

Installation Operation and Maintenance Manual

A210 & A211 DOME LOADED PRESSURE REDUCING VALVE



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SCOPE

This manual covers most A210 (internally loaded) and A211 (externally loaded) models supplied by BiS Wells from 2019 onwards. It will also apply to most A210 and A211 models supplied by previous manufacturers of Wells products, but the user is advised to take additional care to ensure that the instructions are applicable to their valve.

It specifically does not apply to valves with serial numbers that start with the following digits before the first slash:- 138/*, 197/*, 230/*, 233/*, 292/*, 351/*, 727/*, 553/*, 580/*.

In these cases or if any doubt persists 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

The exact maximum working pressure of the product will depend on the model code purchased and will be engraved onto the valve. Ensure that the valve is only operated within the ratings marked on the product.

INSTALLATION

The valve may be installed in any orientation, but has been designed to operate primarily in a vertical position. A210 & A211 valves are 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.

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. Both the A210 and A211 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.

Internally loaded valves allow the reference pressure in the dome to be charged using gas from the inlet side of the valve. Since the media in the dome must be a gas, internally loaded valves are not suitable for hydraulic (liquid) applications. Externally loaded valves must be charged with a separate external gas supply.

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 faster pressure loss likely to be experienced due to their small molecule size. Air and nitrogen are ideal gases for use in the dome.

The maximum flow rate, and flow performance under given criteria through the A210 & A211 valve can be supplied by BiS Wells Ltd. See valve datasheet / installation drawing for capacity factor (Cv). The control pressure will vary slightly with a change in the inlet supply pressure in an inversely proportional manner. This variation can be calculated as follows: -

Fall in supply pressure x sensitivity = **Rise** in outlet pressure.

In addition, 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, do NOT unscrew any needle valve more than ONE TURN.

Internal Charging of Dome – A210 Valves only.

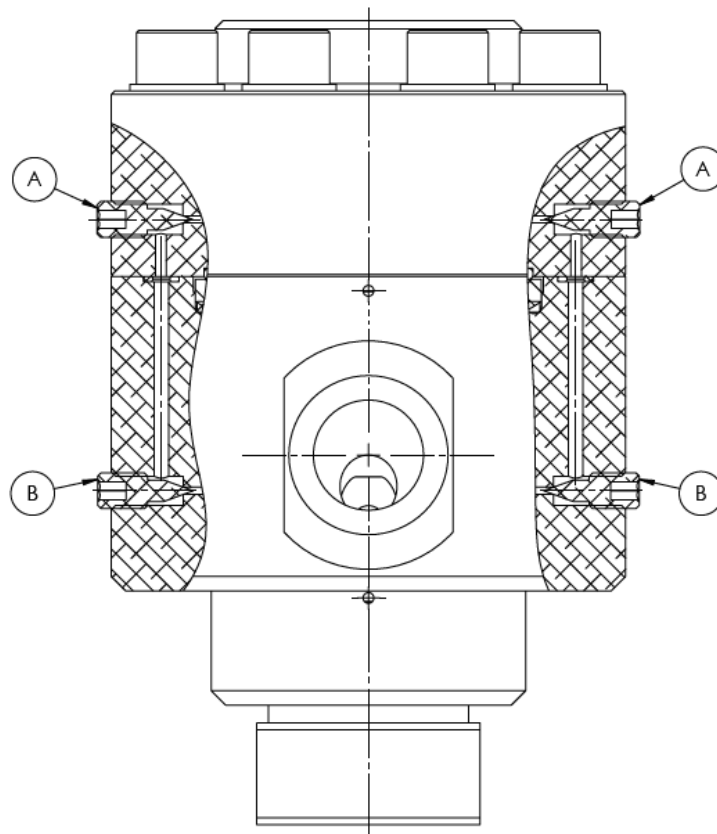
Note: The A210 has common (A) and (B) ports allowing the valve to be set from either side.

1. Ensure all needle valves are firmly closed.
2. Check the dome is de-pressurised by opening one dome needle valve (A) one full turn and then close firmly when no gas is escaping from the needle valve.
3. Apply pressure to the inlet port. No downstream flow should occur.
4. Open needle valve (B) one full turn, gas may escape from around the needle valve – this is normal.
5. Observe the downstream pressure gauge and gently crack open the dome needle (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 dome needle valve (A).
7. Close needle valve (B).

Adjustment

The correct outlet pressure should now be set but if the pressure is too high it can be reduced by gently cracking the vent needle valve (A) to release pressure from the dome which will reduce the set pressure. 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.



