



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® RELIEF VALVE

MODELS

RV-1
RV-2
RV-2CP
RV-3

DRAWING NUMBERS

AD017A[]
AD018A[]
AD020A[]
AD282B0

MANUAL NUMBER

IOM-033

REVISION

Rev. G, 02/05/2024

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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 and operation guide for the Welker® Relief Valves, RV-1, RV-2, RV-2CP, and RV-3. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in Appendix A 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 and operation, 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 inspector's 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 Relief Valve 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 Relief Valve, 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® RV-1, RV-2, and RV-3 Relief Valves are designed to protect instruments and regulators from overpressurization. The RV-2CP is designed to be used in place of a rupture disc to protect cylinders from overpressurization. Unlike a rupture disc, the RV-2CP will only relieve enough pressure required for it to reseal, thus limiting the amount of product discharged. As an added safety feature, the RV-2CP outlet can be vented to a safe location.

- The RV-1 is specifically designed to relieve moderate capacity instruments in the 0–200 psig range.
- The RV-2 is specifically designed to relieve low-capacity instruments in the 0–2000 psig range.
- The RV-2CP is specifically designed to relieve low-capacity cylinders in the 0–2000 psig range.
- The RV-3 is specifically designed to relieve high-capacity instruments in the 0–200 psig range.

Welker® might custom design the RV-1, RV-2, RV-2CP, and RV-3 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 might vary depending on the customization of your equipment.**

Table 1: RV-1 Specifications

Materials of Construction	316/316L Stainless Steel, PTFE, and Viton® Others Available
Maximum Allowable Inlet Pressure	2500 psig (172 barg) 5000 psig (344 barg) [Standard] 6000 psig (413 barg)
Connections	Inlet: ¼" MNPT (Standard) or ⅛" MNPT Outlet: Atmospheric, ¼" FNPT, or ½" FNPT
Spring Range	0–50 psig (0–3 barg) 0–100 psig (0–6 barg) 0–200 psig (0–13 barg)
Options	Pre-Set Relief Sulfinert®-Treated Wetted Parts CE Compliance CRN Certification NACE Compliance

Table 2: RV-2 Specifications

Materials of Construction	316/316L Stainless Steel, PTFE, and Viton® Others Available
Maximum Allowable Inlet Pressure	5000 psig (344 barg)
Connections	Inlet: ¼" MNPT (Standard) or ⅛" MNPT Outlet: Atmospheric or ¼" MNPT
Spring Range	100–300 psig (6–20 barg) 150–800 psig (10–55 barg) 500–1000 psig (34–68 barg) 900–1500 psig (62–103 barg) 1400–2000 psig (96–138 barg)
Option	Pre-Set Relief

Table 3: RV-2CP Specifications

Materials of Construction	316/316L Stainless Steel, PTFE, and Viton® Others Available
Maximum Allowable Inlet Pressure	5000 psig (344 barg)
Connections	Inlet: ½" – 20 UNF Outlet: ¼" FNPT
Spring Range	100–300 psig (6–20 barg) 150–800 psig (10–55 barg) 500–1000 psig (34–68 barg) 900–1500 psig (62–103 barg) 1400–2000 psig (96–138 barg) [Standard]
Options	Pre-Set Relief NACE Compliance

Table 4: RV-3 Specifications

Materials of Construction	316/316L Stainless Steel, PTFE, and Viton® Others Available
Maximum Allowable Inlet Pressure	3600 psig (248 barg)
Connections	Inlet: ¼" MNPT (Standard) or ⅜" MNPT Outlet: ¼" FNPT, ⅜" FNPT, ½" FNPT, ¾" FNPT, or 1" FNPT (Standard)
Spring Range	0–50 psig (0–3 barg) 51–200 psig (3–13 barg)
Option	Pre-Set Relief

