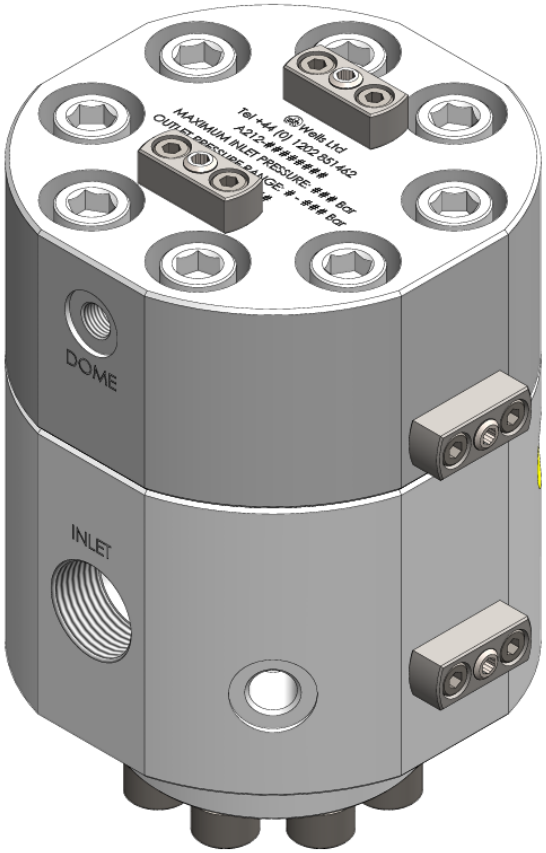
Installation Operation and Maintenance Manual

A212

DOME LOADED PRESSURE REDUCING VALVES



www.biswells.com
sales@biswells.com
+44 (0) 1202 451462
BiS Wells Ltd, Units 17-23 Kingfisher Park, West Moors, Dorset, BH21 6US, United Kingdom

SCOPE

This manual covers dual loaded dome regulator valves with model code A212, excluding serial numbers beginning 218/#.

If in any doubt as to the applicability of these instructions, please contact BiS Wells for further advice quoting the exact model code and serial number of the valve before proceeding.

PRESSURE RANGES

Ensure that the valve is only operated within the ratings marked on the product.

INSTALLATION

The valve has been designed to operate primarily in a vertical position. The valve is supplied as standard with mounting holes on the lower face of the valve body. The valve should be mounted in such a way that the weight of the product does not unduly stress the connecting pipework or fittings.

This valve must not be used as the overriding pressure limiting device and a pressure relief valve should be fitted downstream to protect the system in the event of valve failure. The relief valve should be sized such that it can discharge the full flow that can pass the pressure regulator in the unlikely event that it fails in the fully open position. BiS Wells can assist with this calculation if required.

The valve is supplied in a clean condition ready for installation. Contamination passing through the valve can cause malfunction. It is important to ensure that all connecting pipework and upstream components are clean before any gas or liquid is passed through the system to ensure that contaminant is not introduced to the valve. The installer is recommended to fit local filtration of 25 microns or less to protect the valve seat from contamination ingress.

For safe transportation, the valve is supplied without any reference pressure in the dome. Prior to use, the reference pressure in the dome must be set, either separately on a test rig or on the system if safe to do so. See the Operation section for setting instructions.

Two ports connect into the dome and can be isolated independently using the two needle valves on top of the dome. These dome ports can be used for external loading, connecting to a pilot line, venting of the dome, or for connecting to a gauge or pressure sensor.

OPERATION

Pressure Reducing Valves are designed to provide a reduced and approximately constant outlet pressure from any given inlet pressure within the valve's working range. Dome loaded pressure reducing valves control outlet pressure by means of a pressure sensing diaphragm and a control valve. Pressure contained within the dome is known as the reference pressure, and effectively becomes a gas spring. This pressure acts on the topside of the diaphragm. The pressure at the outlet port acts on the underside of the diaphragm. As the outlet pressure rises the reference pressure will be overcome and the valve will close. The reference pressure contained in the dome will always be slightly higher than the outlet pressure.

