

IVP - Type M31

Installation, Operation and Maintenance Instructions MI0232

GENERAL NOTES

- THESE INSTRUCTIONS APPLY ONLY TO THE M31 SERIES.
- THE PRESSURES SUPPLYING AND CONTROLLED BY THIS BACK PRESSURE VALVE (BPV) ARE SUFFICIENTLY HIGH TO ENDANGER HUMAN LIFE.
- SUITABLY TRAINED, QUALIFIED AND AUTHORISED PERSONNEL MUST CARRY OUT ALL INSTALLATION AND MAINTENANCE PROCEDURES. UNAUTHORISED PERSONS MUST BE PROHIBITED FROM TAMPERING WITH, OR OPERATING THIS EQUIPMENT.
 - IT IS ASSUMED THAT THE SYSTEM INTO WHICH THIS BPV IS TO BE SET IS PROVIDED WITH ADEQUATE ISOLATION AND SAFETY DEVICES RELEVANT TO THE MEDIA BEING PROCESSED.

TECHNICAL INFORMATION

- Maximum Inlet Pressure – 70 Bar
- Hydraulic Test Pressure – 105 Bar
- Outlet Pressure Range – 0.5 – 70 Bar
- CV – 3.4 (kV – 2.9)
- Pressure Surge – 10%

ATEX MARKING INDICATOR

MARKING (STANDARD)	DESCRIPTION
EX II 2 G D	EQUIPMENT IS SUITABLE FOR USE IN NON MINING, EX ENVIRONMENTS, GAS AND DUST
Exc IIC	NON ELECTRICAL EQUIPMENT SUITABLE FOR AN EX ENVIRONMENT
T4 Ta	T RATED EX EQUIPMENT NOT TO BE USED OUTSIDE THE SPECIFIED TEMPERATURE RANGES (Ta)
INLET, OUTLET	PIPEWORK SHOULD BE CONNECTED SUCH THAT IT FUNCTIONS AS PORT MARKINGS
SERIAL No.	FOR YEAR OF MANUFACTURE REFER TO CERTIFICATE OF CONFORMITY

ATEX SEAL TABLE

POLYMER	Ta TEMP	NON ATEX
NITRILE	-10 TO 100°C	-10 to +100°C
VITON	-20 TO 135°C	-20 TO +150°C
EPDM	-30 TO 115°C	-30 TO +115°C

BODY MATERIAL TEMPERATURE GUIDELINES

DUCTILE CAST IRON BS EN 1563 – EN-JS1025 EN-GJS-400-18 LT	
NITRILE	-10 TO 100°C
VITON	-20 TO 135°C
EPDM	-20 TO 115°C

CAST STAINLESS STEEL BS EN 10213-4 1.4408	-40 to +150°C
NITRILE	-10 TO 100°C
VITON	-20 TO 135°C
EPDM	-30 TO 115°C

CAST STEEL BS EN 10213-2 1.0619 QT	0 to +150°C
NITRILE	0 TO 100°C
VITON	0 TO 135°C
EPDM	0 TO 115°C

CAST STEEL BS EN 10213-3 1.6220 QT	-40 TO +50°C
NITRILE	-10 TO 50°C
VITON	-20 TO 50°C
EPDM	-30 TO 50°C

1.0 DESCRIPTION

- The BPV is suitable for use in low to medium-pressure gas/liquid systems where an upstream pressure is to be maintained.
- This valve is not considered subject to creep or fatigue within its specified operating limits
- The range of operation is infinite, and is made possible by the infinitely variable dome charging pressure.
- As standard, a 12.7mm diameter, soft trimmed, balanced valve is fitted.
- Internal sealing is achieved with “O” rings.
- The Inlet/Outlet connections are suitable for mounting into lines of DN25 (nom.).
- It is recommended that connecting pipe-work be suitably supported close to the valve connections.
- It is assumed that a gauge reflecting the inlet pressure is positioned between the inlet isolation valve and BPV.
- Approximate weight of the equipment is, for all material versions 5.5 Kg. therefore, the equipment may be regarded as portable.

