



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

MODEL
HR-4SS

DRAWING NUMBER
AD822BF

MANUAL NUMBER
IOM-078

REVISION
Rev. D, 04/19/2024

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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® Heated Instrument Regulator, Model HR-4SS. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in the Appendix to 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 the following 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 enduser.
- **Note to Enduser**  Keep these instructions for future reference.
- Installation of this Welker® Heated Instrument 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 Welker® Heated Instrument Regulator, please contact a Welker® representative immediately.

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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® *HR-4SS* Heated Instrument Regulator is designed to provide adequate output pressure for instrumentation that is otherwise unable to sustain high pressures.

The gas stream travels to the Heated Instrument Regulator where **the regulator's** components heat the gas prior to decreasing the pressure to help offset the cooling brought on by the Joule-Thomson effect and to prevent sample phase changes.

To set the desired output pressure, an adjusting screw on the device is tightened, pushing down on a spring inside the device. The spring then pushes down on a piston or diaphragm that, in turn, pushes against a poppet.

In addition to the inlet port, the Heated Instrument Regulator has three common ports on its body: the gauge, relief, and outlet. All ports are marked on the device.

The adjustable relief valve functions as a safety device for the unit. The valve will relieve any pressure that exceeds the set pressure of the regulator.

Welker® might custom design the HR-4SS 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: Welker® HR-4SS Heated Instrument Regulator Specifications

Products Sampled	Gases	
Materials of Construction	316/316L Stainless Steel, FKM, and PTFE (Others Available)	
Maximum Allowable Inlet Pressure*	2,160 psig @ -20 °F to 100 °F (148 barg @ -29 °C to 37 °C)	
Thermostat Assembly Control Ranges	180 °F to 380 °F (82 °C to 193 °C) AC 240 V / 200 Watt	
	180 °F to 380 °F (82 °C to 193 °C) AC 120 V / 200 Watt	
	68 °F to 210 °F (20 °C to 100 °C) AC 240 V / 150 Watt	
	68 °F to 210 °F (20 °C to 100 °C) AC 120 V / 150 Watt (Standard)	
Connections	One (1) Inlet and Three (3) Outlets: ¼" FNPT	
Spring Output Option Ranges	Spring Output Range Options	Spring Color Code
	75–200 psig	Black
	20–100 psig	Red
	0–50 psig	Green
	0–25 psig	Yellow
Utility Requirement Options (Heater Cartridge Assembly)	Electrical: 200 W / AC 240V 200 W / AC 120 V 150 W / AC 240 V 150 W / AC 120 V (Standard)	
Electrical Connection	¾" FNPT	
Operation	Diaphragm-Operated	
Approximate Dimensions	10½" x 3¾" x 9" (Length x Width x Height) (Not Including Bracket and Optional Items)	
Features	Heater Cartridge HR-4SS Chamber Insert Junction Box Bracket (Welded to Device) for Wall Mounting Thermostat Thermostat Label	
Industry Standards / Product Certifications	NACE Compliant	
Options	Gauge NACE Certificate Relief Valve (Downstream Relief Recommended)	

*Maximum Allowable Pressures and Temperatures Might Vary Depending on Pipeline Connection Device.

