

Installation, Operation, and Maintenance Manual

MasterSeries® 850, 856, 870V, 876V

Double Check Valve Assembly
Double Check Detector Assembly

2½" – 10"

⚠ WARNING



Read this Manual **BEFORE** using this equipment. Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment. Keep this Manual for future reference.



⚠ WARNING

Local building or plumbing codes may require modifications to the information provided. You are required to consult the local building and plumbing codes prior to installation. If the information provided here is not consistent with local building or plumbing codes, the local codes should be followed. This product must be installed by a licensed contractor in accordance with local codes and ordinances.

⚠ WARNING

Need for Periodic Inspection/Maintenance: This product must be tested periodically in compliance with local codes, but at least once per year or more as service conditions warrant. All products must be retested once maintenance has been performed. Corrosive water conditions and/or unauthorized adjustments or repair could render the product ineffective for the service intended. Regular checking and cleaning of the product's internal and external components helps assure maximum life and proper product function.

NOTICE

If an assembly is recommended where installation may be problematic, the assembly must be protected and secured. Remove the handles of shutoff valves to discourage tampering, or install a protective enclosure to discourage vandals. When opting for an enclosure, install the protective cover so that adequate clearance is available for maintenance and testing. Consult local codes before installing any type of protective enclosure.

These MasterSeries valve assemblies are engineered to safeguard drinking water supplies from hazardous cross-connections, meeting national plumbing codes and water authority requirements for non-health-hazard, non-potable applications such as irrigation, fire protection, and industrial processes. The iron components of each backflow preventer feature ArmorTek®—a patented, three-layer advanced epoxy coating designed to minimize microbial-induced corrosion (MIC) and shield exposed metal surfaces.



LF850-0SY



LF876V-DCDA-0SY

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A WATTS Brand

How It Operates

The Double Check valve assemblies incorporate two independently operating, spring-loaded check valves. With no flow, each check valve produces an approximate pressure drop of 1.0 psig. A complete assembly includes two shutoff valves and four test cocks. (See Figures 1, 2, and 3.)

NOTE: When installed vertically, Models 870V and 876V require vertical support beneath the second check body section.

For bypass operation on Double Check Detector valve assemblies, all low-flow demands up to a minimum of 3 gpm pass exclusively through the bypass assembly. Flows exceeding 3 gpm pass through both the bypass and the main line valve, though meter registration is not accurate at these higher flow rates.



Figure 1
LF850

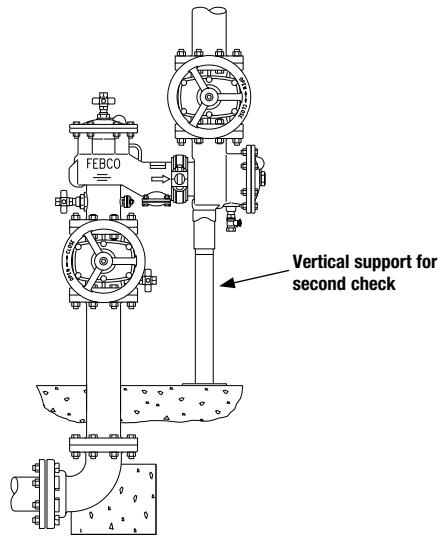
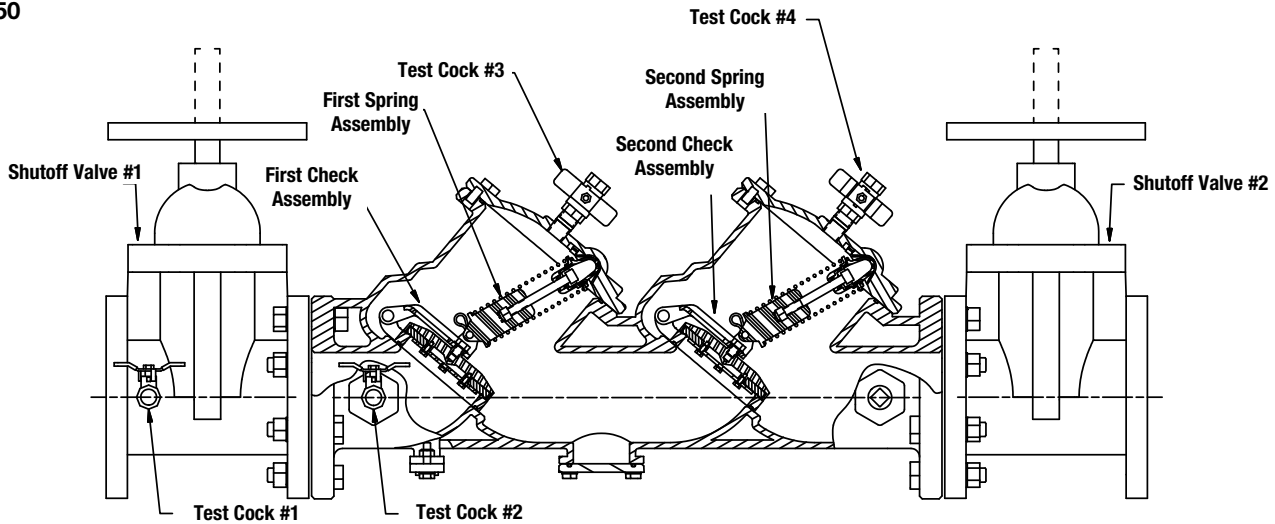


