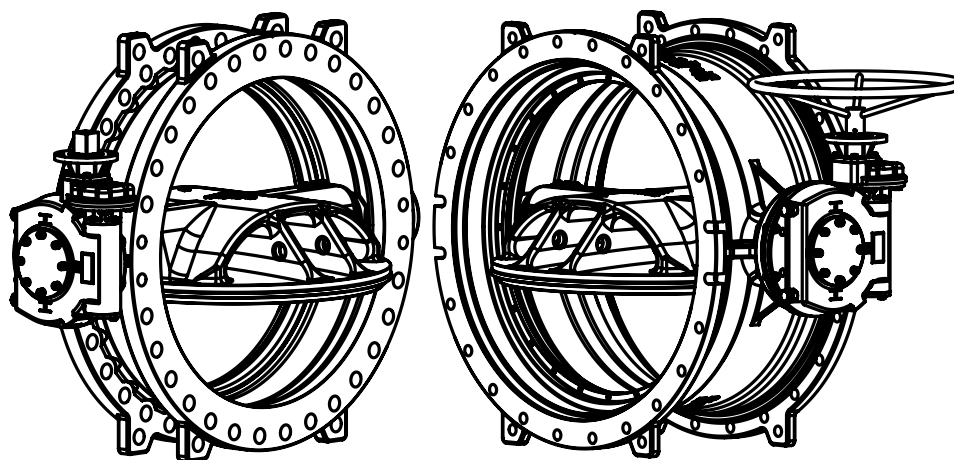


SAV MODEL B77 BUTTERFLY VALVE FIELD MAINTENANCE AND INSTRUCTION MANUAL FOR BUTTERFLY VALVES 24" - 48" EQUIPPED WITH ROTORK ACTUATOR OR HAND OPERATED LEVER

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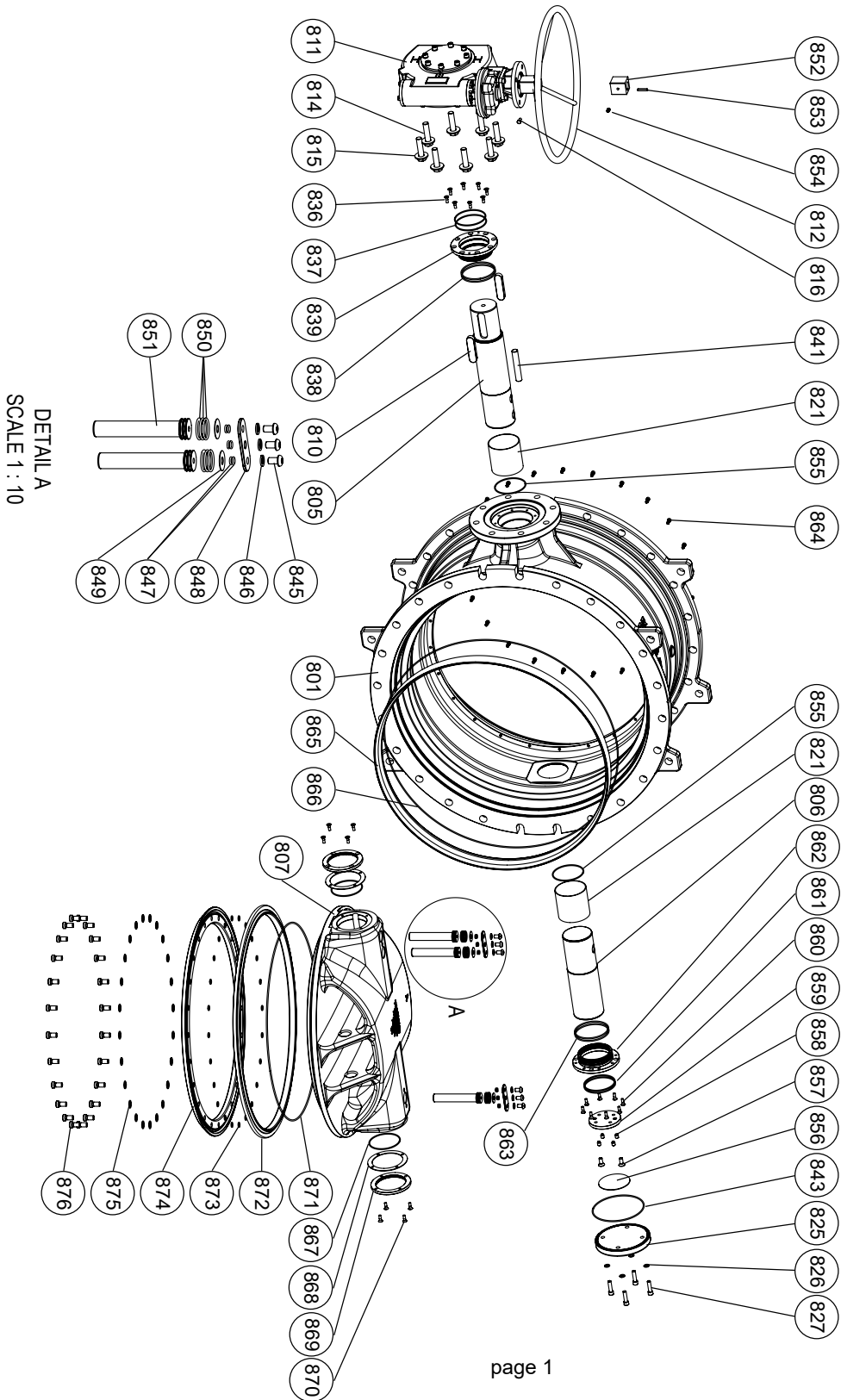
Components:

