



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® HEATED PROBE REGULATOR

MODEL
IHRD-4

DRAWING NUMBER
AD822BB

MANUAL NUMBER
IOM-204

REVISION
Rev. 0, 01/11/2016

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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® Heated Probe Regulator, IHRD-4. 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 Heated Probe Regulator is of a mechanical and electrical 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 Heated Probe Regulator, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Bellfort Street
Sugar Land, TX 77498

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 may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *IHRD-4* Heated Probe Regulator is designed to provide an analyzer with a conditioned sample stream at an output pressure and temperature adequate for downstream instrumentation. The sample stream is regulated at the probe tip to minimize line pack and sample retention, allowing the conditioned sample stream to reach the analyzer more quickly. Special features of the *IHRD-4* prevent the composition of the sample from being compromised: the thermal fins, which mitigate the cooling brought on by the Joule-Thomson effect, and the heater, which replenishes heat lost during regulation. A thermostat is included to allow the operator to set and adjust the temperature.

Welker may custom design the IHRD-4 to suit the particular application and specifications of each customer.

1.3 Specifications



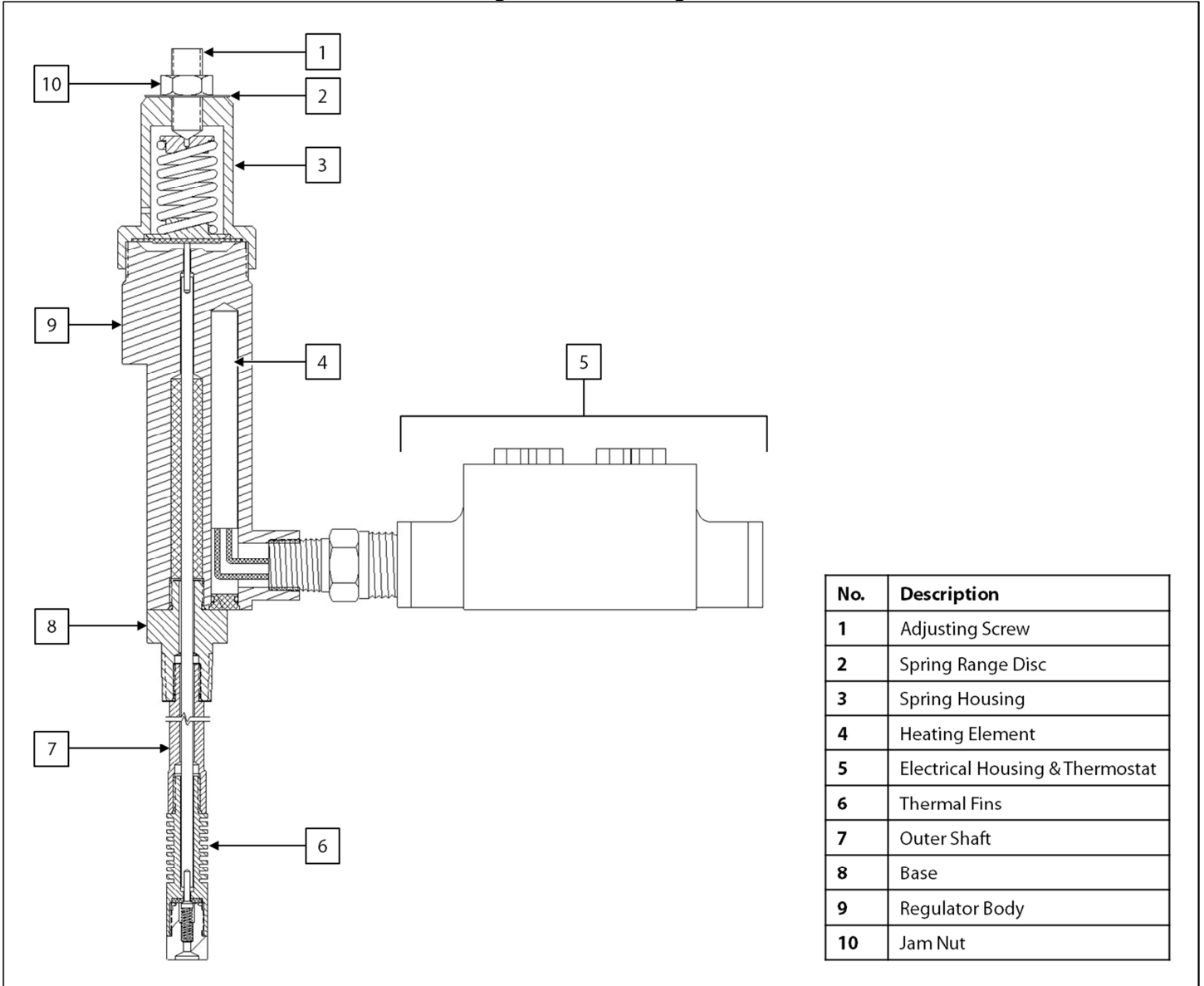
The specifications listed in this section are generalized for this equipment. Welker can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: IHRD-4 Specifications

