



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® AUTOMATIC INSERTION PROBE

HIGH PRESSURE

MODELS

AIP-1HP

AIP-2HP

DRAWING NUMBERS

AD138BV

AD138BX

AD818CA

MANUAL NUMBER

IOM-007

REVISION

Rev. C, 08/14/2024

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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 Probes, AIP-1HP and AIP-2HP. 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 Belfort Street  
Sugar Land, TX 77498

## 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® AIP-1HP and AIP-2HP Automatic Insertion Probes are designed to be used with a pipeline isolation valve so that the unit can be safely inserted and retracted without interrupting the flow or operation of the pressurized pipeline.

The operator controls the insertion and retraction of the probe by manipulating valves and applying either process pressure or pressure from an auxiliary inert gas supply. Insertion lengths can be set with the adjustable lock collar, making the AIP-1HP and AIP-2HP compatible with multiple pipe sizes.

*Welker® may custom design the AIP-1HP and AIP-2HP 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. 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 order. As necessary, see *Section 2.2, Preparing the Unit for Installation*, for instructions on rotating the oil reservoir.



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: AIP-1HP and AIP-2HP Specifications

Applications	Injection, Sampling, and Siphoning	
Products Sampled	Gases and Liquids Compatible With the Materials of Construction	
Materials of Construction	316/316L Stainless Steel, PTFE, and Viton® Others Available	
Maximum Allowable Operating Pressure	3600 psig @ -20 °F to 100 °F (248 barg @ -28 °C to 37 °C) Others Available	
Pipeline Connection	NPT ¾" MNPT 1" MNPT (Standard) 1½" MNPT 2" MNPT	Flanged Size: ¾", 1", 1½", or 2" Rating: 1500 ANSI
Sample Outlet Connections	¼" FNPT (Standard) ½" FNPT	
Insertion Lengths	0-18" (0-45 cm) 0-24" (0-60 cm) 0-30" (0-76 cm) 0-36" (0-91 cm) Others Available	
Probe Diameters	¾" (AIP-1HP) ⅝" (AIP-2HP)	
Mounting	Horizontal Vertical (Standard)	
Feature	Hydraulic Oil Reservoir	
Options	Electropolished and Sulfinert®-Treated Sample Exposed Parts Probe Tip CE Compliance NACE Compliance	

1.5 Equipment Diagrams

Figure 1: AIP-1HP Diagram (NPT Connection)

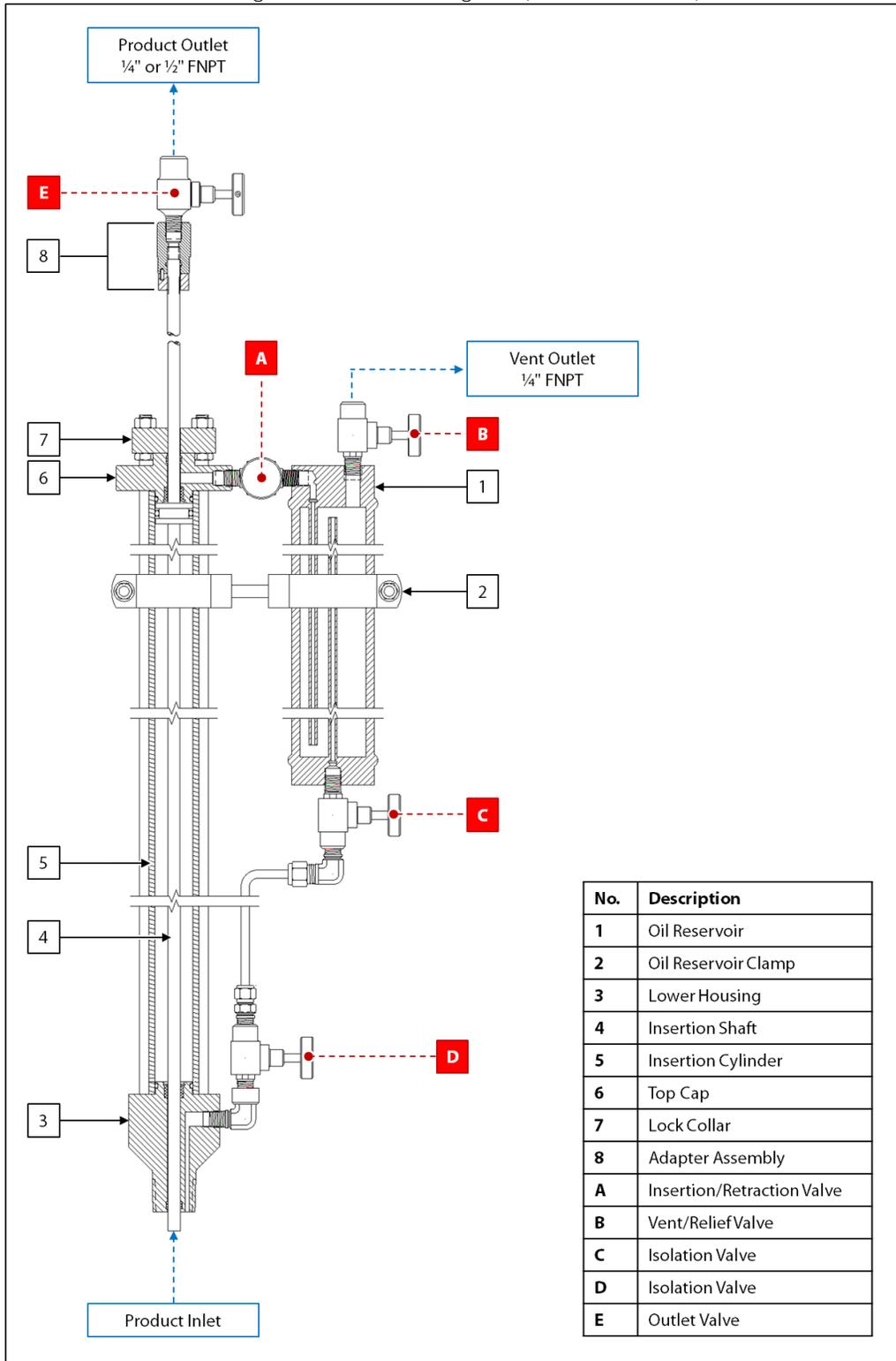
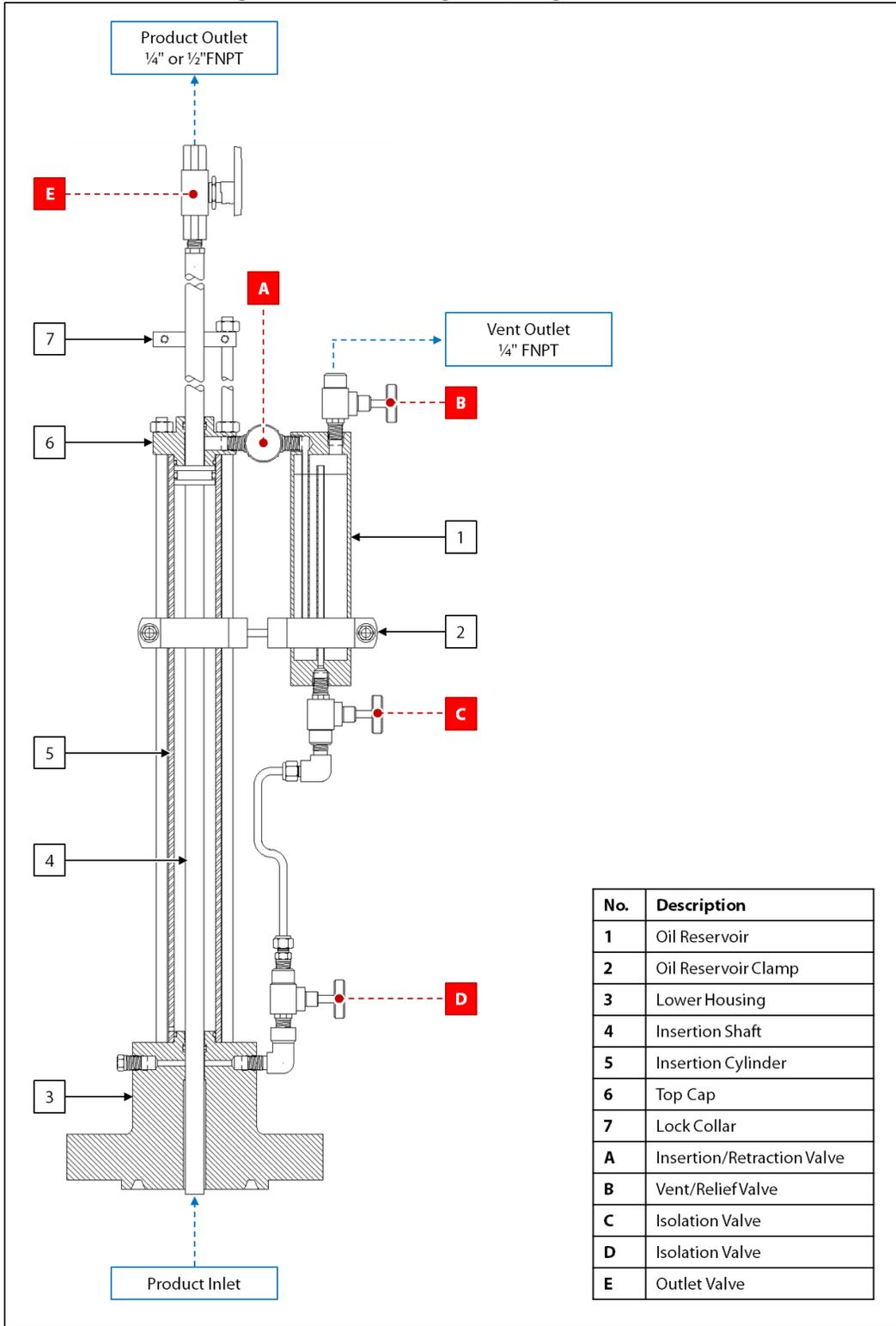


