



# GAS PILOT OPERATED PRESSURE REGULATOR

Models BP, BPNV, PR, PRNV, PRB, LBP, PD

Instruction Manual: IMA-CID

## DESCRIPTION:

The Gas Operated Pressure Regulator combines a pressure pilot with a control valve. Except where liquid or very low gas pressure is involved, upstream gas is used to operate the valve.

In the pilot a spring is compressed with an adjusting screw. This places a force against a thick diaphragm which is in contact with the controlled pressure on the side opposite the spring. As the two forces work against each other, they continually reposition a small three-way valve (the pilot plug and seats) which controls diaphragm pressure in the valve. Proper function can best be accomplished when the gas flowing through the pilot is clean and free of liquid.

The valve shuts off with a resilient seat on the plug closing against a metal seat in the valve body.

## Regulators perform one of three functions:

### BACK PRESSURE REGULATOR

Maintains a constant upstream pressure. It limits upstream pressure by adjusting open to relieve excess pressure or conserves upstream pressure by adjusting closed to limit the flow to downstream.

### PRESSURE REDUCING REGULATOR

Maintains a constant downstream pressure. It limits downstream pressure by adjusting closed to limit the flow to downstream or supports downstream pressure by adjusting open to allow additional flow from upstream.

### DIFFERENTIAL PRESSURE REGULATOR

Maintains a constant difference between upstream and downstream pressure.

NOTE: In order to determine the specific model number of your regulator, see Section A of your Kimray Catalog, or the Packing Sheet which was packed with your regulator.

## AVAILABLE MODELS

<b>BP:</b>	Back Pressure Regulator
<b>BPNV:</b>	Back Pressure Regulator - Non Venting
<b>PR:</b>	Pressure Reducing Regulator
<b>PRNV:</b>	Pressure Reducing Regulator - Non Venting
<b>PRB:</b>	Pressure Reducing Balanced Regulator
<b>LBP:</b>	Liquid Back Pressure Regulator
<b>PD:</b>	Pressure Differential Regulator

### Controlled Pressure Ranges:

<b>BP, BPNV:</b>	5 to 125 psig, 10 to 300 psig .34 to 8.6 bar, .69 to 20.7 bar
<b>PR, PRNV:</b>	5 to 125 psig, 10 to 300 psig .34 to 8.6 bar, .69 to 20.7 bar
<b>PRB:</b>	5 to 125 psig, 10 to 300 psig .34 to 8.6 bar, .69 to 20.7 bar
<b>LBP:</b>	5 to 125 psig, 10 to 300 psig .34 to 8.6 bar, .69 to 20.7 bar
<b>PD:</b>	5 to 125 psig, 10 to 300 psig .34 to 8.6 bar, .69 to 20.7 bar

## SPECIFICATIONS

**Normal Service:** Gaseous fluids

### Features:

Intermittent bleed pilot  
Soft seat for bubble tight shut-off  
High Capacity (full line size seat opening)

### Optional Springs:

125 psig (8.6 bar) Maximum  
300 psig (20.7 bar) Maximum



**BP, BPNV, PR, PRNV, PRB, LBP, PD**  
**Cast Iron & Ductile Iron**  
300 psig Max. Controlled Pressure

### Construction Materials:

Body	Cast Iron	Ductile Iron
Design Pressure	Scrd. 175 psi Flgd. 175 psi (ANSI 125 FF)	Scrd. 300 psi Flgd. 250 psi (ANSI 150 RF)
Stem	303 Stainless	303 Stainless
Plug	Ductile Iron	Ductile Iron
Tubing	Copper	304 Stainless
Fittings	Brass	Steel
Seat	Nitrile	Polyurethane
Diaphragms	Nitrile/Nylon	Nitrile/Nylon

Design is hydrostatically tested to at least 4 times the stated working pressure. (ANSI Standards require at least 1 1/2 times the stated working pressure.)

### Body Sizes and End Connections Available:

1" NPT  
2" NPT, Flanged, Grooved  
3" NPT, Flanged  
4" NPT, Flanged  
6" Flanged

### Body Pressure Rating

Cast Iron: NPT and ANSI 125 Flanged -- 175 psig (12 bar)  
Ductile Iron: NPT 300 psig (20.7 bar)  
ANSI 150 RF Flanged -- 250 psig (17.2 bar)

### Normal Operating Temperature:

-20° to 200° F

### Options:

Plug Size: Reduced flow trim  
Elastomers: HSN, Viton®, Aflas®  
Trim Material: 316 Stainless Steel Tubing, Fittings, and internal exposed parts

### Liquid Service:

Most regulators can be modified for liquid service. An outside source of instrument gas is required. The instrument gas pressure must be at least 60% of the maximum upstream pressure or 10 psig (.7 bar); whichever is greater.