Products	Natural Gas and Natural Gas Liquids Compatible With the Materials of Construction
Materials of Construction	304 Stainless Steel, 316/316L Stainless Steel, PTFE, and Viton® Others Available
Maximum Allowable Operating Pressure	2160 psig @ -20 °F to 100 °F (148 barg @ -28 °C to 37 °C)
Connections	Outlet: 1/4" FNPT Pipeline: 1/2" MNPT, 3/4" MNPT, or 1" MNPT
Output Range	0-25 psig (0-1.7 barg) 0-50 psig (0-3.4 barg) 20-100 psig (1.3-6 barg) 75-200 psig (5-13 barg)
Electrical Connection	AC 120 V
Operation	Diaphragm-Operated Regulator
Feature	Thermostatically Controlled Heating Element Current: 150 W Resistance: 144 Ω Draw: 1.25 A Temperature Range: 68 °F to 212 °F (20 °C to 100 °C)
Product Certification	CSA Approval
Electrical Area Classification	CSA Class I, Div. 1, Groups C & D, T3C
Options	Outlet Valve Pre-Set Relief Valve Probe Tip Relief Valve With Pressure Gauge

1.4 Equipment Diagram

Figure 1: IHRD-4 Diagram



SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin



After unpacking the unit, check the equipment for compliance and any damage that may 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.

1. A sample probe is recommended to extract sample from the center one-third (1/3) of the pipeline in a location where the product is well-mixed and will yield a representative sample.
2. Welker recommends that the probe be installed in the top of the pipe.
3. Take care not to close the pipeline isolation valve on the insertion shaft while the shaft is inserted in the pipeline. This is the most common cause of damage to Welker® probes.