Figure 2: AIP-2HP Diagram (Flanged Connection)



No.	Description
1	Oil Reservoir
2	Oil Reservoir Clamp
3	Lower Housing
4	Insertion Shaft
5	Insertion Cylinder
6	Top Cap
7	Lock Collar
A	Insertion/Retraction Valve
B	Vent/Relief Valve
C	Isolation Valve
D	Isolation Valve
E	Outlet Valve

## 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.

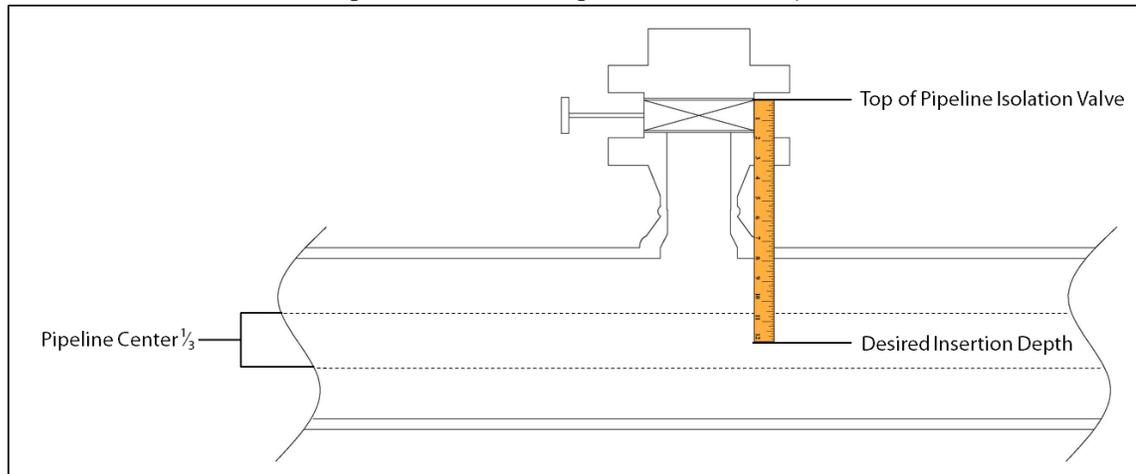
1. For sampling applications, Welker® recommends that the unit be installed to the pipe and inserted into the center one-third ( $\frac{1}{3}$ ) of the pipeline in a location where the product is well-mixed and will yield an accurate and representative sample.
2. For gas sampling applications, Welker® recommends that the unit be installed in the top of the pipe.
3. For liquid sampling applications, locate the unit two to four pipe diameters (2–4D) downstream of an inline static mixer or other flow conditioning system.
4. For liquid sampling applications, Welker® recommends that the unit be installed in the side of the pipe.
5. Handle the unit with care. Avoid bending and scratching the insertion shaft, which has a polished surface that travels through seals.
6. Operate the unit slowly and smoothly while inserting and retracting to avoid damaging the unit.
7. Take care not to close the pipeline isolation valve on the insertion shaft while the shaft is inserted in the pipeline. This is the most common cause of damage to Welker® probes.

