



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

SPECIAL ENGINEERING INSTRUCTIONS

DRAWN BY SPB NO. II-PL-0005
CHK'D. BY SRF DATE 05-23-12 SHEET 1 OF 11
APP. BY CEB REVISION 0 RELEASE NO. 12-T-0239

REV.:	B	ECN NO.:	16-T-0529	DRAWN:	<i>Kunwarani</i>	CHK'D.:	<i>Sean Ray</i>	DATE:	31-Oct-2016
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INSTALLATION & OPERATION INSTRUCTIONS FOR BUCKLING PIN RELIEF VALVE TYPE BPPV



SPECIAL ENGINEERING INSTRUCTIONS

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Buckling Pin Relief Valve Type BPPV

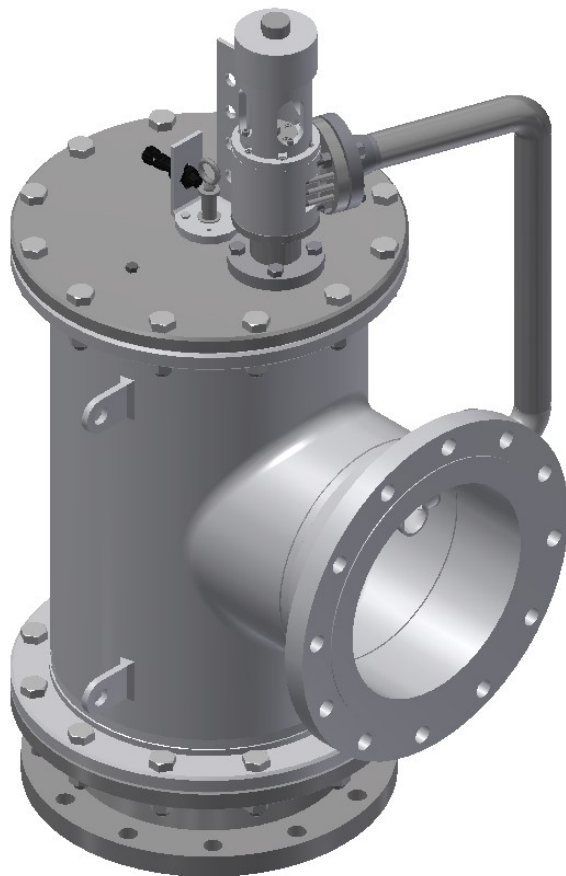


Figure 1: BPPV Valve Arrangement

US & INTERNATIONAL PATENTS PENDING

Danger: BPPV's are intended to provide a pressure relief opening. This BPPV 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 BPPV 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 BPPV'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 BPPV where personnel will be exposed to released product and pressure through the BPPV.
- Warning:** Changes to operating conditions, particularly pressure and temperature. May impact the BPPV performance and should be reviewed and approved by BS&B Pressure Safety Management, L.L.C.
- Caution:** Provide adequate support for the piping and the connections to absorb recoil/reaction forces when the BPPV opens. If the discharge is free vented, a baffle plate may be mounted downstream of the outlet companion pipe flange with extra length studs to minimize recoil.
- Caution:** Do not locate the BPPV where it may be subjected to thermal shock. Review any concerns with BS&B Pressure Safety Management, L.L.C. before installation.
- Caution:** The BPPV valve should not be subjected to bending stresses such as those developed by misaligned piping, unsupported piping or improper torque application to companion flange. Mating flange faces shall be parallel to BPPV flanges.
- Caution:** Use of this Safety Device for other than the service conditions specified that was 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 BPPV 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 BPPV is fitted with a sensor, it is the user's responsibility to ensure that local electrical standards are complied with.

Type BPPV Valve Handling Instructions

1. All BPPV sizes are provided with 4 lifting points built-in into its Main body as shown in Figure 2. The nominal weight of the BPPV is indicated in Table 1 below.

