



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER INFLOW™ ACE CRUDE OIL SAMPLER
FIXED INSERTION

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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 inFlow™ ACE Crude Oil Sampler. 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 inFlow™ ACE Crude Oil Sampler 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 inFlow™ ACE Crude Oil Sampler, 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 may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker *inFlow™ ACE* Crude Oil Sampler is a direct-mount isokinetic probe sampler designed to extract a representative sample of liquid product from the flowing stream. Once all desired samples have been collected, the *inFlow™ ACE* can be fully evacuated of internal sample volume using the purge tube, thus preparing the sampler for the next sample batch.

Sampling may be hydraulically or pneumatically operated but is electronically controlled from a Programmable Logic Controller (PLC) or other signal control system. Sampling may be timed or proportional to flow.

With protection from an external sand relief and check and relief valves designed for sandy oils, this sampler is capable of sampling product containing sand or debris. For added safety, the *inFlow™ ACE* is equipped with a dustcover, shaft wipers to protect seals, and an adjustable V-ring packing for emergency shutdown leak protection.

Designed with ease of use in mind, the external sample volume adjustment simplifies operation of the *inFlow™ ACE* even further. The external adjustment allows the operator to adjust the sample volume without having to remove the *inFlow™ ACE* from the pipeline.



For this manual, the term "PLC," or Programmable Logic Controller, will be used to refer to the PLC, DCS, or other signal control system used by the customer to activate and operate the solenoid.

Welker may custom design the inFlow™ ACE to suit the particular application and specifications of each customer.

1.3 Important Information

1. The lubrication port should remain plugged at all times except when performing maintenance on a sampler that has been isolated from pipeline pressure and/or removed from the pipeline.
2. Prior to injecting Welker Great Barrier Sealant™ into the lubrication port, the plug must be removed and an appropriately sized grease fitting installed.
3. After Welker Great Barrier Sealant™ has been injected into the lubrication port, the grease fitting must be removed and the plug reinstalled before the sampler can be exposed to pipeline pressure and returned to operation.



Failure to remove the grease fitting and return the plug to the lubrication port prior to exposing the sampler to pipeline pressure could result in a product leak and/or injury to the operator.

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: inFlow™ ACE Specifications

Products Sampled	Condensate, Crude Oil, Liquid Products Compatible With the Materials of Construction, Refined Hydrocarbons, and Water
Materials of Construction	316/316L Stainless Steel Wetted Parts, Carbon Steel Lubricator Body and Non-Wetted Parts, PTFE, Kalrez® Wetted Seals, and Buna and Viton® Non-Wetted Seals Others Available
Maximum Allowable Operating Pressure	150 ANSI Carbon Steel: 285 psig @ -20 °F to 100 °F (19 barg @ -28 °C to 37 °C) 300 ANSI Carbon Steel: 740 psig @ -20 °F to 100 °F (51 barg @ -28 °C to 37 °C) 600 ANSI Carbon Steel: 1480 psig @ -20 °F to 100 °F (102 barg @ -28 °C to 37 °C)
Pipeline Connection	Size: 1" or 2" Rating: 150, 300, or 600 ANSI RF
Sample Outlet Connection	¼" FNPT
Motor Housing Actuation Ports	½" FNPT ⅜" FNPT (Standard)
Utility Requirements	Hydraulic or Pneumatic Supply for Motor Operation: 100–150 psig (6–10 barg) Inert Gas Supply for Purge Operation: ¼" FNPT Connection
Sample Volume	D-Style Collection Head: 0.5–10 cc
Features	External Adjustment External Sand Relief Purge Tube V-ring Packing
Options	Pipeline Spool With Mixer NACE Compliance

1.5 Equipment Diagrams

Figure 1: inFlow™ ACE Diagram

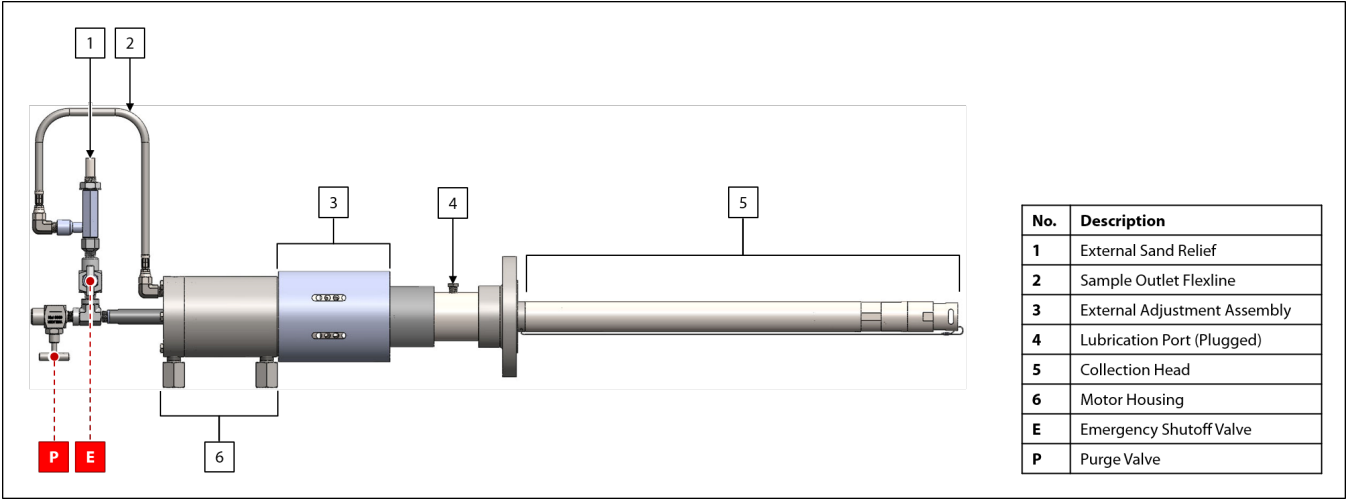
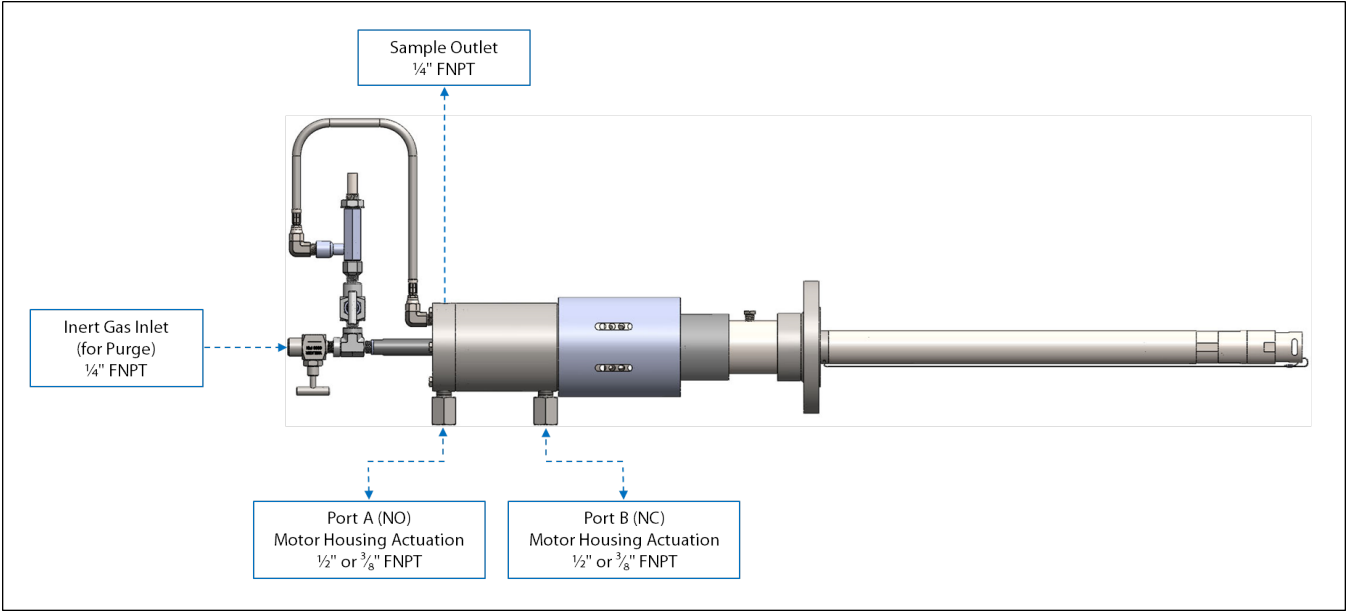


