storage protection before installation.
- Weir Type valves should be stored in their open position.
- Straight Through valves should be stored in the nearly closed position.
- When valves are to be stored for a while, it is a good practice to air blow the valves to remove the moisture that could have been adhered during carriage and could lead to external corrosion. Exposure to outdoors conditions, specially in industrial or marine atmospheres accelerates corrosion process and ageing of bodies and components. The valve surface is protected by a primer paint. In order to prevent damage, corrosion or rust on the surface, avoid extreme temperatures (keep at 5°C to 50°C), avoid high environmental humidity or corrosive environment. Keep the valves away from direct sunlight, dust, flames or rain. Protect rubbers also against UV light. Do not pile up excessive weight. In case of severe bumping inspect the material for any damage and replace if necessary.

4. DESCRIPTION

4.1 General Description

Diaphragm Valves are linear motion valves, bidirectional, bolted bonnet, seatless design, packing free, with a diaphragm as closure element, with rising handwheel. They have a visual position indicator, a yellow stripe in the valve neck that is covered when the valve is closed. Valves are offered with a broad range of diaphragms and linings materials to resist to abrasion and corrosion duties. Valve diagram with parts can be seen at the last chapter of the Manual.

4.2 Area of Application

DIAVAL® Diaphragm Valves Weir type and Straight Through type are devised to stop the flow when necessary. Weir type diaphragm valves can also be used for throttling purposes by keeping the handwheel at intermediate positions, although it might accelerate erosion of diaphragm and body if position is near to the closed position.

4.3 Operating principles

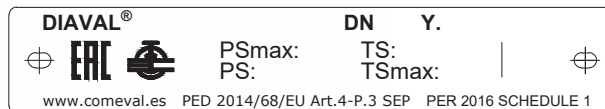
Turning the handwheel clockwise lowers the compressor which moves the diaphragm toward the bottom of the body to provide bubble-tight shutoff in both directions. Turning the handwheel anti-clockwise opens the valve. Consult the manufacturer if a change of the actuation device is required.

4.4 Technical data - remarks

For data such as main features, duties/limits of use, dimensions, weights, etc. refer to Data Sheet.

4.5 Marking/nameplate

Nameplate description of the valve:



4.6 CE marking. Intended use acc. to PED

CE marking for weir type valves (W)

Rubber Diaphragm

| PS | ≤50 | 65-150 | 200 | 250 | 300 |
|----|-----|--------|-----|-----|-----|
| 4 | | | | | |
| 5 | | | | | |
| 6 | | | | | |
| 10 | | | | | |
| 16 | | | | | |

Out of scope

PTFE Diaphragm

| PS | ≤125 | 150 |
|-----|------|-----|
| 3,5 | | |
| 6 | | |
| 10 | | |

Out of scope

Liquids of group 1 & 2* compatible with materials of construction, acc. to Directive 2014/68/EU Annex II tables 8&9 up to category I

CE marking for straight type valves (ST)

| PS | ≤100 | 125-150 | 200-300 |
|-----|------|---------|---------|
| 3,5 | | | |
| 6 | | | |
| 10 | | | |

Out of scope

Liquids of group 1 & 2* compatible with materials of construction, acc. to Directive 2014/68/EU Annex II tables 8&9 up to category I

* Classification of fluids (group 1 or 2) acc. to Directive 2014/68/EU, Article 13.

** See coding system on Data Sheet.

| Mark | Description |
|----------------|--|
| | Manufacturer logo |
| | Marking of compliance with EAC regulations |
| www.comeval.es | Website of manufacturer |
| PED 2014/68/EU | Directive 2014/68/EU |
| SEP | Sound Engineering Practice |
| PER 2016 | Pressure Equipment (Safety) Regulation |
| DIAVAL® | Brand |
| FIG | Valve code** (WD00DI10D10, SD00DI10D10, ...) |
| Y.VV | Manufacturing year (Y.16 = 2016) |
| ZZZZZ-N | Batch / Serial no. |
| TS | Min. / max.. temperature |
| PN | Nominal pressure, max. pressure in bar |
| PSmax | Max. pressure |
| TS | Min. / max. temperature at max. pressure |
| PS | Max. pressure at max. temperature |
| TSmax | Max./min. temperature |
| DN | Nominal diameter |

Check valve selection, material compatibility, pressure and temperature limits and other essential parameters. Ensure proper safety devices/measures are implemented to prevent exceeding intended use of the product. Contact the manufacturer for advice in case of pressure tests exceeding the intended use. Refer to Data Sheet and consult the manufacturer for further information.