Figure 2
LF870V Vertical Configuration

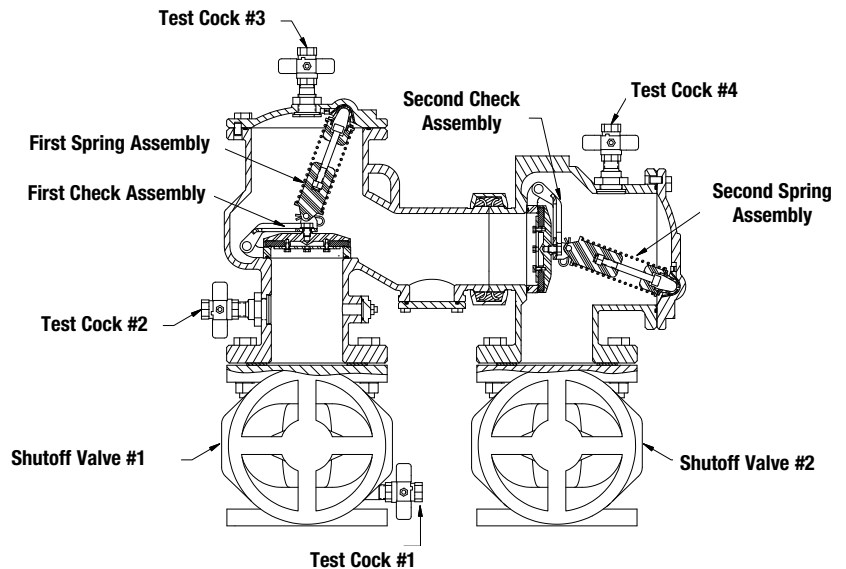


Figure 3
LF870V Standard Configuration

Vandalism Protection

If the valve assembly is installed where vandalism is problematic, the assembly must be protected and secured. Consider the following options:

- For ½" to 2" assemblies, remove the shutoff valve handles to help prevent tampering.
- For 2½" to 10" assemblies, loop a chain through both shutoff valve handwheels and secure it with a lock. Test cock handles can also be removed to further discourage tampering.
- For an assembly installed in conjunction with a fire sprinkler system, place a tamper switch on the OS&Y shutoff valves to trigger an alarm if an unauthorized closure occurs.
- Install a protective enclosure to discourage vandals. When opting for an enclosure, install the protective cover so that adequate clearance is available for maintenance and testing. Consult local codes before installing any type of protective enclosure. (See Figure 4.)

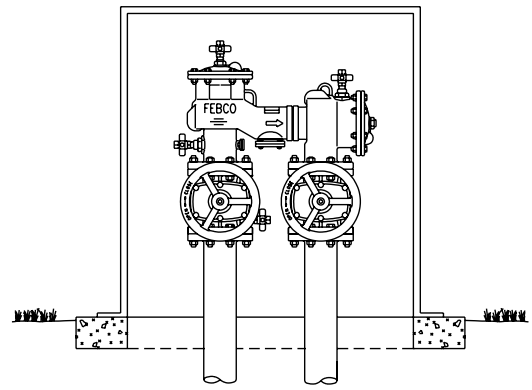


Figure 4
LF870 in Protective Enclosure

Freeze Protection

The Double Check valve assembly can be damaged if internal water is allowed to freeze. Protect the assembly with a heated enclosure, insulation with heat tape, or other suitable freeze-prevention methods. The assembly must remain accessible for testing and maintenance. If the system is shut down during freezing conditions, use the following procedures to drain the internal passages.

