



THE BP-010 SERIES

Operating and Service Manual

Series includes all variants of BP-010

Issue A
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1. Description

The BP010 is an elastomeric diaphragm-sensed back pressure regulator, offering sensitive control.

Featuring a spring-loaded design, the BP010 offers a bolted bonnet for simplified servicing through its top access. In addition, its threaded bonnet comes as standard for optional panel mounting.

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. National Pipe Thread (NPT) 'N' options are available on this regulator. 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. Any gauge ports on the regulator will be 1/4" NPT unless otherwise stated. If any gauge port is not required, ensure that the port is plugged prior to installation.

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

The regulator has been set at the factory to ensure that the maximum pressures stated on the regulator cannot be exceeded. Increasing the inlet pressure setting is achieved by turning the hand wheel clockwise which compresses the load spring and engages the main valve against the soft seat, creating a seal to the inlet pressure. As the inlet pressure increases, the force overcomes the load from the spring and the main valve moves away from the seating area allowing the excess pressure to be relieved to the outlet port.

The hand wheel can be turned anti-clockwise to reduce the inlet pressure setting, however to ensure the most accurate set points final adjustments should be made whilst increasing the inlet pressure setting.

4. Special Conditions for Safe Use

The BP-010 is classed as a Pressure Accessory and not a Safety Accessory under the European Directive 2014-68-EC and as such, should be installed with a suitable relief valve to protect the system from over pressurisation.

The back pressure regulator should not be used as a shut off valve.

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-010 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-010

*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. Secure the regulator body (1) in a vice and use a 3mm Allen key to remove* the 6x M4 cap screws (17) from the regulator body.
***NOTE:** It is recommended to loosen one screw, followed by the screw directly opposite and then proceed in either clockwise or anti-clockwise direction until all screws have been loosened before completely removing the screws.
- ii. Remove the Bonnet Assembly (6,11,12,13,14,15,18), Load Spring (8), Upper Spring Rest (9) and Ball Bearing (10) from the assembly
- i. The diaphragm assembly (2,3,4,5) can then be removed from the Regulator Body. Visually inspect for signs of damage or tearing. Replace diaphragms (4&5) as required, as per the following:
 - a. To disassemble the sensor assembly, secure the flats of the Spring Rest (3), in a vice and remove the Main Valve Pin (2) using an 8mm open ended spanner (or adjustable).
***Note:** It is recommended to leave the spring rest within the vice during this assembly.
 - b. After removing the Main Valve Pin (2) from the Spring Rest (3), visually inspect the Main Valve Pin under a microscope for any damage and replace as required.
 - c. Remove and visually inspect the Both diaphragms for any damage and replace as required.
 - d. With the spring rest (3) still in the vice (with the flat side facing upwards), Place the (black) Nitrile Diaphragm (4), onto the Spring rest.
 - e. Place the (white) PTFE Diaphragm Lining (5), onto the (black) Nitrile Diaphragm (4) and ensure that the holes of the PCD are all correctly in line.
 - f. Apply a droplet of 638 Loctite to the thread of the Main Valve Pin (2).
 - g. Guide the thread of the Main Valve Pin (2), through the central holes of both diaphragms (4,5) and screw into the thread of the Spring rest (3).
 - h. Use an 8mm open ended Spanner (or adjustable) and tighten the Main Valve Pin (2) to the Spring Rest (3).
***IMPORTANT:** When tightening the Main Valve Pin, ensure that that the holes of the PCD are all correctly in line.
- iii. Remove and replace the Soft Seat (7) and O-ring (16) from within the Regulator Body (1)
- iv. Guide the diaphragm assembly (2, 3, 4, 5), through the central bore of the soft seat (7) and into the Regulator Body (1), ensuring that the Main Valve (2) locates correctly into the lower bore of the body
***IMPORTANT:** care must be taken, not to damage the sealing face of the soft seat (7), as the Main Valve Pin passes through.

- v. Place the Load Spring (8), Upper Spring Rest (9) and Ball Bearing (10) onto the Spring Rest (3).
- ii. Then place the Bonnet assembly (6,11,12,13,14,15,18) back onto the regulator body and rotate until the PCD is correctly in line with the diaphragm assembly (2,3,4,5) and Regulator body (1).
- iii. Locate the 6x M4 cap screws (17) through the bonnet (6) into the regulator body (1) and screw until finger tight. Proceed to tighten the screws using the correct pattern*.

*Tighten one screw followed by the screw directly opposite. Then tighten the next screw over in either a clockwise or anti-clockwise direction, then followed by the screw directly opposite to it. Continue until all screws are tightened. It is advisable to perform this tightening procedure two times to ensure correct engagement. Use 4Nm when tightening.

