



H Series Safety & Back Pressure Valves

INSTRUCTION MANUAL

339-0023-000
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TABLE OF CONTENTS

	Warranty	visit www.miltonroy.com
Section 1	Introduction	6
	Description	6
	Product Coding	7
	Principle of Operation	8
Section 2	Installation	10
	Unpacking	10
	Safety Precautions	10
	Installation	11
Section 3	Operation	15
	Start-Up	15
	Adjusting Set Pressure	15
Section 4	Maintenance	19
	Recommended Spare Parts	19
	Returning Units to the Factory	20
	Maintenance	21

TABLE OF CONTENTS (Continued)

Section 5	Troubleshooting	23
	Back Pressure Valves	23
	Safety Valve	24
Section 6	Parts	25
	1/2" Safety Valve Parts List	26
	1" Safety Valve Parts List	28
	1/2" Back Pressure Valve Parts List	30
	1" Back Pressure Valve Parts List	31

LIST OF ILLUSTRATIONS

Figure 1. Safety & Back Pressure Valves	6
Figure 2. Product Code	7
Figure 3. Safety Valve Installation	11
Figure 4. Back Pressure Valve Installation	13
Figure 5. Safety Valve Parts Drawing	25
Figure 6. Back Pressure Valve Parts Drawing	29

Section 1

Introduction

DESCRIPTION

Milton Roy diaphragm safety valves are designed primarily to protect controlled volume pumps and associated equipment from overpressure. Milton Roy back pressure valves are engineered to ensure the necessary differential back pressure on controlled volume pumps in specific situations.

Outwardly, Milton Roy chemical safety valves and back pressure valves appear identical except for arrows indicating inlet and outlet connections; however, the two valves differ internally (refer to Figures 5 and 6). The safety valve has a diaphragm, ball and ball guide.

The back pressure valve on the other hand, does not use a ball because its diaphragm seats directly on the valve seat.

The inlet connection for the safety valve is at the bottom with the outlet connection on the side. For back pressure valves with a set pressure of 70 psi or below, the inlet connection is on the side, and the outlet connection is at the bottom. For back pressure valves with 71 psi and higher set pres-



Figure 1. Safety & Back Pressure Valves are outwardly identical

sure, the inlet connection is on the bottom, and the outlet connection is on the side.

NOTE:

A safety valve cannot be changed to back pressure service by simply reversing the connections.

PRODUCT CODING

Milton Roy safety and back pressure valves are available in several different configurations. To deter-

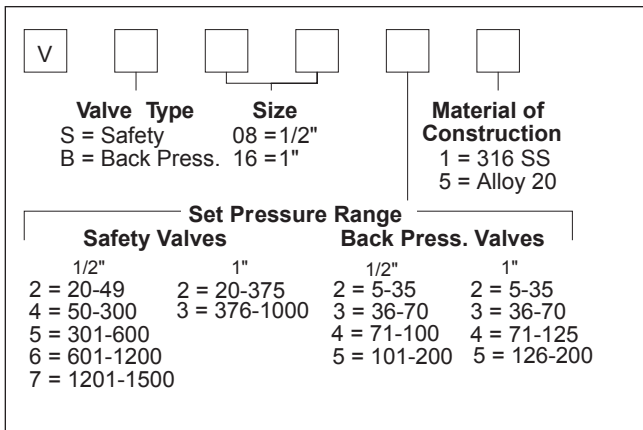


Figure 2. Product Code.

mine which features a specific valve has, compare the product code shown on the valve nameplate with Figure 2. The nameplate is located on the upper body of the valve.

PRINCIPLE OF OPERATION

Safety Valves (refer to Figure 5)

The Milton Roy Safety Valve operates on a differential area principle. The inlet pressure acts against the ball, and the resulting force is opposed by the spring. Product Coding

Milton Roy safety and back pressure valves are available in several different configurations. To determine which features a specific valve Whenever the inlet pressure exceeds the set pressure, the ball rises from the seat. Consequently, a flow of liquid passes through the valve. After the pressure in the system drops to the point where the force on the diaphragm is insufficient to hold it open, the valve closes.

