Installation, Maintenance, and Repair Manual

Series LF909-FS Small

Reduced Pressure Zone Assemblies

¾" – 2"

⚠ 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 this information 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. If installed on a fire suppression system, all mechanical checks, such as alarms and backflow preventers, should be flow tested and inspected in accordance with NFPA 13 and/or NFPA 25. 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 components helps assure maximum life and proper product function.

NOTICE

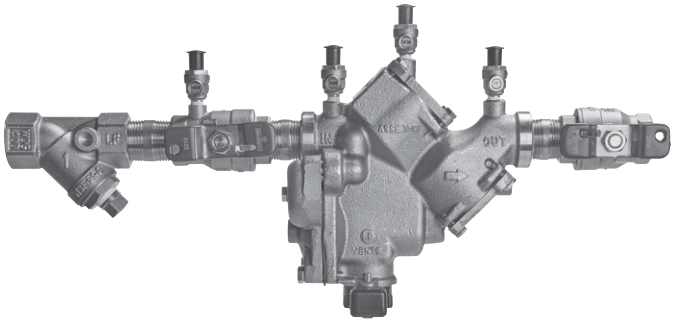
For Australia and New Zealand, line strainers should be installed between the upstream shutoff valve and the inlet of the backflow preventer.

Testing

For field testing procedure, refer to Watts® installation sheets IS-TK-DL, IS-TK-9A, IS-TK-99E and IS-TK-99D at www.watts.com.

For other repair kits and service parts, refer to our Backflow Prevention Products Repair Kits & Service Parts price list PL-RP-BPD at www.watts.com.

For technical assistance, contact your local Watts representative.

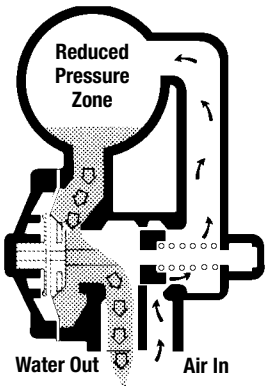


LF909-QT-S-FS

Series LF909-FS Small is equipped with an integrated flood sensor that, when activated, triggers notification of potential flood events from excessive relief valve discharges. An add-on connection is required to implement sensor activation. A retrofit sensor connection kit is available for existing installations. See "Add-on and Retrofit Sensor Connection Kits," on the last page.

How It Operates

The unique relief valve construction incorporates two channels: one for air, the other for water. When the relief valve opens, the right channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The left channel then drains the zone to atmosphere. (See diagram to the right.) Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develops, the relief valve uses the air-in/water-out principle to stop potential backflow.



NOTICE

Use of the integrated flood sensor does not replicate the need to comply with all required instructions, codes, and regulations related to installation, operation, and maintenance of this product, including the need to provide proper drainage in the event of a discharge.

Watts® is not responsible for the failure of alerts due to connectivity or power issues.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

Inquire with governing authorities for local installation requirements.

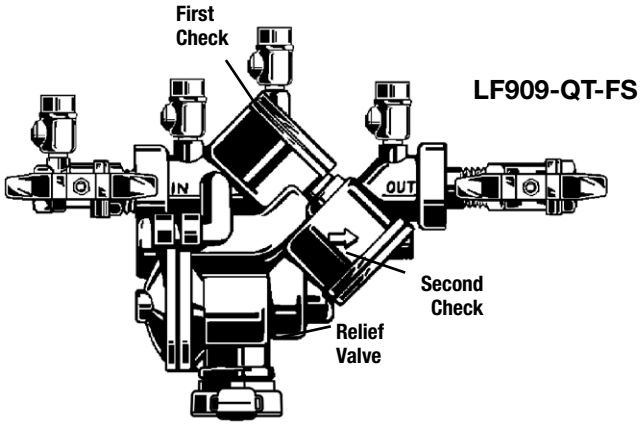
Installation Guidelines

- Install backflow preventers in high-visibility locations to allow for immediate notice of telltale discharge or other malfunction. This location should also facilitate testing and servicing, and protect against freezing and vandalism.
- Do not install a backflow preventer in a pit or vault. Ensure that all local codes and required safety provisions are met. An air gap below the relief port must be maintained so as to avoid flooding and submersion of the assembly, which may lead to a cross-connection.
- Install a strainer ahead of the backflow preventer to protect all internal components from unnecessary fouling.

