



*Installation, Operation, and
Maintenance Manual*

*Welker[®] Automatic Insertion Heated
Regulator High Voltage
Model
IHRA-4SS-220/230
100 or more inch insertion length*

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 above. Correct operating and/or installation techniques, however, are the responsibility of the end user. Welker reserves the right to make changes to this and all products in order to improve performance and reliability.



This IHRA was shipped with an installation support beam attached to upper half of the unit. DO NOT REMOVE SUPPORT BEAM until after instructed to do so during the installation process, or the insertion shaft might bend.

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SPECIFICATIONS

1. SPECIFICATIONS

1.1 INTRODUCTION

We appreciate your business and your choice of Welker products. The installation, operation, and maintenance liability for this product becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manual* 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 1-800-776-7267 in the USA or 1-281-491-2331.

Notes, Cautions, and Warnings



Notes emphasize information or set it off from the surrounding text.



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



Warnings are alerts to a specific procedure or practice that, if not followed correctly, could cause personal injury.

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 Automatic Insertion Heated Regulator (IHRA-4SS) is designed for use in systems where it is desirable to insert the regulator into and retract it from a pressurized line. Using four valves and an oil reservoir, the automatic insertion style allows the operator to safely control the movement of the IHRA-4SS into and out of the pipeline. The unit should always be mounted to a fully ported pipeline isolation valve with a minimum bore of $\frac{3}{4}$ ". It is required that the oil reservoir be mounted in a vertical position.

The preferred location for installation is in a straight section of inlet piping at a point before the flowing stream is subjected to turns and impingements, which can result in aerosols that may produce a sample that is not representative of the gas in the pipeline. The IHRA-4SS's thermal fins are designed to offset the cooling brought on by the Joule-Thomson effect. Only one analytical instrument should be fed by the IHRA-4SS at a time; otherwise, the Joule-Thomson effect brought on by the pressure drop through the point of regulation will be greater than the heating effect brought on by the flowing pipeline gas.

SPECIFICATIONS

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. However, please note that ***the specifications may vary depending on the customization of your product.**

General	
Model number	IHRA-4SS
Description	An automatic insertion device that incorporates a heated regulator and a vaporization probe
Materials of construction	Stainless steel
Application	Vaporization of sample stream
Products sampled	Natural gas, Natural Gas Liquids
Pipeline Connection	¾" NPT, 1" NPT (Standard), 1 ½" NPT, or 1"-2" Flange
Insertion Depth	102" (0.46 m) (Standard) others available
Design temperature	-20°F to 200°F (-28°C to 93°C)
MAOP*	1" NPT 2160 PSIG 2"-600RF 1440 PSIG 2"-300RF 720 PSIG

- A sample probe should be located in the least turbulent area available of the flowing stream; i.e., not in a header or blow-down stack and away from obstructions, elbows or partially closed valves. The sample probe should be installed reaching approximately into the center one-third of the pipeline.
- The unit is shipped from the factory with the assumption that the installation will be vertical. In cases where the unit is mounted in the horizontal position, the user has to rotate the oil reservoir 90° and re-tube, so that the oil reservoir drain valve always faces downward. The internals of the reservoir have a downcomer that does not function if the oil reservoir is located in a horizontal position. For long insertion units, it is sometimes required to support the heated regulator body to protect the shaft from bending stresses.