## 2.2 Preparing the Unit for Installation

### Determining Insertion Depth

1. Prior to installation, the distance the insertion shaft will need to travel inside the pipeline must be determined. Measure the distance the shaft must travel from the top of the pipeline isolation valve to the desired insertion depth (e.g., the center one-third ( $\frac{1}{3}$ ) of the pipeline) (Figure 3). This will be the shaft insertion length.

Figure 3: Determining the Insertion Depth



2. Pull up on the insertion shaft to ensure that it is fully retracted. The end of the insertion shaft should be flush with or in close proximity to the bottom face of the lower housing.

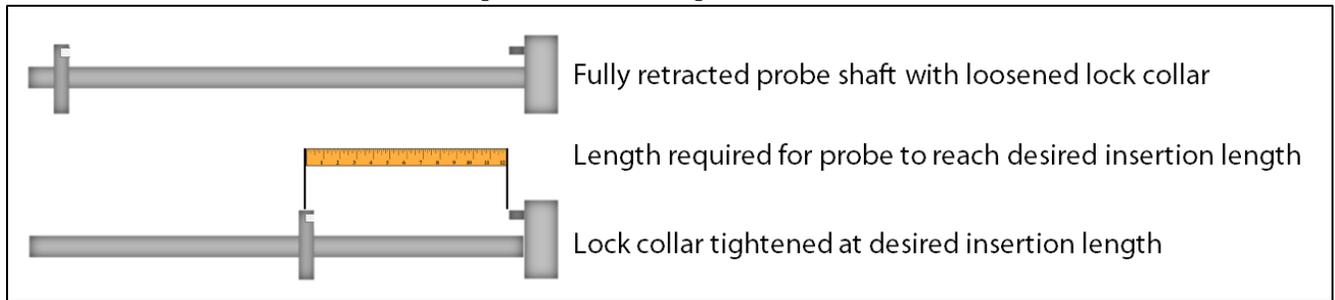


The oil reservoir may need to be relieved of pressure to fully retract the insertion shaft. To relieve pressure in the oil reservoir, open insertion/retraction valve A and vent/relief valve B.

3. Beginning at the top end of the top cap, measure along the insertion shaft to the desired insertion length. As necessary, use a felt tip pen to mark this point.

## Positioning the Lock Collar

Figure 4: Positioning the Lock Collar



4. Remove the hex nuts from the long tie bolts at the top of the lock collar.
5. Loosen the cap screws on the side of the lock collar.
6. Carefully slide the lock collar along the insertion shaft to the desired insertion length, taking care not to scratch the insertion shaft (*Figure 4*).
7. Tighten the cap screws on the side of the lock collar to secure the lock collar to the insertion shaft at the marked point (*Figure 4*).



This procedure ensures that the insertion length will be mechanically limited by the lock collar.

8. If the oil reservoir needs to be rotated, continue to step 9. If the oil reservoir does not need to be rotated, proceed to *Section 2.3, Installing the Unit*.

## Rotating the Oil Reservoir (As Necessary)



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 oriented horizontally.

9. Detach the tubing between isolation valves C and D.
10. Unscrew and remove the oil reservoir clamp from the insertion cylinder and oil reservoir.
11. Loosen insertion/retraction valve A at the top cap.
12. Reposition the oil reservoir so that it is perpendicular to the insertion cylinder. Isolation valve C on the oil reservoir should point down.
13. Tighten insertion/retraction valve A at the top cap.
14. Measure a new piece of tubing to connect isolation valve C to isolation valve D.
15. Attach nuts and ferrules to the ends of the new tubing.
16. Using the new tubing, connect isolation valve C to isolation valve D.

## 2.3 Installing the Unit



For long probes installed horizontally, Welker® recommends field installation of bracing support for the outlet end of the probe to offset the cantilever effect and prevent bending of the shaft. Any bracing or support installed should NOT contact the probe shaft, as scratching or other damage to the shaft may lead to loss of integrity of the sealing surface.



Installation procedures apply to vertical and horizontal installation. Note that Welker® recommends vertical installation.



If the unit will be inserted using an auxiliary gas, continue to step 1.  
If the unit will be inserted using pipeline product, proceed to step 16.

### Using an Auxiliary Gas (Optional)



An auxiliary gas supply is OPTIONAL for this unit. However, for products containing liquid, sand, or other abrasive contaminants, Welker® strongly recommends the use of an auxiliary gas (e.g., clean, dry nitrogen gas) to prevent damage to the insertion cylinder.

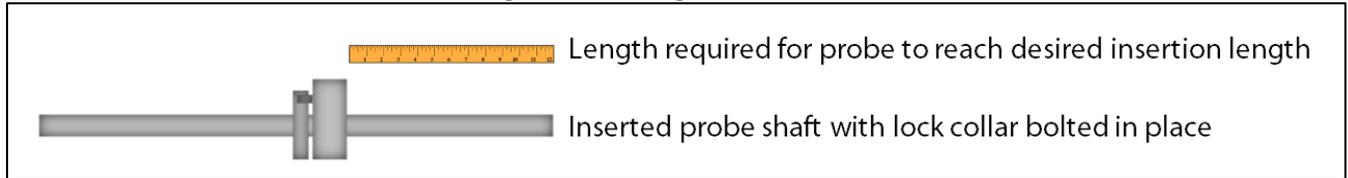
1. Ensure that all valves on the unit are closed.
2. Detach the tubing between isolation valves C and D (*Figure 1* or *Figure 2*).
3. Plug isolation valve D.
4. Connect a customer-supplied auxiliary gas supply to isolation valve C.
5. Install the unit to the pipeline isolation valve.
6. Connect vent/relief valve B to a customer-supplied recovery system (*Figure 1* or *Figure 2*). Valve B should remain closed.
7. Slowly open the pipeline isolation valve. Check for leaks and repair as necessary.
8. Open the valve on the customer-supplied auxiliary gas supply and regulate the supply to pipeline pressure.
9. With insertion/retraction valve A open and vent/relief valve B closed, slowly open isolation valve C. The insertion shaft will begin to insert into the pipeline.



Once the insertion shaft begins to insert, do not open the valve any further. The insertion shaft should be inserted slowly and smoothly. Opening the valve too quickly or too much may cause the insertion shaft to insert into the pipeline too quickly and may result in damage to the unit.

10. Once the lock collar reaches the top cap, close isolation valve C.
11. Secure the lock collar to the top cap by installing the hex nuts to the long tie bolts at the top of the lock collar (*Figure 5*).

Figure 5: Locking the Lock Collar



12. Open vent/relief valve B to relieve pressure trapped in the oil reservoir, and then close vent/relief valve B once pressure has been relieved. The insertion shaft will remain in the pipeline, held mechanically in place by the lock collar.
13. Disconnect the customer-supplied auxiliary gas supply from isolation valve C.
14. Install appropriately sized customer-supplied tubing or other fittings to the product outlet (*Figure 1* or *Figure 2*).
15. Open product outlet valve E to allow product flow to the customer-supplied tubing run assembly (*Figure 1* or *Figure 2*).