⚠ CAUTION

Do not install a strainer ahead of the backflow preventer on seldom-used, emergency water lines (such as fire sprinkler lines). The strainer mesh could potentially become clogged with debris present in the water and cause water blockage during an emergency.

- Consider using an air gap and a fabricated indirect waste line to accommodate normal discharge and nuisance spitting. Floor drains of the same size must be provided in case of excessive discharge.
- Determine if a check valve is required ahead of the backflow preventer. When a backflow preventer is installed for dead-end service applications (such as boiler feed lines, cooling tower makeup, or other equipment with periodic flow requirements), discharge from the relief vent may occur due to water supply pressure fluctuation during static no-flow conditions. *See “Troubleshooting,” before installation.
- Observe the direction of the flow arrows on the valve assembly. The backflow preventer is designed so that the critical level of the relief valve is positioned below the first check. This unique feature allows the valve to be installed either vertically or horizontally.
- Follow guidelines for the specific installation option selected, that is, indoor, outside, or parallel. The installation procedure must comply with all state and local codes.
- Before installation, thoroughly flush all pipelines to remove any foreign matter.
- At the start-up of initial installation and after servicing, be sure the downstream shutoff is closed. Slowly open the upstream shutoff and allow the backflow preventer to fill slowly. Bleed air at each test cock. When the backflow preventer is filled, slowly open the downstream shutoff and fill the water supply system. This is necessary to avoid dislodging O-rings or causing damage to internal components.
- Have the backflow preventer examined by a certified tester at the time of installation to ascertain that the assembly is in full working order and that it can be relied upon to protect the safe drinking water as per applicable standards.



Indoors

ASSE Approved for vertical installation flow up and down

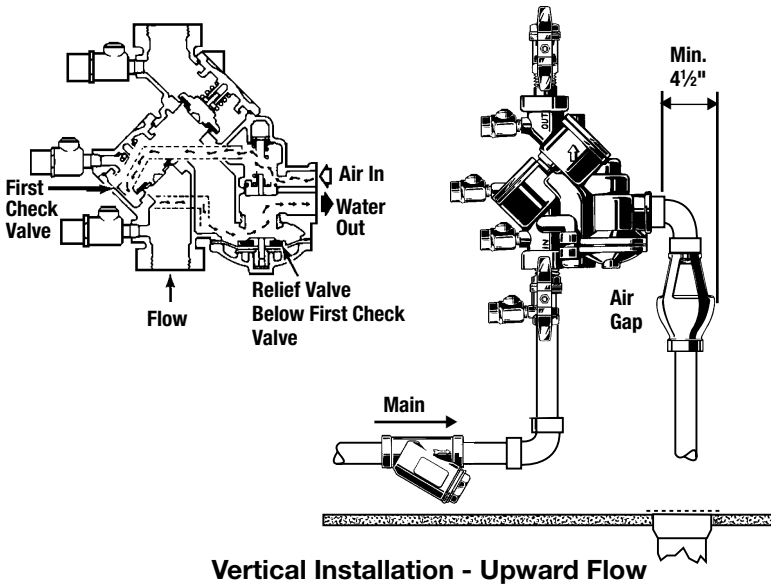
For indoor installations, the valve must be easily accessible to facilitate testing and servicing. The assembly may be installed either vertically or horizontally. If it is located in a line close to wall, be sure the test cocks are easily accessible. A drain line and air gap should be piped from the relief valve connection as shown, where evidence of discharge is clearly visible and so that water damage can be limited. Therefore, never install the assembly in concealed locations.

NOTICE

Test cock must be located on the first or inlet shutoff valve.

For more information on the air gap, download ES-AG/EL/TC at watts.com.