SPECIFICATIONS

1.4 DIAGRAM

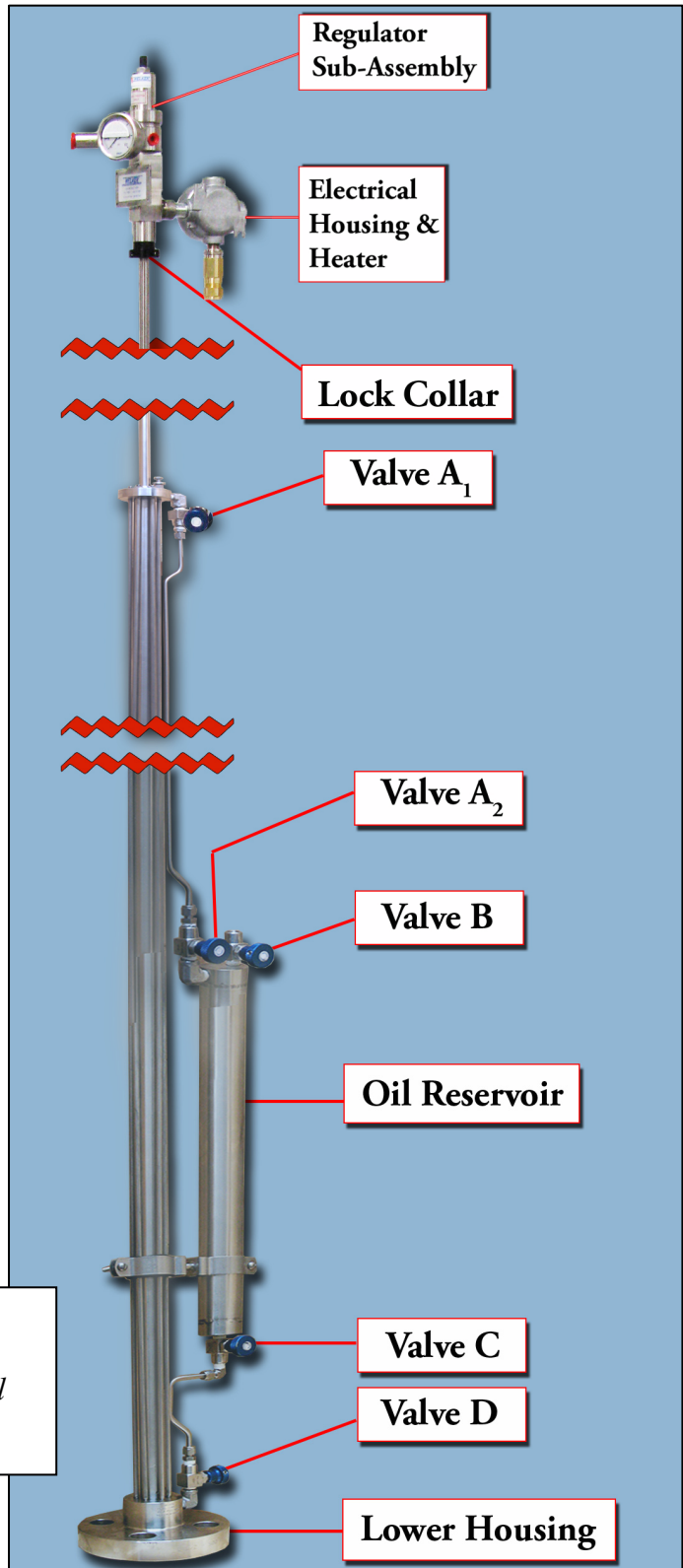


Figure 1
IHRA
Refer to this figure throughout manual
Model shown has flange connection and vertical mount

INSTALLATION & OPERATION

2. INSTALLATION & OPERATION INSTRUCTIONS

2.1 UNPACKING THE UNIT

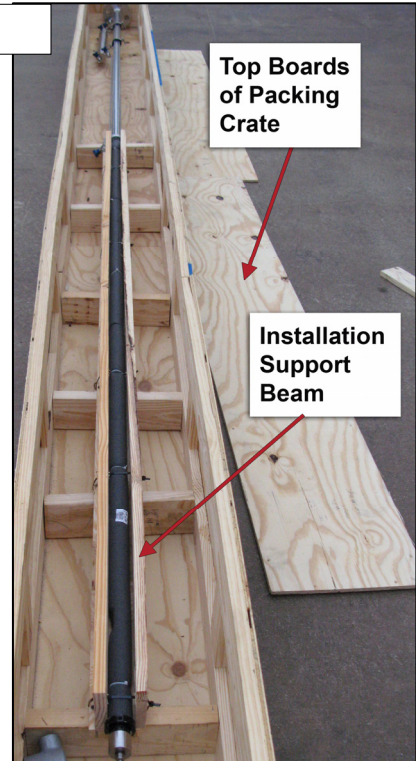
Figure 2

1. Place the packing crate on a flat level surface as close as possible to the installation point (isolation valve).
2. Remove the top boards from the top of the packing crate. (See Figure 2).



This IHRA was shipped with an installation support beam attached to the upper half of the unit. DO NOT REMOVE SUPPORT BEAM until after instructed to do so during the installation process, or the insertion shaft might bend.

3. Remove the screws that hold the installation support beam to the packing crate.
4. Carefully lift the unit out of the crate with the support beam attached; holding the unit level by lifting at the middle, bottom, and top of the unit (This will take three people).
5. Lay the unit on a flat level surface to prepare for installation.
6. After unpacking the unit, check it for compliance and for any damages that may have occurred during shipment.



Claims for damages caused during shipping must be initiated by the receiver and directed to the shipping carrier. Welker is not responsible for any damages caused from mishandling by the shipping company.

