WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL FOR WELKER® INSTRUMENT BACK PRESSURE REGULATOR

MODEL
IBR-1

DRAWING NUMBERS
AD928BG

MANUAL NUMBER
IOM-240

REVISION
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SAFETY

IMPORTANT SAFETY INFORMATION
READ ALL INSTRUCTIONS

NOTES emphasize information and/or provide additional information to assist the user.

CAUTION messages appear before procedures that could result in damage to equipment if not observed.

WARNING messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation, operation, and maintenance guide for the Welker® Back Pressure Regulator. For further information and instructions, please refer to the Installation, Operation, and Maintenance *(IOM)* Manuals *for each individual component. A list of relevant component* IOM Manuals *is provided in the* Appendix *of this manual.*

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide for the installation, operation, and maintenance of the Welker® equipment described in this manual. Correct installation, operation, and maintenance, however, are the responsibility of the end user. Welker® reserves the right to make changes to this manual and all products in order to improve performance and reliability.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT – Save these instructions for local inspectors' use.

IMPORTANT – Observe all governing codes and ordinances.

Note to Installer – Leave these instructions with the end user.

Note to End User – Keep these instructions for future reference.

Installation of this Back Pressure Regulator is of a mechanical nature.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged Back Pressure Regulator, please contact a Welker® representative immediately.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
Sugar Land, TX 77498

SECTION 1: PRODUCT INFORMATION

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance* (IOM) *Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker® at 1.281.491.2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified might have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker Back Pressure Regulator is designed to provide a controlled inlet pressure for devices that need to monitor and maintain an upstream pressure. While similar in design to pressure-reducing control regulators that regulate outlet pressure, the Back Pressure Regulator controls inlet pressure. In some systems, overpressures are often released by pressure relief valves. Unlike the on and off action related to pressure relief valves, the throttling control action of the Back Pressure Regulator improves system pressure regulation.

Welker® might custom design the Back Pressure Regulator to suit the particular application and specifications of each customer.