LF909QT-S



Vertical Installation - Upward Flow

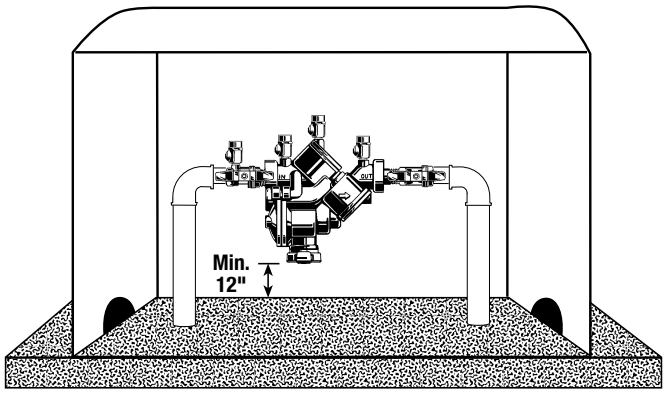
Outside Building Above Ground

In an area where freezing conditions do not occur, the assembly can be installed outside of a building. The most satisfactory installation is above ground; install in this manner whenever possible.

In an area where freezing conditions can occur, the assembly should be installed above ground in an insulated enclosure.

The assembly may be installed in a vertical or horizontal line and in an accessible location to facilitate testing and servicing. A discharge line should be piped from the air gap at the relief valve connection making sure there is adequate drainage. Never pipe the discharge line directly into a drainage ditch, sewer, or sump. The assembly should never be installed where any part of the unit could become submerged in standing water. Consideration should be given to the installation of external support structure as applicable.

In general, the installation of backflow preventers into pits is not recommended. This type of installation should occur only when absolutely necessary and then only when approved by local codes. In such cases, a modified pit installation is preferred.



WattsBox Insulated Enclosures

For more information, download ES-WB.

Parallel

NOTICE

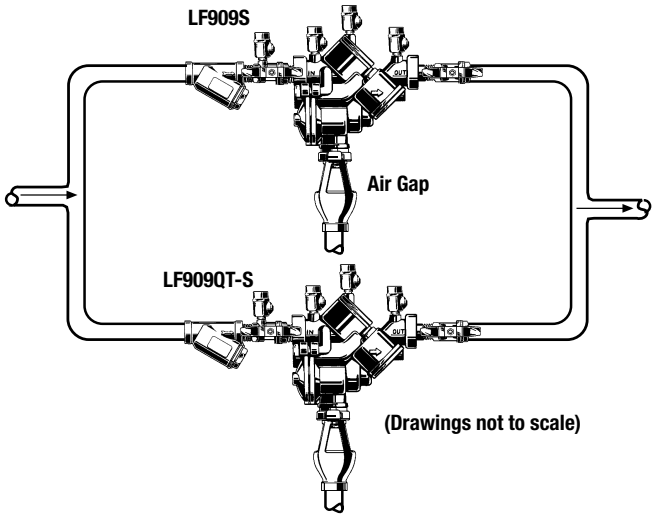
Consult local codes for approval.

Two or more smaller size valves can be piped in parallel (when approved) to serve a larger supply pipe main. This type of installation is employed where increased capacity is needed beyond that provided by a single valve and permits testing or servicing of an individual valve without shutting down the complete line.

The number of valves used in parallel should be determined by the judgment of the compliance engineer based on the operating conditions of a specific installation.

The following table shows the total capacity provided with dual valve installations of various sizes.

CAPACITY REQUIRED FOR SYSTEM					
50 gpm	100 gpm	150 gpm	200 gpm	250 gpm	350 gpm
Two ¾"	Two 1"	Two 1¼"	Two 1½"	Two 1½"	Two 2"
Devices	Devices	Devices	Devices	Devices	Devices

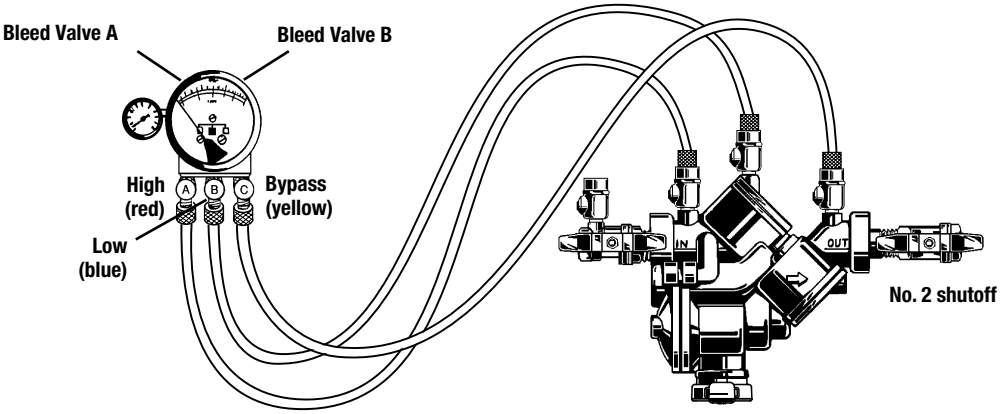


(Drawings not to scale)

Test Procedure for Reduced Pressure Assembly

Complete the following actions before starting the test procedures.

