



**HAYWARD FLOW CONTROL**  
**Series PBV Back Pressure Valve and**  
**Series RPV Pressure Relief Valve**  
**INSTALLATION, OPERATION, AND MAINTENANCE**  
**INSTRUCTIONS**





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# SAFETY WARNINGS

**PLEASE READ THE FOLLOWING INFORMATION PRIOR TO INSTALLING AND USING HAYWARD SERIES PBV BACK PRESSURE VALVE AND SERIES RPV PRESSURE RELIEF VALVES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PRODUCT DAMAGE, PROPERTY DAMAGE, PERSONAL INJURY, OR EVEN DEATH.**

1. Hayward Flow Control (Hayward), a division of Hayward Industries, guarantees its products against defective material and workmanship only. Hayward assumes no responsibility for property damage or personal injury resulting from improper installation, misapplication, or abuse of any product.
2. Hayward assumes no responsibility for property damage or personal injury resulting from chemical incompatibility between its products and the process fluids to which they are exposed. Determining whether a particular PVC, CPVC, PP or PVDF product is suitable for an application is the responsibility of the user. Chemical compatibility charts provided in Hayward literature are based on ambient temperatures of 70°F and are for reference only.
3. Hayward products are designed for use with non-compressible liquids.

## **WARNING**

**Hayward PVC and CPVC products should NEVER be used or tested with compressible fluids such as compressed air or nitrogen. Use of PVC and CPVC products in compressible fluid applications may result in product damage, property damage, personal injury, or even death.**

## **WARNING**

**The Series PBV and RPV is intended for use in liquid service only. Do not attempt to use this valve for controlling air or gases. Use of this product in air or gas service may result in product damage, property damage, personal injury, or even death.**

4. The maximum recommended fluid velocity through any Hayward product is eight feet per second (8 ft/s). Higher fluid velocity can result in damage due to the water hammer effect.
5. Piping systems must be designed and supported to prevent excess mechanical loading on Hayward products due to system misalignment, weight, shock, vibration, and the effects of thermal expansion and contraction.
6. The effect of temperature on plastic piping systems must be considered when the systems are initially designed. The pressure rating of plastic systems must be reduced with increasing temperature. Maximum operating pressure is dependent upon material selection as well as operating temperature. Before installing any Hayward product, consult Hayward product literature for pressure vs. temperature curves to determine any operating pressure or temperature limitations.

7. PVC and CPVC plastic products become brittle below 40°F. Use caution in their installation and operation below this temperature.

**WARNING**

**Hayward PVC and CPVC products should not be used in services with operating temperature below 34°F.**

8. Due to differential thermal expansion rates between metal and plastic, transmittal of pipe vibration and pipe loading forces, **DIRECT INSTALLATION OF PLASTIC VALVES INTO METAL PIPING SYSTEMS IS NOT RECOMMENDED**. Wherever installation of plastic valves into metal piping systems is necessary, it is recommended that at least 10 pipe diameters in length of plastic pipe be installed upstream and downstream of the plastic valve to compensate for the factors mentioned above.
9. Published operating requirements are based on testing of new valves using clean water at 70°F. Valve performance is affected by many factors including fluid chemistry, viscosity, specific gravity, flow rate, and temperature. These should be considered when sizing Hayward products.
10. Systems should always be depressurized and drained prior to installing or maintaining any Hayward product.

**WARNING**

**Failure to depressurize and drain system prior to installing or maintaining valve may result in product damage, property damage, personal injury, or even death.**

11. Always follow your site and or company procedures for any safety training and or site specific precautions or warnings in addition to those in this document.

# ***SAFETY PRECAUTIONS***

**Always follow the safety instruction below:**

- Wear protective clothing and glasses when working with or near chemicals.
- Refer to the MSDS for all chemicals used.
- Use only Genuine Hayward parts. Use of other parts may result in damage to equipment or injury and invalidate warranty.
- Flush all components that are in contact with chemicals prior to servicing.
- Secure all chemicals and equipment making them inaccessible to children and pets.
- Dispose all chemicals and waste according to all local, state and federal regulations.
- Stop the flow of chemicals through the system prior to working on the valve.
- **Do Not** exceed the maximum operating pressure.