Figure 2: inFlow™ ACE Connections Diagram



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.

1. Welker recommends that the unit be installed to the side of 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. Locate the unit at least two to four pipe diameters downstream of an inline static mixer or other flow conditioning system.
3. Handle the unit with care.

2.2 Installing the Unit



The pipeline must be depressurized prior to installing and removing the unit.

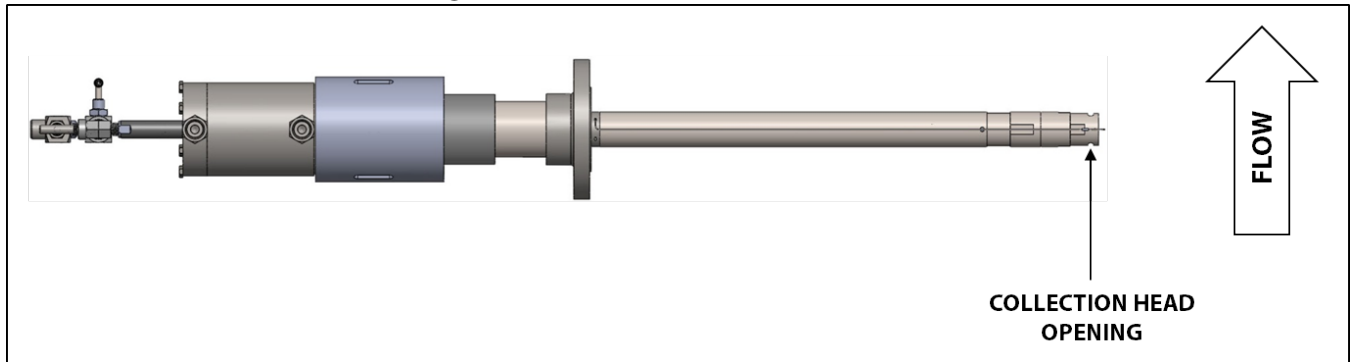
1. Close all valves on the inFlow™ ACE.
2. Using a felt tip pen, mark the location of the opening in the hanger on the motor housing.



Once the unit is installed to the pipeline, the mark on the motor housing will be an external reference point to the collection head opening.

3. Determine the direction of product flow in the pipeline.
4. Install the inFlow™ ACE to the pipeline so that the opening in the collection head faces the direction of product flow, as this allows the flowing stream to pass through the opening (*Figure 3*). As necessary, refer to the mark on the motor housing to ensure the inFlow™ ACE is installed correctly.

Figure 3: Correct inFlow™ ACE Installation



5. Secure the inFlow™ ACE to the pipeline.
6. Using ¼" tubing, connect from the sample outlet to an appropriate customer-supplied sample container, such as a Welker TCC Transportable Crude Oil Container.



Customer-supplied ¼" tubing must slope downward from the inFlow™ ACE to the sample container.

7. Use appropriately sized tubing to connect from the normally open port on the solenoid to port A on the motor housing (Figure 2). Use appropriately sized tubing to connect from the normally closed port on the solenoid to port B on the motor housing (Figure 2).



The normally open port should be stamped "A" or "NO."
The normally closed port should be stamped "B" or "NC."

8. Pressurize the pipeline.
9. Open emergency shutoff valve E (Figure 1).
10. Adjust the external sand relief. With emergency shutoff valve E open, loosen the jam nut, tighten the adjusting screw on the external sand relief until no product emerges from the outlet, and then tighten the jam nut as a locking device (Figure 10).



After the external sand relief valve has been set, emergency shutoff valve E must remain open during sampling. For more information about emergency shutoff valve E, see Section 2.6, *Emergency Shutoff*.



The external sand relief comes factory-set by the manufacturer if requested at the time of order.

2.3 Setting the Sample Volume

- 1. To set or adjust the sample volume, locate the external adjustment assembly, and then slide the dustcover down to expose the external adjustment chamber (Figure 4).



Setting the sample volume is accomplished by:

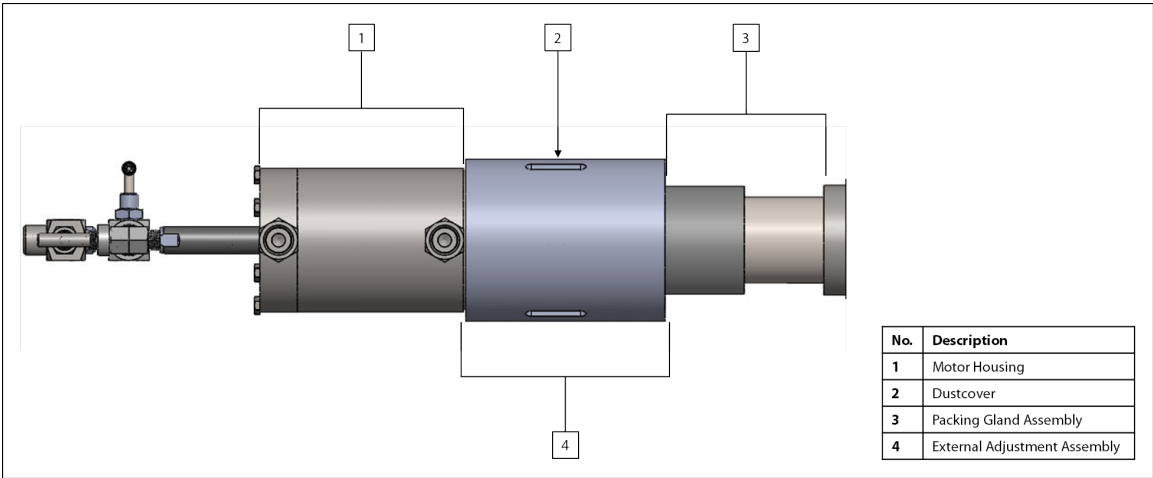
- determining where the adjustment pin will need to be placed to attain the desired sample volume,
- rotating the upper external adjustment ring in relation to the adjustment pin setting to attain the desired sample volume, and
- installing the adjustment pin to the predetermined slot.

The sample volume is determined by the distance between the upper external adjustment ring and the adjustment pin.



