BV Series Piston Control Valves

Model	Function	Size					
		2″	3″	4″	6″	8″	12″
BV02	Check Valve	·	·	·	·	·	·
BV03	No Controls	·	·	·	·	·	·
BV10	On-Off Solenoid	·	·	·	·	·	·
BV11	On-Off Solenoid	·	·	·	·	·	·
BV28	Power Cylinder Operated		·	·	·		
BV50	Pressure Reducing	·	·	·	·	·	·
BV54	Flow Limiting	·	·	·	·	·	·
BV60	Back Pressure Control	·	·	·	·	·	·
BV70	Differential Control	·	·	·	·	·	·
BV86	Mechanical 2-Stage	·	·	·	·	·	·
BV88	Digital Control	·	·	·	·		
BV89	Rate of Flow 2-Stage Set Stop	·	·	·	·	·	·

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1 Read Me First

Notice

Brodie International, a Brodie Meter Co., LLC Company (“Brodie”) shall not be liable for technical or editorial errors in this manual or omissions from this manual.

Brodie makes no warranties, express or implied, including the implied warranties of merchantability and fitness for a particular purpose with respect to this manual and, in no event, shall Brodie be liable for any special or consequential damages including, but not limited to, loss of production, loss of profits, etc.

Product names used herein are for manufacturer or supplier identification only and may be trademarks/registered trademarks of these companies. The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, expressed or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such products at any time.

Brodie does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Brodie product remains solely with the purchaser and end-user.

2 Essential Instructions

General

Brodie International designs, manufactures and tests its products to meet many international standards. As the instruments are sophisticated technical products they must be installed, used and maintained properly to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and incorporated into onsite safety programs where possible.

Read all instructions prior to installing, operating, and servicing the product. If this instruction manual is not the correct manual, telephone +1 912 489 0200 and the requested manual will be provided.

Save this instruction manual for future reference. If you do not understand any of the instructions, contact your Brodie representative for clarification.

Follow all warnings, cautions, and instructions marked on and supplied with the product. Inform and educate your personnel in the proper installation, operation, and maintenance of the product. Install your equipment as specified in the installation instructions of the appropriate instruction manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.

To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product. When replacement parts are required, ensure that qualified personnel use replacement parts specified by the manufacturer.

Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look-alike substitutions may result in fire, electrical hazards, or improper operation.

Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified personnel, to prevent electrical shock and personal injury.

When installing this equipment, bolting must conform to the requirements of ASME B16.5 paragraph 5.3 and to the material requirements of ASME B16.5 Table 1B. Gaskets must conform to the requirements of ASME B16.20.

It is the customer's responsibility to ensure that piping or other attachments connected to the valve do not place adverse stresses on the valve. The design of the valve has not been assessed for the effects of traffic, wind, or earthquake loading.

It is the customer's responsibility to provide fire prevention measures and equipment per local regulations.

The valve has been designed without allowance for corrosion. The customer should implement a periodic inspection and maintenance program to ensure that no part of the valve's pressure retaining components has been subjected to corrosion.

Use of this equipment for any purpose other than its intended purpose may result in property damage and/or serious personal injury or death.

Essential Instructions for Measuring Equipment, Including the European Union (Directive 2004/22/EC MID)

Although measurement transducers are not specifically included in the MID regulations as they do not form a complete measuring instrument system, in accordance with Article 1 and 4, Annex I and Annex MI-005, Brodie Meter Co., LLC implements the same stringent regulations for all products and tests to the same standards which are used for complete measuring instrument systems.

The complete system must contain all the necessary components to meet the requirements of the local regulations. These components may include pumps, air eliminators, strainers, valves, flow computers, etc. The unit must be sealed in accordance with the local regulations; it is the end user's responsibility to ensure this happens.

Flow measuring devices are provided with two labels which specify flow ranges. The name plate label, which includes the factory serial number, details the operating flow range. This is the flow range the device will operate within without causing damage. The custody transfer label details the working flow range associated with a particular weights and measures approval.

It should be noted that these may not be the same; therefore, in trade applications, the flow ranges specified on the custody transfer label should be followed.

Essential Instructions for Electrical Equipment, Including the European Union (Directive 2004/108/EC and 2004/22/EC)

This unit contains Electrostatic sensitive circuit boards. Electrostatic safety precautions should be taken to prevent damage.

When connecting wiring it is good practice to use shielded cable. The shield should be connected to earth at the read out or control systems end of the cable; the other end of the shield should not be connected.

This wiring practice is mandatory in order to comply with the requirements for electromagnetic compatibility as per the EMC directive 2004/108/EC and MID 2004/22/EC of the council of the European Union.

It is the end user's responsibility to ensure that all protective covers are in place to prevent electrical shock and/or personnel injury.

Essential Instructions for Pressure Containing Equipment, Including the European Union (Directive 97/23/EC)

When installing the equipment the bolting must conform to the requirements of ASME B16.5, paragraph 5.3, and to the material requirements of ASME B16.5, Table 1B. Gaskets must conform to the requirements of ASME B16.20.

Although it is not expected for the device to be used in a service where it would come in to contact with unstable fluids, it is the end user's responsibility to assess any risks and take any precautions necessary.

It is the end user's responsibility to ensure that piping and other attachments connected to the Brodie instrument do not place adverse stresses upon it, the design of the instrument has not been assessed for the effects of traffic, wind or earthquake loadings.

It is the end user's responsibility to ensure that the instrument is mounted when required on suitable supporting foundations.

It is the end user's responsibility to install the device in a well-designed system to avoid potential hazards such as water hammer, vacuum collapse or uncontrolled chemical reactions.

It is the end user's responsibility to provide fire protection measures and equipment in accordance with the local regulations.

It is the end user's responsibility to install suitable straining and air/gas elimination systems.

The instrument has been designed without allowance for corrosion or other chemical attack. The end user should implement a periodic inspection and maintenance program to ensure that none of the instruments pressure containing components have been subject to any corrosion. It is possible to examine the instrument for evidence of corrosion through the inlet and the outlet.

When the ambient temperature is below the minimum operating temperature specified on the device it is the end user's responsibility to ensure that the device is warmed to an appropriated temperature before being pressurized.

Do not exceed the operating pressure and temperature limits of the instrument as stamped on the nameplates.

It is the customer's responsibility to install this equipment in a system that provides adequate over-pressure protection and that limit pressure surges to 10% of the maximum allowable working pressure of the instrument.

It is the end user's responsibility to provide fire protection measures and equipment in accordance with the local regulations.

Essential Instructions for Equipment to be Used in Hazardous Locations, Including the European Union (Directive 94/9/EC)

Any Hazardous area approval applies to equipment without cable glands. When mounting the flameproof enclosure in a hazardous area only cable glands/conduit seals certified to meet or exceed the rating of the equipment should be used, refer to the type approval documentation for further details. Cable glands and cable must be suitable for the operating temperature of the device under its rated conditions, this is especially important if the device has an operating temperature above 1580F (700C). It is the end user's responsibility to ensure this happens.

The meter has been provided with an approved sealing device in one of the cable entries, the other entry has been closed with a plastic cap plug. It is the end user's responsibility to remove the cap plug and replace it with a suitable cable gland or conduit seal before the equipment is put into service.

It is the end user's responsibility to ensure, when the instrument is located in a hazardous area, that all cable glands and conduit seals are installed in accordance with all local codes and regulations.

It is the end user's responsibility to ensure that before opening an electronic enclosure in a flammable atmosphere that all the electrical circuits have been interrupted.

If replacement of the screws which secure the sensor housing, the UMB cover of the electronic register and its cover, are required, they must be replaced with either factory direct parts or M6-1x16 (6g) mm hex head socket screws of equal length. The screws must be made from stainless steel grade A1-70 or A2-70 and be torqued to a value of 55 inch lbs. upon installation. It is the end user's responsibility to ensure this happens.

It is the end user's responsibility to assess the maximum surface temperature of the device and the equipment the device is attached to and located next to as this may exceed the temperature ratings of the device itself. If this happens, additional safety precautions will need to be implemented by the end user.

Flame proof housings contain Aluminum; although the composition of these enclosures is carefully maintained to prevent any risk of an ignition source it is the end users responsibility to ensure that the housing is not struck by rusty tools or objects.

If the equipment is to be installed in an area where dust deposits and build up are to be expected, a maintenance plan should be arranged to include regular removal of the dust build up. This will prevent the dust from forming a possible source of ignition.

The power supply requirements for this product are specified within the operating and maintenance manual, it is the end user's responsibility to operate the product within these specified limits.

The instrument may contain surfaces that constitute flames paths, these surfaces should not contain any mars or scratches. If any are present the factory or the local representative should be contacted immediately to obtain a new housing as the safety of the enclosure may be impaired. It is the end user's responsibility to inspect these surfaces every time the enclosure is opened.

When flanged flame paths are reassembled the gap between them should be less than 0.0015" (0.038 mm) such that a 1/2" (12.5mm) wide 0.0015" (0.038 mm) feeler gauge will not enter the gap more than 1/8" (3mm). It is the end user's responsibility to ensure this happens each time the enclosure is reassembled.

3 Warranty Claim Procedures

3.1 - Limited Warranty

Subject to the limitations contained in Section 2 herein and except as otherwise expressly provided herein, Brodie International, a Brodie Meter Co., LLC Company ("Brodie") warrants that the firmware will execute the programming instructions provided by Brodie, and that the Goods manufactured, or Services provided, by "Brodie" will be free from defects in materials or workmanship under normal use and care until the expiration of the applicable warranty period.