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SAV Model B77 Butterfly Valve Exploded Parts Breakdown 24-inch through 48-inch

- 801. Body
- 805. Drive Shaft
- 806. Stub Shaft
- 807. Disc Body
- 810. Gearbox Key
- 811. Gearbox
- 812. Hand Wheel
- 814. Gearbox Bolt
- 815. Gearbox Washer
- 816. Hand Wheel Screw
- 821. Axial Bearing
- 825. End Plate
- 826. End Plate Washers
- 827. End Plate Bolts
- 836. Upper O-ring Retainer Screws
- 837. Upper O-ring Retainer Inner O-rings
- 838. Upper O-ring Retainer Outer O-rings
- 839. Upper O-ring Retainer Safety Key
- 841. Safety Key
- 843. End Plate Dust O-ring
- 845. Pin Screw
- 846. Pin Lock Washer
- 847. Outer Pin O-ring
- 848. Pin Safety Plate
- 849. Pin Washer
- 850. Inner Pin O-ring
- 851. Disc Pin
- 852. Wrench Nut
- 853. Wrench Nut Key
- 854. Wrench Nut Set Screw
- 855. Axial Bearing O-ring
- 856. Axial Thrust Bearing Gasket
- 857. Axial Thrust Bearing Mounting Screws
- 858. Axial Thrust Bearing Adjustment Screws
- 859. Axial Thrust Bearing
- 860. Lower O-ring Retainer Mounting Screws
- 861. Lower O-ring Retainer Inner O-rings
- 862. Lower O-ring Retainer
- 863. Lower O-ring Retainer Outer O-rings
- 864. Seat Mounting Screws
- 865. Seat Ring
- 866. Seat Ring O-ring
- 867. Disc Cover O-ring
- 868. Disc Cover Gasket
- 869. Disc Cover

- 870. Disc Cover Mounting Screws
- 871. Disc Seal Retainer O-ring
- 872. Disc Seal
- 873. Disc Seal Retainer Mounting Screw O-rings
- 874. Disc Seal Retainer
- 875. Disc Seal Retainer Mounting Screw Washers
- 876. Disc Seal Retainer Mounting Screws