1.4 Equipment Diagrams

Figure 1: Welker® HR-4SS Heated Regulator Basic Diagram

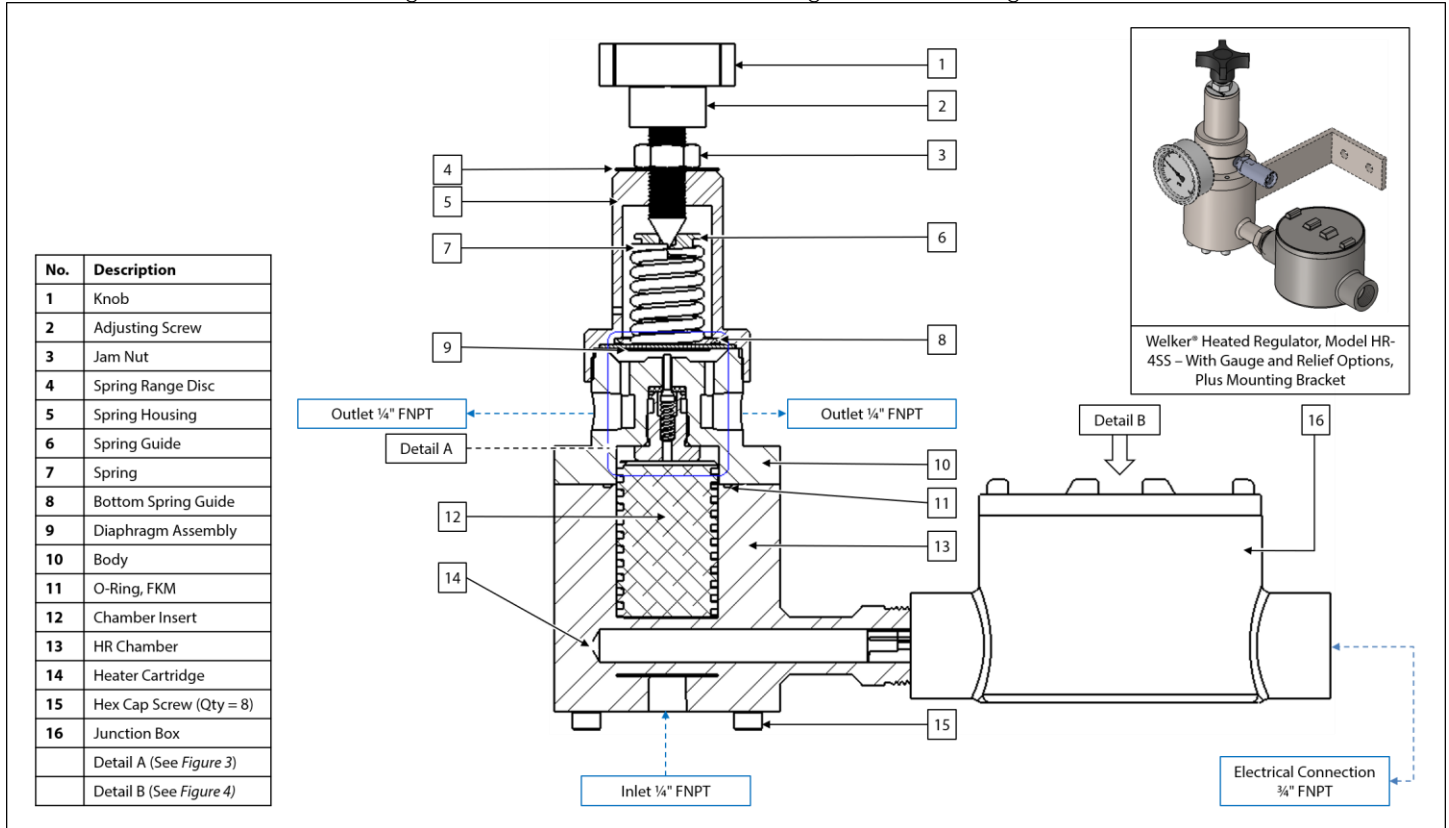
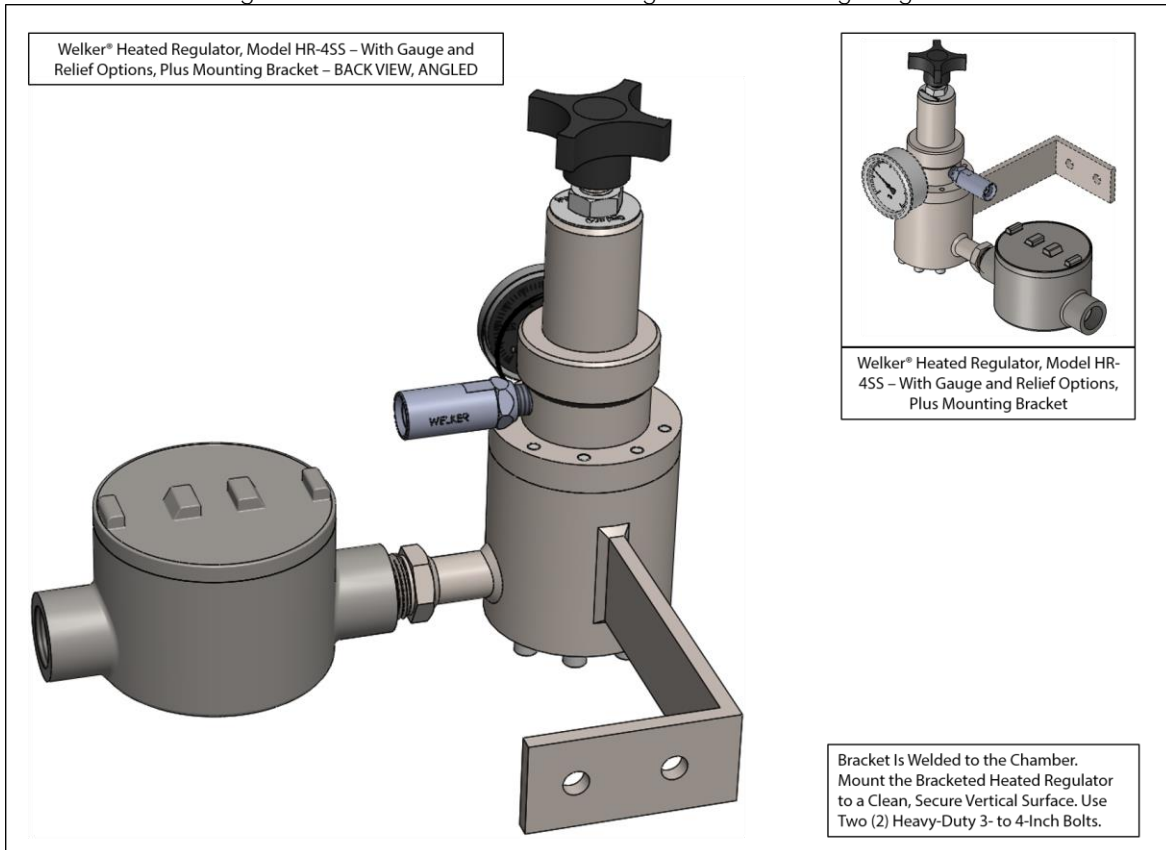


