WELKER

INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® AUTOMATIC INSERTION PROBE

MODEL
AID-1

DRAWING NUMBER
AD784[ ][ ]
AD809[ ][ ]

MANUAL NUMBER
IOM-003

REVISION
Rev. C, 08/09/2024

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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® Automatic Insertion Probe, AID-1. 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 Automatic Insertion Probe is of a mechanical 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 Automatic Insertion Probe, please contact a Welker® representative immediately.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
Sugar Land, TX 77498

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

1.2 Product Description

The Welker® Standard *AID-1 Series* of Automatic Insertion Probes is designed for use in systems where it is advantageous to insert and retract the probe/shaft from a pressurized pipeline up to 2160 psig (*149 barg*) or 6000 psig (*414 barg*). The automatic insertion style allows the operator to control the movement of the probe into and out of the pipeline safely through the use of four valves and an oil reservoir, instrument air, or process fluid. The unit should always be mounted to a full opening, full ported valve matching the mating connection. The AID-1 device can be equipped with an injection nozzle (see *Figure 1* and *Figure 2*). In such cases, the nozzle is used to disperse the product in a more efficient manner than the typical straight tube. The AID-1 can also be used to insert temperature and other sensors, siphon probes, corrosion coupons, and end user proprietary equipment, to name a few application variations. The device can be used with an oil pot or other external pressure source, such as an inert gas like nitrogen, for insertion and retraction.

This device is frequently used in conjunction with another manufacturer's device. The other device's manual should also be consulted prior to installation, operation, or maintenance.

Welker® may custom design the AID-1 to suit the particular application and specifications of each customer.

1.3 Important Information

1. The unit should always be mounted to a full port pipeline isolation valve with a bore that exceeds the probe diameter.
2. **Oil Reservoir:** With the use of a hydraulic oil reservoir, process or auxiliary pressure is applied and released to ensure smooth insertion and retraction of the shaft. The oil in the reservoir is applied on a piston attached to the shaft to assure a smooth travel. Welker® ships the oil reservoir with the necessary oil volume and standard vertical installation. For horizontally mounted probes, the oil reservoir must be positioned so that it remains vertical while inserted. **The oil reservoir will not function properly if installed horizontally.** The oil reservoir can be positioned at the factory to suit the particular application and specifications of each customer if noted at the time of the order.

For products containing liquid, sand, or other abrasive contaminants, Welker® recommends the use of an auxiliary gas supply (e.g., clean, dry nitrogen gas) to prevent damage to the insertion cylinder and oil reservoir.

