



BS&B SAFETY SYSTEMS, L.L.C.

SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY J. Saffich NO. II-PL-0009
 CHK'D. BY Bark DATE 17-JUN-15 SHEET 1 OF 11
 APP. BY Tom Aoch REVISION 0 RELEASE NO. 15-T-0050

REV.: A	ECN NO.: 20-00185	DRAWN: J. Saffich	CHK'D.: Bark	DATE: 23-Jul-20
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INSTALLATION & OPERATION

INSTRUCTIONS

FOR

BUCKLING PIN RELIEF VALVE

TYPE EORV

Sales Order No.: _____ Serial No.: _____

Size: _____ Tag No.: _____

Valve Assembly No.: _____

Created by: _____

Date: _____



SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY J. Saffin NO. II-PL-0009
CHK'D. BY Bark DATE 17-JUN-15 SHEET 2 OF 11
APP. BY Tom Aochl REVISION 0 RELEASE NO. 15-T-0050

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Buckling Pin Relief Valve Type EORV

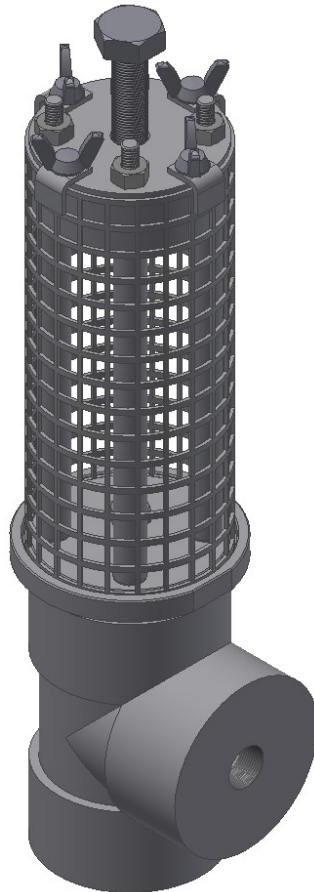


Figure 1: EORV General Arrangement

US & INTERNATIONAL PATENTS PENDING

Danger: EORV's are intended to provide a pressure relief opening. This EORV is designed to instantaneously open at a specified temperature and pressure, thereby relieving excess pressure or preventing excessive vacuum in a system.

IT IS IMPERATIVE THAT THIS EORV BE PROPERLY INSTALLED AND SAFELY VENTED IN ORDER TO AVOID BODILY INJURY, DAMAGE TO PROPERTY, POLLUTION AND LOSS OF PRODUCT.

BS&B Pressure Safety Management, L.L.C. supplies EORV's selected by their customers which are manufactured in reliance upon information and specifications supplied by the customer. BS&B Pressure Safety Management, L.L.C. shall not be liable for any damage resulting from improper installation, improper system design, unsafe venting, or other factors beyond BS&B Pressure Safety Management, L.L.C. control.



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SAFETY PRECAUTIONS:

- Warning:** Do not locate the EORV where personnel will be exposed to released product and pressure through the EORV.
- Warning:** Changes to operating conditions, particularly pressure and temperature, may impact the EORV performance and should be reviewed and approved by BS&B Pressure Safety Management, L.L.C.
- Warning:** Valve does not contain any user serviceable parts. Contact BS&B Pressure Safety Management, L.L.C. to schedule service. User removal of the stamped lead seals voids the valve warranty.
- Caution:** Provide adequate support for the piping for flange connections and for valve with fitting connections to absorb recoil/reaction forces when the EORV opens. If the discharge is free vented, a baffle plate may be mounted downstream of the outlet connection to minimize recoil.
- Caution:** Do not locate the EORV where it may be subjected to thermal shock. Review any concerns with BS&B Pressure Safety Management, L.L.C. before installation.
- Caution:** The EORV valve should not be subjected to bending stresses such as those developed by misaligned piping, unsupported piping or improper torque application to companion flange connection. Mating flange faces shall be parallel to EORV flanges.
- Caution:** Use of this Safety Device for other than the service conditions specified that were previously agreed with BS&B Pressure Safety Management, L.L.C. shall void the warranty.
- Caution:** Corrosion and process conditions may cause deterioration and necessitate periodic inspection and/or replacement of component parts.
- Caution:** When the EORV opens a pressure shock wave is generated. Take account of the affect this may have on the operating performance of downstream equipment.
- Caution:** External icing of pin arrangement may affect the valve response to overpressure, consult BS&B Pressure Safety Management, L.L.C. regarding use of trace heating or other mitigation method.
- Caution:** When EORV is fitted with a sensor, it is the user's responsibility to ensure that local electrical Standards are complied with.
- Caution:** EORV will be shipped with a Protective Screen Cover installed over the pin cage. It is the customer's responsibility to ensure this cover is re-installed after removal for any maintenance activities or pin installation/removal.

