



# THE BP-HF250 SERIES

Operating and Service Manual

Series includes all variants of BP-HF250/251

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## **1. Description**

The BP-HF251 is Back Pressure Regulator which can be used as a precision relief valve to maintain a constant set pressure within gas or hydraulic systems. The regulator incorporates a 19.5mm diameter seat orifice and provides a Cv capacity of 7.0 for 'high flow' rate applications. The regulator accurately controls inlet pressures of up to 250 bar and vents excess pressure back via the outlet connection port. The control on the regulator is set via compression of an adjustable spring.

## **2. Installation**

Before system start-up, it is recommended that all systems be pressure tested, leak tested and purged with an inert gas such as nitrogen.

Check the model number reference to ensure that the pressure range complies with the installation requirements.

Visually inspect the regulator for any signs of damage or contamination. If any foreign materials are present and cannot be removed from the regulator, or if the threads on the regulator appear to be damaged, please contact the office immediately to arrange for the regulator to be returned for service.

The Inlet and Outlet ports are clearly marked. Select the correct size and type of connection fittings for these ports which are indicated in the regulators part number. Both British Standard Pipe (BSPP) 'B' and National Pipe Thread (NPT) 'N' options are available on this regulator. Use the correct dowty or bonded seal for BSPP connections, self centering seals are recommended. For NPT threads, ensure that PTFE tape is applied correctly to the fittings, applying two overlapping layers in the direction of the thread, taking care that the tape does not come into contact with the first thread.

The media supplied to the regulator must be clean. Contamination can damage the seat which may cause the regulator to fail. Filtration suited to the application is recommended upstream of the regulator.

Should further assistance or information be required in relation to installation of any Pressure Tech regulator please contact the office, giving reference to the regulators part number and/or serial number.

### **3. Operation**

Adjusting the loading spring sets the controlled inlet pressure to the regulator. Pressure exceeding this set value allows the main valve to open and vent off the excess pressure through the seat orifice - until the inlet pressure is equivalent to the loading force set by spring against the pressure sensing element, at which point the Main Valve closes the flow through the seat. Compressing the spring increases the pressure at which the regulator will relieve excess pressure.

The BP-HF250 series may be offered with pressure limiting, pressure locking or pre-set pressure options:

Pressure limited regulators are fitted with locknuts on the adjusting mechanism in order to limit the maximum allowable control pressure. Regulators fitted with pressure limiting locknuts will state the limited pressure on the regulator label and this will also be indicated in the part number.

Pressure locking regulators are fitted with a locking cap which may be set (when specified) to pre-determined requirements. It is secured in place by three M5 grub screws which lock against the bonnet of the regulator creating an anti-tamper device to ensure the pressure cannot be adjusted accidentally.

Pre-set pressure regulators are adjusted (factory set) to specified customer requirements within a given pressure range.

Both pressure locking and pre-set pressure regulators will be fully adjustable through a given pressure range and the maximum allowable working pressures will be indicated on the regulator label and in the part number.

\*Note - A table is available on request defining allowable tolerances for set points within a given pressure range.

### **4. Special Conditions for Safe Use**

The BP-HF250/251 is classed as a Pressure Accessory and not a Safety Accessory under the European Directive 97/23/EC, and as such, should be installed with a relief valve to protect the users system from over pressurisation.

### **5. Hazardous Location Usage**

This equipment has not been manufactured specifically for use in potentially explosive atmospheres and as such an ignition hazard assessment has not been carried out on this product. If the user should wish to use this product in such an environment where there may be a potentially explosive atmosphere then it is the responsibility of the user to conduct an ignition hazard assessment against 99/92/EC.

## 6. Servicing and Maintenance

Servicing and maintenance work on the BP-HF250/251 regulators should only be performed after fully reading and understanding the Operating and Servicing Manual. Due to the typical nature of the gases the regulator can be used with, the operator should not endanger himself/herself or others by working on this regulator without prior knowledge on the Health and Safety concerns relating to handling of technical gases. Any uncertainty should be clarified with Pressure Tech before working on the regulator.

Pressure Tech Ltd recommends the use of Krytox GPL 205 during servicing.

Prior to commencing service, please ensure that:

- The equipment has been de-pressurised
- The load spring has been de-compressed by turning the adjusting mechanism fully anti-clockwise
- Applications involving toxic, flammable or corrosive media have been fully purged

To ensure the best possible results from servicing, when re-assembling the regulator and any assemblies within it, ensure that all areas of the components and the regulator body are cleaned and free from contaminants which may result in failure of the regulator.

