



Installation, Operation, and Maintenance Manual

Welker[®] Automatic Insertion Regulator

Model IRA, IRA-HP

The information in this manual has been carefully checked for accuracy and is intended to be used as a guide to operations. 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 to improve performance and reliability.

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1. GENERAL

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 IO&M Manual prior to installation and operation of this equipment is required so that you have a full understanding of its application and performance prior to commencement of use. If you have any questions, please call 1-800-776-7267 or 1-281-491-2331 in the USA.

1.2 Description

The Welker Automatic Insertion Regulator (IRA Series) is designed for use in systems where it is desirable to insert and retract the regulator into a pressurized line up to 2,160 psi. IRA-HP models have a maximum allowable pressure of 3,600 psi. The automatic insertion style allows the operator to control the movement of the regulator into and out of the pipeline safely using four valves and an oil reservoir. The unit should always be mounted to a fully opening pipeline isolation valve with a minimum bore of $\frac{3}{4}$ ". The required mounting position is such that the oil reservoir is vertical.

The preferred location for installation is in a straight section of inlet piping before the flowing stream is subjected to turns and impingements that can result in aerosols that may produce a sample that is not representative of the gas in the pipeline. The Automatic Insertion Regulator's thermal fins are designed to offset the cooling brought on by the Joule-Thomson effect. This happens by transferring heat from the flowing gas in the pipeline to the gas in the probe. Only one analytical instrument should be fed by the probe style regulator 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.

2. INSTALLATION INSTRUCTIONS

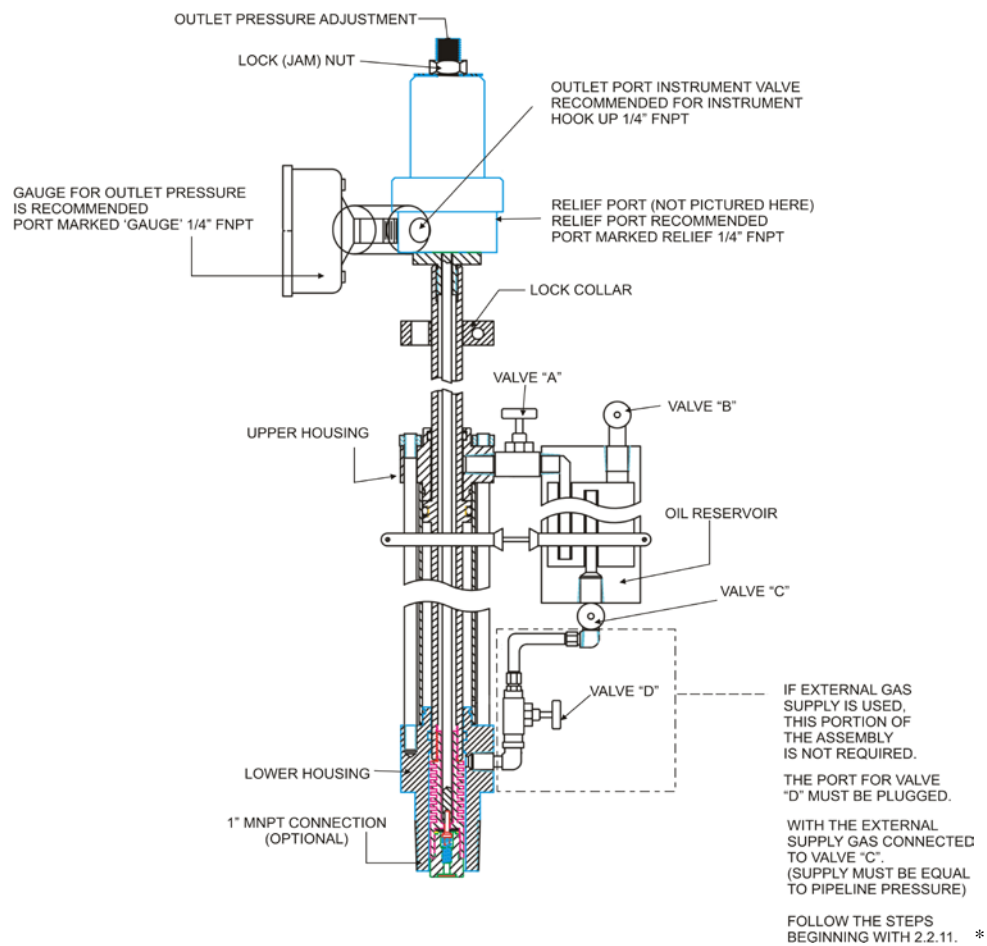
2.1 General

2.1.1 After unpacking the unit, check it for compliance and any damages that may have occurred during shipment.

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

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

2.2 Installation Instructions



* In a pipeline with a liquid process, the oil reservoir can be eliminated and a hydraulic pump can be used to insert the probe.