#### Using Pipeline Product (If Not Using an Auxiliary Gas)

16. Ensure that all valves on the unit are closed.
17. Install the unit to the pipeline isolation valve.
18. Connect vent/relief valve B to a customer-supplied recovery system (*Figure 1* or *Figure 2*). Valve B should remain closed.
19. Slowly open the pipeline isolation valve. Check for leaks and repair as necessary.
20. Slowly open isolation valves C and D to allow pipeline pressure to enter the oil reservoir.
21. Slowly open insertion/retraction valve A. The insertion shaft will begin to insert into the pipeline.



Once the insertion shaft begins to insert, do not open the valve any further. The insertion shaft should be inserted slowly and smoothly. Opening the valve too quickly or too much may cause the insertion shaft to insert into the pipeline too quickly and may result in damage to the unit.

22. Once the lock collar reaches the top cap, close isolation valves C and D.
23. Secure the lock collar to the top cap by installing the hex nuts to the long tie bolts at the top of the lock collar (*Figure 5*).
24. Open vent/relief valve B to relieve pressure trapped in the oil reservoir, and then close vent/relief valve B once pressure has been relieved. The insertion shaft will remain in the pipeline, held in place mechanically by the lock collar.
25. Install appropriately sized customer-supplied tubing or other fittings to the product outlet (*Figure 1* or *Figure 2*).
26. Open product outlet valve E to allow product flow to the customer-supplied tubing run assembly (*Figure 1* or *Figure 2*).

#### 2.4 Retracting the Unit

1. Ensure that all valves on the unit are closed.
2. Ensure that vent/relief valve B is connected to a customer-supplied recovery system. Valve B should remain closed.
3. Disconnect the customer-supplied tubing, fittings, or instrument attached to the unit.



If the unit will be retracted using an auxiliary gas, continue to step 4.  
If the unit will be retracted using pipeline product, proceed to step 17.

## Using an Auxiliary Gas (Optional)



An auxiliary gas supply is OPTIONAL for this unit. However, for products containing liquid, sand, or other abrasive contaminants, Welker® strongly recommends the use of an auxiliary gas (e.g., clean, dry nitrogen gas) to prevent damage to the insertion cylinder.

4. Ensure that the tubing between isolation valves C and D is detached.
5. Ensure that isolation valve D is plugged.
6. Connect a customer-supplied auxiliary gas supply to isolation valve C.
7. Open the valve on the customer-supplied auxiliary gas supply and regulate the supply to pipeline pressure.
8. Open insertion/retraction valve A, and then slowly open isolation valve C to ensure that auxiliary pressure is applied to the internal shaft piston.



Failure to ensure that adequate pressure is applied to the internal shaft piston prior to retraction could result in unexpected retraction of the insertion shaft, which could damage the unit or injure the operator.

9. Close isolation valve C.
10. Remove the hex nuts from the long tie bolts at the top of the lock collar.
11. Slowly open vent/relief valve B. This will relieve pressure from the internal shaft piston, allowing the insertion shaft to begin retracting from the pipeline. If pipeline pressure is not sufficient to push the insertion shaft out of the line, the insertion shaft may be retracted manually.



Once the insertion shaft begins to retract, do not open the valve any further. The insertion shaft should be retracted slowly and smoothly. Opening the valve too quickly or too much may cause the insertion shaft to retract from the pipeline too quickly and may result in damage to the unit.



If the insertion shaft will not retract from the pipeline automatically or manually, the insertion shaft could be bent or damaged. Contact Welker® for service options.

12. Once the insertion shaft has been fully retracted from the pipeline, close vent/relief valve B, and then close the pipeline isolation valve to isolate the unit from pressure.
13. Disconnect the customer-supplied auxiliary gas supply from isolation valve C.
14. If complete removal of the unit from the pipeline is desired, remove the plug from isolation valve D, and then open isolation valve D to relieve any trapped pressure.
15. Disconnect the customer-supplied recovery system from vent/relief valve B. The unit is now ready to be removed from the pipeline isolation valve for maintenance or to be relocated.



Continuous pressure venting from one or more of the unit's valves may indicate leakage from the pipeline isolation valve. The operator should consult an on-site safety engineer.

16. If the unit will remain secured to the pipeline after retraction, secure the lock collar to the top cap by repositioning the lock collar and installing the hex nuts to the long tie bolts at the top of the lock collar.

## Using Pipeline Product (If Not Using an Auxiliary Gas)

17. Open insertion/retraction valve A, and then slightly open isolation valves C and D to ensure that pipeline pressure is applied to the internal shaft piston.



Failure to ensure that adequate pressure is applied to the internal shaft piston prior to retraction could result in unexpected retraction of the insertion shaft, which could damage the unit or injure the operator.

18. Close isolation valves C and D.
19. Remove the hex nuts from the long tie bolts at the top of the lock collar.
20. Slowly open vent/relief valve B. This will relieve pipeline pressure from the internal shaft piston, allowing the insertion shaft to begin retracting from the pipeline. If pipeline pressure is not sufficient to push the insertion shaft out of the line, the insertion shaft may be retracted manually.



Once the insertion shaft begins to retract, do not open the valve any further. The insertion shaft should be retracted slowly and smoothly. Opening the valve too quickly or too much may cause the insertion shaft to retract from the pipeline too quickly and may result in damage to the unit.



If the insertion shaft will not retract from the pipeline automatically or manually, the insertion shaft could be bent or damaged. Contact Welker® for service options.

21. Once the insertion shaft has been fully retracted from the pipeline, close vent/relief valve B, and then close the pipeline isolation valve to isolate the unit from pressure.
22. If complete removal of the unit from the pipeline is desired, open isolation valves C and D to relieve any trapped pressure, and then ensure that the customer-supplied recovery system has been disconnected from vent/relief valve B. The unit is now ready to be removed from the pipeline isolation valve for maintenance or to be relocated.



Continuous pressure venting from one or more of the unit's valves may indicate leakage from the pipeline isolation valve. The operator should consult an on-site safety engineer.

23. If the unit will remain secured to the pipeline after retraction, secure the lock collar to the top cap by repositioning the lock collar and tightening the hex nuts to the long tie bolts at the top of the lock collar.

## 3.1 Before You Begin

1. Welker® recommends that the unit have standard maintenance under normal operating conditions: for *gas sampling* every six (6) months; and for *liquid sampling* every twelve (12) months. 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 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, 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.