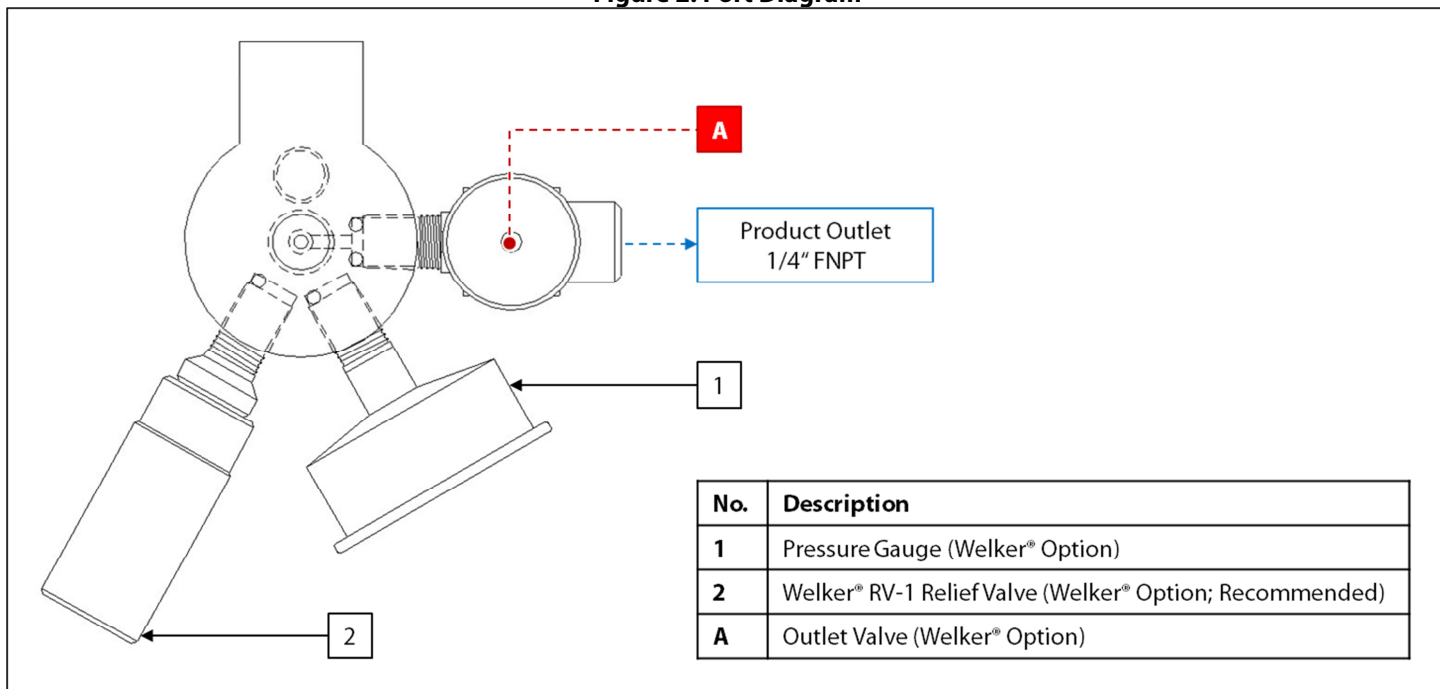
2.2 Installing the Unit



Ensure that the operating pressure of the pipeline does not exceed the MAOP of the unit.

1. As necessary, install a pressure gauge to the pressure gauge port (*Figure 2*).

Figure 2: Port Diagram



Welker can install a relief valve and pressure gauge if requested at the time of order.

- As necessary, use a safe auxiliary gas supply to set the relief valve to the proper pressure. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for instructions on setting the relief.



If a Welker® relief valve is used, Welker can set the relief valve prior to shipment if requested at the time of order.

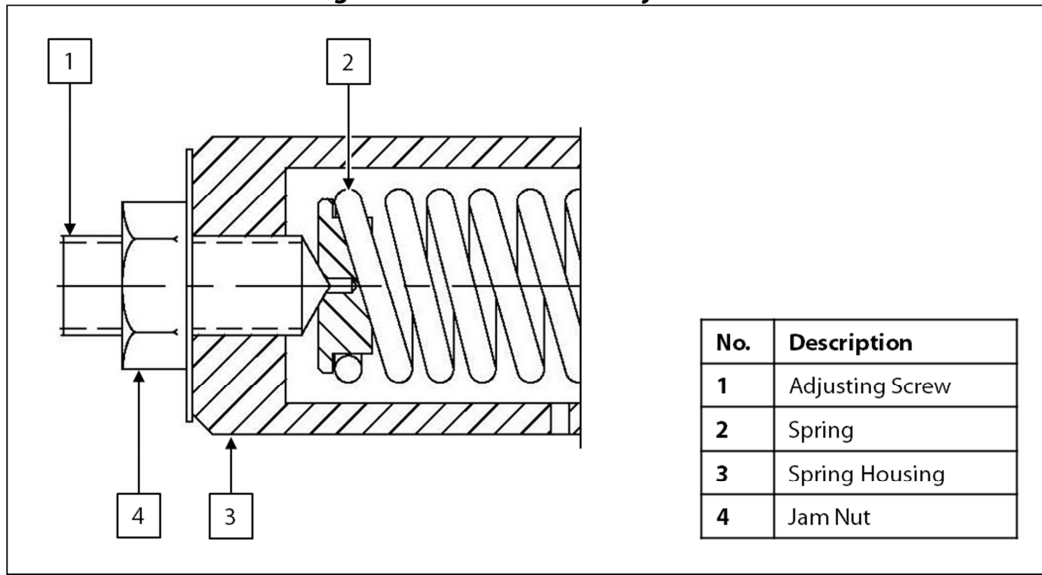
- As necessary, install the set relief valve to the relief valve port (*Figure 2*).
- Depressurize the pipeline.



The pipeline must be depressurized prior to installing and removing the unit.