DO NOT LIFT THE BPPV BY ATTACHING LIFTING EQUIPMENT TO OTHER LOCATIONS – THIS MAY DAMAGE THE VALVE; BS&B SHALL NOT BE RESPONSIBLE FOR SUCH DAMAGE

2. It is recommended that swivel hoist rings to be used. Follow supplier recommendations in selecting and using these rings. Please make use of lifting lugs provided on the BPPV valve body while using swivel hoist rings. Along with swivel hoist rings use slings suitably that protects BPPV valve from any damage.
3. Never over-torque a lifting device. Never use a lifting device that has bad threads. Never use a lifting device that is corroded, cracked, bent, twisted, stretched, fatigued, undersized, or questionable.
4. Never step under a lifted load, or move a load over personnel.



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Part List Identification

- Item 1 – BPPV Main Body
- Item 2 – Lifting Points in Main Body

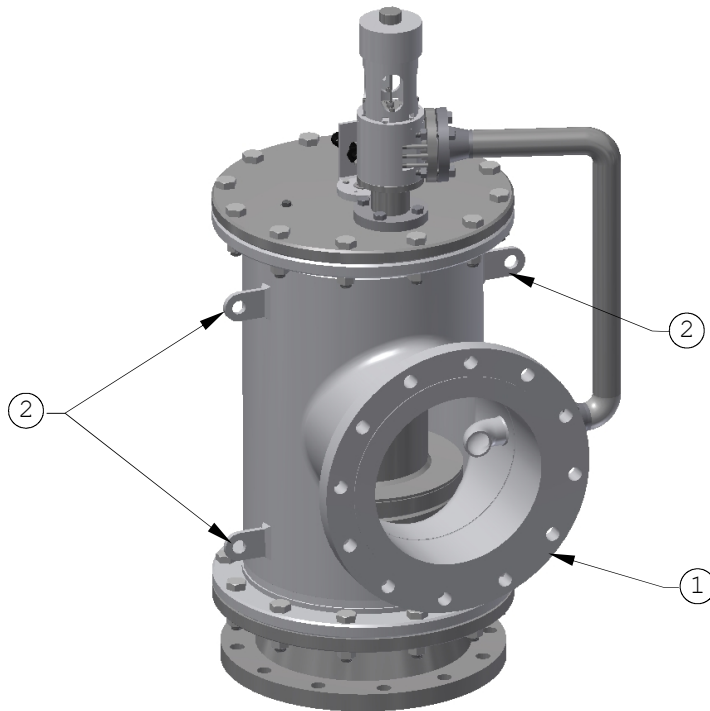


Figure 2: BPPV with Lifting Lug Locations

TABLE 1: BPPV VALVE NOMINAL WEIGHT

BPPV SIZE	NOMINAL WEIGHT (ASSUMING STAINLESS STEEL)
	LBS
6"	255
8"	385
10"	700
12"	880
14"	1150
16"	1350
18"	1870
20"	2400
24"	2880
30"	3900



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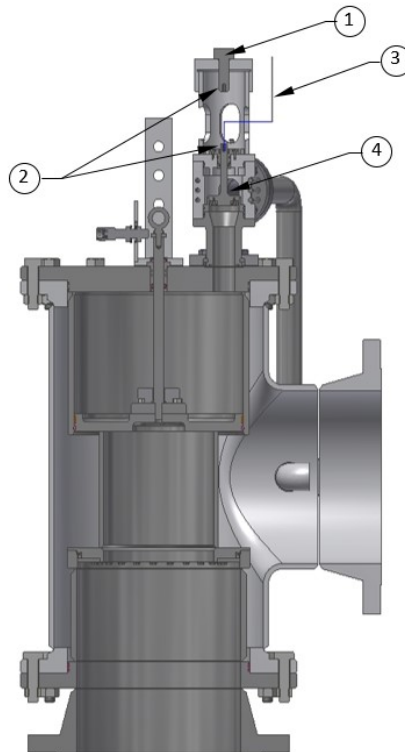
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Inspecting a New BPPV Valve

1. Inspect the new BPPV valve mating surfaces for foreign materials. Dirt or grit can cause the companion flange gaskets to not seal properly and leak.
2. Inspect the valve for physical damage. Damage to the valve could cause the valve to open at a pressure other than the rated pressure.
3. With no pin installed, the pilot valve plug assembly (Item 4 of Figure 3) should move up and down freely. If it does not, the valve will need cleaning and/or servicing.
4. The BPPV valve size and rating must match the size and rating of the companion flange.
5. A new BPPV will be fitted with a Red 'shipping pin' (Item 3 of Figure 3). Remove the shipping pin after installing the valve in service. This shipping pin will be replaced with a calibrated Buckling pin for service.