# GAS PILOT OPERATED PRESSURE REGULATOR

Models BP, BPNV, PR, PRNV, PRB, LBP, PD

## INSTALLATION:

### BEFORE INSTALLATION:

Be sure you fully understand the application, operation and connection of the device before installing.

### WARNING:

Only trained personnel should install or service a regulator. Regulators and other control devices should be installed, operated, and maintained in accordance with international codes and regulations, manufacturer's instructions, and proven best practices.

Personal injury, equipment damage, property damage, leakage or bursting of pressure-containing parts may result if the regulator is overpressured or installed where service conditions could exceed the limits given in the SPECIFICATIONS section.

Overpressure protection should also be provided if the regulator inlet pressure may exceed the safe working pressure of the equipment downstream.

To avoid injury or damage, install pressure-relieving or pressure limiting devices to prevent service conditions from exceeding those limits. Consult the appropriate code, regulations, or standards.

If a pressure regulator is used in a hazardous or flammable fluid service, personal injury and property damage could occur due to fire or explosion of vented fluid that may have accumulated. To prevent such injury or damage, install piping or tubing to vent the fluid to a safe, well-ventilated area or containment vessel. When venting a hazardous fluid, the piping or tubing should be located far enough away from any buildings or windows so as not to create further hazard. The vent opening should be protected against anything which could obstruct it.

Consideration should be given to the potential risk of injury or property damage due to escaping fluid. To avoid such risks, install the regulator in a safe location.

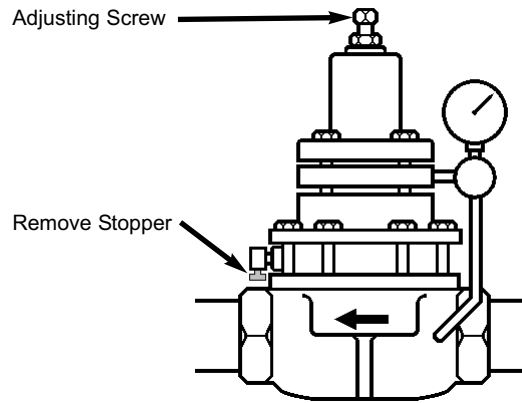
Consideration should also be given to the location of the valves in the piping system. Install the regulator with a minimum of 20 pipe diameters between the regulator and any upstream or downstream tees, elbows, reducers, swages, or any device which imposes a restriction to flow

Inspect the openings in the regulator for foreign material and clean the pipe lines to remove scale, chips and debris.

Install the regulator with the arrow on the body pointing in the direction of flow. The arrow signifies that the device will regulate pressure only in the direction of flow indicated and will not necessarily prevent flow in the opposite direction. **If conditions indicate the possibility of backward flow you may wish to install check valves.**

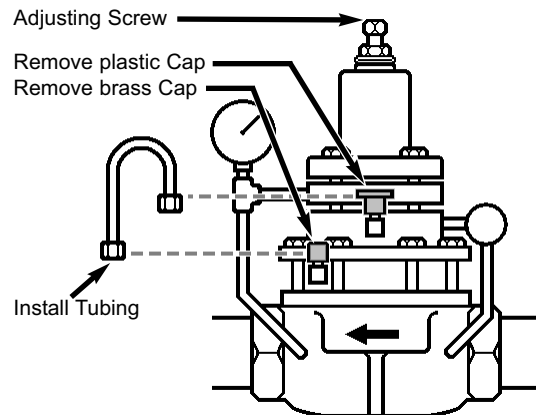
**A person should never stand directly over or in front of a regulator when the system is pressurized. Never look directly into a pressure regulator in a pressurized system. The regulator could suddenly open, blowing gas, dirt, metal particles, or other debris into the person's face and eyes.**

Install adjusting screw.: Most regulators are shipped with the adjusting screw wired to the tubing. Remove the wire, and install the adjusting screw in the top of the regulator.



**Back Pressure & Pressure Differential Regulators**

**Back Pressure Regulator & Differential Regulator:** You should find a small plug with a tag attached reading "Remove stopper from hole in breather plug." (See Diagram) Remove the stopper **after** the regulator is installed. Your regulator contains oil—the plug prevents it from leaking during shipment and installation.



**Pressure Reducing Regulator**

**Pressure Reducing Regulator:** Your regulator contains oil. A section of tubing is shipped disconnected to prevent oil from fouling the pilot. Some minor assembly will be required after the regulator is placed in line and prior to start-up.