- Install the IHRD-4 to the pipeline.
- In a counterclockwise direction, back off the adjusting screw on the regulator subassembly (*Figure 3*) so that the unit is closed (i.e., no setting or tension on the spring).

Figure 3: Outlet Pressure Adjustment

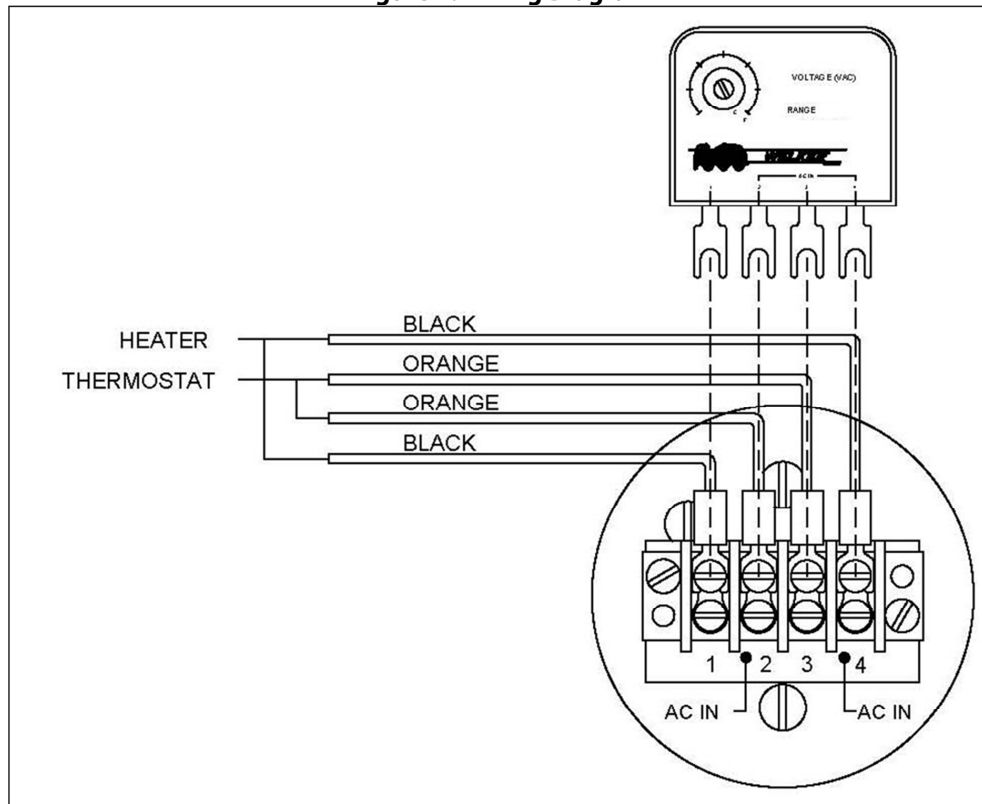


- Pressurize the pipeline. Check for leaks and repair as necessary.
- Check the outlet pressure gauge on the IHRD-4. The gauge should read zero (0) psig. If the pressure gauge does not read zero (0) psig, disassemble the IHRD-4 and check for internal leaking, making sure to examine the poppet and seat retainer in the thermal fin subassembly for damage. See *Section 3.2, Maintenance*, for instructions on disassembling and maintaining the thermal fin subassembly.

Start-Up Procedures

- Remove the cover from the electrical housing.
- With the customer-supplied electrical power turned OFF, connect the AC 120 V leads to terminals 2 and 4 in the provided electrical housing (*Figure 4*).

Figure 4: Wiring Diagram



For systems used in hazardous locations, sealing compound is required to seal all fittings to restrict the passage of gases, vapors, or flames.

- Adjust the thermostat to the desired temperature.
- Secure the cover to the electrical housing and cable gland.
- Install customer-supplied tubing or other fittings to the outlet port on the IHRD-4 (*Figure 2*).



Welker recommends that this tubing be insulated and heat-traced so that the sample maintains its temperature increase prior to reaching the analyzer.

- Loosen the jam nut on the adjusting screw (*Figure 3*).
- Screw the adjusting screw clockwise to adjust the outlet pressure. Tighten the jam nut on the adjusting screw to secure the adjusting screw at the desired outlet pressure (*Figure 3*).
- Turn ON the electrical power to begin operation. Allow at least thirty (30) minutes for the IHRD-4 to warm up.