5. INSTALLATION

5.1 General remarks on installation

The following points should be taken into account in addition to the general principles governing installation work:



ATTENTION!

- Before installation, make sure previous chapters are thoroughly followed.
- Ensure safe access and working conditions for proper performance.
- Only operate the valve while observing all the safety measures.
- Remove flange covers or any other remaining packing/storage protection if present.
- Lay pipelines such that damaging transverse, bending and torsional forces are avoided.



ATTENTION!

- Protect valves from dirt during construction work. The interior of the valve and the pipeline must be free of foreign particles.
- Protect the valve soft parts from heating caused by welding works at the plant during commissioning.
- Avoid mechanical damage to the seating surfaces.
- There is not preferred direction of flow. Valve is bidirectional. Stem can be installed at any position, better upwards and/or pointing far away from personnel in case of dangerous media.
- When using the valve as an end seal, the employers' liability insurance association of the gas and waterworks specifies the use of a safety precaution such as a plug-in disc, blind flange, etc. With a medium jet that freely exists, you must secure the exit area.
- When installing the valve, there is a crushing hazard between valve and pipe system. Mind the hands to avoid it.

Flanged ends valves:

Make sure that counterflanges are compatible with the standard of the valve flanges. When matching up flanges, avoid gradients, rotation and pipe misalignment that could cause pipe and valve stress and leakage once installed. Flanges should fit smoothly. Select the proper flange face gaskets according to duty and centre them on the flange face properly. Do not use gaskets for rubber lined valves. Do not force the counterflanges and do not try to tighten the bolts when a gap exists between valve and pipe or if misalignment is observed. Tighten in a crosswise, moderate and uniform manner.

Screwed ends valves:

Make sure that the pipe screw has the correct finish and compatible cone for the valve. Use proper sealant according to duty, such as hemp core, Teflon, etc.

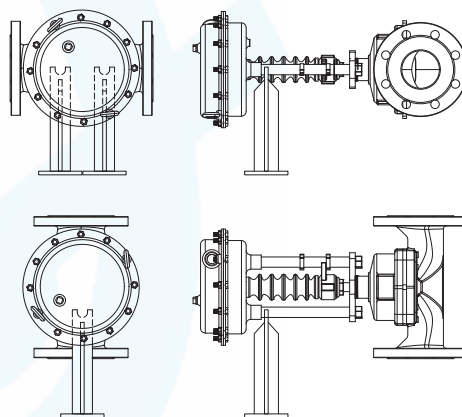
Check that pipe introduction in the valve does not exceed its thread, leave a safety margin of minimum 1 mm. Tighten with a plain or adjustable wrench on the hexagon end of the valve only. Apply force to other area of valve may seriously damage the valve. Do not use hook spanners or other wrenches that could damage the hexagon surface. Valve should be threaded smoothly. If not, do not try to force the thread and avoid wrench extensions since this could lead to breaking the valve or damaging the thread. A general recommendation is not to exceed the tightening torque of 30Nm.

- When the valve is operated, there is a crushing hazard between the diaphragm and the body. Ensure the valve is not under operation in case hands are introduced inside the valve.

Actuator:

-If the valve requires pneumatic, electric or hydraulic actuator, separate actuator Manual shall be also followed. Make sure that the actuator is suitable for service particular requirements, valve adaptability, function needed, adequate torque for the valve, adequate speed, need for limit switches, etc. Contact our Technical Department for advice. In case of actuator mounted, disconnect the energy supply before starting work.

-To avoid unnecessary stress and risk of valve break, consider the weight and the relative position of actuator to evaluate its support. Recommended position for actuator is vertically upwards. In case of horizontal installation, the actuator weight shall be properly supported, to avoid tensions on the valve-actuator anchoring. Avoid installation vertically downwards.



5.2 Assembling additional modules

Optional accessories (limit switches, extensions, etc.) that are supplied with valves must be fitted as required for their functions as shown in the system plan.