After the seals 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. Crescent Wrench (Qty. 2)
  - b. Hex Key Set
  - c. Seal Pick

## 3.2 Maintenance



Do not scratch or scrape the metal surfaces of the parts when removing O-rings from the O-ring grooves. Scratching or scraping the sealing surface could result in a leak.

1. Prior to maintenance, the unit must be removed from the pipeline. See *Section 2.4, Retracting the Unit*, for instructions on retracting the insertion shaft and removing the unit from the pipeline.
2. Once the unit is removed from the pipeline, ensure that all valves are closed.

### Removing the Oil Reservoir

3. Disconnect the tubing between isolation valves C and D.
4. Unscrew the oil reservoir clamp from around the insertion cylinder, taking care not to misplace the nut and screw.
5. Disconnect the oil reservoir from the top cap at insertion/retraction valve A. Valves A, B, and C should remain connected to the oil reservoir.
6. Verify that the oil reservoir is three-quarters ( $\frac{3}{4}$ ) full.
7. As necessary, remove vent/relief valve B, and then add oil to the oil reservoir. Install vent/relief valve B to the oil reservoir after oil has been added.



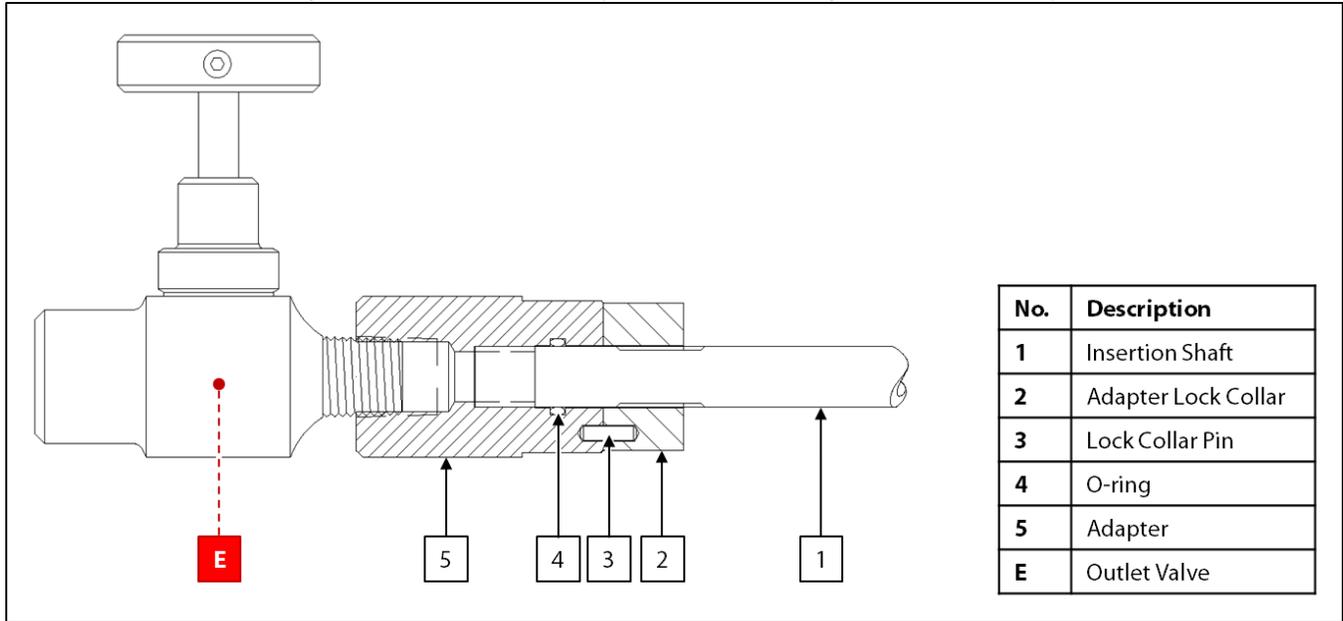
If oil needs to be added to the oil reservoir, this could indicate a leak.

8. Set the oil reservoir aside.



The AIP-2HP is not equipped with an adapter assembly. To continue maintenance on the AIP-2HP, proceed to step 23.

Figure 6: Adapter Assembly Maintenance Diagram (AIP-1HP Only)

