PRATT
INDUSTRIAL

2" - 24"
BF Series
Butterfly Valves

Document #: BF Series IOM Revision Date: 10/2/2014

Operation and Maintenance Manual

Job Name: _____

Contractor: _____

Date: _____

SAFETY MESSAGES

All safety messages in the instructions are flagged with an exclamation symbol and the word “warning”. These messages indicate procedures that must be followed exactly to avoid equipment damage, physical injury, or death. Safety labels on the product indicate hazards that can cause equipment damage, physical injury, or death.

WARNING

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emission of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline materials.

PARTS

Order parts directly from Henry Pratt Company through your local distributor, or by contacting the factory directly. When ordering parts, please include the serial number located on the valve tag.

WARRANTY ISSUE

Seller warrants that, at its option, it will repair, replace, or refund the unit purchase price of any products which are non-conforming due to Seller’s material or workmanship during the warranty period. The warranty period shall be twelve (12) months for parts and eighteen (18) months for all other goods after date of shipment. This shall be Buyer’s sole remedy. In order to maintain this product warranty, Buyer must give written notice to Seller’s Field Service Supervisor prior to any work being performed.

IN CONSIDERATION OF THE FOREGOING, SELLER EXCLUDES ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Seller does not warrant water operated metallic cylinders against damage caused by corrosion, electrolysis or mineral deposits. In no event shall warranty include valve removal or reinstallation.

WARNING

Read all applicable directions and instructions prior to any maintenance, troubleshooting or installation

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Functional Description

Round butterfly valve disc rotates 1/4 turn to provide tight shut off in air or water pipelines. The valves can be used to regulate flow rate by positioning the disc between 10 and 90 degrees open.

Manually Operated Valve

Manually operated butterfly valves are powered with gear actuators, which convert multiple handwheel, chainwheel or handle input turns into 1/4 turn valve operation. The travel of the valve disc is limited by physical stops in the actuator housing.

WARNING

Forcing the handwheel, chainwheel or nut against the stops will not provide tighter shutoff of the valve and may damage the actuator. Only actuator adjustments will affect valve shutoff.

Motor Operated Valve

Motor operated butterfly valves are powered with gear actuators, which convert multiple motor input turns into 1/4 turn valve operation. The travel of the valve disc is limited by limit switches in the motor housing and physical stops in the actuator housing. Valve shutoff is affected by limit switch and physical stop settings.

WARNING

Improperly set limit switches and/or physical stops may damage the motor and/or actuator.

Cylinder Operated Valve

Hydraulically operated butterfly valves are powered with a gear box and double acting cylinder. The linear stroke of the cylinder is converted to 1/4 turn operation by the gear box. Auxiliary controls are provided to direct hydraulic power to the cylinder and to control the operating speed of the cylinder.

INSTALLATION

GENERAL

Valves are a significant component of any piping system. Failure due to faulty installation, improper operation or maintenance in such systems could result in damage, down time and costly repairs. In buried underground installations, problems or malfunctions can result in extensive, costly unearthing operations to correct the problem. Many problems with valves can be traced to improper installation, operation, or maintenance procedures.

UNLOADING

Inspect valves on receipt for damage in shipment and conformance with quantity and description in the shipping notice and order. Carefully unload all valves to the ground without dropping using fork trucks or slings under skids. Do not lift valves with slings or chain around operating shaft, actuator, or through waterway. Instead, lift valves with eye bolts or rods through flange holes

STORAGE

Whenever practical, store valves indoors. If not, protect valves and actuators from weather and accumulation of water, dirt, rocks and debris. When valves fitted with power actuators and controls are stored, energize electric actuator or otherwise protect electrical control equipment to prevent corrosion of electrical contacts due to condensation resulting from temperature variation. Do not expose rubber seats to sunlight or ozone for any extended period. Valves should be stored with the valve disc or closure member slightly open.

INSPECTION PRIOR TO INSTALLATION

Make sure flange faces and joint sealing surfaces, body seats and disc seats are clean. Check bolting attaching actuator to valve for loosening in transit and handling. If loose, tighten firmly. Open and close valve to make sure it operates properly and that stops or limit switches are correctly set so that the valve seats fully. Check that valve rotation direction is correct and close valve before installing.

INSTALLATION

The following items must be performed during installation to ensure proper function.

- Carefully place valves into position avoiding contact or impact with other equipment, vault walls or trench walls.

- Valves are to be installed in accordance with the General Arrangement Drawings furnished for the order.

- Foreign material in a valve can damage the rubber seat when valves are operated. Be sure valve interiors and adjacent piping are clear of foreign material prior to mating valve to pipe joint.