Back Pressure Valves (refer to Figure 6)

The Milton Roy Back Pressure Valve maintains a set pressure at the metering pump discharge to insure precise metering and to prevent siphoning* in systems where process pressure is lower than suction pressure. During the pump discharge stroke, pressure acts on the valve diaphragm, lifting it off the back pressure seat and

allowing the metered volume of liquid to flow through it. As the pump discharge flow decreases to zero (suction stroke), the diaphragm reseats and traps the liquid under pressure between the pump outlet and the valve. This maintains a constant positive pressure on the pump discharge check valve.

Note:

**Siphoning is prevented only when the pump is producing flow. With the pump turned off, liquid may leak through the valve. If positive siphon shut off is required when the pump flow is at zero, a positive shut off valve should be employed.*

SECTION 2 INSTALLATION

UNPACKING

Units are shipped FOB factory and the title passes to the customer when the carrier signs for receipt of the unit. In the event that damages occur during shipment, it is the responsibility of the customer to notify the carrier immediately and to file a damage claim.

Carefully examine the shipping crate upon receipt from the carrier to be sure there is no obvious damage to the contents. Open the crate carefully so accessory items fastened to the inside of the crate will not be damaged or lost. Examine all material inside the crate and check against the packing list to be sure that all items are accounted for and intact.

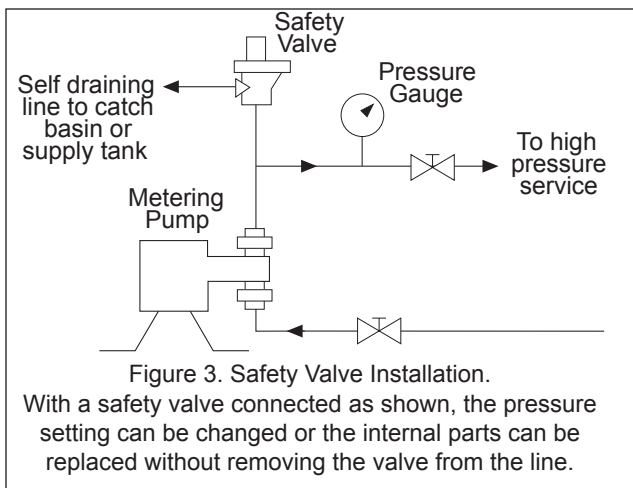
SAFETY PRECAUTIONS

When installing, operating, and maintaining safety and/or back pressure valves, keep safety considerations foremost. Use proper tools, protective clothing, and eye protection when working on the equipment and install the equipment with a view toward ensuring safe operation. Follow the instructions in this manual and take additional safety measures appropriate to the liquid being pumped. Be extremely careful in the presence of hazardous substances (e.g., corrosives, toxics, solvents, acids, caustics, flammables, etc.).

INSTALLATION

Safety Valves (Refer to Figure 5)

Generally, a safety valve should be installed as near as possible to the discharge port of the pump which the valve is to protect. The valve should always be installed upstream of any shut off valve in the discharge line in order to protect the pump if a shut off valve should be inadvertently closed while the pump is in operation. Since the Milton Roy safety valve is a diaphragm type, the valve must be installed so that *no back pressure can be applied to the outlet**. This means that the valve must be installed in



such a way that it will be self-draining after operation.

NOTE:

The presence of any small pressure on the outlet can cause valve chattering and variations of actuating pressure. Even a few feet of standing liquid pressure on the outlet can cause unwanted valve operation.

Satisfactory ways of piping the outlet include: (1) directly to a drain, with the piping properly sloped downward from valve to drain, and (2) back to the chemical storage tank, with the valve outlet at the top of the storage tank and piping extending into it.

The Milton Roy diaphragm safety valve should not be used: (1) on liquefied gas applications where the outlet cannot be opened to the atmosphere, (2) on any application where the outlet may be subjected to fluid pressure, (3) across a pump, that is, the valve should never be connected from the discharge side of a pump to the suction side of the pump.

CAUTION:

Be sure to install safety valves so that the inlet port at the bottom is connected to the system to be protected from overpressure. Outlet pressure over 100 psi exceeds the valve burst pressure rating.