2.2 INSTALLATION INSTRUCTIONS



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

Recommended Tools

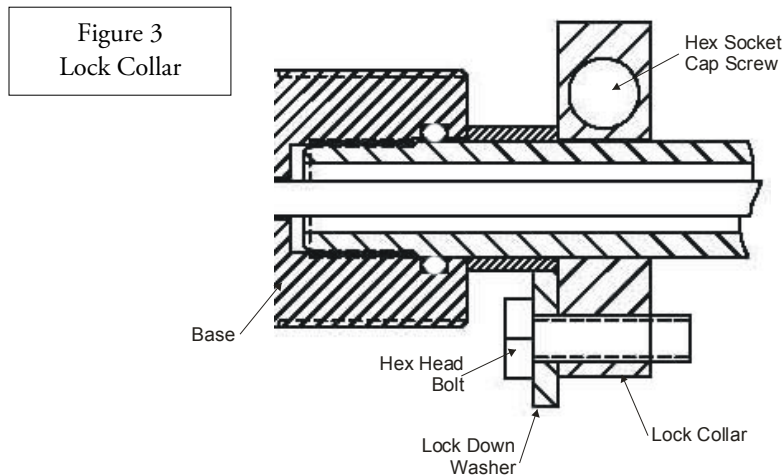
It would be advisable to have the following tools available for installation of the unit; however, tools used will vary depending on probe model.



- Measuring tape
- Small hex key set
- 6" adjustable wrench
- 10" adjustable wrench
- Flat blade screwdriver
- Permanent marker

INSTALLATION & OPERATION

1. If the model you ordered did not include a relief valve and a gauge then you will need to install these in the appropriate ports, which will be marked on the regulator.
2. Determine the amount of insertion travel desired by measuring from the top of the pipeline isolation valve to the center one-third of the pipeline.
3. Remove the lockdown bolt and washer. Loosen the stop collar (lock collar) and hex socket cap screw (Figure 3 and Figure 1).



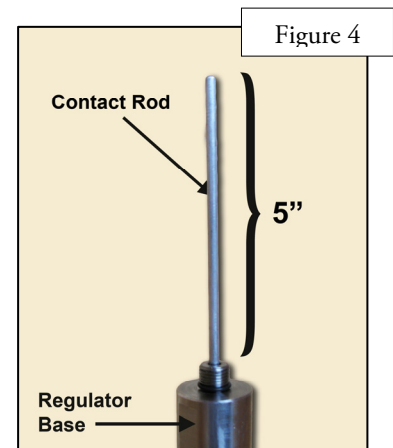
4. With the IHRA-4SS fully retracted, move the lock collar on the shaft to the appropriate length. For example, if the insertion travel desired is 6", measure up 6" from the upper housing (top cap) and tighten the hex socket cap screw at that position. This limits the insertion travel to 6".

Install the probe onto the pipeline isolation valve:

5. Carefully lift the unit by holding onto the middle. As you raise the unit, you will most likely need to climb onto a ladder to keep supporting the unit at the middle. Place the unit on the pipeline isolation valve.
6. Connect the unit to the pipeline isolation valve by cross bolting the lower housing nuts for flange unit, or by screwing in the NPT connection.
7. Remove the installation support beam from the upper half of the unit.

Install the regulator sub-assembly onto the probe.

8. Make sure the contact rod is all the way down in the unit. There should be only 5 inches from the base if the regulator to the top of the rod. (See Figure 4).



INSTALLATION & OPERATION



Figure 5
Contact Rod
Top View

9. Insert the pin into the top of the contact rod. (See Figure 5 & Figure 6).



Figure 6

10. Carefully place the regulator sub-assembly onto the contact rod and screw it onto the regulator base.
11. In a counterclockwise direction, back off the adjusting screw on the regulator subassembly (Figure 7) so that the IHRA-4SS is closed (i.e., no setting or tension on the spring).

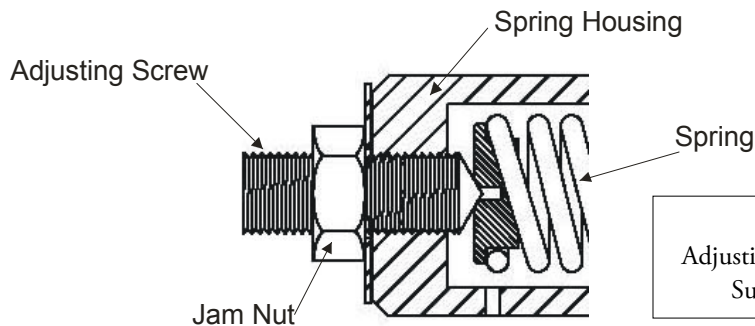


Figure 7
Adjusting Screw on Regulator
Sub-assembly Detail



Do not use the oil reservoir as a leverage grip to rotate the unit on the valve.