- Ensure all needle valves are closed on the test kit.
- Open test cock No. 4 and flush test cocks No. 1, No. 2, and No. 3 on the reduced pressure assembly then close test cock No. 4.
- Attach the hoses as shown in the diagram. Bleed air from the kit then close the No. 2 shutoff.



LF909-QT-FS

Test No. 1 - Check Valve No. 2

Purpose: To test check valve No. 2 for tightness against reverse flow.

Requirements: The valve must be tight against reverse flow under all pressure differentials.

1. Slowly open the needle valves “A” high (red) and “C” bypass (yellow). Keep the needle valve “B” low (blue) closed.
2. Open test cock No. 4.
3. Observe that the pressure differential decreases slightly. If the pressure differential continues to decrease (until the vent opens), the No. 2 check valve is reported as “leaking.”

Test No. 2 - Shutoff Valve No. 2

Purpose: To test shutoff valve No. 2 for tightness.

1. After passing Test No. 1, continue to test No. 2 by closing test cock No. 2.
2. Observe that the pressure differential decreases slightly. If pressure differential continues to decrease (approaching “zero”), the No. 2 shutoff valve is reported to be “leaking.”

NOTICE

A leaking No. 2 shutoff always gives a false reading in tests No. 3 and 4.

Test No. 3 - Check Valve No. 1

Purpose: To test check valve No. 1 for tightness.

Requirements: The valve must be tight against reverse flow under all pressure differentials.

1. Close needle valve A high (red) and open test cock No. 2.
2. Close test cock No. 4. Disconnect the bypass hose (yellow) at test cock No. 4.
3. Open needle valves B low (blue) and C bypass (yellow), bleeding to atmosphere. Then close needle valve B (blue) to restore the system to a normal static condition.
4. Observe the pressure differential gauge. If there is a decrease in the indicated value, the No. 1 check valve is reported as “leaking.”

Test No. 4 - Pressure Differential Relief Valve

Purpose: To test operation of pressure differential relief valve.

Requirements: The pressure differential relief valve must operate to maintain the “zone” between the two check valves at least 2 psi less than the supply pressure.

1. Close needle valve C bypass (yellow).
2. Open needle valve A high (red).
3. Open needle valve B low (blue) very slowly until the differential gauge needle starts to drop.
4. Hold the valve at this position and observe the gauge reading at the moment the first discharge is noted from the relief valve. Record this as the opening differential pressure of the relief valve.

NOTICE

The differential gauge needle must drop slowly. This is important to maintain stability.

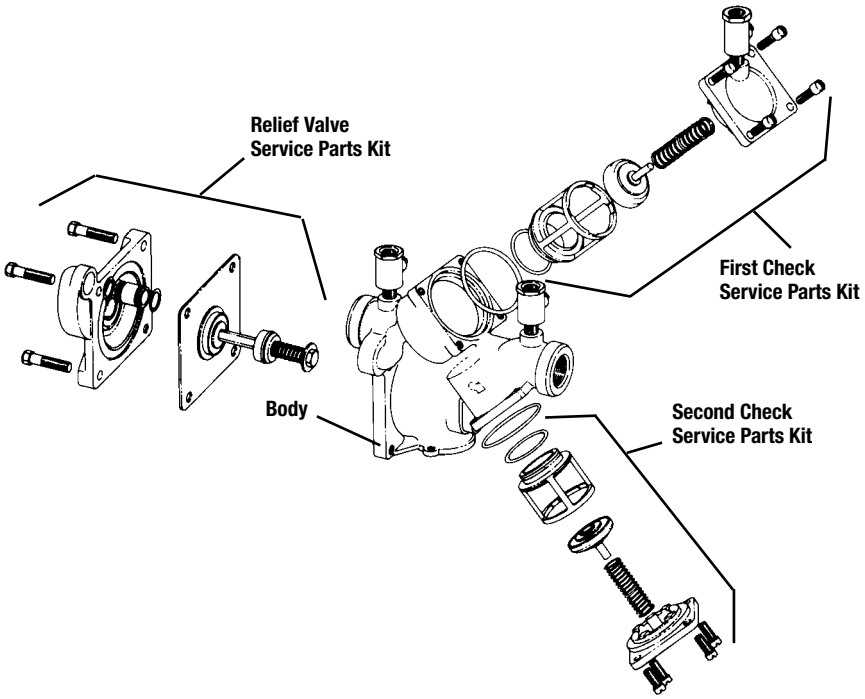
5. Close test cocks No. 2 and No. 3. Remove the hoses from test cocks No. 2 and No. 3.
6. Use the bypass hose (yellow) to relieve pressure from the test kit by opening needle valves A, B, and C and bleeding valves A and B.
7. Remove all test equipment and open No. 2 shutoff.