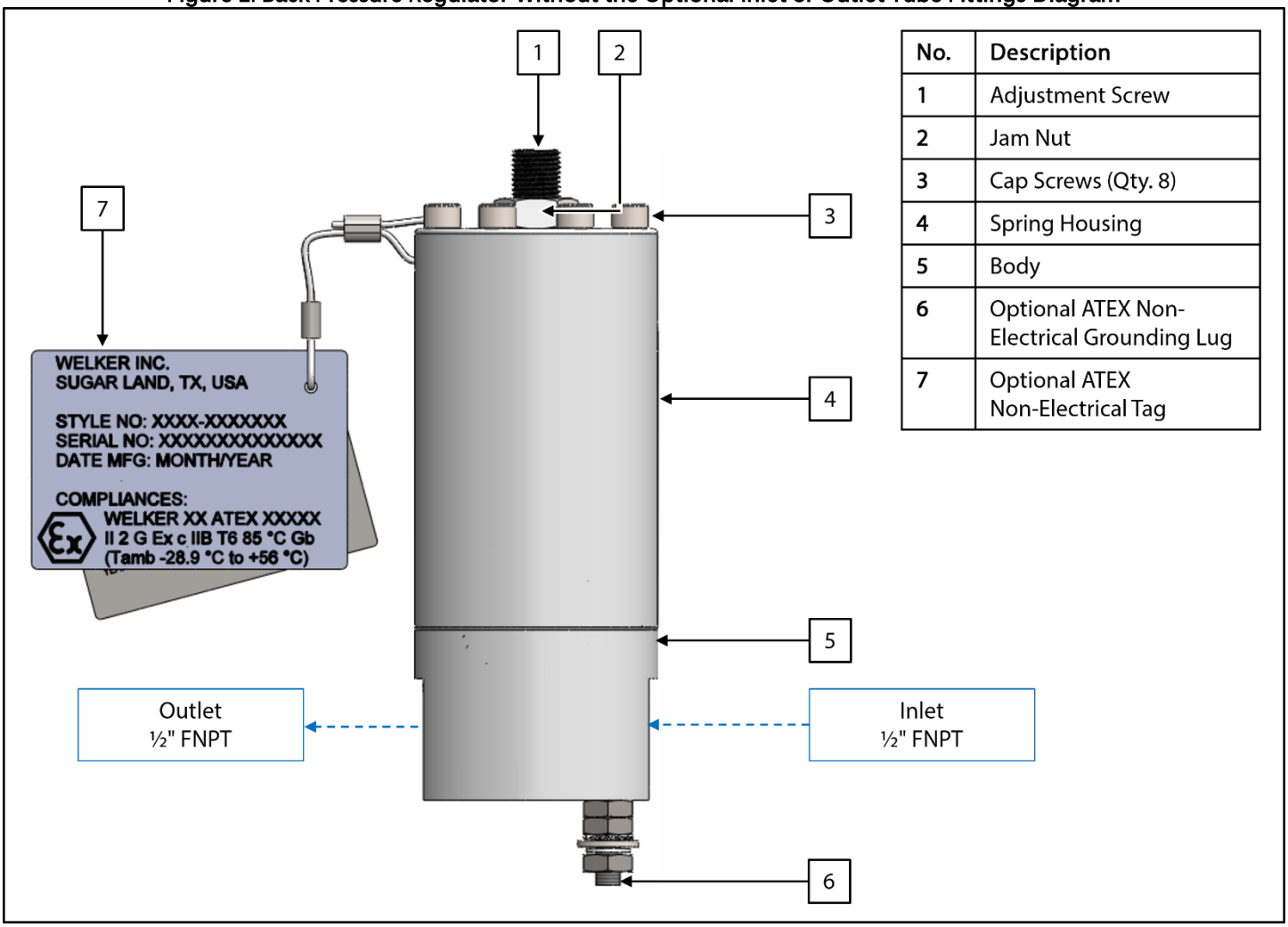
1.3 Specifications

The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: Welker® Back Pressure Regulator Specifications	
Products	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel and FKM
Maximum Allowable Operating Pressure	3600 psig @ -20 °F to 200 °F (*248.21 barg @ -28.8 °C to 93.3 °C*)
Connections	**Inlet:** ½" FNPT **Outlet:** ½" FNPT
Inlet Pressure Regulation Range	100–2250 psig (*82.73–155.13 barg*)
Operation	Piston-Operated
Mounting	Bottom-Mounted
Approximate Weight	8 lb
Approximate Dimensions	2½" x 3½" x 8" (L x W x H)
Features	Jam Nut Locking Mechanism Screw Adjustment Spring-Loaded Pressure Control
Industry Standards / Product Certifications	NACE MR0175 Compliant
Options	¾" Tube Male Connector Inlet ¾" Tube Stub and Nut Outlet ATEX Non-Electrical Compliant CE/PED Compliant