Goods are warranted for twelve (12) months from the date of initial installation or eighteen (18) months from the date of shipment by "Brodie", whichever period expires first. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services.

Products purchased by "Brodie" from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer.

Buyer agrees that "Brodie" has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products.

If The Buyer discovers any warranty defects The Buyer must notify "Brodie" thereof in writing during the applicable warranty period. "Brodie" shall, at its option, promptly correct any errors that are found by "Brodie" in the firmware or Services, or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by "Brodie" to be defective, or refund the purchase price of the defective portion of the Goods/Services.

All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources, unsuitable environmental conditions, accident, misuse, improper installation, modification, repair, storage or handling, or any other cause not the fault of "Brodie" are not covered by this limited warranty, and shall be at Buyer's expense.

"Brodie" shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by an authorized "Brodie" representative.

All costs for dismantling, reinstallation, freight and the time and expenses of "Brodie's" personnel for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by "Brodie".

Goods repaired and parts replaced during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Brodie and can be amended only in a writing signed by an authorized representative of "Brodie".

Except as otherwise expressly provided in the Agreement, THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE, OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

It is understood that corrosion, or erosion, of materials is not covered by our guarantee.

3.2 - Limitation of Remedy and Liability

Brodie International, a Brodie Meter Co., LLC Company (“Brodie”) shall not be liable for damages caused by delay in performance.

The sole and exclusive remedy for breach of warranty hereunder shall be limited to repair, correction, replacement or refund of purchase price under the limited warranty clause in Section 1 herein.

In no event, regardless of the form of the claim or cause of action (whether based in contract, infringement, negligence, strict liability, other tort or otherwise), shall “Brodie’s” liability to buyer and/or its customers exceed the price to buyer of the specific goods manufactured or services provided by Brodie giving rise to the claim or cause of action.

Buyer agrees that in no event shall Brodie’s liability to buyer and/or its customers extend to include incidental, consequential or punitive damages.

The term “consequential damages” shall include, but not be limited to, loss of anticipated profits, loss of use, loss of revenue and cost of capital.

Brodie International
P.O. Box 450 (30459-0450)
19267 Highway 301 North
Statesboro, GA 30461, USA

www.brodieintl.com
Phone: +1 (912) 489-0200

4 Receipt of Shipment

When you receive your equipment inspect the outside of the packing case for damage which may have incurred during shipping. Damage incurred during shipment is the responsibility of the carrier and is not part of the factory warranty. If the packing case is damaged, notify the local carrier immediately.

If the package is in good condition remove the envelope containing the packing list and carefully remove the equipment and all components included in the shipment from the packing case. Inspect for damaged or missing parts, referring to the packing list, and prior to discarding the packing material.

If Items are missing from your shipment, contact your sales representative. Your sales order number will be required.

5 Return of Equipment

If the equipment must be returned to the factory for repair or replacement, a Returned Materials Authorization (RMA) must be included with the components.

RMA forms may be obtained from your sales representative or from the Product Service Department. In addition to the RMA, a Material Safety Data Sheet and a Decontamination Statement must be included with Items being returned to the factory. A Decontamination Statement is included in the back of this manual.

If the equipment is removed from service it must be thoroughly drained and neutralized before it is packed for shipment. Care must be taken to ensure that product removed from the equipment is disposed of in accordance with all applicable local, state and federal regulations.

The flanges should be sealed to keep residual fluid from leaking out of the meter during transport. The type of flange seal required will vary with the form of transportation used. Contact the carrier for specific instructions.

The equipment should be securely mounted on a wooden skid for shipment. The original container or a solid wooden box should be used to protect the exterior of the components.

When packing the components for return to the factory, place the RMA and a copy of the packing list that was delivered with the equipment inside an envelope. Place the envelope inside the shipping container with the Item being returned and reference the RMA number on the outside of the shipping container.

Equipment returned to the factory without the proper documentation will be returned to sender at their expense.

Ship the container to:
Brodie Meter Co., LLC
Product Service Department
19267 Highway 301 North
Statesboro, GA 30461, USA

Phone: +1 (912) 489-0200
Fax: +1 (912) 489-0294
service@brodieintl.com

6 Storage

Brodie International Control Valves are precision devices and should be handled and stored with care. They should not be subjected to rough or improper handling or stored in an environment where moisture, extreme temperatures, or foreign material can damage the meter.

The inlet and outlet flange covers should remain on the instrument until the unit is ready for installation.

If extended storage is required it is recommended that the instrument be placed in an environmentally controlled warehouse. If this is not possible the instrument should be stored in a waterproof lined wooden box. Desiccant packs should be taped to the inside of the instrument end connections before they are sealed to reduce the effect of humidity on the equipment and accessories. Caution must be used to ensure desiccant packs are removed prior to installation.

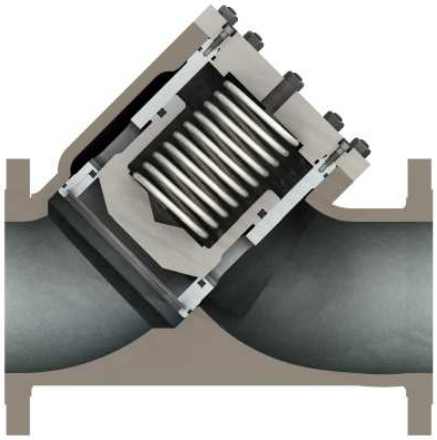
Depending on the storage time it may also be preferable to use a compatible corrosion inhibitor.

If the valve is removed from service for an extended period of time it should be flushed with a light oil before being placed into storage.

7 Description

General

The Brodie Control Valve features a two-piece cylinder assembly with characterized ports, and an optional position indicator. Pilots and other optional accessories enable the valve to perform a variety of control functions such as regulating rate of flow, pressure relief, surge control, etc. Different valve functions are provided in a single standard body and controlled with different pilots that are used to steer the valve piston open or closed as required by the application.



7.1 - Design Features

Brodie Valves are pressure balanced, single seated and pilot operated. The valves are hydraulically powered, using the flowing fluid product stream as the power medium. Pilot operated valves are equipped with a needle valve in the pilot supply line for adjusting the closing rate and sensitivity control.

The Aggressive Product (hereby referred to as "AP") option valve cylinder incorporates a combination of seals and O-ring materials to provide optimum performance in AP applications.

All Brodie valves feature a modular construction with no diaphragms or stuffing boxes to ensure long service life. All valve internal parts, including seal ring, can be removed without disturbing line connections. Valve cylinder assemblies are available as replacement kits.

The 45° body design assures high capacity and low pressure drop through the valve, while tapered ports allow for better low flow response.

The valve piston has equal front and rear surface areas. This means that every Model BV valve has check valve functionality. O-ring seals provide positive, bubble-tight shut-off and zero leakage - no additional system check valve is required to prevent reverse flow. The valve will only open when upstream pressure is sufficient to overcome spring force.

The linear relationship between percentage open and flow rate gives much better control and prevents instability, especially at low flow rates.

All Brodie Model BV Valves may be equipped with hydraulic, pneumatic, or solenoid pilot control.

7.2 - Types of Pilots

On/Off Pilots are electrically switched pilots which will allow the valve to open or close.

Pressure regulating pilots allow the valve to be throttled to any degree to provide various pressure control schemes. These valves are totally self-regulating and require no external actuation, pressure measurement, or regulation, or energy source. Once the pilots are set they will continue to function automatically until such time that settings are changed.

7.3 - Models BV02 and BV03, Basic Function Check Valve

The Basic Function Model BV02 and BV03 Check Valves are designed to provide smooth shock-free opening and closure to prevent reverse flow.

Model BV02 is equipped with a manual valve to allow opening speed adjustment.

Model BV03 is supplied as a basic valve with no controls and can be utilized as a check valve or replacement for original equipment.

8 Specifications

Materials of Construction

	Material
Main Valve Body	Steel, ASTM-A216-GR-WCB
Main Valve Cylinder	17-4 PH Stainless Steel
Main Valve Piston	Stainless Steel
Seat Ring	Stainless Steel
Seals	Viton Standard (Other elastomers available)

Pilot Spring Ranges

150 - 300 lb. Valves Equipped with Pilot Control	
PSI *	kPa
0 - 20	0 - 138
0 - 40	0 - 276
10 - 50 **	69 - 345
30 - 80	207 - 552
70 - 180	483 - 1241
150 - 350	1034 - 2413
350 - 650	2413 - 4482

* Spring selection based on control pressure set point.
** Model BV89 Only

Pressure and Temperature Ratings

Pressure Class	Maximum Safe Working Pressure (100°F)	Maximum Safe Working Temperature
150 lb. ANSI	285 psi (1965 kPa)	Standard: 150°F (66°C) Optional "AP": 250°F (121°C)
300 lb. ANSI	740 PSI (5100 kPa)	