12. Make sure that all valves on the unit are closed.
13. Slowly open the pipeline isolation valve and visually check for external leaks. Locate and fix any leaks.
14. Check the IHRA-4SS's outlet gauge. The gauge should read 0 psi. If the gauge does not read 0 psi, check the IHRA-4SS for internal leaking.
15. Slowly open valve **C**, at the bottom of the oil reservoir, and valve **D**, at the bottom of the lower housing, to allow pipeline pressure to enter the reservoir



The IHRA-4SS is shipped from the factory with the necessary oil volume. If additional oil is needed, the unit should be fully retracted prior to adding it. Remove valve **B** and add oil, filling the reservoir just below the top of the tube that is connected to the port at valve **C**. Then replace valve **B**.

16. Slowly open valves **A₁** and **A₂** between the reservoir and the top cap of the insertion unit. This allows the probe to descend or insert into the pipeline until the lock collar stops at the top cap.

INSTALLATION & OPERATION

17. Align the lock collar so that it fits over the stand-off, and then replace the lockdown bolt and washer.
18. Close valve A₂ (valve A₁ can remain open) and visually check for external leaks. Locate and fix any leaks.
19. With the customer-supplied electric power turned off, connect the 220/230 VAC leads to terminals 2 and 4 in the connection box provided (Figure 8).

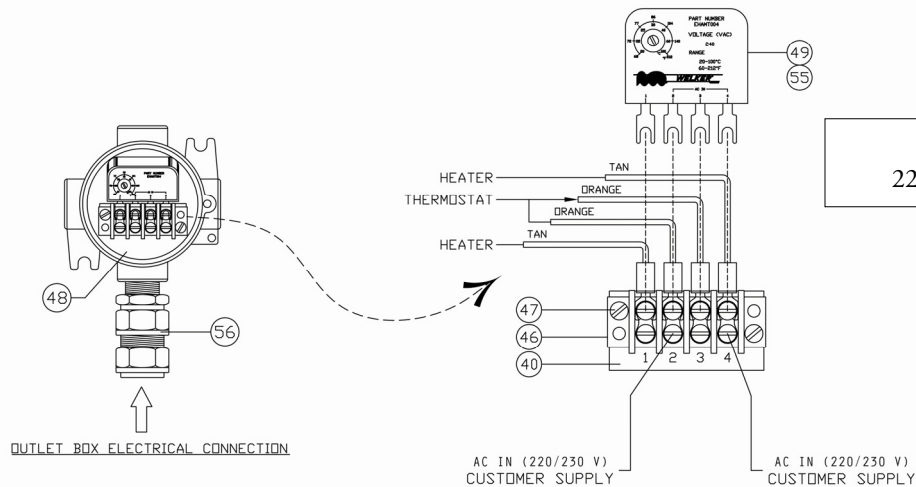


Figure 8
220/230 VAC

20. Set the adjustment on the electrical controller to the desired temperature.
21. Secure the cover to the electrical box and cable gland.
22. Connect tubing from outlet valve of IHRA-4SS to the instrument.
23. Loosen the jam nut on the adjusting screw (Figure 9).

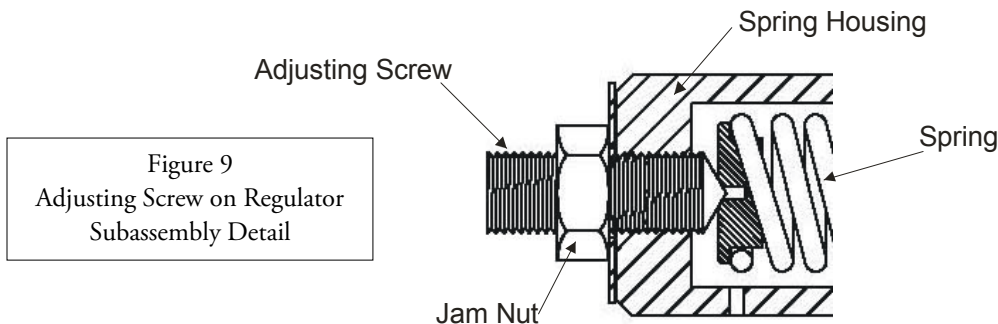


Figure 9
Adjusting Screw on Regulator
Subassembly Detail

24. In a clockwise direction, screw down on the adjusting screw to set the desired outlet pressure. Use a wrench to tighten the jam nut.
25. Refer to the Relief Valve IOM to set the relief valve.
26. Visually check the entire system for external leaks. Locate and fix any leaks.
27. Turn on the electric power to begin operation of the IHRA-4SS.

MAINTENANCE

3. MAINTENANCE

3.1 GENERAL

Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit handy for the system in case of unexpected wear or faulty seals. All maintenance and cleaning of the unit should be done on a smooth, clean surface.



We recommend that the unit have annual maintenance under normal operating conditions. In the case of severe service, dirty conditions, excessive cycling usage, or other unique applications that may subject the equipment to unpredictable circumstances, a more frequent maintenance schedule may be appropriate.