Dual loading valves allow the dome reference pressure to be charged internally (using gas from the inlet side of the valve), or externally (using a separate gas pressure source). Since the media in the dome must be a gas, internal loading is not suitable for hydraulic (liquid) applications.

Only inert gases should be used to charge the dome. Oxygen is not recommended as a suitable gas for the dome chamber. Helium and hydrogen may be used but are not preferred due to the increased chance of pressure loss because of their small molecule size. Dry air and Nitrogen are ideal gases for use in the dome.

The maximum flow rate, and flow performance under given criteria through the A212 valve can be supplied by BiS Wells Ltd. See valve datasheet / installation drawing for capacity factor (Cv).

Due to the balanced design, change in inlet pressure has negligible effect on outlet pressure, though the outlet pressure will reduce with increasing flow across the valve.

Setting Instructions

Prior to use, the reference pressure in the dome must be set.

To aid setting, it is advisable to have a pressure gauge and isolating stop valve available downstream of the reducing valve. This will enable a small downstream volume to be isolated and will allow accurate indication of downstream control pressure and precise and positive adjustment.

WARNING!

When adjusting the dome pressure, unscrew any needle valves gradually to avoid pressure spikes.

Internal Charging of Dome

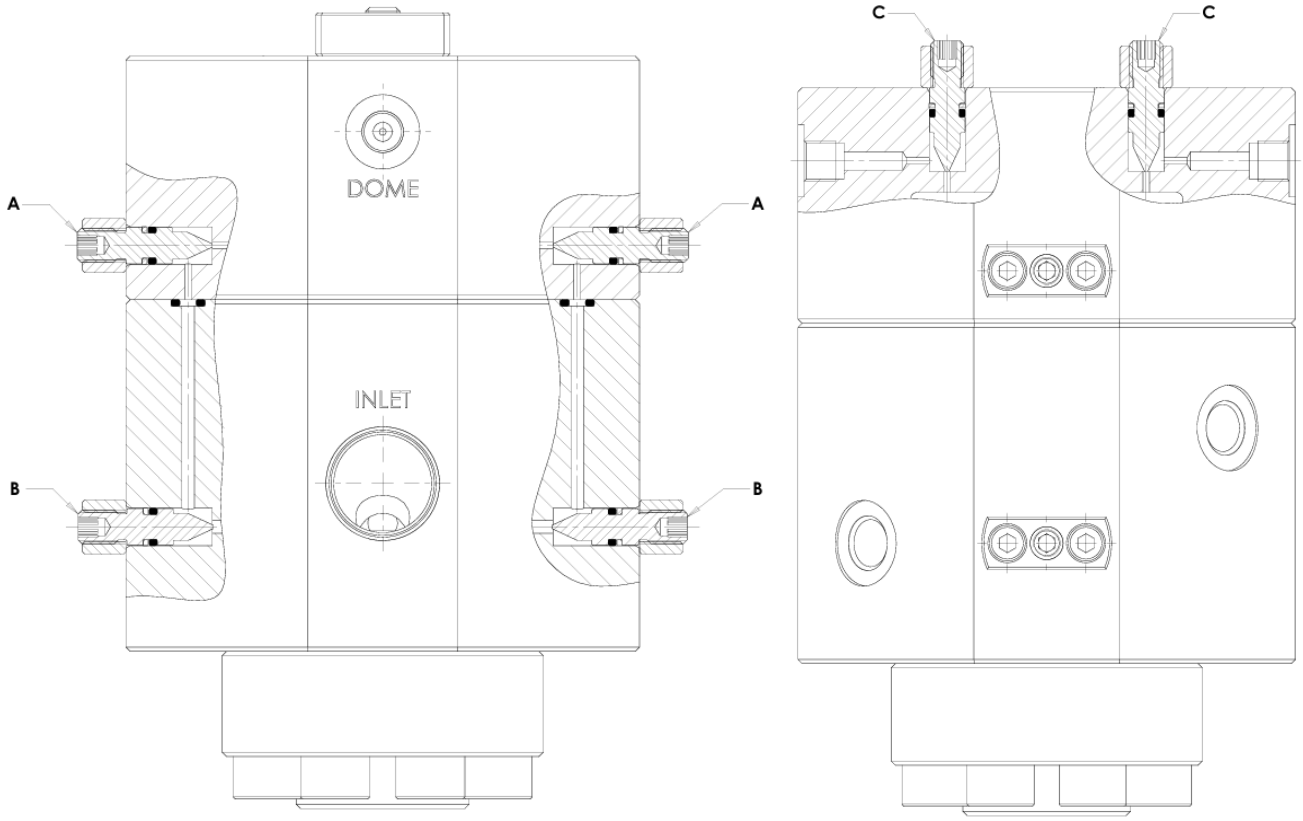
Note: The A212 has two sets of internal loading needles, allowing the valve to be set from either side.