1.1 FUNCTION

A BPV is in principle similar to a relief valve; however its construction gives it higher accuracy than a relief valve. Installed correctly the valve will maintain the upstream (inlet) pressure at a constant value regardless of downstream (outlet) pressure. This is achieved by the upstream pressure having to overcome the dome pressure to flow the valve. The valve will close when the upstream pressure falls to that in the dome thus maintaining upstream pressure. BPV's are sometimes referred to as Pressure Maintaining Valves or Inlet Pressure Regulators.

2.0 INSTALLATION

BEFORE COMMENCEMENT OF ANY INSTALLATION WORK, IT IS IMPORTANT THAT ANY SOURCE OF PRESSURISED MEDIA BE TURNED OFF OR ISOLATED FROM THE POINT AT WHICH THE BPV WILL BE INSTALLED.

DAMAGE MAY OCCUR TO THE VALVE IF SUBJECTED TO ANY IMPACT. THIS RISK INCREASES AT LOWER TEMPERATURES. IF THE VALVE IS DROPPED OR SUBJECT TO ANY IMPACT IT SHOULD BE RETURNED TO THE MANUFACTURER FOR INSPECTION.

AT ALL TIMES, IT IS ESSENTIAL THAT ISOLATING VALVES MUST BE ACTUATED SLOWLY TO AVOID THE RISK OF EXPLOSION DUE TO DIESELING.

The valve is not designed specifically to function without any effect from shock loads incurred as a result of adverse traffic, wind or seismic conditions. Any use in these areas is at user risk.

- Remove packaging and ensure that there are no obviously loose parts or visual signs of damage.
- Check that the information listed on the nameplate confirms that the BPV supplied is suitable for the intended service.
- The system into which the BPV is to be set must be clean and free of any solid inclusion that could be a source of damage to soft seated components.
- The BPV is set directly into the line using the threaded inlet and outlet connections.
- The two ports are diametrically opposite **and it is important that the BPV is correctly oriented into the pipe-work.** A Flow direction arrow is cast on the body. Other than for ease of maintenance, the **angular** orientation of the BPV in the line is not important.

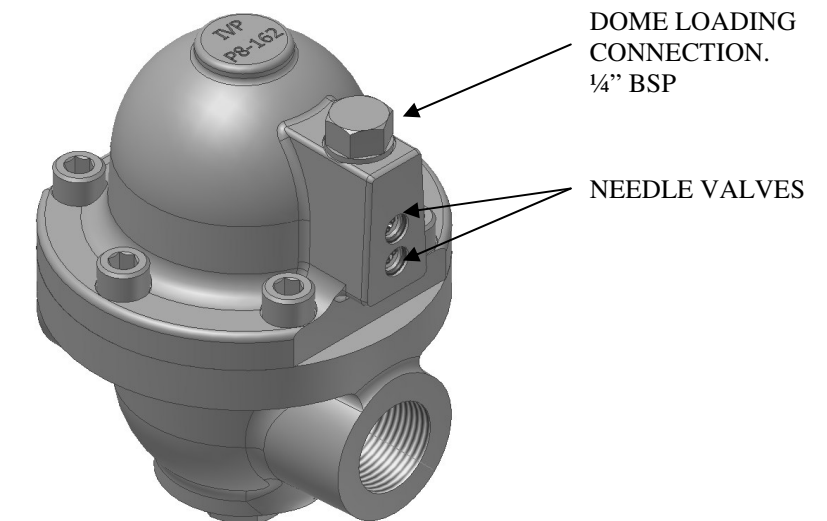


Figure 1 - Needle Valve

2.1 SETTING TO WORK

- Ensure that inlet and outlet connections are leak-tight. Check with “leak detection” fluid if necessary.
- Ensure that supply isolation valve is **closed**.
- Close needle valve.
- Gauges must be provided in the line in order that inlet pressures may be monitored during setting up.
- Ensure that **correct supply pressure** is available upstream of the closed inlet isolating valve.
- **To load the dome** from an external supply. Remove vent plug, open needle valve NV1 (anti C/W), and attach a regulated supply with integral pressure gauge to dome loading connection (1/4”BSP). Adjust supply to required pressure and lock pressure in dome by closing needle valve NV1 (C/W).
- It will be necessary to load the dome approx. 0.7 bar over the required set pressure to overcome other forces, valve spring etc. in the valve.
- Remove supply, refit plug and bonded seal.
- **Venting dome:** Unscrew plug approximately one turn, then open needle valve NV 1 to vent dome.
- **Note that external valve surfaces may become very hot or cold during use, dependant on media.**

3.0 MAINTENANCE

- Having few moving parts, the M31 will require only periodic inspection of those items subject to wear, or deterioration to, ensure long service and reliability.
- It is recommended that when servicing or repair becomes necessary the BPV be returned for factory refurbishment. However, the design of the M31 does enable servicing in the field, with minimal inconvenience, to satisfy plant operations and minimise down times.
- It is recommended that all repairs and servicing be carried out using only quality assured spares supplied by the manufacturer.