New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease (silicone grease or other) before they are installed into the equipment. This helps in the installation of the seals while reducing the risk of damage when positioning them on the parts. After the seals are installed, some additional lubrication can be applied to shafts or cylinder inner diameters to allow smooth transition of parts.

Recommended Tools

It would be advisable to have the following tools available for maintenance of the unit; however, tools used will vary depending on probe model.



- Small Hex Key Set
- 6" Adjustable Wrench
- 10" Adjustable Wrench
- $\frac{7}{16}$ " Combination Wrench

3.2 RETRACTION

To retract the IHRA, complete the following steps:



If the IHRA-4SS is being withdrawn to "pig" the pipeline, follow the Section 3.2, Retraction through Step 5.

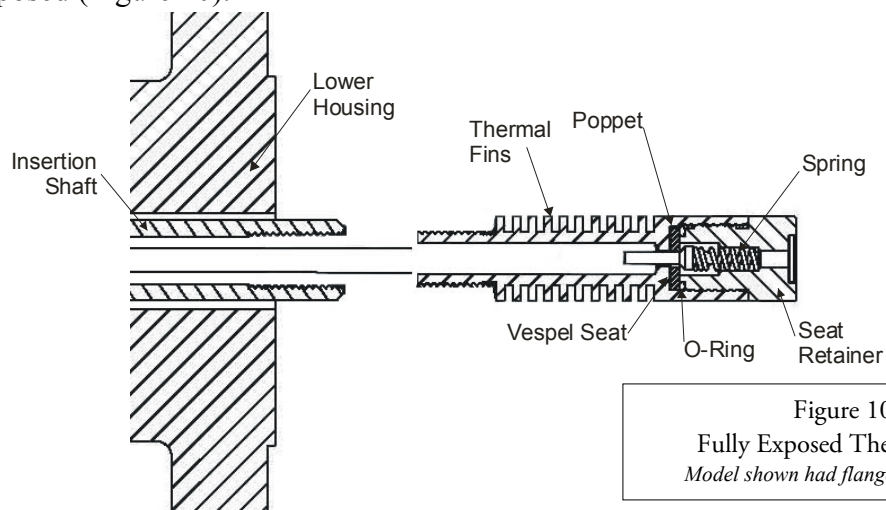
1. Turn off the electrical power, and disconnect the electrical wiring.
2. Close the outlet valve of the IHRA-4SS and disconnect the tubing to the instrument, allowing trapped pressure in the tubing run to be released.
3. Open valve A₂ and close valves C and D (Figure 1 on page 4).

MAINTENANCE

4. Remove the lockdown bolt.
5. Slowly open valve B and vent the gas in the reservoir. This allows the probe to withdraw from the pipeline. If the pressure in the pipeline has fallen to levels so low as to not produce the force on the probe required to push it out of the line, the probe can be manually pulled from the pipeline by hand. Take care that the pipeline pressure doesn't increase while manually retracting the probe from the line as this would cause the probe to surge suddenly out of the pipeline producing a dangerous situation.
6. When the probe is completely withdrawn, close the pipeline isolation valve.
7. Open the outlet valve of the IHRA-4SS to vent off trapped pressure.
8. Open valves C and D to vent any remaining trapped gas in the lower housing.
9. Close all valves on the IHRA-4SS and remove the unit from the pipeline valve.
10. The IHRA-4SS is now ready for disassembly or to be moved to another location.

3.3 DISASSEMBLY/ASSEMBLY AND MAINTENANCE

1. Make sure that the probe is fully retracted and valves A₁, A₂, B, C and D are closed.
2. Disconnect the tubing between valves C and D.
3. Use a crescent wrench on the body of valve A and remove the oil reservoir from the top cap of the insertion unit.
4. Push the probe assembly through the lower housing so that the thermal fins are fully exposed (Figure 10).



5. Slide the lock collar over the stand-offs, and tighten it around the shaft.
6. Use a wrench to secure the probe, and use another wrench to loosen the thermal fin/seat retainer sub-assembly.
7. Remove the seat retainer, spring and poppet (Figure 11).

MAINTENANCE

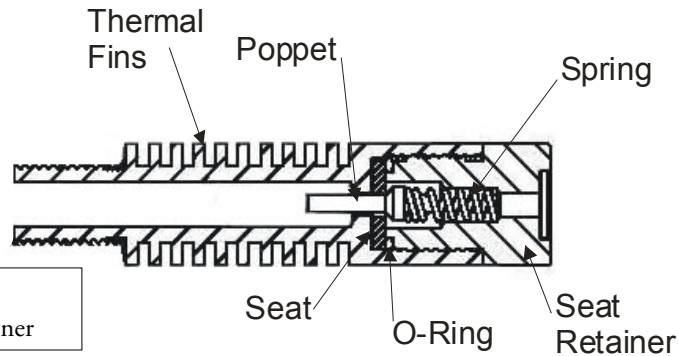


Figure 11
Thermal Fin/Seat Retainer

8. Examine the poppet to ensure there is good finish on the seating face. Replace the poppet and spring, if damaged.
9. Use a small knife or pointed instrument to carefully pick the vessel seat out of the thermal fin/seat retainer subassembly.
10. Visually inspect the seat for debris or scratches and replace it, if damaged.
11. Guide the poppet into the seat.
12. Replace the spring and the seat retainer, and use a wrench to tighten snugly.
13. Replace the O-ring and place the thermal fin/seat retainer subassembly to the side.