Type EORV Valve Handling Instructions

1. All EORVs are slightly smaller in size with weight of 50 lbs approx. which allows handling of these valves in bare hands. Use any soft gloves if required to avoid any damage to the coating.

DO NOT LIFT THE EORV USING PIN CAGE COLUMNS OR ADJUSTER SCREW – THIS MAY DAMAGE THE VALVE; BS&B SHALL NOT BE RESPONSIBLE FOR SUCH DAMAGE

2. Never step under a lifted load, or move a load over personnel.



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Inspecting a new EORV Valve

1. Remove the protective screen cover by removing the wing nuts and brackets on top of the valve.
2. Inspect the new EORV valve mating surfaces for foreign materials. In flange connection, dirt or grit can cause the companion flange gaskets to not seal properly and leak. Similarly, in fitting connection, check for dirt or grit in thread and O-Ring mating surfaces.
3. Inspect the valve for physical damage. Damage to the valve could cause the valve to open at a pressure other than the rated pressure.
4. With no pin installed, the Plug Stem should move up and down freely at least for a small distance. If it does not, the valve will need cleaning and/or servicing.
5. The EORV valve size and rating must match the size and rating of the companion connections.
6. A new EORV will be fitted with a 'shipping pin', appropriately marked. Inspect the shipping pin for damage. Remove the shipping pin after installing the valve in service and prior to installing calibrated pin for service.

Part List Identification

- Item 1 – Protective Screen (when fitted)
- Item 2 – Adjuster Screw
- Item 3 – Buckling Pin Holders
- Item 4 – Shipping Pin

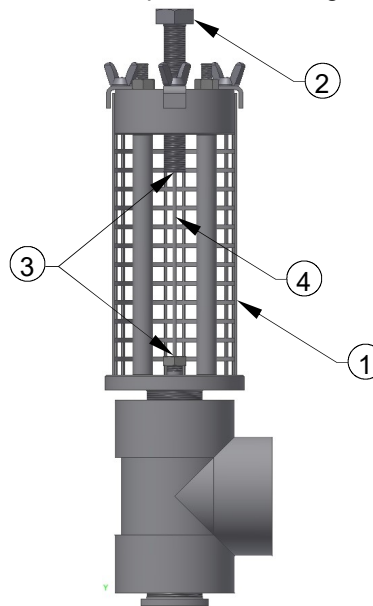


Figure 2: EORV with Shipping Pin

Check the installation conditions for the EORV Valve

1. Ensure that the flow path orientation of the installation matches that for which the EORV was calibrated. The standard EORV is designed for a vertical inlet configuration. Alternative orientation must be approved by BS&B Pressure Safety Management, L.L.C. Failure to notify BS&B Pressure Safety Management, L.L.C. and obtain approval before use may result in improper valve function.

BS&B SUPERVISORY SERVICES

1. BS&B Pressure Safety Management, L.L.C. recommends that its supervisory services are employed during EORV installation.