- Prepare pipe ends and install valves in accordance with the pipe manufacturer's instructions for the joint used. Do not deflect pipe/valve joint. Do not use valve and jack to pull pipe into alignment

- In plant piping, install so as to minimize bending of valve connection with pipe loading.

- Make sure valve disc, when opened, will not contact pipe port. This is especially necessary on pipe with linings. Check manufacturer for minimum pipe I.D. required for clearance.

WARNING

Valve disc without actuator may open or close at any time and cause injury to persons or damage to valve and other property. The shaft/disc clamping device when furnished is intended for temporary use during shipping, handling and valve installation only. Do not subject valve to flow conditions before actuator is mounted and tested for performance and clamping device is removed.

Buried valves installed with valve boxes must be so installed that the valve box does not transmit shock or stress to the valve actuator as a result of shifting soil or traffic load

When valves are installed in vaults, the vault design must provide space for valve/actuator repair. The valve operating nut should be accessible from the top opening of the vault with a tee wrench.

... Series valves are bi-directional and will control flow equally well in either direction. For the best results in slurry service, position the valve so that the valve stem is in the horizontal position and the lower disc edge opens downstream. This will ensure a self flushing effect extending the life of the valve.

The valve should not be placed too close to other valves, elbows, etc. as its operational performance may be affected. It is recommended that the valve have, at a minimum, six pipe diameters upstream and four pipe diameters downstream between int and any other valves, elbows, etc. in the system.

Installation Between Pre Existing Flanges

1. Observe that the disc sealing edge is in line with the parallel flats (or keyway) on the stem. Rotate the stem clockwise to position the disc within the body at least 0.375in. away from the body face.

2. Spread the flanges to exceed the valves face to face dimension by 0.19in. before placing the valve in position to prevent distortion and/or damage to the seating face of the valve.

3. Center the valve body between the flanges and span the valve body with all flange bolts possible. Turn the disc to the fully open position.

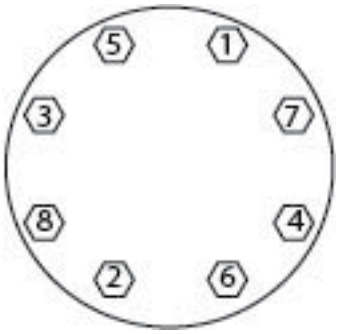
4. While gradually removing the flange spreaders, center the valve to the flanges and tighten the bolts half tight. Slowly close the valve to check for adequate disc clearance.

5. Return the disc to the fully open position and cross-tighten all bolting. Bolt tightening sequence should be per the following table and diagram.

Bolt Torques

Flange Size	***Recommended Min. Bolt Torque (Pound Force Inches)***	***Flange Size***	***Recommended Min. Bolt Torque (Pound Force Inches)***
2"-4"	238 - 354	14"-16"	1681 - 2398
5"-8"	398 - 592	18"-20"	1796 - 2522
10"	628 - 893	24"	2575 - 3593
12"	955 - 1327		

Bolt Tightening Sequence



New Construction Installation Using Welding Type Flange

1. With the disc in the nearly closed position, align and center the companion flange bolt holes to the body lug holes.

2. Assemble the body and flanges with the flange bolting and line up the bolting using the flange-body-flange assembly for fit up and centering to the pipe

3. Tack weld the flanges to the pipe

4. Remove the flange bolting and valve assembly from between the flange

WARNING

Do not finish weld the flanges to the pipe with the valve bolted between the flanges as this will result in serious heat damage to the valve seat.

5. Finish welding the flanges to the pipe and allow the flanges to cool completely before proceeding.

6. Follow steps 1 through 5 of “Installation Between Pre Existing Flanges” on previous page.

TESTING

When rubber seated valves are used to isolate sections of line for test, it is important to realize that these valves are designed and factory adjusted to hold rated pressure only. Test pressure may cause leakage past the rubber seat or damage to the valve.

In order to prevent time lost in searching for leaks, it is recommended that excavations for buried valves not be back-filled until after hydrostatic pressure tests have been made.

Seat leakage can occur due to foreign material in the line. If this occurs, open valve 5 – 10 degrees to get high velocity flushing action. Close and repeat several times to clear seats for tight shut off.

Seat leakage can occur due to rotational shift in position of the disc with relation to the body seat. Readjust closing stop in accordance with manufacturer’s instructions.

OPERATION

Do not permit use and operation of any valve at pressure above the rated pressure of the valve.

Do not exceed 300 ft-lb input torque on actuators with wrench nuts, 200 lb. rim pull input torque for handwheels or chainwheels. If portable auxiliary actuators are used, size the actuator or use a torque limiting device to prevent application of torque exceeding 300 ft-lbs. If an oversize portable auxiliary actuator with no means of limiting torque is used, stop the actuator before valve is fully opened or closed against stops and complete the operation manually. Be sure to check portable auxiliary actuator directional switch against direction indicated on wrench nut, handwheel or records before applying opening and closing torque.