Figure 2: Welker® HR-4SS Heated Regulator Mounting Diagram



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.

It would be advisable to have the following tools available for installation of the unit. However, the actual tools used might vary depending on how the unit is deployed.

- 10" Adjustable Wrench
- Two (2) 2" or 3" Center Hole Bolts
- Tubing
- Thread Sealant

2.2 Installation Instructions

1. Connect a gauge to the gauge port on the regulator (*Figure 1*).
2. Connect a relief valve to the relief valve port on the regulator (*Figure 1*).



If the operator requests, Welker® can preset a Welker® relief valve prior to shipment.



Do not turn on the inlet supply at this time. Turning on the inlet supply before the relief valve is set could result in overpressurizing the instrument.

3. Close all valves connected to the regulator.
4. A mounting bracket is welded to the device (*Figure 2*) so it can be elevated to permit tubing to be connected to the inlet on the bottom of the HR-4SS (*Figure 1* and *Figure 3*). Mount the bracketed unit vertically to a secure surface.
5. 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, which is listed in the *Appendix* to this manual).
6. Remove the lid of the terminal housing (i.e., junction box) (*Figure 4*).
7. Attach conduit to the terminal housing.
8. Connect the appropriate electrical wiring to the terminal strip in the terminal housing (*Figure 4*).
9. Use tubing to connect from the outlet port on the regulator to the inlet of the instrument (*Figure 1*).
10. Use tubing to connect the product to be regulated to the inlet port on the regulator.



Welker® recommends installing an upstream filter if product has solid particles or possible hydrocarbon liquids. The filter should be installed on the connection to the regulator inlet.

11. Set the thermostat to the desired temperature (*Figure 4*).
12. Allow the device to heat for 30 to 60 minutes.
13. Open the valve supplying the product to the regulator.
14. Turn on the sample supply valve to pressurize the regulator inlet.
15. Loosen or tighten the adjusting screw until the gauge reads the desired pressure for the outlet (*Figure 1*).
16. Tighten the nut on the adjusting screw to secure it into place (*Figure 1*).
17. Open the outlet of the regulator that leads to the analyzer.
18. Open the analyzer valve.
19. Check the entire system for leaks and repair as necessary.
20. The 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 of the system in case of normal or 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.