1.4 Specifications

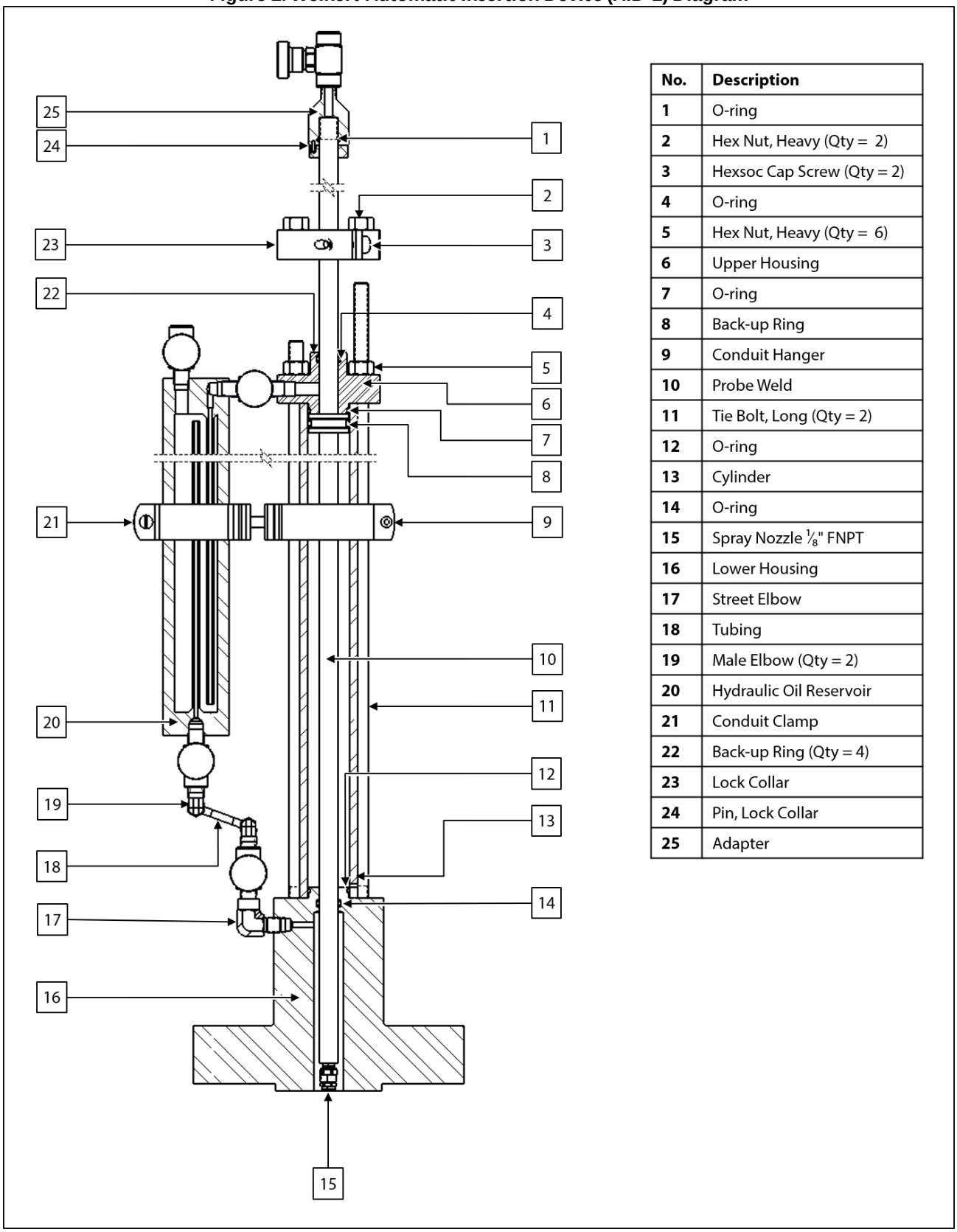
The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. **Please note that the specifications may vary depending on the customization of your equipment.**

Table 1: AID-1 Welker® Automatic Insertion Probe Specifications	
Applications	Injection, Sampling, and Siphoning
Products	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, 7075-T6 Aluminum, Carbon Steel, Viton, and PTFE
Maximum Allowable Operating Pressure*	2160 psig @ 20 °F to 100 °F (*148 barg @ -29 °C to 37 °C*) 6000 psig @ 20 °F to 100 °F (*414 barg @ -29 °C to 37 °C*)
Maximum Allowable Temperature*	350 °F (*176 °C*)
Connections	**Pipeline:** 1" NPT Standard (Others and Flanged Available) **Sample Outlet:** ¼" NPT Standard (Others Available)
Insertion Length	18" (457mm) Standard [Others Available in 6" (152mm) Increments]
Viscosity Range	0.009 cp to 2000 cp @ 68 °F (*20 °C*)
Operation	Piston-Operated
Mounting	Adjustable (Vertical to Horizontal) Horizontal Vertical (Standard)
Feature	Hydraulic Oil Reservoir
Weight	Approx. 100 lb
Dimensions	See Specific Drawing
Area Classification	Can Be Used in Hazardous Locations
Options	Pressure Ratings Temperature Ratings Materials of Construction No Hydraulic Oil Reservoir Probe Tip

***Maximum allowable temperatures and pressures may be lower depending on specifications of pipeline connections device.

1.5 Equipment Diagrams

Figure 1: Welker® Automatic Insertion Device (AID-1) Diagram



No.	Description
1	O-ring
2	Hex Nut, Heavy (Qty = 2)
3	Hexsoc Cap Screw (Qty = 2)
4	O-ring
5	Hex Nut, Heavy (Qty = 6)
6	Upper Housing
7	O-ring
8	Back-up Ring
9	Conduit Hanger
10	Probe Weld
11	Tie Bolt, Long (Qty = 2)
12	O-ring
13	Cylinder
14	O-ring
15	Spray Nozzle ⅛" FNPT
16	Lower Housing
17	Street Elbow
18	Tubing
19	Male Elbow (Qty = 2)
20	Hydraulic Oil Reservoir
21	Conduit Clamp
22	Back-up Ring (Qty = 4)
23	Lock Collar
24	Pin, Lock Collar
25	Adapter