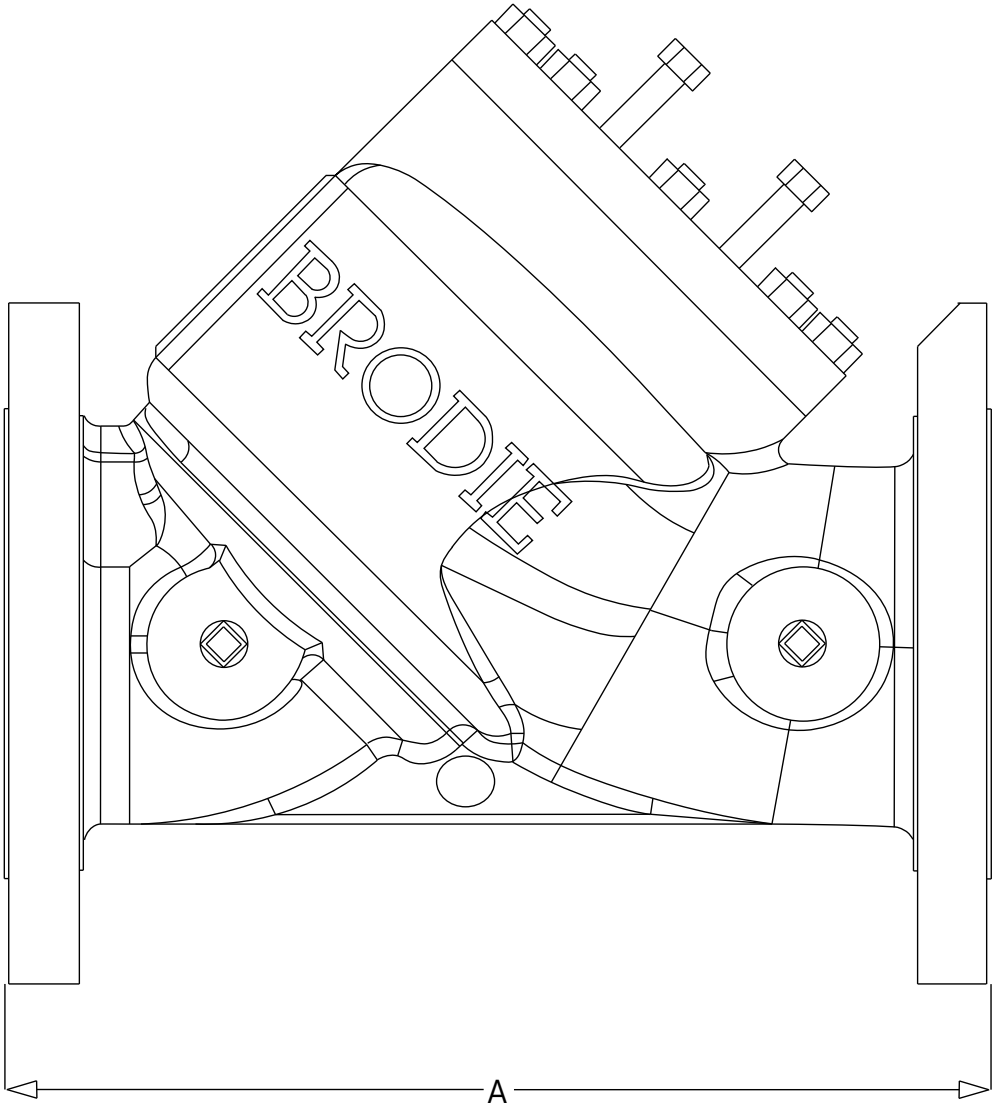
Approx. Shipping Weights and Volumes

Model	Size	150# Lbs.	300#	150# Kg	300#	Volumes Cu. Feet	Cu. Meters
BV Series Valve with Single Pilot	2"	60	110	27	50	1.02	.029
	3"	105	135	48	61	1.73	.049
	4"	140	276	64	125	2.13	.060
	6"	210	250	95	113	3.82	.181
	8"	370	N/A	168	N/A	6.64	.188
	12"	1040	N/A	472	N/A	17.25	.488

Dimensions and Approvals

Valve Size			2″	3″	4″	6″	8″	12″
Dimensions [A]	150#	inch	10 1/4	11	13	17	22 1/2	30 7/8
		mm	260	279	330	432	571	784
	300#	inch		13 1/8	14 1/2	17 7/8	23 1/2	
		mm		333	368	454	597	
Capacity		*Cv-GPM	90	190	315	700	1300	2950
Pressure Approvals	150 lb.		SEP	SEP	SEP	CRN, PED	CRN, PED	CRN, PED
	300 lb.		PED	PED	PED			
Electrical Approvals	CSA, UL, ATEX for all sizes							

* Cv based on wide open valve utilizing water at 60F (15.6C)



9 Installation and Operation

General

The following is a general guideline for the proper operation, installation and start-up of any Brodie Control Valve.

For model specific installation instructions please refer to model specific manuals available from Brodie. For more information please contact you Brodie Representative.

As with all control valves, it is important that proper installation be accomplished if the valve is to operate as designed. Preliminary setup should include the following steps.

1. Evaluate the metering system in the process line to determine that criteria pertinent to valve control has been met.
2. Reference engineering drawings for proper in-line sequence of all components.
3. Check valve position. The inlet flange has been marked and is to be in the upstream position.
4. Verify all electrical connections against wiring diagrams and unit specifications.
5. Flush the lines of any and all contaminants.
6. Bleed as much air as possible from the system.

9.1 - Principles of Operation

The images below show the effects and force of the main valve spring, which is the total control force in the BV02 and BV03 Control Valves. This is because the area on the inlet side of the piston is equal to the area on the spring side of the piston, therefore making the main valve spring the differential force that controls the position of the main valve piston.

P1 - Inlet Pressure
P2 - Outlet Pressure
P3 - Spring Force

In Figure 9-1 the valve is Closed because P1 is less than P2 in the seated position. Also, if P2 is greater than P1 then the basic design of the valve dictates that it will function as a check valve.

In Figure 9-2 we see that the pressure differential across the valve (P1 minus P3) is equal to the spring force in the 50% Open position.

In Figure 9-3 the pressure differential across the valve is equal to the spring force in the Fully Open position.

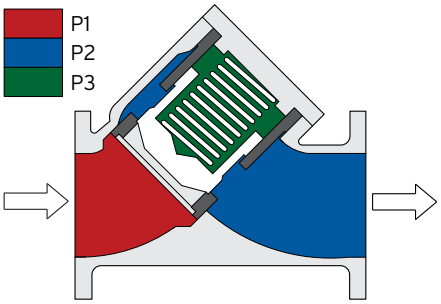


Figure 9-1 Fully Closed

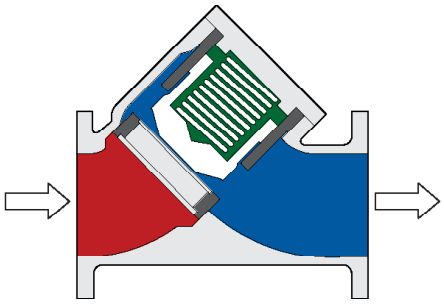


Figure 9-2 50% Open

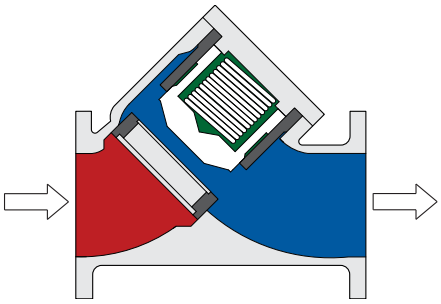


Figure 9-3 Fully Open

In the following Figures the basic valve has been equipped with a Manual Control Pilot Loop. The design of the valve allows it to function as a check valve, it is possible, in some applications, to reverse flow through the pilot control loop, but this can be eliminated by installing a check valve in the X-port.

Figure 9-4 shows the valve in the Closed Position. The Y-Port (spring force [P3]) to the Z-Port (valve outlet pressure [P2]) is closed through the use of the Manual Pilot. The X-Port (valve inlet pressure [P1]) is balanced due to the open needle valve on the strainer. The main valve spring is able to keep the piston firmly seated in the closed position. The needle valve on the strainer also controls the speed of closure by controlling the flow through the X-Port.

Figure 9-5 shows the valve in the Open/Controlled Position. The Manual Pilot is partially opened, which allows flow from the Y-Port to the Z-Port, but is being restricted. The Pilot control is a variable orifice that regulates the pressure at the Y-Port by controlling the flow through the Z-Port. Increasing or decreasing Y-Port pressure will cause the valve piston to change positions. In the controlled position pressure drop across the valve (inlet pressure minus spring force [P1-P3]) is being controlled or purposely induced to regulate pressure or flow within specified parameters.

Figure 9-6 shows the valve in the Fully Open/ Non-Controlled Position. The Manual Pilot has been fully open to allow unrestricted flow from the Y-Port to the Z-Port. Inlet pressure [P1] is greater than the outlet pressure [P2] plus the spring force [P3]. The valve will not open unless the pressure drop across the valve ([P1-P3]) is slightly greater than the force applied by the main valve spring. In a non-control state the percentage open of the main valve is directly proportional to the pressure drop across the valve.