Item No.	Description	Material
801	Body	Ductile iron, ASTM A536
805	Drive Shaft	431 Stainless steel
806	Stub Shaft	431 Stainless steel
807	Disc Body	Epoxy coated ductile iron, ASTM A536
810	Gearbox Key	304 Stainless steel
811	Gearbox	N/A
812	Hand Wheel	Mild Steel
814	Gearbox Bolt	304 Stainless steel
815	Gearbox Washer	304 Stainless steel
816	Hand Wheel Screw	304 Stainless steel
821	Axial Bearing	Steel with PTFE
825	End Plate	Ductile iron, ASTM A536
826	End Plate Washers	304 Stainless steel
827	End Plate Bolts	304 Stainless steel
836	Upper O-ring Retainer Screws	304 Stainless steel
837	Upper O-ring Retainer Inner O-rings	EPDM NSF61
838	Upper O-ring Retainer Outer O-rings	EPDM NSF61
839	Upper O-ring Retainer	Aluminum Bronze
841	Safety Key	431 Stainless steel
843	End Plate Dust O-ring	NBR
845	Pin Screw	304 Stainless steel
846	Pin Lock Washer	304 Stainless steel
847	Outer Pin O-ring	EPDM NFS61
848	Pin Safety Plate	304 Stainless steel
849	Pin Washer	Zinc
850	Inner Pin O-ring	EPDM NFS61
851	Disc Pin	431 Stainless steel
852	Wrench Nut	Ductile iron, ASTM A536
853	Wrench Nut Key	304 Stainless steel
854	Wrench Nut Set Screw	304 Stainless steel
855	Axial Bearing O-ring	NBR
856	Axial Thrust Bearing Gasket	NBR
857	Axial Thrust Bearing Mounting Screws	304 Stainless steel
858	Axial Thrust Bearing Adjustment Screws	304 Stainless steel
859	Axial Thrust Bearing	304 or 316
860	Lower O-ring Retainer Mounting Screws	304 Stainless steel
861	Lower O-ring Retainer Inner O-rings	NBR
862	Lower O-ring Retainer	Aluminum Bronze
863	Lower O-ring Retainer Outer O-rings	NBR
864	Seat Mounting Screws	304 Stainless steel
865	Seat	304 or 316
866	Seat O-ring	NBR
867	Disc Cover O-ring	NBR
868	Disc Cover Gasket	NBR
869	Disc Cover	420 or 316
870	Disc Cover Mounting Screws	304 Stainless steel
871	Disc Seal Retainer O-ring	NBR
872	Disc Seal	EPDM
873	Disc Seal Retainer Mounting Screw O-rings	NBR
874	Disc Seal Retainer	316 Stainless steel
875	Disc Seal Retainer Mounting Screw Waashers	304 Stainless steel
876	Disc Seal Retainer Mounting Screws	304 Stainless steel

SAFETY

These operations and maintenance instructions must be observed and applied at all times.

Arbitrary alterations of this product and any appertaining parts are not allowed. SAV will not assume any liability for the consequent damage due to non-compliance with these instructions.

The generally acknowledged rules of technology must be observed by use of this product (e.g. the AWWA standard , ANSI/AWWA C504 etc.). The installation must be carried out by qualified personnel only (see also section – General safety instructions).

Please see the respective documentation for further technical information on dimensions, materials and applications.

SAV valves are designed and manufactured according to the highest standards and their safety of operation is generally ensured. However, valves may be potentially damaged if operated improperly or not installed for the intended use.

Make sure that the pipeline section is free from hazards and has been depressurized before removing any protective devices and/or performing any work on the valves. Any kind of unauthorized, unintentional or unexpected actuation as well as any hazardous movement caused by stored energy (pressurised air, water under pressure) must be prevented.

During monitoring or inspection of equipment, all relevant laws and regulations must be complied with (the Industrial Code, the Accident Prevention Regulations, the Ordinance of Steam Boilers and instruction pamphlets issued by the Pressure Vessel Study Group). In addition, local accident prevention regulations must be observed.

When a valve serving as an end-of-line valve is opened in a pressurised pipeline, this must be performed with the utmost care to prevent the emerging fluids from causing any damage. The valve must also be closed cautiously in order to avoid crushing or trapping.

When a valve is dismantled from a pipeline, fluids may emerge from the pipeline or the valve. Therefore, the pipeline must be emptied completely before the valve is dismantled. Be careful that residue does not continue flowing.

INTRODUCTION / DESCRIPTION

• DOUBLE ECCENTRIC DESIGN

- The center line of the valve disc is offset horizontally and vertical from the center line of the valve. This design ensure that the seat is not compressed when the valve is open, ensuring long seat life. Seat compression is relaxed after a few degrees of disc travel when opening which reduces seat friction a wear.

• DRY DISC HUB DESIGN

- The hub of the disc is O-ring sealed, preventing water from entering the disc hub, which reduces corrosion in this critical area.

• FLOW THROUGH DISC

- Minimizes head loss across the valve while maintaining strength and rigidity

• ACTUATION

- SAV provides both traveling nut and worm gear actuators. Electric actuators can easily be mounted on the F10 mounting flanges.

• SHAFT SEALS

- Multiple O-ring seals on the upper and lower shafts provide long trouble-free life and minimal torque requirements. The O-rings can be easily replaced in the unlikely event that is necessary.

• TESTING

- Tested according to the requirements of AWWA C504

RECEIVING AND STORAGE

Inspect valves upon receipt for damage in shipment. Unload all valves carefully without dropping. Do not allow lifting slings, chains, fork lift forks, or other lifting devices to pass through the valve. Use eyebolts or rods through the flange holes on large valves. Never lift the valve by its actuator.

