



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL  
WELKER® AUTOMATIC INSERTION DEVICE

MODEL  
AID-3

DRAWING NUMBER  
AD603CK  
AD734BJ.2

MANUAL NUMBER  
IOM-004

REVISION  
Rev. F, 8/14/2024

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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 Device, AID-3. 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 Device 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 Device, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Bellfort 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 might have additional requirements and specifications that are not listed in this manual.*

## 1.2 Product Description

The Welker® AID-3 Automatic Insertion Device is designed to safely insert and retract probes, ultrasonic heads, thermowells, hydrometers, siphons, injection nozzles, temperature sensors, microphones, and corrosion coupons, all of which have an integral insertion shaft, into pipelines of various sizes and pressures.

The removable insertion/retraction device, which can be operated using pipeline product, an auxiliary gas supply, or hydraulic fluid, allows for controlled insertion and retraction of the insertion shaft. Once the insertion shaft is inserted in the pipeline, the insertion/retraction device can be removed, giving the inserted device a low profile, which is ideal for locations where clearance at the top of the pipe is critical.

*Welker® might custom design the AID-3 to suit the particular application and specifications of each customer.*

## 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. Please note that the specifications might vary depending on the customization of your equipment.

**Table 1: AID-3 Automatic Insertion Device Specifications**

Applications	Safe Automatic Insertion and Retraction of Probes, Ultrasonic Heads, Thermowells, Hydrometers, Siphons, Injection Nozzles, Temperature Sensors, Microphones, Corrosion Coupons, and Other Equipment
Products Sampled	Gases and Liquids Compatible With the Materials of Construction
Materials of Construction	316/316L Stainless Steel, Aluminum, Carbon Steel, Fluorotrel®, PTFE, and FKM (Others Available)
Maximum Allowable Operating Pressure	Insertion/Retraction Device: 200 psig @ -20 °F to 100 °F (13 barg @ -28 °C to 37 °C) Lower Assembly – Stainless Steel: 1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C) Lower Assembly – Carbon Steel: 1480 psig @ -20 °F to 100 °F (102 barg @ -28 °C to 37 °C) (Others Available)
Pipeline Connection	NPT: 1" or 2" Flanged: 1", 2", or 3"; Rating – 150, 300, 600, 900, or 1500 ANSI (Others Available)
Insertion Length	Up to 120"
Probe Diameter	$\frac{5}{8}$ " (Others Available)
Utility Requirements	Auxiliary Gas Supply, Hydraulic Fluid, or Pipeline Pressure
Operation	Insertion/Retraction Device: Piston-Operated
Feature	Removable Insertion/Retraction Device
Options	Removable Insertion/Retraction Device Accessories, Such as Fittings, Flexlines, Pressure Gauges, Reliefs, and Valves Safety Plate