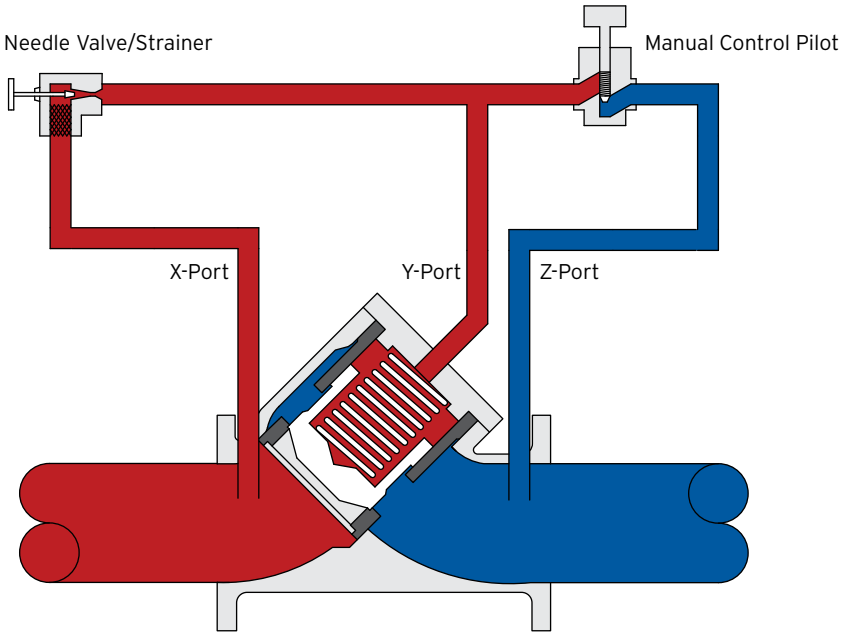


Figure 9-4 Fully Closed

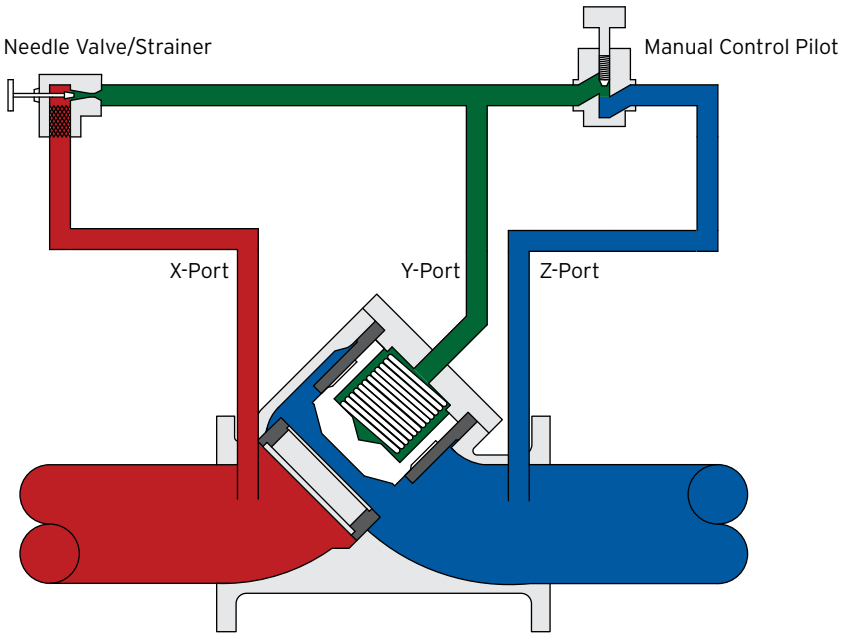


Figure 9-5 Open/Controlled

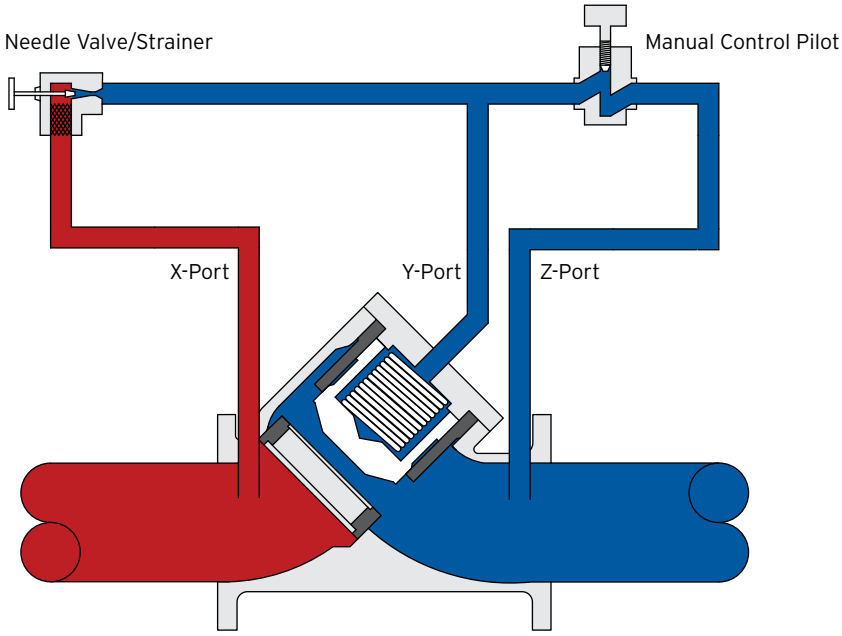


Figure 9-6 Open/Non-Controlled

9.2 - Recommended Installation Instructions

1. If possible, install the control valve within 25 feet of the point at which line pressure is to be controlled. This distance limitation is due to the sense line which must be run to the pilot (unless it is configured for internal sensing). Consult the factory if sense lines of greater length are required.

NOTE:
It is recommended that the control valve be installed between isolating valves. This will permit the system to remain operational while maintenance is being performed on the valve.

1. Ensure that the line is completely free of all foreign material before the valve is bolted into the line.

2. If it is impractical to flush the line before installing the valve, bolt in spool piece or the valve body. Remove the cylinder assembly by following the basic valve disassembly instructions and seal the opening with a temporary cover.

3. Disconnect or isolate the sense line if it is connected to the pilot. This will eliminate the possibility of foreign material flowing into the sensing chamber of the pilot. Flushing the line will not be necessary if the product line and liquid are positively known to be clean.

4. One 3/8" sense line is required between the pilot and the piping sense point unless the pilot is configured for internal sensing. These size lines are a minimum requirement, based on a maximum product viscosity of 500 SSU. Use a larger size sense line if the viscosity of the product is in excess of 500 SSU. The sense line is mated with the lower connection of the pilot.

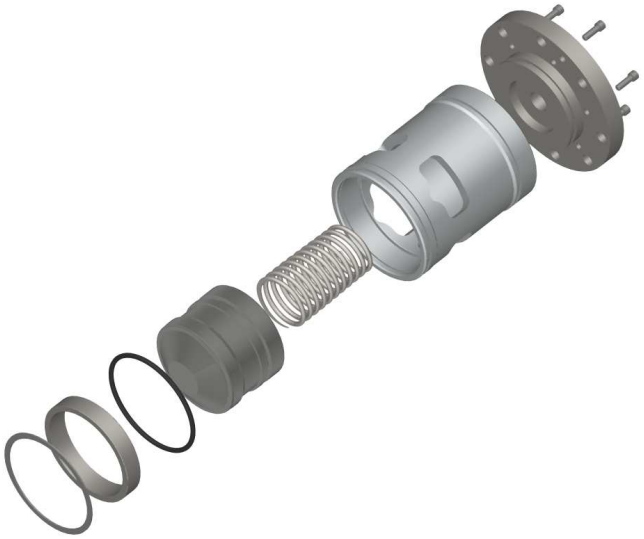
5. Including a pressure gauge in the valve circuit is recommended. This gauge monitors the upstream or downstream pressure when installed at the location indicated on the valve schematic. It is very important that the gauge be installed correctly in-line with other components in order to monitor and properly adjust the valve. This gauge is not furnished by Brodie.

6. Verify that the pilots set point is correct as ordered. A tag containing the factory set point is attached to the pilot. The set point can be changed in the field to any set point within the pilot spring range.

10 Maintenence

General

The following chapter explains the basic disassembly of the bare valve. Please refer to pilot documentation for specific instructions on the maintenence and disassembly of the pilot. The basic processes and techniques explained in this chapter apply to all Brodie BV Series Control Valves regardless of size.



The following tools will be needed to disassemble and reassemble the valve:

- Socket Wrench
- Adjustable Wrench
- T Handle or Extended Allen Wrench
- Screwdriver
- Rubber Hammer
- Arbor Press

10.1 - Disassembly of the Cylinder Assembly with Valve Position Indicator

WARNING:
The cylinder head is bolted to a spring loaded cylinder assembly and will require caution when performing any disassembly procedure. Failure to comply with recommended practice could result in serious personal injury and/or damage to the equipment. Service should be performed only by trained and qualified service personnel.

WARNING:
No attempt should be made to service this valve without referring to the pictorial examples in this manual.

NOTE:
All item numbers can be found in Chapter 12, Parts Lists. Reference the section appropriate for your model equipment. Section numbers are given where appropriate.

1. Remove two screws (Item 17) and lockwashers (Item 18) from indicator guard (Item 20).

2. Grasp indicator guard and remove from valve assembly along with microswitch, if equipped (Section 12.5 and 12.6), screw, washer, mounting plate, screw, and washer.

3. Remove O-ring (Item 23), upper bearing (Item 19), trip dog (Section 12.6 and 12.7), and set screw (Section 12.6 and 12.7).

4. Remove nuts (Item 3, Section 12.1) holding cylinder head (Item 2, Section 12.1) in valve body (Item 1, Section 12.1).

5. Alternately tighten each jack screw (Item 5, Figure 12.1.1) one half turn until cylinder assembly is free of valve body. (Figure 10-1)

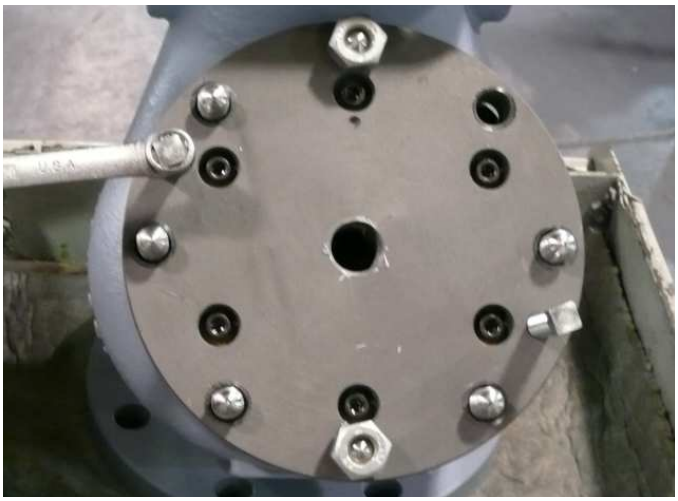


Figure 10-1 Alternately Tighten Jack Screw

Figure 10-2 Remove Cylinder Assembly From Valve Body

CAUTION:

These screws should be tightened evenly to prevent damaging the cylinder O-rings and binding the cylinder assembly.