Valves should remain crated, clean and dry until installed to prevent weather related damage. The Valve should remain slightly open while in storage, approximately 10 degrees.

For long term storage the valves should be stored indoors. The resilient seat should not be exposed to sunlight or other possible harmful agents such as ozone for long periods.

Electric actuators should be stored indoors. Follow the electric actuator manufacturer instructions for storage. Electric actuators with internal heaters must have the heaters wired and operating if the temperature is below 60F and the relative humidity is greater than 50%. Seal the wire entrance points against moisture.

INSPECTION PRIOR TO INSTALLATION

Make sure all mounting surfaces and disc seats are clean and free of foreign materials. Check the Gearbox bolting to the valve for any loosening during transit. If loose, tighten the mounting hardware. Open and close the valve to verify operation and proper stop adjustments for both the open and closed positions. Check that the valve rotation direction is correct and close the valve prior to installation.

INSTALLATION

WARNING: The line must be isolated, depressurized, and drained before installing/removing the valve to/from the system line. Failure to do so may cause pressure to be released resulting in severe injury or death.

Correct installation of the Model B77 Butterfly Valve is important for proper operation..

APPLICATIONS

It is recommended that the SAV double eccentric butterfly valve are used only in media with no risk of clogging.

SAV model B77 butterfly valves are suitable for use with the following media:

1. Drinking water and other neutral liquids.
2. Raw and cooling water (with the appropriate corrosion protection)

ACCEPTABLE OPERATING PARAMETERS

The pressure applied on the closed valve must not exceed the rated valve working pressure. The SAV double eccentric butterfly valve has adjustable mechanical limit stops on the gearbox to ensure a correct open and closed position. The stops have been set and sealed from factory to guarantee an optimum performance.

NOTE: Broken stop seals may affect the warranty.

SITE REQUIREMENTS

When the valve is installed between two pipeline flanges, these must be completely aligned. If not aligned, it may result in impermissibly high loads stressing the valve body during operation which may eventually lead to fracture.

When the valve is installed in a pipeline, make sure it is as tension-free as possible. The gap between the flanges must be large enough to avoid damage of the coating on the flange face during installation. The pipeline flanges must not be drawn towards the valve during installation.

If work around the valve may cause dirt (e.g. painting, masonry or work with concrete), the valve must be covered adequately. Assembly in drinking water pipelines requires approved sealing materials , lubricants and process material for drinking water only. The pipeline sections must be thoroughly cleaned and purified before the valve is set into operation.

INSTALLATION (cont.)

VALVE LOCATION

The location of the valve on site must allow sufficient space for maintenance.

If the valve is installed in the open air, make sure it is protected against extreme weather conditions (e.g. formation of ice) by adequate covers.

If the valve is installed as an end-of-line valve, make sure the free outlet side is not accessible for any kind of interference.

ADDITIONAL SYSTEM REQUIREMENTS

If the valve is used in a contaminated media, it requires a filter with a suitable mesh size placed upstream of the valve in order to prevent malfunction. The following distances must be kept to avoid irregular flow which could disturb the valve function:

- The distance to elbows strainers etc. must be kept to a minimum of NPS (Nominal Pipe Size), upstream or downstream.
- The distance to control valves must be kept to a minimum of 10 x NPS (Nominal Pipe Size), upstream of the butterfly valve.

INSTALLATION POSITIONS

SAV double eccentric butterfly valves in all nominal widths can be installed with shafts in horizontal position (with gear facing upwards or downwards). A vertical position of the valve shaft is possible but it may affect the service life of the valve. (See Fig. 1)