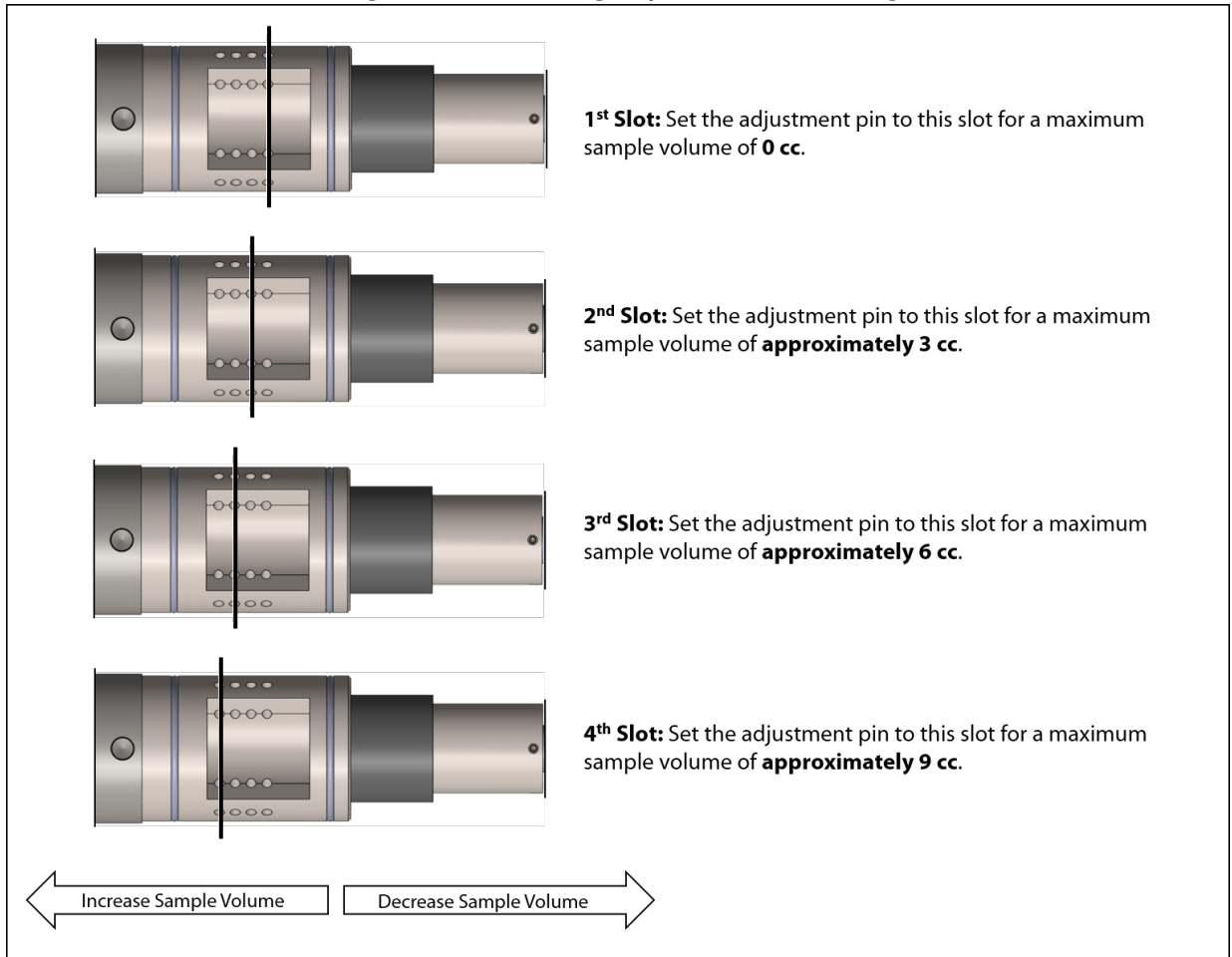
Once the desired volume is set, the sample volume can be changed at any time externally without removing the inFlow™ ACE from the pipeline.

Figure 4: Upper Housing Diagram



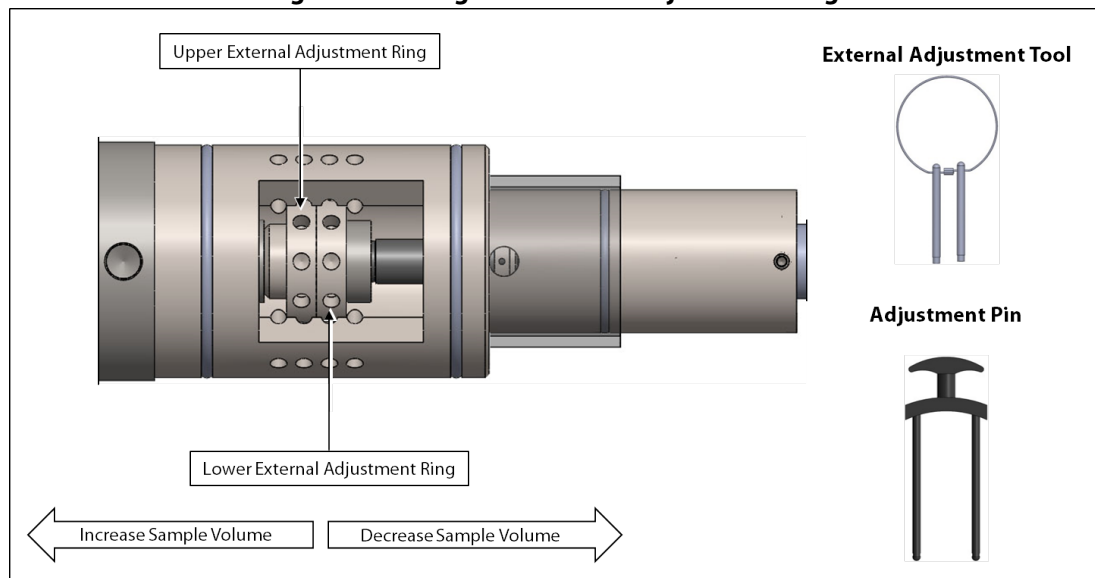
- 2. Determine to which slot the adjustment pin will be installed after the external adjustment rings have been set (Figure 5).

Figure 5: Determining Adjustment Pin Setting



3. Begin with the lower external adjustment ring at the bottom of the external adjustment chamber and the upper external adjustment ring tightened down on top of it (*Figure 6*).

Figure 6: Setting the External Adjustment Rings





Welker recommends using a felt tip pen to mark the front of both external adjustment rings so that it is clear when the adjustment rings have made a full rotation.

4. Using the provided external adjustment tool, turn the upper external adjustment ring to the desired volume (*Figure 6*).



One full rotation of the upper external adjustment ring is approximately 1 cc if the inFlow™ ACE is equipped with the D-Style collection head. Each hole in the upper external adjustment ring is equal to approximately 0.10 cc.

5. Turn the lower external adjustment ring until it meets the upper external adjustment ring. Tighten firmly to prevent slippage that might lead to inconsistencies in sample volume.



The lower external adjustment ring and O-ring are used to lock the upper external adjustment ring in place to prevent slippage and subsequent changes in the sample volume during sampling.

6. Slide the dustcover up to cover the external adjustment chamber (*Figure 4*).
7. Install the adjustment pin through the dustcover to the appropriate slot.
8. Turn ON and actuate the hydraulic or pneumatic supply to collect a sample from the sample outlet to ensure that the sample volume collected is the same as the desired sample volume.



Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for use with this unit.