⚠ CAUTION

To prevent freezing, hold the test kit vertically to drain the differential gauge and hoses before placing the kit in the case.

For additional testing information, refer to IS-TK-DL, IS-TK-9A, IS-TK-99E, or IS-TK-99D.

Servicing First and Second Check Valves

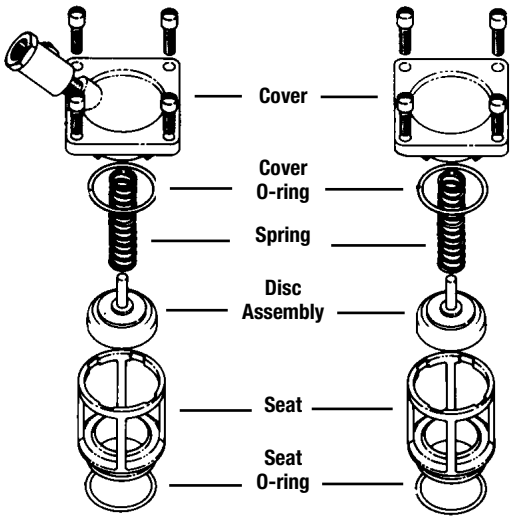


NOTICE

No special tools are required to service the check valves.

1. Remove the four screws holding the first check valve cover.
2. Lift off the first check valve cover. The check valve comes out with the cover and is attached with a bayonet type locking arrangement.
3. Holding the check valve module in both hands, rotate the assembly quarter turn. This disengages the disc assembly, spring, and seat cover into individual components.
4. Clean and reassemble the disc assembly or, depending upon its condition, discard and replace it with a new assembly from the service kit. O-rings should be cleaned or replaced as necessary and lightly greased with the FDA Approved silicon grease which is also furnished with the service kit.
5. Reassemble the check valve module in the reverse order. Service is identical for both the first and the second check valves.

   For further details contact your local technical sales representative.



NOTICE

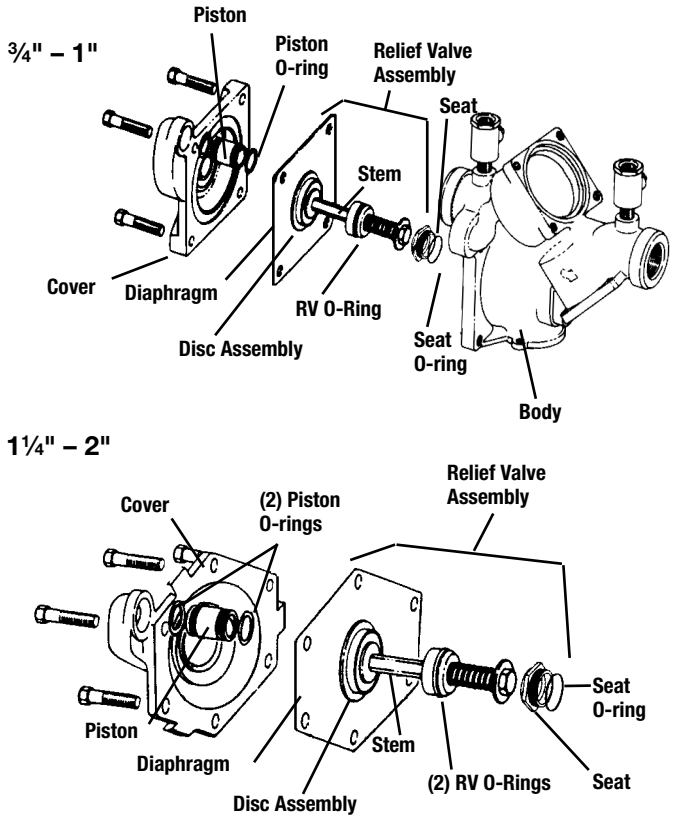
The springs and covers of the first and second check valves are not interchangeable. The heavier spring loaded module should be in the first check and the lighter in the second check module.

