



Zaiput Flow Technologies

Separation made simple

Back Pressure Regulators

High Precision Pressure Controllers for flow Chemistry

Technical Data

Overview

Zaiput Flow Technologies' Back Pressure Regulators (BPRs) are specifically designed for the needs of flow chemists. Our devices feature a unique combination of high accuracy and precision, broad pressure ranges, and metal-free wetted parts with outstanding chemical compatibility in a compact format.

The BPRs compare the pressure of the fluid to control (main stream) to a reference pressure (set point). Flow through the main stream is only allowed if its pressure meets the reference pressure.

Importantly:

- ◆ The reference pressure is set by the user with compressed gas.
- ◆ Once the reference pressure is set, the device can be disconnected from the compressed gas source.
- ◆ The device has metal-free wetted parts with outstanding chemical resistance.

Key Features

- ◆ Metal-free wetted parts with excellent chemical resistance (wetted materials are ETFE and PFA)
- ◆ Very accurate and precise (< 1% error across a broad range of flowrates between the two devices)
- ◆ User selected back pressure value
- ◆ Excellent with gas-liquid streams
- ◆ Maximum Pressure: 2MPa (290 psi)
- ◆ Can be used without external reference pressure source
- ◆ Robust to clogging
- ◆ Easy to use and implement
- ◆ Potential use as a relief valve

Product Line



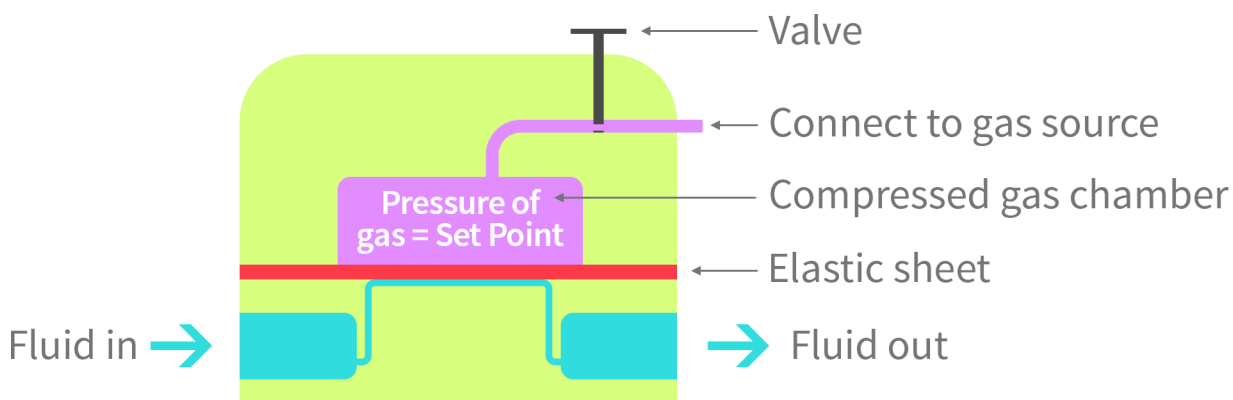
- ◆ Two available product sizes which together cover a range of flow rates from 0.05 ml/min—1000 ml/min with minimal error.
- ◆ A rugged yet simple design allows for repeatable results with minimal need for maintenance.
- ◆ The ability to disconnect the BPRs from the compressed gas source allows for plug and play ability, perfect for labs and pilot plants that are constantly evolving.
- ◆ Consistent design allows you to scale between the devices without worrying about inconsistent results.



Back Pressure Regulators

Principle

- The BPRs have a chamber that the user fills with compressed air. The pressure of the inputted air represents the back pressure set point of the device. An elastic sheet intercepts the process fluid flow path and allows a comparison of the pressure of the process fluid to the reference pressure. In other words, the process fluid can flow through the device only when its pressure is equal to the reference pressure.

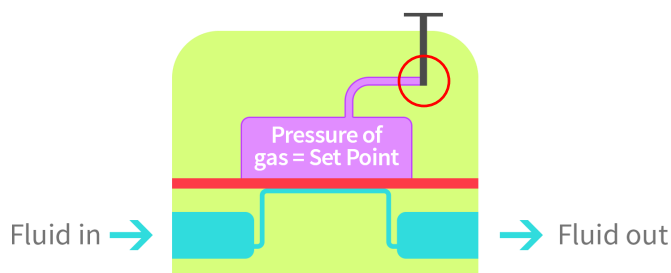


Modes of Operation

The Zaiput BPR can be used in two main ways:

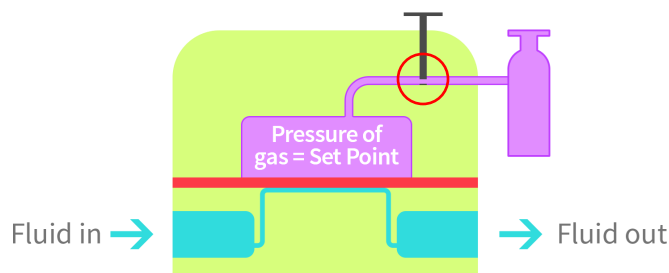
Mode 1: Set It And Forget It

- After compressing the air in the gas chamber of the device, the user manually closes the air supply valve. The device is sealed and the pressure stays in the device. The user can now disconnect the BPR from the pressure source (e.g., gas tank). If another set point is required, this procedure can be repeated by setting the pressure of the top chamber to the new value. The advantage is that a gas tank is not required for operation.



Mode 2: Dynamic Set Point

- Some processes require the fluid pressure to dynamically change over the course of operation. The Zaiput BPR is able to provide a continuous pressure setting as well. To achieve this, the user connects the Zaiput BPR to the gas/pressure source by leaving the valve open. By changing the pressure of the gas source (e.g., the regulator of the gas tank), the set point, P , is dynamically changed.



Note that the Zaiput BPR sets a minimum level of pressure for the main fluid flow. If multiple BPRs are placed in series, the pressure of the fluid flow will be equal to the highest pressure set point, and not the sum of the multiple set points. As a result, the device can also be used as a relief valve. Each BPR comes with a connection tube (the external pressurized gas source is not included).



Back Pressure Regulators

Specifications



Part Number	BPR—10
Total Flow Rate	0.05-20 ml/min (error <1%)
	20-100 ml/min (error <5%)
Set Point Pressure Range	0.2-2 MPa (29-290 psi)
Dimensions	52 x 52 x 44 mm
Maximum Inlet Pressure	5 MPa
Max Operating Temperature	130 °C
Process Fluid Ports	¼" UNF - 28 flat bottom
Reference Pressure Port	1 port, adequate connector provided
Wetted Parts	Perfluorinated polymers (ETFE, PFA)



Part Number	BPR—1000
Total Flow Rate	20-500 ml/min (error <2%)
	500-1000 ml/min (error <5%)
Set Point Pressure Range	0.2-2 MPa (29-290 psi)
Dimensions	97 x 97 x 64 mm
Maximum Inlet Pressure	5 MPa
Max Operating Temperature	130 °C
Process Fluid Ports	¼" OD tubing with Swagelok PFA ferrules and our compression Nut
Reference pressure port	Two ports: One for 1/8"OD Swagelok plus one with provided connector
Wetted Parts	Perfluorinated polymers (ETFE, PFA)

Additional notes

- **Device sets an "at least pressure":** This device sets a minimum level of pressure for the main stream, therefore, if more devices are placed in series, the main stream pressure will be equal to the higher set point of all the devices (and not the sum of their set points).
- **Robustness to clogging:** While this device is not designed for slurries, users observe an increased robustness to clogging when particles/solids are present with respect to conventional devices.
- **Error:** These devices are very accurate and precise, providing small errors. For reference, a standard spring device has a typical error of 10%. The devices can be run outside the suggested ranges, but the error will increase.
- **Use with hot liquids:** If the device is used in the "Set It and Forget it Mode", it will heat up when used with hot liquids. As a result, the pressure set point may change because the reference gas will heat up.



Back Pressure Regulators

Selected Publications

70+ Publications



- Britton, J. and Jamison, T.F., [The assembly and use of continuous flow systems for chemical synthesis](#) *Nature Protocols* Oct 2017.
- Adamo, A., Beingessner, R.L., Behnam, M., Chen, J., Jamison, T.F., Jensen, K.F., Monbaliu, J.C.M., Myerson, A.S., Revalor, E.M., Snead, D.R. and Stelzer, T., [On-demand continuous-flow production of pharmaceuticals in a compact, reconfigurable system](#) *Science* April 2016.
- Ollivier N, Toupay T, Hartkoorn RC, Desmet R, Monbaliu JC, Melynk O. [Accelerated microfluidic native chemical ligation at difficult amino acids toward cyclic peptides](#). *Nature communications*. 2018 Jul 20;9(1):2847.

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- **Zaiput Flow Technologies**, an MIT spin-out, is focused on bringing innovative separation technology and related tools to market.
- We are looking forward to assist you with your questions, support needs, or to discuss your application.