Figure 1: AID-3 Diagram

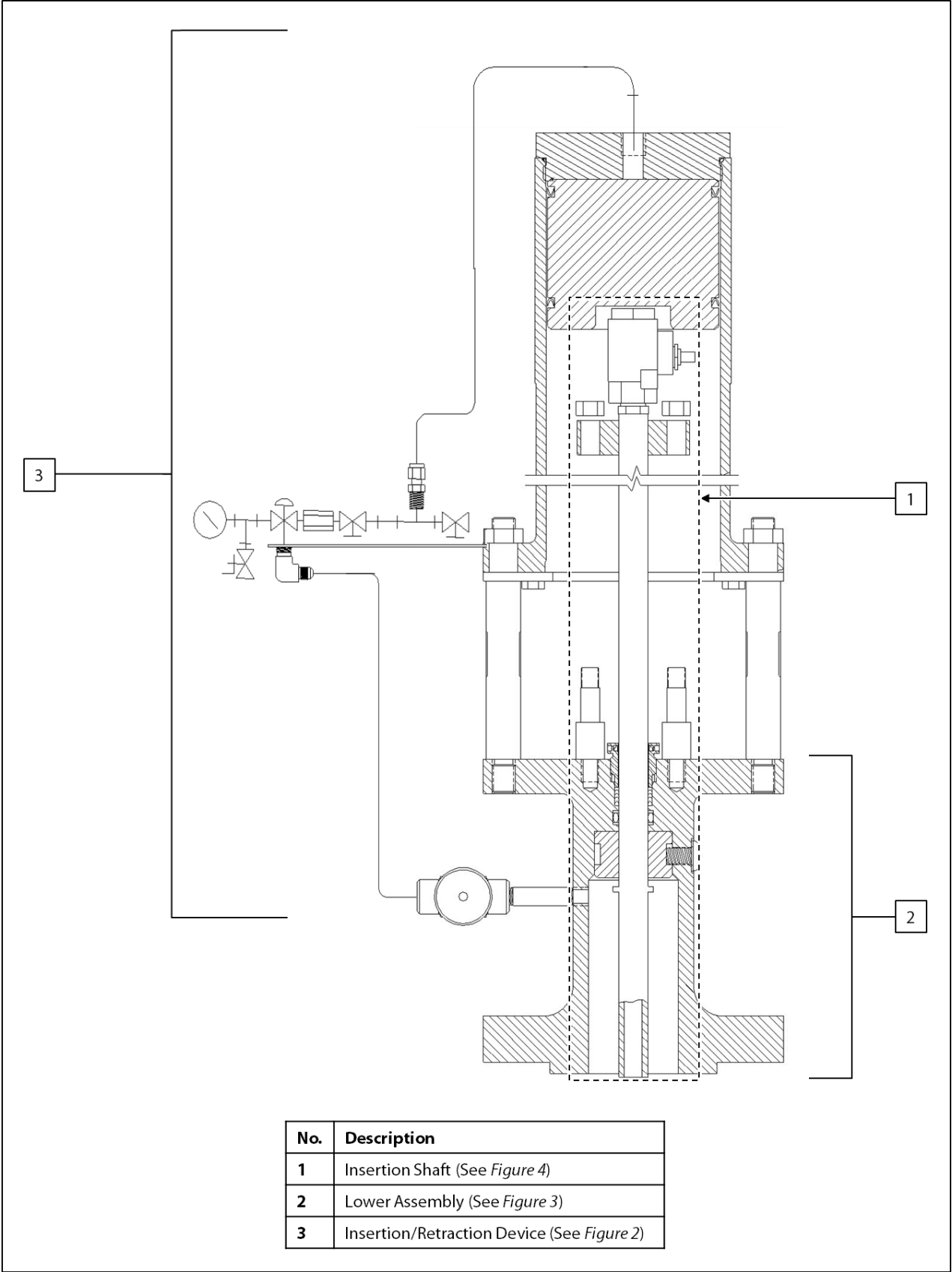


Figure 2: Insertion/Retraction Device Diagram

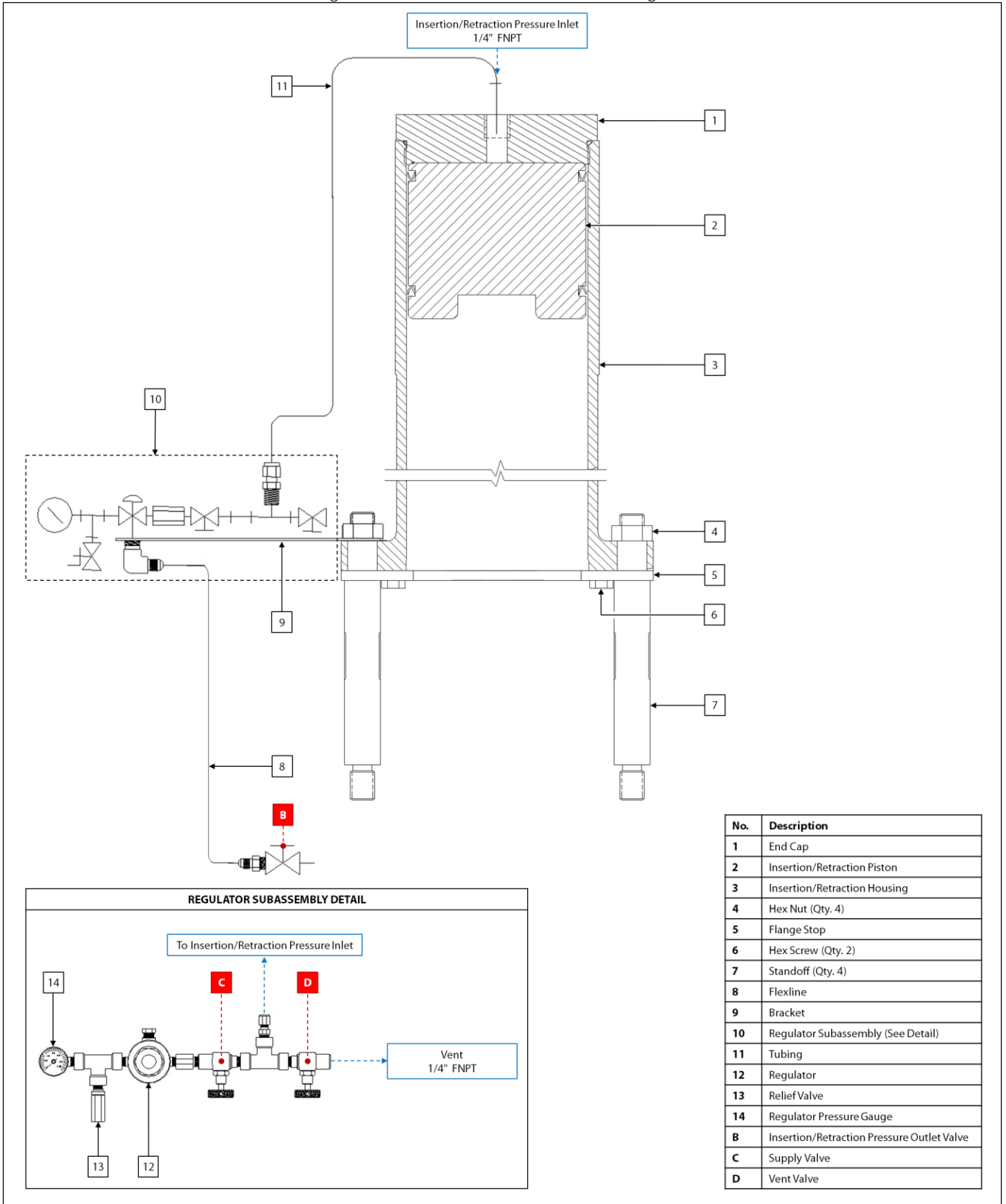


Figure 3: Lower Assembly Diagram

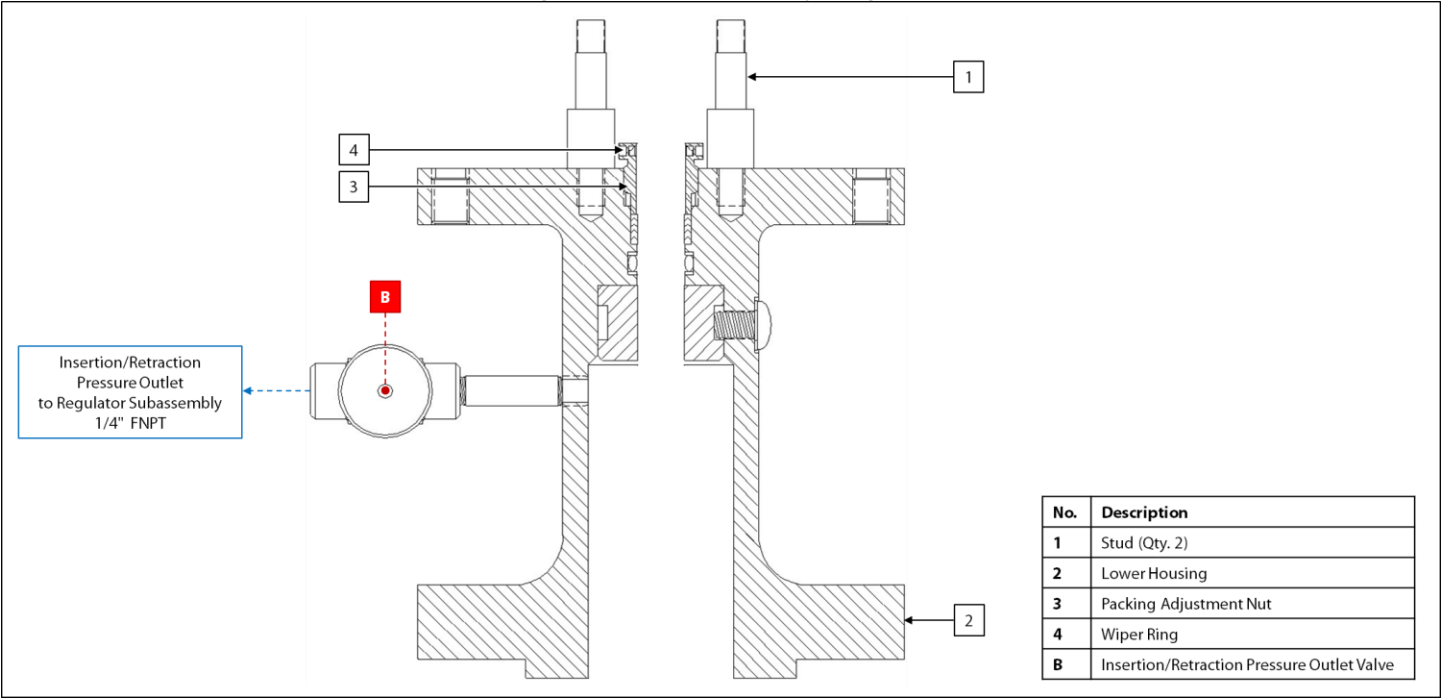
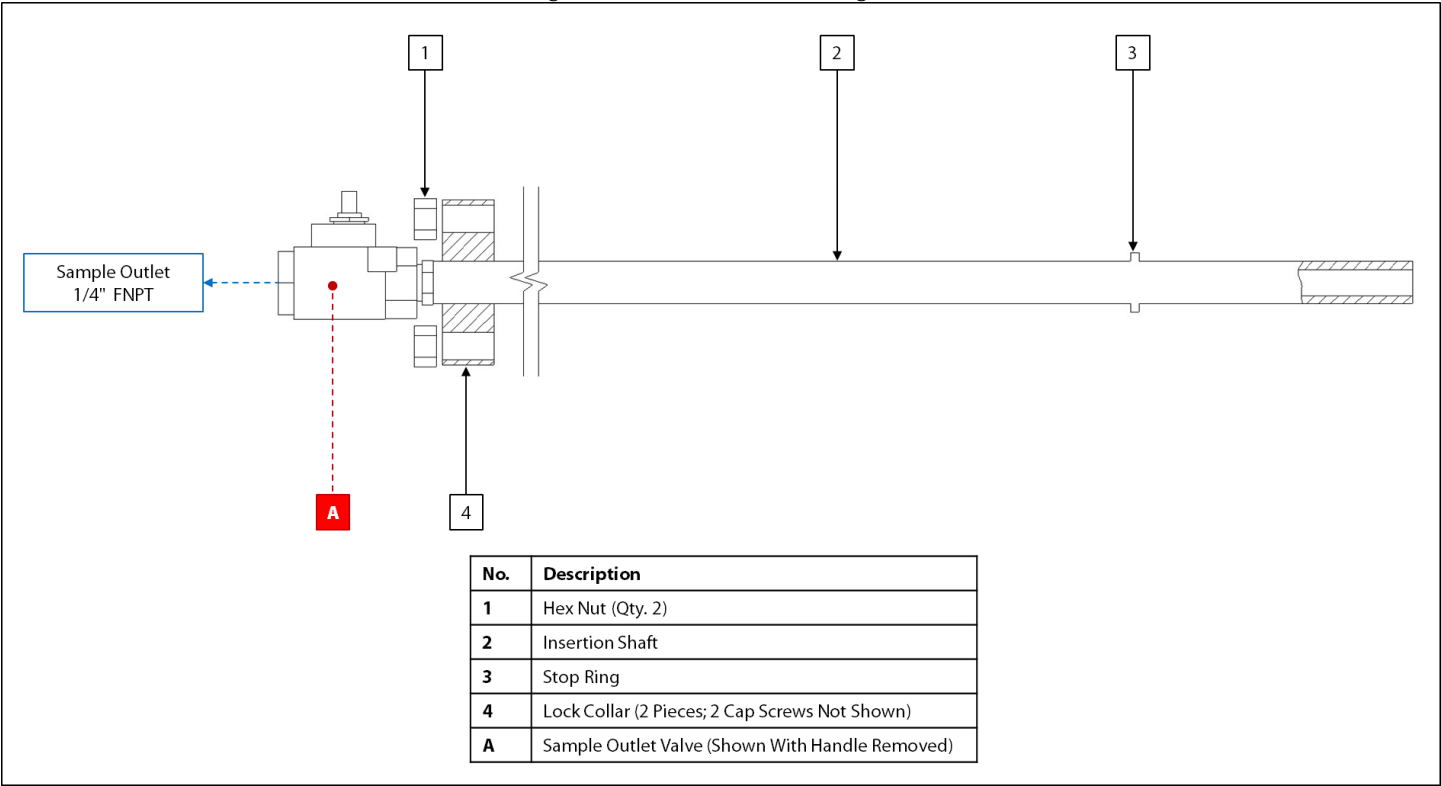


