



***Installation,
Operation,
&
Maintenance
Manual***

***Welker[®] Automatic Insertion
Probe Regulator***

***Model
AID-3IRA***

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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INTRODUCTION

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 in order to have a full understanding of its application and performance prior to use. If you have any questions, please call 1-800-776-7267 or 1-281-491-2331 in the USA.

Notes, Warnings, and Cautions



NOTE

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



CAUTION

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



WARNING

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

1.2 Product Description

The Welker AID-3IRA Automatic Insertion Probe Regulator is designed for use in systems where it is desirable to insert and retract the probe while the pipeline remains pressurized. The device allows the removal of the upper insertion unit after the probe is inserted into the pipeline, primarily for use in locations where clearance on top of the pipeline is critical.

SPECIFICATIONS

1.3 Specifications

Table 1

General	
Products Sampled	Natural Gas and other gases and liquids compatible with the materials of construction
Materials of Construction	316 Stainless Steel, Viton [®] , PTFE, Carbon and Aluminum (others available)
Insertion Length	0" to 120" (0mm to 3,048mm)
Sample Outlet Connection	1/4" FNPT (others available)
Temperature Range	-20° F to 100° F (-29° C to 38° C)
Maximum Line Pressure	Refer to ANSI rating, Table 2 (for 316 SS)
Pipeline Connection	1", 1 1/2", 2", 6", or 8" (others available). Refer to ANSI rating (5.08cm, 15.24cm, 20.32cm)
Sample Outlet Connection	1/4" NPT (others available)
Area Classification	Can be used in hazardous areas.
Spring Range (Output)	0-25 psi outlet range (0-1.72 bar)
Maximum Allowable Operating Pressure of Upper Assembly	200 psi (14 bar)
Maximum Allowable Operating Pressure of Lower Assembly	Refer to ANSI rating, Table 2 (for 316 SS)

Table 2

ANSI CLASS	MAXIMUM ALLOWABLE PRESSURE
150	275 psi (18 bar)
300	720 psi (49 bar)
600	1440 psi (99 bar)
900	2160 psi (145 bar)

INSTALLATION & OPERATION

2. INSTALLATION INSTRUCTIONS

2.1 General

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

N 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.

N NOTE

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

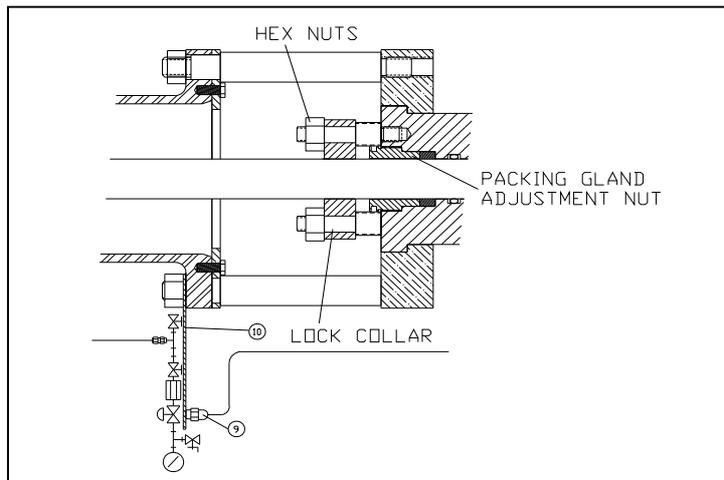


FIGURE 1

- 2.1.2 With the lower unit lying in the horizontal position, loosen the packing gland adjustment nut, and loosen and remove hex nuts (see Figure 1).
- 2.1.3 Loosen the lock down collar's cap screw, and make sure the lock down collar is moved to the end of the shaft in the direction of the instrument regulator. Be careful not to scratch the probe shaft.

N NOTE

Chart pressure required to be applied before loosening lock collar to retract.

- 2.1.4 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.