# ***INTRODUCTION***

## **Description:**

### **Back Pressure Valve**

The Hayward Series PBV, diaphragm back pressure valve, is used to enhance the performance of chemical feed pumps and systems by providing a constant discharge head pressure. These valves also function as an anti-siphon valve. The diaphragm is held against the seat by the internal spring. Back pressure is adjustable from 10 - 150 psi via the adjustment screw. When the inlet pressure exceeds the preset pressure the diaphragm lifts off the seat and the chemical flows to the injection point. After each discharge stroke of the pump, as the pressure drops, the diaphragm reseats itself.

### **Pressure Relief Valve**

Hayward Series RPV, diaphragm pressure relief valve, is designed to protect chemical feed pumps and systems from overpressure caused by defective equipment or blockages in the chemical line. The 3 port design allows chemical to flow through the valve via an internal chamber. When the pressure in the chemical line exceeds the preset pressure of the valve the diaphragm lifts off the seat and the chemical then flows out the bottom port back to the chemical tank. Relief pressure is adjustable via the adjustment screw in the top of the valve.

# ***INSTALLATION***

## **Unpacking:**

The carton should contain:

- 1 Backpressure valve or Pressure Relief valve
- 1 Instruction Manual
- Accessories as ordered

## **Installation:**

As a general rule, installation should follow the layout as outlined in the “TYPICAL INSTALLATION” drawing. See page 11.

## **Back Pressure Valve:**

Generally, the back pressure valve can be installed anywhere in the discharge line, provided there is some downstream pressure at the dosage point. If there is no downstream pressure the back pressure valve should be installed at the dosage point to prevent siphoning and drainage of the chemical line. The valve can be installed either vertically or horizontally. The flow must be across the valve in the direction of the arrow. All **PBVs** are factory set at 50 psi, unless otherwise specified. Field adjustment is possible with the adjustment screw.

Back pressure valve performance will be enhanced with the installation of a pulsation dampener to smooth out the discharge / suction cycles of the pump. Thus, the diaphragm is free to float inside the valve chamber, minimizing the wear on the stress points of the diaphragm. Pulsation dampeners will also reduce the pressure drop across the valve by reducing peak flows. Backpressure valves should be installed downstream of the dampener. For most applications diaphragm type dampeners are required. Generally speaking 5 to 10% dampening is sufficient. Consult with your pump manufacturer to get his recommendations.



## **Pressure Relief Valve:**

### **3 Port Valves:**

Installation should be made as close to the chemical pump discharge valve as possible, without any equipment, especially shut-off valves, between the valve and the pump. Direction of flow must be across the valve; however the side of entry is not important. The valve can be installed either vertically or horizontally. The relief port is on the bottom of the valve.

### **2 Port 180° Valves:**

Installation of a tee should be made as close to the chemical pump discharge valve as possible, without any equipment, especially shut-off valves, between the valve and the pump. The flow can travel at 90° or 180° through the tee, with the relief valve connected to the 3<sup>rd</sup> port of the tee. Direction of relief flow must be in the direction of the arrow on the valve.

### **2 Port 90° Valves:**

Installation of a tee should be made as close to the chemical pump discharge valve as possible, without any equipment, especially shut-off valves, between the valve and the pump. The flow can travel at 90° or 180° through the tee, with the relief valve connected to the 3<sup>rd</sup> port of the tee. Direction of relief flow must be in the side of the valve with the relief port being on the bottom.