1.4 Equipment Diagrams

Figure 1: RV-1 Diagram

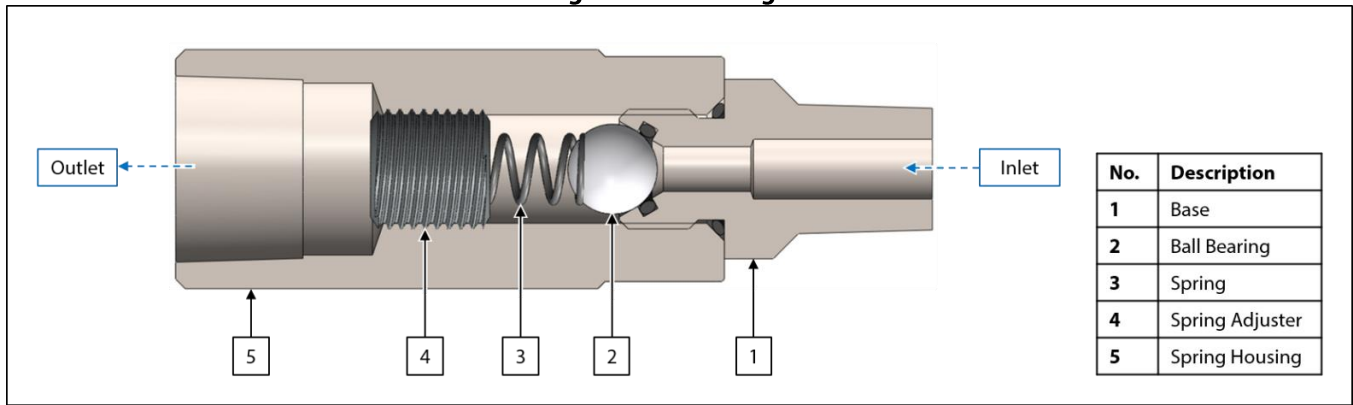


Figure 2: RV-2 Diagram

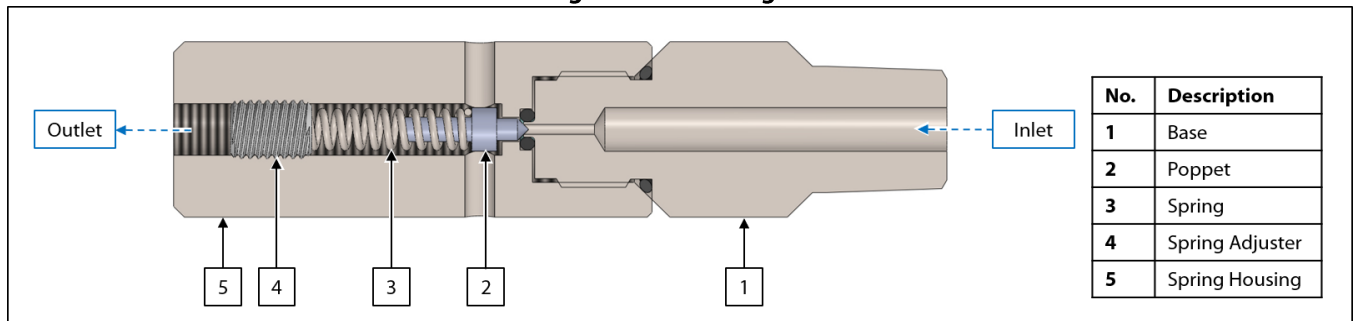


Figure 3: RV-2CP Diagram

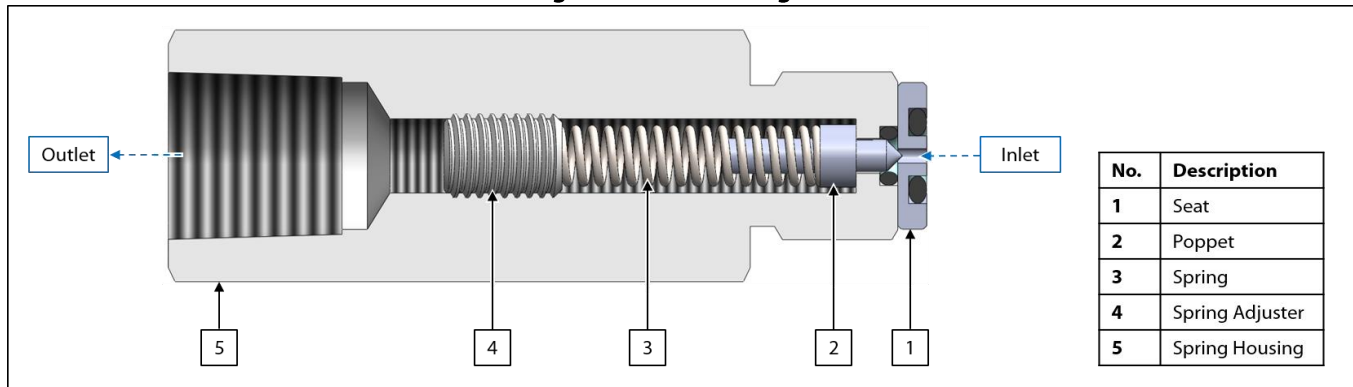
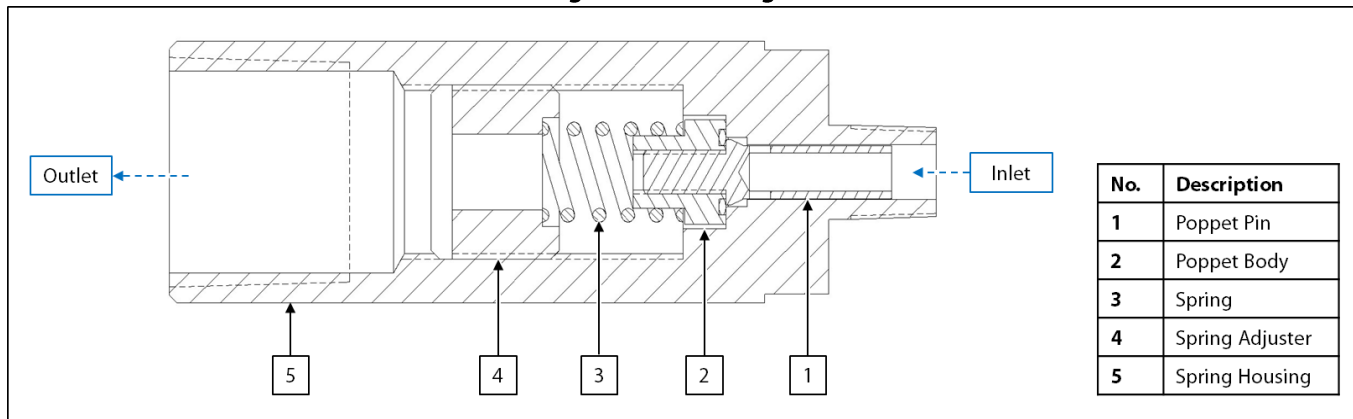


Figure 4: RV-3 Diagram



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin



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



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

2.2 Setting and Installing the Relief: RV-1, RV-2, and RV-3



If installing and setting an RV-2CP, see *Section 2.3, Installing and Setting the Relief: RV-2CP*.



To accurately set the relief, a safe gas source, regulator, and pressure gauge are needed.

Setting the Relief Valve

1. Connect the regulator to a safe gas source.
2. Screw the spring adjuster of the relief valve clockwise to fully close the relief valve.
3. Install the relief valve to the regulator.
4. Set the regulator to the desired pressure, and then apply auxiliary gas through the regulator to the relief valve.
5. Screw the spring adjuster of the relief valve counterclockwise until pressure starts to relieve. A hissing sound will be audible.



For the RV-1 and RV-2, use a hex key to screw the spring adjuster.
For the RV-3, use a Phillips head screwdriver to screw the spring adjuster.

6. Screw the spring adjuster of the relief valve clockwise until the hissing sound stops and the relief valve obtains a positive shutoff.

Testing the Relief Valve

7. Set the regulator to a pressure slightly below the relief valve set point, and then slowly increase the pressure of the regulator until it is slightly higher than the relief valve set point. A hissing sound should be audible.
8. Slowly decrease the pressure of the regulator until it is slightly below the relief valve set point. The hissing sound should stop as the relief valve reseats.
9. If the relief valve does not begin to relieve pressure or does not reseal, it might be necessary to repeat steps 4–6 to reset the relief valve.
10. If the relief valve is to be used with the regulator it was set with, reset the regulator to the desired point.

Installing the Relief Valve

11. Either wrap the threads of the relief valve with PTFE tape or apply pipe dope to the threads.
12. Using a wrench, install the relief valve to the correct port on the instrument it will be relieving.
13. Installation is complete, and the relief valve is now operational.