FIGURE 1

To place the unit in service, refer to Figure 1 and follow these procedures:

- 2.2.1 Install a relief valve and a gauge in the appropriate ports.
- 2.2.2 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.
- 2.2.3 Remove the lock down bolt and washer, and loosen the lock collar.
- 2.2.4 With the regulator fully retracted, move the lock collar on the shaft to the appropriate length. Example: If the insertion travel desired is 12 inches, measure up 12 inches from the upper housing and tighten the lock collar at that position. This will limit the insertion travel to 12 inches.
- 2.2.5 We recommend that you install a valve in the primary outlet port so that you can shut off the supply to your instrument.

- 2.2.6 Install the IRA to the pipeline isolation valve. Back off the adjusting screw of the regulator so that the regulator is closed; i.e., no setting or tension on the range spring.

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

- 2.2.7 Make sure that all valves are closed on the oil reservoir.

NOTE: The unit is shipped from the factory with the necessary oil volume. If oil is needed, the unit should be fully retracted prior to adding any oil. Remove valve "B" and add oil until the reservoir is three-fourths full. Then replace valve "B."

It should also be noted that the unit is shipped from the factory with the assumption that the installation will be vertical. In cases where the unit is mounted horizontally, the user will have to rotate the oil reservoir 90 degrees and re-tube, so that the oil reservoir drain valve will always face downward. **The internals of the reservoir have a down-comer that will not function properly if the oil pot is located in a horizontal position.**

- 2.2.8 Make sure to close the outlet port valve on the regulator.
- 2.2.9 Slowly open the pipeline isolation valve and check for leaks.

- 2.2.10 Check the outlet gauge of the regulator. The gauge should read 0 psi, assuring that the regulator is not leaking internally.
- 2.2.11 Slowly open valves “C” and “D” at the bottom of the oil reservoir to allow pipeline pressure to enter the reservoir. **(Reference Figure 1)**
- 2.2.12 Slowly open valve "A" between the reservoir and the upper housing of the insertion unit. This will allow the probe to descend or insert into the pipeline until the lock collar stops at the upper housing.
- 2.2.13 Align the lock collar so that it fits over the stand-off, and then replace the lock down bolt and washer.
- 2.2.14 Close valves “A,” “C,” and “D” and check for leaks.
- 2.2.15 Connect tubing from outlet valve of regulator to the instrument.
- 2.2.16 Loosen the jam nut on the regulator adjusting screw. Screw down on the adjusting screw to set the desired outlet pressure. Then tighten the jam nut.
- 2.2.17 Set the relief valve.
- 2.2.18 Check the entire system for leaks.
- 2.2.19 The unit is now in service.

NOTE: When using the IRA in a pipeline with liquid process, the following options are available for insertion:

- **Standard method using liquid to insert the probe.**
- **External gas supply (see Figure 1).**
- **Replacing the oil reservoir with a hydraulic hand pump (ME1037OO).**

Contact your Welker representative for more details.

3. REMOVAL INSTRUCTIONS

3.1 Retraction

- 3.1.1 Close the outlet valve of the regulator and disconnect the tubing to the instrument allowing for release of trapped pressure in the tubing run.
- 3.1.2 Open valve "A," "C," and "D" (see Figure 1).
- 3.1.3 Remove the lock down screw.
- 3.1.4 Close valves "C" and "D."
- 3.1.5 Slowly open valve "B" and vent the gas in the reservoir to atmosphere. This will allow the probe to withdraw from the pipeline.
- 3.1.6 When the probe is completely withdrawn, close the pipeline isolation valve.
- 3.1.7 Open the outlet valve of the regulator to vent off the trapped pressure in the regulator.
- 3.1.8 Open valves "C" and "D" to vent any remaining trapped gas in the lower body.
- 3.1.9 Close all valves on the IRA and remove the unit from the pipeline valve.
- 3.1.10 Unit is now ready for maintenance or to be moved to another location.

NOTE: If the regulator is being withdrawn from the pipeline to "pig" the pipeline, simply follow the withdrawal process through step 3.1.4.

- 3.1.11 Refer to 2.2.8 to 2.2.17 for reinsertion instructions.

3.2 Helpful Suggestions

- 3.2.1 The most common cause for repairs to an IRA is having the pipeline isolation valve close on the probe while the probe is still inserted in the line. Avoid this practice!
- 3.2.2 Open and close the valves on the unit slowly and smoothly to avoid slamming of the lock collar and probe piston with sudden stops.
- 3.2.3 Avoid rough handling of the probe and unnecessary bending of the probe shaft. This is a polished surface, which seals and travels through seals. The entire unit should be handled with care.