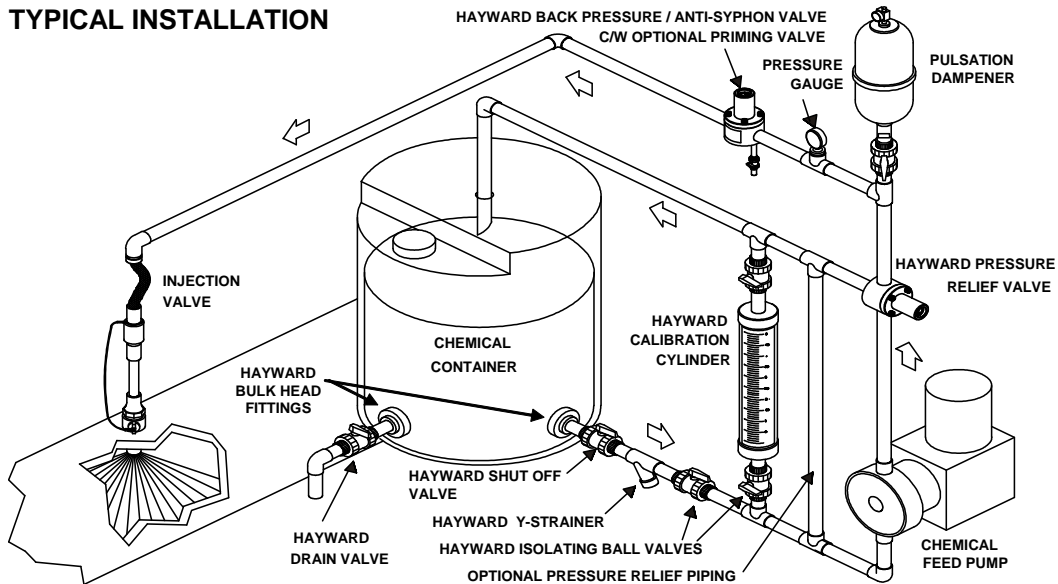
The optimum installation for any relief valve is to vent the relief port back to the chemical tank, or directly to a containment area. However if this is not possible, the relief port can be piped back into the suction side of the pump. This will apply the suction head to the relief port. To compensate, divide the NPSH by 4 and add this pressure to the relief valve setting. Do not put a shut off valve in the relief line.

All **RPVs** are factory set at 50 psi, however field adjustment is possible with the adjustment screw.

## Important Precautions:

- Do not over tighten the connection piping.
- Threading metal pipe or pipe fittings into plastic valves is not recommended. See page 4.
- Do not use thread sealant. Hayward recommends the use of PTFE tape only for thread sealing.
- Check to ensure that the valve bolts are tight.
- Do not bottom out the adjustment screw.

# TYPICAL INSTALLATION



# OPERATION

## Start-up:

Before starting the chemical feed system make sure the backpressure and safety valves are installed correctly and the proper pressures are set for the application. The valves are factory set at 50 psi unless otherwise specified. Valves can be field adjusted.

## Adjusting Set Pressure:

The set pressure of the valves can be adjusted to any pressure value between the maximum and minimum value as stated on the valve ID tag. This is done via the adjustment screw located under the black cap on the top of the valve. To increase the pressure, turn the screw clockwise. This should be done with the pump operating and a pressure gauge installed between the pump and the back pressure valve. If no gauge is installed the pressure can be estimated to change approximately 25 psi per revolution for 1/4" and 3/8" valves, approximately 8 psi per revolution for 1/2" through 4" valves using the standard 150 psi spring. Consult factory for other spring options.

### **Caution:**

Pressure setting changes should be made only after careful consideration of the effect of the change on the entire hydraulic system, including the chemical feed pump.

Never attempt to adjust the valve outside the pressure limit of the spring as improper operation and/or damage to the valve and/or system components may occur.

# MAINTENANCE

## General:

Hayward valves were designed with a minimum amount of maintenance required to keep the valves in operation. However, periodic replacement of the diaphragm is required. The Hayward design permits routine inspection and repair without removing the valve from the pump line after depressurizing and flushing the valve.

### Caution:

Ensure that the chemical feed system is not under pressure and that the chemical lines have been flushed with water before starting disassembly.