9. As necessary, repeat steps 1–8 to further adjust the sample volume.

2.4 Operating the Unit

- 1. Turn ON the hydraulic or pneumatic supply.
- 2. As necessary, adjust the hydraulic or pneumatic supply to 100 psig.
- 3. Set the timer or controller to actuate the solenoid at the desired sampling actuation frequency based on the sampling equations provided (Figure 7).

Figure 7: Sampling Frequency Equations

Liquid Sampling, Proportional to Flow Collection
<p>Equation 1: Number of Samples Needed</p> $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Container Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$
<p>Equation 2: Proportional-to-Flow</p> $\text{Volume of Flow Between Sample Grabs} = \frac{\text{Batch Size (Total Volume to be Sampled)}}{\text{Number of Samples Needed (Eq. 1)}}$
<p>Use Equation 1 to determine the number of actuations needed. Use Equation 2 to determine how often (after what volume of flow) to take each sample.</p>
Liquid Sampling, Timed Collection
<p>Equation 1: Number of Samples Needed</p> $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Container Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$
<p>Equation 2: Timed Sampling</p> $\text{Time Between Sample Grabs} = \frac{\text{Total Time in Sample Period}}{\text{Number of Samples Needed (Eq. 1)}}$
<p>Use Equation 1 to determine the number of actuations needed. Use Equation 2 to determine how often (after what amount of time) to take each sample.</p>



Never fill the container above 80% of its capacity. Allow at least 20% room for product expansion should the container be exposed to increased temperatures.



Note the 0.8 in Equation 1 represents the 80% volume limit for liquid sampling.

- 4. Ensure that emergency shutoff valve E is open (Figure 1).
- 5. As necessary, turn on electrical power and activate the hydraulic or pneumatic supply to actuate the solenoid at the set sampling frequency.



At start-up, several actuations may be required to displace trapped air and fill the insertion shaft with product before sample appears at the outlet port.

6. Collect a sample from the sample outlet to ensure that the sample volume collected is the same as the desired sample volume.



Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for use with this unit.

2.5 Purging the Unit



The purge tube allows the sampler to be completely evacuated of sample from the inlet to the sample container. Automated purging can be achieved with the Welker PNP Plug & Purge Panel.



To prevent cross-contamination between samples, Welker recommends that the inFlow™ ACE be evacuated, or purged, following each sample batch to inject all sampled product remaining in the unit into the sample container.

1. Connect an appropriate customer-supplied nitrogen or other inert gas supply to purge valve P (*Figure 1*).



Welker recommends using nitrogen or helium as the inert gas supply.

2. Set the inert gas supply pressure to approximately 50 psig above the external relief on the inFlow™ ACE.



Prior to purging the unit, ensure that the purge pressure (i.e., the purge setting minus the external adjustable relief setting) does not exceed the pressure rating of the sample container.

3. Turn ON the inert gas supply.
4. Open purge valve P (*Figure 1*).
5. Allow product in the inFlow™ ACE to drain. Monitor the sample container for under- or over-purging.



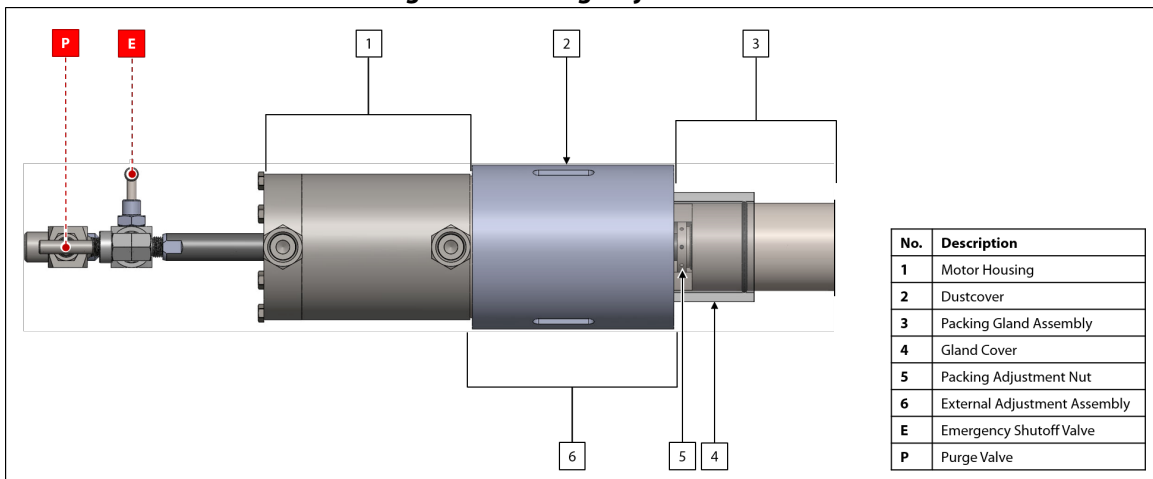
If no inert gas is heard entering the sample container, the purge pressure has been set too low and previous product remains in the sampler.

If more than a burst of inert gas is heard entering the sample container, the purge pressure has been set too high and the operator risks overpressurizing the sample container.

6. Turn off the inert gas supply.
7. Close purge valve P (*Figure 1*).
8. Disconnect the inert gas supply from purge valve P (*Figure 1*).

2.6 Emergency Shutoff

Figure 8: Packing Adjustment Nut



1. If sample begins to free flow from the sample outlet, turn OFF the hydraulic or pneumatic supply to the motor, and then close emergency shutoff valve E.



DO NOT operate the pump after emergency shutoff valve E is closed. Operating the pump while emergency shutoff valve E is closed may damage the pump.



Free flow from the sample outlet indicates that the external adjustable relief has not been set correctly or that the external adjustable relief has failed.

2. If leaking becomes evident elsewhere on the inFlow™ ACE, turn OFF the hydraulic or pneumatic supply to the motor, and then tighten the packing adjustment nut to stop the leak until the unit can be removed for service.

2.7 Removing the Unit

1. Ensure that the inFlow™ ACE has been purged. See *Section 2.5, Purging the Unit*, for instructions on properly purging the inFlow™ ACE.
2. Deactivate or turn OFF the hydraulic or pneumatic supply.
3. Depressurize, drain, and disconnect the hydraulic or pneumatic supply lines.
4. Close emergency shutoff valve E (*Figure 1*).
5. Disconnect the sample container from the sample outlet.
6. Depressurize the pipeline.



The pipeline must be depressurized prior to installing and removing the unit.