Figure 4: Insertion Shaft Diagram





## 2.1 Before You Begin



After unpacking the unit, check the equipment for compliance and any damage that might 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. A sample probe is recommended to extract sample from the center one-third (1/3) of the pipeline in a location where the product is well-mixed and will yield a representative sample.
2. For gas sampling applications, Welker® recommends the unit be installed in the top of the pipe.
3. For liquid sampling applications, Welker® recommends the unit be installed in the side of the pipe.
4. Handle the unit with care. Avoid bending and scratching the insertion shaft, which has a polished surface that travels through seals.
5. Operate the unit slowly and smoothly while inserting and retracting to avoid damaging the unit.
6. 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 for Installation

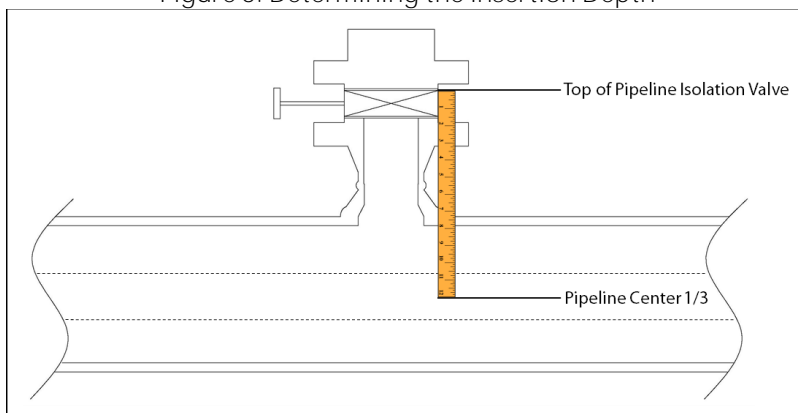
Removing the Insertion/Retraction Device

1. Disconnect the flexline from insertion/retraction pressure outlet valve B (*Figure 2*).
2. Remove the hex nuts from the standoffs (*Figure 2*).
3. Carefully remove the bracket supporting the regulator subassembly and the insertion/retraction housing from the standoffs (*Figure 2*).
4. Unscrew the standoffs from the lower housing (*Figures 2 & 3*).

Determining the Insertion Depth

5. Loosen the packing adjustment nut (*Figure 3*).
6. The distance the insertion shaft will need to travel inside the pipeline must be determined. Measure the distance the insertion shaft must travel from the top of the pipeline isolation valve to the desired insertion depth (e.g., the center one-third (1/3) of the pipeline) (*Figure 5*). This will be the shaft insertion length.

Figure 5: Determining the Insertion Depth



7. Pull up on the insertion shaft to ensure that it is fully retracted. The end of the insertion shaft should be flush with the lower housing face.
8. Beginning at the top shoulder of a stud, measure along the insertion shaft to the desired insertion length (*Figures 3 & 4*). Use a felt-tip pen to mark this point.

#### Positioning the Lock Collar

9. Remove the hex nuts from the lock collar (*Figure 4*).
10. Loosen the cap screws (*Figure 4*).
11. Carefully slide the lock collar along the insertion shaft to the desired insertion length, taking care not to scratch the insertion shaft.
12. Tighten the cap screws to secure the lock collar to the insertion shaft at the marked point.