INSTALLATION & OPERATION

- 2.1.5 Retract the probe shaft through the lubricator body so that the tip of the probe shaft is flush with the lubricator body flange face.
- 2.1.6 Tighten the lock collar on the probe shaft at the appropriate insertion length.

EXAMPLE:

If the insertion length desired is 75 inches, measure a distance of 75 inches from the top shoulder of the stud up the probe shaft, and tighten the lock down collar so that the bottom of the collar is at that position. This measure will limit the insertion travel to the desired 75 inches.



The lock down collar must always be locked to the probe shaft at the maximum designed insertion length or less. The maximum allowable travel of the insertion probe shaft **must not exceed the maximum insertion length** of the device, as indicated in Section 1.3.

- 2.1.7 Before mounting the upper insertion assembly to the lower lubricator body move the upper assembly piston to the bottom of the upper housing next to the flange stop.
- 2.1.8 The piston can be moved manually by removing the top cap and pushing the piston to the stop. It can be moved automatically by gradually applying pressure through the ¼" NPT connection found in the end cap of the upper insertion assembly (approximately 20-30 psi).



Moving the piston down will prevent it from slamming the probe shaft and sample outlet valve when actuation air is supplied to the upper housing at insertion.



If the piston does not move with the application of 10 to 20 psig, **stop applying pressure**, and relieve pressure from the upper housing. Remove the upper insertion assembly end cap and check for possible obstruction.



When applying pressure, CAUTION should be taken so as **not to exceed the maximum working pressure (200 psig) of the upper insertion housing**. If pressure is used, disconnect unit from the pressure source and depressurize the upper insertion housing once the piston is at the bottom of the housing next to the flange stop.

INSTALLATION & OPERATION

- 2.1.9 Remove hex nuts from standoffs, then remove standoffs from upper insertion assembly.
- 2.1.10 Screw standoffs (threads fully engaged) into the lubricator body (4 places) prior to attempting to mount the upper insertion assembly to the lubricator body.
- 2.1.11 Install the AID-3IRA to the pipeline isolation valve. Back off the regulator's adjustment screw so that the regulator is closed (i.e., no setting or tension on the range spring).
- 2.1.12 With the lower unit in the horizontal position, retract the probe shaft so that the tip is flush with the lubricator flange face.
- 2.1.13 Push the insertion end of the probe and the lubricator body against a flat surface.

N NOTE

Care should be taken to make sure that the probe shaft is protected and not scratched.

- 2.1.14 Align the lower unit with the upper insertion assembly and insert the instrument regulator valve into the counter bore in the upper insertion assembly piston.
- 2.1.15 Push the upper insertion assembly down around the probe shaft to the lubricator body. The upper insertion assembly piston will slide up into the upper insertion housing as the housing is pushed down around the probe shaft.
- 2.1.16 Align and attach the upper insertion housing flange to the standoffs. Tighten hex nuts using a wrench.
- 2.1.17 Mount the complete assembly to the pipeline isolation valve.
- 2.1.18 Tighten packing adjustment nut until tension has been applied to packing (light torque only).
- 2.1.19 Close the valve on the lubricator body.
- 2.1.20 **Slowly** open the pipeline isolation valve, pressurizing the lubricator body to full line pressure.

N NOTE

Should pressure begin to exhaust past the packing adjustment nut, close the pipeline isolation valve and replace packing and O-ring seal per maintenance instructions.

N NOTE

When using a pressure source greater than 200 psig to insert the probe shaft, a high pressure, self-relieving regulator should be attached to the lubricator body blow down valve. The regulator (self relieving) should have a relief and gauge installed to prevent over-pressuring of the upper insertion housing.

 **WARNING**

If 200 psi pressure is applied to the upper insertion housing and the probe shaft has not inserted so that the lock down collar is seated on the shoulders of the studs, relieve all pressure on the upper insertion housing and call the Welker Service Department at 1-800-776-7267 or 1-281-491-2331.