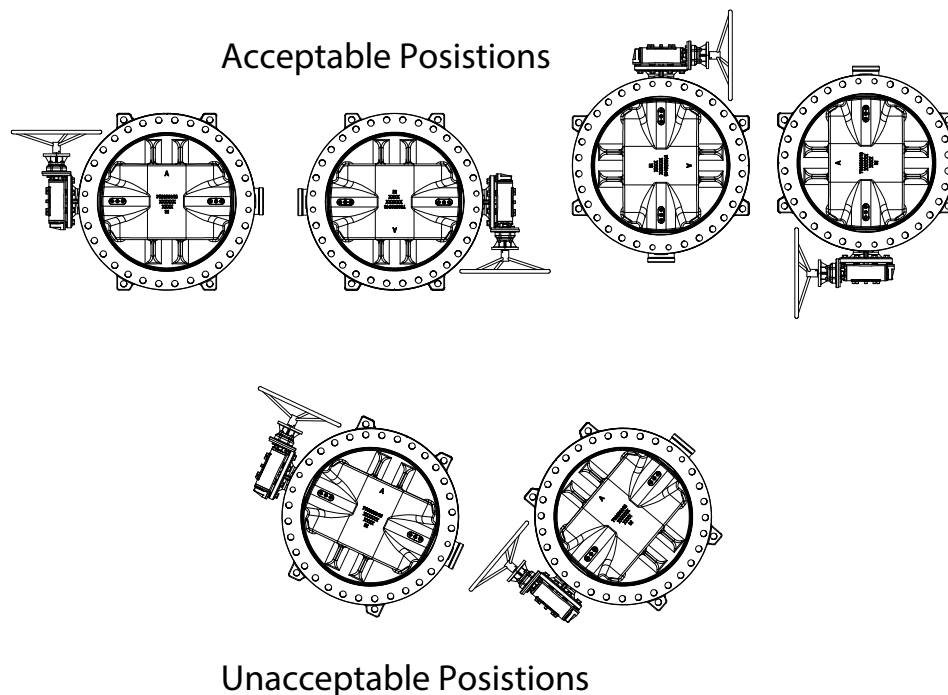


Fig. 1
page 5

ASSEMBLY INSTRUCTIONS

Check the valve for possible damage that may have occurred during transport or storage.

Protect the valve from any kind of dirt on the construction site by using an adequate cover until installation.

All components (like rubber sealing in the body and disk seat ring) must be thoroughly cleaned before installation in order to remove all dirt particles. SAV does not assume any liability for consequential damage caused by dirt, shot-blasting gravel residues etc.

If any equipment is sand-blasted for cleaning prior to the installation, make sure that this equipment is adequately covered. If solvents are used for cleaning, make sure that the solvents do not destroy the pipeline seals or the valve.

The sealing and operational parts must be checked for proper functionality before installation. If the valve needs a repaint at a later stage, it is important to keep sealing and operational parts completely free from paint. Also, it is not allowed to paint over the identification plates.

Make sure that the proper load suspension devices as well as means of transport and lifting devices are available during assembly of the SAV double eccentric butterfly valve.

When the SAV double eccentric butterfly valve is in open position, the disc may protrude beyond the overall length. Make sure there is enough space between the disc and other pipeline installations.

Suspending the valve by its disc may lead to damage or destruction of disc or valve.

Hexagon bolts and nuts with washers from flange to flange must be used in the through holes to connect the valve with the pipeline flanges. Fasten the bolts evenly and crosswise to prevent unnecessary tension with cracks or breaks in consequence. The pipeline must not be pulled towards the valve. If the gap between valve and flange is too wide, this must be compensated by thicker seals.

The seal material must be selected according to the operation conditions.

The operator must select bolts and nuts suitable for the respective operating pressure, temperature, flange material, operational loads and the seal. The choice of seal material and whether the seal is used in main friction connections or secondary friction connections will lead to very different tightening torques of the flange bolts. Therefore, the operator must choose the tightening torque of the flange bolts according to the above parameters.

Make sure the flange bolts are not tightened too hard as this may result in crack formations in the flanges.

Make sure that pipeline flanges are in alignment with each other during installation of the valve.

The pipeline must be laid in a way that prevents harmful pipeline forces from being transmitted to the valve body. If construction work near the valve is still in process, the valve must be adequately covered to protect it from dirt.

MECHANICAL JOINT VALVES

The successful operation of the mechanical joint requires that the plain end of the pipe be centrally located in the valve bell end, and that adequate anchorage be provided where abrupt changes in direction and dead ends occur. The rubber gasket will seal more effectively if the surfaces with which it comes in contact are thoroughly cleaned (for example, with a wire brush) just prior to assembly in order to remove all loose rust or foreign material. Lubrication and additional cleaning should be performed by brushing the gasket and the inside of the bell with pipe lubricant just prior to slipping the gasket onto the pipe and assembling the joint.

Valve Size In.	Bolt Size In.	Torque Range Ft. Lbs.
24-30	1 1/4	225-250
36-48	1 1/2	300-500

Table 1 - Flange Bolt Torque Values

VALVE SET-UP AND OPERATION

VISUAL INSPECTION AND PREPARATION

A visual inspection of all functional parts must be performed before valve and equipment are put into operation. Check if all bolted connections have been properly fastened.