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

#### Preparing the Insertion/Retraction Device

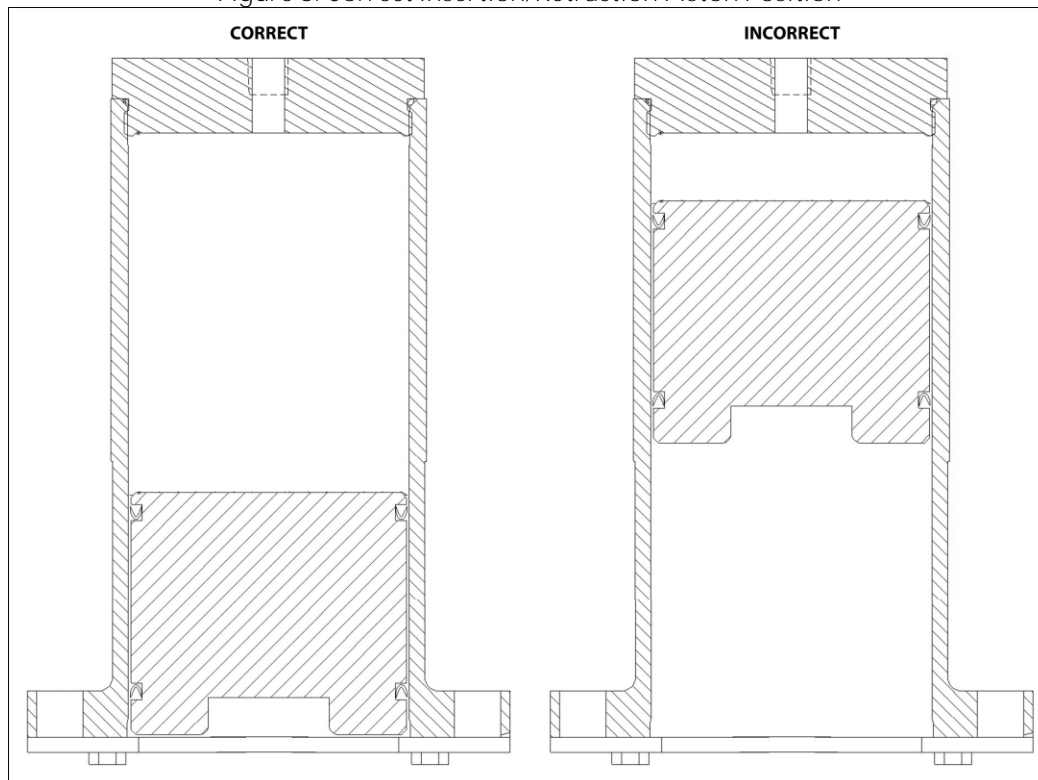


Prior to mounting the insertion/retraction device to the lower assembly, the piston must be moved to the bottom of the insertion/retraction housing so that it is against the flange stop. This protects the insertion shaft and outlet valve during insertion and retraction.



The piston may be moved manually or by using auxiliary pressure.  
To move the piston manually, continue to step 13.  
To move the piston using auxiliary pressure, proceed to step 17.

Figure 6: Correct Insertion/Retraction Piston Position



## Manually

13. Remove the end cap from the insertion/retraction housing (*Figure 2*).
14. Slowly push the insertion/retraction piston down to the flange stop (*Figures 2 & 6*).



As needed, use a clean wooden dowel or PVC pipe to gently push the piston down. DO NOT use metal objects, as they might scratch and damage the unit.

15. Return the end cap to the insertion/retraction housing (*Figure 2*).
16. Proceed to *Section 2.3, Installing the Unit*.

## Using Auxiliary Pressure



DO NOT exceed the maximum allowable operating pressure of the insertion/retraction device.



Welker® recommends using nitrogen as the inert gas supply.

17. Connect a customer-supplied auxiliary pressure supply to the insertion/retraction pressure inlet in the end cap of the insertion/retraction housing (*Figure 2*).
18. Open the outlet valve on the customer-supplied auxiliary pressure supply and supply approximately 10-20 psig of pressure to the top of the insertion/retraction piston.
19. The insertion/retraction piston should begin to move easily down to the flange stop.



If the insertion/retraction piston does not move easily down to the flange stop with the application of 10-20 psig of auxiliary pressure, STOP applying pressure to the insertion/retraction piston, and then bleed the pressure from the insertion/retraction housing. Remove the end cap and check for a possible obstruction.

20. Once the insertion/retraction piston has reached the flange stop, stop applying auxiliary pressure (*Figures 2 & 6*).
21. Disconnect the auxiliary pressure supply from the end cap, and then depressurize the insertion/retraction housing.

## 2.3 Installing the Unit

1. Close sample outlet valve A, and then remove the handle from the valve (*Figure 4*).
2. Ensure that the insertion shaft is fully retracted.
3. Lay the lower assembly on its side.

### Installing the Insertion/Retraction Device

4. Remove the hex nuts from the insertion/retraction device standoffs (*Figure 2*).
5. Remove the standoffs from the insertion/retraction device (*Figure 2*).
6. Screw the standoffs into the lower housing and tighten securely (*Figure 3*).
7. Align the insertion/retraction device with the lower assembly. Sample outlet valve A should fit into the counterbore of the insertion/retraction piston (*Figure 1*).
8. Push the insertion/retraction device down toward the lower housing. The insertion/retraction piston will move up inside the insertion/retraction housing as the insertion/retraction device is pushed down around the insertion shaft.
9. As necessary, align the insertion/retraction housing with the standoffs.
10. Screw the nuts onto the standoffs to secure the insertion/retraction device to the lower assembly (*Figure 2*). Tighten securely.
11. If pipeline product will be used to insert the shaft, connect the flexline to insertion/retraction pressure outlet valve B (*Figure 1*). If an auxiliary gas or hydraulic fluid will be used to insert the shaft, the flexline can remain disconnected.
12. Ensure that insertion/retraction pressure outlet valve B is closed.
13. Mount the assembly to the pipeline isolation valve.
14. Tighten the packing adjustment nut until tension has been applied to the packing (*Figure 3*).
15. Slowly open the pipeline isolation valve. The lower housing will be pressurized to full pipeline pressure.



If pressure exhausts past the packing adjustment nut, close the pipeline isolation valve. Leaking at the packing adjustment nut indicates maintenance is required. See *Section 3.2, Maintenance*, for instructions on maintaining the unit.

## Calculating the Balanced Pressure



The diameter of the insertion shaft, the current pipeline pressure, and the diameter of the insertion/retraction piston must be known in order to calculate the balanced pressure and determine the insertion and retraction pressure.

16. If pipeline product or an auxiliary gas will be used to insert the insertion shaft, use the provided equations to calculate the balanced pressure to help determine the approximate pressure required to insert the insertion shaft into the pressurized pipeline (Figure 7). If hydraulic fluid will be used to insert the insertion shaft, the balanced pressure does not need to be calculated.

Figure 7: Pressure Requirement Equations

Pressure Requirements
<p><b>Equation 1: Force on the End of the Insertion Shaft</b></p> $\text{Force on the End of the Insertion Shaft} = \pi \times \left( \frac{\text{Shaft Diameter}}{2} \right)^2 \times \text{Pipeline Pressure}$ <p><b>Equation 2: Balanced Pressure</b></p> $\text{Balanced Pressure} = \frac{\text{Force on the End of the Insertion Shaft (Eq.1)}}{\pi \times \left( \frac{\text{Piston Diameter}}{2} \right)^2}$
<p>Use Equation 1 to determine the amount of force acting on the end of the insertion shaft. Use Equation 2 to determine the approximate pressure required to counter the force on the end of the insertion shaft and prevent movement of the shaft.</p>



The actual pressure required to insert or retract the insertion shaft will vary, as these equations do not account for friction.

## Inserting the Unit



DO NOT place any part of the human body directly over the insertion shaft.



Keep hands clear of moving parts between the lower housing and insertion/retraction device.



For long probes installed horizontally, Welker® recommends field installation of bracing or support from 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 insertion shaft, as scratching or other damage to the shaft might lead to loss of integrity of the sealing surface.



If the unit will be inserted using pipeline product, continue to step 17.  
If the unit will be inserted using an auxiliary gas, proceed to step 30.  
If the unit will be inserted using hydraulic fluid, proceed to step 45.

## Using Pipeline Product

17. Set the regulator to the balanced pressure calculated using the provided equations (*Figure 7*).
18. Open insertion/retraction pressure outlet valve B (*Figure 3*).
19. Open supply valve C (*Figure 2*).
20. Slowly increase the regulator pressure to a pressure greater than the balanced pressure. The insertion shaft should begin to insert into the pipeline.