Main Valve Draining

Use the appropriate procedure to properly drain the main valve during shutdown in freezing conditions.

Size ½" to 2"

1. Close the main shutoff valve.
2. Open the inlet drain.
3. Open the inlet and outlet ball valves to a 45 degree (half-open/half-closed) position.
4. Open all test cocks.
5. Open the outlet drain.
6. Remove the cover and inlet check module to allow all internal water to drain back through the inlet drain.
7. If compressed air is used to blow out the piping downstream of the backflow assembly, do the following:
 - a. Connect the air supply to the outlet drain and close the outlet ball valve.
 - b. After clearing the system with air, partially open the outlet ball valve.
 - c. Leave all drain valves, test cocks, and ball valves in the half-open/half-closed position for the winter.

Size 2½" to 10"

NOTE: See the drawings on later pages for item identification.

Slowly close supply valve within freeze protected area, open all test valves on the backflow preventer. Water in the zone between the two checks may be drained by loosening the bolts (Item 24) on the bottom cover plate (Item 19).

All water drains from the inlet side and the zone between the two checks on Series 870V. On Series 850, water on the inlet side drains to the No. 1 test cock. Remaining inlet-side water may be drained from the lowest point by removing the small bottom plate (Item 36). If a drain plug is desired, the cover (Item 19) has sufficient material for drilling and tapping a ¼" IPS thread, though adding a drain plug is not required. Loosen the mounting nuts and bolt to allow drainage from beneath the plate.

The system design must provide a means of draining upstream of the No. 1 shutoff valve and downstream of the No. 2 shutoff valve.

Position the assembly shutoff valves and test cocks in the half-open/half-closed position to ensure complete draining of the shutoff valve bodies and test cocks.

Ball Valve Shutoff Draining

NOTE: Assemblies with ball valve shutoffs must also have the shutoff valves drained to prevent freeze damage.

1. After the draining the backflow prevention assembly, position all ball valve shutoffs and test cocks in a half-open, half-closed 45 degree position. (See Figure 5.)
2. Open the ball valve approximately 45 degrees, while draining the pipeline and assembly, to allow water between the ball valve and valve body to drain. Leave the ball valve in this position for the winter to prevent freeze damage.
3. Fully close the ball valves before the system is repressurized. **OPEN AND CLOSE BALL VALVES SLOWLY TO PREVENT DAMAGE TO THE SYSTEM CAUSED BY WATER HAMMER.**

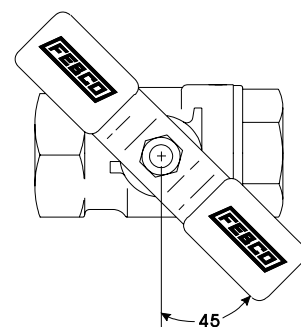


Figure 5
Ball Valve, ½" – 2"

General Service Guidelines

- Service the FEBCO assemblies with commonly available tools. The assemblies are designed for ease of maintenance and to be serviced in line. Removal from the line during servicing is unnecessary. No special tools are required.
- Flush the line clean of debris before installing the assembly. The most common cause of check fouling and relief valve discharge is dirt and debris in the seating areas. To flush the line after installation, slowly close the inlet shutoff valve, remove the covers and spring assemblies of both check valves, and open the inlet shutoff valve to allow sufficient flow of water through the assembly to clear all sand, debris, and other matter from the line. If debris in the water continues to cause fouling, a strainer may be installed upstream of the assembly. Check local codes for these requirements.
- Rinse all the parts with clean water before reassembly.
- For Series 870V and 876V, use lubricant only on the No. 2 check cover O-ring to help hold the O-ring in place during reassembly. Apply a thin coating of the lubricant supplied in the repair kit to the O-ring groove in the No. 2 check body, and position the O-ring in the groove.
- Carefully inspect seals seating surfaces for damage or debris. If the check valve seat disc has been severely cut at the seat ring diameter, the assembly has been subjected to extremely high and repeated backpressure. Either thermal water expansion or water hammer are the most likely causes. If backpressure persists, consider installation of a pressure relief valve downstream of the assembly.
- Use caution to avoid damaging any guiding surfaces while handling parts. Do not force parts together. The O-ring seals used in the assemblies require only a small tightening force to ensure a positive seal.
- Test the assembly after servicing in accordance with the locally approved test method to ensure proper operation.
- See the applicable lists on later pages for parts identification and the cut-a-way views for visual aid information.