6. Using both hands pull the cylinder assembly straight out along its axis. Completely remove the two jack screws. (Figure 10-2)

7. With extreme caution, depress piston against spring until ports are cleared. An arbor press may be necessary to depress piston depending on pressure exerted by main valve spring.

8. Block piston in open position by inserting suitable wedges through port openings. (Figure 10-3)

9. Spirolox retaining ring (Item 6), seal ring (Item 5) and O-ring (Item 9) may now be removed from cylinder (Item 2). (Figure 10-4, 10-5, and 10-6)

Figure 10-3 Block Piston In Open Position

Figure 10-4 Spirolox Retaining Ring

Figure 10-5 Seal Ring

Figure 10-7 Removing Spring From Cylinder

Figure 10-6 O-ring

Figure 10-8 Removing Spring From Cylinder

10. With piston wedges removed, spring (Item 3) can be removed from cylinder. (Figures 10-7, and 10-8)

CAUTION:

Remove piston blocks with caution, as spring exerts considerable force against piston.

11. Remove indicator stem (Item 21) with pin (Item 15) and piston cap (Item 13) as an assembly after removing three screws (Item 18 on 2", Item 14 or 3", 4", and 6") from piston cap. The indicator stem may be removed from the piston cap by driving the roll pin out of the piston cap.

12. Remove O-rings (Item 12).

13. Remove indicator guard adaptor (Item 16) from cylinder head by turning counter-clockwise.

14. Remove cylinder from cylinder head by removing screws (Item 7) and O-rings (Item 10).

10.2 - Reassembly of Cylinder Assembly With Valve Position Indicator

To prevent nicking of O-rings during reassembly coat all O-rings with a light grease or high-grade lubricant. All O-rings should be carefully examined for cuts, nicks or distortion during reassembly and replaced if found to be defective.

1. Install O-rings (Item 10) on cylinder head (Item 1).

2. Install piston cap (Item 13) on indicator stem (Item 21) with roll pin (Item 15) and place O-ring (Item 12) in the nose of the piston (Item 4) and secure with three screws (Item 26 on 2", Item 14 on 3", 4" , and 6")

3. Install two O-rings (Item 11) on cylinder (Item 2).

4. Install O-ring (Item 8) on piston.

5. Install spring (Item 3) and piston in cylinder and block piston in the open position (may require an arbor press). (Figure 10-3)

CAUTION:
With extreme care, depress piston against spring until rectangular ports are cleared. An arbor press may be necessary to depress the piston depending on the pressure exerted by the main valve spring. Block piston in open position by inserting suitable wedges through port openings, using care not to damage O-rings.

6. Insert O-ring (Item 9) and sealing ring (Item 5) in cylinder.

7. Install the spriolox retaining ring (Item 6) in cylinder, start one end in groove and gradually wind into place. When all of the retaining ring is in the groove use a punch applied to one end to completely seat the retaining ring.

8. Using caution, remove piston blocks.

9. Install cylinder assembly (Item 2, Section 12.1) in valve body and secure with nuts (Item 3, Section 12.1).

10. Install indicator guard adaptor (Item 16) on cylinder head by turning clockwise.

11. Install O-ring (Item 23) on upper bearing (Item 19), place bearing and trip dog (Section 12.6 and 12.7) on indicator stem.

12. Place indicator guard (Item 20) on indicator guard adaptor and secure with two lockwashers (Item 18) and screws (Item 17).

13. Replace two jack screws (Item 5, Section 12.1).

10.3 - Disassembly of Cylinder Assembly without Valve Position Indicator

WARNING:
No attempt should be made to service this valve without referring to the pictorial examples in this manual. Failure to comply with this procedure can result in serious personal injury and/or damage to the equipment.

1. Remove nuts (Item 3).

2. The entire cylinder assembly, including seat ring, may now be removed as a unit by utilizing the two jack screws (Item, 5, Section 12.1) provided in the cylinder head. (Figure 10-1).

CAUTION:
These screws should be tightened evenly to prevent damaging the cylinder O-rings and binding the cylinder assembly.

3. Using both hands pull the cylinder assembly straight out along its axis. Completely remove the two jack screws. (Figure 10-2)

1. With extreme caution, depress piston against spring until ports are cleared. An arbor press may be necessary to depress piston depending on pressure exerted by main valve spring.

2. Block piston in open position by inserting suitable wedges through port openings. (Figure 10-3)

3. Spirolox retaining ring (Item 6), seal ring (Item 5) and O-ring (Item 9) may now be removed from cylinder head (Item 2). (Figure 10-4, 10-5, and 10-6)

4. With piston wedges removed, spring (Item 3) can be removed from cylinder. (Figures 10-7, and 10-8)

CAUTION:
Remove piston blocks with caution, as spring exerts considerable force against piston.

5. Remove cylinder from cylinder head by removing screws (Item 7) and O-rings (Item 10).

10.4 - Reassembly of Cylinder Assembly without Valve Position Indicator

To prevent nicking of O-rings during reassembly coat all O-rings with a light grease or high-grade lubricant. All O-rings should be carefully examined for cuts, nicks or distortion during reassembly and replaced if found to be defective.

1. Install O-rings (Item 10) on cylinder head (Item 1).

2. Install piston cap (Item 13) on indicator stem (Item 21) with roll pin (Item 15) and place O-ring (Item 12) in the nose of the piston (Item 4) and secure with three screws (Item 26 on 2", Item 14 on 3", 4" , and 6")

3. Install two O-rings (Item 11) on cylinder (Item 2).

4. Install O-ring (Item 8) on piston.

5. Install spring (Item 3) and piston in cylinder and block piston in the open position (may require an arbor press). (Figure 10-3)

CAUTION:
With extreme care, depress piston against spring until rectangular ports are cleared. An arbor press may be necessary to depress the piston, depending on the pressure exerted by the main valve spring. Block piston in open position by inserting suitable wedges through port openings. Be careful not to damage O-rings.

6. Insert O-ring (Item 9) and sealing ring (Item 5) in cylinder.

7. Install the spriolox retaining ring (Item 6) in cylinder, start one end in groove and gradually wind into place. When all of the retaining ring is in the groove, use a punch applied to one end to completely seat the retaining ring.

8. Using caution, remove piston blocks.

9. Install cylinder assembly (Item 2, Section 12.1) in valve body and secure with nuts (Item 3, Section 12.1).

10. Replace two jack screws (Item 5, Section 12.1).

10.5 - Aggressive Products Cylinder Disassembly

WARNING:
The Cylinder Head is bolted to a spring loaded cylinder assembly and will require caution when performing any disassembly procedure. Failure to comply with recommended practice could result in serious personal injury and/or damage to the equipment. Service should be performed only by trained and qualified service personnel.

1. Position the cylinder assembly with the cylinder head (Item 1) up. Larger units may require the use of a spindle or arbor press to facilitate removal of the piston assembly in which case the arbor should be resting against the cylinder head.

2. Carefully loosen the screws (Item 7) which hold the cylinder head in place. Alternate to opposite sides to equalize release of spring tension on the cylinder head.

3. Using extreme caution, hold the cylinder head firmly against the cylinder assembly and remove the retaining screws.

4. Lift off the cylinder head and retain accompanying O-rings for reassembly.

5. If an indicator is being used, care should be taken to avoid bending or damaging the indicator stem (Item 21) in this operation.

NOTE:
It is not necessary to remove the indicator guard (Item 20) or other component parts of the indicator at this time; however the indicator stem should be wiped clean of any residue or foreign material that may have gathered on its surface. This will protect the O-Ring (Item 23) from unnecessary abrasion upon removal of the indicator stem.

6. The spring, piston, indicator stem assembly (if used), and cylinder may be removed at this time by pushing from the bottom of the unit.

NOTE:
Do not attempt to remove the piston through the seat area. Removal through the seat area will destroy the spring loaded Teflon cup seals.

7. Inspect all O-rings (cylinder, piston, cylinder head and indicator), and cup-seals for nicks, damage or wear, and replace as required.

8. The cylinder and piston may be cleaned to remove foreign materials or residue that may impede proper operation. Care should be taken not to damage the piston seat radius or seals.

10.6 - Cup-Seal Replacement on Existing "AP" Option Piston

If your Valve is being modified to accommodate applications requiring the use of aggressive products used in petroleum blending operations the following procedures should be followed in retrofitting your valve.

To replace existing standard cylinder assemblies with the current AP Option:

1. Remove the original cylinder assembly as shown in Section 9.1 or 9.3. The cylinder assembly will be supplied from the factory with or without an indicator (specified on order).

2. Clean and inspect O-ring sealing surfaces in the main valve body. Apply a lightweight lubricant to these surfaces before installing the new cylinder assembly.

3. Lower the new cylinder assembly and cylinder head into the valve body. Align the bolt holes in the cylinder head with the studs in the main valve body.

4. With extreme caution, depress piston against spring until ports are cleared. An arbor press may be necessary to depress piston depending on pressure exerted by main valve spring.