5.3 Requirements at the place of installation

- Aggressive environmental conditions may reduce the life span of the product. Consider special construction/protective measures in such a case.
- Consider the interaction between the system and the equipment. Foresee elements to absorb vibrations, pipe dilations, guides, anchoring and proper support according to the weight of the components.
- The system and operation protocol should be conceived in such a way to avoid high velocities and cavitation. Prevent pulsing flow or water hammers, which are very harmful for valves and the rest of the components.
- Flooding of the product is not recommended.
- Allow enough space for valve installation, operation and maintenance.
- It is recommended to install a proper sized mesh strainer upstream the valve in order to protect seating surfaces from abrasion or erosion that could lead to seat leakage.
- Planners / construction companies or the owner are responsible for positioning and installing products.

6. COMMISSIONING & OPERATION



ATTENTION!

- Before commissioning the valve, check the material, pressure, temperature and other essential parameters. Always use the product within the scope of intended service and operating duties.
- Before commissioning, make sure previous chapters are thoroughly followed.
- Regional safety instructions should be adhered to.
- It is essential to flush the pipe system thoroughly to eliminate all the particles and impurities which could remain in the pipes and particularly welding residue, chips, tool remains, etc. that could damage the equipment during start-up. Ensure that during cleaning of the pipe system, any chemicals used and temperature are compatible with the valve construction.
- Temperatures above 50°C or below 0°C may cause personnel injuries if valves are touched.
- Leakage of media through valve, between counterflanges or at closing (end of pipeline) may also cause scalding, health harm, pollution, fire or damage to other parts of the installation depending on the media. Use suitable protection equipment when approaching the valve, ensure that the corresponding warning signs are displayed on the valve or surrounding area, and/or isolate the equipment in case of danger.
- Before commissioning a new plant or restarting it after repairs or modification, always ensure that:
 - All work has been completed correctly.
 - The valve is in the correct position for its function.
- Safety devices/measures have been implemented.- Valve operation, filling, warming-up and starting-up shall be gradual so as to avoid any inadmissible stress. Check for tightness in valve connections, body/bonnet union, and bonnet witness hole, and retighten crosswise and gradually if necessary until leakage elimination. (Observe Torque values table in table 1).

Ensure valve surface is in good condition and retouch coating protection when needed.

- Before plant commissioning check that the body / bonnet nuts are tight to the correct torque in table 1.
- During initial plant start up, the body / bonnet nuts may, in a small number of cases, need to be re-torqued to allow for expansion / contraction of the diaphragm.
- If the valves are to be re-painted after installation ensure that the valve is in the closed position and that the colour chosen does not cause confusion with the yellow colour of the indicator stem.



ATTENTION!

- In the event of infrequent use, operate the valve as frequently as possible to avoid deposits of dirt and valve blocking. Check for smooth operation and grease the stem thread when needed.
- When using the valve as an end seal, the employers' liability insurance association of the gas and waterworks specifies the use of a safety precaution such as a plug-in disc, blind flange, etc. With a medium jet that freely exists, you must secure the exit area.
- Before disassembling the valve, note chapters 3, 10 & 12.
- When the valve is operated, there is a crushing hazard between the diaphragm and the body. Ensure the valve is not under operation in case hands are introduced inside the valve.
- Only carry out maintenance work in the pipework when the valve has been secured from operation (in case of actuator, ensure it has been disconnected from the mains supply and secured from reactivation).
- Check the valve surface inside and outside and retouch coating protection when needed. If advanced corrosion or erosion is observed, double check service and valve features and replace the valve properly.

- Once the valve installed, make an initial opening and closing operation to check its proper operability, without additional tools.
- In case of risk of media freezing inside the valve, take due measures to avoid it.

7. CARE AND MAINTENANCE

The operator must define maintenance and maintenance intervals to meet requirements.

- Check for body, seat and connections tightness, and valve smooth operation without additional tools. There is a witness hole in the bonnet to identify diaphragm break (see parts list chapter 13).
- The valves can normally be dismantled in-situ whereupon valve linings and diaphragms should be checked for wear and / or damage.
- Check that correct diaphragm matches the body style, i.e. Weir diaphragm fitted into a WeirType body and Straight Through diaphragm fitted into a Straight Through body.



Straight Through Type



Weir Type

- During valve build up check as follows:
 - Valve and diaphragm material are suitable for service:
 - Body/bonnet fastenings are tight.