Servicing the Relief Valve

NOTICE

The spring tension in the relief valve assembly is contained in the design of the relief valve; therefore, the relief can be removed in a one-piece spool-type assembly.

1. Detach the activation module, if installed, from the flood sensor then remove the sensor from the relief valve.
2. Remove the four bolts that hold the relief valve cover in place.
3. Remove the cover. The stainless steel adapter (or piston) with O-ring attached is also removed with the cover.
4. Pull out the relief valve assembly.
5. Clean the relief valve seat and disc without disassembling the relief valve assembly. If the relief valve diaphragm, the disc, or both need replacement, disassemble the relief valve module. No special tools are required.



Reassembling the Relief Valve

Much care is required to put the relief valve assembly back together. Follow the instructions closely to prevent any damage to the stem.

⚠ CAUTION

If the relief valve cover does not press against the body, the assembly is crooked. Tightening the bolts in this instance causes the stem to bend. Do not force the cover into place; misalignment causes damage.

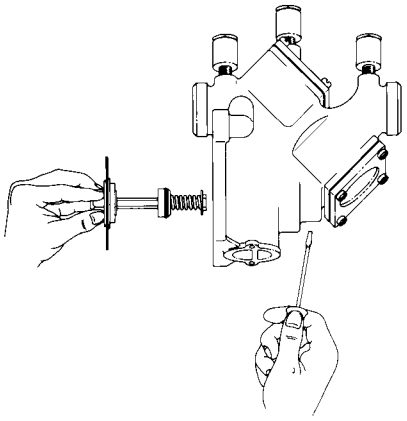


Figure 1

Have a screwdriver handy to reassemble the relief valve assembly.

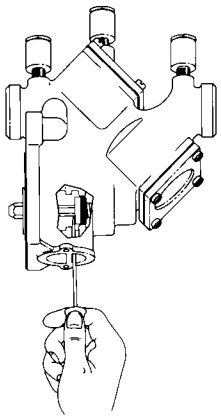


Figure 2

Depress the assembly, carefully guiding it against the 2 pound spring load. When properly aligned, the piston is in the cylinder bore. Insert the screwdriver along the right channel wall, positioning the screwdriver tip to the left of the relief valve O-rings to hold the assembly in place.

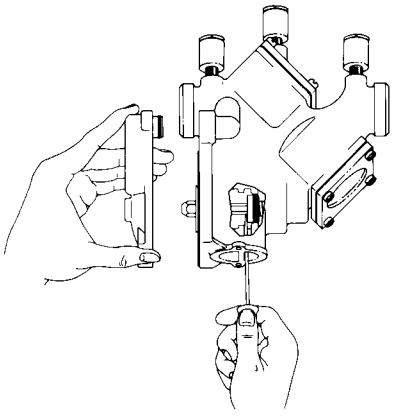


Figure 3

Let go of the screwdriver and use both hands to reattach the cover. Insert two bolts 180 degrees apart and fasten to hold the cover in place. Insert the two remaining bolts and fasten by alternating one to the other until the cover is secure. Remove the screwdriver. Reattach the flood sensor to the relief valve and mount the activation module to the sensor.