Figure 2: Welker® Automatic Insertion Device (AID-1) Valve Diagram

No.	Description
A	Valve, ¼" NPT M/F
B	Valve, ¼" NPT M/F
C	Valve, ¼" NPT M/M
D	Valve, ¼" NPT M/F
E	Valve, ¼" NPT F/F

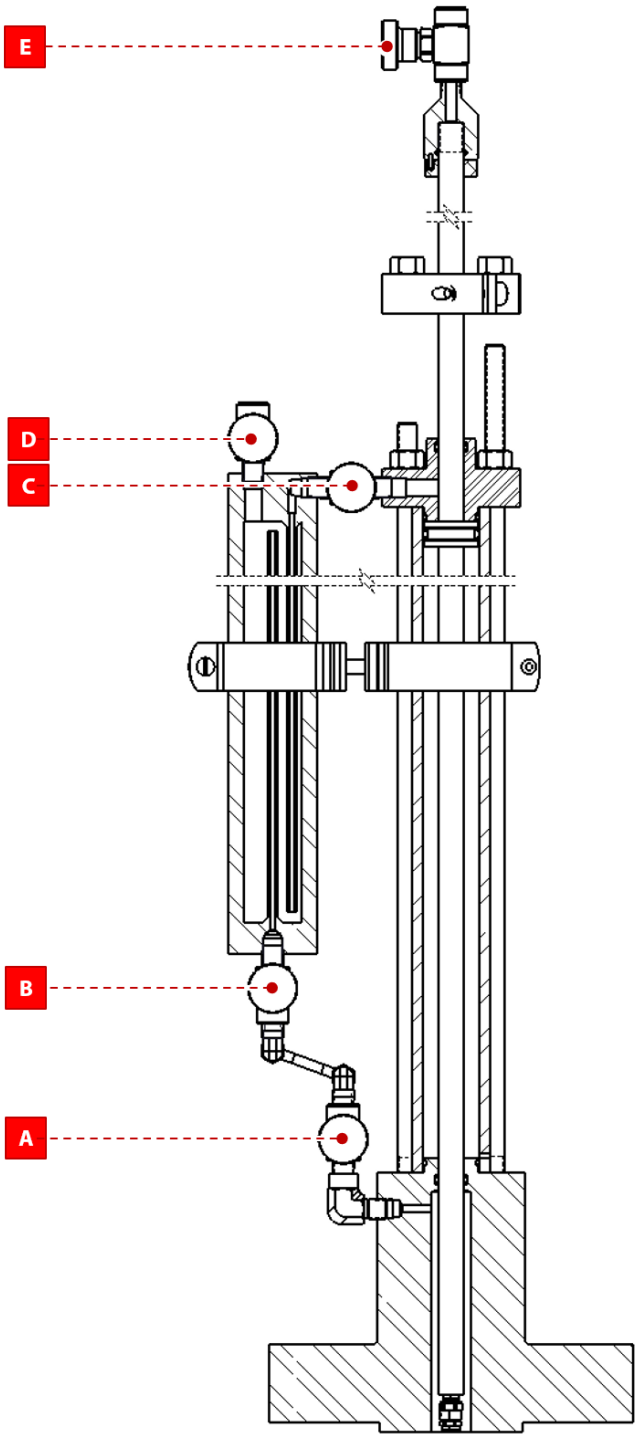
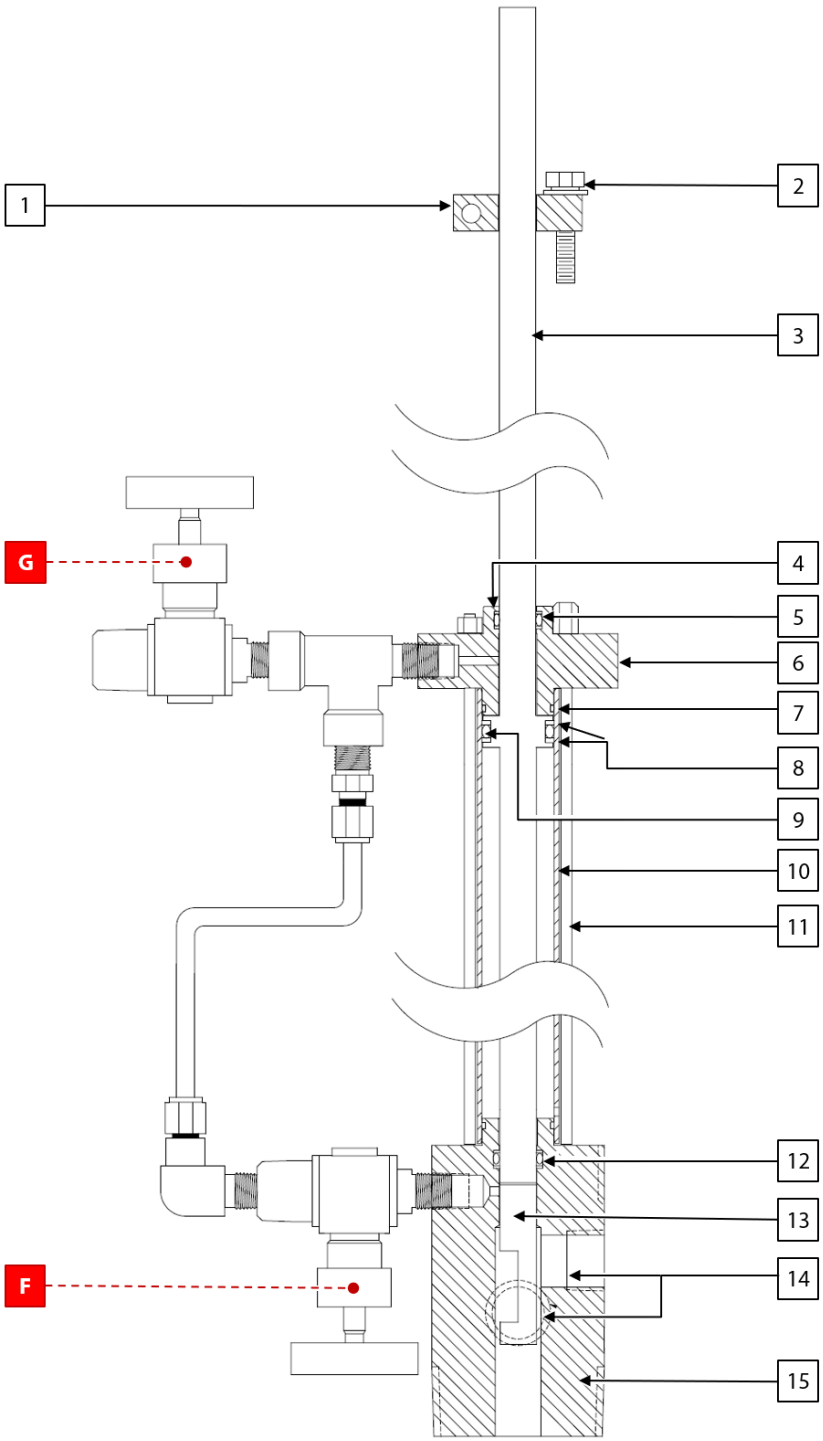


Figure 3: Welker® Automatic Insertion Device (AID-1) Diagram (Without Oil Pot)



No.	Description
1	Stop Collar
2	Hex Bolt, Lock Washer, & Washer
3	Insertion Shaft
4	Back-up Ring (Qty = 4)
5	O-ring
6	Upper Housing
7	O-ring
8	Back-up Ring (Qty = 2)
9	O-ring
10	Cylinder
11	Tie Bolt (Qty = 6)
12	O-ring (Qty = 2)
13	Customer-Supplied Tip
14	Wash/Inspection Ports (90° Apart)
15	Lubricator Body
F	Valve
G	Valve

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.