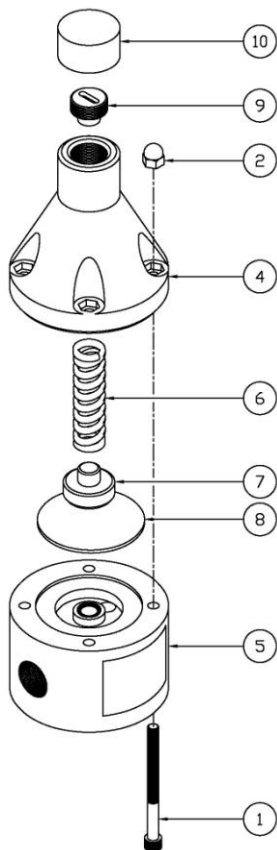
Unscrew the pressure adjustment screw to remove the pressure from the diaphragm. Remove the 4 bolts and lift off the valve top.

After the diaphragm and the valve seat have been inspected and replaced if necessary, (White PTFE side down), check the adjustment spring. Make sure there is no rust or corrosion. Place the support disc and the spring onto the valve body and slide the top back over the four bolts.

Tighten the 4 bolts, and then replace the adjustment screw. Turn the adjustment screw clockwise to approximately the same position as it was prior to disassembly. If an exact pressure setting is required or a different pressure is desired a pressure gauge should be used to verify the setting. Turning the adjustment screw clockwise will increase pressure.

**Use only genuine Hayward Valve parts in your Hayward Valves.**

# PARTS DETAIL



1	Body Bolting - SS
2	Cap Nut - SS
3	Washer (not shown)
4	Dome
5	Body
6	Spring
7	Compressor
8	Diaphragm
9	Adjustment Screw
10	Protective Vinyl Cap

# SPARE PARTS:

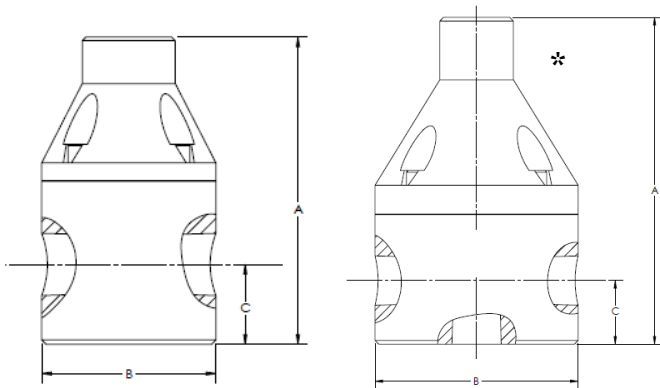
Part or Kit Number	Description
PBVDIAPE050	1/4" - 1/2" Diaphragm PTFE/EPDM
PBVDIAPE100	3/4" - 1" Diaphragm PTFE/EPDM
PBVDIAPE200	1-1/2" - 2" Diaphragm PTFE/EPDM
PBVDIAPV050	1/4" - 1/2" Diaphragm PTFE/FPM
PBVDIAPV100	3/4" - 1" Diaphragm PTFE/FPM
PBVDIAPV200	1-1/2" - 2" Diaphragm PTFE/FPM
PBV1SPRNG050	1/4" - 1/2" Pressure Spring 10 - 150 psi
PBV1SPRNG100	3/4" - 1" Pressure Spring 10 - 150 psi
PBV1SPRNG200	1-1/2" - 2" Pressure Spring 10 - 150 psi
PBV0SPRNG050	1/4" - 1/2" Pressure Spring 0 - 50 psi
PBV0SPRNG100	3/4" - 1" Pressure Spring 0 - 50 psi
PBV2SPRNG050	1/4" - 1/2" Pressure Spring 10 - 250 psi
PBV2SPRNG100	3/4" - 1" Pressure Spring 10 - 250 psi
PBVKITPE037	Rebuild Kit 1/4" - 1/2" (Diaphragm PTFE/EPDM, Compressor, Adjustment Screw, Spring 10-150psi)
PBVKITPE100	Rebuild Kit 3/4" - 1" (Diaphragm PTFE/EPDM, Compressor, Adjustment Screw, Spring 10-150psi)
PBVKITPE200	Rebuild Kit 1-1/2" - 2" (Diaphragm PTFE/EPDM, Compressor, Adjustment Screw, Spring 10-150psi)