If 200 psig is applied to the insertion/retraction device and the lock collar secured to the insertion shaft has not reached the studs on the lower housing, stop applying pressure. Bleed off all pressure in the insertion/retraction housing, and then contact Welker® for service options.



If the pipeline product is a gas, the compressibility of the gas might prevent the unit from inserting and retracting smoothly.

21. Once the lock collar is visible below the flange stop, close supply valve C to stop applying pressure to the insertion/retraction device (*Figure 2*).
22. As necessary, align the lock collar holes with the studs on the lower housing (*Figure 3*).
23. Once the lock collar holes are aligned with the studs on the lower housing, slowly open supply valve C to apply pressure to the insertion/retraction device (*Figure 2*).
24. Once the lock collar seats on the studs, return the hex nuts to the studs and tighten firmly (*Figure 3*).



DO NOT stop applying pressure to the insertion shaft until the lock collar has been secured to the lower housing.

25. Once the lock collar is secured to the lower housing, close insertion/retraction pressure outlet valve B (*Figure 3*).
26. Slowly open vent valve D to depressurize the insertion/retraction device (*Figure 2*).



Halt depressurization of the insertion/retraction device if the insertion shaft moves. Slight movement of the insertion shaft during depressurization indicates that the lock collar requires tightening; significant movement of the insertion shaft is an indication the lock collar needs to be reset.

27. Adjust the regulator so that no pressure is left in the insertion/retraction device.
28. Slightly loosen the flexline fitting at the regulator to relieve pressure in the flexline assembly (*Figure 2*).
29. Proceed to step 56 for instructions on removing the insertion/retraction device.

## 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® recommends the use of an auxiliary gas supply (e.g., clean, dry nitrogen gas) to prevent damage to the insertion/retraction device.



Welker® recommends adding a pressure gauge to the auxiliary gas supply so that the maximum allowable operating pressure of the insertion/retraction device is not exceeded.

30. Disconnect the flexline from insertion/retraction pressure outlet valve B and from the regulator inlet (*Figures 2 & 3*).
31. Connect a customer-supplied inert gas supply to the regulator inlet (*Figure 2*).
32. Set the regulator to the balanced pressure calculated using the provided equations (*Figure 7*).
33. Open the customer-supplied inert gas supply.
34. Open supply valve C (*Figure 2*).
35. Slowly increase the regulator pressure to a pressure greater than the balanced pressure. The insertion shaft should begin to insert into the pipeline.



If 200 psig is applied to the insertion/retraction device and the lock collar secured to the insertion shaft has not reached the studs on the lower housing, stop applying pressure. Bleed off all pressure in the insertion/retraction housing, and then contact Welker® for service options.



The compressibility of the inert gas might prevent the unit from inserting and retracting smoothly.

36. Once the lock collar is visible below the flange stop, close supply valve C to stop applying pressure to the insertion/retraction device (*Figure 2*).
37. As necessary, align the lock collar holes with the studs on the lower housing (*Figure 3*).
38. Once the lock collar holes are aligned with the studs on the lower housing, slowly open supply valve C to apply pressure to the insertion/retraction device (*Figure 2*).
39. Once the lock collar seats on the studs, return the hex nuts to the studs and tighten firmly (*Figure 3*).



**DO NOT** stop applying pressure to the insertion shaft until the lock collar has been secured to the lower housing.

40. Once the lock collar is secured to the lower housing, close supply valve C (*Figure 2*).
41. Close the customer-supplied inert gas supply, and then disconnect the inert gas supply from the regulator.
42. Slowly open vent valve D to depressurize the insertion/retraction device (*Figure 2*).



Halt depressurization of the insertion/retraction device if the insertion shaft moves. Slight movement of the insertion shaft during depressurization indicates that the lock collar requires tightening; significant movement of the insertion shaft is an indication the lock collar needs to be reset.

43. Adjust the regulator so that no pressure is left in the insertion/retraction device.
44. Proceed to step 56 for instructions on removing the insertion/retraction device.

## Using Hydraulic Fluid (Optional)



If using hydraulic fluid to insert and retract the insertion shaft, the customer must provide a way to drain hydraulic fluid from the insertion/retraction housing.



Welker® recommends adding a pressure gauge to the hydraulic supply so that the maximum allowable operating pressure of the insertion/retraction device is not exceeded.



Hydraulic fluid provides the smoothest insertion and retraction.

45. Disconnect the flexline from insertion/retraction pressure outlet valve B (*Figure 3*).
46. Disconnect the tubing from the insertion/retraction pressure inlet in the end cap of the insertion/retraction device (*Figure 2*).
47. Install a customer-supplied hydraulic supply to the insertion/retraction pressure inlet in the end cap of the insertion/retraction device (*Figure 2*).
48. Slowly open the hydraulic supply. The insertion shaft should begin to insert into the pipeline.
49. Once the lock collar is visible below the flange stop, close the customer-supplied hydraulic supply to stop applying pressure to the insertion/retraction device.
50. As necessary, align the lock collar holes with the studs on the lower housing (*Figure 3*).
51. Once the lock collar holes are aligned with the studs on the lower housing, slowly open the customer-supplied hydraulic supply to apply pressure to the insertion/retraction device.
52. Once the lock collar seats on the studs, return the hex nuts to the studs and tighten firmly (*Figure 3*).



DO NOT stop applying pressure to the insertion shaft until the lock collar has been secured to the lower housing.

53. Once the lock collar is secured to the lower housing, close the customer-supplied hydraulic supply.
54. Drain the hydraulic fluid from the insertion/retraction housing.
55. Disconnect the customer-supplied hydraulic supply from the insertion/retraction pressure inlet.

## Removing the Insertion/Retraction Device

56. Once the insertion/retraction device and flexline have been depressurized, the insertion/retraction device can be removed from the lower assembly.
57. As necessary, disconnect the flexline from insertion/retraction pressure outlet valve B (*Figure 3*).
58. Remove the nuts from the standoffs (*Figure 2*).
59. Carefully remove the bracket supporting the regulator subassembly and the insertion/retraction housing from the standoffs (*Figure 2*).
60. Unscrew the standoffs from the lower housing (*Figure 2*).



## Preparing the Unit for Operation

61. Return the valve handle to sample outlet valve A (*Figure 8*).
62. If the unit is equipped with the optional safety plate, follow these procedures to install the optional safety plate at this time: screw the safety standoffs into the lower housing and tighten firmly; fit the safety plate over the safety standoffs; install nuts to the safety standoffs and tighten firmly (*Figure 8*).
63. Install a customer-supplied 1/4" straight tube fitting to sample outlet valve A.