Maintenance on the instrument regulator should not be performed until the regulator has been powered off and cooled.

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.
 - Small Hex Key Set
 - Seal Pick
 - ¾" Socket Wrench
 - **10" Adjustable Wrench**
 - **6" and 10" Channel Lock Pliers**
 - Cleaning Solvent

3.2 Maintenance

1. Turn off the inlet supply pressure to the regulator inlet.

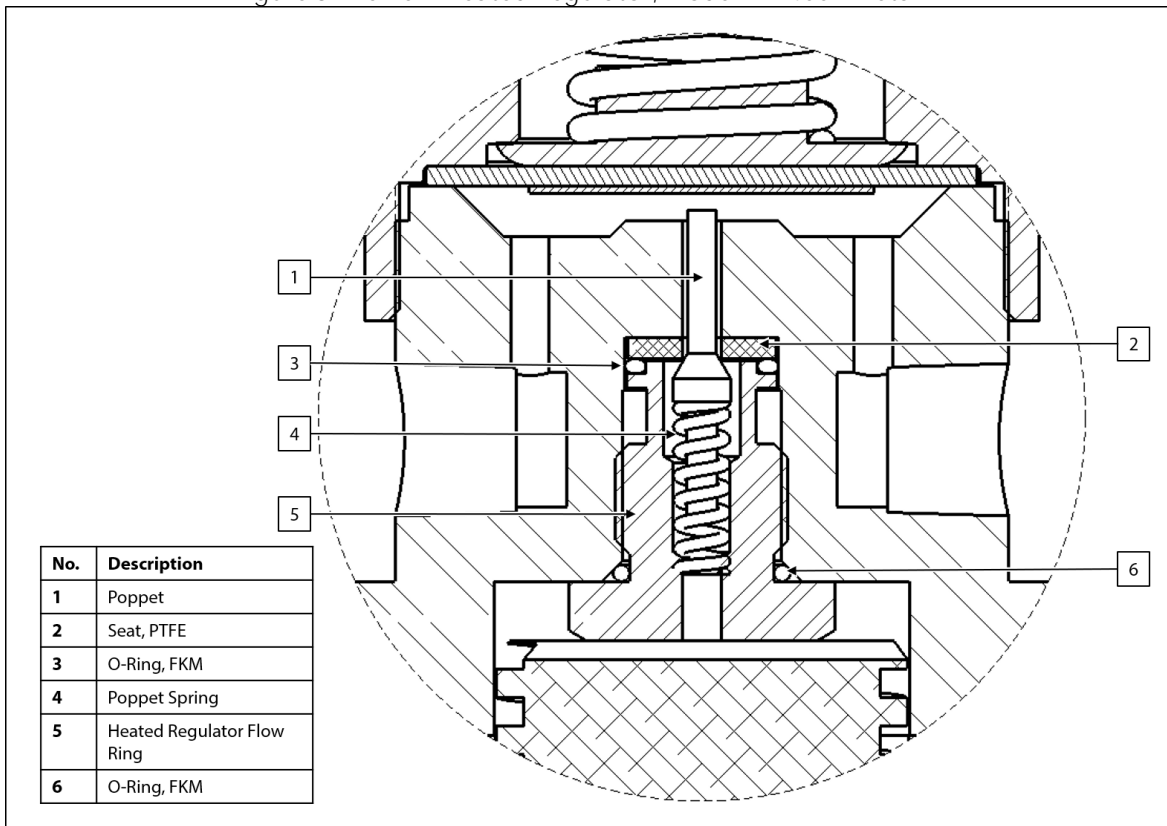


Check valves for leaks and repair as necessary during reinstallation.