## SPECIFICATIONS

<b>Sizes:</b>	<b>1/4", 3/8", 1/2", 3/4", 1", 1-1/2", 2", 3", 4"</b>	
<b>Flow Rates @ 150 psi</b>		
<b>Size:</b>	<b>Pulsating</b>	<b>Continuous</b>
<b>1/4"</b>	<b>100 USgph</b>	<b>5 USgpm</b>
<b>3/8"</b>	<b>200 USgph</b>	<b>10 USgpm</b>
<b>1/2"</b>	<b>300 USgph</b>	<b>15 USgpm</b>
<b>3/4"</b>	<b>367 USgph</b>	<b>19.2 USgpm</b>
<b>1"</b>	<b>462 USgph</b>	<b>24.2 USgpm</b>
<b>1-1/2"</b>	<b>1388 USgph</b>	<b>72.7 USgpm</b>
<b>2"</b>	<b>1533 USgph</b>	<b>80.3 USgpm</b>
<b>3"</b>	<b>5157 USgph</b>	<b>270 USgpm</b>
<b>4"</b>	<b>5157 USgph</b>	<b>270 USgpm</b>
<b>Max Temp: (Body Material)</b>	<b>PVC: 140°F</b>	<b>CPVC: 190°F</b>
	<b>PP: 180°F</b>	<b>PVDF: 300°F</b>
<b>Max Operating Pressure @ 70°F</b>	<b>PVC, CPVC, PVDF: 250 psi</b>	
	<b>PP: 150 psi</b>	
<b>Pressure Adjustment</b>	<b>Standard: 10 - 150 psi; Optional: 0 – 50 psi, 10 – 250 psi</b>	
<b>Materials of Construction:</b>		
<b>Diaphragm</b>	<b>PTFE / EPDM, FPM, &amp; PTFE / FPM</b>	
<b>Valve Body</b>	<b>PVC, CPVC, PP, PVDF</b>	
<b>Dome</b>	<b>Glass Filled Noryl®</b>	



# DIMENSIONS



Size	A	B	C
	in / mm	in/mm	in/mm
<b>1/4"</b>	3.55 / 90.2	2.35 / 59.7	0.750 / 19.1
<b>3/8"</b>	3.55 / 90.2	2.35 / 59.7	0.750 / 19.1
<b>1/2"</b>	4.25 / 108	2.35 / 59.7	1.08 / 27.4
<b>3/4"</b>	5.56 / 141	3.50 / 88.9	1.13 / 28.6
<b>1"</b>	5.86 / 149	3.50 / 88.9	1.25 / 31.8
<b>1-1/2"</b>	8.35 / 212	4.90 / 124	1.83 / 46.4
<b>2"</b>	8.90 / 226	4.90 / 124	2.15 / 54.6
<b>3"</b>	Please Consult Hayward Tech Services		
<b>4"</b>			

\*Three port design for 1/4" - 1" RPV.  
Optional Port configurations available, consult Hayward.

# ***NOTES***

# ***NOTES***

**TWO YEAR WARRANTY:** All products manufactured by Hayward are warranted against defects in material or workmanship for a period of two years from date of shipment. Our sole obligation under this warranty is to repair or replace, at our option, any product or any part or parts thereof found to be defective. **HAYWARD MAKES NO OTHER REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The warranty set forth above is the only warranty applicable to Hayward products and in no event shall Hayward be liable for any delay, work stoppage, cartage, shipping, loss of use of equipment, loss of time, inconvenience, loss of profits of any direct or indirect incidental resulting from or attributable to a breach of warranty. **The remedies under this warranty shall be the only remedies available. OUR MAXIMUM LIABILITY SHALL NOT IN ANY EVENT EXCEED THE CONTRACT PRICE FOR THE PRODUCT.**

**Note:**

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