5. Block piston in open position by inserting suitable wedges through port openings. (Figure 9-3)

6. Spirolox retaining ring (Item 6), seal ring (Item 5) and O-ring (Item 9) may now be removed from cylinder head (Item 2). (Figure 9-4, 9-5, and 9-6)

7. With piston wedges removed, spring (Item 3) can be removed from cylinder. (Figures 9-7, and 9-8)

CAUTION:
Remove piston blocks with caution, as spring exerts considerable force against piston.

8. Remove cylinder from cylinder head by removing screws (Item 7) and O-rings (Item 10).

10.7 Torque Specifications for Cylinder Head Bolts (ft./lb.) (Item 3, Figure 12.1.1)

Size (All Models)	150 lb. ANSI	300 lb. ANSI	600lb. ANSI
2"	22	26	77
3"	36	49	68
4"	36	46	136
6"	37	67	250
8"	170	211	387
12"	403	496	700

11 Troubleshooting

General

Periodic examination of all seals and o-rings for nicks, cuts and wear is recommended, disassembly procedures are covered in Chapter 9, Maintenence. If the control valve is found to be in need of repair, it is important that that service be performed by trained and qualified service personnel and it is recommended the user contact the Brodie Meter Co., LLC Repair Department.

A table has been provided to aid in basic trouble-shooting. The most frequent problem encountered with any control valve is the accumulation of sediment, rouge, scale and other foreign material in the pilot or its supply system. It is therefore good practice to periodically remove the pilot from the valve and inspect it for accumulation of these materials.

The strainer and needle valve in the pilot supply line should also be flushed periodically to avoid erratic control and slow response typical to obstructed flow. If substandard conditions persist after thoroughly cleaning the system, examine the pilot for swollen O-rings.

Symptom	Possible Cause(s)	Test/Check	Corrective Action
Does not control.	Main valve piston.	Swollen O-rings due to fluid incompatibility?	Inspect O-rings, confirm correct elastomer compound, replace as necessary.
	Needle valve adjustment.	Are Needle valve(s) adjusted correctly?	Open needle valve(s), flush and reset.
	Pilot malfunction (electical).	Signal logic from control device incorrectly programmed?	Correct programming logic at control device including set points, control tolerance, and timing delay as required.
		Valve stem mounted micro switches (cam settings) incorrectly adjusted?	Adjust cam settings to achieve correct control function.
		Valve stem mounted micro switches incorrectly wired?	Check wiring schematic and correct as necessary.
		Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.
	Pilot malfunction (hydraulic).	Pilot adjustment spring incorrectly set?	Adjust spring setting.
		Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.
		Incorrect spring range installed?	Inspect spring for proper control range.
Leaks.	O-rings or seals.	Damaged or worn O-rings or seals?	Replace as required.
	Indicator stem.	Bent indicator stem?	Replace indicator stem.

Table continued on next page.

Symptom	Possible Cause(s)	Test/Check	Corrective Action
Does not open or opens too slow.	No inlet pressure.	Is pump running?	Turn pump on.
	Isolation valves closed.	Upstream block valve closed?	Open valve.
		Downstream block valve closed?	Open valve.
	Insufficient inlet pressure.	Clogged strainer?	Clean strainer.
	Bypass valve.	Are bypass valve(s) closed?	Close bypass valve.
	Needle valve(s) closed or incorrectly set.	Needle valve(s) open?	Open needle valve(s), flush and reset.
	Internal valve strainer or sense lines.	Strainer or sense lines clogged?	Clean strainer/sense lines as necessary.
	Pilot malfunction (electrical).	Correct voltage at solenoid?	Correct voltage supply source and wiring.
		Signal logic from control device incorrectly programmed.	Correct programming logic at control device to include pump delay timer and low flow start settings.
		Defective solenoid?	Replace solenoid.
		Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.
	Pilot malfunction (hydraulic).	Pilot adjustment spring incorrectly set?	Adjust spring setting.
		Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.
Does not close or closes too slow	Main valve piston.	Swollen O-rings due to fluid incompatibility?	Inspect O-rings, confirm correct elastomer compound, replace as necessary.
	Valve seat O-ring.	Seat O-ring cut or damaged?	Inspect and replace as necessary.
	Needle valve(s) closed or incorrectly set.	Needle valve(s) open?	Open needle valve(s), flush and reset
	Internal valve strainer or sense lines.	Strainer or sense lines clogged?	Clean strainer/sense lines as necessary.
	Indicator stem.	Bent indicator stem?	Replace indicator stem
	Pilot malfunction (electrical).	Incorrect wiring?	Check wiring with schematic and correct as necessary.
		Signal logic from control device incorrectly programmed?	Correct programming logic at control device to include zero shut-off control.
		Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.
	Pilot malfunction (hydraulic).	Defective or worn O-rings or seals.	Inspect and replace O-rings and seals, as necessary.

12 Parts Lists

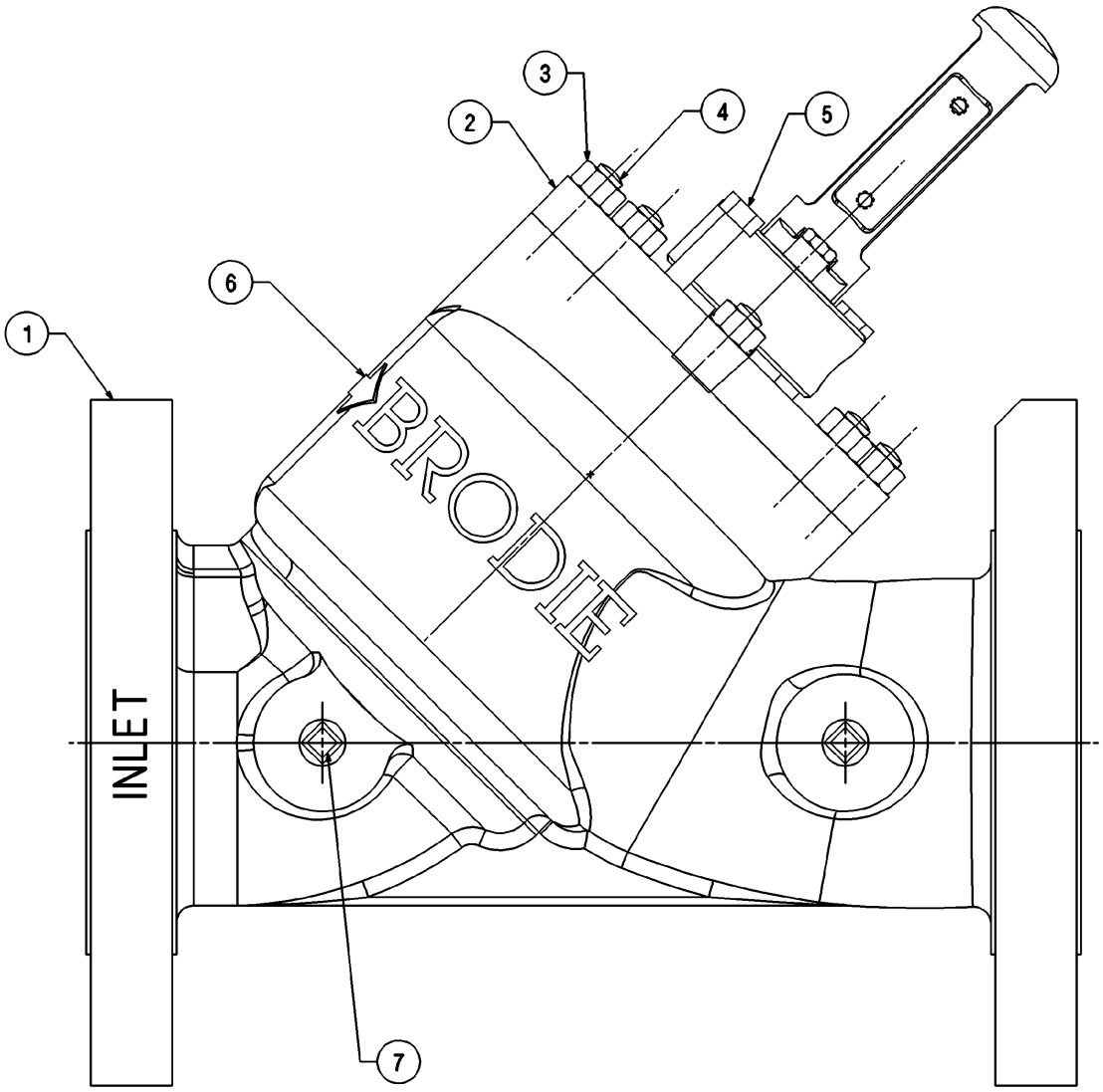
General

This chapter contains the necessary parts required for routine maintenence and service of the Brodie Valve. Each parts list contains recommended spare and replacement parts denoted by an asterisk. For items not listed, or additional information, consult the factory. When ordering, the following information must be furnished:

- Model Number
- Serial Number
- Part Number
- Quantity

O-Ring Material	Suffix
Buna-N	None
EPR	-005
Fluorosilicone	-016
Viton-A	-022
Viton-V	-023
Viton-F	-026
Kalrez	-075
Nitrile	-114
Neoprene	-116
Low Swell Nitrile	-120