Troubleshooting

Problem	Cause	Solution
Valve spits periodically from the vent.	Fluctuating supply pressure.	Install a soft seated check valve immediately upstream of the device.
	Fluctuating downstream pressure.	Install a soft seated check valve downstream of the device, as close as possible to the shutoff valve.
Valve drips continually from the vent.	Fouled first check.	Flush valve. If flushing does not resolve problem, disassemble valve and clean or replace the first check.
	Damaged or fouled relief valve seat.	Clean or replace the relief valve seat.
	Relief valve piston O-ring not free to move due to pipe scale, dirt, or build up of mineral deposits.	Clean, grease, or replace the piston O-ring.
	Excessive back pressure, freezing, or water hammer has distorted the second check.	Eliminate source of excessive backpressure or water hammer in the system downstream of the device. Use Watts No. 15 to eliminate water hammer. Replace defective second check assembly. In case of freezing, thaw, disassemble, and inspect internal components. Replace as necessary.
	Electrolysis or relief valve seat or first check seats.	Replace relief valve seat or inlet cover. Electrically ground the piping system and/or electrically isolate the device with plastic pipe immediately upstream and downstream of the device.
	Valve improperly reassembled.	If valve is disassembled during installation, exercise caution when reinstalling check springs in their proper location.
Valve exhibits high pressure drop.	Fouled strainer.	Clean strainer element or replace.
	Valve too small for flows encountered.	Install proper size device based upon flow requirements.
No water flows down-stream of valve.	Valve installed backward.	Install valve in accordance with flow direction arrow.
Valve does not test properly.	Manufacturer's test procedure not followed.	Clean or replace gate valve with full port ball valves or resilient wedge shutoff valves.
	Leaky downstream gate valve.	
Valve quickly and repeatedly fouls following servicing.	Debris in pipeline is too fine to be trapped by strainer.	Install finer mesh strainer element in the strainer.
Performance of backflow preventers affected during winter season.	Cold temperatures.	Electric heat-tape wrap closely together around the valve body. Build a small shelter around the valve with a large light bulb installed and left on at all times. If the supply line is not used during the winter, removal of the complete body is the best. This creates an air gap to eliminate any possible backflow.

Add-on and Retrofit Sensor Connection Kits for Building Management Systems

ORDERING CODE	ADD-ON/RETROFIT KIT		DESCRIPTION
88003056		FP-BF-BMS-1/2-2 BMS Sensor Connection Kit Series LF909-FS Small Sizes ¾" to 2"	Includes sensor activation module with cable, ground wire, and power adapter. Use this kit to activate the integrated flood sensor and enable flood detection capabilities on the relief valve of a new installation working with a BMS controller (not included).
88003058		FP-RFK-BF-BMS-CFS-1-11/2 BMS Sensor Retrofit Connection Kit Series LF909 Small Sizes ¾" to 1"	Includes flood sensor, sensor activation module with cable, mounting bolts, ground wire, and power adapter. Use this kit to install the flood sensor and enable flood detection capabilities on the relief valve of an existing installation working with a BMS controller (not included).
88003059		FP-RFK-BF-BMS-CFS-2 BMS Sensor Retrofit Connection Kit Series LF909 Small Sizes 1¼" to 2"	Includes flood sensor, sensor activation module with cable, mounting bolts, ground wire, and power adapter. Use this kit to install the flood sensor and enable flood detection capabilities on the relief valve of an existing installation working with a BMS controller (not included).

Add-on and Retrofit Sensor Connection Kits for Cellular Communication

ORDERING CODE	ADD-ON/RETROFIT KIT		DESCRIPTION
88003060		FP-BF-CFS-1/2-2 Cellular Sensor Connection Kit Series LF909-FS Small Sizes ¾" to 2"	Includes sensor activation module with cable, Cellular Gateway with mounting kit, ground wire, and power adapter. Use this kit to activate the integrated flood sensor and enable flood detection capabilities on the relief valve of a new installation working with cellular communication to send alerts by email message, SMS text message, or voice call.
88003062		FP-RFK-BF-CFS-1-11/2 Cellular Sensor Retrofit Connection Kit Series LF909 Small Sizes ¾" to 1"	Includes flood sensor, sensor activation module with cable, Cellular Gateway with mounting kit, mounting bolts, ground wire, and power adapter. Use this kit to install the flood sensor and enable flood detection capabilities on the relief valve of an existing installation working with cellular communication to send alerts by email message, SMS text message, or voice call.
88003063		FP-RFK-BF-CFS-2 Cellular Sensor Retrofit Connection Kit Series LF909 Small Sizes 1¼" to 2"	Includes flood sensor, sensor activation module with cable, Cellular Gateway with mounting kit, mounting bolts, ground wire, and power adapter. Use this kit to install the flood sensor and enable flood detection capabilities on the relief valve of an existing installation working with cellular communication to send alerts by email message, SMS text message, or voice call.

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