Part List Identification

- Item 1 – Adjust screw
- Item 2 – Buckling Pin Holders
- Item 3 – Shipping Pin
- Item 4 – Pilot Plug Assembly

Figure 3: BPPV with Shipping Pin



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Check the installation conditions for the BPPV Valve

1. Ensure that the flow path orientation of the installation matches that for which the BPPV was calibrated. The standard BPPV is designed for a vertical inlet and horizontal outlet 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 BPPV Installation.



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BPPV INSTALLATION BETWEEN COMPANION FLANGES

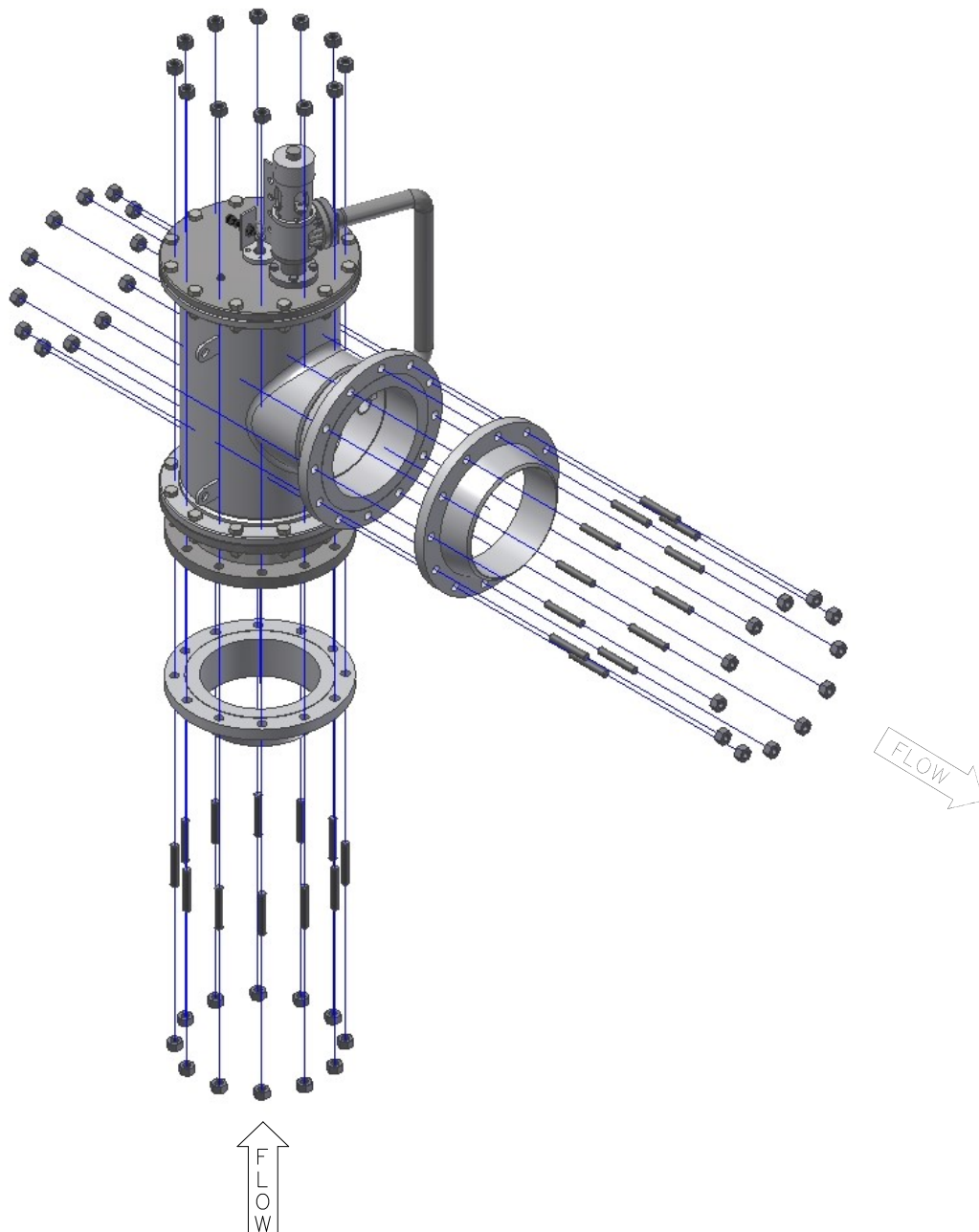


Figure 4: Typical Installation of BPPV between companion flanges.
“Flow Arrow” will be identified on the side of Valve Body.