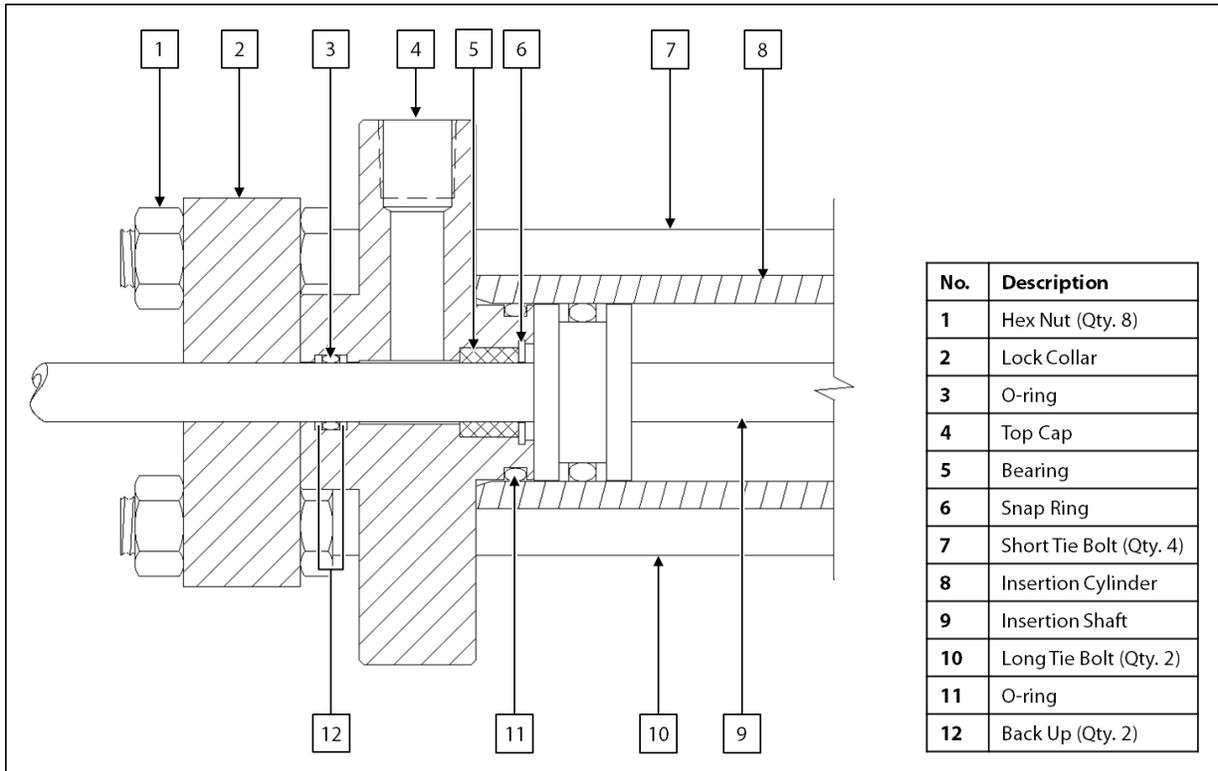


9. Loosen the cap screw in the adapter lock collar.
10. Unscrew the adapter assembly from the insertion shaft.
11. Separate the adapter from the adapter lock collar, taking care not to misplace the pin that aligns the adapter lock collar with the adapter or the screw that secures the adapter lock collar to the insertion shaft.
12. As necessary, clean the adapter.
13. Replace the O-ring in the adapter.
14. Assemble the adapter assembly by aligning the pin in the adapter lock collar with the pin hole in the adapter.

## Top Cap Assembly

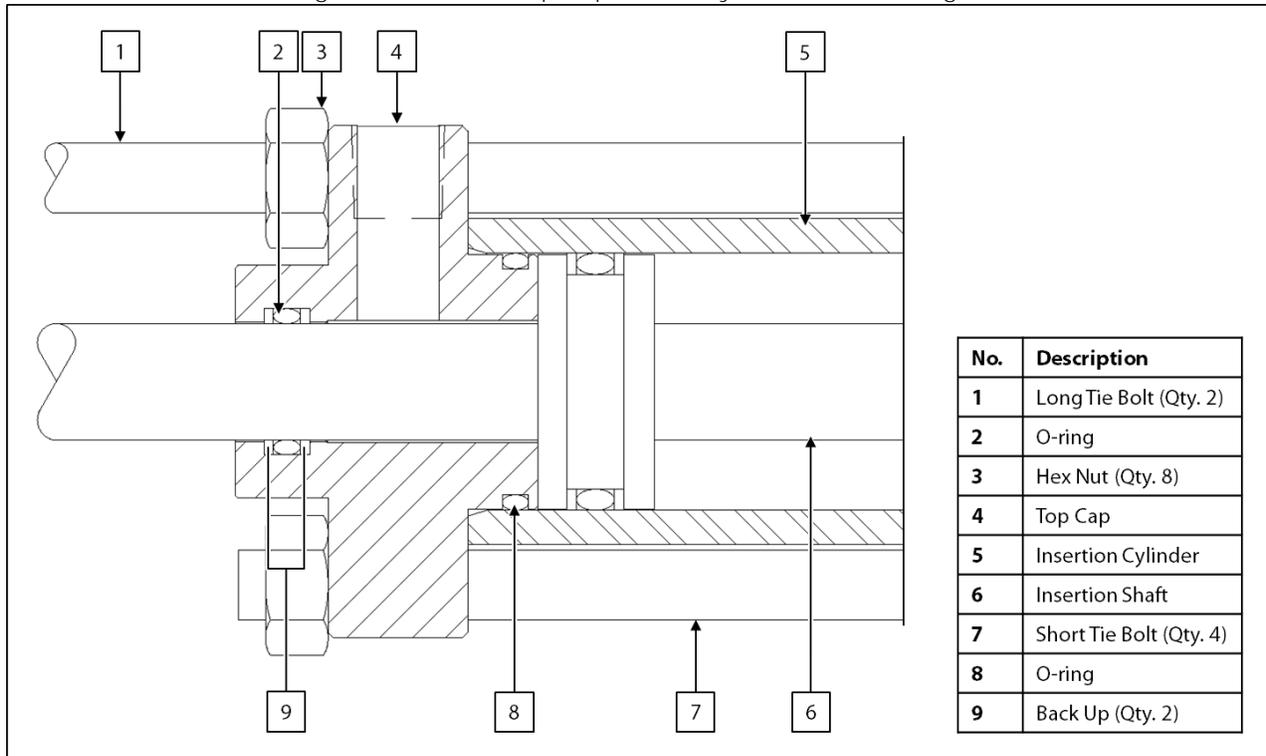
AIP-1HP

Figure 7: AIP-1HP Top Cap Assembly Maintenance Diagram



15. Loosen and remove the lock collar from the insertion shaft, taking care not to scratch the insertion shaft.
16. Remove the top cap from the insertion cylinder, taking care not to scratch the insertion shaft.
17. Remove the back ups, O-rings, bearing, and snap ring from the top cap.
18. As necessary, clean the top cap.
19. Replace the back ups and O-rings in top cap.
20. Inspect the bearing for damage or wear. Replace as necessary.
21. Install the snap ring to the top cap.
22. Proceed to step 29.

Figure 8: AIP-2HP Top Cap Assembly Maintenance Diagram



23. Unscrew outlet valve E from the insertion shaft at the fitting.
24. Loosen and remove the lock collar from the insertion shaft, taking care not to scratch the insertion shaft.
25. Remove the top cap from the insertion cylinder, taking care not to scratch the insertion shaft.
26. Remove the back ups and O-rings from the top cap.
27. As necessary, clean the top cap.
28. Replace the back ups and O-rings in top cap.