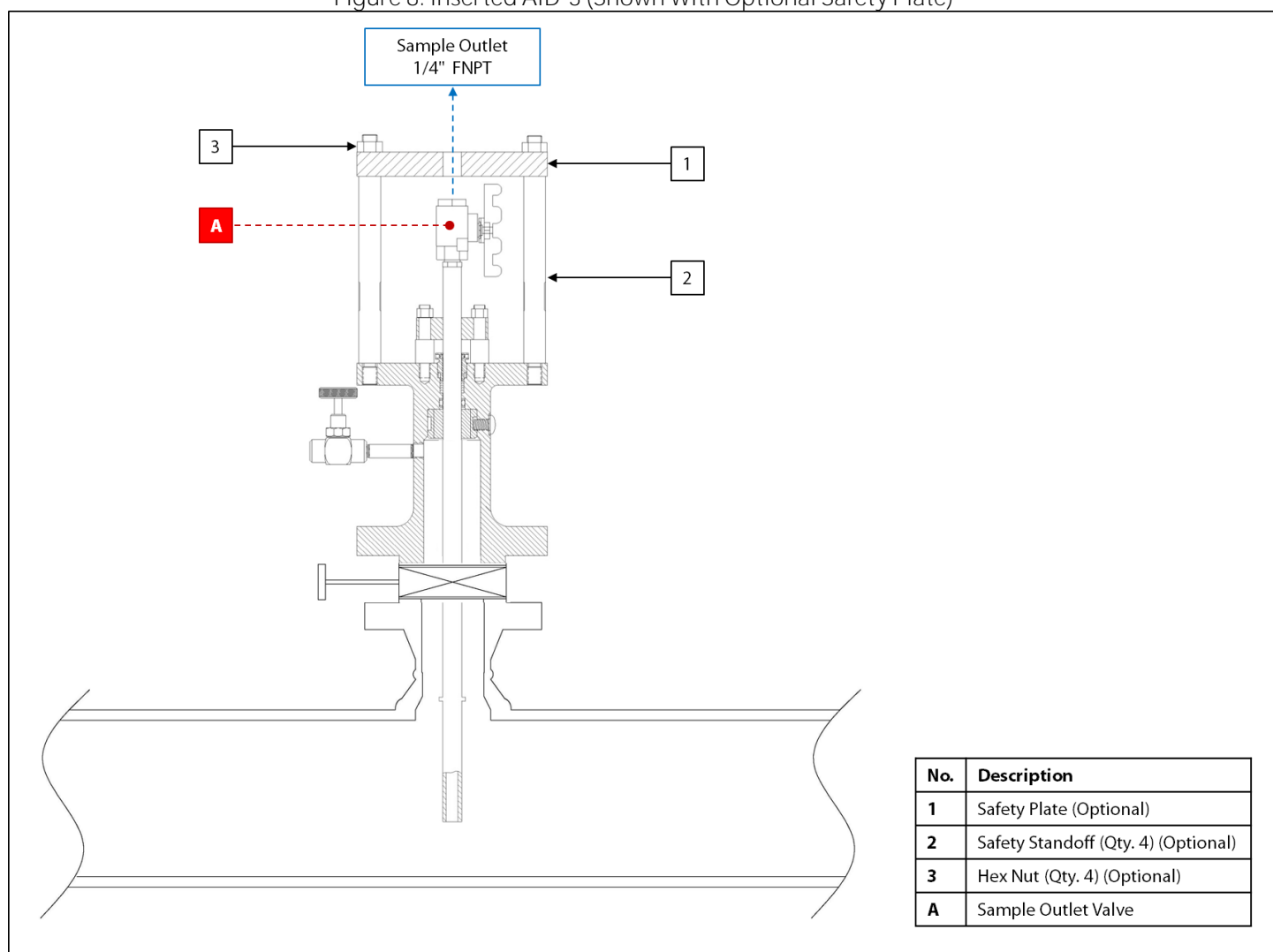


DO NOT hold fingers or hands between the sample outlet valve and the optional safety plate.



A 3/4" hole is centered in the optional safety plate to allow the customer to install 1/4" tubing from the sample outlet valve.

Figure 8: Inserted AID-3 (Shown With Optional Safety Plate)



## 2.4 Retracting the Unit

1. Close sample outlet valve A, and then disconnect any tubing attached to the valve (*Figure 8*).
2. Remove the handle from sample outlet valve A.

### Preparing the Unit for Retraction

3. If the unit is equipped with the optional safety plate, follow these procedures to remove the optional safety plate at this time: remove the nuts from the safety standoffs; remove the safety plate from the safety standoffs; and remove the safety standoffs from the lower housing (*Figure 8*).
4. Prepare the insertion/retraction device for installation. See *Section 2.2, Preparing for Installation*, for instructions on moving the insertion/retraction piston to the bottom of the insertion/retraction housing.
5. Install the insertion/retraction device. See *Section 2.3, Installing the Unit*, for instructions on installing the insertion/retraction device to the lower housing.

### Calculating the Balanced Pressure



The diameter of the insertion shaft, the current pipeline pressure, and the diameter of the insertion/retraction piston must be known in order to calculate the balanced pressure and determine the insertion and retraction pressure.

6. If pipeline product or an auxiliary gas will be used to retract the insertion shaft, use the provided equations to calculate the balanced pressure to help determine the approximate pressure required to retract the insertion shaft into the pressurized pipeline (*Figure 7*). If hydraulic fluid will be used to insert the insertion shaft, the balanced pressure does not need to be calculated.

### Retracting the Unit



DO NOT place any part of the human body directly over the probe shaft.



Keep hands clear of moving parts between the lower housing and insertion/retraction device.



If the unit will be retracted using pipeline product, continue to step 7.  
If the unit will be retracted using an auxiliary gas, proceed to step 14.  
If the unit will be retracted using hydraulic fluid, proceed to step 24.

### Using Pipeline Product

7. Once the balanced pressure has been calculated, set the regulator to a pressure slightly higher than the balanced pressure, and then open supply valve C to apply pressure to the insertion/retraction device (*Figure 2*).



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

8. Remove the hex nuts from the studs, and then slightly loosen the packing adjustment nut (*Figures 2 & 3*).

9. Close supply valve C, and then slightly open vent valve D (*Figure 2*). This relieves the pressure in the insertion/retraction device, allowing the insertion shaft to retract.



If the pipeline product is a gas, the compressibility of the gas might prevent the unit from inserting and retracting smoothly.

10. Once the insertion shaft is fully retracted, open vent valve D further to gradually depressurize the insertion/retraction device (*Figure 2*).
11. Adjust the regulator so that no pressure is left in the insertion/retraction device.
12. Close vent valve D, and then relieve pressure in the flexline assembly (*Figure 2*).
13. Proceed to step 32 for instructions on removing the insertion/retraction device.

#### 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® recommends the use of an auxiliary gas supply (e.g., clean, dry nitrogen gas) to prevent damage to the insertion/retraction device.



Welker® recommends adding a pressure gauge to the auxiliary gas supply so that the maximum allowable operating pressure of the insertion/retraction device is not exceeded.

14. Connect a customer-supplied inert gas supply to the regulator inlet (*Figure 2*).
15. Set the regulator to a pressure slightly higher than the balanced pressure calculated using the provided equations (*Figure 7*).
16. Open the customer-supplied inert gas supply.
17. Open supply valve C (*Figure 2*).



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

18. Remove the hex nuts from the studs, and then slightly loosen the packing adjustment nut (*Figures 2 & 3*).
19. Slowly decrease the regulator pressure. This allows the pressure in the insertion/retraction device to drop, thereby allowing the insertion shaft to retract.



The compressibility of the inert gas might prevent the unit from inserting and retracting smoothly.

20. Once the insertion shaft is fully retracted, close supply valve C, and then slightly open vent valve D (*Figure 2*). This relieves the pressure in the insertion/retraction device.
21. Close the customer-supplied inert gas supply, and then disconnect the inert gas supply from the regulator.
22. Adjust the regulator so that no pressure is left in the insertion/retraction device.
23. Proceed to step 32 for instructions on removing the insertion/retraction device.

## Using Hydraulic Fluid (Optional)



If using hydraulic fluid to insert and retract the insertion shaft, the customer must provide a way to drain hydraulic fluid from the insertion/retraction housing.