3.1 PREVENTATIVE MAINTENANCE

- In a clean system, the M31 will continue to deliver trouble free service over long periods of time. Under these conditions, maintenance intervals may be as long as 24-36 months. In more arduous conditions or in aggressive media service, the periods may be shorter, 6-12 months. It is however, important that units in safety related applications be inspected more frequently. During these preventative maintenance periods, the following procedure is suggested :
 - a) Inspect all "O" seals for wear, brittleness or other signs of damage. All those displaying any indication of damage or deterioration should be replaced. However, it is recommended that all seals, regardless of any damages should be routinely replaced.
 - b) Remove the valve and seat and inspect closely for wear or damage. Typical signs of damage will be nicks or raised burrs around the seating edge of the seat, or indentations, abrasions and hard particle inclusions in the soft (seating) area of the valve member. Severe wear and/or very apparent nicks, burrs or particle inclusion would indicate that replacement is necessary. Light wear and the presence of a clean, continuous seating ring on both parts would indicate that they are suitable for re-use.
 - c) Any components showing signs of corrosion should be inspected for indications of permanent damage (i.e. pitting etc.) and replaced if any are present.

3.2 REMEDIAL MAINTENANCE

- If the M31 is maintained to a planned programme, it is unlikely that the need for remedial service will arise. However, if the system becomes contaminated or an operating system problem causes damage to one of the control elements, the BPV may malfunction. In general it is recommended that damaged BPV's be returned to the factory for repair. To facilitate field repair, and minimise plant downtime, **Table 1** lists some possible faults and probable causes/solutions.

We also make the following recommendations:

- It is preferable that the BPV be repaired or serviced under workshop conditions, as the opened equipment must be protected from ingress of dirt and other foreign material. Should operational requirements make it necessary to service the BPV in the pipeline, then precautions should be taken to avoid contamination of the unit or parts.

SAFETY NOTE: WHEN UNDERTAKING ANY REPAIR OR SERVICING IN WHICH THE PRV REMAINS IN THE LINE, IT IS ESSENTIAL THAT THE EQUIPMENT IS ISOLATED FROM THE PRESSURISED MEDIA. IT IS ALSO IMPORTANT THAT THE DOME IS FULLY VENTED - SEE 2.1 FOR PROCEDURE.

SYMPTOM	CAUSE	SOLUTION
Outlet flow present when inlet pressure is more than 0.7bar below dome pressure.	Damaged valve and/or seat Dirty valve and/or seat Damaged valve "o" ring Damaged seat "o" ring Valve spring failure Valve jams open	Replace part(s). Clean part(s). Replace part Replace part Replace part Investigate cause - replace valve if necessary
Loss of inlet pressure	Damaged diaphragm Leaking dome	Replace part. Tighten or replace part.

Table 1

4.0 STRIPPING AND RE-ASSEMBLY

Having few parts, stripping and re-assembly of the M31 may be regarded as straightforward, provided certain conditions are observed.

- Cleanliness is of the utmost importance; even the smallest of inclusions may seriously affect the operation of the BPV.
- Tool List:
Torque wrench
3 mm A/F Hexagon Wrench Key
8 mm A/F Hexagon Wrench Key
25 mm A/F Hexagon Socket.
Circlip Pliers (small)
Pin punch
- Use only sparing amounts of grease during re-assembly. That recommended is "Dow Corning MS4", any alternative should be checked carefully. Use of greases at all, with media other than inert gases, **MUST BE CHECKED WITH LUBRICANT SUPPLIERS!**
- For safety, **all** tightening torque values **must** be adhered to. Refer to assembly drawing.