Functional check and pressure test Prior to operation, the functional parts of the valve must be opened and closed completely at least once to ensure a trouble-free operation.

.Warning: It is not allowed to operate the SAV double eccentric butterfly valve in a dry state more than once due to the risk of damaging the disc seals and/or increasing the torques. A newly installed pipeline system must be thoroughly cleaned to remove all foreign particles. Residue or dirt particles in the pipeline may damage the valve function or its free movement.

Please note that after repair work or upon commissioning of new equipment, it is very important to clean the pipeline system again with the valve in fully open position. If detergents or disinfectants are used, it must be ensured that these materials do not attack the valve material. As a standard, the valve is closed by turning the hand wheel clockwise towards the gearbox.

The dimensions of stem and actuators allow valve operation by one person via hand wheel. The 90° turn is confined by a limit stop on the gear. If it is turned any further due to excessive force, this may cause damage. Check that the function is working properly by opening and closing the valve several times (not in a dry state).

ACTUATORS

Actuators (gear and electric actuators) are designed for flow velocities according to ANSI/AWWA C504 . Any deviating operating conditions need to be specified. Adjustment of the limit stops (open, close) must not be changed without the manufacturer's approval. If the valve is installed without gear units, it must be ensured that the valve is not pressurised.

The SAV double eccentric butterfly valve has an adjustment angle of 90°. The valve itself is not equipped with position limiters.

OPERATING TORQUE

Operating torques are the maximum required torques (in Ft.-Lb.) acting on the gearbox input shaft at full differential pressure.

MAINTENANCE AND REPAIR

GENERAL SAFETY INSTRUCTIONS

These instructions must be followed prior to inspection and/or maintenance work on the valve or its assemblies:

- Shut off the pressurized pipeline and depressurize it.
- Secure it against inadvertent activation
- Comply with all required safety regulations- depending on the type and risk of the fluid conveyed.

When the inspection/maintenance work is completed, all connections must be checked for tightness before resuming operation, perform the steps described for initial set-up according to "Set-up and valve operation".

Do not remove the gearbox on a pressurised valve!

Statutory and local provisions as well as the safety and accident prevention regulations must be observed and complied with at all times.

Service, maintenance and inspection work as well as replacement of spare parts must be carried out by qualified personnel only. The plant operator is responsible for selecting qualified personnel to carry out any of this work.

If the plant operator does not have personnel with the qualifications required, a training course must be initiated. Upon request, such training course can be held by SAV service employees. The plant operator must ensure that all employees concerned fully understand the operation and maintenance instructions as well as all further instructions referred to here.

Protective equipment such as safety boots, safety helmets, goggles, protective gloves etc. must be worn during any kind of work that prescribes such protective equipment. Incorrect use of the valve must be avoided.

INSPECTION AND OPERATION INTERVALS

At least once a year, the valve must be inspected for tightness, proper operation and corrosion protection. In case of extreme operating conditions, such inspection is required more frequently.

RECOMENDATIONS FOR REPLACEMENT PARTS

Replace O-rings whenever necessary. Intervals of replacement depend on the operating conditions.

REPAIR PROCEDURES

Leakage, broken parts, hard operation, and other defects should be corrected by a repair crew as soon as possible after the defect has been reported. If repairs are to be performed in the field, the repair crews should take a full complement of spare parts to the jobsite. Provisions should be made to isolate the defective valve from water pressure and relieve internal trapped pressure prior to performing any corrective maintenance. Disassembly of the valve should be accomplished in accordance with the procedure supplied in the following sections. After repairing the valve, the operating mechanism should be cycled through one complete operating cycle. With full line pressure applied to the valve in the open position, an inspection should be made to detect leakage in the areas around the seal plate, bonnet, packing gland, and body-end connections. A record should be made to indicate that the valve has been repaired and is in working condition. Any marking that the valve is inoperable should be removed. In addition, fire department and other appropriate municipal departments should be informed of satisfactory repair of the valve.

UPPER O-RING RETAINER, O-RING REPLACEMENT

Note: Shut off the pressurized pipeline and depressurize it.