Welker recommends that the unit be enclosed or insulated to maximize the heating effect of the IHRD-4.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker recommends that the unit have standard maintenance every six (6) months under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may 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 may 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 may vary by model.
 - a. Crescent Wrench (Qty. 2)
 - b. Flat Head Screwdriver
 - c. Gloves
 - d. Hex Key Set
 - e. Multimeter
 - f. Phillips Head Screwdriver

3.2 Maintenance

1. Turn OFF all electrical power to the unit.



The heater will be HOT after use. Allow approximately thirty (30) minutes for the heater to cool down prior to performing maintenance.

2. Disconnect the electrical wiring.
3. Depressurize the pipeline.



The pipeline must be depressurized prior to installing and removing the unit.

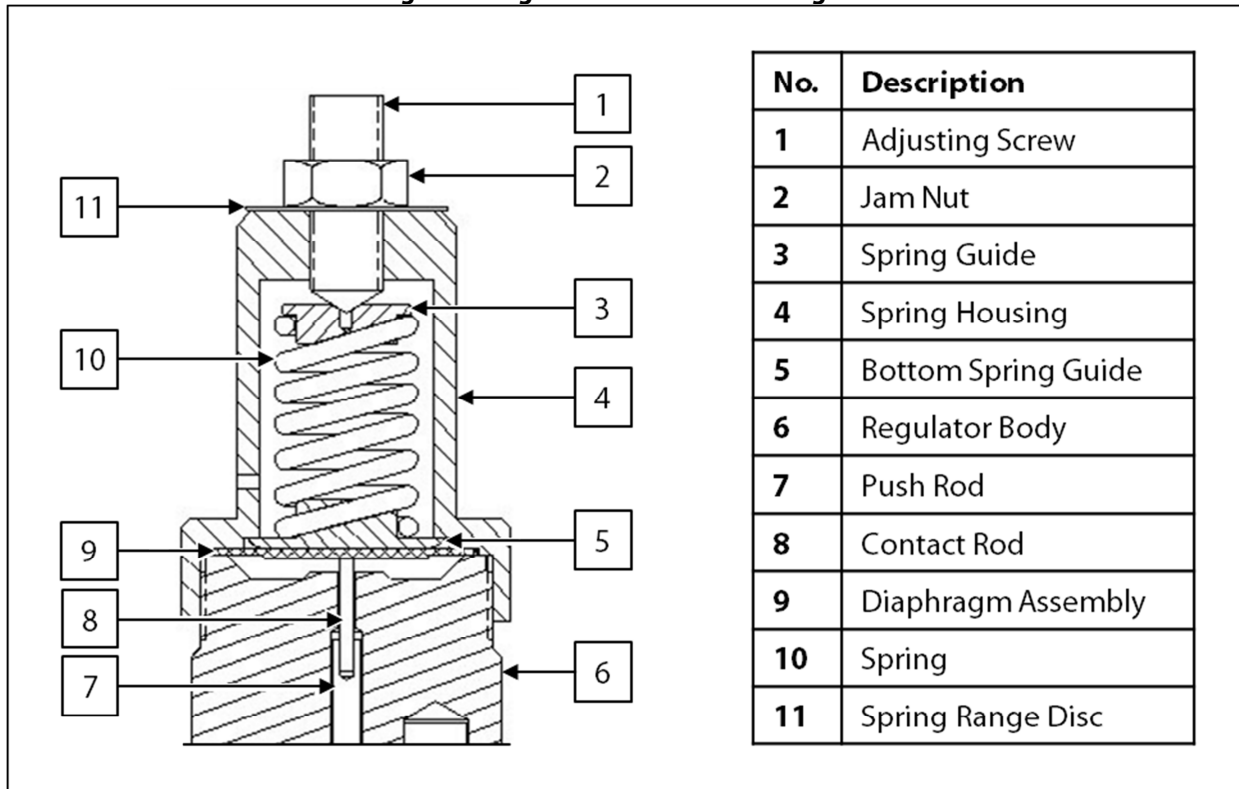
4. Disconnect the customer-supplied tubing, fittings, or instrument attached to the unit.
5. Remove the IHRD-4 from the pipeline.