Back Pressure Valve (Refer to Figure 6)

Generally, a back pressure valve should be installed on the discharge line of the pump if the natural pressure in the pipe line is lower than the minimum allowable discharge pressure for the pump. This is usually about 50 psi. The valve should be installed near the pump. However, on some systems, it may be necessary to locate the back pressure valve near the point where the liquid enters the process. This situation often occurs when the discharge line is small in diameter and very long.

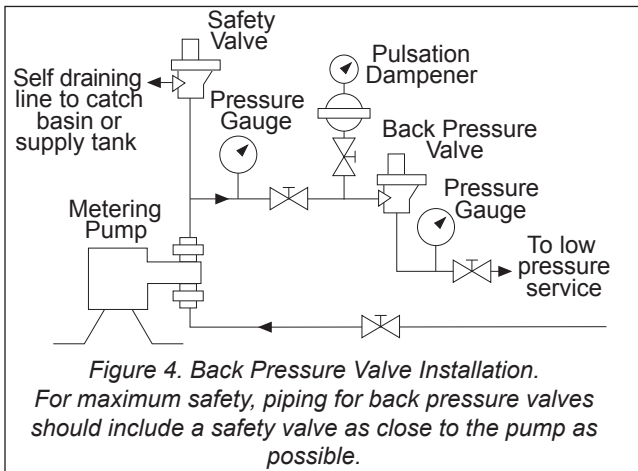


Figure 4. Back Pressure Valve Installation.

For maximum safety, piping for back pressure valves should include a safety valve as close to the pump as possible.

The performance of a back pressure valve can be aided by the use of a pulsation dampener or surge chamber between the pump discharge and the back pressure valve (refer to Figure 4). The pulsation dampener will absorb the peak flow from the pump, allowing the valve to operate at an average opening. In this way, the valve will not have to open on the pump discharge stroke and close at the end of the stroke. Thus, the diaphragm will stay open at an average position, not wide open nor tightly closed. A pulsation dampener will not only greatly reduce the wear on the moving parts of the valve, but will also cause the flow of the process liquid to be more nearly continuous instead of pulsating.

It is suggested that some form of standard commercial hydraulic accumulator or pulsation dampener be considered in these applications. Contact Milton Roy Company for information on AccuRoy™ Pulsation Dampeners.

NOTE:

The Milton Roy back pressure valve should not be used in abrasive slurry applications because the slurry will quickly erode the seat and disable the valve.

SECTION 3 OPERATION

START-UP

Before starting a system with a Milton Roy safety or back pressure valve installed, make sure that the valve is set to the proper pressure for the application. The factory set pressure is stamped on the valve name-plate. If a pressure other than the factory set pressure is desired, refer to “Adjusting Set Pressure” below.

Make sure that the valve is properly piped, with the valve in the proper position. Inlet and outlets are indicated in Figures 5 & 6.

Adjusting Set Pressure (refer to Figures 5 & 6)

The set pressure of Milton Roy safety and back pressure valves can be adjusted within the range specified by the model code. It should never be adjusted outside of this range as improper operation and/or damage to the valve and/or other system components may occur.

Back Pressure Valve Pressure Setting

The valve pressure should be set with the valve installed and with the pump operating. With a pressure gauge installed between the pump and the valve, adjust the valve adjusting screw (N) until the desired pressure is read on the gauge.

Safety Valve Pressure Setting

CAUTION:

This procedure should be performed only by trained, competent personnel. It involves actions which, if not performed correctly, could result in serious personal injury from piping and equipment bursting (from being subjected to pressure greater than 5000 psi) and sudden release of process chemical.

Unless local requirements conflict, it is recommended that the safety valve set pressure be 20% or more greater than the highest expected operating pressure, but under no circumstance should it be greater than the maximum pressure rating of the lowest pressure rated item in the hydraulic circuit (valves, pressure gauges, pipe, pipe fittings, pump, etc.).

Setting Methods

There are two methods commonly used, “bench” and “in place.”