Check Valve Disassembly and Reassembly

NOTE: For the following procedures, see the cross-sectional views on later pages for location of the numbered items.

Spring Module Removal

1. Slowly close the outlet shutoff valve and inlet shutoff valve. Bleed residual pressure by opening test cocks No. 4, No. 3, and No. 2 in that order.
2. Remove the cover bolts, taking off last the two bolts located next to the retainer pin, then remove the cover.

NOTE: The spring module is positioned in the body by the cover. The spring is captured in the module.

3. Remove the pivot bearing (Item 13) from the upper spring retainer of the spring module. Inspect the pivot bearing (Item 13) and bearing socket (Item 15). Any small hole in the bearing socket indicates replacement is required. Remove the retaining clip (Item 5.1) from the groove on one end of the load pin (Item 7). Hold the spring module with one hand while sliding out the load pin (Item 7) from the arm (Item 4). Lift out the spring module and inspect for wear or damage. Replace the spring module if necessary.

Check Disk Removal

Remove the jam nut (item 16) and washer (item 17) from the check disc stem threads. Lift the arm and remove the check disc (item 6). Inspect the sealing surface for debris or damage. Replace the check disc if necessary.

NOTE: When the jam nut (Item 16) is tight, the check disc is designed to wobble.

Seat Ring Assembly Removal

NOTE: Remove the seat ring assembly only if the seat ring (item 3) or the arm (item 4) shows wear or damage. (See Figure 6.)

1. Remove the locknuts (item 3.4).

NOTE: When reassembling, tighten the locknuts to 40 to 50 in./lb. If leaking occurs around the bolt, further tighten it until the leaking stops. Do not overtighten.

2. Remove the seat ring assembly.
3. Remove the retaining clip (Item 5) from one end of the swing pin (Item 4.2). Hold the arm (Item 4) while sliding out the swing pin (Item 4.2). Inspect the bushings (Item 4.1) and pin (Item 4.2) for wear or damage. Replace if necessary. Inspect the gasket (Item 3.1) for debris and/or damage. Replace if necessary.

NOTE: Reverse this procedure to reassemble the components. The seat ring fits into the body only one way. Check the alignment of the seat ring if the studs don't align with the body holes. The gasket is also nonsymmetric. Both the seat ring and the gasket have a notch that indicates the nonsymmetric hole. Clean all parts thoroughly with clear water before reassembly. Reassemble and bleed test cocks No. 4 and No. 3. Repressurize and test the assembly in accordance with the locally approved test method.