The push rod and contact rod are free and will fall out of the shaft and the IHRA-4SS, if care is not taken.

14. Remove the heated regulator body from the base and set to the side.
15. Remove the base from the insertion shaft and replace both O-rings on the base (Figure 12).

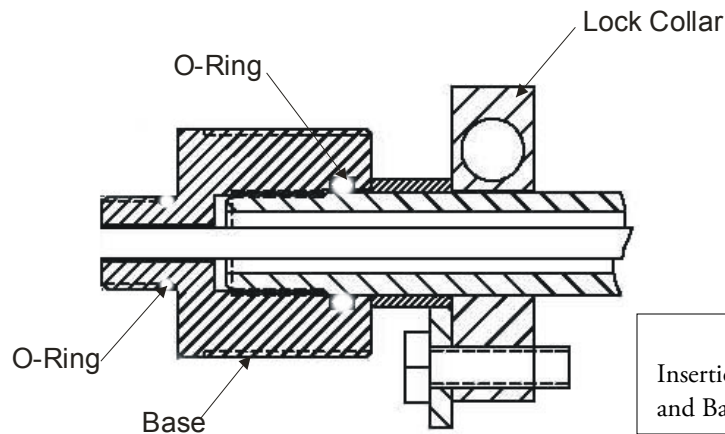
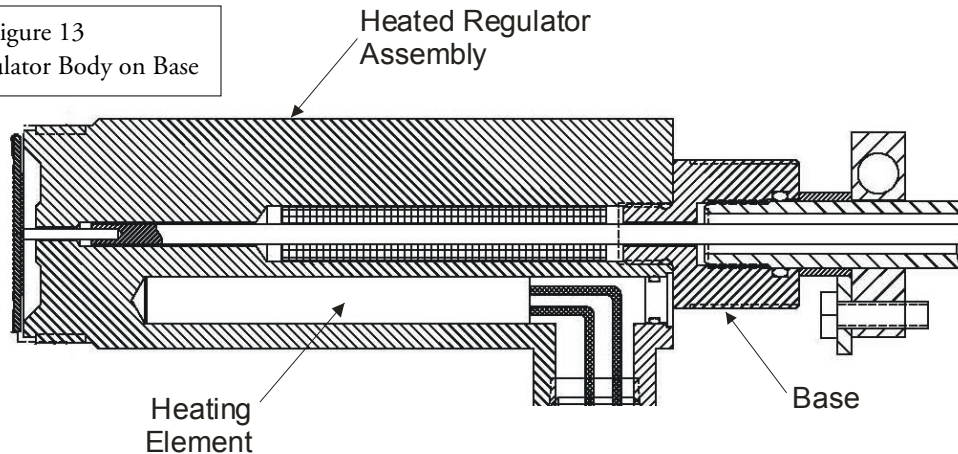


Figure 12
Insertion Shaft with O-rings
and Backup Rings

16. Reinstall the base to the heated regulator assembly, and use a wrench to tighten (Figure 13).

MAINTENANCE

Figure 13
Heated Regulator Body on Base



17. Unscrew the spring housing from the heated regulator body.
18. Reinstall the diaphragm with metal pad facing down (Figure 14).