4. MAINTENANCE

4.1 General

Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit handy for the system in case of encountering unexpected wear or faulty seals.

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.

4.2 Instructions

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.

After the IRA has been removed from the pipeline, find a clean area for disassembly.

The following tools will be required during disassembly and maintenance:

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

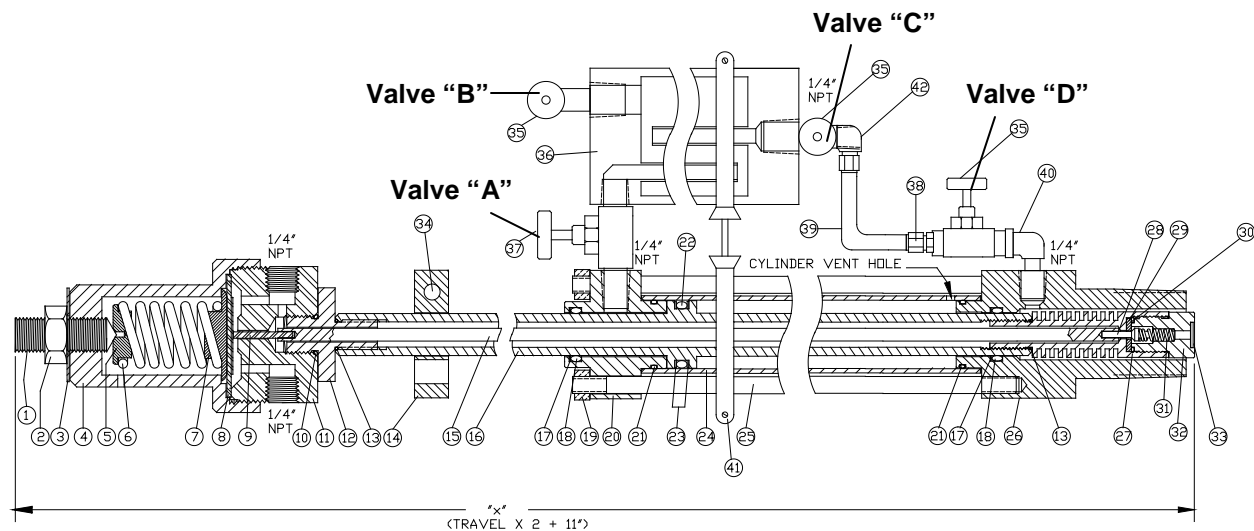


FIGURE 2

Refer to Figures 1 and 2.

- 4.2.1 Make sure that the probe is fully retracted and valves "A," "B," "C" and "D" are closed.
- 4.2.2 Disconnect the tubing between valves "C" and "D".
- 4.2.3 Use an adjustable wrench on the body of valve "A" and remove the oil reservoir #36 from the upper housing #20 of the insertion unit.
- 4.2.4 Push the probe assembly through the lower housing so that the thermal fins are fully exposed.
- 4.2.5 Slide the lock collar #34 over the stand-offs, and tighten it around the shaft #16.
- 4.2.6 Use one wrench to hold the thermal fins #27, and use the other wrench to loosen the seat retainer #32.
- 4.2.7 Remove the seat retainer, poppet spring #31 and poppet #28. Examine the poppet for a good finish on the seating face. Replace the poppet and spring, if necessary.
- 4.2.8 Use a small knife or pointed instrument to carefully pick the seat #29 out of the thermal fin body #27. Replace the seat. Trash or scratches on either the seat or the poppet will prevent positive shut-off of the regulator.
- 4.2.9 Guide the poppet into the seat. Replace the spring and the seat retainer. Tighten snugly.
- 4.2.10 Replace the O-ring #13, and then lay the unit to the side.

NOTE: The push rod #15 and contact rod #9 will be free and will fall out of the shaft #16 and regulator. Use care because the contact rod is small and easily lost.

4.2.11 Remove the base #12 from the body #11 of the regulator or the insertion shaft #16 and replace both seals #10 and #13. Replace the base to the regulator body, and tighten.