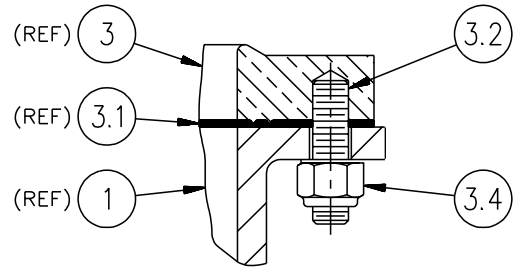


Figure 6
Seat Ring

Testing

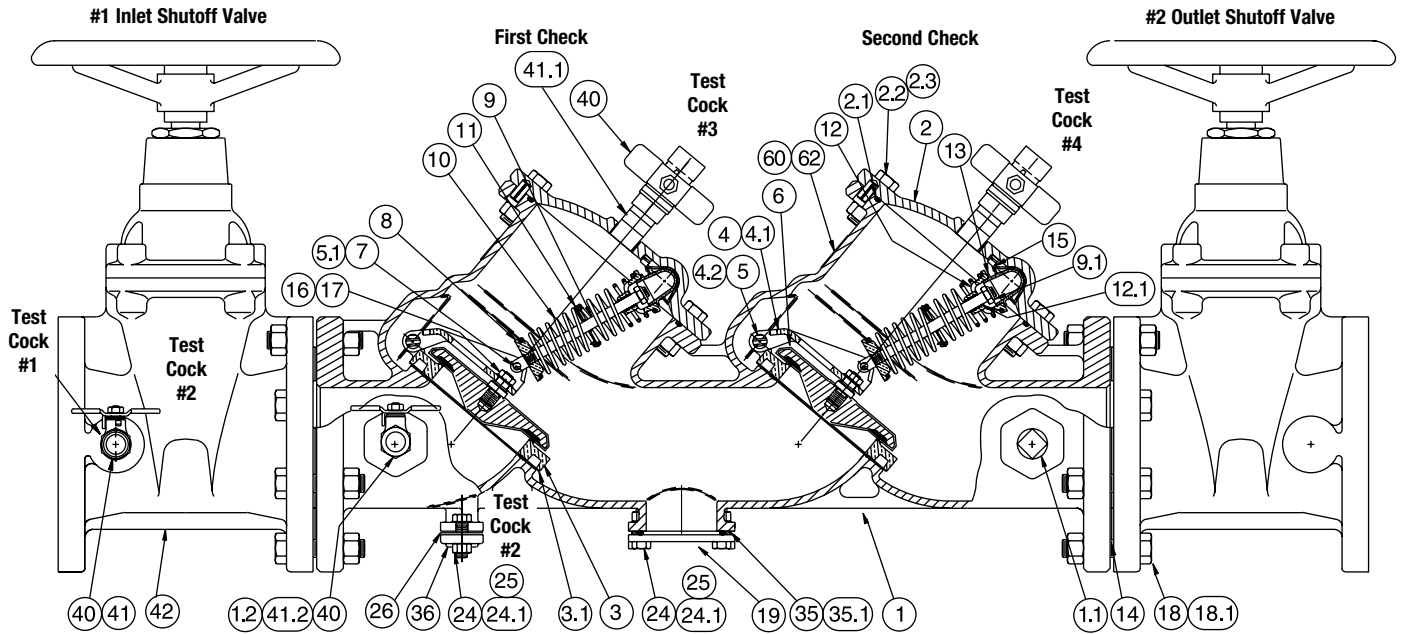
Inspect all mechanical devices on a regular basis to ensure proper operations. Test the assembly at the time of initial installation, after servicing or maintenance, and at least annually thereafter. Acceptable test procedures are published by Foundation for Cross Connection Control and Hydraulic Research at the University of Southern California (USC), American Water Works Association (AWWA), American Society of Sanitary Engineering (ASSE Series 5000), and Canadian Standards Association (CAN/CSA B64.10). Consult the regulatory authority for information specific to the local area.

Troubleshooting

Call customer service if you need assistance with technical details.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Check fails to hold 1.0 psid minimum	Debris on sealing surfaces	Inspect and clean
	Leaking shutoff valve	Inspect and clean, or repair
	Damaged seat or seat disc	Disassemble and replace
	Spring stem not moving freely	Inspect for debris or damage
Chatter during flow conditions	Worn and damaged parts	Inspect and replace
Low flow passing through the mainline valve (DCDA only)	Mainline check fouled	Inspect and clean, or repair
	Bypass plugged	Inspect and clean