- Table 1 shows the max torque values needed when replacing a Diaval® rubber diaphragm:

| Valve Size (DN) | Weir Type | | Straight Through | | Valve Size (DN) | Weir Type | | Straight Through | |
|--------------------|-----------|------|------------------|------|--------------------|-----------|-------|------------------|-------|
| | lbs ft | Nm | lbs ft | Nm | | lbs ft | Nm | lbs ft | Nm |
| 15 | 4.0 | 5.0 | 4.0 | 5.0 | 125 | 34.0 | 44.0 | 30.0 | 42.0 |
| 20 | 4.0 | 5.0 | 4.0 | 5.0 | 150 | 60.0 | 81.0 | 60.0 | 81.0 |
| 25 | 4.5 | 6.5 | 8.5 | 11.0 | 200 | 74.0 | 100.5 | 74.0 | 100.5 |
| 32 | 6.0 | 8.2 | 8.5 | 11.0 | 250 | 82.0 | 111.0 | 82.0 | 111.0 |
| 40 | 10.0 | 12.5 | 9.0 | 12.0 | 300 | 93.0 | 126.0 | 93.0 | 126.0 |
| 50 | 18.5 | 26.0 | 19.0 | 25.0 | 350 | 93.0 | 126.0 | | |
| 65 | 26.0 | 36.0 | 22.0 | 30.0 | | | | | |
| 80 | 37.0 | 50.0 | 34.0 | 45.0 | | | | | |
| 100 | 30.0 | 40.0 | 30.0 | 40.0 | | | | | |

Table1

- Table 2 shows the max torque values needed when replacing a Diaval® PTFE diaphragm:

| Valve Size (DN) | lbs ft | Nm | Valve Size (DN) | lbs ft | Nm |
|--------------------|--------|-----|--------------------|--------|-----|
| 15 | 5 | 6.5 | 125 | 43 | 58 |
| 20 | 5 | 6.5 | 150 | 79 | 107 |
| 25 | 6 | 8 | 200 | 97 | 132 |
| 40 | 13 | 17 | 250 | 108 | 146 |
| 50 | 24 | 33 | 300 | 122 | 166 |
| 65 | 35 | 47 | | | |
| 80 | 49 | 67 | | | |
| 100 | 39 | 53 | | | |

Table2

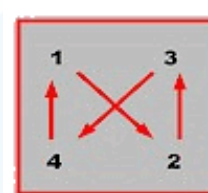
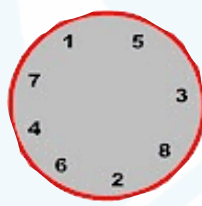


ATTENTION!

Apply full torque only with the valve in stand position, never fully close

- Good engineering practice requires that torque settings be checked periodically during pre-installation, commissioning, operation and routine maintenance, using a torque wrench set to the required figure.

Recommended tightening sequence:



IMPORTANT NOTICE FOR ASSEMBLING BODY-BONNET:

- Weir Type:

1. For elastomeric diaphragm (screwed connection), screw the diaphragm to the bonnet compressor until achieving contact between diaphragm and compressor. An excessive rotation strength could lead to break the diaphragm screwed pin by torsion. Then loose some degrees of rotation until diaphragm and bonnet holes are aligned. For PTFE diaphragm (bayonet type connection), introduce the bayonet in the compressor hole and then turn the diaphragm 90° to get diaphragm and bonnet holes aligned. Make sure that PTFE diaphragm is provided with elastomeric safe that protects PTFE from the compressor action.
2. Ensure that diaphragm is in stand position (valve open once mounted).
3. Tight body-bonnet bolts in a crosswise, progressive and uniform manner, according to the recommended torque values in this Manual.

4. Keep the valve in open position if storage.

- Straight Through Type:

1. Screw elastomeric diaphragm to the bonnet compressor until achieving contact between diaphragm and compressor. An excessive rotation strength could lead to break the diaphragm screwed pin by torsion. Then loose some degrees of rotation until diaphragm and bonnet holes are aligned.
2. Ensure that diaphragm is in stand position (valve closed once mounted).
3. Always check and adjust if necessary the maximum travel by turning the stem screw of the valve in relation to the bonnet in such a way that diaphragm rubber have enough contact with body seat surface. This allows to balance and avoid abnormal wear of body linings and diaphragms sealing line.
4. Tight body-bonnet bolts slight, crosswise and uniformly, making sure that diaphragm remains as centered as possible.
5. Proceed to make a complete travel of opening and closing of the valves to ensure the correct centering for the diaphragm.
6. Then retighten bolts according to the recommended torque values in this Manual. Make sure that the valve is not completely closed to allow the tightening of the bolts without damaging the diaphragm.
7. Keep the valve near to close position if storage.