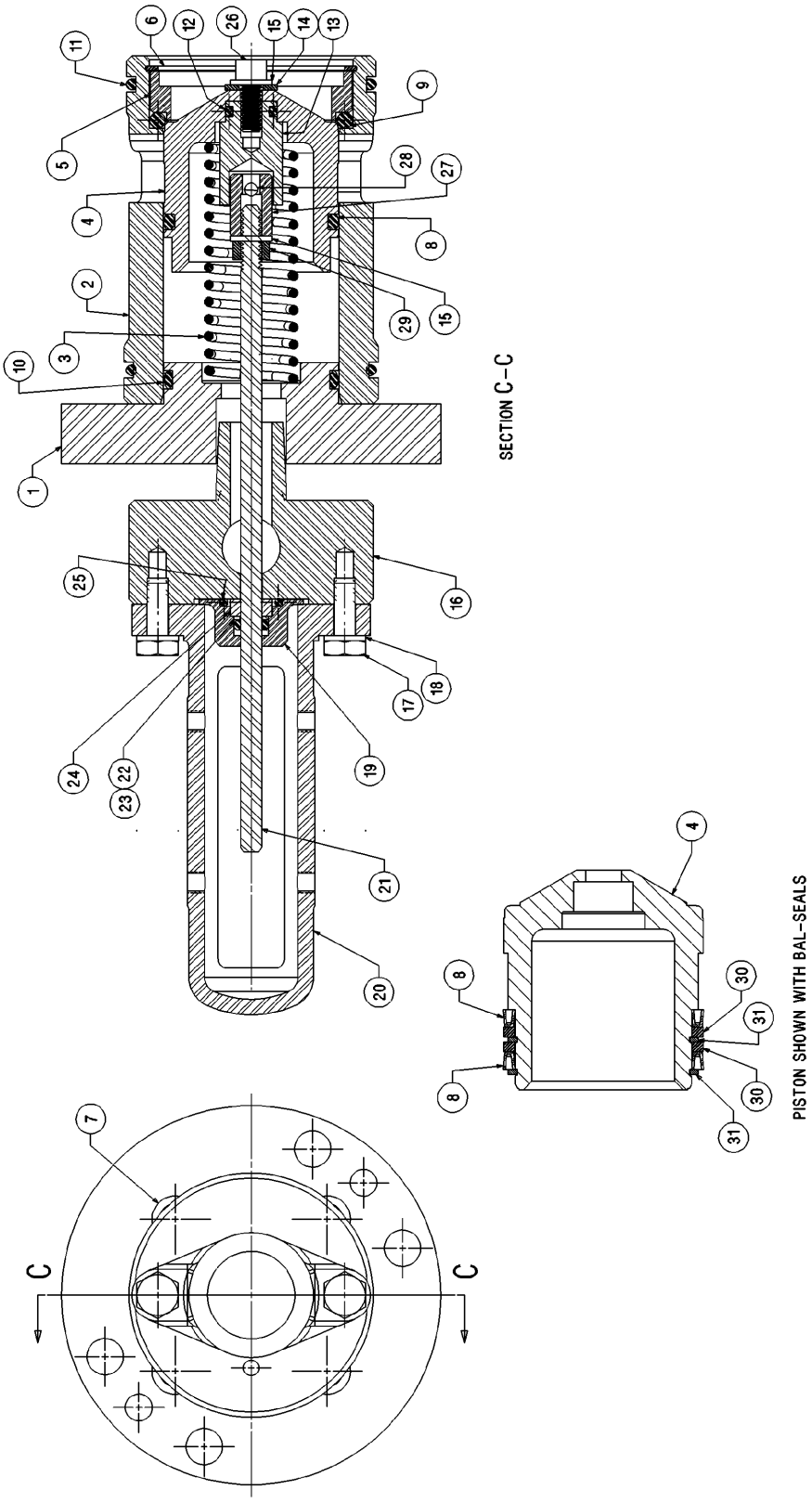
12.1.1 - BV Series Valve Illustrated Parts List



12.1.2 - BV Series Valve Part Numbers

Item #	Description	Qty	2"	3"	4"	6"	8"	12"
1	Valve Body, 150#	1	VS21001M	VS31001M	VS41001M	VS61001M	VS81001M	VS121001M
	Valve Body, 300#	1	VS23001M	VS33001M	VS43001M	VS63001M	VS83001M	
2	Cylinder Assembly	1	VS20075-421M	VS30075-421M	VS30075-421M	VS60075-421M		VS12075-421M
	AP Cylinder Assembly	1	VS20075-426M	VS30075-426M	VS430075-426M	VS60075-426M	VS80075-412M	
	Cylinder Assembly w/ Indicator	1	VS20175-421M	VS30175-421M	VS40175-421M	VS60175-421M		
	AP Cylinder Assembly w/ Indicator	1	VS20175-426M	VS30175-426M	VS40175-426M	VS60175-426M	VS80175-412M	
3	Nut	A/R	151546M (4)	151547M (6)	151547M (8)	151553M (10)	151558M (10)	151560M (12)
4	Stud	A/R	151309M (4)	151305M (6)	151305 (8)	151347M (10)	151335M (10)	151395M (12)
5	Set Screw	2	150691	150695			150696	150699
6	Nameplate	1	VS20019					
7	Pipe Plug	2	154721M					154704M

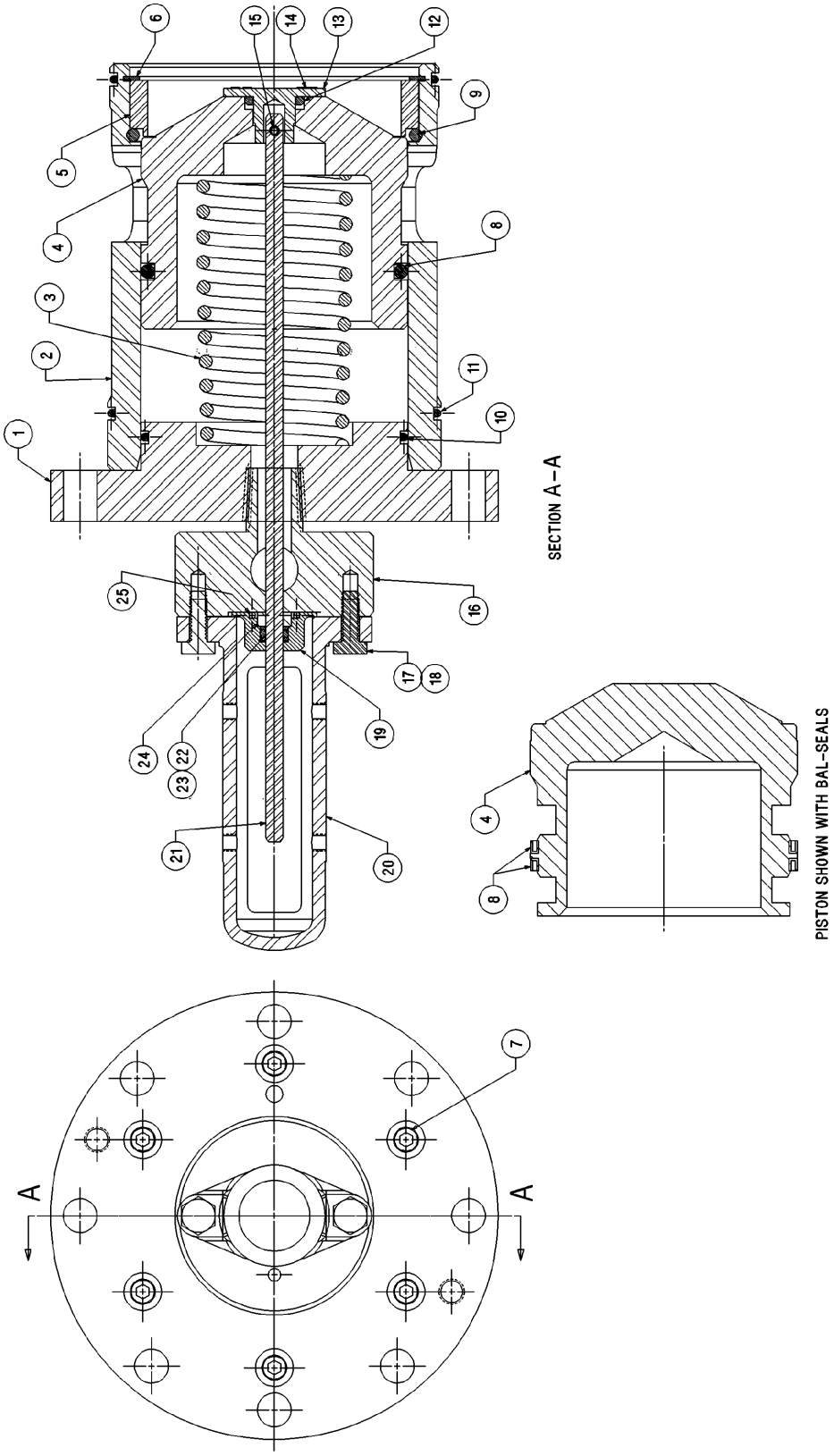
12.2.1 - 2" Valve Cylinder Illustrated Parts List



12.2.2 - 2" Valve Cylinder Part Numbers

Item #	Description	2"	2" AP	Qty.
1	Cylinder Head	VS20056-500M		1
2	Cylinder	VS20471-600		1
3	Valve Spring	VS20029		1
4	Piston	VS20024-690	VS20024-693	1
4	Piston with Indicator	VS20124-690	VS20124-693	1
5	Seal Ring	VS20026-600		1
6	Retaining Ring	156460		1
7	Screw	151012M		4
8	O-ring/Teflon Seal	152073-022	159775	1 | 2
9	O-ring	152085-022	152085-120	1
10	O-ring	157029-022	157029-120	1
11	O-ring	157000-022	15700-120	2
12*	O-ring	152070-022	152070-120	1
13*	Piston Plug	VS40086		1
14*	Screw	151857		1
15*	Roll Pin	152119		2
16*	Indicator Guard Adaptor	VS40081M		1
17*	Screw	150727		2
18*	Washer	152119		2
19*	Bearing	VS40189-500		1
20*	Indicator Guard	VS40082		1
21*	Indicator Stem	VS20183		1
22*	Back-Up Ring	157172		2
23*	O-ring	152096-022	152096-120	1
24*	Seal Retainer	VS40188-500		1
25*	O-ring	157012-022	157012-120	1
26*	Screw	151010-019		1
27*	Piston Connector	VS40087		1
28*	Roll Pin	153540		1
29*	Screw	151544-019		1
30*	Seal Retainer		VS20027-690	2
31*	Retaining Ring		156576	2