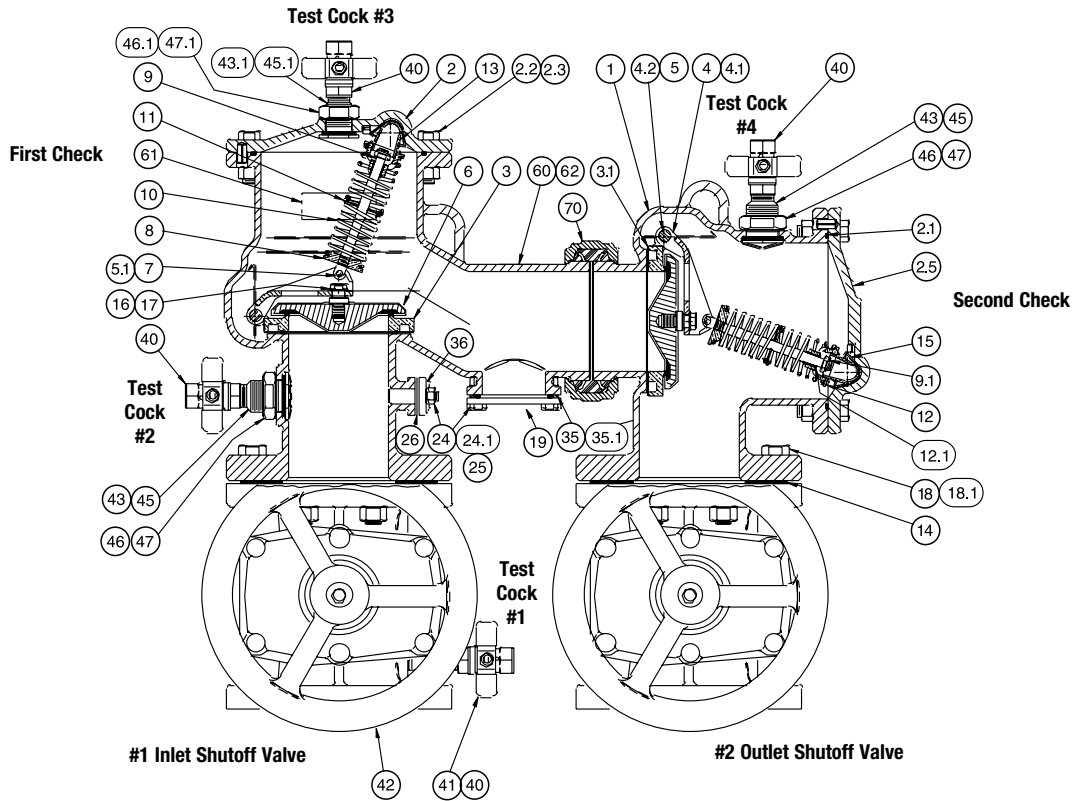
Repair Parts 850, 856



ITEM DESCRIPTION	STYLE	SIZE	2½", 3"	4"	6"	8", 10"
DISC ASSEMBLY Items 6, 16, 17	N-Shape Only	Part #	905182	905153	905154	905155
SINGLE SPRING MODULE Items 5.1, 7, 8, 9, 9.1, 10, 11, 12, 12.1	850	Part #	905142	905143	905144	905145
	856	Part #	905147	905148	905149	905150
CHECK REPLACEMENT KIT Items 2.1, and 3 - 17	850	Part #	905527	905534	905537	905539
	856	Part #	905529	905536	905538	905541
SEAT RING/ARM ASSEMBLY Items 3, 3.1, 3.2, 3.4, 4, 4.1, 4.2, 5	ALL	Part #	905157	905158	905159	905160
RUBBER PARTS KIT Items 2.1, 3.1, 6, 15, 26, 35, 35.1, 45, 45.1	ALL	Part #	905249	905163	905164	905165
COVER ASSEMBLY Items 2, 2.1, 15	With Bulkhead Fitting	Part #	905167	905168	905169	905170
	TAPPED	Part #	905376	905377	905378	905379
BULKHEAD FITTING FOR COVER* Items 43.1, 45.1, 46.1, 47.1	850	Part #	905275		905277	
	856	Part #	905275		905277	
BULKHEAD FITTING FOR BODY* Items 43, 45, 46, 47	850	Part #	905276		905277	
	856	Part #	905277			

*Bulkhead fittings are not furnished on late models. Very early productions of Series 856 may require a different bulkhead fitting. Consult your FEBCO representative for assistance.