After any maintenance work please refer to chapters 5 and 6 for installation / commissioning.

Recommended Spare parts:

Use only original spare parts.

We recommend to keep spare diaphragms as spare parts. Type and number of each spare part to be stored according to many factors: service level, valves quantity, etc.

8. TROUBLESHOOTING

In the event of malfunction or faulty operating performance, check that the installation and adjustment work has been carried out and completed in accordance with this Manual.



ATTENTION!

- It is essential that the safety regulations are observed when identifying faults.

9. TROUBLESHOOTING TABLE



ATTENTION!

- Read the complete Manual before carrying out installation and repair work.
- Read chapter 6 before recommissioning.

| FAULT | POSSIBLE CAUSE | CORRECTING MEASURES |
|--|---|---|
| Not flow | Valve closed or partially closed | Check valve position |
| Not enough flow | Valve protections / packing not removed | Remove protections |
| | Pipe system or strainer clogged | Check and clean system |
| Leakage between body and counterflanges | Counterflanges tightening not uniform or not enough, valve not properly centered or not well aligned pipe | Revise assembly and tightening, dismount and mount back properly if needed |
| | Flanges surfaces, lining or gasket damaged | Dismount the valve from pipeline, clean, correct damages or replace parts |
| Flange broken | Assembly bolts not well tightened or counterflanges are misaligned or too much gap | Replace valve and install according to this Manual |
| Difficult to operate or blocked / not able to achieve full closing or full open position | Wrong handwheel rotation | Operate rightly. Clockwise to close |
| | Stem/bonnet thread jammed or damaged | Inspect and clean/grease and replace parts if needed |
| | High pressure | Revise working conditions. Specially large size valves may require a relative high torque when operated under pressure |
| | Valve in "difficult position" for applying force | Arrange a correct access to the workers for valve operation |
| Seat leakage at valve closed | Impurities trapped between diaphragm and body | Open and close the valve under pressure to sweep the dirt trapped. Clean the system and set a strainer upstream of the valve. Repair or replace the valve if needed |
| | Diaphragm damaged | Replace diaphragm |
| | Body sealing surface damaged | Replace body |
| | Impurities trapped between diaphragm and body | Open and close the valve under pressure to sweep the dirt trapped. Clean the system and set a strainer upstream of the valve. Repair or replace the valve if needed |
| Leakage through bonnet witness hole | Diaphragm damaged | Replace diaphragm |
| Leakage between body and bonnet | Union fasteners excessively, insufficiently or improperly tightened, or diaphragm damaged | Retighten crosswise and uniformly or replace diaphragm or valve when needed |
| | Too much working pressure | Revise working conditions |

Technical support always available through our website www.comeval.es or your local distributor.

10. DISMANTLING THE VALVE OR THE TOP PART



ATTENTION!

The following points must be observed:

- Pressureless pipe system.
- Medium must be cool.
- Plant must be drained.
- Note chapter 3 for proper handling and lifting.
- Additionally, in case of toxic, corrosive, flammable or caustic media:
 - Purge pipe system carefully.
 - Use proper protection equipment to avoid health harm.
 - Adopt proper actions to avoid pollution of the environment.