It is recommended that all parts in the repair kits are used. Any defect parts removed during the service should be disposed of. Parts should be kept clean in line with media requirements. Following re-assembly of the regulator, pressure tests should be made to both the inlet and outlet side of the regulator, to ensure there is no internal or external leakage across the regulator.

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.

6.1.2. Adjusting the Set Point

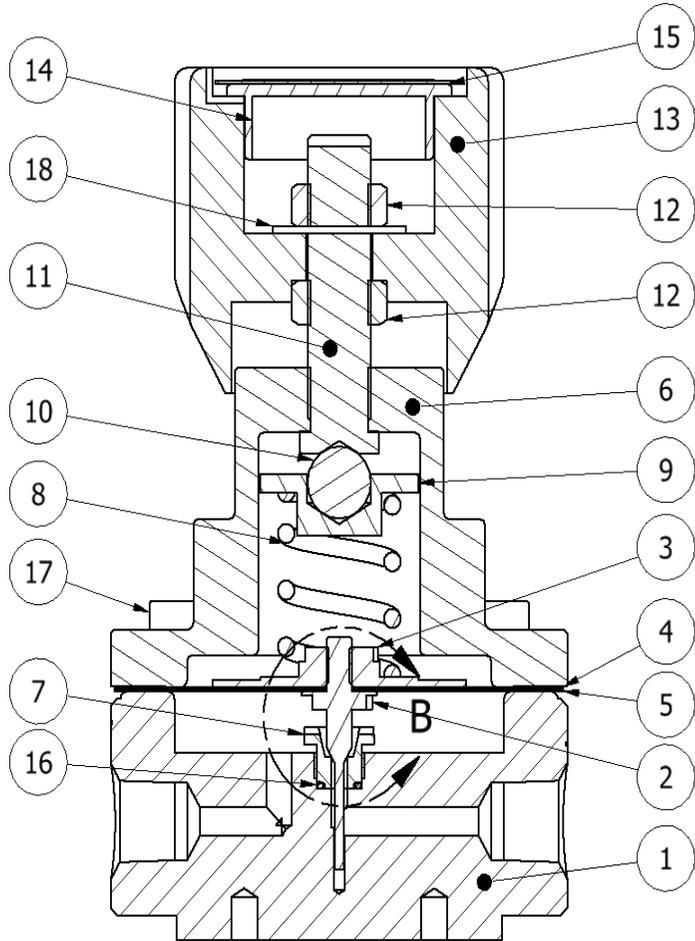
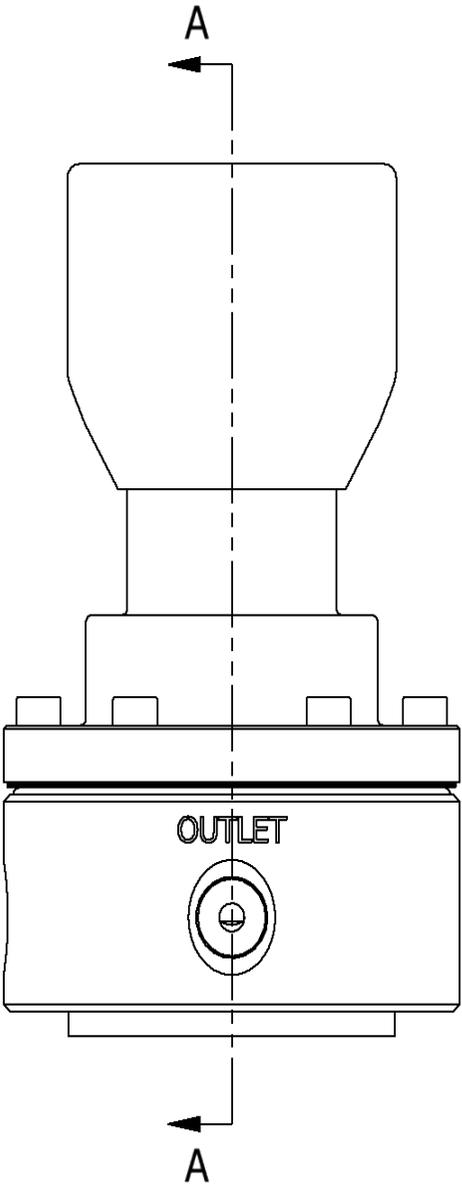
It is not recommended (or necessary) to remove the Hand Wheel during service as this will affect the set point of the regulator. Should it be required to adjust the set point, a supply pressure from a test pressure regulator will be required to gradually increase the inlet pressure until the required set point is reached. Please follow the instructions below:

- i. Remove the Nameplate (15) and Cap (14) from the Hand Wheel (13) and loosen the upper Lock Nut (12) such that the Hand Wheel is able to spin freely on the Adjusting Screw (11)
- ii. Connect the test regulator to the inlet of the BP010 via connecting pipework. Ensure that any gauge ports are either plugged or that the correct gauge is fitted to the inlet gauge port to measure the supply pressure. If an inlet gauge is not fitted on the regulator, a pressure gauge is required to measure the supply pressure to the regulator.
- iii. Connect a compression fitting adaptor to the outlet of the regulator and a small piece of pipework which can be positioned in a container of water to check for leaks.
- iv. Turn the adjusting screw one full turn to prover initial shut off on the BP010 regulator. Increase the inlet pressure from the test regulator until the until there is leakage across the seat (detected when bubbles appear from the pipework on the outlet placed in the container of water). Monitor the pressure gauge on the inlet to determine the pressure at which the regulator starts to relieve.
- v. Using a slotted screwdriver, turn the Adjusting Screw (11) clockwise until the desired set point has been reached. This will require frequent adjustments

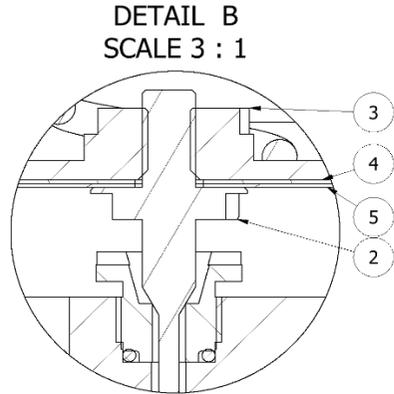
- between the test regulator to simulate the required relieving pressure and the Adjusting Screw on the BPO10 regulator.
- vi. With the inlet pressure set, screw the lower Lock Nut (12) to the base of the Adjusting Screw (11) against the Bonnet (6)
 - vii. Position the Hand Wheel (13) onto the lower Lock Nut (12). Ensure that the Lock Nut and Hand Wheel become engaged
 - viii. Fasten the upper Lock Nut (12) against the Hand Wheel (13) and gently begin to tighten using a 13mm socket until it begins to secure itself
 - ix. At this point, whilst holding the Hand Wheel (13) securely continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (6)
 - x. Ensure that the upper Lock Nut (12) is sufficiently tightened, taking care not to adjust the set point
 - xi. Turning of the Hand Wheel (13) should now also turn the Adjusting Screw (11) which will control the pressure
 - xii. Turn the Hand Wheel clockwise until it reaches its set point and check to make sure that the desired outlet pressure is correct by increasing the pressure on the test regulator and reading the pressure on the inlet pressure gauge.
 - xiii. If the set point is not correct, repeat steps v. to xiii.
 - xiv. Reduce the pressure downstream by venting the pressure through ball/needle valve and then turning the Hand Wheel anti-clockwise until the regulator closes
 - xv. The Cap (14) and Nameplate (15) can now be placed into the Hand Wheel (13). Ensure that the information stated on the Nameplate is in accordance with the set pressure of the regulator

Should any assistance be required during a service please do not hesitate to contact the office.

6.1.3. Figure 1 – Sectional View of the BP-010



PARTS LIST			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	BP-010-01-SS-02N-BL ISS B	BODY
2	1	PT-BP-010-001	MAIN VALVE PIN
3	1	PT-BP-010-002	DIAPHRAGM SUPPORT PLATE
4	1	PT-BP-010-003	NITRILE DIAPHRAGM
5	1	PT-BP-010-004	PTFE DIAPHRAGM LINING
6	1	PT-BP-010-005-001	BONNET
7	1	PT-BP-301-009	SEAT
8	1	PT-C-011-009	LOAD SPRING
9	1	PT-C-017	UPPER SPRING REST
10	1	BALL-010-SS-316	BALL BEARING
11	1	PT-C-019-003	ADJUSTING SCREW
12	2	PT-C-020	LOCKNUT
13	1	PT-C-021	SMALL HANDWHEEL
14	1	FIT-CAP-4343092	NAMEPLATE CAP
15	1	PT-C-022	NAMEPLATE
16	1	OR-0050-10	O' RING STD
17	6	DIN 912 - M4 x 12	Cylinder Head Cap Screw
18	1	DIN 137 - B10	CRINKLE WASHER



7. Technical Data

Fluid Media:	All gases compatible with materials of construction
Max Working Pressure:	10 bar
Outlet Pressure Range:	0-5 bar
Operating Temperature:	-20°C to +80°C
Materials:	Shell: 316 SS Seat: PCTFE
Flow Capacity (Cv):	0.1 (Low Flow)
Leakage:	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.