2.2 Inserting and Operating the Device

1. Determine the amount of insertion travel desired by measuring from the top of the pipeline isolation valve to the desired depth in the pipeline.
2. With the probe fully retracted, locate the lock collar on the shaft at the appropriate length (i.e., if the insertion travel desired is 12 inches, measure up 12 inches from the top of the upper housing and tighten the lock collar at this point. This will limit the insertion travel to 12 inches).
3. Close all valves on the assembly.
4. Mount the device onto the pipeline isolation valve.

If the unit has an oil reservoir, do not use the oil reservoir and tubing as a leverage grip to rotate or locate the unit on the valve. The oil reservoir is shipped from the factory with the necessary oil volume.

The internals of the reservoir have a down-comer that will not function if the oil pot is located in a horizontal position.

It should 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 in the horizontal position, the user will have to rotate the oil reservoir 90 degrees and re-tube so that the oil reservoir drain valve is always aimed toward the ground.

5. Slowly open the pipeline isolation valve and check all connections for leaks. If the unit is equipped with an oil reservoir, go to steps 6 through 9. Otherwise, go to step 10.
6. Close valve D, open valves A and B (see *Figure 2*) and allow pipeline pressure to enter the oil reservoir.
7. Slowly open valve C between the oil reservoir and the top cap. This will allow the probe to insert smoothly into the pipeline to the desired length.
8. Rotate the probe to align the lock collar and the top cap so that the lock down screw can be installed through the collar into the top cap. Tighten the lock down screw.
9. Close valve C and check for leaks. Go to step 11.
10. Close valve D (see *Figure 2*) and open valves A and B to allow pipeline pressure to valve C on the top cap. Open valve C slowly. This will allow the probe to insert into the pipeline to the desired length. Rotate the probe to align the lock collar and the top cap so that the lock down screw can be installed through the collar into the top cap. Tighten the lock down screw.
11. Close valves A and C. Open valve D to release any trapped process pressure from the insertion tubing/valve assembly. Close valves B and D.
12. Check the entire system for leaks.
13. Make any auxiliary hook-ups with other manufacturer's equipment.
14. The unit is now ready for operation.

2.3 Retracting the Device

1. Disconnect any auxiliary hook-ups that would be damaged during retraction. If the unit is equipped with an oil reservoir, go to steps 2 through 5. Otherwise, go to step 6.
2. Open valves A, B, and C (*see Figure 2*).
3. Remove the lock down screw.
4. Close valves A and B and slowly open valve D. This will vent the gas in the reservoir to the atmosphere, allowing the probe to withdraw from the pipeline.
5. When the probe has retracted completely, close the pipeline isolation valve and valves C and D. Go to step 9.
6. Open valves A, B, and C (*see Figure 2*).
7. Remove the lock down screw. Close valves A and B.
8. Open valve D slowly to release the pressure from the top portion of the insertion cylinder. Make sure to open valve D slowly so that the probe retracts from the process line. When the probe has retracted completely, close the pipeline isolation valve.

If the probe is being withdrawn from the pipeline to run a pig, stop at step 8.

9. Open all system valves to vent the pressure in the probe assembly.

Properly and appropriately dispose of the process fluid that is being vented.

10. Remove the instrument from the pipeline isolation valve.
11. The instrument is now ready for maintenance or to be moved to another location.

2.4 Helpful Suggestions

1. The most common cause for repair on an automatic insertion device is precipitated by closing the isolation valve on the insertion shaft while the shaft is still inserted into the pipeline. Before closing the pipeline isolation valve, be sure to check that the insertion shaft has been fully retracted.
2. Operate the assembly slowly and smoothly to avoid slamming the lock collar and the probe piston with sudden stops.
3. If oil is needed, the unit should be fully retracted first and depressurized. Then, remove the vent valve on the oil reservoir and add oil until it is three-fourths (¾) full. Then replace the vent valve.
4. Avoid rough handling of the probe and unnecessary bending of the shaft. This is a polished surface that seals and travels through O-rings.

The entire instrument should be handled with care.

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 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/O-rings 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/O-rings, Welker® recommends non-hydrocarbon-based lubricants, such as Krytox®.
For non-sample-exposed seals/O-rings, Welker® recommends either non-hydrocarbon-based lubricants or silicone-based lubricants, such as Molykote® 111.