Lower Housing Maintenance

Figure 9: AIP-1HP Lower Housing Maintenance Diagram

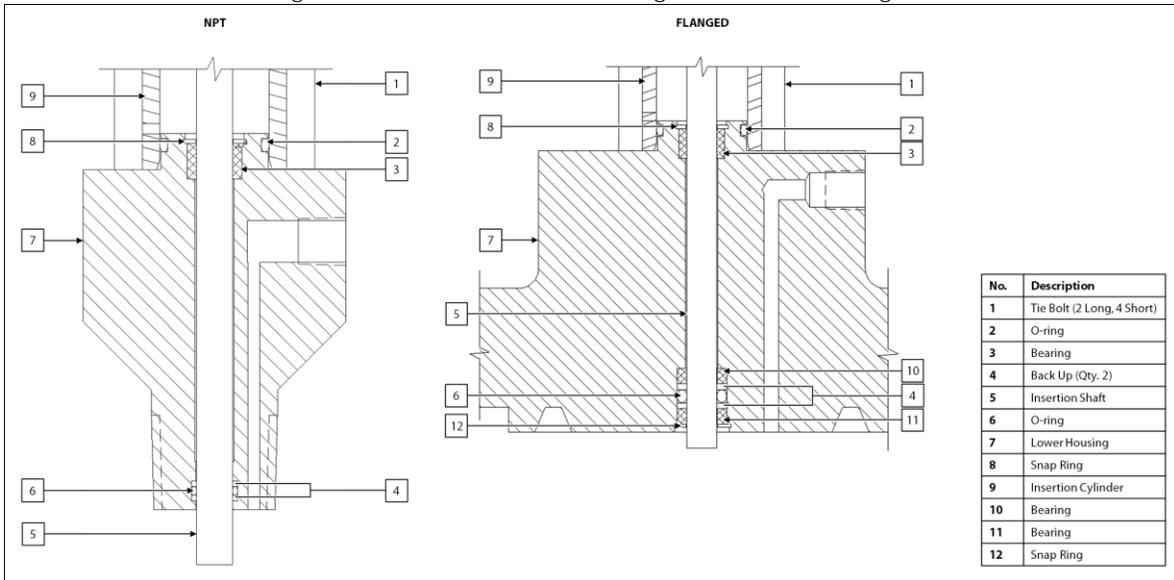
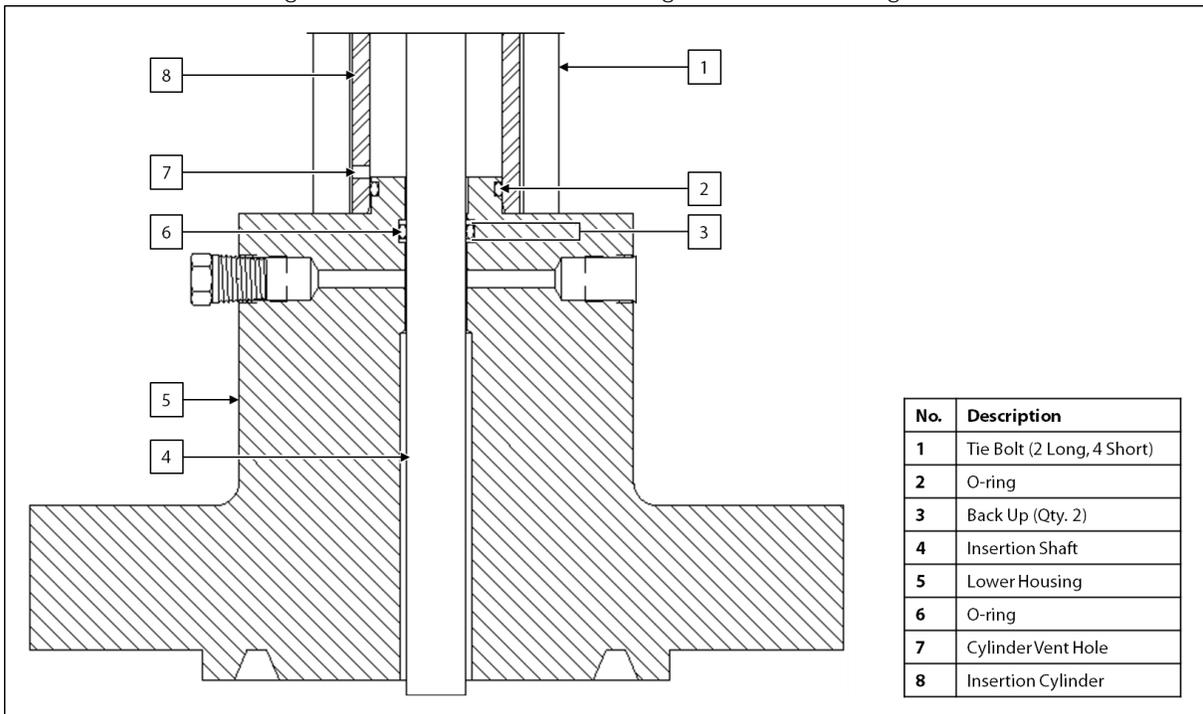


Figure 10: AIP-2HP Lower Housing Maintenance Diagram



29. Carefully slide the insertion shaft out of and the insertion cylinder off the lower housing.
30. Replace the O-rings and back ups in the lower housing.
31. If performing maintenance on an AIP-1HP with flanged lower housing, inspect the snap rings and bearings in the lower housing (Figure 9). Replace if they show signs of damage or wear.

Figure 11: AIP-1HP Shaft Detail

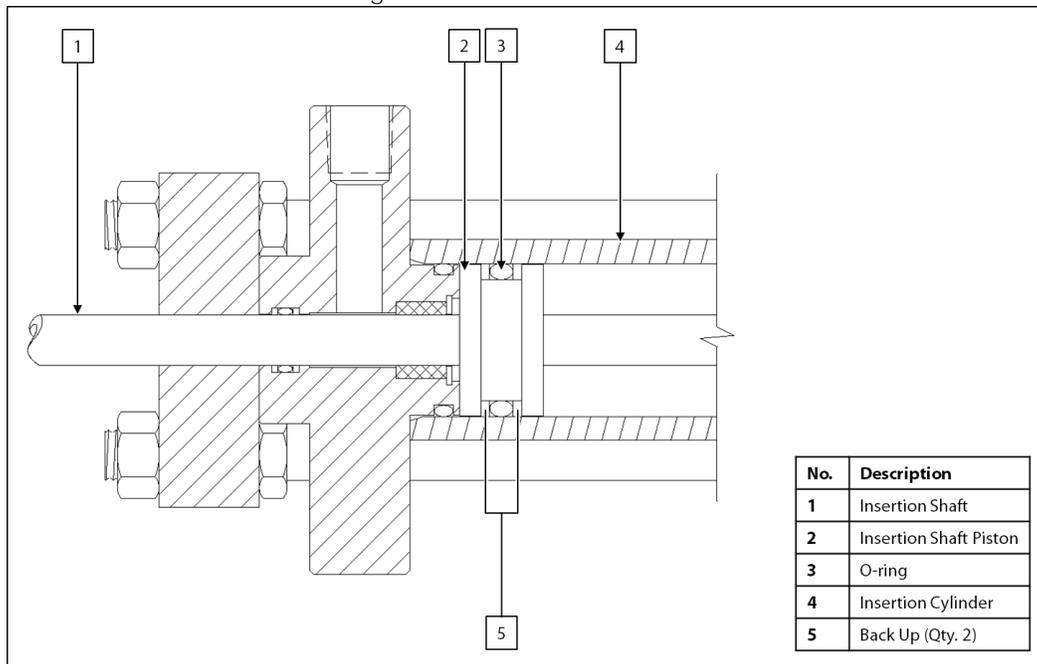
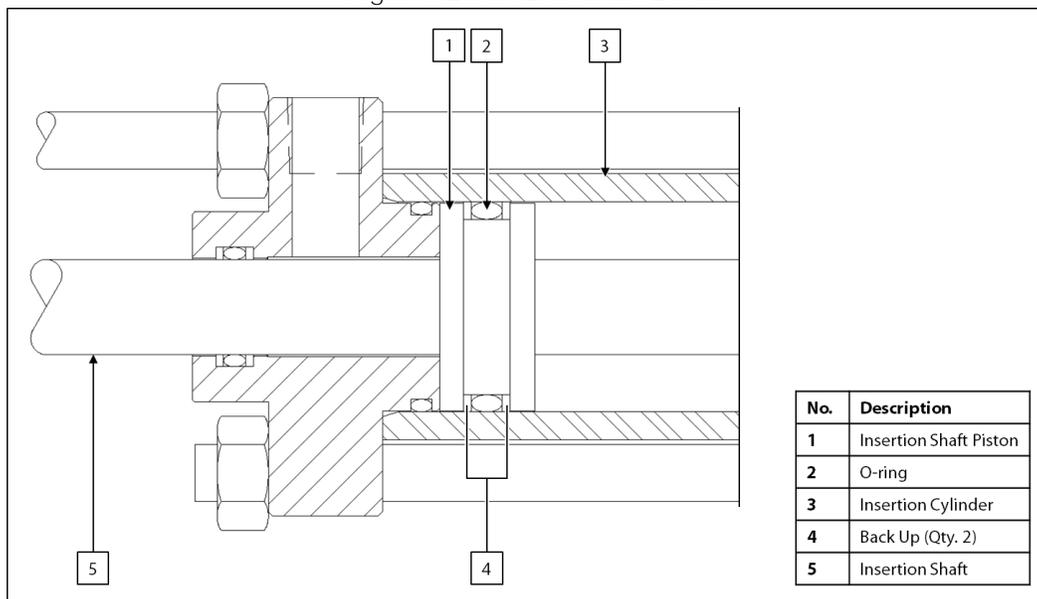