Regulator Upper Housing Maintenance



Maintenance should not be performed on the regulator until the regulator has been isolated from all pressure.

Figure 5: Regulator Maintenance Diagram



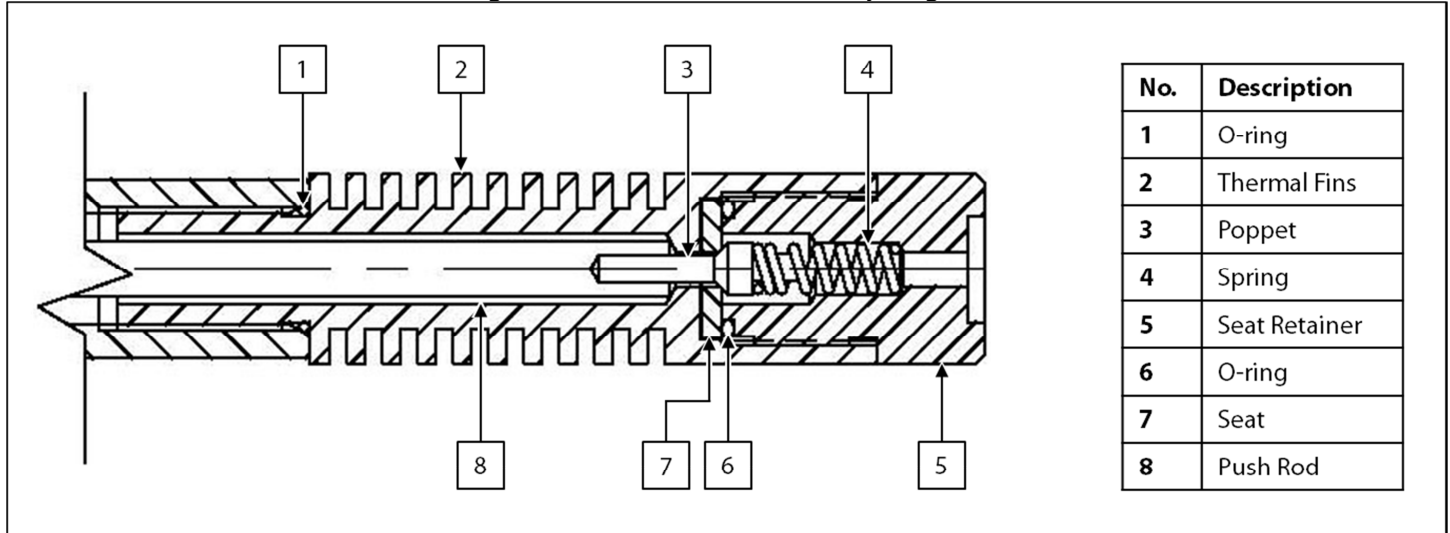
6. Loosen the jam nut on the adjusting screw.
7. In a counterclockwise direction, back off the adjusting screw to relieve tension on the spring.
8. As necessary, perform maintenance on the relief valve. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the relief valve for maintenance instructions.
9. Separate the spring housing from the regulator body.
10. Remove the spring guides and spring.
11. Remove the diaphragm assembly.
12. Inspect the diaphragm for wear. Replace as necessary.
13. Place the diaphragm assembly on top of the regulator body with the bottom spring guide facing up.
14. Place the spring on the diaphragm assembly. Ensure that the spring is sitting on the bottom spring guide.
15. Return the spring guide to the top of the spring.
16. Install the spring housing to the regulator body.



When reassembling the upper housing, **HAND-TIGHTEN ONLY**.

Thermal Fin Subassembly Maintenance

Figure 6: Thermal Fin Subassembly Diagram



17. Remove the thermal fin subassembly.
18. When the thermal fin subassembly is removed, the contact rod and push rod should easily slide out (*Figure 5*).
19. While holding the thermal fin subassembly with a crescent wrench, use a second crescent wrench to unscrew the seat retainer.
20. Remove the spring and poppet.
21. Examine the seating face of the poppet for scratches or damage. Replace as necessary.



Debris or scratches on the poppet will prevent positive shutoff of the regulator.