- 2.1.21 The following formulas can be used to determine the exact pressure required to insert the probe shaft less those forces required to overcome slight amounts of friction.

$$3.14 \times \text{Pipeline pressure} \times \left[\frac{\text{probe shaft diameter}}{2} \right]^2 = \text{Force on the end of probe shaft}$$

Formula 1

$$\frac{\text{Force on the end of probe shaft}}{3.14 \times \left[\frac{\text{Piston diameter}}{2} \right]^2} = \text{Insertion pressure required}$$

Formula 2

- 2.1.22 Once the correct insertion pressure has been determined, apply the required pressure to the top of the upper insertion housing. Make sure the probe shaft movement is smooth and continuous.
- 2.1.23 Once the lock down collar has appeared from the bottom of the upper insertion housing, stop applying pressure and realign the lock down collar through holes with the studs. After alignment is complete, continue to apply pressure.
- 2.1.24 Once the lock down collar seats against the stud shoulders and the insertion of the shaft has stopped, place hex nuts on the studs and tighten with a wrench.
- 2.1.25 Insertion is complete and the upper insertion assembly can now be depressurized.

 **CAUTION**

Depressurization of the upper insertion housing should be gradual. If movement of the insertion probe shaft occurs during depressurization, **stop immediately**, as additional tightening of the lock down collar is required. If significant movement of the probe shaft occurs, resetting of the lock down collar may be required.

INSTALLATION & OPERATION

2.2 Operating the unit

- 2.2.1 Adjust the self-relieving regulator so that no pressure is left in the upper insertion assembly housing.
- 2.2.2 Close the valve on the lubricator body, and open valves to relieve pressure on the flexline assembly.
- 2.2.3 Hex nuts, housing, and standoffs can be removed with pressure relieved from the flexline assembly and the upper insertion housing.



Never place any body part directly over the probe shaft.

- 2.2.4 Install a relief valve and a gauge in the appropriate ports of the instrument regulator.
- 2.2.5 Connect tubing from outlet port of regulator to the instrument.
- 2.2.6 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.
- 2.2.7 Set the relief valve.
- 2.2.8 Check the entire system for leaks.
- 2.2.9 The unit is now in service.
- 2.2.10 Installation is complete and the device is now ready for use.

2.3 Retracting the unit

- 2.3.1 Close the outlet valve of the regulator and disconnect any tubing attached to the regulator.
- 2.3.2 Remove the pressure gauge and relief.
- 2.3.3 Move the upper insertion piston to the bottom of the upper insertion housing next to the flange stop as was required for insertion of the sample probe (*see step 7 of Section 2.1*). Screw standoffs (threads fully engaged) into the lubricator body (4 places), and install the upper insertion assembly just as it was for insertion (*see step 17 of Section 2.1*).
- 2.3.4 Apply 80 psi to the upper insertion assembly housing by opening valve and closing bleed valve using the regulator (self relieving) to maintain pressure (see Formulas 1 and 2 in Section 2.1 for possible back pressures required for this step). **Do not exceed 200 psi.**
- 2.3.5 Remove hex nuts from the studs, and slightly loosen the packing adjustment nut.

INSTALLATION & OPERATION



If the sample unit has been in service for a long period of time, the packing under the adjustment nut may have taken “a set” around the probe shaft and may not allow the shaft to immediately retract. Do not allow the pressure in the upper housing to drop below 50 psi without the shaft rising. **Never place any body part over the top of the probe shaft, and keep hands clear of moving parts between the lubricator body and the upper insertion assembly.**

- 2.3.6 Slowly adjust the self-relieving regulator in order to allow the pressure in the upper housing to drop, thus allowing the probe shaft to retract.
- 2.3.7 Once the probe shaft is fully retracted and all pressure is vented from the upper housing, refer to steps 3 and 4 of Section 2.2.
- 2.3.8 Close the pipeline isolation valve.
- 2.3.9 Slowly open valves on lubricator body and flexline assembly to depressurize the probe assembly.
- 2.3.10 Retraction is complete and the unit can now be removed from the pipeline.

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 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.

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.