4.1 STRIPPING

- Remove M10 socket head capscrews and washers.
- Lift off dome complete with needle valve and plug.
- The needle valve, 'o' ring, plug (if fitted), and bonded seal can be removed.
- The dome plate/diaphragm/diaphragm plate assembly complete with valve assy can then be withdrawn.
- Working at the other end of the valve, unscrew and withdraw the body plug complete with spring and 'o' rings. **Note that some residual pressure may escape during removal of the body plug.**
- At this stage the seat and 'o' ring may come out with the body plug, however if not, gently pull out with a hooked instrument
- To separate diaphragm undo and remove M5 bolt.
- To remove valve assembly from body plate, knock out two 1.6 dia. dowel pins'
- Valve pad can now be removed by unscrewing valve case from piston.

4.2 RE-ASSEMBLY

- This is a direct reversal of stripping.
- It is important that components are clean
- Replace the dome in the correct orientation i.e. with the boss containing the needle valves facing the inlet.

Torque figures:

M10 Socket head capscrews.....	35 Nm
Body Plug.....	40 Nm
Blanking plug	35 Nm

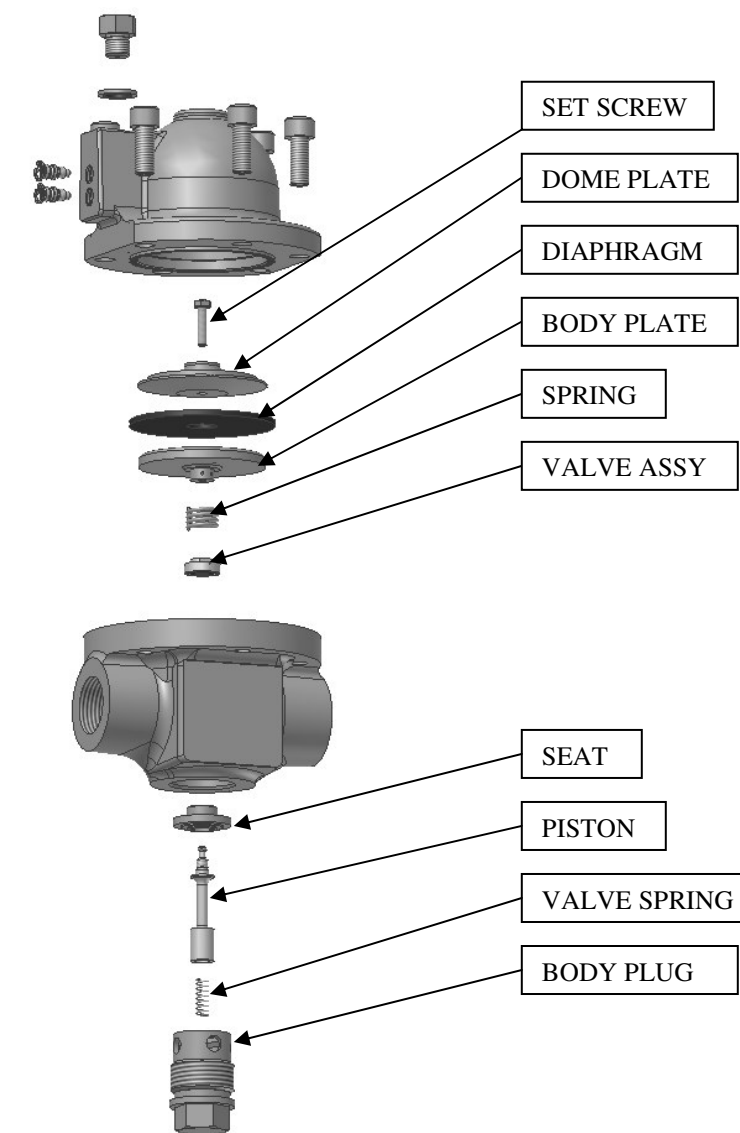


Figure 2 - Valve Dis-assembly ('o' rings not shown)

Manufacturer:

In the event of fire the seals on this valve may become ineffective and/or give off toxic fumes. Note that the valve is not CE marked with respect to fire service.

With respect to unstable and dangerous fluids intended for use with this valve, refer to Transport and Handling sections of the Manufacturers Safety Data Sheet for that fluid or contact Thompson Valves Technical Sales for advice.