1. Bench setting procedures are established by the setting facility.
2. In place setting is setting the relieving pressure while the valve and pump are installed and operating in the working application. To do this:

- a. Install a shut off valve in the pump discharge line downstream of the safety valve.
- b. Install a pressure gauge between the safety valve and the pump. The gauge should have a maximum pressure at least 30% higher than the safety valve setting.
- c. With the shut off valve open, operate the pump at the maximum expected flow rate setting.
- d. Use a hex key tool to adjust the safety valve setting to its lowest setting, which is when the adjusting screw (N) is flush with the top of the body.
- e. While observing the pressure gauge, slowly increase pressure in the pipeline by slowly closing the shut off valve. Don't close it all the way.
- f. At some point, the safety valve should begin relieving. Continue closing the shut off valve to completely closed while observing the pressure gauge. (The pressure gauge should not register a pressure higher than your intended set pressure. If it does, immediately open shut off valve and make sure that step 2d was properly followed and that the valve is large enough for the system it is relieving. Do not allow pressure to rise above intended set pressure.)
- g. Adjust the set pressure of the valve with the hex key until the desired pressure is read on

- the gauge.
- h. Open the shut-off valve and turn off the pump.
 - i. Check the relief valve setting by operating the pump with the shut-off valve open. Slowly close the shut-off valve. The relief valve should open at the previously set pressure. Readjust the relief valve as necessary.

NOTE

Pressure setting changes should be made only after careful consideration of the effect of the change on the entire hydraulic system, including the controlled volume pump. Never attempt to adjust the valve outside of the pressure limit shown in the model code, as improper operation and/or damage to the valve and/or other system components may occur.

SECTION 4 MAINTENANCE

RECOMMENDED SPARE PARTS

It is recommended that a standard spare parts group be kept on hand at all times to prevent serious delay in repairs.

Safety Valves

- 1 Diaphragm (50)
- 1 Ball (80)
- 1 Ball Seat (30)
- 1 Ball Guide (40)
- 1 Gasket (20)
- 1 Gasket (90)

Back Pressure Valves

- 1 Diaphragm (50)
- 1 Control Seat (30)
- 1 Gasket (20)
- 1 Gasket (90)

Part orders must include the following information:

1. Quantity required.
2. Part number.
3. Part description.
4. Valve serial number (on valve nameplate).
5. Valve model number (on valve nameplate).

Always include the serial and model numbers in all correspondence regarding the unit.

All inquiries or parts orders should be addressed to your local Milton Roy Representative or sent to:

Milton Roy Company
201 Ivyland Road
Ivyland, PA 18974-0577
Phone (215) 441-0800
FAX (215) 441-8620
www.miltonroy.com
info@miltonroy.com

Terms and conditions are listed below:

- a. Terms are net 30 days, f.o.b. factory. Transportation charges are collect, unless otherwise noted.
- b. All shipments are made at the purchaser's risk, FOB Ivyland. Any claims for damage or nondelivery should be filed with the carrier at the destination. We will be glad to assist in providing shipping information.
- c. Where obsolete parts are ordered, we reserve the right to furnish the latest interchangeable part.
- d. No credit for returned material will be allowed unless authorization has first been obtained from the factory. Such shipment must be prepaid and include a Milton Roy Return Material Tag.

RETURNING UNITS TO THE FACTORY

Milton Roy valves will not be accepted for repair without a Return Material Authorization, available from the Factory Repair Department. The valve should be

flushed from of process liquid before the valve is shipped. Label the valve clearly to indicate the process liquid the valve was in contact with.

NOTE:

Federal law prohibits handling of equipment that is not accompanied by an OSHA Material Safety Data Sheet (MSDS). A completed MSDS must be packed in the shipping crate. These safety precautions will aid the troubleshooting and repair procedure and prevent serious injury to repair personnel from hazardous residue in the valve.

MAINTENANCE

General

The unique design of the Milton Roy back pressure or safety valve permits routine inspection and repairs without removing the valve from the pump line. The upper body may be removed by loosening the union nut (K). The internal parts are then readily accessible for inspection and replacement. After the parts have been installed, the unit is reassembled by placing the upper body in position and retightening the union nut. It should not be necessary to readjust the set pressure if the adjusting screw has not been removed. If the set pressure needs to be adjusted, see “Adjusting Set Pressure” in Section 3.