### 6.1. Servicing the BP-HF251

\*Note: fig 1 should be used as a reference for the following set of instructions

#### 6.1.1. Accessing the Main Valve Assembly

To access the Main Valve Assembly (MVA):

- i. Loosen and remove the eight M10 socket head cap screws (23) and lift the bonnet assembly (16, 21) away from the body (1)  
\*Note - It is useful to tilt the bonnet assembly to the side until the spring may be supported which then keeps the adjusting assembly secured inside the upper bonnet
- ii. The sensor assembly (2, 4, 6, 10, 11, 12, 13, 14, 15) can be removed from the regulator body (1) using pliers to grip either the spring rest (13) or an M5 screw which can be mounted onto one of the two positions on the sensor holder (12)
- iii. Secure the spring rest (13) in a vice with the main valve (2) upright and using a 28mm open ended spanner, loosen and remove the sensor and valve assembly
- iv. Separate the sensor holder (12) from the assembly and replace the o-rings (14, 15)
- v. Secure the flats on the upper sensor (11) in a vice and loosen and remove the lower sensor (10) using a 28mm open ended spanner
- vi. Remove the valve spring (4)
- vii. The main valve (2) can be separated from the lower sensor (10) by securing the flats in a vice and then removing the nut (6) using an 11mm open ended spanner
- viii. Inspect and replace the main valve (2) and o-ring (9) as necessary

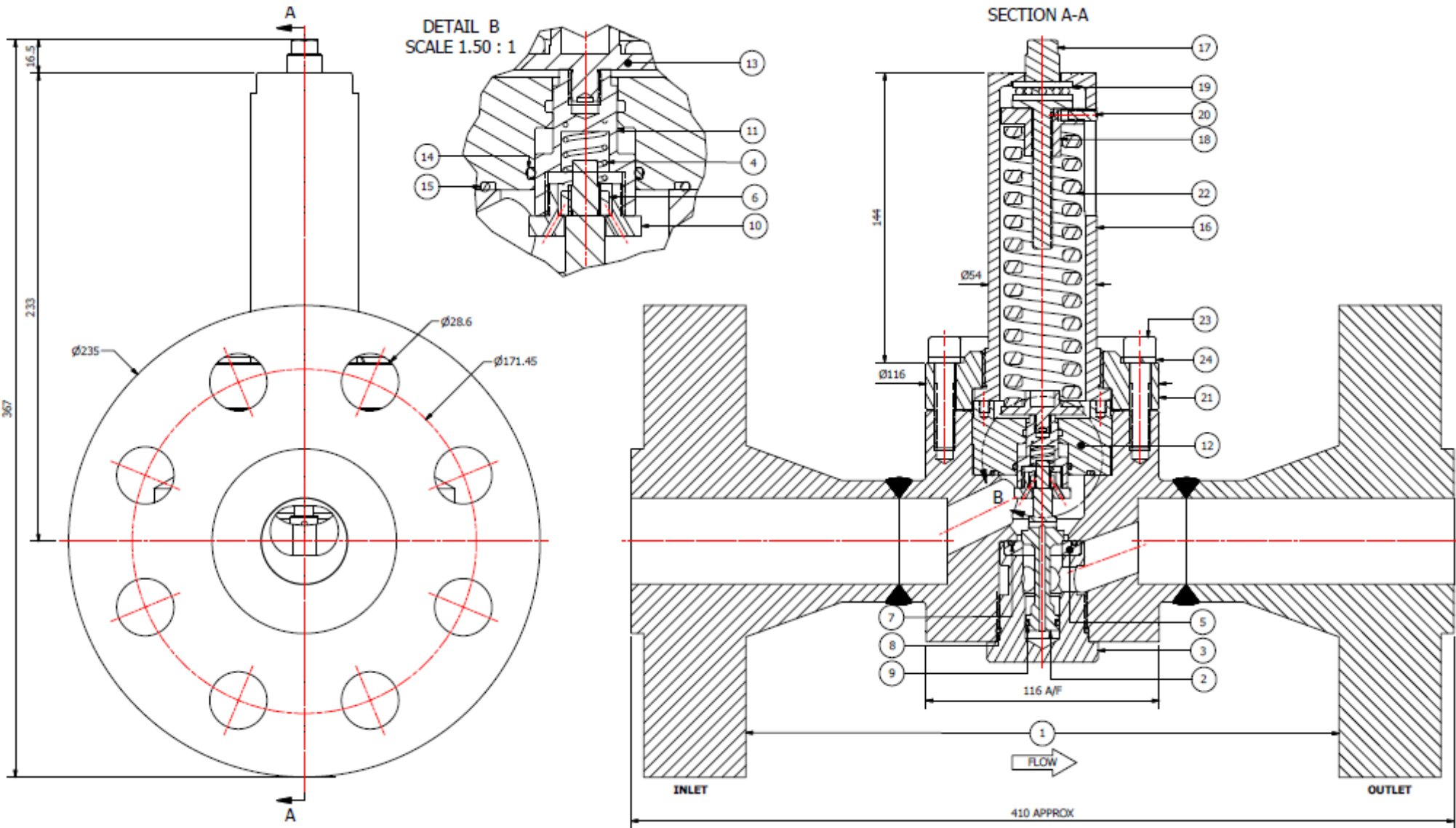
- ix. Place the lower sensor (10) over the main valve (2) face first, ensuring that the thread on each component is towards the top after assembly
- x. Tighten the nut (6) onto the main valve (2) using an 11mm open ended spanner
- xi. Place the valve spring (4) into the upper sensor (11) and screw the lower sensor (10) in place, ensuring that the top of the main valve (2) locates inside the valve spring (4)
- xii. Tighten this assembly using a 28mm open ended spanner with the flats of the upper sensor (11) secured in a vice
- xiii. Locate this assembly (2, 4, 6, 9, 10, 11) into the sensor holder (12) ensuring appropriate lubrication has been used on the o-ring (14)
- xiv. Screw the spring rest (13) into the upper sensor (11) and tighten by securing the flats in a vice and using a 28mm open ended spanner
- xv. Position the sensor assembly (2, 4, 6, 10, 11, 12, 13, 14, 15) back into the regulator body (1) ensuring that the main valve passes through the seat (5) and into the bottom nut (3)  
\*Note – be careful not to damage the sealing edge of the soft seat when installing this assembly
- xvi. Lift the bonnet assembly carefully whilst supporting the load spring (22) from below, this is to ensure that the adjusting mechanism (17, 18, 19, 20) within remains in place
- xvii. Guide the load spring (22) onto the spring rest (13) and then position the bonnet assembly (16, 21) over the regulator body (1) carefully, aligning the holes on the PCD
- xviii. Secure the eight M10 socket head cap screws (23) in place and tighten securely