22. Use a small, pointed instrument to carefully remove the seat from the thermal fin subassembly.
23. Inspect the seat for debris or scratches. Replace as necessary.



Debris or scratches on the seat will prevent positive shutoff of the regulator.

24. Replace the O-ring on the seat retainer.
25. Use solvent to clean the screen in the seat retainer.

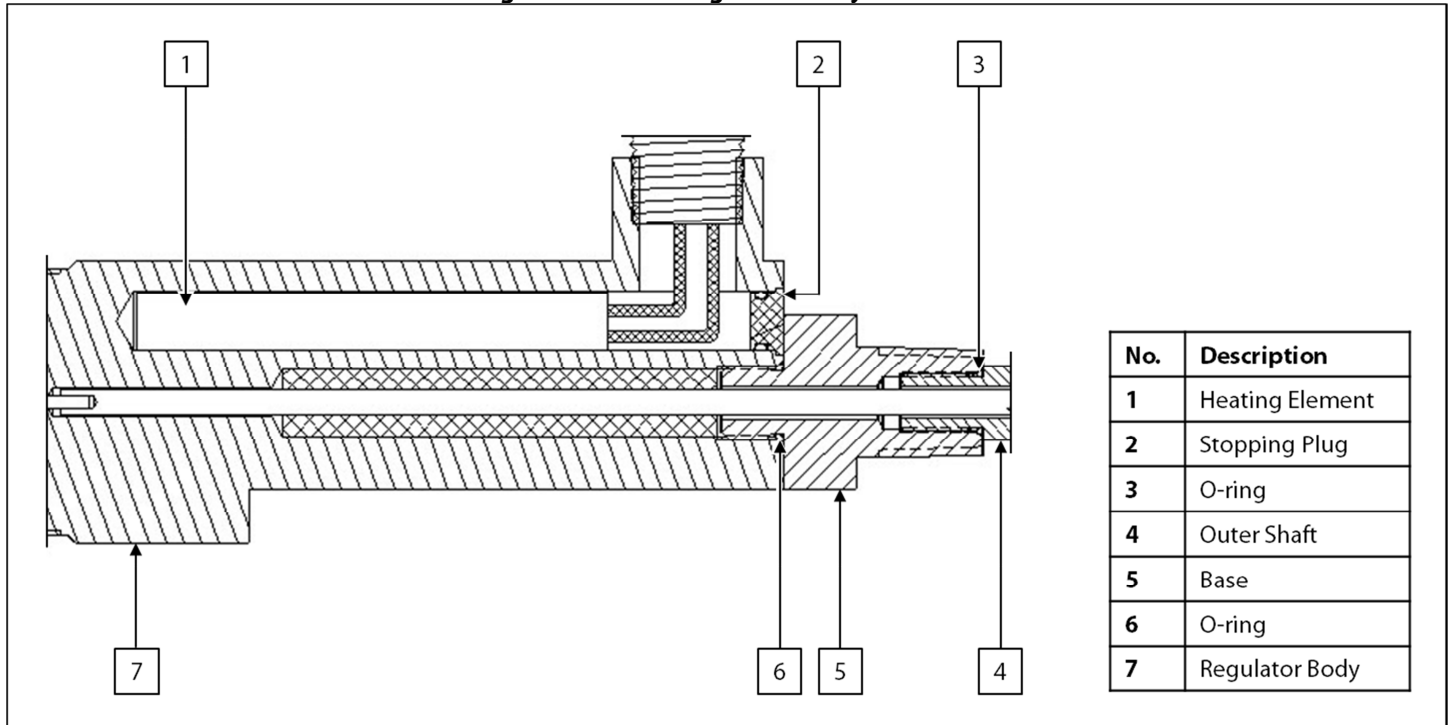


Welker recommends using a solvent, such as rubbing alcohol, that does not leave a film when dry and will not adversely affect analytical instrument results.

26. Install the seat to the thermal fin subassembly.
27. Guide the poppet into the seat.
28. Return the spring to the poppet.
29. Return the seat retainer to the thermal fin subassembly and tighten firmly.
30. Replace the O-ring at the base of the thermal fin subassembly, and then set the thermal fin subassembly aside.