If a valve is stuck in some intermediate position between open and closed, check first for jamming in the actuator. If nothing is found, the interference is inside the valve. In this case, do not attempt to force the disc open or closed since excessive torque in this position can severely damage internal parts.

MANUAL ACTUATOR FUNCTION AND USE:
The manually operated butterfly valves are operated by rotating the handwheel, chainwheel, or nut. The actuator is equipped with gearing to convert the many turns into 1/4 turn operation. Inside actuator stops that limit the travel of the valve are pre-set at the factory. Forcing the handwheel, chainwheel, or nut will not cause the valve to shut off any tighter and may cause damage to the gearing.

CYLINDER ACTUATOR FUNCTION AND USE:
The cylinder operated butterfly valves are operated automatically by directing hydraulic pressure to either side of the power cylinder. Solenoid valves are used to direct the fluid to the cylinder ports based on electrical power signals. In cylinder actuators, the travel stops are in the cylinder so that full hydraulic pressure can be held on the cylinder at either end of travel.

MOTOR ACTUATOR FUNCTION AND USE:
The motor actuator is designed to open and close the valve through its one quarter turn of rotation. It contains gearing so that hundreds of turns of the motor or handwheel will slowly move the valve from open to close position or vice versa. Electrical controls are included in the motor actuator for local electrical control.

The output motion of the actuator is limited to about 100 degrees of output rotation by mechanical stops in the gearing. These are factory set and should not need adjustment. The actual positioning of the valve disc will be done by limit switches in the motor actuator. The switches are also set at the factory but adjustment is sometimes required if the motor unit is installed on a separate mounting base or floorstand. Detailed procedures are given in the motor manual if adjustment is needed for the mechanical stops or the limit switches. The wiring and power requirements are given on wiring diagrams included in this instruction manual.

WARNING

Fluids exposed to freezing temperatures may cause valve to fail resulting in injury to persons or damage to valves and other property. Do not use in applications that are exposed to freezing temperatures unless sufficient flow is maintained through the valve to prevent freezing, or other protection is provided.

WARNING

IMPORTANT SAFETY NOTICE

All persons who will install, operate or adjust this equipment must read the instructions and drawings carefully. Injury and property damage may occur from improper use. It is understood that this equipment will be installed by individuals with knowledge and skills in electrical equipment. The manufacturer cannot be responsible for the misuse of this information or equipment, nor can it assume any resultant liability.

MAINTENANCE

Maintenance of valves by owner is generally limited to actuators and shaft seals. In some instances, valve design permits field adjustment of seat when leakage occurs. Unless the owner has skilled personnel and proper equipment, any major rework will require removal of the valve from the line. Depending on condition, valve may require return to the manufacturer.

ANNUAL MAINTENANCE

1. Cycle valve to verify operation and no interference in line.
2. Close valve and check for leakage. If leakage is detected, check actuator stops to verify that disc is fully closed. If leakage persists, remove valve to inspect seat. Refer to the service procedures section of this manual for information regarding adjustment or replacement of seat.
3. Check flange connections for leakage. Tighten bolts accordingly.
4. Check top trunnion area for shaft leakage. If leakage is detected, replace valve o-rings in top cover.
5. If Access to the line is possible, then removal of scale that may interfere with disc travel is suggested. The seat should be inspected for wear and the screws should be tight.

NOTE: LUBRICATION IS NOT REQUIRED.

WARNING

Removal of actuator from valve shaft will cause disc to rotate, striking persons or objects in the disc path, causing injury to persons and damage to valve. Block or lock disc before removing actuator.

Typical maintenance would be shaft o-ring replacement and actuator adjustment. O-ring leakage, broken parts and difficult operation should be discussed with the factory before valve repairs are attempted.

Stop line flow and isolate from line pressure prior to performing any corrective maintenance