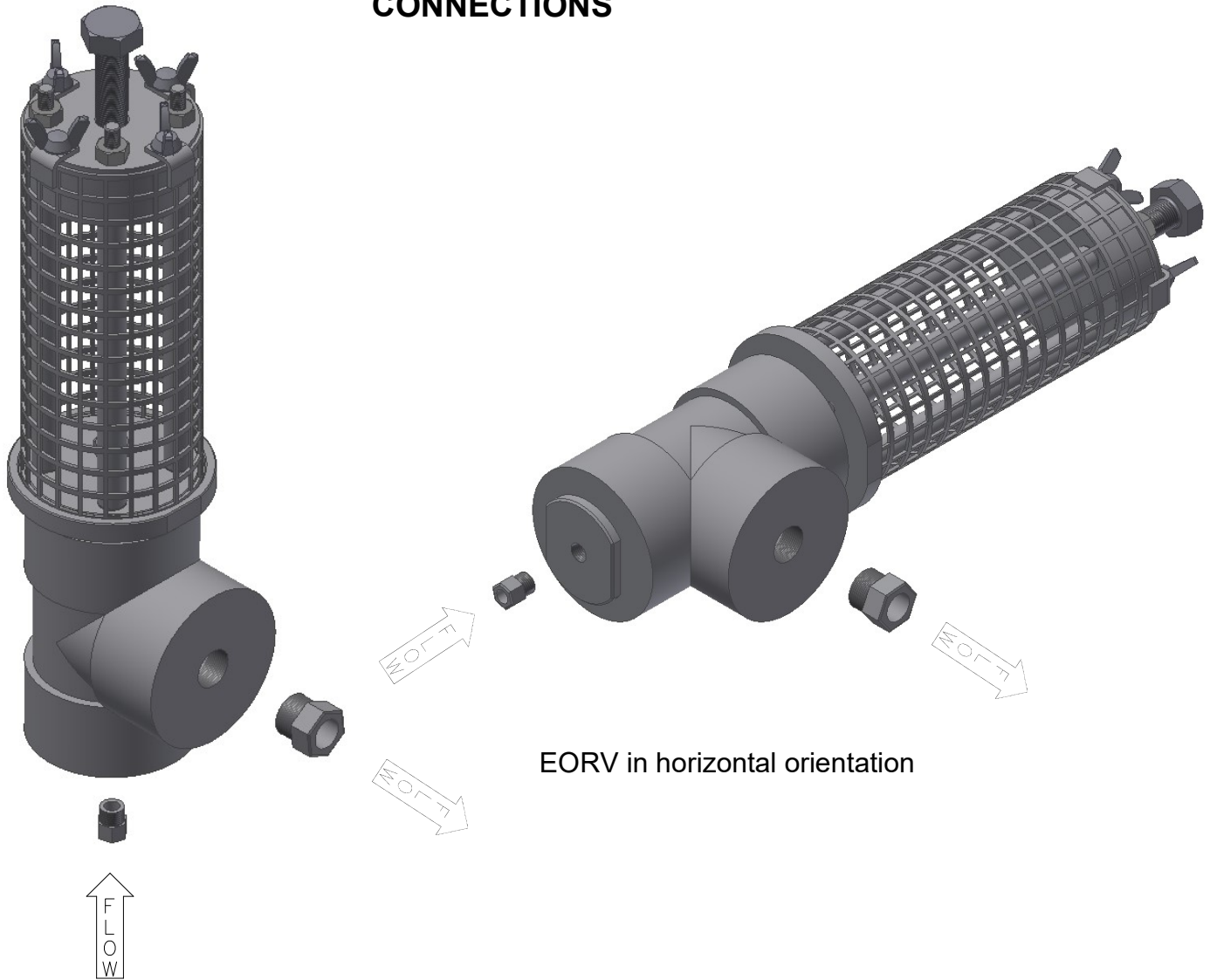
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EORV INSTALLATION BETWEEN FITTING / COMPANION FLANGE CONNECTIONS



EORV in vertical orientation

EORV in horizontal orientation

Figure 3: Typical Installation of EORV in vertical and horizontal orientation between fittings



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EORV Installation Procedure Between Fittings / Companion Flanges

Note: Safe and proper lifting procedures and practices shall be employed during installation of the EORV valve.