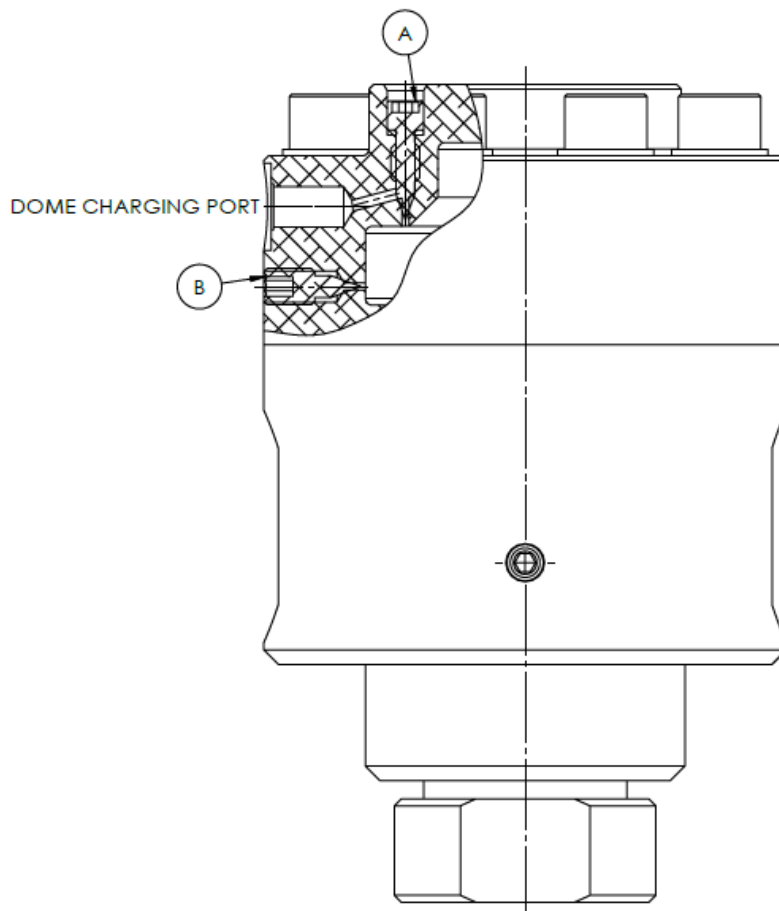
External Charging of Dome – A211 Valves only.

1. Ensure both (A) and (B) needle valves are firmly closed.
2. Check dome is de-pressurised by opening the vent needle valve (B) one full turn and then close firmly when no gas is escaping from the needle valve.
3. Apply pressure to the inlet port. No downstream flow should occur.
4. Connect the pilot pressure supply to the dome charging port and apply suitable pressure.
5. Observe the downstream pressure gauge and gently crack open the dome needle (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 dome needle valve (A).

Adjustment

The correct outlet pressure should now be set but if the pressure is too high it can be reduced by gently cracking the vent needle valve (B) to release pressure from the dome which will reduce the set pressure. 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, open the dome needle valve (valve A for A210, valve B for A211) one full turn and allow all gas to escape then remove needle valve to ensure dome is de-pressurised. Replace the needle valve but do not tighten.

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.

Diaphragm replacement.