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BPPV Installation Procedure Between Companion Flanges

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

1. The BPPV must be installed in a Vertical up or Horizontal configuration with flow at a 90 degree angle to inlet piping.
2. Place the BPPV valve body in between inlet and outlet companion flanges as shown in Figure 4 (outlet flange may not be applicable for free vent flow). Make certain that the flow arrow matches the flow direction of the piping system.
3. Install the companion flange gaskets. Ensure gaskets meet the required BS&B installation torque values shown in Table 2 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.
4. 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 2: BPPV VALVE COMPANION FLANGE TORQUE
(COMPRESSED FIBER GASKETS)**

SIZE	COMPANION FLANGE	NUMBER OF STUDS	DIAMETER OF STUDS	MINIMUM LENGTH OF STUDS		STUD TORQUE	
				IN	MM	Ft.-Lbs	Nm
6"	150	8	0.750	4.50	114.3	75	102
8"	150	8	0.750	4.75	120.6	95	129
10"	150	12	0.875	5.00	127.0	122	165
12"	150	12	0.875	5.25	133.3	122	165
14"	150	12	1.000	5.75	146.0	185	251
16"	150	16	1.000	5.75	146.0	185	251
18"	150	16	1.125	6.25	158.7	270	366
20"	150	20	1.125	6.75	171.4	270	366
24"	150	20	1.250	7.25	184.1	385	522
30"	150	28	1.250	10.00	228.6	385	522

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.

Note: The BPPV piston assembly stem and bushing should be free-moving with slight friction or resistance. Lubricant may be used for lubrication when needed



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BUCKLING PIN INSTALLATION INTO BPPV

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

Warning: BEFORE INSTALLING THE BUCKLING PIN IN THE BPPV 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 BPPV VALVE

Inspect the BPPV Pilot Assembly

1. Inspect the pilot assembly mechanism for damage. Damage to the pilot could cause the valve to open at a pressure other than the rated pressure.
2. The pilot assembly should be free of dirt, grime, grit and corrosion. Do not store foreign objects near the buckling pin.
3. With no pin installed, the plug assembly should move up and down freely. If it does not, the valve may need cleaning or servicing.
4. The BPPV pilot must not be machined or modified in any way.
5. The BPPV valve must be installed in a vertical up or horizontal configuration. Any other orientation could affect valve performance and/or set pressure.
6. A new BPPV 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 pin for service.

Inspect the Buckling Pins

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 BPPV 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.



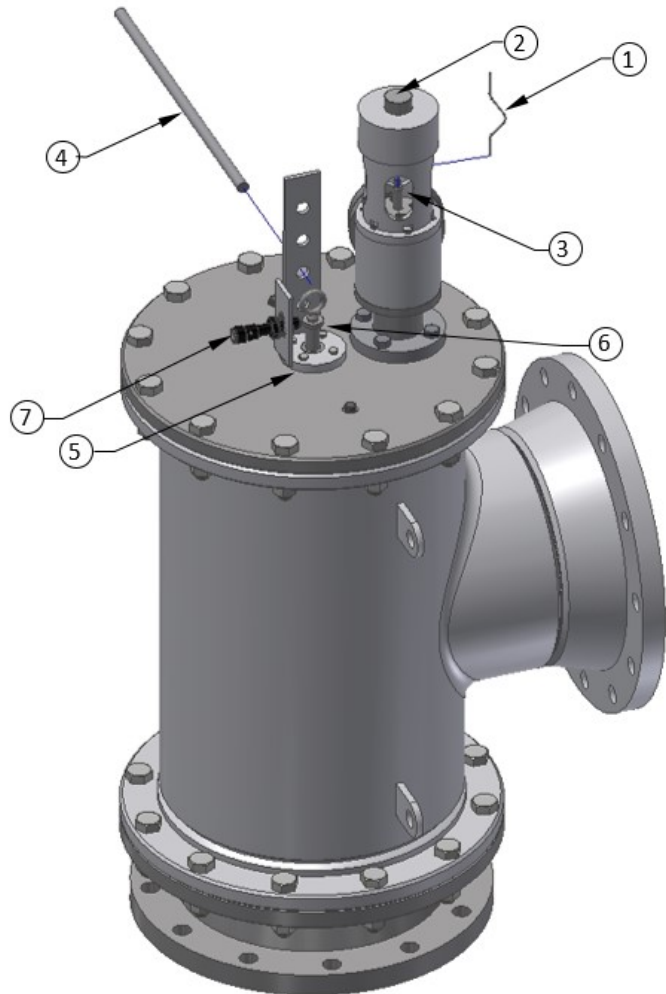
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BUCKLING PIN INSTALLATION INSTRUCTIONS