3.2 Disassembly Instructions

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

- Small Hex Key Set
- 6" Adjustable Wrench
- 10" Adjustable Wrench
- 7/16" Combination Wrench
- Adjustable hex wrench

- 3.2.1 Remove the insertion tubing connections from the upper and lower assemblies.
- 3.2.2 Remove the four hex nuts holding the upper and lower assembly together.
- 3.2.3 Carefully remove the upper insertion housing from the standoffs on the lower insertion housing.

MAINTENANCE

3.3 Upper assembly maintenance

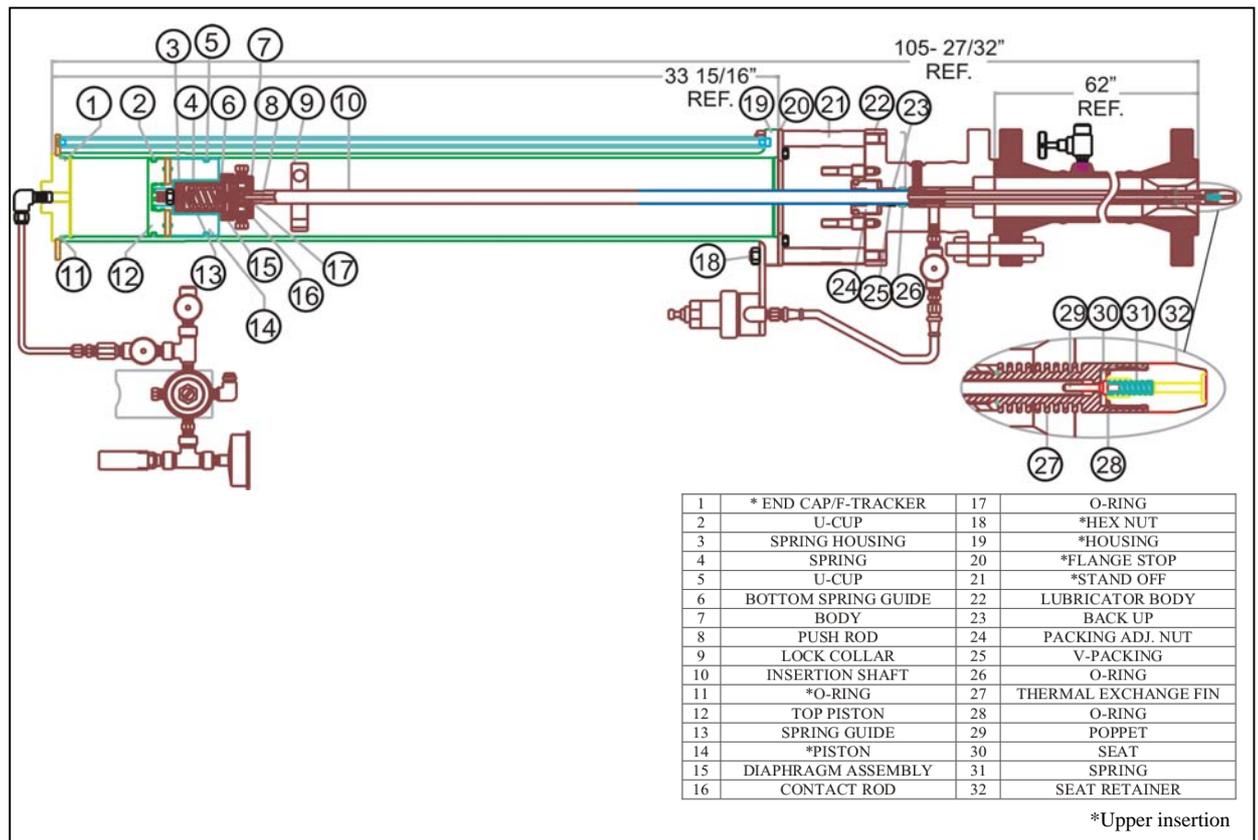


FIGURE 2

Refer to this Figure throughout Sections 3 and 4.