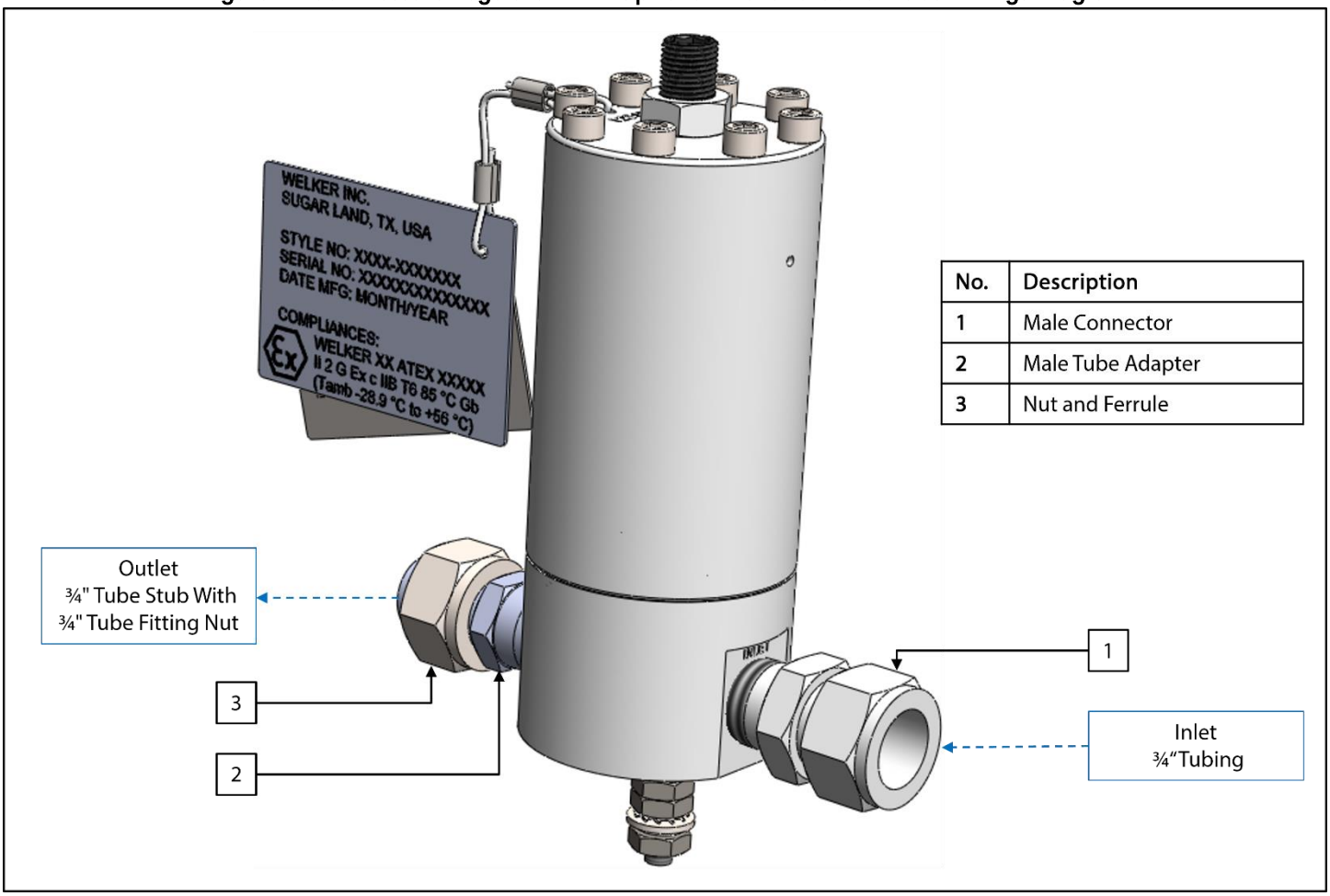
1.4 Equipment Diagrams

Figure 1: Back Pressure Regulator Without the Optional Inlet or Outlet Tube Fittings Diagram



No.	Description
1	Adjustment Screw
2	Jam Nut
3	Cap Screws (Qty. 8)
4	Spring Housing
5	Body
6	Optional ATEX Non-Electrical Grounding Lug
7	Optional ATEX Non-Electrical Tag

Figure 2: Back Pressure Regulator With Optional Inlet and Outlet Tube Fittings Diagram



No.	Description
1	Male Connector
2	Male Tube Adapter
3	Nut and Ferrule

SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the Welker® Back Pressure Regulator, check it for compliance and any damage that might have occurred during shipment. Immediately contact a Welker® representative if you received a damaged Welker® Back Pressure Regulator.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the brand used.

2.2 Principles of Operation

1. To set the desired inlet pressure, the Back Pressure Regulator's adjusting screw is tightened, pushing down on a spring inside the device. The spring, in turn, pushes down on a piston, which pushes against a spring (i.e., small spring) / poppet assembly.

The compression of the spring (i.e., larger spring) will determine the maximum inlet pressure (i.e., set pressure), which means a higher spring compression will require a higher upstream pressure to open the regulator.

With the spring load adjusted to the desired regulated set pressure, the Back Pressure Regulator will create a secure and very tight seal against the applied upstream pressure.