2. Disconnect the inlet supply from the regulator inlet port.
3. Disconnect the instrument from the regulator outlet port.
4. Shut down all electrical connections to the regulator.
5. Open the lid of the terminal housing (i.e., terminal block) (*Figure 4*).
6. Disconnect the incoming electrical wiring.
7. Remove the conduit.
8. Loosen the nut on the adjusting screw (*Figure 1*).
9. Loosen the adjusting screw to relieve tension on the spring (*Figure 1*).
10. Loosen and remove the spring housing (*Figure 1*).
11. Remove the spring range disc and the spring (*Figure 1*).
12. Remove the bottom spring guide (*Figure 1*).

13. Remove the diaphragm assembly (*Figure 1*). Inspect for wear and replace if necessary.
14. Set the bottom spring guide back into place on the spring (*Figure 1*).

Figure 3: Welker® Heated Regulator, Model HR-4SS – Detail A



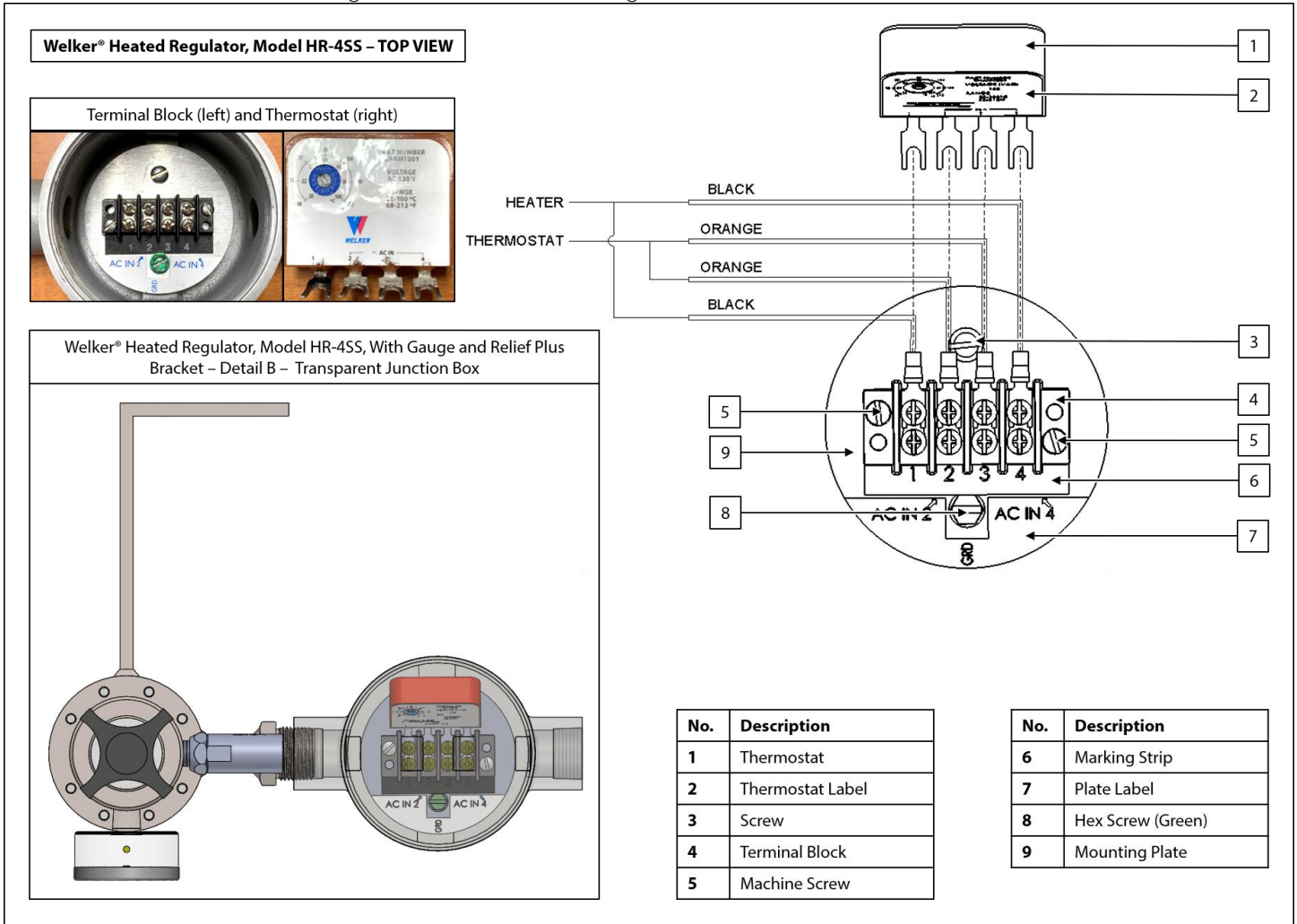
15. Reattach the spring housing (*Figure 1*).
16. Set the spring range disc back into place on top of the spring (*Figure 1*).
17. Reattach the spring housing securely (*Figure 1*).
18. Loosen and remove the eight (8) cap screws (*Figure 1*).
19. Using the 3/4" size socket wrench, remove the chamber insert (*Figure 1*).
20. Unscrew the flow ring from the regulator body (*Figure 3*).
21. Replace the O-ring around the flow ring (*Figure 3*).
22. Remove the poppet spring and the poppet (*Figure 3*).
23. Examine the poppet and the poppet spring. If they show deep scratches, they will need to be replaced.
24. Use a seal pick to carefully pick the seat out of the body (*Figure 3*).
25. Examine the seat and replace if necessary (*Figure 3*).
26. Set the seat back into place. The bevel in the seat should face the poppet (*Figure 3*).