### **6.1.2. Accessing the Seat**

- i. With the regulator secured (ideally in the horizontal position or upside down), loosen and remove the bottom nut (3) using a 48mm open ended wrench
- ii. Inspect the soft seat (5) under a microscope and replace as required
- iii. Replace the o-ring (8) around the bottom nut (3)
- iv. Locate the soft seat (5) into the bottom nut (3)
- v. Place the o-ring (7) into the groove of the soft seat (5)
- vi. Then, carefully insert the bottom nut (3) into the regulator body (1) ensuring that the main valve (2) locates correctly within the bore  
\*Note – this where possible should be done with the regulator upright to help prevent the soft seat from falling out of position
- vii. Tighten the bottom nut (3) securely using a 48mm open ended spanner

To ensure that the main valve assembly has been correctly and effectively installed it may be required to perform the appropriate seat leak test as per ANSI/FCI 70-2.

6.1.3. Figure 1 – Sectional View of the BP-HF251



## 7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Inlet Pressure:	250 bar
Pressure Control Range:	1-10 bar (Diaphragm) 5-250 bar (Piston)
Operating Temperature:	-20°C to +80°C
Materials:	Body and Trim: 316 SS Seat Gas: PCTFE Seat Hydraulic: PEEK Main Valve: 316 SS
Flow Capacity (Cv):	7.0
Leakage:	Hydraulic: Zero drops of water at max inlet Gas: Bubble tight

## 8. Warranty Statement

Pressure Tech Ltd guarantee all products correspond with their specification at the time of delivery and, with exception to wear and tear, wilful damage, negligence, and abnormal working conditions, will be free from defects for a period of 12 months from date of delivery.