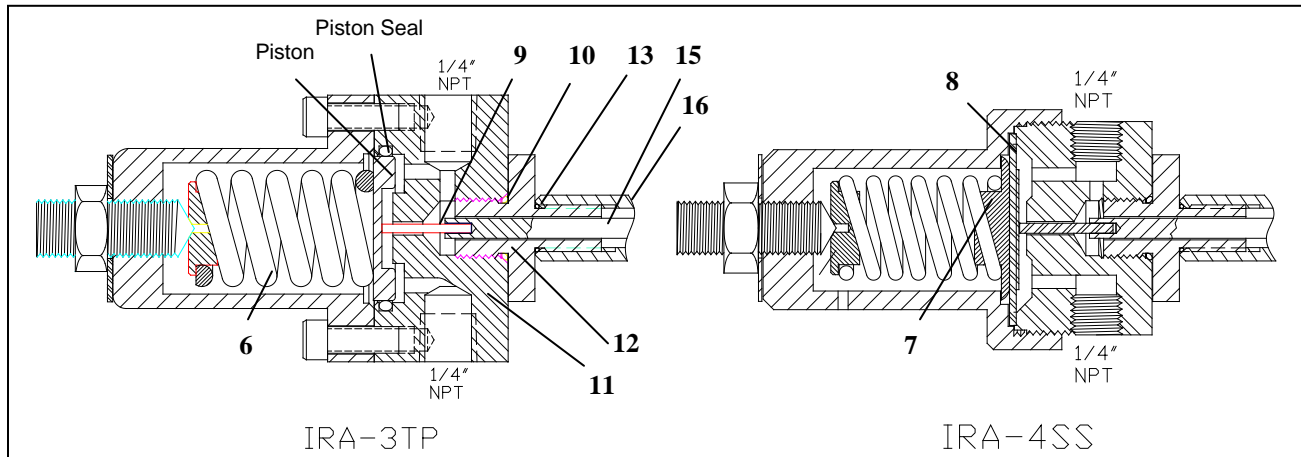


FIGURE 3

4.2.12 To replace the piston seal (IRA-3TP), remove the eight Allen head cap screws from the spring housing and lift the housing off the body (see Figure 3).

To replace the diaphragm assembly #8 (IRA-4SS), unscrew the spring housing #4 from the body.

Diaphragm: Replace diaphragm with metal pad facing down.

Piston: Carefully lift piston out of the seal. Examine the sealing edge of piston, and replace if damaged. Replace O-ring seal in the body and lubricate well before replacing piston.

4.2.13 Reassemble the range spring #6 and spring guide #5. Diaphragm types have a lower spring guide #7, as well, that sits on the diaphragm.

4.2.14 Reassemble the spring housing and tighten the screws (IRA-3) in a crossing pattern or screw the housing on hand tight (IRA-4). Lay regulator to the side.

4.2.15 Remove the lock collar #14 from the insertion shaft.

- 4.2.16 Remove the tie bolt nuts #19 and slide the upper housing #20 off the shaft. Replace the seals and backups #17, #18 and #21 on the housing.
- 4.2.17 Mark the top of the shaft and the top of the cylinder for reassembly. Carefully slide the insertion shaft and the cylinder #24 out of the lower housing #26. Replace the seals #'s 17, 18 and 21 on the lower housing.
- 4.2.18 Remove the cylinder from the shaft, and replace the O-ring seal and backups #22 and #23 on the shaft piston.
- 4.2.19 Examine the shaft carefully. The surface is polished and must be free of scratches except on the very ends. Replace the shaft, if necessary. Examine the inside of the cylinder for deep scratches. Replace the cylinder, if necessary.
- 4.2.20 Lubricate the inside of the cylinder liberally and reinsert the shaft into the cylinder approximately halfway. Note the marks for the tops of both pieces.
- NOTE:** The vent hole on the cylinder and the shorter portion of the shaft face down toward the lower housing of the unit.
- 4.2.21 Lubricate the shaft. Slide the lower housing #26 onto the bottom end of the shaft and up to the cylinder.
- 4.2.22 Slide the top flange #19 onto the top end of the shaft and down to the cylinder.
- 4.2.23 Reinstall the tie bolts and tie bolt nuts. Tighten securely.
- 4.2.24 Reinstall the lock collar on the top of the shaft.
- 4.2.25 Manually push the shaft up and down in the cylinder to check for smooth travel. If the shaft is dragging, find the cause, as this will damage the shaft finish.
- 4.2.26 Replace the thermal fin assembly and tighten snugly.
- 4.2.27 Slide the push rod into the shaft and carefully feel it slip onto the poppet.

- 4.2.28 Place the contact rod into the push rod and carefully screw the regulator back onto the top of the shaft. Unit should screw on easily. If not, loosen slightly and shake the assembly to help the contact rod to slip into the hole in the regulator body. Then tighten snugly.
- 4.2.29 Fully retract the shaft and replace the oil reservoir and tubing. Use PTFE tape or pipe dope on the valve threads.
- 4.2.30 Unit is now ready to install.