- Remove the two safety caps placed on the tubing fittings. The cap on the upper fitting is blue plastic; the cap on the lower fitting is brass. Save the brass cap in the event the regulator needs to be removed from service for repairs. (See Diagram)
- Install the section of tubing and wrench tighten the fittings only after the regulator has been installed in the piping.

Note: Install the regulator in a horizontal line. Installation of a Pilot Operated Regulator in a vertical line is strongly discouraged.



# GAS PILOT OPERATED PRESSURE REGULATOR

Models BP, BPNV, PR, PRNV, PRB, LBP, PD

**VENT:\***

Check all vents periodically to be certain they are clear. If a vent should become blocked the regulator could lose control.

**Warning:\*** If a hazardous or flammable gas is being conveyed and the regulator is in an enclosed area, personal injury or property damage could result from accumulated gas being released through the vent. To avoid potential risk provide adequate ventilation or pipe away the vented gas.

\*Does not apply to NV - Non Vent models. No gas is vented with NV.

**ADJUSTMENT:**

Loosen the locknut before adjusting pressure. Clockwise rotation of the adjusting screw increases set point pressure. Counter-clockwise rotation of the adjusting screw reduces set point pressure. Monitor the adjusted pressure during adjustment. Tighten the locknut after adjusting pressure.

**START-UP & TEST:**

With installation completed and appropriate relief and check valves installed and set, slowly open the upstream and downstream shutoff valves. Turn the adjusting screw out and then back in until you feel it begin to meet resistance as it engages the spring. At this point the valve section of the regulator will be positioned as follows:

- Back Pressure Regulator.....Open
- Pressure Reducing Regulator....Closed
- Differential Pressure Regulator...Open

As you turn the adjusting screw clockwise, the set point pressure will increase.

**WARNING:**

Before performing any service be sure that the regulator is fully isolated and that all pressure upstream and down has been relieved. Use bypass valves or fully shut off the process.

Be sure that any operating or instrument gas lines have been disconnected.

Never assume that a check valve is fully blocking the downstream line.

Never tighten any fitting or the main connections to the regulator while there is pressure on the line.

**NOTE:**

When a gasket seal is disturbed during disassembly a new gasket should be installed during reassembly to ensure proper sealing.

**MAINTENANCE:**

Maintenance should be performed on a regular basis. An initial inspection interval of 12 months is recommended. Depending on the service conditions and the condition of the valve, the inspection interval may be decreased or increased.

**Warning:** If the regulator vents fluid or a leak develops in the system, it indicates that service is required. Failure to take the regulator out of service immediately may create a hazardous condition.

The regulator can be repaired without being removed from the piping.

Detailed repair instructions are available for your specific regulator.

Repair Kits are available. Consult the Kimray Catalog, Section A, or the packing slip which is enclosed with each regulator for the correct Repair Kit number.

**REPAIR HINTS:**

- If pilot bleeds gas continuously, the pilot plug seat may be dirty.
- Disconnect any tubing to lower housing before installing.
- Make sure there is minimum "play" of valve stem in the lower housing.
- Do not over tighten seat nut.
- Do not over tighten the 4 screws which hold the bonnet on.
- Diaphragms will harden with age.
- Make sure valve is mounted where oil will reach the stem in the lower housing