1. The EORV must be installed in a Vertical upright or Horizontal configuration with flow at a 90 degree angle to inlet piping as shown in Figure 3.
2. Place the EORV valve body in between inlet and outlet connections as shown in Figure 3 (outlet connection may not be applicable for free vent flow). Make certain that the flow arrow matches the flow direction of the piping system.
3. For ASME Flange connection: Install the companion flange gaskets. Ensure gaskets meet the required BS&B installation torque values shown in Table 1 for compressed fiber. If Flexitallic® or other gasket types are required, companion flange stud torque values must be approved by BS&B Pressure Safety Management, L.L.C. before use. For installation of RTJ Gasket refer the table 1 below for torque values.
4. For Fitting connection: Install the appropriate O-Ring and insert the fitting to the inlet connection and apply torque of 30 Ft-Lbs and similarly for outlet connection insert the fitting and apply a torque of 90 Ft-Lbs.
5. For API Flange connection: Install the companion flange RTJ gaskets. Ensure gaskets meet the required BS&B installation torque values shown in Table 2. If other gasket types are required, companion flange stud torque values must be approved by BS&B Pressure Safety Management, L.L.C. before use.
6. For G-Lok Flange connection: Install the Seal ring between hubs and place the clamps covering the hubs. Insert the bolts specified to clamp. Apply the torque value as specified in the Table 2 below.
7. Install the studs with nuts. Tighten all nuts finger-tight before torquing. Even torque can be achieved by applying the torque in 1/3 increments of the desired final torque. The torque shall be applied in a criss-cross pattern using a calibrated torque wrench. Evenly torque the studs to the value listed in Table 2, using a calibrated torque wrench.

**TABLE 1: EORV COMPANION FLANGE TORQUE
(ASME B16.5 COMPRESSED FIBRE GASKETS)**

SIZE	COMPANION FLANGE	NUMBER OF STUDS	DIAMETER OF STUDS	MINIMUM LENGTH OF STUDS		STUD TORQUE	
				IN	MM	Ft.-Lbs	Nm
2	ASME B16.5 CLASS 2500	8	1.000	7.00	180.0	226	307

NOTE: The torque values are suitable for use with studs of a minimum design stress of 25,000 psi. The companion flanges must be suitable for use with stud stresses up to 25,000 psi. Consult BS&B Pressure Safety Management, L.L.C. when using flanges of material or construction where the supplier recommends lower torque values.



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(ASME B16.5 RTJ GASKETS)

SIZE	COMPANION FLANGE	NUMBER OF STUDS	DIAMETER OF STUDS	MINIMUM LENGTH OF STUDS		STUD TORQUE	
				IN	MM	Ft.-Lbs	Nm
2	ASME B16.5 CLASS 2500	8	1.000	7.00	180.0	491	666

(API 6A RTJ GASKET)

SIZE	COMPANION FLANGE	NUMBER OF STUDS	DIAMETER OF STUDS	MINIMUM LENGTH OF STUDS		STUD TORQUE	
				IN	MM	Ft.-Lbs	Nm
2	5000psi	8	0.875	6.00	152.0	319	432
2	10000psi	8	0.750	5.50	140.0	200	271
2	15000psi	8	0.875	6.25	159.0	319	432
2	20000psi	8	1.125	8.25	210.0	686	930

(G-LOK)

SIZE	COMPANION FLANGE	NUMBER OF STUDS	DIAMETER OF STUDS	MINIMUM LENGTH OF STUDS		STUD TORQUE	
				IN	MM	Ft.-Lbs	Nm
2	20460psi	4	0.875	7.25	185.0	120	162



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BUCKLING PIN INSTALLATION INTO EORV

INSTALLATION OF BUCKLING PIN INTO PIN HOLDER AFTER VALVE HAS BEEN INSTALLED INTO PIPING SYSTEM

Warning: BEFORE INSTALLING THE BUCKLING PIN IN THE EORV, THE VALVE SHALL BE UNPRESSURIZED AND AT AMBIENT TEMPERATURE CONDITIONS

PIN REPLACEMENT ORDERS:

1. Order replacement pins by lot number (shown on pin tag).

BEFORE YOU INSTALL THE BUCKLING PIN IN THE EORV

Inspect the EORV

1. Remove Protective Screen Cover (See Figure 2, Item 1).
2. Inspect the valve for damage. Damage to the valve and pin holders could cause the valve to open at a pressure other than the rated pressure.
3. The valve assembly should be free of dirt, grime, grit and corrosion. Do not store foreign objects near the buckling pin.
4. With no pin installed, the Plug Stem should move up and down freely at least for a small distance. If it does not, the valve may need cleaning or servicing.
5. The EORV must not be machined or modified in any way.
6. The EORV must be installed in a vertical upright or horizontal configuration. Any other orientation could affect valve performance and/or set pressure.
7. A new EORV will be fitted with a RED “shipping pin”, appropriately marked. Inspect the “shipping pin” for damage. Remove the “shipping pin” after installing the valve in service and install the new buckling pin with correct ID/Lot number and Serial Number in the pin tag.

Inspect the Buckling Pin

1. Inspect the buckling pins. Make sure the new pins have not been bent or damaged. Do not install a damaged buckling pin. Do not install an untagged buckling pin.
2. Do not machine or modify the buckling pin in any way. The buckling pins are precision manufactured components. Any alteration voids the warranty on this product.
3. Do not install anything other than the calibrated buckling pin that is specifically marked on its tag with matching ID/Lot number and Serial number that is stamped on the EORV body tag. Replacement buckling pins can be ordered, by the ID/Lot Number and Serial number printed on the pin tag or body tag from BS&B.



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BUCKLING PIN INSTALLATION INSTRUCTIONS

Part List Identification

- Item 1 – Adjuster Screw
- Item 2 – Plug Stem
- Item 3 – Buckled Pin (Used Pin)
- Item 4 – Bonnet

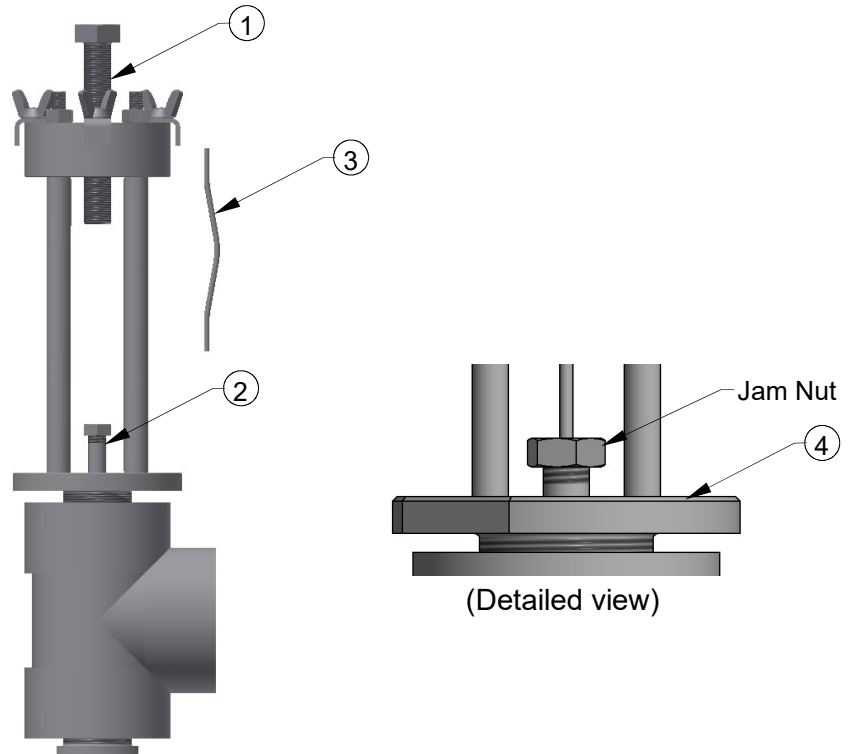


Figure 4: Shipping Pin/Buckled Pin Removal

Removal of Used Buckling Pin (Item 3)

1. **Caution: Do not perform any work removing used buckling pins unless the system is unpressurized, "0psig", upstream and downstream of the valve location. Failure to do this can cause bodily injury.**
2. Remove Protective Screen Cover (See Figure 2).
3. The valve is in closed position with an inactivated Buckling Pin, "such as shipping pin", the Adjuster screw (Item 1 of Figure 4) need to be unscrewed counterclockwise until the shipping pin can be removed using the 1-1/4" wrench size. Throw away shipping pin.