Welker® recommends adding a pressure gauge to the hydraulic supply so that the maximum allowable operating pressure of the insertion/retraction device is not exceeded.



Hydraulic fluid provides the smoothest insertion and retraction.

24. Ensure that the flexline is disconnected from pressure outlet valve B (*Figures 2 & 3*).
25. Ensure that the tubing from the insertion/retraction pressure inlet in the end cap of the insertion/retraction device has been disconnected (*Figure 2*).
26. Install a customer-supplied hydraulic supply to the insertion/retraction pressure inlet in the end cap of the insertion/retraction device (*Figure 2*).
27. Slowly open the customer-supplied hydraulic supply to apply pressure to the insertion/retraction device.



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

28. Remove the hex nuts from the studs, and then slightly loosen the packing adjustment nut (*Figures 2 & 3*).
29. Slowly drain the hydraulic fluid from the insertion/retraction housing. This allows pressure in the insertion/retraction device to drop, thereby allowing the insertion shaft to retract.
30. Once the insertion shaft is fully retracted, close the customer-supplied hydraulic supply.
31. Disconnect the customer-supplied hydraulic supply from the insertion/retraction pressure inlet (*Figure 2*).

## Removing the Insertion/Retraction Device

32. Once the insertion/retraction device and flexline have been depressurized, the insertion/retraction device can be removed from the lower assembly.
33. As necessary, disconnect the flexline from insertion/retraction pressure outlet valve B (*Figures 2 & 3*).
34. Remove the nuts from the standoffs (*Figure 2*).
35. Carefully remove the bracket supporting the regulator subassembly and the insertion/retraction housing from the standoffs (*Figure 2*).
36. Unscrew the standoffs from the lower housing (*Figure 2*).
37. Close the pipeline isolation valve.
38. The unit may now be removed from the pipeline for maintenance or for transport to another location.

## SECTION 3: MAINTENANCE

### 3.1 Before You Begin

1. Maintenance is necessary if a leak occurs at the packing adjustment nut.
2. 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 might lead to excess wear on the unit, a more frequent maintenance schedule might be appropriate.
3. 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. This eases the installation of the seals and reduces the risk of damage when positioning them on parts. Welker® recommends non-hydrocarbon-based lubricants, such as Krytox®, for use with all sample cylinder seals and silicone-based lubricants, such as Molykote® 111, for use with seals not exposed to the sample product.



Wipe excess lubricant from the seals, as it might adversely affect analytical instrument results.



After the seals are installed, the outer diameter of shafts and inner diameter of cylinders may be lubricated to allow smooth transition of parts.

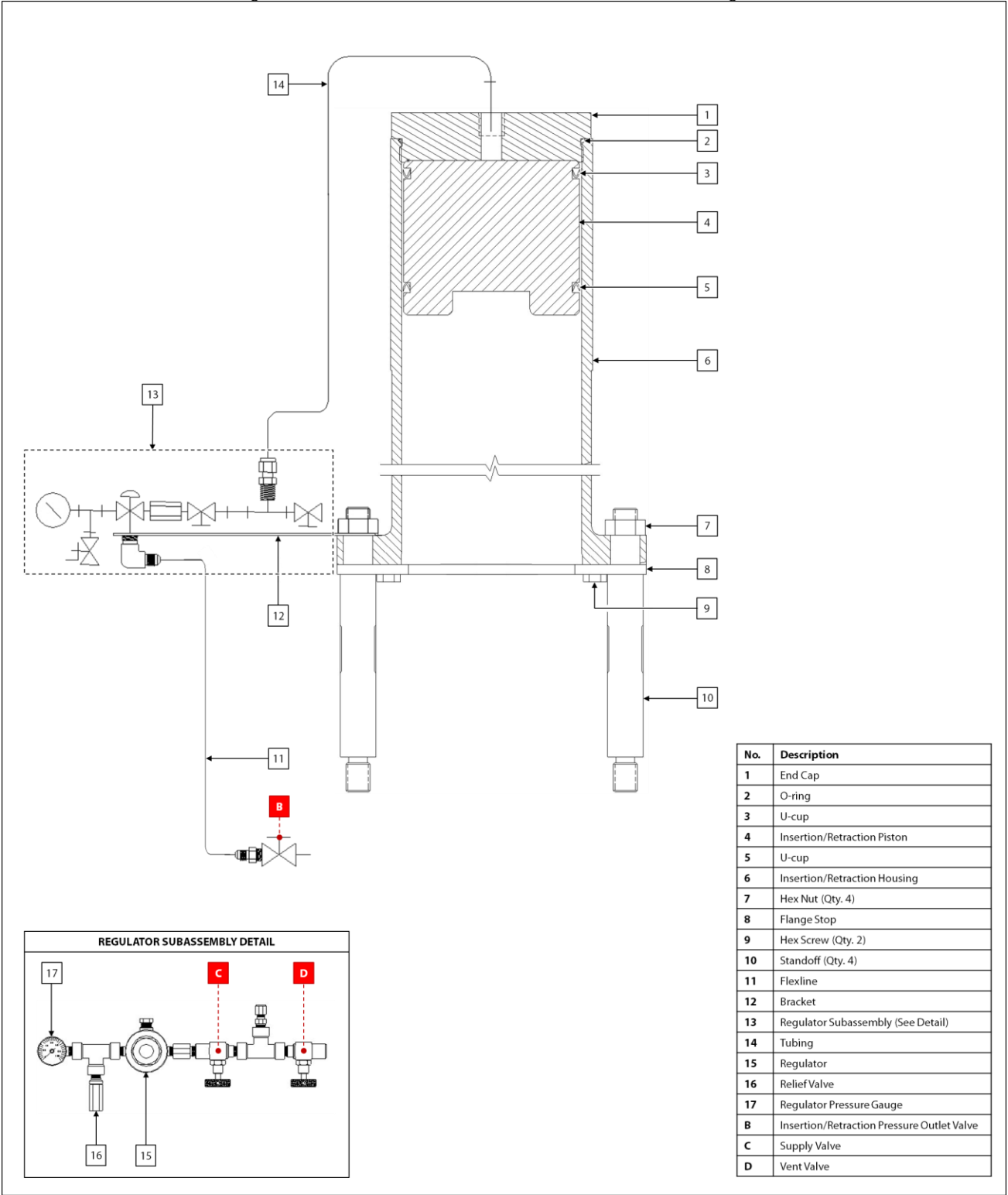
4. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.

3.2 Maintenance

1. Prior to performing maintenance, the AID-3 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.

Insertion/Retraction Device

Figure 9: Insertion/Retraction Device Maintenance Diagram



## Removing the Insertion/Retraction Piston

2. Lay the insertion/retraction device on its side.
3. Remove the hex screws from the bottom of the flange stop.
4. Remove the insertion/retraction piston from the bottom of the insertion/retraction housing. The piston may be moved manually or by using auxiliary pressure.



To move the insertion/retraction piston manually, continue to step 5.  
To move the insertion/retraction piston using auxiliary pressure, proceed to step 7.

### Manually

5. Slowly push the insertion shaft down and out through the bottom of the insertion/retraction housing.



As needed, use a clean wooden dowel or PVC pipe to gently push the piston down. DO NOT use metal objects, as they may scratch and damage the unit.

6. Proceed to step 11 to continue maintenance on the insertion/retraction device.

### Using Auxiliary Pressure



DO NOT exceed the maximum allowable operating pressure of the insertion/retraction device.