1. Turn the Disc Assembly (F807) to the closed position.
2. Support the Gearbox (F811) safely.
3. Remove the Gearbox Bolts (F814) using an open end wrench. Set the Gearbox Bolts (F814), and Gearbox Washers (F815) aside for use during re-assembly. (See Fig. 2A)
4. Remove the eight, Upper O-ring Retainer Screws (F836) from the Upper O-ring Retainer (F839) using an allen wrench. (See Fig. 2B)
5. Remove old, Upper O-ring Retainer Inner O-rings (F837) and Upper O-ring Retainer Outer Orings. (F838)
6. Clean Seal House. (F839)
7. Grease and install new o-rings.
8. Re-install in reverse order and tighten screws.

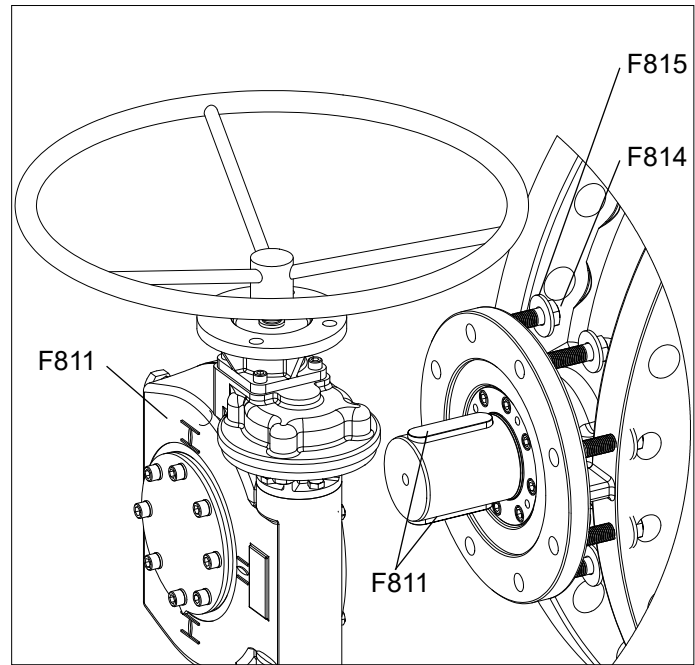


Fig. 2A

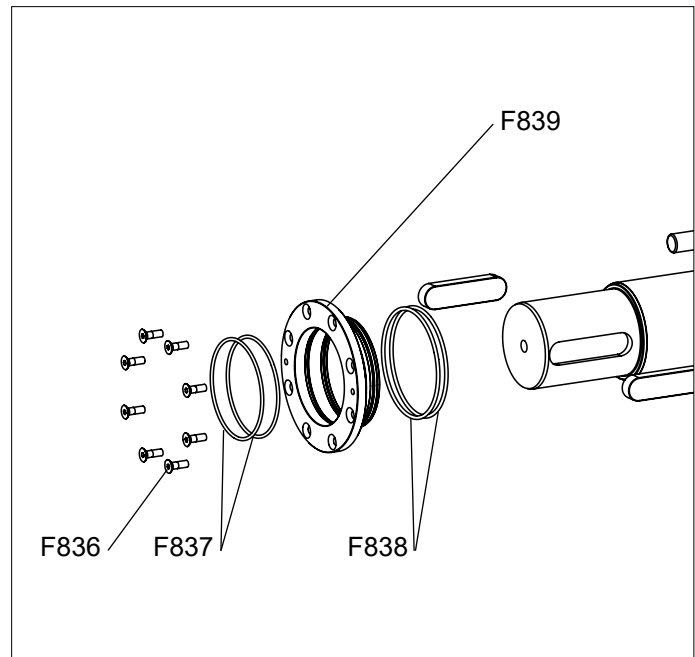


Fig. 2B

END PLATE O-RING REPLACEMENT

Note: Shut off the pressurized pipeline and depressurize it.

1. Turn the Disc Assembly (F807) to the closed position.
2. Remove the four End Plate Bolts (F827), End Plate Washers (F826), and End Plate (F825) using an allen wrench. (See Fig. 2C)
3. Remove old End Plate Dust O-ring (F843) and Axial Thrust Bearing Gasket (F856).
4. Clean End Plate. (F825)
5. Grease and install new o-ring. Replace Axial Thrust Bearing Gasket (F856).
6. Re-install in reverse order and tighten screws.

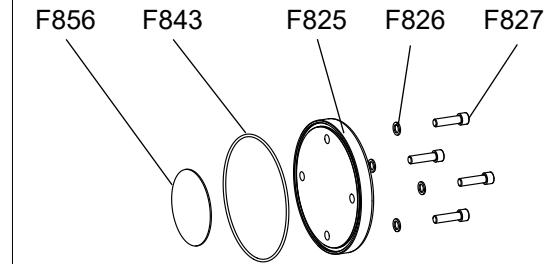


Fig. 2C

LOWER O-RING RETAINER, O-RING REPLACEMENT

Note: Shut off the pressurized pipeline and depressurize it.