2.3 Installing and Setting the Relief: RV-2CP



If setting and installing an RV-1, RV-2, or RV-3, see *Section 2.2, Setting and Installing the Relief: RV-1, RV-2, and RV-3*.

Installing the RV-2CP



Prior to being set, the RV-2CP must be installed to the cylinder it will be relieving.

1. Install the seat of the RV-2CP to the cylinder the RV-2CP will be relieving (*Figure 3*). The O-ring side of the seat must face away from the RV-2CP.
2. Either wrap the threads of the RV-2CP with PTFE tape or apply pipe dope to the threads.
3. Install the RV-2CP on top of the seat.
4. Using a torque wrench, tighten the RV-2CP to 30 ft·lbs. The RV-2CP may now be set.

Setting the RV-2CP



To accurately set the relief, a safe gas source, regulator, and pressure gauge are needed.

5. Connect the regulator to a safe gas source.
6. Using a hex key, screw the spring adjuster of the RV-2CP clockwise to fully close the RV-2CP.
7. Connect from the regulator to the cylinder end cap to which the RV-2CP is installed.
8. Set the regulator to the desired pressure, and then apply auxiliary gas through the regulator to the RV-2CP.
9. Using a hex key, screw the spring adjuster of the RV-2CP counterclockwise until pressure starts to relieve. A hissing sound will be audible.
10. Screw the spring adjuster of the RV-2CP clockwise until the hissing sound stops and the RV-2CP obtains a positive shutoff.

Testing the RV-2CP

11. Set the regulator to a pressure slightly below the RV-2CP set point, and then slowly increase the pressure of the regulator until it is slightly higher than the RV-2CP set point. A hissing sound should be audible.
12. Slowly decrease the pressure of the regulator until it is slightly below the RV-2CP set point. The hissing sound should stop as the RV-2CP reseats.
13. If the RV-2CP does not begin to relieve pressure or does not reseal, it might be necessary to repeat steps 8–10 to reset the RV-2CP.
14. Disconnect the regulator from the cylinder end cap.
15. The RV-2CP is now operational.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the unit have standard maintenance under normal operating conditions:** for **gas** every six (6) months; and for **liquid** every twelve (12) months. 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 of 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, as 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.