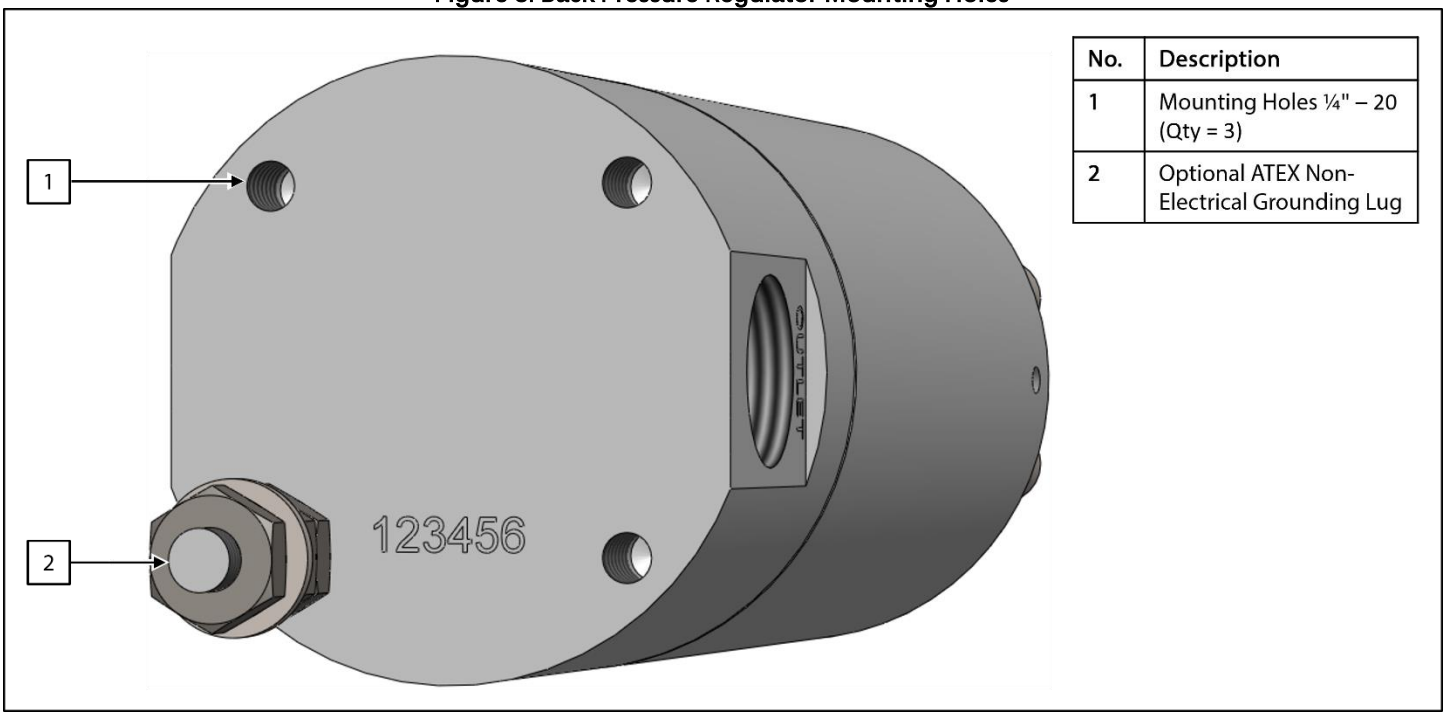
2. When the upstream process pressure applied to the piston is greater than the set pressure, the piston is forced upward against the spring load. The tension on the (small) spring / poppet assembly is gradually lessened on the poppet seat as the upstream pressure level increases.
3. When the flowing liquid or gas is relieved to the downstream side of the process at a faster rate than the upstream pressure can supply, there will be a decrease in upstream pressure. When the pressure begins to decrease, the spring load forces against the small spring / poppet assembly, creating increased tension that pushes the (small) spring / poppet assembly toward the poppet seat, creating a tight seal between the two. This ensures that the desired set pressure is maintained.

2.3 Installation

1. Mount the Back Pressure Regulator to the desired location (*Figure 3*).

> The Back Pressure Regulator can be mounted in any position.