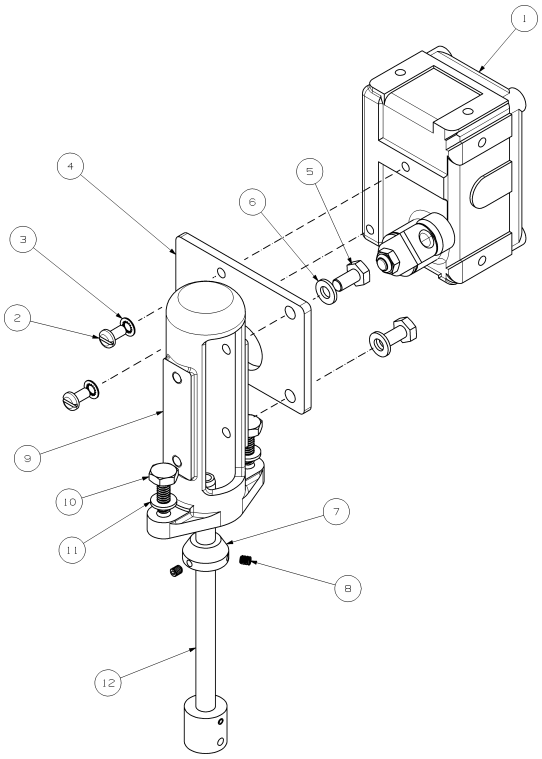
12.3.1 - 3", 4", 6", 8" and 12" Valve Cylinder Illustrated Parts List



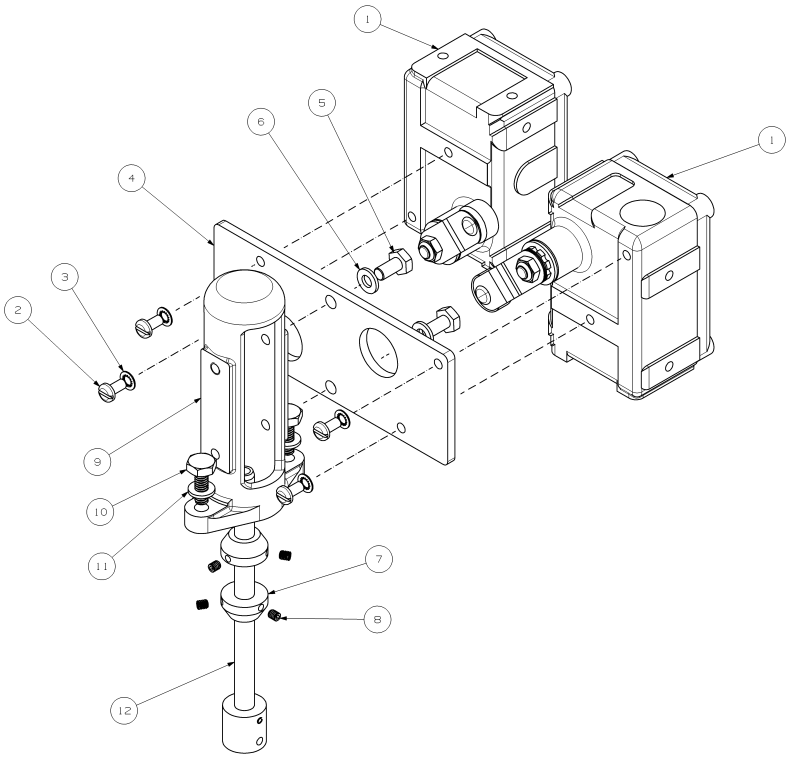
12.3.2 - 3", 4", 6", 8", and 12" Valve Cylinder Part Numbers

Item	Description	3"	4"	6"	8"	12"	Qty
1	Cylinder Head	VS30056-500M	VS40056-500M	VS60056-500M	VS80056-500M	VS120056-500M	1
2	Cylinder	VS30471-600	VS40471-600	VS60471-600	VS80471-600	VS120471-600	1
	Low Flow Cylinder	N/A	N/A	N/A	N/A	N/A	1
3	Valve Spring -Light	N/A	VS40031	N/A	N/A	N/A	1
	Valve Spring - Medium	VS30029	VS40029	VS60029	VS80029	VS120029	1
	Valve Spring - Heavy	VS30059	N/A	N/A	N/A	N/A	1
4	Piston	VS30024-690	VS40024-690	VS60024-690	VS80024-690	VS120024-690	1
	Piston w/ Indicator	VS30124-690	VS40124-690	VS60124-690	VS80124-690	VS120124-690	1
	AP Piston	VS30024-693	VS40024-693	VS60024-693	VS80024-693	N/A	1
	AP Piston w/ Indicator	VS30124-693	VS40124-693	VS60124-693	VS80124-693	N/A	1
5	Seat Ring	VS30026-600	VS40026-600	VS60026-600	VS80026-600	VS120026-600	1
6	Spirolox Retaining Ring	156458	156459	156461	156464	156470	1
7	Screw	151012 (6)	151012 (6)	151012 (8)	151460M (8)	1500994M (6)	A/R
8	O-ring - Piston	152075-XXX	152078-XXX	157002-XXX		157018-XXX	1
	Teflon Bal Seal - Piston	159714	159715	159716	159777		2
9	O-ring - Seat	152100-XXX	152080-XXX	157003-XXX	157006-XXX	157017-XXX	1
10	O-ring - Cylinder Head	159575-XXX	157032-XXX	159576-XXX	157074-XXX	157030-XXX	1
11	O-ring - Cylinder O.D.	152095-XXX	152094-XXX	152079-XXX	157004-XXX	157019-XXX	2
12	O-ring - Piston Plug	152048-XXX					1
13	Piston Plug	VS40053					1
14	Screw - Piston Plug	150333					3
15	Roll Pin	153622					1
16	Indicator Guard Adaptor	VS40081M					1
17	Screw	150727					2
18	Lock Washer	152119					2
19	Bearing	VS40189-500					1
20	Indicator Guard	VS40082			VS80082	VS120082	1
21	Indicator Stem	VS30183	VS40183	VS60183	VS8183	VS120183	1
22	Teflon Back Up Ring	157172					2
23	O-ring - Upper Indicator	152096-XXX					1
24	Seal Retainer	VS40188-500					1
25	O-ring - Lower Indicator	157012-XXX					1
32	Backup Washer	1501038 (6)	1501038 (6)	1501038 (8)	151859 (8)	1501086 (6)	A/R

12.4.1 - Model BV20 Single Microswitch Assembly Illustrated Parts List



12.4.2 - Model BV20 Dual Microswitch Assembly Illustrated Parts List



12.4.3 - Model BV20 Single or Double Microswitch Assembly Part Numbers

13Item #14	Description	Part Number	Qty.
1	Electric Control Switch	VP6090	2
2	Screw	150134	4
3	Lockwasher	152259	4
4	Mounting Plate - Single	VP60902-001	1
	Mounting Plate - Dual	VP60903-001	1
5	Hex Head Screw	150725	2
6	Lockwasher	152119	2
7	Trip Dog	VS460907	2
8	Set Screw	150975-419	4
9	Indicator Guard	VS40082	1
10	Hex Head Screw	150727	2
11	Lockwasher	152119	2
12	Indicator Shaft Assembly	VS60633	1

Appendix A

Decontamination Statement

RMA Number: _____

Item Being Returned: _____

List all chemicals, process fluids and gases that have come in contact with the equipment, including cleaning agents. Attach additional pages of information if necessary. A Material Safety Data Sheet (MSDS) is required if non-food grade products have been used with the item being returned.

Information Required	Product 1	Product 2
Chemical Name		
Health and Safety Hazards		
Precautions, First Aid		

I hereby certify the equipment being returned has been cleaned and decontaminated in accordance with good industrial practices and in compliance with OSHA and DOT regulations. This equipment poses no health or safety risks due to contamination.

Signature:_____

Name (Please Print):_____

Title:_____

Company Name:_____

Phone Number:_____

Fax:_____

E-mail:_____

Reason for Return:_____

REMINDER

All items being returned must be packaged separately. This decontamination statement and the MSDS sheet(s) must be placed on the outside of the shipping container.

Brodie International
A Brodie Meter Co. LLC Company
www.brodieintl.com

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Statesboro, GA 30461, USA

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Fax: +1 (912) 489-0294

Appendix B

Customer Problem Report

For faster service, complete this form and return it along with the affected equipment to customer service at the address indicated below. If you require technical assistance, please contact the Product Service Department at the phone number listed below.

Company Name:_____ Phone: _____

Technical Contact: _____

Repair PO#: _____

Invoice Address: _____

_____

_____

Shipping Address:_____

_____

_____

Return Shipping Method: _____ S/N:_____

Equipment Model #: _____ Failure Date:_____

Description of Problem:_____

_____

_____

What was happening at time of failure: _____

_____

Additional Comments: _____

_____

Report Prepared by: _____ Title: _____

Brodie International
A Brodie Meter Co. LLC Company
www.brodieintl.com

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19267 Highway 301 North
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