Part List Identification

- Item 1 – Buckling Pin (Used)
- Item 2 – Adjuster screw
- Item 3 – Lower Pin Holder
- Item 4 – Lever Arm
- Item 5 – Bushing Retainer
- Item 6 – Sensor Target and Stem Assembly
- Item 7 – Sensor

Figure 5: Shipping Pin/Buckled Pin Removal

Removal of Used Buckling Pin (Item 1, Refer Figure 5)

1. **Caution: Do not** perform any work removing used buckling pins unless the system is unpressurized, "Opsig", upstream and downstream of the valve location. Failure to do this can cause bodily injury.
2. If the valve is in open position go to step c below. If the valve is in closed position with a buckling pin or shipping pin:
 - a. Unscrew the Adjuster screw (Item 2) until the pin can be removed from between the pin holders (Item 2 and Item 3).
 - b. Throw away the shipping pin.
 - c. Manually unseat the piston and valve. Unseat the piston by pulling up on the lower pin holder (Item 3). Unseat the valve by



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inserting a lever arm (Item 4) through the bushing retainer (Item 5) and through the eye bolt located on the top of the stem assembly (Item 6). **FAILURE TO UNSEAT THE VALVE AND PISTON AFTER REMOVAL OF THE SHIPPING PIN CAN RESULT IN A BURST PRESSURE OUTSIDE OF THE ALLOWABLE TOLERANCE.**

- d. Reseat the valve by using a lever arm to push down on the stem assembly until the valve seats. If excessive force is required to reseat, then the reseating procedure should be stopped, and supervisory services of BS&B Pressure Safety Management, L.L.C. shall be contacted for assistance.
- e. After reseating the valve, the sensor target (Item 6) on the piston pin assembly should be inline with the sensor (Item 7)
- f. Reseat the piston by manually pushing down on the lower pin holder until the plug seats. If excessive force is required to reseat, then the reseating procedure should be stopped, and supervisory services of BS&B Pressure Safety Management, L.L.C. shall be contacted for assistance.

Part List Identification

- Item 1 – Bucking Pin
- Item 2 – Adjuster screw
- Item 3 – Lower Pin Holder

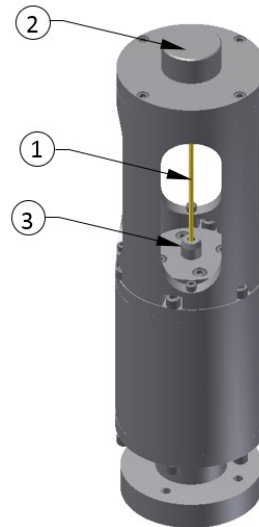


Figure 6: Buckling Pin Installation

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, "0 psig", upstream and downstream of the valve location. Failure to do this can cause bodily injury.**
2. Unscrew the Adjuster screw (Item 2) and remove it from the piston assembly.
3. Insert one end of a buckling pin (Item 1) into the hole of the Adjuster screw.
4. Lower the Adjuster screw into the piston assembly and insert the other end of the pin into the hole of the lower pin holder (Item 3).
5. Tighten the Adjuster screw until it is flush with the top of the piston assembly. The pin should have very little up and down movement (.030") and should be able to rotate freely.
6. The buckling pin is now installed and ready for use.