Back Pressure Valves

To keep the back pressure valve in good operating condition, the following steps should be followed once a year:

1. Replace the parts contained in the recommended spares list. Refer to General Maintenance & Figure 6.
2. Apply a light coating of grease to the inside threads and bore area.

Safety Valves

To keep the safety valve in good operating condition, exercise it every six months by increasing system pressure until the safety valve relieves.

There are no parts which should be routinely replaced. Replace parts only if malfunction occurs during test. If any malfunction occurs, replace *all* the parts indicated in the recommended spares list. Refer to General Maintenance & Figure 5.

SECTION 5 TROUBLESHOOTING

Back Pressure Valves

Insufficient back

- pressure • Back pressure may not be properly adjusted. Adjust the set pressure by turning the adjusting screw (N).
- • Debris may be lodged between the seat and diaphragm. Disassemble, clean well, and reassemble.
- • Spring seat (F) may be stuck open. Disassemble and lubricate with grease.

Excessive

- back pressure. • Back pressure may not be properly adjusted. Adjust the set pressure by turning the adjusting screw (N).
- • Spring seat (F) may be stuck closed. Disassemble and lubricate with grease.

Liquid leaking from

- upper body weep hole. • Diaphragm is ruptured or torn. Disassemble and replace all affected items.

Safety Valve

Valve relieves at unexpectedly low pressure.

- Liquid standing in outlet piping may be exerting back pressure on the valve, lifting the diaphragm and ball prematurely. Mount the valve directly onto the supply tank or in a manner which will ensure the outlet pipe completely drains empty after relieving.

Valve chatters

when relieving.

- See remedy above.

Valve does not close

after relieving.

- See remedy above.

Liquid leaking from

upper body weep hole.

- Diaphragm is ruptured or torn. Disassemble and replace all affected items.

SECTION 6 PARTS

SAFETY VALVE PARTS DRAWING

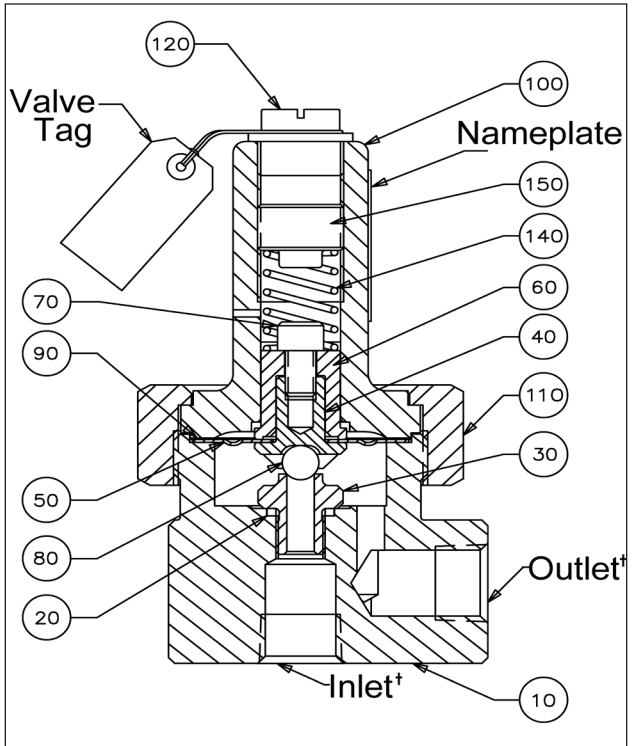


Figure 5. Safety Valve Parts Drawing.
(A-102-1110-000-C)

1/2" Safety Valve Parts List

Dwg. Ref.	Description	Qty. Req.	Part Number
10	Lower Body (1/2) (316 SS)	1	208-0019-016
	Lower Body (1/2) (CA-20)	1	208-0019-028
	Lower Body (1/2) (PVC)	1	208-0019-271
20	Gasket (1/2)	1	7025-0080-175
30	Control Seat (3/8) (316 SS)	1	7024-0176-116
	Control Seat (3/8) CA-20)	1	7024-0176-128
	Control Seat (3/8) (PVC)	1	7024-0176-171
40	Ball Guide (3/8) (316 SS)†	1	7292-0A42-116
	Ball Guide (3/8) (316 SS)‡	1	7292-0042-116
	Ball Guide (3/8) (CA-20)†	1	7292-0A42-128
	Ball Guide (3/8) (CA-20)‡	1	7292-0042-128
	Ball Guide (3/8) (PVC)†	1	7292-0A42-171
	Ball Guide (3/8) (PVC)‡	1	7292-0042-171
50	Diaphragm (1/2)†	1	7298-0049-175
	Diaphragm (1/2)‡	1	7298-0035-175
60	Spring Seat (302 SS)	1	7024-0135-114

Notes:

* Plastic valves are limited to 175 psi.