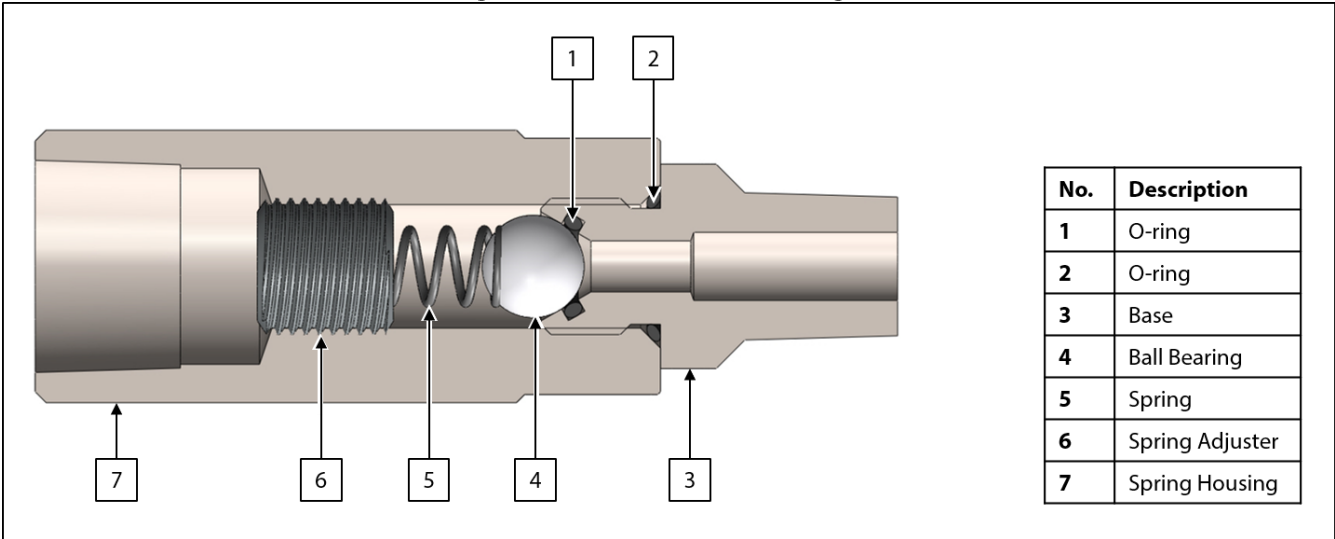


After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.
4. Welker® recommends having the following tools available for maintenance. Please note that the exact tools required might vary by model.
 - a. Adjustable Wrench
 - b. Channel Lock Pliers
 - c. Flat Head Screwdriver
 - d. Hex Key Set
 - e. Phillips Head Screwdriver

3.2 Maintenance: RV-1

Figure 5: RV-1 Maintenance Diagram



- 1. Isolate and depressurize the RV-1 from the supply source.
- 2. Remove the RV-1 from the supply.
- 3. Using a hex key, remove the spring adjuster, spring, and ball bearing.
- 4. Inspect the spring. If the spring is in good condition, it can be reused.
- 5. Inspect the ball bearing for nicks and scratches. Replace as necessary.
- 6. Unscrew the base from the spring housing, and then replace the O-ring on the base.
- 7. Remove and replace the O-ring in the spring housing side of the base.



DONOTlubricate the O-ring on which the ball bearing seals (Figure 5, #1).

- 8. Screw the base into the spring housing.
- 9. Return the ball bearing and spring to the spring housing.

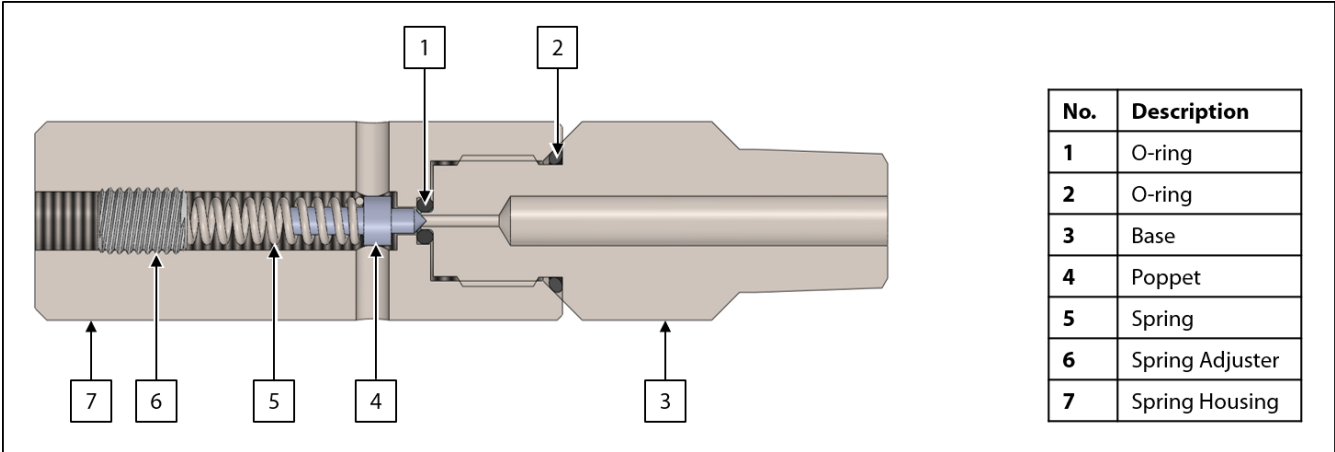


The ball bearing must rest on the O-ring. If the ball bearing rests on the metal trim, the relief will not seat.

- 10. Screw the spring adjuster into the spring body.
- 11. The RV-1 is now ready to be reset and reinstalled. See *Section 2.2, Setting and Installing the Relief: RV-1, RV-2, and RV-3*, for instructions on setting and installing the relief.