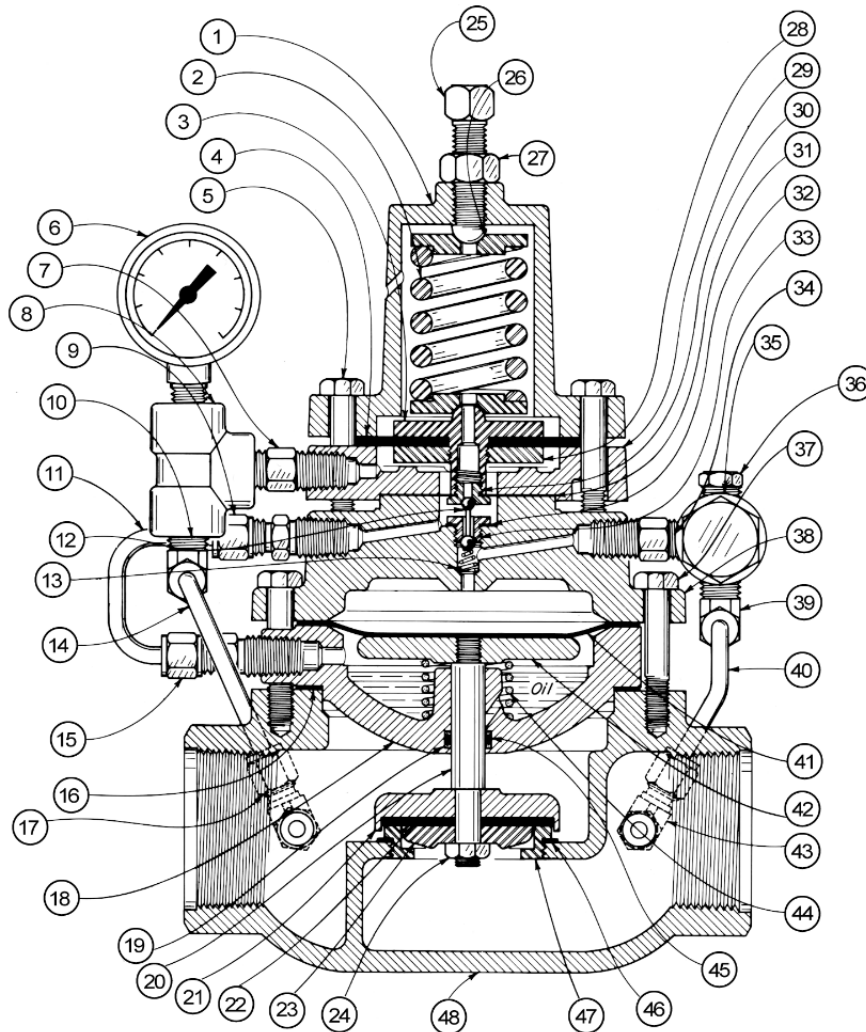
**TROUBLE SHOOTING:**

SYMPTOM	POSSIBLE CAUSE
Regulator appears to be stuck in one position.	Stopper has not been removed from breather plug in lower housing. (BP Regulator)
Regulator leaks through to downstream.	Over tightened seat nut can cause seat to bulge and leak.
Pilot bleeds gas continuously.	The pilot plug seat may be dirty.
Minimum set point cannot be set to zero.	Bonnet screws are over tightened.
Regulator will not open.	A pilot seat may be loose. (BP Regulator)
Regulator will not close	A pilot seat may be loose. (PR Regulator)



# GAS PILOT OPERATED PRESSURE REGULATOR

PARTS for Models BP, BPNV, PR, PRNV, PRB, LBP, PD



This is a general representation of a cast iron or ductile iron pressure regulator including the following models: BP, BPNV, LBP, PR, PRNV, PRB, and PD. For specific parts and their orientation refer to the Kimray Catalog or the packing slip which is enclosed with each regulator.

### Key Description

- 1 Bonnet, \*cast iron or \*\*ductile iron
- 2 Spring, 125 psig-orange, 300 psig-green
- 3 Plate, plated steel
- 4 Diaphragm, polyurethane
- 5 Screw, plated steel
- 6 Gauge
- 7 Nipple, plated steel
- 8 Tee, plated steel
- 9 Connector, \*brass or \*\*steel
- 10 Ell or Connector, \*brass or \*\*steel
- 11 Tubing, \*copper or \*\*stainless steel
- 12 Pilot Plug, stainless steel
- 13 Spring
- 14 Tubing, \*copper or \*\*stainless steel
- 15 Ell or Connector, \*brass or \*\*steel
- 16 Gasket

### Key Description

- 17 Ell, \*brass or \*\*steel
- 18 Housing, \*cast iron or \*\*ductile iron
- 19 Back Ups (2) leather,
- 20 Stem, stainless steel
- 21 Seat Disc, ductile iron or steel
- 22 Seat, \*nitrile, \*\*polyurethane
- 23 Ratio Plug, ductile iron or steel
- 24 Lock Nut, stainless steel
- 25 Adjusting Screw, plated steel
- 26 Spring Plate (2), plated steel
- 27 Nut, plated steel
- 28 Nut, plated steel
- 29 Housing, \*cast iron or \*\*ductile iron
- 30 Pilot Seat, stainless steel
- 31 Diaphragm, nylon reinforced nitrile
- 32 Gasket
- 33 Pilot Seat, stainless steel

### Key Description

- 34 Nipple, plated steel
- 35 Filter, Housing - plated steel  
Internal screens - stainless steel
- 36 Plug, steel
- 37 Screw, plated steel
- 38 Housing, \*cast iron or \*\*ductile iron
- 39 Ell, \*brass or \*\*steel
- 40 Tubing, \*copper or \*\*stainless steel
- 41 Diaphragm, nylon reinforced nitrile
- 42 Plate, steel
- 43 Ell, \*brass or \*\*steel
- 44 Spring
- 45 O Ring, nitrile
- 46 Gasket
- 47 Removable seat, ductile iron
- 48 Body, \*cast iron or \*ductile iron

\* Regulators Rated to 175 psig (12 bar)

\*\*Regulators Rated to 250 psig (17.2 bar) or 300 psig (20.7 bar)