FAILURE TO REMOVE THE SHIPPING PIN CAN RESULT IN A HIGH ACTIVATION PRESSURE.

4. It is recommended to unseat and reseat the Plug once prior to installation of new buckling pin. In order to unseat the valve, simply pull the plug upwards. The valve should unseat easily and move up and down freely. If it does not unseat, the valve may need cleaning or servicing.
5. Reseat the Plug Stem. Slightly push the plug stem by hand so that the used "buckled" pin can be removed from the pin holders (Item 1 and Item 2). Use the Reset Tool provided with the valve. Bolt the threaded rod of the Reset Tool to the Bonnet hole and reseat the plug using Leveling Mount as shown in the Figure 5 below. If excessive force is being experienced, then the reseating procedure should be stopped, and supervisory services of BS&B Pressure Safety Management, L.L.C. shall be contacted for assistance.



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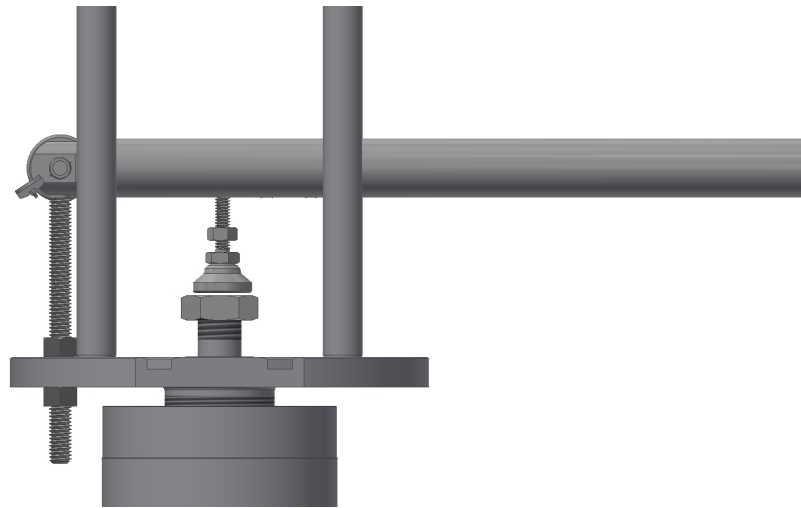


Figure 5: Reseating of EORV

6. After reseating the Plug Stem, when sensor is used the metal target washer should be in-line with the sensor.

Part List Identification

- Item 1 – Adjuster Screw
- Item 2 – Plug Stem
- Item 3 – Buckling Pin
- Item 4 – Protective Screen Cover

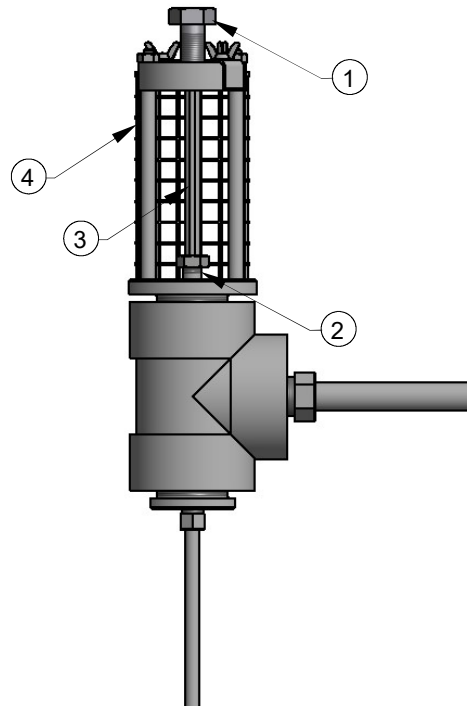


Figure 6: New Buckling Pin Installation



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Buckling Pin Installation (Refer Figure 6)