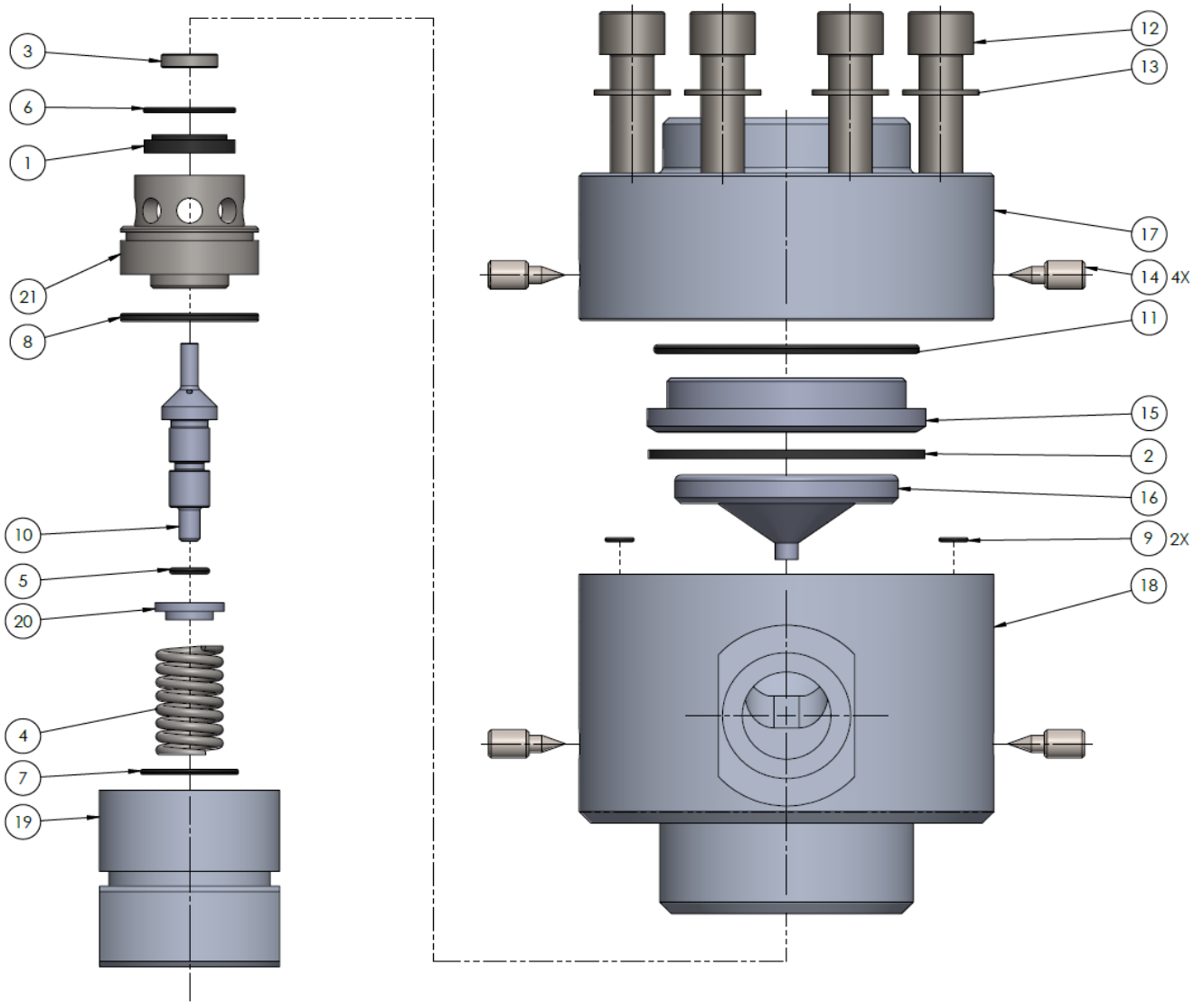
1. Unscrew the dome securing screws (12) and separate the dome (17) and body (18).
2. Remove the old diaphragm (2) and the 'O' rings (9) & (11).
3. Inspect all components for damage and wear before re-assembly. Replace parts as required.
4. Fit the new diaphragm (2) and 'O' rings (9) & (11) ensuring all mating parts are clean and damage free.
5. Replace the fixing screws and torque to 80 Nm

Valve Seat, Poppet and Spring replacement.

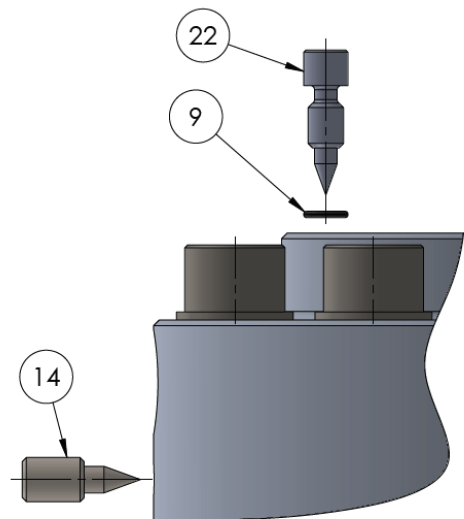
1. Unscrew the body plug (19) and remove from the valve body (18). Remove the spring (4) and spring support (20). Take care not to lose or damage O-ring (7)
2. Pull the valve assembly from the body (18). The valve assembly comprises of parts: (5), (10), (8), (21), (1), (6) & (3)
3. Push the valve (10) up through item 21. This will free and remove the valve seat (1), along with O-ring (6) and seat support (3).
4. Remove all seals.
6. Inspect all components for damage and wear. Replace parts as required.
7. Ensure all parts are clean before re-assembly.
8. Fit new O-rings, valve seat (6), valve (10) and seat support (3) and lubricate with a suitable lubricant.
9. Rebuild the valve assembly ensuring all items are correctly fitted as per exploded view.
10. Refit the body plug assembly into the body and torque to 80 Nm.
11. Before refitting the valve to the system, it is advisable to check for leaks on a test rig suitable for this purpose.

NOTE: Ensure lubricants are compatible with the system medium.

A210 EXPLODED VIEW



A211 EXPLODED VIEW ADDITIONAL DETAIL



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.	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 valve or valve seat.	a. Fit new valve or valve Seat. Clean up or replace the valve or valve seat, as necessary.
	b. Failure of valve spindle 'O' ring when fitted. (balanced valves only)	b. Replace 'O' ring.