1. Ensure all needle valves are firmly closed.
2. It is preferable to start from a state where the dome is de-pressurised. To depressurise the dome, ensure one of the dome ports is open / at ambient pressure and open the adjacent needle valve on the top of the dome (C) to release any dome pressure. Then re-close the needle valve (C).
3. Apply pressure to the inlet port. No downstream flow should occur.
4. Open one of the lower internal loading needle valves (B).
5. Observe the downstream pressure gauge and gently crack open the corresponding upper loading needle valve (A), keeping the socket key in position in the needle valve. Allow the pressure to feed into the dome which should cause the outlet pressure to rise to the desired value.
6. Quickly close the upper loading needle valve (A).
7. Vent down the main service ports, then close the lower loading needle valve (B).
8. Now re-apply inlet pressure and ensure the outlet pressure rises to the desired value.

Adjustment

The correct outlet pressure should now be set. However, if the outlet pressure is too high or too low the procedure must be repeated. It may be necessary to allow some gas out of the downstream volume to be able to observe the effect on the outlet pressure.

Ensure all needle valves are secure when setting is finalised.



External Charging of Dome

Note: The A212 has two sets of external loading ports and needles, allowing the valve to be set from either side.

1. Ensure all needle valves are firmly closed.
2. It is preferable to start from a state where the dome is de-pressurised. To depressurise the dome, ensure one of the dome ports is open / at ambient pressure and open the adjacent needle valve on the top of the dome (C) to release any dome pressure. Then re-close the needle valve (C).
3. Apply pressure to the inlet port. No downstream flow should occur.
4. Connect a separate pressure source to one of the dome ports, providing the desired dome pressure.
5. Observe the downstream pressure gauge and gently crack open one dome needle (C) keeping the socket key in position in the needle valve. Allow the pressure to feed into the dome which should cause the outlet pressure to rise to the desired value.
6. Quickly close the dome needle valve (C).
7. Remove the external pressure source.
8. Vent down the main service ports.
9. Now re-apply inlet pressure and ensure the outlet pressure rises to the desired value.

Adjustment

The correct outlet pressure should now be set. However, if the outlet pressure is too high or too low the procedure must be repeated. It may be necessary to allow some gas out of the downstream volume to be able to observe the effect on the outlet pressure.

Ensure all needle valves are secure when setting is finalised.

MAINTENANCE

When service is required, BiS Wells recommend return of the product for factory repair and refurbishment. However, if preferred, spares kits are available, which may be installed using these fitting instructions. Only personnel experienced in the service of high pressure fluid power equipment should attempt service of these products. Incorrectly maintained pressure products can cause damage and fatal injury.

When ordering spares kits please state model and serial numbers of the valve and fluid in system.

Valve products contain elastomeric sealing materials such as o-rings which may degrade over time and other components such as valve seats that may degrade with wear. If the avoidance of leakage in the event of degradation is critical, a regular service routine should be adopted. Since every system is different, the actual service interval should be determined by the criticality of failure and monitoring of performance in the system. Regardless, we recommend that the valve is serviced by fitting a new service kit at least every 5 years.