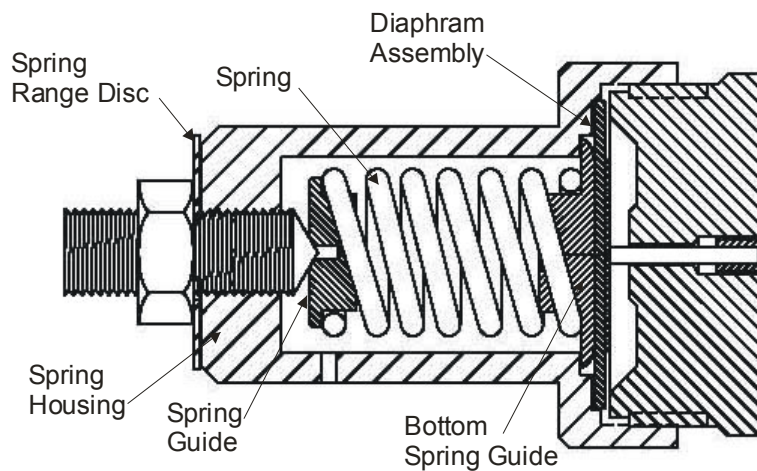
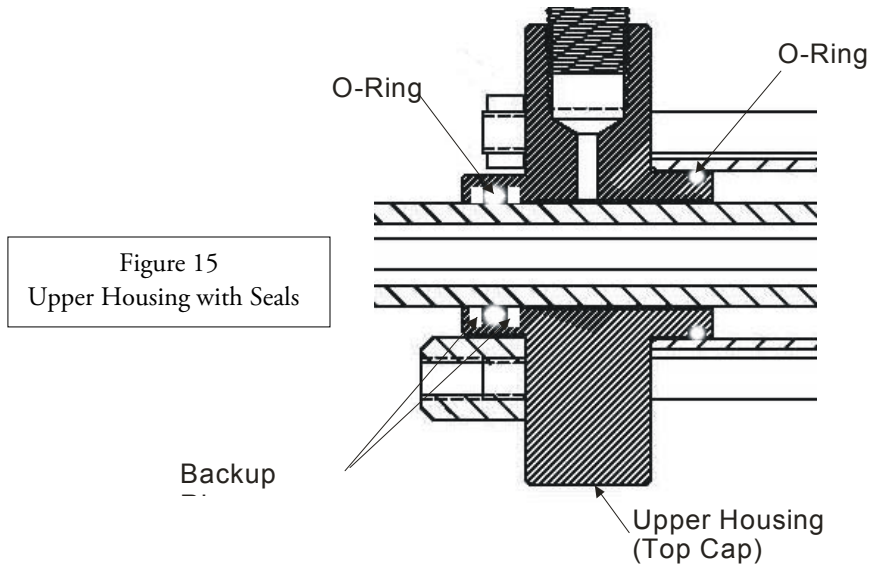


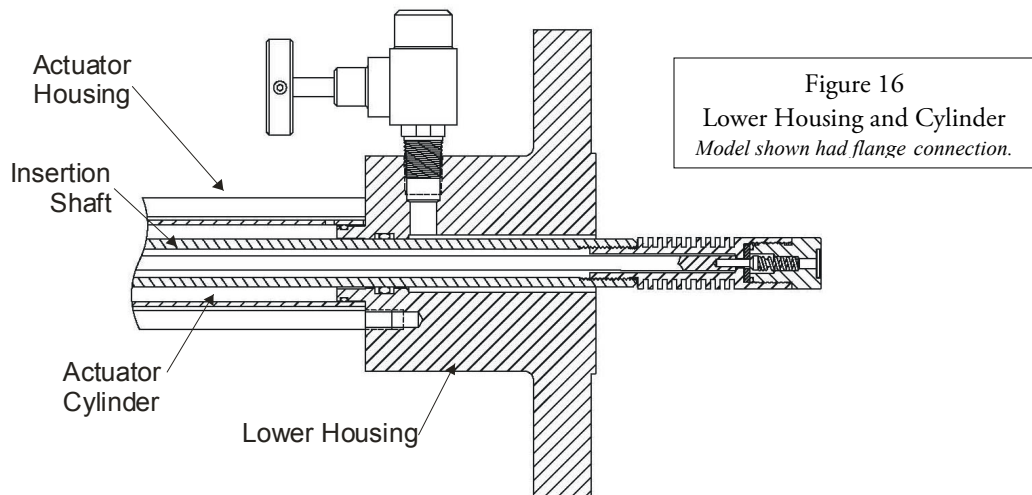
Figure 14
Spring Housing and
Diaphragm Assembly

19. Reinstall the spring guide.
20. Reinstall the spring housing to the heated regulator body.
21. Place the regulator sub-assembly to the side.
22. Loosen and remove the lock collar from the insertion shaft.
23. Remove the tie bolt nuts and slide the top cap off the shaft.
24. Replace the seals on the upper housing (Figure 15).