Debris or scratches on either the poppet or seat will prevent positive shut off of the regulator.

27. Guide the poppet into the seat (*Figure 3*).
28. Reattach the poppet spring and flow ring (*Figure 3*).
29. Tighten the flow ring securely.
30. Clean the chamber insert (*Figure 1*) with solvent.
31. Reconnect the chamber to the regulator body (*Figure 1*).
32. Replace the eight (8) cap screws.

Figure 4: Welker® Heated Regulator, Model HR-4SS – Detail B



3.3 Replacing the Heating Element

1. Disconnect the two heater element leads (black) from the terminal (*Figure 4*).
2. Pull out the heater cartridge (*Figure 1*) and leads from the chamber (*Figure 1*).
3. Replace the heater cartridge with a new heater cartridge.
4. Heavily lubricate the new heater cartridge with a silicone-based lubricant such as Molykote® III. This surrounds the chamber containing the electrical wires with a substance that promotes steady thermal conductivity. The lubricant both prevents overheating and fills the chamber void in order to help transfer heat. Reconnect the lubricated heater cartridge into the chamber (*Figure 1*).
5. Reconnect the leads to the terminal block (*Figure 4*).
6. Close the lid of the terminal block.
7. Maintenance is now complete. The unit is ready for reinstallation.

3.4 Troubleshooting Guidelines

Table 2: Welker® Heated Regulator, Model HR-4SS Troubleshooting Guidelines

Issues	Possible Causes	Solutions
The relief valve goes off prematurely.	<p>The inlet supply was turned on before the relief valve was set.</p> <p>The spring is not adjusted to the correct tension.</p>	<p>Turn off the inlet supply and allow the device to depressurize. Then set the relief valve before turning on the inlet supply.</p> <p>Adjust the seat and poppet to the correct spring pressure.</p>
Solid particles or hydrocarbon liquids are reaching the analyzer.	There is no upstream filter.	Welker® recommends installing an upstream filter if product has solid particles or possible hydrocarbon liquids. The filter should be installed on the connection to the regulator inlet.
The regulator is not regulating correctly.	Debris or scratches on either the poppet or seat will prevent positive shut off of the regulator.	Follow <i>Section 3.2 Maintenance</i> to examine and replace the poppet and/or seat.
The heater cartridge is not conducting heat to the chamber.	Air pockets exist that do not transfer heat.	When replacing the heater cartridge, be sure to heavily lubricate it with a silicone-based lubricant such as Molykote® III. This surrounds the chamber containing the electrical wires with a substance that promotes steady thermal conductivity. The lubricant both prevents overheating and fills the chamber void in order to help transfer heat.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-033: Welker® Relief Valve, Models RV-1, RV-2, RV-2CP, and RV-3

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: AD822BF (Welker® Heated Regulator, Model HR-4SS)