Figure 12: AIP-2HP Shaft Detail



32. Replace the O-ring and back ups on the piston.
33. Closely inspect the polished outer diameter of the insertion shaft. Scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker® for service options.
34. Closely inspect the honed inner diameter of the insertion cylinder for scratches or damage. Scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker® for service options.

## Reassembly

35. Coat the inside of the top end of the insertion cylinder with lubricant, and then insert the shorter end of the insertion shaft approximately halfway into the insertion cylinder. The bottom of the insertion cylinder can be identified by its vent hole.



Welker® recommends a silicone-based lubricant, such as Molykote® 111, for use with this unit.

36. Liberally lubricate the insertion shaft.  
 37. Carefully slide the bottom end of the insertion shaft into lower housing.  
 38. Carefully slide the insertion cylinder onto the lower housing.  
 39. Carefully slide the top cap onto the top end of the insertion shaft and down to the insertion cylinder.  
 40. Following a cross-bolting sequence, install the tie bolts and tighten the hex nuts to the appropriate torque (*Figure 13* and *Table 2*).

Figure 13: Cross-Bolting Sequence

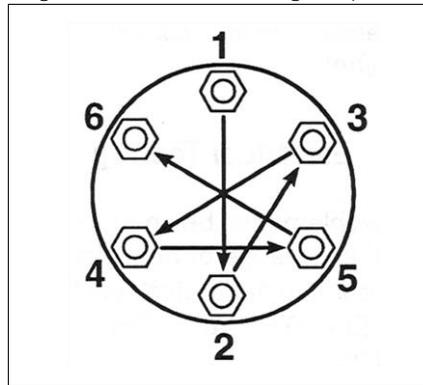


Table 2: Torque Specifications for Tie Bolts

Tie Bolt Diameter	Foot-Pounds (ft•lb)	Kilograms per Meter (kg/m)
$\frac{3}{8}$ "	5–6	0.69–0.82
$\frac{1}{2}$ "	15–20	2.07–2.76
$\frac{5}{8}$ "	25–30	3.45–4.14
$\frac{7}{8}$ " or 1"	55–65	7.60–8.98

41. Carefully return the lock collar to the top of the insertion shaft, and then tighten the cap screws in the sides of the lock collar to hold the collar in place.  
 42. If performing maintenance on an AIP-1HP, screw the adapter assembly onto the top end of the insertion shaft, and then tighten the cap screw in the side of the adapter lock collar to secure it to the insertion shaft.  
 43. If performing maintenance on an AIP-2HP, screw outlet valve E and its fitting onto the top of the insertion shaft.  
 44. Fully retract the insertion shaft.  
 45. Prepare the oil reservoir for reattachment by wrapping the valve threads with PTFE tape or coating them with pipe dope.  
 46. If pipeline pressure will be used to install the unit to the pipeline, reconnect the tubing between isolation valves C and D.  
 47. Reconnect the oil reservoir to the top cap at insertion/retraction valve A.

48. Attach the oil reservoir to the unit. Mount the bracket around the insertion cylinder and secure it with the nut and screw.
49. The unit is now ready for installation. See *Section 2.2, Preparing the Unit for Installation*, and *Section 2.3, Installing the Unit*, for instructions on correctly installing the unit to the pipeline.



Check valves for leaks and repair as necessary during reinstallation.

### 3.3 Troubleshooting Guidelines

**Table 3: AIP-1HP and AIP-2HP Troubleshooting Guidelines**

Issues	Possible Causes	Solutions
The insertion shaft does not insert or retract smoothly.	Air may be trapped in the oil reservoir.  There may not be enough oil in the oil reservoir.	Slowly open vent/relief valve B to vent any air trapped in the oil reservoir to the atmosphere.  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 insertion shaft piston O-ring.	Replace the O-ring on the insertion shaft piston. See <i>Section 3.2, Maintenance</i> , for instructions.
Pipeline pressure is leaking from the vent hole in the insertion cylinder.	The seals in the lower housing are leaking.	Replace the seals in the lower housing. See <i>Section 3.2, Maintenance</i> , for instructions.
The insertion shaft will not retract from the pipeline.	Pipeline pressure may not be high enough to retract the insertion shaft.  The insertion shaft is bent or damaged inside the pipeline.	Carefully pull up on the insertion shaft until it begins to retract.  Contact Welker® for service options.

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

- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

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

- Parker Hannifin Corporation Ball and Plug Valves (Welker® IOM-V213)
- Parker Hannifin Corporation Needle Valves Pipe Valves P Series (Welker® IOM-

V361) Welker® drawings and schematics suggested for use with this unit:

- Assembly Drawing: AD138BV (AIP-1HP, NPT Connection)
- Assembly Drawing: AD138BX (AIP-1HP, Flanged Connection)
- Assembly Drawing: AD818CA (Standard AIP-2HP)