Figure 3: Back Pressure Regulator Mounting Holes



No.	Description
1	Mounting Holes ¼" – 20 (Qty = 3)
2	Optional ATEX Non-Electrical Grounding Lug

2. Using a ½" NPT fitting, connect the inlet supply to the inlet port on the back pressure regulator (*Figure 2*).

> Welker® recommends installing an upstream filter if the product has solid particles. The filter should be installed on the connection to the Back Pressure Regulator inlet.

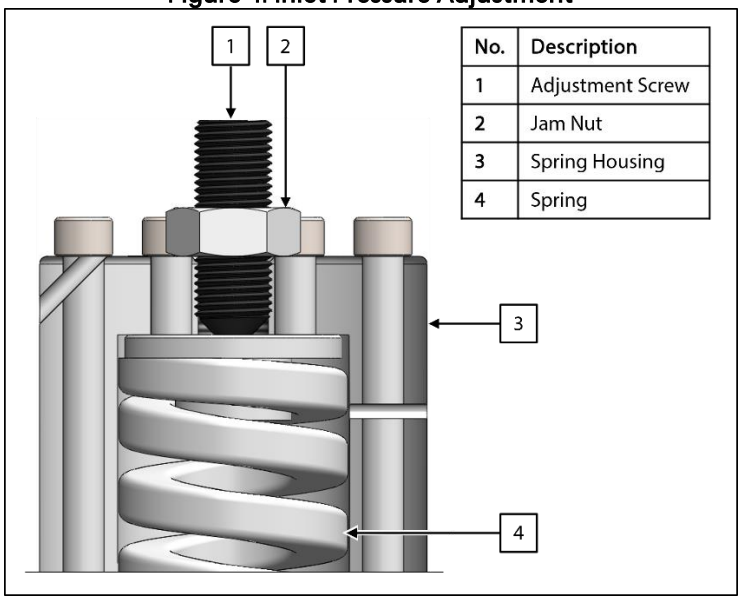
3. Using a ½" NPT fitting, connect from the outlet port on the Back Pressure Regulator to the inlet of the downstream process (*Figure 2*).

2.4 Setting the Inlet Pressure

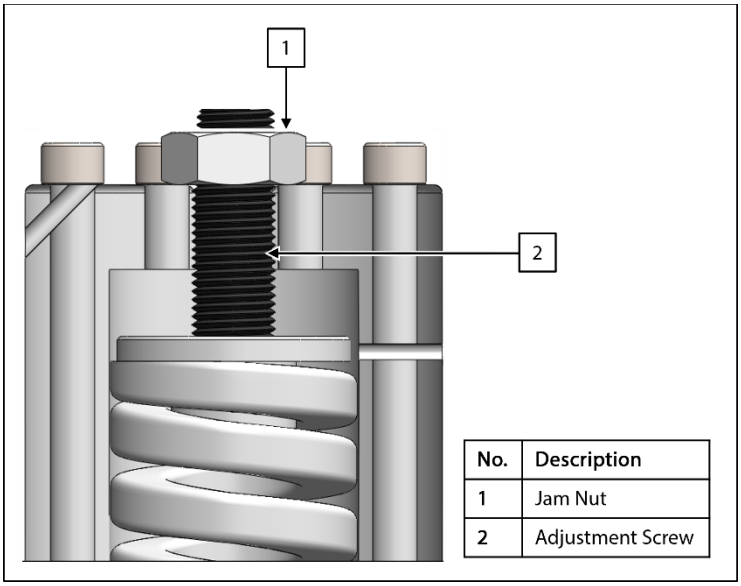
If requested at the time of the order, Welker® can set the Back Pressure Regulator prior to shipment.