Repair Parts 870, 870V, 876, 876V



ITEM DESCRIPTION	STYLE	SIZE	2½", 3"	4"	6"	8"	10"
DISC ASSEMBLY Items 6, 16, 17 (10", Item 6 only)	ALL	Part #	905152	905153	905154	905155	400145
SINGLE SPRING MODULE Items 5.1, 7, 8, 9, 9.1, 10, 11, 12, 12.1	870 870V	Part #	905142	905143	905144	905145	905146
	876 876V	Part #	905147	905148	905149	905150	905151
CHECK REPLACEMENT KIT Items 2.1, and 3 - 17	870 870V	Part #	905528	905534	905537	905539	905540
	876 876V	Part #	905530	905536	905538	905541	905542
SEAT RING/ARM ASSEMBLY Items 3, 3.1, 3.2, 3.4, 4, 4.1, 4.2, 5	ALL	Part #	905157	905158	905159	905160	905161
RUBBER PARTS KIT Items 2.1, 3.1, 6, 15, 26, 35, 35.1, 45, 45.1	ALL	Part #	905162	905163	905164	905165	905166
COVER ASSEMBLY (Inlet Check)* Items 2, 2.1, 15	ALL	Part #	905167	905168	905169	905170	905171
COVER ASSEMBLY (Outlet Check)* Items 2, 2.1, 15	ALL	Part #	905244	905245	905246	905247	905248
BULKHEAD FITTING FOR COVER* Items 43.1, 45.1, 46.1, 47.1	870 870V	Part #	905275			905277	
	876 876V	Part #	905275			905277	
BULKHEAD FITTING FOR BODY* Items 43, 45, 46, 47	870 870V	Part #	905276			905277	
	876 876V	Part #	905277				

* Bulkhead fittings are not furnished on late models. Very early productions may require a different bulkhead fitting. Consult your FEBCO representative for assistance.

Service Procedures Series 805YB, 3/4" Bypass

NOTE: See the next page for visual identification and location of parts.

Bypass Check Valve Inspection and Repair

1. Close the inlet and outlet shutoff valves. Bleed residual pressure by opening first the No. 4 test cock, then the No. 3 and No. 2 test cocks.
2. Unscrew the cap using an appropriate size wrench.

CAUTION

The cap is spring loaded.

3. Remove the spring and disc holder assembly.
4. Inspect the guiding bore of the cap and poppet stem for any buildup of calcium or other mineral deposits. If a buildup exists, remove it carefully with a 5/8" (0.625) reamer or a thin blade knife.
5. Check the disc holder and stem movement in the guide to ensure these move freely. Debris can inhibit proper movement.

Check Valve Seat Disc Replacement

1. Hold the disc holder assembly in one hand and remove the screw and disc washer.

CAUTION

The use of pliers or other tools may damage the guiding surfaces and require unnecessary replacement. Do not scratch or mark sealing or guiding surfaces

2. Inspect the seat disc for wear or cuts. Remove the old seat disc and replace it. (The disc may be turned over for temporary repair until a new disc is available.)
3. If the seat disc has been severely cut along the seat ring diameter, the assembly is being subjected to extremely high backpressure from thermal water expansion, water hammer, or other causes of excessive water pressure. Replace the seat disc if it is damaged in such a manner. Do not turn over the seat disc for reuse.

Check Seat Ring Replacement

NOTE: The seat ring is threaded into the body with an O-ring seal against the body.

1. Replace the seat ring only if the sealing edge is damaged. Using an inside pipe wrench (1-inch IPS size), grip the inside surface of the seat ring and loosen the part.
2. Unscrew the seat ring and O-ring and discard.
3. Using lubricant supplied with the repair kit, apply a thin coating of lubricant to the O-ring surface and position the O-ring on the seat ring.
4. Thread the seat ring and O-ring into the body until the O-ring is compressed and the seat ring contacts the body. Tighten by hand only. Do not overtighten.

Check Valve Reassembly

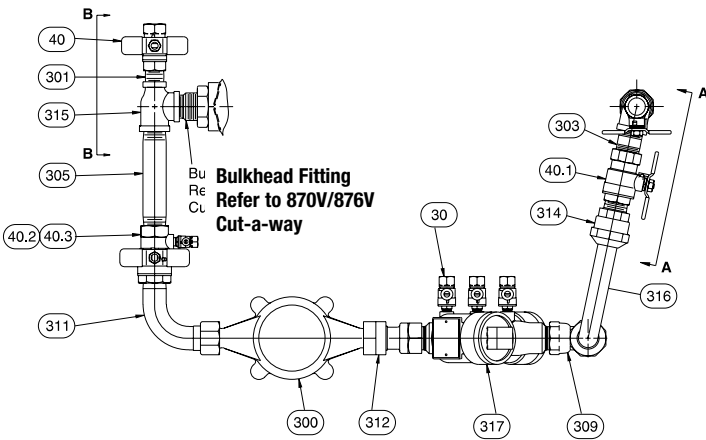
1. Position the disc in the cleaned holder and retain it with the disc washer and screw.
2. Position the spring around the centering ring of the disc holder and reinsert the disc holder assembly into the check body.
3. Apply a thin coating of lubricant (food grade) on the O-ring in the cap and thread the cap onto the check valve body using the appropriate sized wrench.
4. Close No. 4, No. 3, and No. 2 test cocks and slowly open first the inlet and then outlet shutoff valves. Return the assembly to service.
5. Test the assembly to ensure it operates properly.