† Parts marked with this symbol are for valves with a set pressure of 20–49 psi only.

‡ Parts marked with this symbol are for valves with any set pressure except 20–49 psi.

1/2" Safety Valve Parts List (Continued)

Dwg. Ref.	Description	Qty. Req.	Part Number
70	Socket Head Screw (5/16-18x1/2)	1	405-0157-014
80	Ball (3/8) (316 SS)	1	407-0014-112
	Ball (3/8) (CA-20)	1	407-0014-113
	Ball (3/8) (PVC)	1	407-0170-113
90	Gasket (1/2) Neoprene	1	225-0069-081
100	Upper Body (1/2) (304 SS) †	1	7208-A025-106
	Upper Body (1/2) (304 SS) ‡	1	7208-0025-106
110	Small Body Union Nut	1	245-0024-030
120	Plug Screw (3/4 & 7/8 UNC & F)	1	405-2008-011
140	Spring (20-49 psi)	1	280-0046-241
	Spring (50-300 psi*)	1	280-0046-741
	Spring (301-600 psi*)	1	280-0046-441
	Spring (601-1200 psi*)	1	280-0046-541
	Spring (1201-1500 psi*)	1	280-0046-641
150	Adjusting Screw	1	256-0037-051

Notes:

* Plastic valves are limited to 175 psi.

† Parts marked with this symbol are for valves with a set pressure of 20–49 psi only.

‡ Parts marked with this symbol are for valves with any set pressure except 20–49 psi. .

1" SAFETY VALVE PARTS LIST

Dwg. Ref.	Description	Qty. Req.	Part Number
10	Lower Body (1) (316 SS)	1	7208-B021-216
	Lower Body (1) (CA-20)	1	7208-B021-229
	Lower Body (1) (PVC)	1	208-0017-071
20	O-Ring (Parker 2-212) (Teflon)	1	408-0095-033
30	Ball Seat (3/4) (316 SS)	1	7024-A106-116
	Ball Seat (3/4) (CA-20)	1	7024-A106-128
	Ball Seat (3/4) (PVC)	1	7024-A106-171
40	Ball Guide (3/4) (316 SS)	1	7292-0062-116
	Ball Guide (3/4) (CA-20)	1	7292-0062-128
	Ball Guide (3/4) (PVC)	1	7292-0062-171
50	Diaphragm (3/4)	1	7298-0048-175
60	Spring Seat (3/4) (302/303 SS)	1	7024-0187-114
70	Socket Head Screw (5/16-18x5/8)	1	405-0157-024
80	Ball (3/4) (316 SS)	1	407-0014-192
	Ball (3/4) (CA-20)	1	407-0014-193
	Ball (3/4) (PVC)	1	407-0170-193
100	Upper Body (3/4)	1	7208-0018-106
110	Large Body Union Nut	1	245-0024-050
120	Plug Screw (1-14 UNC & F)	1	405-2008-021
140	Spring (20-375 psi*)	1	280-0053-141
	Spring (376-1000 psi*)	1	280-0053-241
150	Adjusting Screw	1	7123-0005-251

NOTE:

* Plastic valves are limited to 175 psi.