1. **Caution: Do not perform any work on pin holders unless the system pressure is verified to be zero, "Opsig", upstream and downstream of the valve location. Failure to do this can cause bodily injury.**
2. **Ensure the valve is fully seated prior to installing the new buckling pin.** Make sure the distance between the Adjuster screw (Item 1) and Plug Stem (Item 2) is at least the total length of the pin so that the pin can be installed unhindered between the Pin holders. If more distance is required, unscrew the Adjuster screw by placing a wrench on the hexagonal head. Insert one end of a buckling pin (Item 3) into the hole of the Plug Stem.
3. Lower the Adjuster screw and insert the other end of the pin into the hole of the Adjuster screw.
4. Using the hand, tighten the Adjuster Screw until the buckling pin is securely held between the pin holders. There should be no freedom of movement of the buckling pin with respect to the pins holders, other than in the rotational direction.
5. The buckling pin is now installed and ready for use.
6. Install Protective Screen Cover (Item 4).



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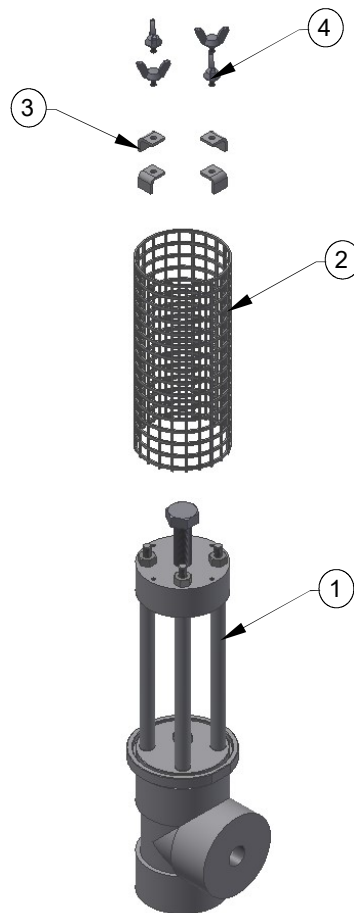
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EORV MAINTENANCE INSTRUCTIONS

In order to ensure proper operation of the EORV throughout its life, basic valve operation must be checked periodically by following these maintenance procedures at a minimum of every 3 years.

- Caution: Do not perform any work removing used buckling pins unless the system is unpressurized, "0 psig", upstream and downstream of the valve location. Failure to do this can cause bodily injury.**



Part List Identification

- Item 1 – Valve Assembly
- Item 2 – Protective Screen
- Item 3 – L-Brackets
- Item 4 – Wing Screws

Figure 7: Removal Protective Screen

- Remove protective screen cover (Item 2 of Figure 7) by first removing the wing screws (Item 4 of Figure 7) and then the brackets (Item 3 of Figure 7).
- If the valve is in closed position with an inactivated buckling pin, "such as shipping pin", unscrew the Adjuster screw by placing a wrench on the hexagonal head until the shipping pin can be removed from the pin holders.



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REV.: A	ECN NO.: 20-00185	DRAWN: J. Saffich	CHK'D.: Bark	DATE: 23-Jul-20
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FAILURE TO REMOVE THE SHIPPING PIN CAN RESULT IN A HIGH ACTIVATION PRESSURE.

4. It is recommended to unseat and reseat the Plug once prior to installation of new buckling pin. In order to unseat the valve, simply pull the plug upwards. The valve should unseat easily and move up and down freely. If it does not unseat, the valve may need cleaning or servicing.
5. Inspect the valve for physical damage. Damage to the valve could cause the valve to open at a pressure other than the rated pressure.
6. Ensure the pin holders are not damaged in any way. Wear and damage to the pin holders could cause the valve to open at a pressure other than rated pressure.
7. After all maintenance and service items are completed, reinstall a buckling pin per the Buckling Pin Installation Instructions (Refer page 8 of this document).

BS&B Supervisory Services are available to oversee maintenance procedures and checks. Contact BS&B Pressure Safety Management, L.L.C. for more information. All service must be completed by BS&B Service Personnel. Replacement of the main valve seal will require BS&B Supervisory Services. Valve does not contain any user serviceable parts. Contact BS&B Pressure Safety Management, L.L.C. to schedule service. User removal of the stamped lead seals voids the valve warranty."