Repair Parts 805YB, Bypass

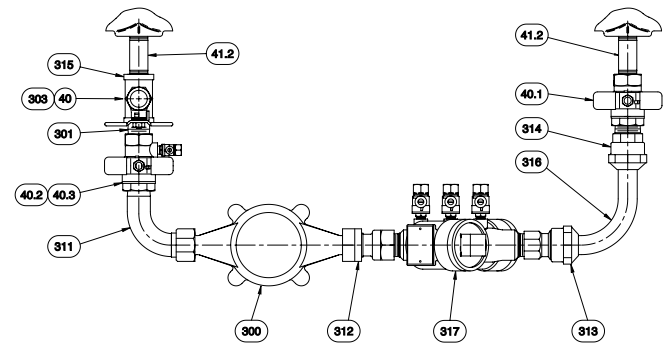
ITEM	DESCRIPTION	MATERIALS
1	Body	Bronze
7	Cap	Bronze
8	O-ring	Buna-N
9	Disc Holder	Acetal
10	Seat Disc	Nitrile
11	Washer	Stainless Steel
12	Screw	Stainless Steel
13	Spring	Stainless Steel
30	Test Cock	Bronze
35	Seat Ring	Bronze
36	O-ring	Buna-N
40	Ball Valve	Bronze
40.1	Ball Valve	Bronze
40.2	Ball Valve w/tap	Bronze
40.3	Test Cock	Bronze

ITEM	DESCRIPTION	MATERIALS
300	Water	Meter
301	Nipple	Brass
302	Nipple	Brass
303	Nipple	Brass
305	Nipple	Brass
309	Elbow	Bronze
311	Elbow	Bronze
312	Fitting	Bronze
314	Fitting	Bronze
315	Tee	Brass
316	Elbow	Copper
317	805YB-3/4"	
Part No. 905-042	805YB Rubber Repair Kit	
Part No. 905-044	805 YB Check Assembly	
Part No. 905-280	805 YB Seat Ring Kit	

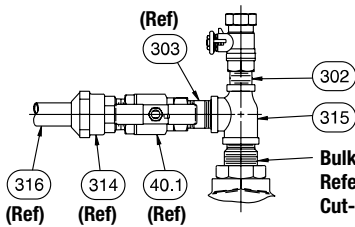
Series 876V Bypass



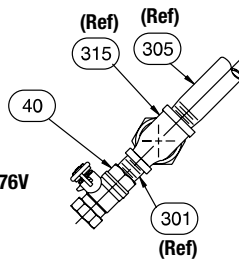
Series 856 Bypass



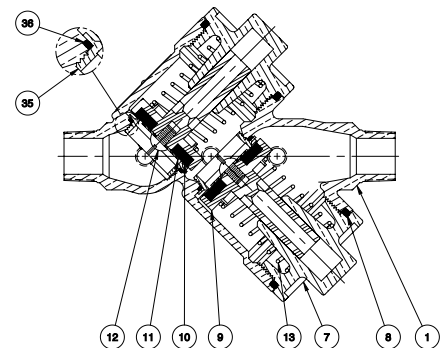
VIEW A-A
(Top of 2nd check)



VIEW B-B
(Inlet side of valve)



805YB



Limited Warranty: FEBCO (the "Company") warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. The main valve ductile wall of each product manufactured with the Company's ArmorTek® advanced coating system is warranted against perforations due to microbial-induced corrosion (MIC) under normal usage for a period of eight (8) years from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge.

THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance or alteration of the product.

Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore, the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**



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