7. The unit is now ready to be removed from the pipeline for maintenance or to be relocated.

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 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. Adjustable Wrench (Qty. 2)
 - b. Channel Lock Pliers
 - c. Hex Key Set
 - d. Seal Pick
 - e. Snap Ring Pliers
 - f. Welker Great Barrier Sealant™

3.2 Maintenance

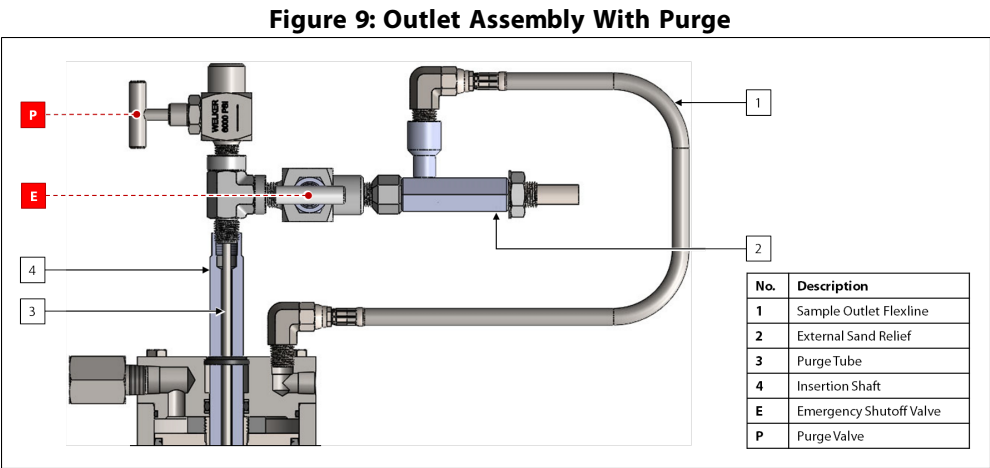
- 1. Prior to performing maintenance, the inFlow™ ACE must be removed from the pipeline. See *Section 2.7, Removing the Unit*, for instructions on removing the unit from the pipeline.
- 2. Relieve any trapped pressure by loosening the jam nut and turning the adjusting screw on the external sand relief counterclockwise and opening purge valve P (*Figure 9* and *Figure 10*).
- 3. Lay the inFlow™ ACE on a smooth, clean surface

Collection Head Assembly

- 4. As necessary, cut the safety wire from the relief cap to the lubricator body, and then remove the safety wire.
- 5. Unscrew and remove the collection head assembly from the lubricator body.
- 6. Refer to *Appendix B, D-Style Collection Head Maintenance*, for instructions on performing maintenance on the collection head.

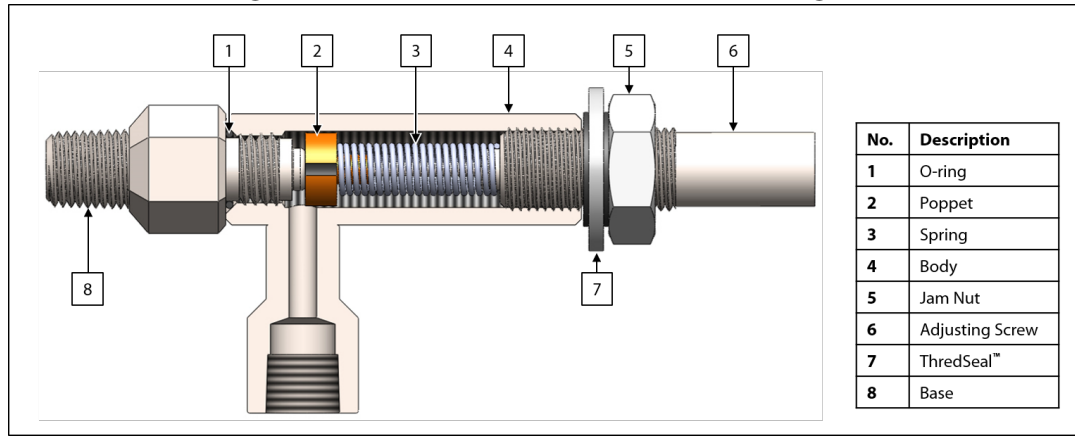
Purge Assembly

- 7. Unscrew the sample outlet flexline from the elbow above the sample outlet (*Figure 9*).



- 8. Unscrew the purge assembly at the tee connecting it to the insertion shaft. Note that the long purge tube is attached to the purge assembly and will be removed at this time. Take care not to bend or otherwise damage the purge tube.
- 9. Unscrew the external sand relief from emergency shutoff valve E.
- 10. Unscrew the flexline from the elbow in the external sand relief.
- 11. Unscrew the base of the external sand relief from the body (*Figure 10*).

Figure 10: External Sand Relief Maintenance Diagram

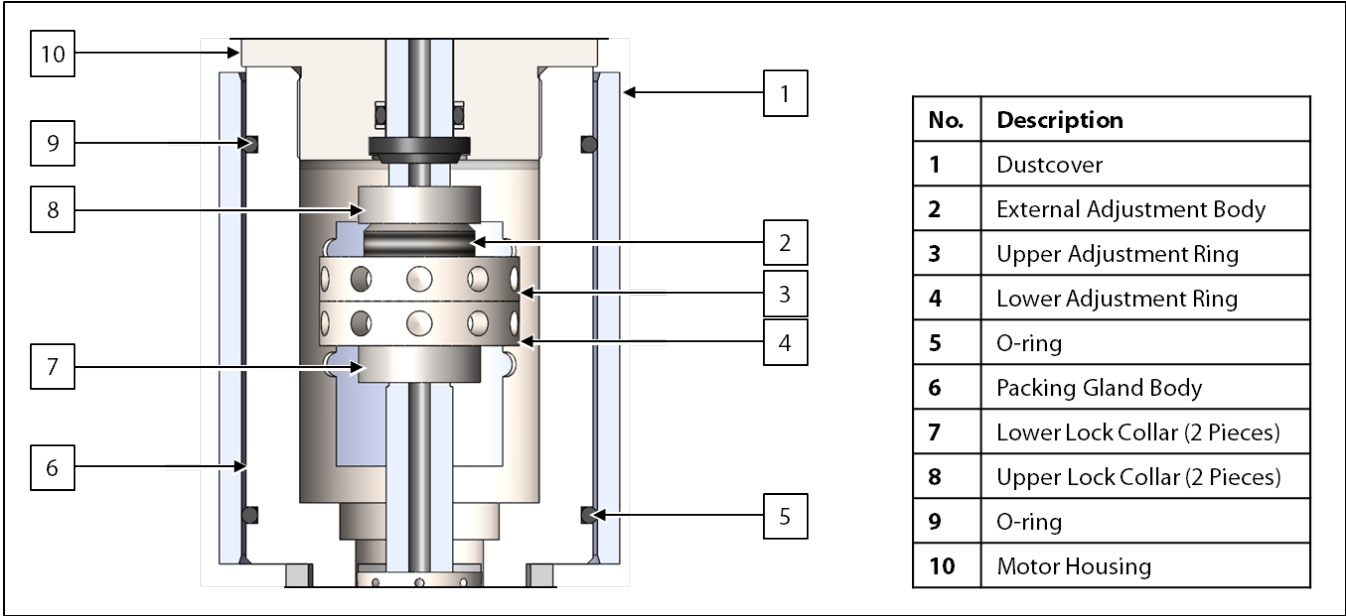


12. Replace the O-ring on the base.
13. Unscrew the jam nut from the adjusting screw.
14. Inspect the poppet for scratches or other damage. If scratches or other damage are present on the poppet (face) seat, replace the poppet.
15. Reassemble the external sand relief.
16. Screw the external sand relief into emergency shutoff valve E (*Figure 9*).
17. Screw the flexline into the elbow in the external sand relief (*Figure 9*).