11. GOODS RETURN & DISPOSAL

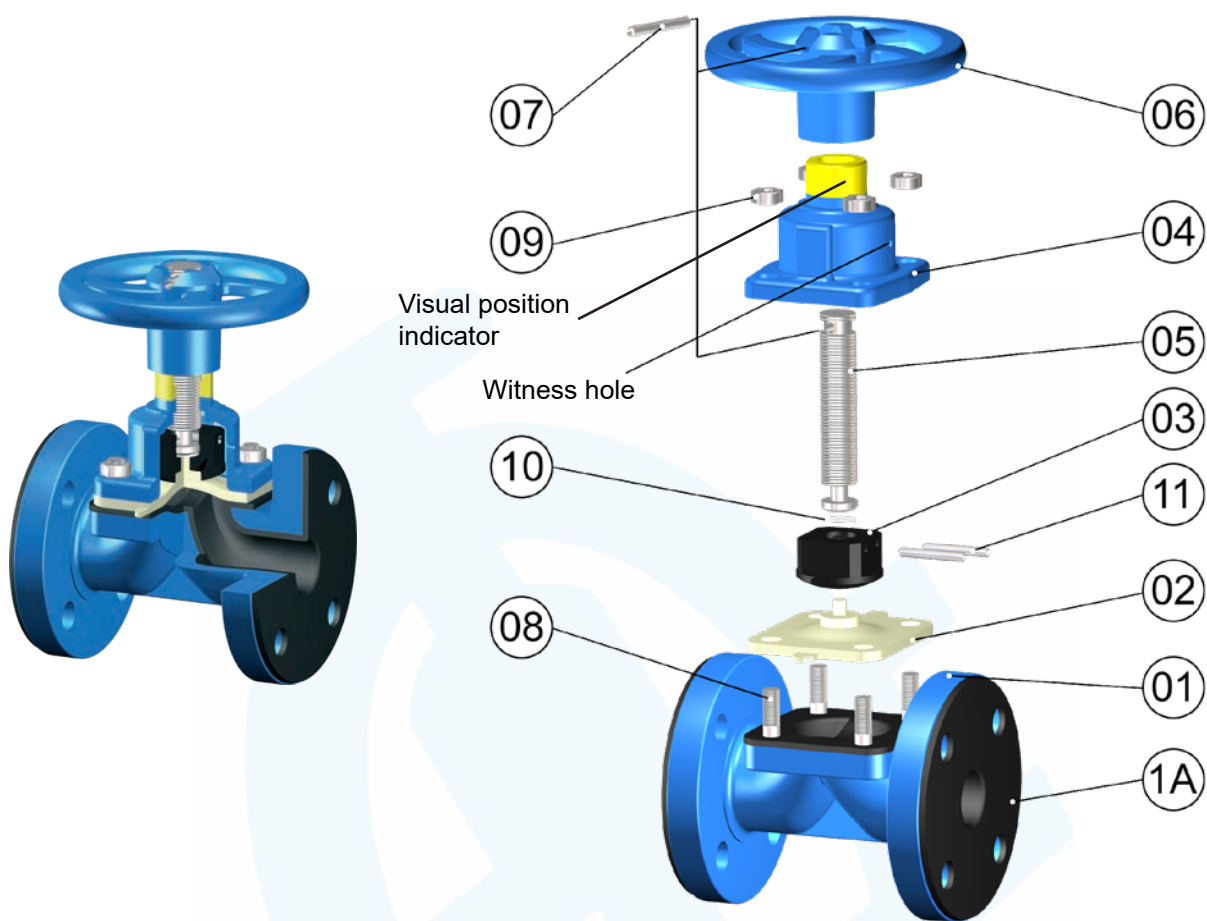
- For any returned goods, the issuing company must provide information in written on any hazards and the precaution in case of potentially polluting or harmful residues, or any mechanical damage that could present a health, safety or environmental risk, as enforced by EU Health, Safety and Environment Law, including the Safety Data Sheet of the substances identified as potentially hazardous.
- Valves are recyclable and not expected hazard to the environment, with the exception of soft parts (PTFE and rubber compounds) that should be disposed separately only by approved procedure, and no incineration is permitted.

12. WARRANTY / GUARANTEE

- The extent and period of warranty cover are specified in the "General Sales Terms" of COMEVAL VALVE SYSTEMS valid at the time of delivery or, by way of departure, in the contract of sale itself.
- We guarantee freedom of faults in compliance with state-of-the-art technology and the confirmed application.
- No warranty claims are accepted for any damage caused as the result of incorrect handling or disregard of this Manual, Data Sheet and relevant regulations.
- This warranty also does not cover any damage which occurs during operation under conditions deviating from those laid down by specifications or other agreements.
- Justified complaints will be eliminated by repair carried out by us or by a specialist appointed by us.
- No claims will be accepted beyond the scope of this warranty. The right to replacement delivery is excluded.
- The warranty shall not cover maintenance work.
- Our guarantee coverage does not cover for any commissioning, maintenance or installation of the product or external parts.
- Our guarantee does not cover products proved to have been tampered with or faulted by material wear and tear.
- The Purchaser is responsible for checking that the incoming product is received in good condition and conforms to the ordered specifications. In case of damage caused during transit it is necessary to immediately complain to the carrier within 24 hours. After this time carriers could not assume the derived costs. In case of any deviation in relation to order specifications, please contact us.