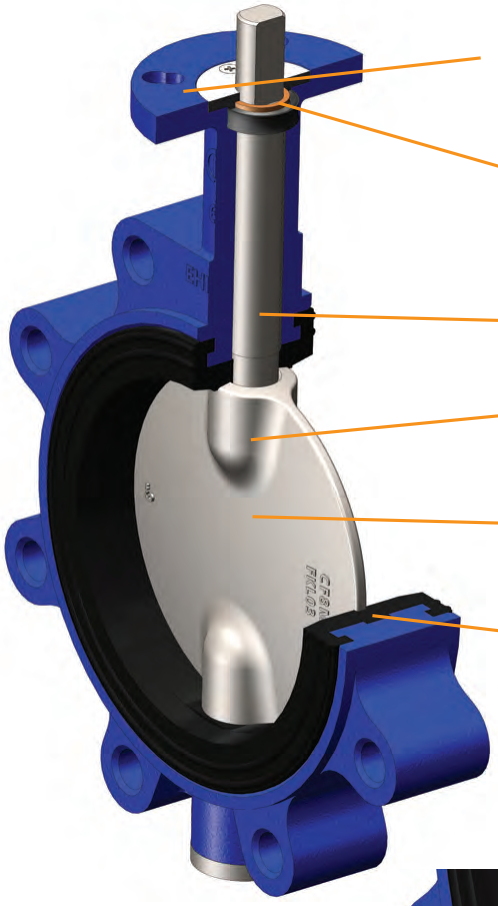
After completing repair, cycle valve through one complete operating cycle and after line pressure has been restored, inspect for leakage.

Troubleshooting Guide

Problem	Causes	Remedies
High Torque	• Pinched seats • Flange bolts are not evenly torqued • Over-torqued bolts	Loosen the flange bolts. Manually pin the disc through the valve a few times to reshape the seat. Tighten the flange bolts in the correct sequence.
	Valve installed to close to reduction, strainer, elbow or other obstruction	Change piping or location to the valve or upgrade the torque on actuator
	Obstruction in the pipeline	Remove valve from pipeline and remove the obstruction
	Valve stem or disc bent	Return valve to factory for replacement
	Scale buildup on stem or seat	Open and close the valve several times. Operate the valve at least monthly. Check seat for deterioration. Flush system periodically. Excessive addition of chemicals at one time may coat the surface of valve seat and disc.
	Improper pipe supports	Install piping supports
	Improperly welded flange	Re-weld flange properly
Leakage when valve in closed position	Actuator is not properly adjusted	Reset stops in actuator
	Line pressue is higher than the valve's rated close off pressure	Reduce line pressure to valves rated close off pressure, or upgrade actuator
	High Torque	See 'High Torque' above.
Leakage past the flange face	Flange bolts are not evenly torqued	Loosen the flange bolts. Tighten the flange bolts in the correct sequence.
Valve opens only a few degrees and stops	Improper installation. Valve is not aligned properly	Loosen the flange bolts, realign the valve with flanges and retighten the flange bolts to the correct torque.

2"-24" Exploded Parts Drawing

Pratt BF Series Butterfly Valve Design Details: Butterfly Valve, sizes 2" through 24" 2"-12" 230psi, 14"-28" 150psi



Top flange conforms to ISO 5211 and KV industrial standard allowing a universal mounting pad for automation requirements which is suitable for most actuators in the market.

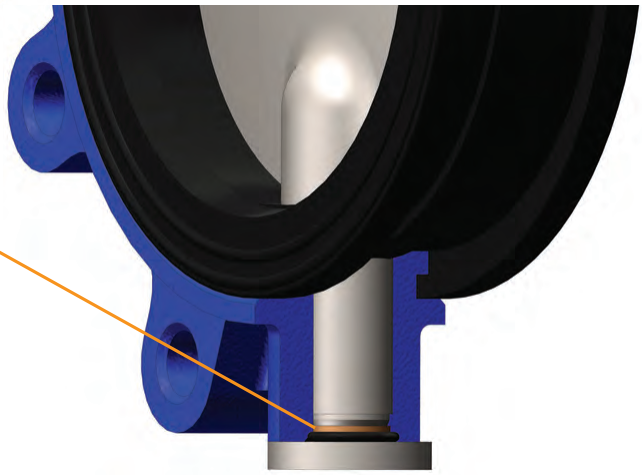
Blowout proof stem meets all API 609 requirements. Our unique design also creates a secondary stem journal seal preventing leakage to atmosphere.

A full length Nylatron® bushing reduces stem journal friction and reduces torque.

Pratt utilizes 2 internally driven shafts creating a strong drive connection and allowing for a thin profile disc creating high Cv's.

Thin profile, high tensil strength disc maximizes Cv's and allows for 230psi pressure rating.

Pratt's unique seat design utilizes 3 tongue and groove connection points to the valve body. Seats remain secure and stable even under high dead-end pressure and full vacuum services. The center tongue not only locks the seat in place, but allows rubber material to flow into the center body groove when cycling the valve, drastically reducing the operating torque.



Pratt's BF Series bottom cap provides lower stem retention and also creates a secondary stem journal seal preventing external leakage to atmosphere. 2"-12" lower shafts ride on a precision wear guide reducing shaft drag.

14" and larger utilizes an axial bearing to support the weight of the shaft and disc, providing a close to friction-free movement.