Disassembling the Upper Housing

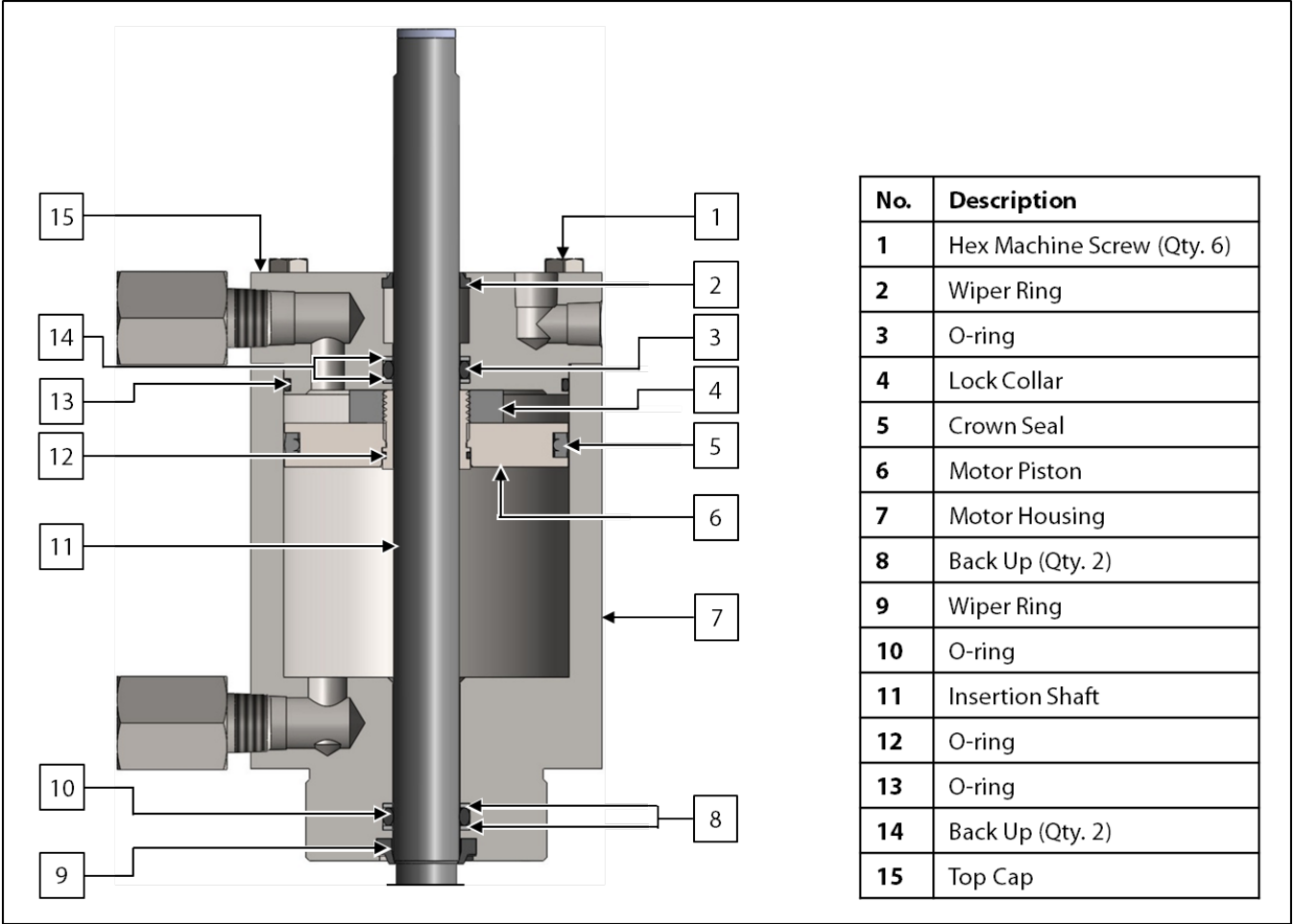
- 18. Unscrew the machine screws from the top cap and carefully remove the top cap from the motor housing (*Figure 12*).
- 19. Unscrew the packing gland assembly from the lubricator body.
- 20. Unscrew the packing gland body from the motor housing, and then carefully remove the packing gland body from the insertion shaft. Take care not to scratch or otherwise damage the insertion shaft assembly.
- 21. Loosen the setscrews in the upper and lower lock collars on the external adjustment body, and then remove the lock collars from the insertion shaft assembly (*Figure 11*). Take care not to misplace the pins that align the lock collars with the external adjustment body.

Figure 11: External Adjustment Assembly



- 22. Carefully slide the external adjustment body off the insertion shaft. Take care not to scratch or otherwise damage the insertion shaft assembly.
- 23. Carefully pull the insertion shaft out through the motor housing.

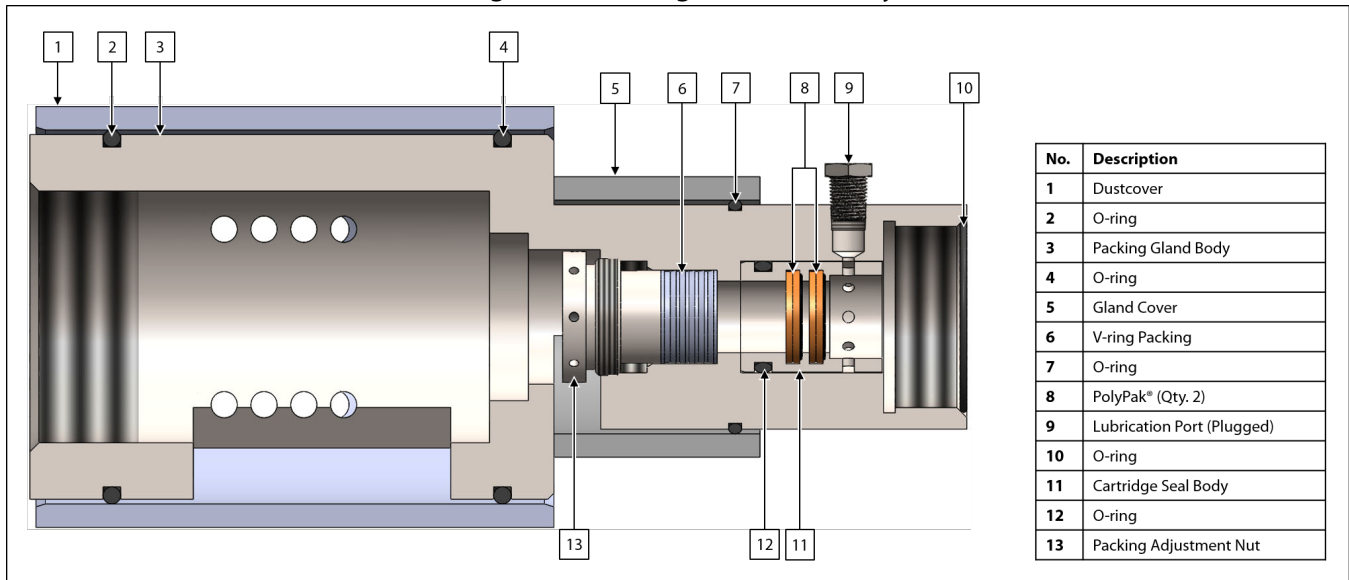
Figure 12: Motor Housing Assembly



- 24. Replace the O-rings and back ups on the top cap.
- 25. Inspect the wiper ring in the top cap. Replace it if it shows signs of wear or damage.
- 26. Replace the O-ring and crown seal on the piston.
- 27. Replace the O-ring and back ups in the motor housing.
- 28. Inspect the wiper ring in the motor housing. Replace it if it shows signs of wear or damage.
- 29. Inspect the polished portion of the insertion shaft. If any scratches or damage are present, repair or replace as necessary.