3.3 Maintenance: RV-2

Figure 6: RV-2 Maintenance Diagram



- 1. Isolate and depressurize the RV-2 from the supply source.
- 2. Remove the RV-2 from the supply.
- 3. Using a hex key, remove the spring adjuster, spring, and poppet.
- 4. Inspect the spring. If the spring is in good condition, it can be reused.
- 5. Inspect the poppet for nicks and scratches. Replace as necessary.
- 6. Unscrew the base from the spring housing, and then replace the O-ring on the base.
- 7. Remove and replace the O-ring in the base side of the spring housing.



This small O-ring may be picked out, or a small burst of air may be blown through the opposite end of the spring housing to release the seal.



DO NOT lubricate the O-ring on which the poppet seals (Figure 6, #1).

- 8. Screw the base into the spring housing.
- 9. Return the poppet and spring to the spring housing.

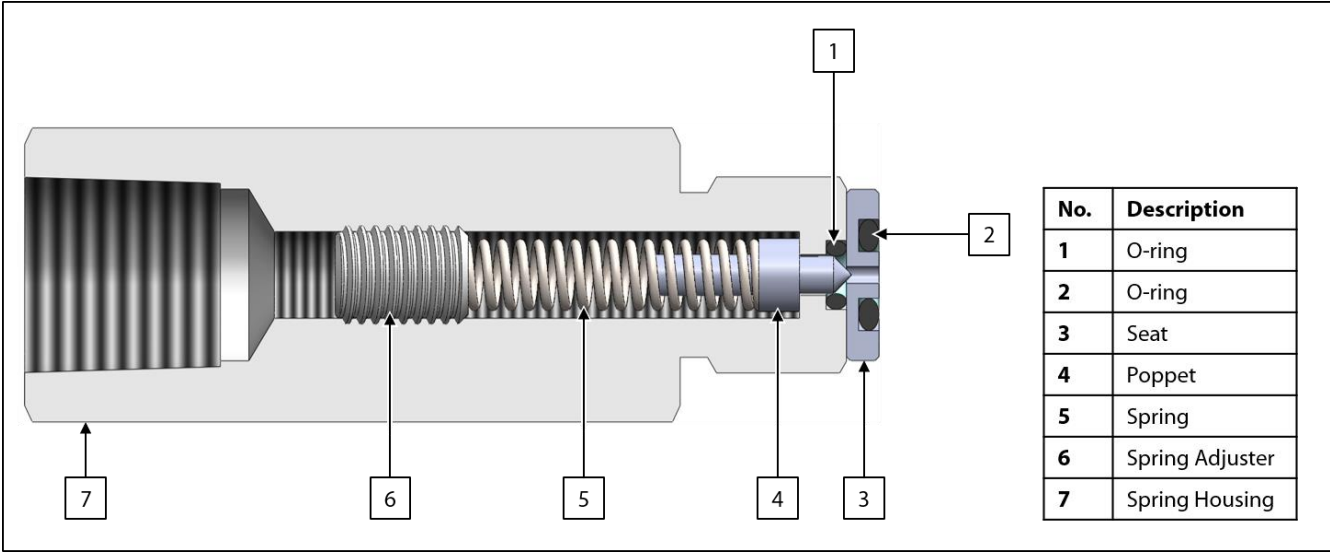


Ensure that the poppet is returned to the spring housing in the correct orientation.

- 10. Screw the spring adjuster into the spring housing.
- 11. The RV-2 is now ready to be reset and reinstalled. See *Section 2.2, Setting and Installing the Relief: RV-1, RV-2, and RV-3*, for instructions on setting and installing the relief.

3.4 Maintenance: RV-2CP

Figure 7: RV-2CP Maintenance Diagram



- 1. Isolate and depressurize the RV-2CP from the supply source.
- 2. Remove the RV-2CP from the supply.
- 3. Using a hex key, remove the spring adjuster, spring, and poppet.
- 4. Inspect the spring. If the spring is in good condition, it can be reused.
- 5. Inspect the poppet for nicks and scratches. Replace as necessary.
- 6. Remove and replace the O-ring on the seat, and then set the seat aside. Take care not to misplace the seat.
- 7. Remove and replace the O-ring in the seat side of the spring housing.



This small O-ring may be picked out, or a small burst of air may be blown through the opposite end of the spring housing to release the seal.



DO NOT lubricate the O-ring on which the poppet seals (Figure 7, #1).

- 8. Return the poppet and spring to the spring housing.