Regulator Body Maintenance

Figure 7: Heated Regulator Body and Base



31. While holding the outer shaft with a crescent wrench, use a second crescent wrench to unscrew the base from the outer shaft.
32. Replace the O-ring on the outer shaft.
33. Unscrew the base from the regulator body.
34. Replace the O-ring on the base.
35. Install the base to the regulator body and tighten firmly.

Reassembly

36. Screw the thermal fin subassembly into the outer shaft.
37. Carefully slide the push rod through the outer shaft into the thermal fin subassembly until it slips onto the poppet.



The push rod should fit easily over the poppet and should not stack on top of the poppet. The IHRD-4 will not be able to be reassembled correctly if the push rod is stacked on top of the poppet.

38. Insert the contact rod into the push rod.
39. Install the regulator subassembly to the outer shaft. The unit should screw on easily.



If the unit does not screw on easily, loosen the unit slightly, and then gently move the unit back and forth until the contact rod slips into the regulator body hole.

40. The unit is now ready for installation. See *Section 2.2, Installing the Unit*, for instructions on installing the unit to the pipeline.

3.3 Heater Failure



Neither the controller nor the heating element is prone to fail; however, failure is possible in instances of misuse and extreme malfunction of the electrical system.



If the controller or heating element fails, replacement is required.

Assessing the Controller

1. Ensure that all electrical power to the unit has been turned OFF and that the electrical wiring has been disconnected.



The heated regulator will be HOT after use. Allow approximately thirty (30) minutes for the regulator to cool down prior to performing maintenance.

2. Remove the cover from the electrical housing.
3. Disconnect the two (2) power supply leads from the terminal block.
4. As necessary, disconnect the customer-supplied tubing, fittings, or instrument attached to the unit.
5. Remove the heated regulator subassembly from the base.
6. Transport the heated regulator subassembly to a hazard-free area.
7. Connect an appropriate electrical supply to prongs 2 and 4, and then use a multimeter to measure the current across prongs 1 and 4. If the current reads 0 A, the controller needs to be replaced; continue to step 8. If the current reads greater than 0 A, the heating element needs to be assessed for failure; proceed to step 12.

Replacing the Controller

8. Ensure that all electrical power to the unit has been turned OFF and that the electrical wiring has been disconnected.



The heated regulator will be HOT after use. Allow approximately thirty (30) minutes for the regulator to cool down prior to performing maintenance.

9. Remove the cover from the electrical housing.
10. Disconnect the four (4) controller prongs from the terminal block, and then remove the failed controller.
11. Install a new controller to the electrical housing.

Assessing the Heating Element

12. Ensure that all electrical power to the unit has been turned OFF and that the electrical wiring has been disconnected.



The heated regulator will be HOT after use. Allow approximately thirty (30) minutes for the regulator to cool down prior to performing maintenance.

13. Remove the cover from the electrical housing.
14. Disconnect the four (4) heating element leads from the terminal block.
15. Using a multimeter, measure the resistance across the two (2) black leads. If the resistance reads "OL" or " ∞ ," the heating element needs to be replaced; continue to step 16. If the resistance reads a numerical value, the heating element does not need to be replaced; proceed to step 24.

Replacing the Heating Element

16. As necessary, disconnect the customer-supplied tubing, fittings, or instrument attached to the unit.
17. Remove the heated regulator subassembly from the base.
18. Use a flat head screwdriver to remove the plug from the regulator body.
19. Feed the heating element leads through the electrical housing into the regulator body.
20. Pull the heating element leads out through the hole in the regulator body. Note that the heating element will also be removed at this time.
21. Lightly lubricate the replacement heating element.



Welker recommends a silicone-based lubricant, such as Molykote® 111, for use with this unit.

22. Install the replacement heating element to the regulator body.
23. Pull the heating element leads through the terminal outlet.
24. Connect the leads to the terminals.
25. With customer-supplied electrical power turned OFF, connect the appropriate leads to terminals 2 and 4 in the provided electrical housing (*Figure 4*).
26. Secure the cover to the electrical housing.
27. As necessary, replace the O-ring on the plug.
28. Install the plug to the regulator body.
29. Return the regulator body to the base.
30. The unit is now ready for installation. See *Section 2.2, Installing the Unit*, for instructions on installing the unit to the pipeline.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-033: Welker® RV-1, RV-2, RV-2CP, and RV-3 Relief Valves
- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

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: AD822BB