1. Follow instructions to remove End Plate.
2. Remove the four End Plate Bolts (F827), End Plate Washers (F826), and End Plate (F825) using an allen wrench. (See Fig. 2C)
3. Remove old End Plate Dust O-ring (F843) and Axial Thrust Bearing Gasket (F856).
4. Clean End Plate. (F825)
5. Grease and install new o-ring. Replace Axial Thrust Bearing Gasket (F856).
6. Remove the eight Lower O-ring Retainer Mounting Screws (F860) (See Fig. 2D)
7. Remove the Lower O-ring Retainer (F862), along with the Lower O-ring Retainer Inner O-rings (F861), and Lower O-ring Retainer Outer O-rings (F863).
8. Remove the old o-rings from the Lower O-ring Retainer (F862).
9. Clean the Lower O-ring Retainer (F862) and install new orings (F861) and (F863).
10. Re-install in reverse order and tighten screws.

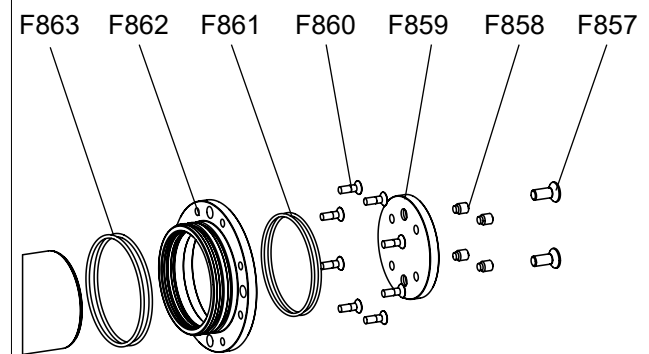


Fig. 2D

TROUBLESHOOTING GUIDE

WARNING: The butterfly valve must be isolated before performing any maintenance. Failure to do so may cause pressure to be released resulting in severe injury or death.

Several problems and solutions are presented below to assist you in troubleshooting the hydrant.

PROBLEM: Valve making noises.

Probable Cause: Unfavorable installation position causing unfavorable flow around or inside the valve might be installed too closely downstream of an elbow.
Valve operating beyond its design limits.

Corrective action: Change installation position.
Check design and/or operation data, change flow resistance in the valve – if required – by using different intervals.

PROBLEM: Valve can't operate or is hard to operate.

Probable Cause: Foreign particle/object in the seat area.

Corrective action: Flush valve; if required, disassemble valve and remove foreign object.

Probable Cause: Electric actuator not connected to power supply.

Corrective action: Connect to power supply.

Probable Cause: Unfavorable flow and impairment of movement.

Corrective action: Change installation position.

PROBLEM: Valve seat leaking.

Probable Cause: Valve not closed.

Corrective action: Close valve.

Probable Cause: Foreign particle/object in the seat area.

Corrective Action: Flush valve; if required, disassemble valve and remove foreign object.

PARTS AND SERVICE

For information on parts and service for your area contact SAV. Make a note of the valve model number and size located on the valve and contact:

Steel Arch Valves Company

14527 West 112th Street
Overland Park, KS 66210

PH: 913-513-0886

FAX: 913-535-6220

www.steelarchvalves.com

SAV Company warrants its Model B77 Butterfly Valves to be free from defects in workmanship and materials for a period of one (1) year from the date of shipment from SAV Company except as noted. SAV Company shall have no obligation under this warranty unless it is notified of claims hereunder promptly and in writing upon discovery thereof and within the warranty period, and unless the product is delivered to SAV Company within thirty (30) days of such notice.

SAV shall have the right to inspect said product before it is removed from installation. If the product is removed from installation prior to approval from SAV this warranty shall be void.

As to motors, gearing or accessory equipment purchased by SAV Company from other manufacturers, and used or incorporated into SAV Company's products, those manufacturers' warranties shall apply.

SAV Company's sole responsibility shall be, in its sole discretion, to replace the product with the same or a similar product, repair the product, or refund the price paid for the product provided the product has been properly applied and used under normal service and under conditions for which it is designed. SAV Company shall not be liable for indirect, special, incidental, or consequential damage or penalties and does not assume any liability of purchase to others or to anyone for injury to persons or property.

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