Cleanliness during assembly is most important, particularly on all sealing surfaces.

It is recommended to lightly lubricate seals on installation. Threads should be lubricated to minimise the risk of seizure. This is particularly important when working with stainless steel valves. Ensure that any lubricant used in wetted areas of the valve are compatible with the system fluid. If in doubt, contact the factory for advice on suitable lubricants.

It is advisable to hold a Spares Kit for emergency situations.

If a filter has been fitted upstream of the valve it should be regularly cleaned or replaced.

Spares Kit

The correct spares kit part number will depend on the exact model code of the valve being serviced. When ordering a Spares Kit, it is important to state the valve type, serial number and or the gas or fluid in the system.

The standard spares kit contains a valve seat, main poppet, spring, seat support, diaphragm and o-rings.

Replacement parts should only be sourced through BiS Wells. The use of any parts from any other source will invalidate any remaining warranty on the product.

WARNING!

BEFORE MAINTENANCE WORK IS UNDERTAKEN, whether the pressure regulator is installed in a line or not, IT IS ESSENTIAL to ensure that all pressure is vented from the valve and dome chamber. To vent the dome chamber, follow steps 1 and 2 of the dome charging procedures.

Service Instructions

Before undertaking any servicing of the valve, ensure the valve is completely isolated from the supply and outlet pressures, any pressure in the valve has been removed and the dome has been de-pressurised. The valve should be removed from the line and worked on in a clean environment.

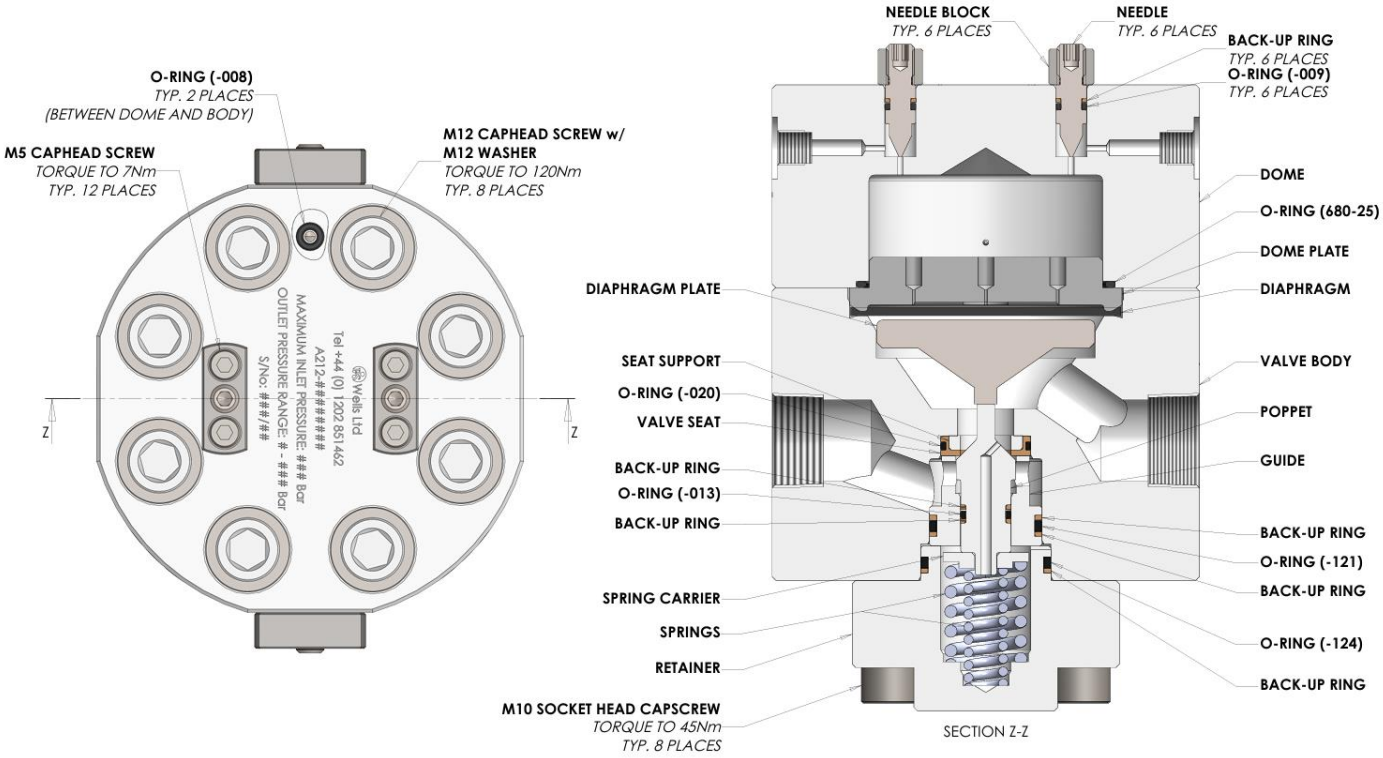
1. Wind each Needle fully out (anti-clockwise).
2. Unscrew all the M5 Caphead Screws and remove the Needle Blocks from the Valve Body and Dome.
3. Remove the O-rings (-009) and Back-up Rings from the Needles and discard.
4. Unscrew the M12 Caphead Screws and separate the Dome and Valve Body.
5. Remove the size (-008) and (680-25) O-rings and discard.
6. Lift the Dome Plate, then remove the Diaphragm and discard.
7. Remove the Diaphragm Plate.
8. Unscrew the M10 Caphead Screws and remove the Retainer from the Valve Body. Remove the Spring Support. Discard the Springs.
9. Remove the size (-124) O-ring and Back-up Ring and discard.
10. Push the Poppet through from the diaphragm end, ejecting the Poppet and Guide.
11. Remove the size (-013) and (-121) O-rings and Back-up Rings from the Poppet and Guide respectively and discard.
12. Remove the Valve Seat, size (-020) O-ring, and Seat Support from the Valve Body and discard.