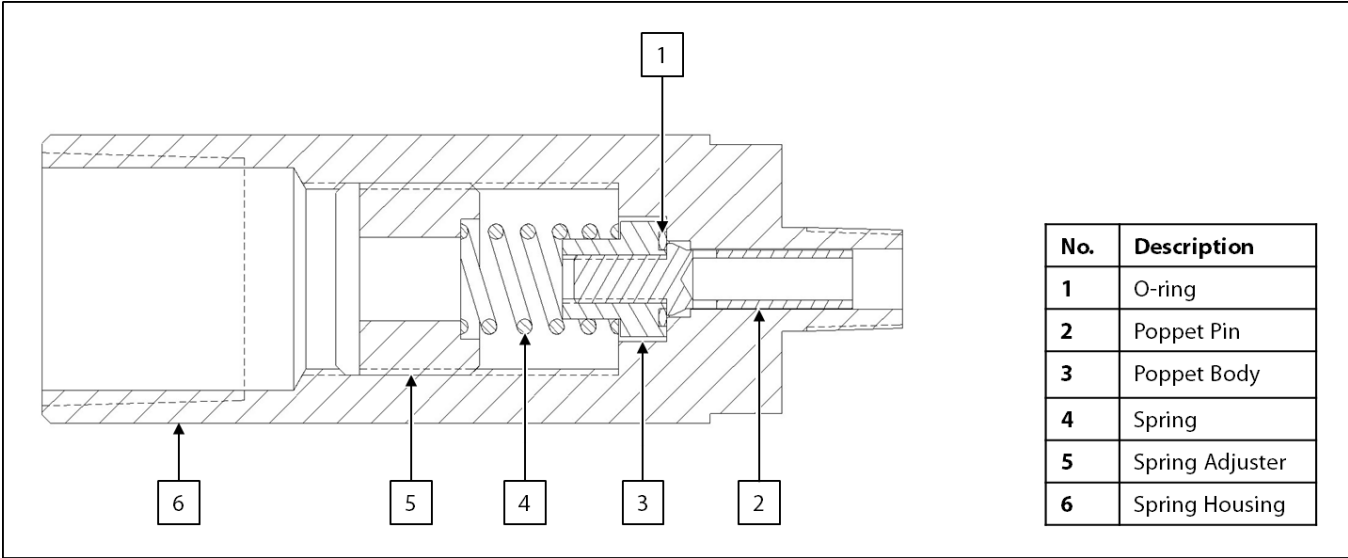



Ensure that the poppet is returned to the spring housing in the correct orientation.


- 9. Screw the spring adjuster into the spring housing.
- 10. The RV-2CP is now ready to be reinstalled and reset. See Section 2.3, *Installing and Setting the Relief: RV-2CP*, for instructions on installing and setting the relief.

3.5 Maintenance: RV-3

Figure 8: RV-3 Maintenance Diagram



1. Isolate and depressurize the RV-3 from the supply source.
 2. Remove the RV-3 from the supply.
 3. Using a large screwdriver, unscrew the spring adjuster. This will remove the spring adjuster, spring, and poppet assembly from the body.
 4. Inspect the spring. If the spring is in good condition, it can be reused.
 5. Unscrew the poppet pin from the poppet body.
 6. Inspect the poppet for nicks and scratches. Replace as necessary.
 7. Unscrew the poppet pin from the poppet body, and then replace the O-ring in the poppet body.
- 

DO NOT lubricate the O-ring on which the poppet body seals (Figure 8, #1).
8. Screw the poppet pin into the poppet body.
 9. Return the poppet assembly and spring to the spring housing.
- 

Ensure that the poppet assembly is returned to the spring housing in the correct orientation.
10. Screw the spring adjuster into the spring housing.
 11. The RV-3 is now ready to be reset and reinstalled. See *Section 2.2, Setting and Installing the Relief: RV-1, RV-2, and RV-3*, for instructions on setting and installing the relief.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- None

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

- None

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

- Assembly Drawing: AD017A[] (RV-1)
- Assembly Drawing: AD018A[] (RV-2)
- Assembly Drawing: AD020A[] (RV-3)
- Assembly Drawing: AD282BO (RV-2CP)

NOTES

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