



# THE BP-301 SERIES

Operating and Service Manual

Series includes all variants of BP-301 (LF 0.1Cv / MF 0.5Cv)

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## **1. Description**

The BP-301 is a piston sensed back pressure regulator which incorporates a highly sensitive piston, capable of providing accurate inlet pressure control up to 150bar (Low Flow 0.1Cv) or 35bar (Medium Flow 0.5Cv) on both gas and liquid applications. Unlike relief valves, the set load from the spring is not directly applied to the seating area, and the piston sensor provides accurate control throughout the control range. As standard, the regulator housing is machined from stainless steel (316/316L) which ensures maximum protection against the media on which it will be used and from the environment in which it will be placed.

## **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 piston 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-301 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 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-301 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-301 (LF)

\*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. With the flats of the Regulator Body (1) secured in a vice, loosen the Bonnet (15) using a 47mm wrench ensuring that the Hand Wheel (16) is fully wound anti clock wise (*\*Ref. 6.1.2*)
- ii. Remove the Load Spring (12), Upper Spring Rest (13) and Ball Bearing (14) from the assembly
- iii. The sensor assembly (3, 4, 6, 7, 8) can then be removed from the Regulator Body
  - a. To disassemble the sensor assembly, secure the Spring Rest (8) in a vice and remove the Sensor (6) using a 21mm open ended spanner (11mm for high pressure sensor) or adjustable  
\*it is advisable that after loosening the Sensor, to remove the sensor assembly from the vice and unscrew the Spring Rest with the Main Valve pointing downwards. This prevents the Main Valve (3) and Valve Spring (4) from dropping out of the Sensor (6) during disassembly
  - b. After removing the Main Valve (3) and Valve Spring (4) from the sensor assembly, visually inspect the Main Valve under a microscope for any damage and replace as required
  - c. Replace the O-rings (10, 11) in the Sensor Holder (7) and O-ring (9) around the Spring Rest (8)
  - d. Reassemble the sensor assembly by first placing the Sensor (6) into the Sensor Holder (7)  
IMPORTANT: with reference to figure 1, ensure that the Sensor Holder (7) is of the correct orientation when installing the Sensor (6)
  - e. Place the Main Valve (3) and Valve Spring (4) into the Sensor (6), then screw the Spring Rest (8) into the Sensor (6)
  - f. Secure the assembly by gripping the Spring Rest (8) in a vice and tighten using 21mm open ended spanner (11mm for high pressure sensor) or adjustable
- iv. Remove and replace the Soft Seat (2) and O-ring (5) from within the Regulator Body (1)
- v. Position the sensor assembly (3, 4, 6, 7, 8) into the Regulator Body (1), ensuring that the Main Valve (3) locates correctly into the lower bore of the body
- vi. Place the Load Spring (12), Upper Spring Rest (13) and Ball Bearing (14) onto the Spring Rest (8) and then screw the Bonnet (15) back onto the regulator body
- vii. Secure the bonnet to 90Nm using a torque wrench with 47mm crow foot

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.