- 3.3.1 With the upper insertion assembly in the horizontal position, remove nuts #18, standoff #21, and flange stop #20. **Cautiously** apply a small amount of pressure (**1 to 3 psi**) through the upper insertion assembly end cap #1, and slowly push the piston #14 out of the upper insertion housing.
- 3.3.2 Replace u-cups #2 and #5.
- 3.3.3 Remove the end cap #1, lubricate and replace new O-ring #11 on the end cap.
- 3.3.4 Slowly insert piston into the top of upper insertion housing #19, and replace end cap #1.
- 3.3.5 Replace flange stop #20, nuts #18, and standoff #21.
- 3.3.6 Upper insertion assembly is now ready for field service.

MAINTENANCE

3.4 Lower assembly maintenance

- 3.4.1 With the lower insertion assembly in the horizontal position, loosen the packing adjustment nut #24 and remove it from the lubricator body #22.
- 3.4.2 Remove the regulator body assembly contact rod and push rod.
- 3.4.3 Slowly retract the probe shaft through the bottom of the lubricator body being careful not to scratch the shaft. Once the shaft is retracted, put it aside in a clean place.
- 3.4.4 Remove the packing #25, O-ring #26 and back-ups #23.
- 3.4.5 Clean the inner diameter of the lubricator body and inspect for damage. If there is damage, contact the Welker Service Department (see 2.1.14).
- 3.4.6 If the lubricator body needs no repairs, lubricate the new O-ring #26 and place it into the lubricator body with back-ups #23 being careful not to harm the seals.
- 3.4.7 Replace packing #25 and the packing adjustment nut #24. Only slightly tighten the nut so as not to prevent the re-insertion of the probe shaft.
- 3.4.8 Check the probe shaft for scratches or any damage. If the probe shaft is scratched or damaged, contact the Welker Service Department. If the probe shaft is free of scratches and damage, clean it off and slowly insert it into the top of the lubricator body #22 through the packing adjustment nut #24. When the probe shaft is inserted through the lubricator body, slightly tighten the packing gland nut.
- 3.4.9 Use one wrench to hold the thermal fins #27, and use the other wrench to loosen the seat retainer #32.
- 3.4.10 Remove the seat retainer, poppet spring #31 and poppet #29. Examine the poppet for a clean finish on the seating face. Replace the poppet and spring, if necessary.
- 3.4.11 Use a small knife or pointed instrument to carefully pick the seat #30 out of the thermal fin body #27. Replace the seat. Debris or scratches on either the seat or the poppet will prevent positive shut-off of the regulator.
- 3.4.12 Guide the poppet into the seat. Replace the spring and the seat retainer. Tighten snugly.
- 3.4.13 Replace the O-ring #28, and then lay the unit to the side.



The push rod #8 and contact rod #16 will be free and will fall out of the shaft #10 and regulator. The contact rod is small and easily lost.

- 3.4.14 Remove the body #7 from the insertion shaft #10 and replace the O-ring #17.
- 3.4.15 Replace the body to the shaft.
- 3.4.16 To replace the diaphragm assembly #15 (IRA-4SS), unscrew the spring housing #3 from the body.

MAINTENANCE

- 3.4.17 Replace the range spring #4 and spring guide #13. Diaphragm types have a lower spring guide #6 that sits on the diaphragm.
- 3.4.18 Replace the spring housing and screw the housing on hand tight (IRA-4). Lay regulator to the side.
- 3.4.19 Remove the lock collar #9 from the insertion shaft.
- 3.4.20 Examine the shaft carefully. The surface is polished and must be free of scratches except on the ends. Replace the shaft, if necessary. Examine the inside of the cylinder for deep scratches. Replace the cylinder, if necessary.
- 3.4.21 Replace the thermal fin assembly and tighten snugly.
- 3.4.22 Slide the push rod into the shaft and carefully feel it slip onto the poppet.
- 3.4.23 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.
- 3.4.24 Unit is now ready to reinstall.



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