MAINTENANCE

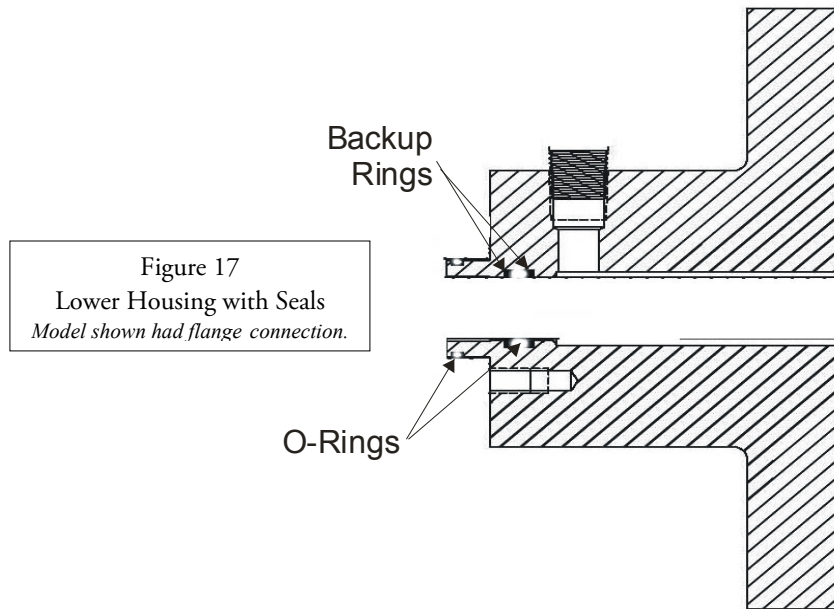


25. Mark the top of the shaft and the top of the cylinder with directional indicators for proper reassembly. This enables the user to distinguish between the top and bottom of the shaft and cylinder upon reinstallation.
26. Carefully slide the insertion shaft and the actuator cylinder out of the lower housing (Figure 16).

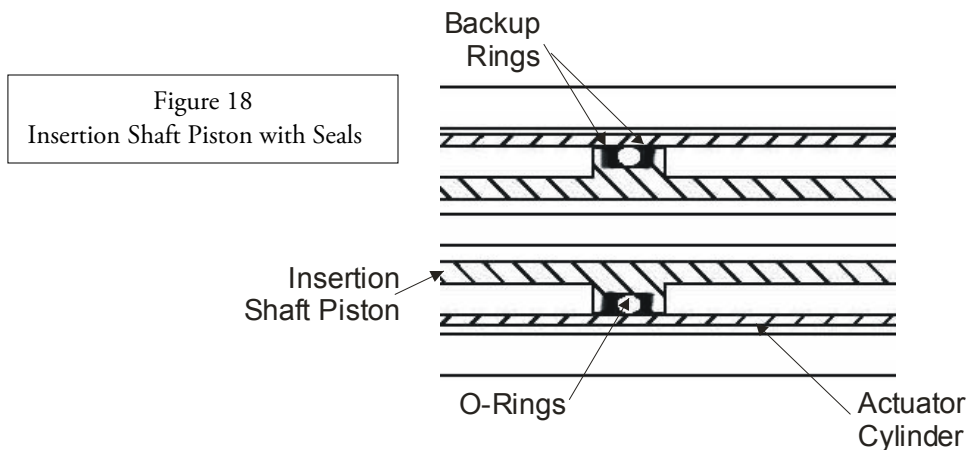


27. Replace two O-rings and two backup rings on the lower housing (Figure 17).

MAINTENANCE



28. Remove the actuator cylinder from the insertion shaft, and replace the seals on the shaft piston (Figure 18).



29. Examine the shaft carefully. The surface is polished and must be free of scratches except on the extreme ends. Replace the shaft, if damaged.
30. Examine the inside of the cylinder for deep scratches. Replace the cylinder, if damaged.
31. Lubricate the inside of the cylinder liberally with DC 111 grease.
32. Reinsert the shaft into the cylinder approximately halfway according to the marks scribed on both parts (refer to Step 25).

MAINTENANCE



Position the vent hole on the cylinder and the shorter portion of the shaft so that they face down toward the lower housing of the unit.

33. Lubricate the shaft with DC 111 grease.
34. Slide the lower housing onto the bottom end of the insertion shaft.
35. Slide the actuator cylinder onto the lower housing hub.
36. Slide the upper housing into the top end of the insertion shaft and down to the cylinder.
37. Reinstall the tie bolts and tie bolt nuts. Use the cross bolt pattern and a crescent wrench to secure the tie bolts.
38. Reinstall the lock collar on the top of the shaft.
39. Manually push the shaft up and down in the cylinder to check for smooth travel. If the shaft drags, find the cause, as this will damage the shaft finish.
40. Reinstall the thermal fin/seat retainer sub-assembly, and use a wrench to tighten snugly.
41. Slide the push rod into the shaft and carefully feel it slip onto the poppet.
42. Place the contact rod into the push rod and carefully screw the IHRA-4SS sub-assembly onto the top of the insertion shaft. The unit should screw on easily. If not, loosen the unit slightly and shake the assembly to help the contact rod slip into the regulator body hole.
43. Tighten the assembly snugly.
44. Fully retract the shaft and replace the oil reservoir and tubing.
45. Use Teflon (PTFE) tape or pipe dope on the valve threads.
46. The unit is now ready for installation and operation.



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