1. Use a safe auxiliary gas supply to set the Back Pressure Regulator to the proper inlet pressure.

Figure 4: Inlet Pressure Adjustment



No.	Description
1	Adjustment Screw
2	Jam Nut
3	Spring Housing
4	Spring



No.	Description
1	Jam Nut
2	Adjustment Screw

2. Tighten the adjustment screw (*Figure 4*) to set inlet pressure.
3. Turn on the inlet supply to pressurize the Back Pressure Regulator inlet to the set pressure.
4. Continue adjusting the screw until the desired inlet pressure has been reached.
5. Tighten the jam nut to secure the adjustment screw in place. The inlet pressure is now set.
6. To readjust the inlet pressure, repeat steps 3 and 4 until the desired set pressure is achieved.
7. Check for leaks and repair or replace as necessary.
8. The Back Pressure Regulator is now operational.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the unit have standard yearly maintenance under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that might lead to excess wear on the unit, a more frequent maintenance schedule might be appropriate.
2. Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit available for repairs to the system in case of unexpected wear or faulty seals.

New seals supplied in spare parts kits should be lightly lubricated before being installed to ease the installation of the seals and reduce the risk of damage when positioning them on parts. Wipe excess lubricant from the seals, because it might adversely affect analytical instrument results.

For sample-exposed seals, Welker® recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals, Welker® recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

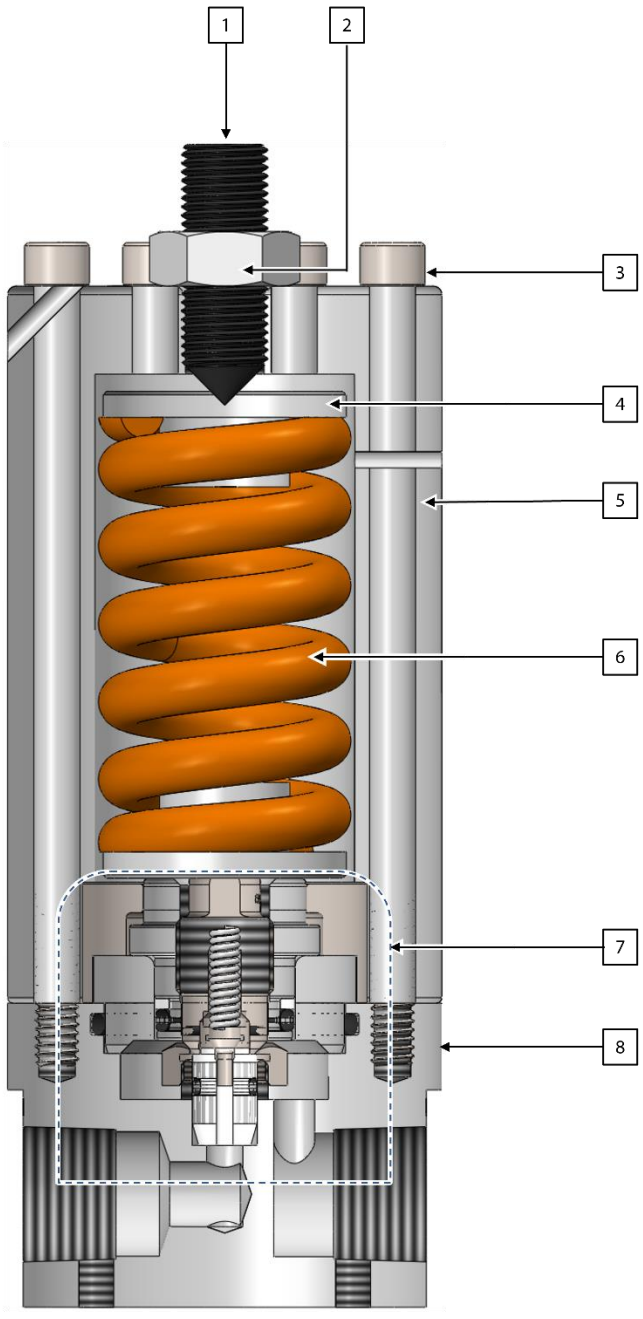
After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

2. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
3. Welker® recommends having the following tools available for maintenance. Please note that the exact tools required might vary by model.
    a. 6″ Adjustable Wrench
    b. Hex Key Set
    c. Medium Strength Thread-Locking Fluid
    d. Seal Pick
    e. Torque Wrench

3.2 Maintenance

The Back Pressure Regulator MUST be isolated from ALL pressure prior to performing maintenance.