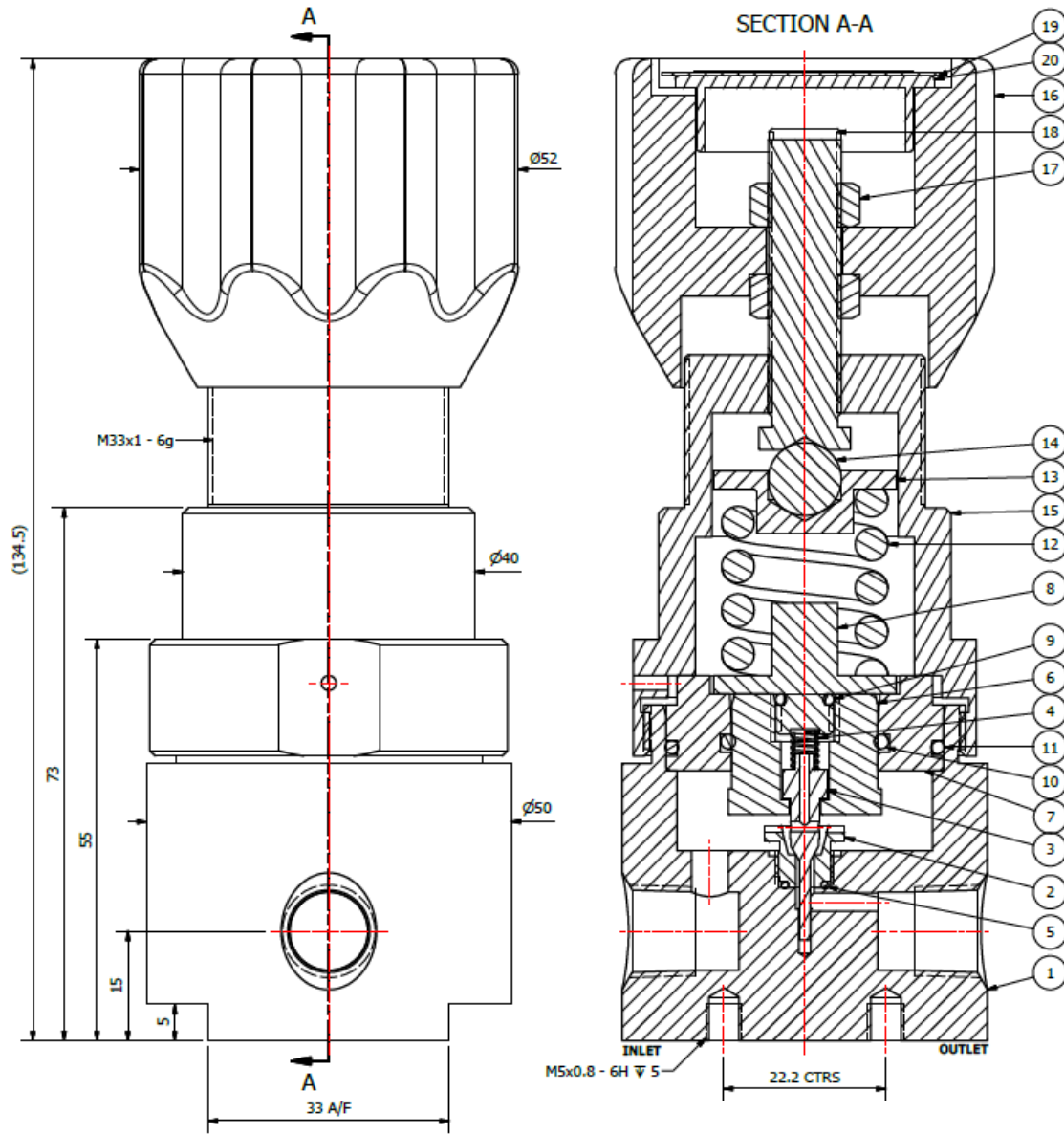
### **6.1.2. Adjusting the Set Point**

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 please follow the instructions below:

- i. Remove the Nameplate (19) and Cap (20) from the Hand Wheel (16) and loosen the Lock Nut (17) such that the Hand Wheel is able to spin freely on the Adjusting Screw (18)
- ii. Connect the correct fittings to the Inlet and Outlet ports of the regulator. Ensure that any gauge ports are plugged or that the correct gauge is fitted
- iii. With the Regulator Body (1) secured in a vice apply the Maximum Working Pressure (MWP) to the Inlet of the regulator
- iv. Connect the Outlet port to a calibrated pressure test gauge appropriate to the required set pressure. As the regulator is non-venting, ensure that a ball/needle valve is fitted to allow pressure to be relieved downstream of the regulator
- v. Using a slotted screwdriver, turn the Adjusting Screw (18) clockwise until the desired set point has been reached
- vi. Ensure repeatability by allowing flow through the regulator using the ball/needle valve
- vii. With the outlet pressure set, screw the first Lock Nut (17) to the base of the Adjusting Screw (18) against the Bonnet (15)
- viii. Position the Hand Wheel (16) onto the Lock Nut (17). Ensure that the Lock Nut and Hand Wheel become engaged
- ix. Fasten the second Lock Nut (17) against the Hand Wheel (16) and gently begin to tighten using a 13mm socket until it begins to secure itself
- x. At this point, whilst holding the Hand Wheel (16) continue to tighten whilst simultaneously turning slightly anti-clockwise to prevent it from locking against the Bonnet (15)
- xi. Ensure that the Lock Nut (17) is sufficiently tightened, taking care not to adjust the set point
- xii. Turning of the Hand Wheel (16) should now also turn the Adjusting Screw (18) which will control the pressure
- xiii. Turn the Hand Wheel clockwise until it reaches its set point and check to make sure that the desired outlet pressure is correct.
- xiv. If the set point is not correct, repeat steps v. to xiii.
- xv. Reduce the pressure downstream by venting the pressure through ball/needle valve and then turning the Hand Wheel anti-clockwise until the regulator closes
- xvi. The Cap (20) and Nameplate (19) can now be placed into the Hand Wheel (16). 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-301 (LF)



PARTS LIST		
ITEM	PART NUMBER	DESCRIPTION
1	PT-BP-301-LF-N-SS-02N-001	BODY – N PORTING
2	PT-BP-301-009	PCTFE SEAT NUT
3	PT-C-001-021	MAIN VALVE
4	PT-C-006-002	MAIN VALVE SPRING
5	OR-0045-10	O-RING STD
6	PT-BP-301-002-001	20MM SENSOR LF
7	PT-BP-301-001	20MM SENSOR HOLDER
8	PT-BP-301-006	SPRING REST
9	OR-0050-15	O-RING STD
10	OR-0190-20	O-RING STD
11	OR-BS028	O-RING STD
12	PT-C-011-003	LOAD SPRING
13	PT-C-017	UPPER SPRING REST
14	BALL-010-SS-316	BALL BEARING
15	PT-C-015	BONNET
16	PT-C-021	SMALL HAND WHEEL
17	PT-C-020	LOCK NUT
18	PT-C-019-003	ADJUSTING SCREW
19	PT-C-022	NAMEPLATE
20	FIT-CAP-4343092	NAMEPLATE CAP

## 7. Technical Data

Fluid Media:	All gases and liquids compatible with materials of construction
Max Working Pressure:	150 bar
Outlet Pressure Range:	0-150 bar
Operating Temperature:	-20°C to +80°C
Materials:	Shell: 316 SS Seat: PCTFE or PEEK®
Flow Capacity (Cv):	0.1 (Low Flow) 0.5 (Medium Flow)
Leakage:	Liquid: 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.