Welker® recommends using nitrogen as the inert gas supply.

7. Connect a customer-supplied auxiliary pressure supply to the insertion/retraction pressure inlet in the end cap of the insertion/retraction housing.
8. Open the outlet valve on the customer-supplied auxiliary pressure supply and apply 1-3 psig of pressure to the top of the insertion/retraction piston to slowly push the insertion/retraction piston down and out through the bottom of the insertion/retraction housing.
9. Once the insertion/retraction piston has been removed from the insertion/retraction housing, stop applying auxiliary pressure.
10. Disconnect the auxiliary pressure supply from the end cap.

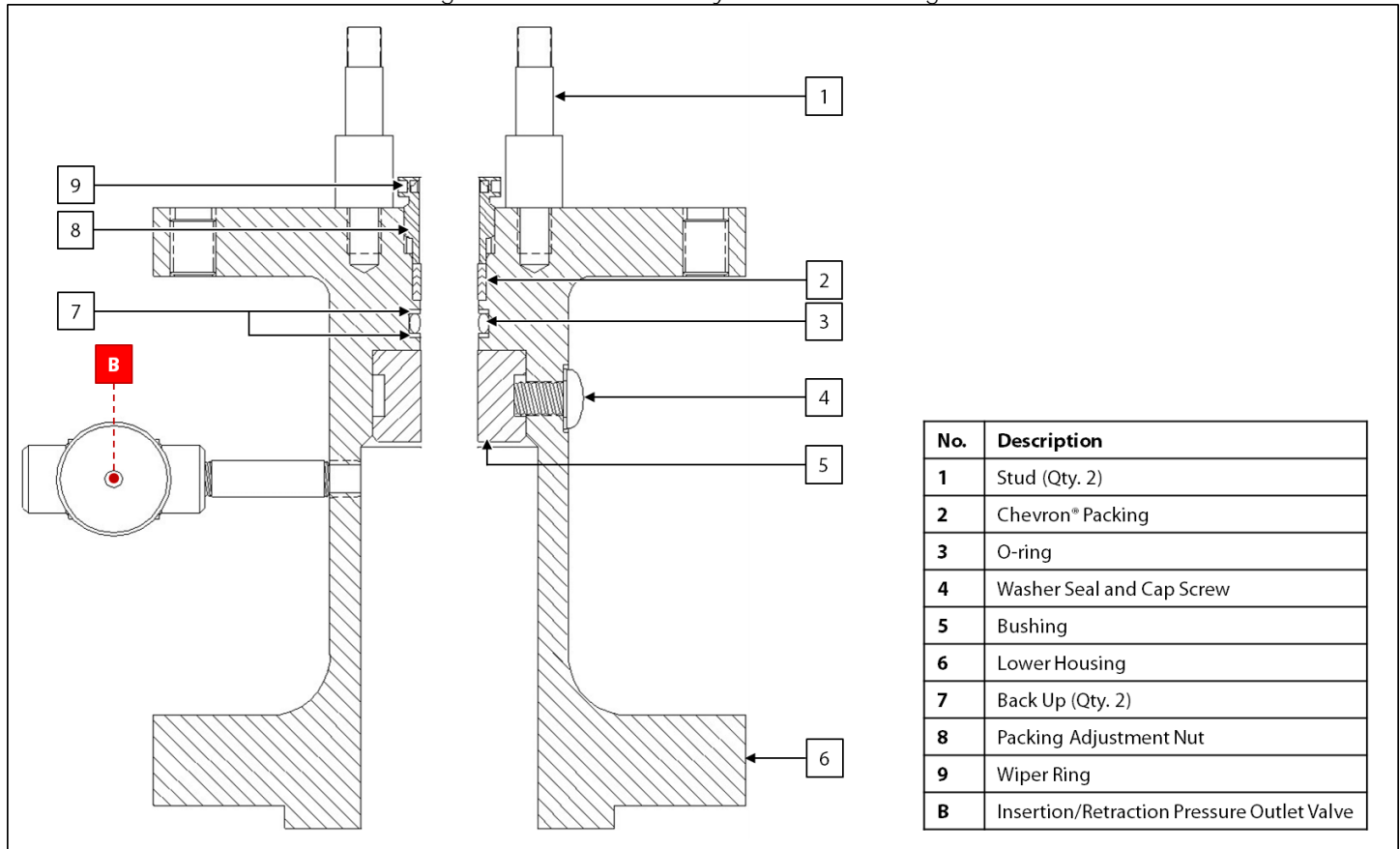
## Maintaining the Insertion/Retraction Device

11. Replace the seals on the insertion/retraction piston.
12. Remove the insertion/retraction device end cap and replace the O-ring.
13. Slowly insert the insertion/retraction piston through the top of the insertion/retraction device.
14. Return the insertion/retraction device end cap to the insertion/retraction housing.
15. Return the flange stop to the base of the insertion/retraction housing and secure in place using the hex screws.
16. To perform maintenance on the regulator subassembly, refer to the *Installation, Operation, and Maintenance (IOM) Manuals* for the regulator, relief, and valves.



If a leak occurs at the packing adjustment nut, the lower assembly requires maintenance.

Figure 10: Lower Assembly Maintenance Diagram



17. Lay the lower assembly on its side.
18. Remove the packing adjustment nut from the lower housing.
19. Remove outlet valve A from the top of the insertion shaft (*Figure 4*).
20. Loosen the lock collar cap screws and carefully slide the lock collar up and off the insertion shaft (*Figure 4*).
21. Slowly pull the insertion shaft out through the lower housing, taking care not to scratch the shaft.
22. Remove the Chevron® packing, O-ring, and back ups from the lower housing.
23. Inspect the bushing for damage or wear. Replace as necessary.
24. Clean the inner diameter of the lower housing, and then inspect for damage. If the lower housing shows signs of damage, contact Welker® for service options.
25. Install new back ups and a new O-ring to the lower housing.
26. **Install new Chevron® packing to the lower housing so that the "V" is open to the direction of sample flow.**
27. Inspect the wiper ring on the packing adjustment nut. Replace it if it shows signs of wear or damage.
28. Screw the packing adjustment nut into the lower housing. Slightly tighten the packing adjustment nut to allow for easy insertion of the insertion shaft through the lower housing during reassembly.



## Insertion Shaft

29. Inspect the insertion shaft for scratches or damage. If scratches or damage are present, repair or replace as necessary.
30. Carefully insert the insertion shaft through the bottom of the lower housing, taking care not to scratch the shaft.
31. Once the insertion shaft has been inserted, tighten the packing adjustment nut.
32. The unit is now ready for installation. See *Section 2.2, Preparing 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.

## Referenced or Attached Documents

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

- IOM-033: Welker® RV-1, RV-2, RV-2CP, and RV-3 Relief Valves
- IOM-105: Welker® NV-1 and NV-2 Instrument Valves

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

- Apollo Valves 76-100 Series Ball Valves (Welker® IOM-V141)
- Norgren® R83 Pressure Regulator (Welker® IOM-V014)
- Parker Fluoropolymer Hose (Welker® IOM-V174)
- Swagelok® D Series Nonrotating-Stem Needle Valves (Welker® IOM-V214)
- WIKA Type 232.53 and Type 233.53 Bourdon Tube Pressure Gauges (Welker® IOM-V171)

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

- Assembly Drawing: AD603CK (2" – 600 ANSI RF Lower Housing)



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