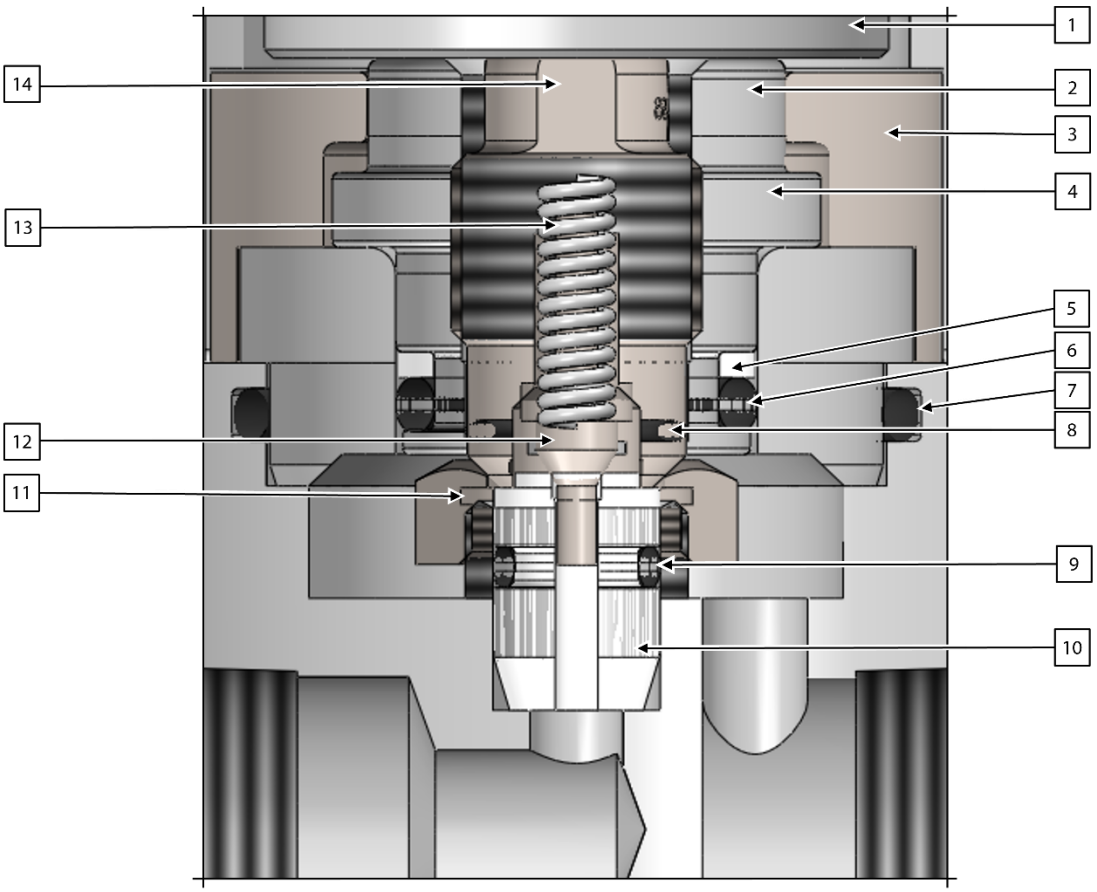
Figure 5: Back Pressure Regulator With (Small) Spring / Poppet Assembly Maintenance Diagram



No.	Description
1	Adjustment Screw
2	Jam Nut
3	Cap Screw (Qty = 8)
4	Spring Guide

No.	Description
5	Spring Housing
6	Spring
7	Detail A (See *Figure 8*)
8	Body

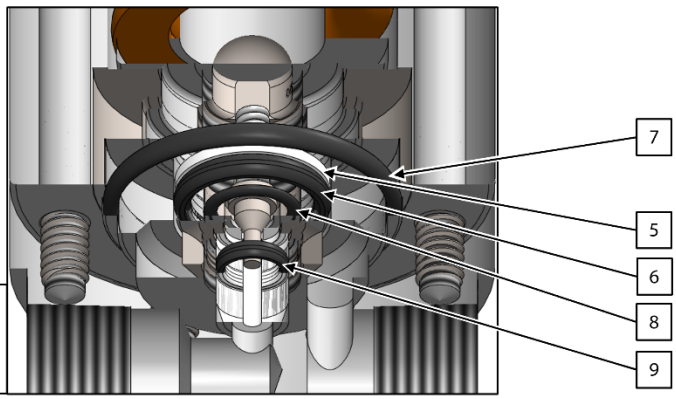
Figure 6: Back Pressure Regulator With (Small) Spring / Poppet Assembly Maintenance Diagram – Detail A