Packing Gland Body

Figure 13: Packing Gland Assembly



30. Replace the O-rings on the packing gland body.
31. Remove the plug from the lubrication port, and then slide the gland cover off the packing gland body.
32. Unscrew the packing adjustment nut from the packing gland body.
33. Inspect the wiper ring in the packing adjustment nut. Replace it if it shows signs of wear or damage.
34. Replace the V-ring packing in the packing gland body. The V-ring packing should be installed so that the "V" is open to the product pressure.
35. Remove the cartridge seal body from the packing gland body.
36. Install a replacement cartridge seal body to the packing gland body.
37. Screw the packing adjustment nut into the packing gland body.
38. Replace the O-ring in the packing gland body.

Reassembling the Upper Housing

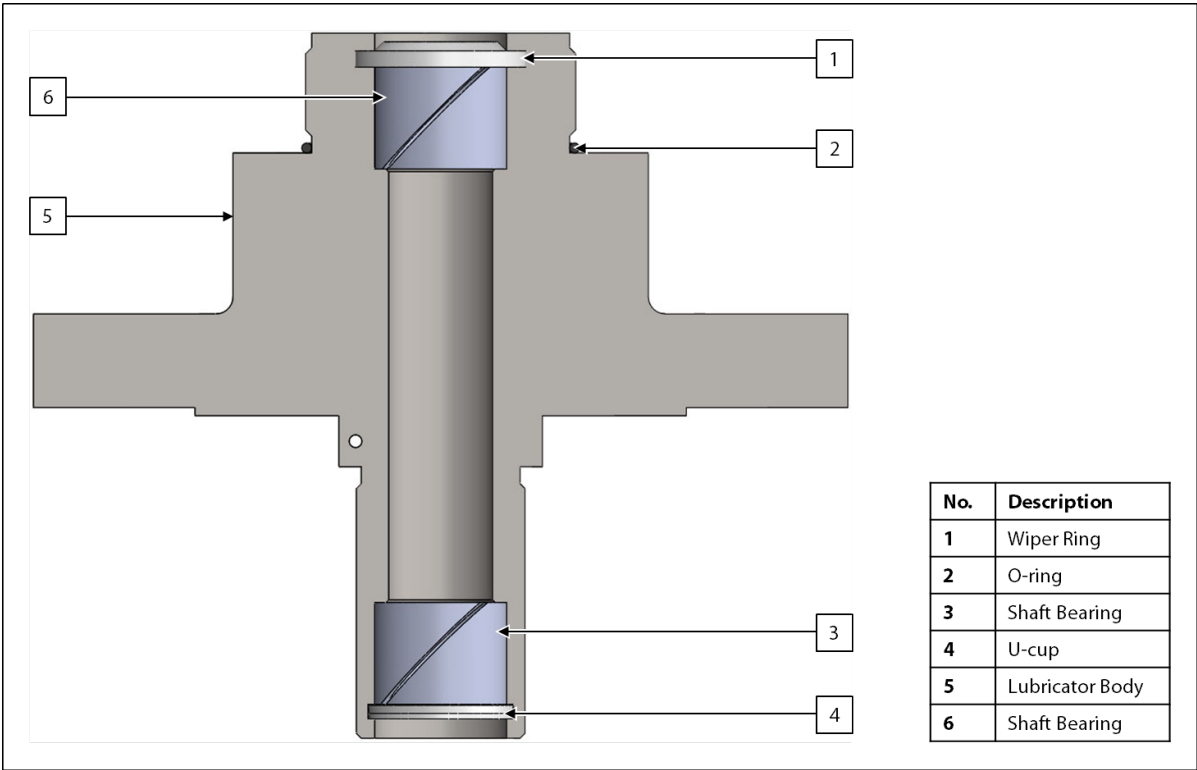
39. Carefully slide the external adjustment body onto the insertion shaft. The lock collar grooves in the insertion shaft should be accessible on both sides of the external adjustment body.
40. Install the lower lock collar to the groove below the external adjustment body and align the pin hole in the lock collar with the pin in the external adjustment body.



The lower lock collar must be installed to the insertion shaft assembly before the upper lock collar.

41. Install the upper lock collar to the groove above the external adjustment body and align the pin hole in the lock collar with the pin in the external adjustment body.
42. Tighten the setscrews in the upper and lower lock collars to secure the adjustment assembly to the insertion shaft.
43. Carefully insert the insertion shaft assembly through the packing gland body, taking care not to scratch the shaft.
44. Slide the gland cover onto the packing gland body, and then return the plug to the lubrication port.
45. Slide the dustcover onto the packing gland body.
46. Carefully slide the motor housing onto the insertion shaft, taking care not to scratch the shaft.
47. Carefully screw the motor housing into the packing gland body.
48. Return the top cap to the top of the insertion shaft and carefully slide the top cap down to the motor housing.
49. Bolt the top cap in place.
50. Set the upper housing and insertion shaft assembly aside.

Figure 14: Lubricator Body Detail



- 51. Replace the O-ring on the lubricator body.
- 52. Inspect the wiper ring and shaft bearings. Replace them if they show signs of wear or damage.
- 53. Replace the U-cup. The U-cup should be installed so that the "U" is open to the product pressure.

Reassembly

- 54. With the upper housing assembly attached to the insertion shaft, insert the insertion shaft through the lubricator body.
- 55. Screw the packing gland body onto the lubricator body.
- 56. Insert the purge tube into the insertion shaft, and then screw the purge assembly into the insertion shaft.
- 57. Reconnect the flexline at the sample outlet.
- 58. Remove the plug from the lubrication port, and then install an appropriately sized grease fitting (Figure 13).
- 59. Inject Welker Great Barrier Sealant™ into the grease fitting until the lubricator body is full of Welker Great Barrier Sealant™.
- 60. Once properly lubricated, remove the grease fitting, and then return the plug to the lubrication port.
- 61. Tighten the collection head onto the lubricator body.
- 62. The unit is now ready for installation.

3.3 Troubleshooting

Table 2: inFlow™ ACE Troubleshooting		
Issues	Possible Causes	Solutions
The inFlow™ ACE is not actuating properly.	The hydraulic supply may be too low or not operating.	Inspect the electro-hydraulic unit (EHUC). Add hydraulic oil as necessary. If the EHUC is not operating, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the EHUC.
	The pneumatic supply may be too high, too low, or not operating.	Inspect the pneumatic supply and regulator to ensure that air is supplied at the appropriate pressure.
	The solenoid may not be operating properly.	Use the manual override button on the solenoid and ensure proper operation. If the solenoid is operating improperly, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the solenoid.
The sample container is not filling.	The inlet valve on the sample container may be closed.	Ensure that the sample inlet valve on the sample container is open during sampling.
	The outlet on the sample container may be open.	Ensure that the sample outlet valve on the sample container is closed during sampling.
	The inFlow™ ACE is not collecting the correct sample volume.	Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for verifying the sample volume of the inFlow™ ACE. See <i>Section 2.3, Setting the Sample Volume</i> , for instructions on adjusting the sample volume.
	The inFlow™ ACE may be set at a slower sampling frequency than desired.	Adjust the inFlow™ ACE to sample at the desired rate. Ensure that the calculations used to determine the sample frequency are correct (<i>Figure 7</i>).
	The relief on the inFlow™ ACE may be set too high.	Check the setting on the relief and adjust as necessary.