    Inspect all components for damage and wear before re-assembly. Contact BiS Wells if any parts not included in the spares kit are damaged and require replacement. Ensure all parts are clean before re-assembly.

13. Fit the new Seat Support and size (-020) O-ring to the new Valve Seat, then assemble into the Valve Body in the orientation shown.
14. Fit new size (-013) and (-121) O-rings and Back-up Rings to the Poppet and Guide respectively. Fit the Poppet into the Guide, then fit this subassembly into the Valve Body.
15. Fit the Spring Carrier and new Springs onto the Poppet.
16. Fit a new size (-124) O-ring and Back-up Ring to the Retainer and re-fit this over the Springs, into the Valve Body.
17. Re-fit the M10 Caphead Screws and tighten to 45 Nm.
18. Re-fit the Diaphragm Plate, followed by the new Diaphragm and the Dome Plate.
19. Fit new size (-008) and (680-25) O-rings.
20. Re-fit the Dome, ensuring the orientation is correct.
21. With the Washers in place, tighten the M12 Caphead Screws to 120 Nm.
22. Fit new size (-009) O-rings and Back-up Rings to the Needles
23. Ensure the Needles are screwed fully into the Needle Blocks before fitting the Needle Blocks into the Valve Body and Dome.
24. Fit the M5 Caphead Screws and tighten to 7 Nm.
25. Close all Needle Valves.

NOTE: Ensure lubricants are compatible with the system medium.

A212 ASSEMBLY VIEW



FAULT DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	ACTION
1. With adequate inlet supply pressure, outlet control pressure falls or valve closes completely.	a. Leakage from the dome chamber past the dome needle valve(s).	a. Re-charge the dome and tighten all needle valves. Replace needle valves if necessary.
	b. Leakage from diaphragm.	b. Inspect and replace the diaphragm as required.
2. The valve fails to close and hold pressure when outlet line is closed.	a. A damaged poppet or valve seat.	a. Fit new poppet or valve seat as necessary.
	b. Failure of an O-ring seal.	b. Replace O-rings.