No.	Description
1	Spring Guide
2	Spring Piston Male, Poppet Style
3	Piston Travel Limit Cap
4	Spring Piston Female

No.	Description
5	Backup Split
6	O-Ring
7	O-Ring
8	O-Ring
9	O-Ring

No.	Description
10	Seat Poppet
11	Seat Retainer Cap
12	Poppet
13	Spring
14	Poppet Stabilizer



Back Pressure Regulator With Poppet / Spring Assembly – Detail A Angled to Show Placement of O-Rings and Backup

1. Turn off the inlet supply pressure to the Back Pressure Regulator (*Figure 1* and *Figure 2*).
2. Disconnect the inlet supply from the Back Pressure Regulator inlet port (*Figure 1* and *Figure 2*).
3. Disconnect the supply from the Back Pressure Regulator outlet port (*Figure 1* and *Figure 2*).
4. Loosen the jam nut on the adjustment screw (*Figure 5*).

5. Loosen the adjustment screw to relieve tension on the spring (*Figure 5*).
6. Remove the eight (8) cap screws. Then separate the spring housing from the body (*Figure 5*).
7. Remove the spring guide and spring.
8. Disassemble the internal components as shown in *Figure 6*. Check parts for scratches or debris.

Debris or scratches on the sealing surfaces of the piston assembly might prevent proper sealing and shutoff of the Back Pressure Regulator.

9. Replace O-rings, backup, and seat as needed (*Figure 6*).
10. Reassemble the internal components as shown in *Figure 6*.
11. Return the spring housing to the body and install the eight (8) cap screws into the spring housing (*Figure 5*).
12. Following a cross-bolting sequence, tighten the cap screws to the appropriate torque to secure the spring housing to the body (*Figure 7* and *Table 2*).

Figure 7: Cross-Bolting Sequence

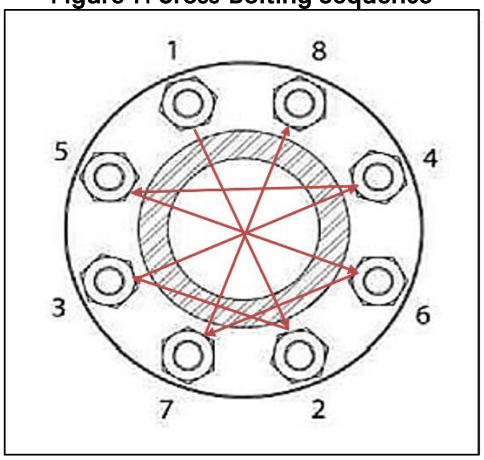


Table 2: Torque Specifications for Cap Screws

Cap Screw Diameter	Foot-Pounds (ft·lb)	Kilograms Per Meter (kg/m)
¼"	5–6	0.69–0.82

3.4 Troubleshooting Guidelines

Table 4: Welker® Back Pressure Regulator Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
The Back Pressure Regulator is not sealing properly.	Debris is trapped between the poppet and seat.	Ensure a filter is installed upstream of the inlet. Service the unit and replace the O-rings. Refer to *Section 3.2, Maintenance*, for instructions.
Gas is leaking from the spring housing vent.	One of the O-rings has failed.	Service the unit and replace the O-rings. Refer to *Section 3.2, Maintenance*, for instructions.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for reference or for use with this unit:

- None

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for reference or for use with this unit:

- None

Welker® drawings and schematics suggested for reference or for use with this unit:

- Assembly Drawing: AD928BG (Welker® Back Pressure Regulator)

NOTES

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