Table 2: inFlow™ ACE Troubleshooting (Continued)

Issues	Possible Causes	Solutions
The sample container is filling too quickly.	The inFlow™ ACE is not collecting the correct sample volume.	Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for verifying the sample volume of the inFlow™ ACE. See <i>Section 2.3, Setting the Sample Volume</i> , for instructions on adjusting the sample volume.
	The inFlow™ ACE may be set at a faster sampling frequency than desired.	Adjust the inFlow™ ACE to sample at the desired rate. Ensure that the calculations used to determine the sample frequency are correct (<i>Figure 7</i>).
	The relief on the inFlow™ ACE may be set too low.	Check the setting on the relief and adjust as necessary.

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-105: Welker NV-1 and NV-2 Instrument Valves
- IOM-117: Welker TCC-1 Transportable Crude Oil Container
- IOM-134: Welker Checkpoint™ Sample Bite Verification Panel
- IOM-165: Welker PNP Plug & Purge Panel
- IOM-186: Welker TCC Optimum™ Transportable Crude Oil Container
- IOM-197: Welker TCC-5 Transportable Crude Oil Container
- IOM-206: Welker TCC-2 Transportable Crude Oil Container
- IOM-207: Welker TCC-3 Transportable Crude Oil Container
- IOM-208: Welker TCC-10 Transportable Crude Oil Container

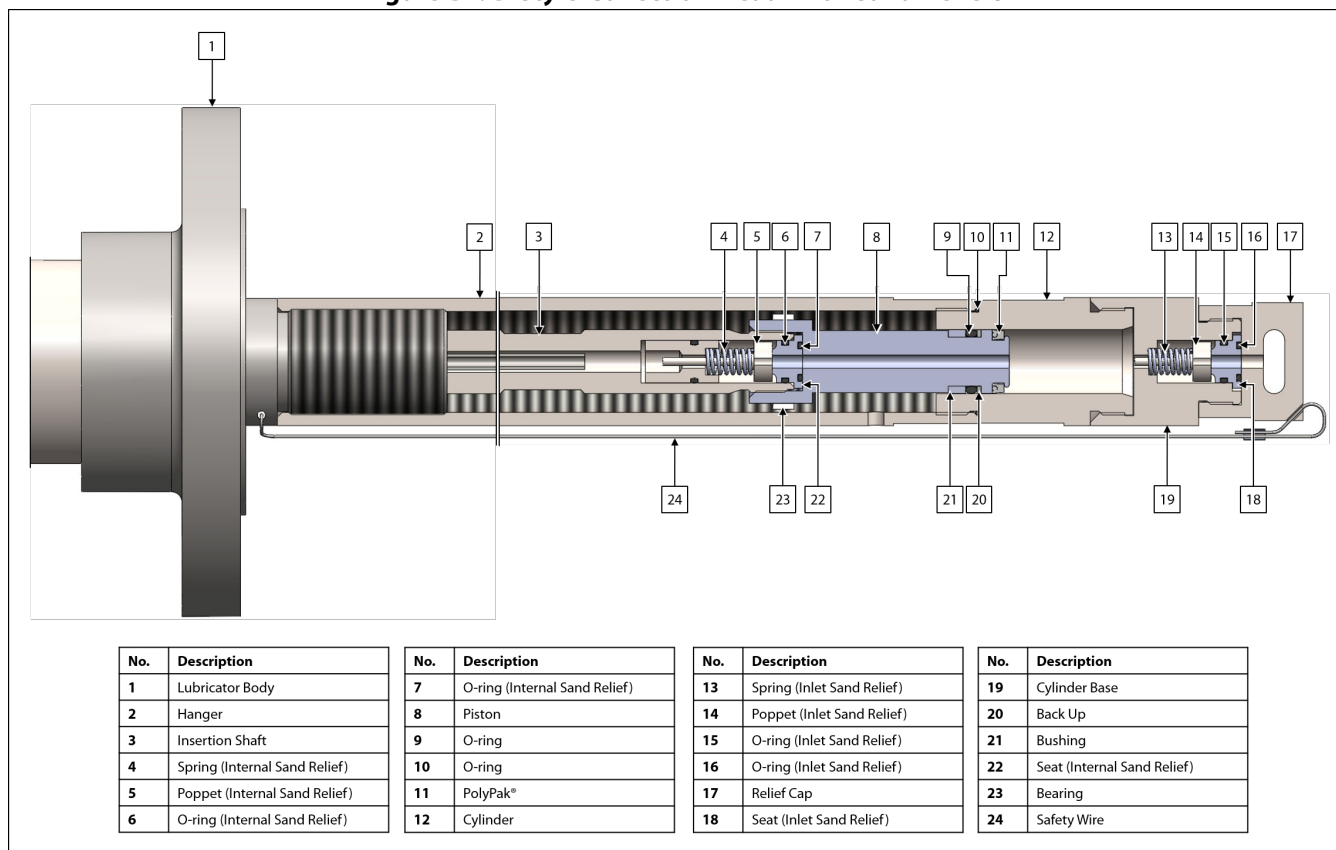
Other Installation, Operation, and Maintenance (IOM) Manuals suggested for use with this unit:

- Parker Hannifin Corporation Fluoropolymer Hose (Welker IOM-V174)
- Swagelok Company Proportional Relief Valves R Series (Welker IOM-V086)

Welker drawings and schematics suggested for use with this unit:

- Assembly Drawing: AD887AC (Standard inFlow™ ACE Fixed Insertion)
- Collection Head Drawing: AD224BX.K (D-Style Collection Head)
- Collection Head Drawing: AD224BY.K (D-Style Collection Head)

Figure B1: D-Style Collection Head With Sand Reliefs



1. Unscrew the collection head assembly from the lubricator body.
2. Unscrew the piston from the insertion shaft to expose the internal sand relief. If wrenches are needed, place the wrenches on the wrench flats.

Internal Sand Relief

3. Examine the seat of the internal sand relief for damage or wear. Replace as necessary.
4. As necessary, replace the O-rings on the seat of the internal sand relief.
5. Examine the spring of the internal sand relief for damage or wear. Replace as necessary.
6. Examine the poppet of the internal sand relief for damage or wear. Replace as necessary.

Piston and Cylinder

7. Inspect the bushing and bearing for signs of wear. Replace as necessary.
8. Replace the O-ring, back up, and PolyPak® on the piston.
9. Inspect the plated cylinder for scratches or other damage. Polish or replace as necessary.
10. Unscrew the cylinder base and relief cap from the cylinder.
11. Replace the O-ring on the cylinder.

Inlet Sand Relief

12. Unscrew the relief cap from the cylinder base to expose the inlet sand relief.
13. Examine the seat of the inlet sand relief for damage or wear. Replace as necessary.
14. As necessary, replace the O-rings on the seat of the inlet sand relief.
15. Examine the spring of the inlet sand relief for damage or wear. Replace as necessary.
16. Examine the poppet of the inlet sand relief for damage or wear. Replace as necessary.

Reassembly

17. Insert the inlet sand relief into the cylinder base, and then screw the relief cap onto the cylinder base.
18. Screw the cylinder base with relief cap onto the cylinder.
19. Insert the internal sand relief into the piston.
20. If performing full maintenance on the inFlow™ ACE, set the collection head aside and continue to the next step in *Section 3.2, Maintenance*. If maintenance is only being performed on the collection head, screw the piston onto the insertion shaft, and then screw the collection head assembly onto the lubricator body.
21. Connect a safety wire from the opening in the relief cap to the lubricator body. Ensure that the safety wire is wrapped in a counterclockwise rotation to prevent the associated threads from unscrewing from each other.



If a replacement safety wire is not available, ensure that the relief cap is securely tightened so that it can withstand the pressure of the flowing stream.

NOTES

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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