After the seals/O-rings 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. Small Hex Key Set
    b. 6" Adjustable Wrench
    c. 10" Adjustable Wrench
    d. 10" Water Pump Pliers
    e. Fine Grit Sandpaper

3.2 Maintenance

1. If the instrument has an oil reservoir, go to step 2. Otherwise, go to step 5.

Check valves for leaks and repair as necessary during reinstallation.

2. Close valves B, C, and D (see *Figure 2*).
3. Disconnect the tubing between valves A and B (see *Figure 1* and *Figure 2*).
4. Use an adjustable wrench on the body of valve C and remove the oil reservoir from the upper housing.
5. Disconnect and remove any junction boxes or external fittings on the shaft (probe (see *Figure 1* or *Figure 3*).

Depending on the apparatus that is mounted to the automatic insertion device, some additional disassembly and reassembly may be required. See the auxiliary apparatus manufacturer's instructions for further guidance.

6. Slide the lock collar off the probe shaft (see *Figure 1* or *Figure 3*).
7. Unscrew or unbolt the upper housing from the cylinder and slide the upper housing off the probe.
8. Mark the top end of the cylinder and the probe for reassembly.
9. Unscrew or slide the cylinder from the lower housing and slide the lower housing off the probe.
10. Carefully remove the probe from the cylinder.

Take care when removing the shaft to locate and handle any wires in the shaft (if applicable) so as not to break or twist.

11. Replace the O-rings in both upper and lower housings and on the probe piston.
12. Examine the inner surface of the cylinder for a smooth finish. If there are any pits or major scratches, the seals will leak. Call Welker® for service options.
13. Examine the outer surface of the probe for a smooth finish.

3.3 Reassembly Instructions

1. Coat the inside, top end of the cylinder with silicone grease or an equivalent lubricant, and reinsert the probe into the cylinder.

The valve end or top of the probe/shaft should end up at the top end of the cylinder.

2. Push the probe shaft into the cylinder approximately halfway and replace the upper and lower housings. Push the probe shaft carefully through the seals in the top cap and base. Do not replace the valve at this time.
3. Thread or bolt the cylinder into both housings securely.
4. Manually work the probe back and forth in the cylinder to check for a smooth travel. If the probe is dragging, stop and inspect further before any obstruction damages the probe's finish.
5. Fully retract the probe and replace the oil reservoir and tubing.
6. Replace the lock collar.
7. Reassemble the probe valve (if applicable) to the shaft using PTFE tape or pipe dope on the threads, or reinstall the tubing fitting ferrules.
8. Replace any junction boxes or fittings, if applicable.
9. The assembly is now ready to install.

O-rings/seals can be easily damaged. Use care in assembly when pushing parts through or over seals.

3.4 Troubleshooting Guidelines

Table 2: Welker® AID-1 Automatic Insertion Device Troubleshooting Guidelines		
Issues	**Possible Causes**	**Solutions**
The insertion shaft does not insert or retract smoothly.	Air may be trapped in the oil reservoir.	Slowly open vent/relief valve B to vent any air trapped in the oil reservoir to the atmosphere.
	There may not be enough oil in the oil reservoir.	Remove vent/relief valve B. Add oil to the oil reservoir until the reservoir is three-quarters (¾) full. Install vent/relief valve B to the oil reservoir.
Oil needs to be added to the oil reservoir often.	Oil may be leaking past the probe shaft piston O-ring.	Replace the O-ring on the probe shaft piston. See *Section 3.2, Maintenance*, for instructions.
Pipeline pressure is leaking from the vent hole in the lower housing.	The O-rings in the lower housing are leaking.	Replace the O-rings in the lower housing. See *Section 3.2, Maintenance*, for instructions.
The insertion shaft will not retract from the pipeline.	Pipeline pressure may not be high enough to retract the insertion shaft.	Carefully pull up on the insertion shaft until it begins to retract.
	The insertion shaft is bent or damaged inside the pipeline.	Contact Welker® for service options.

APPENDIX: REFERENCED OR ATTACHED DOCUMENTS

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

- None

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: AD784[][]
- Assembly Drawing: AD809[][]

NOTES

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