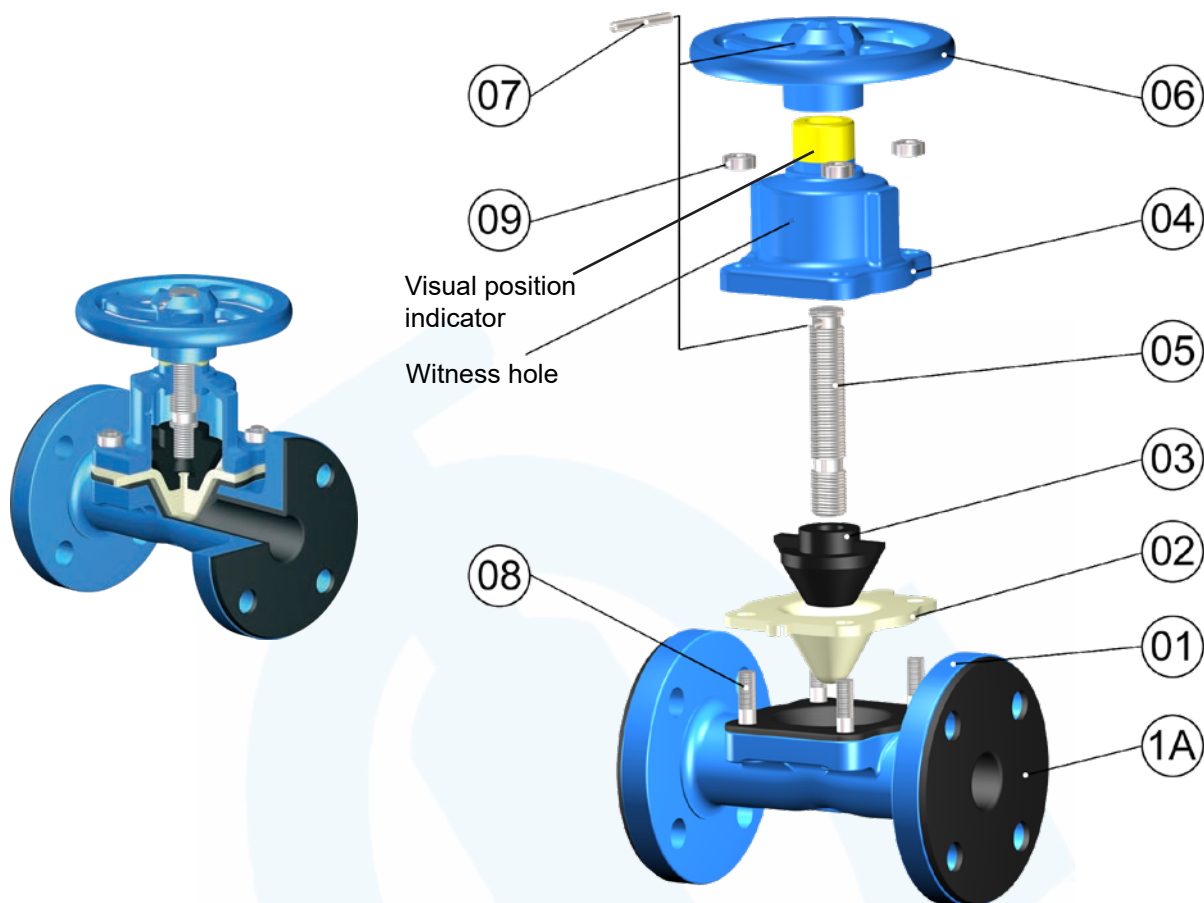
13. PARTS LIST

W - Weir Type



| Nº | PART |
|----|-----------------------|
| 01 | Body |
| 1A | Lining (lined valves) |
| 02 | Diaphragm |
| 03 | Compressor |
| 04 | Bonnet |
| 05 | Spindle |
| 06 | Handwheel |
| 07 | H/W dowel pin |
| 08 | Body studs |
| 09 | Body nuts |
| 10 | Thrust washer |
| 11 | Compressor pins |

ST - Straight Through Type



| Nº | PART |
|----|-----------------------|
| 01 | Body |
| 1A | Lining (lined valves) |
| 02 | Diaphragm |
| 03 | Compressor |
| 04 | Bonnet |
| 05 | Spindle |
| 06 | Handwheel |
| 07 | H/W dowel pin |
| 08 | Body studs |
| 09 | Body nuts |

14. ANNEXES

- 14.1 Declaration of Conformity - DC09EN
- 14.2 Data Sheet - DS09

Updated documents on www.comeval.es