BACK PRESSURE VALVE PARTS DRAWING

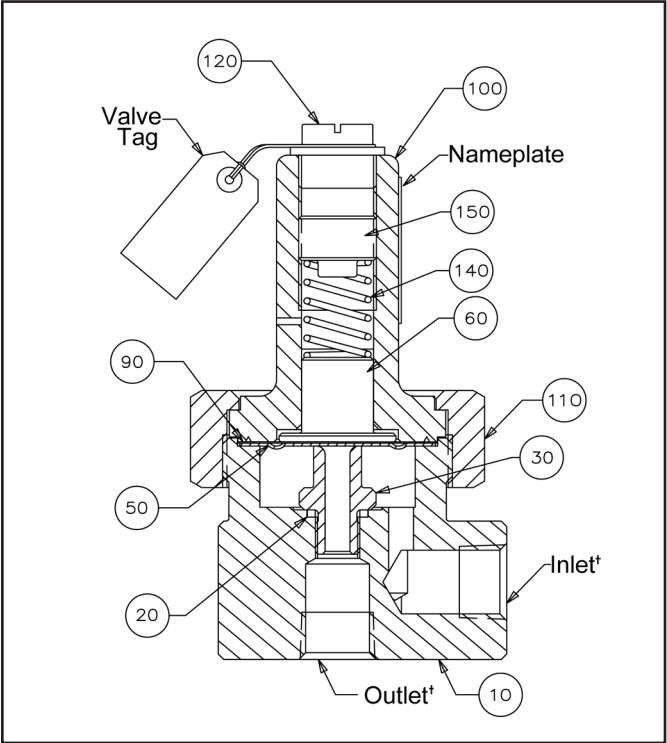


Figure 6. Back Pressure Valve Parts Drawing.
(A-102-1111-000-C)

1/2" BACK PRESSURE VALVE PARTS LIST

Dwg. Ref.	Description	Qty. Req.	Part Number
10	Lower Body (1/2) (316 SS)	1	208-0019-016
	Lower Body (1/2) (CA-20)	1	208-0019-028
	Lower Body (1/2) (PVC)	1	208-0019-271
20	Gasket (1/2)	1	7025-0080-175
30	Control Seat (1/2) (316 SS)	1	7024-0176-116
	Control Seat (1/2) CA-20)	1	7024-0176-128
	Control Seat (1/2) (PVC)	1	7024-0176-171
50	Diaphragm (1/2)	1	7298-0045-175
60	Spring Seat (1/2) (302/303 SS)	1	7024-0174-114
90	Gasket (1/2) Neoprene	1	225-0069-081
100	Upper Body (1/2) (304 SS)	1	7208-0028-106
110	Small Body Union Nut	1	245-0024-030
120	Lug Screw (3/4 & 7/8 UNC & F)	1	405-2008-011
140	Spring (5-35 psi)	1	280-0046-441
	Spring (36-70 psi)	1	280-0046-541
	Spring (71-100 psi)	1	280-0046-341
	Spring (101-200 psi)	1	280-0046-441
150	Adjustment Screw	1	256-0037-051

NOTES:

* Plastic valves are limited to 175 psi.

† Configuration shown is for valves with a set pressure of 70 psi or below. If set pressure is 71 psi or higher, the connections are reversed.

1" BACK PRESSURE VALVE PARTS LIST

Dwg. Ref.	Description	Qty. Req.	Part Number
10	Lower Body (1) (316 SS)	1	7208-B021-216
	Lower Body (1) (CA-20)	1	7208-B021-229
	Lower Body (1) (PVC)	1	208-0017-071
20	O-Ring (Parker 2-212)(Teflon)	1	408-0095-033
30	Control Seat (1) (316 SS)	1	7024-0179-116
	Control Seat (1) CA-20)	1	7024-0179-128
	Control Seat (1) (PVC)	1	7024-0179-171
50	Diaphragm (1)	1	7298-0046-175
60	Spring Seat (1) (302/303 SS)	1	7024-0177-114
100	Upper Body (1) (304 SS)	1	7208-0029-106
110	Large Body Union Nut	1	245-0024-050
120	Plug Screw (1-14 UNC & F)	1	405-2008-021
140	Spring (5-35 psi)	1	280-0053-141
	Spring (36-70 psi)	1	280-0053-241
	Spring (71-125 psi)	1	280-0053-141
	Spring (126-200 psi*)	1	280-0053-241
150	Adjusting Screw	1	7123-0005-251

NOTES:

* Plastic valves are limited to 175 psi.

† Configuration shown is for valves with a set pressure of 70 psi or below. If set pressure is 71 psi or higher, the connections are reversed.

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