



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER INLOOP™ ACE CRUDE OIL SAMPLER

DRAWING NUMBER
AD905BL

MANUAL NUMBER
IOM-195

REVISION
Rev. B, 10/10/2019

TABLE OF CONTENTS

	SAFETY	3
1.	PRODUCT INFORMATION	4
1.1	Introduction	4
1.2	Product Description	4
1.3	Important Information	5
1.4	Specifications	5
1.5	Equipment Diagrams	6
2.	INSTALLATION & OPERATION	8
2.1	Before You Begin	8
2.2	Setting the Sample Volume	8
2.3	Preparing the Unit for Installation	10
2.4	Installing the Unit	10
2.5	Operating the Unit	12
2.6	Purging the Unit	13
2.7	Emergency Shutoff	14
3.	MAINTENANCE	15
3.1	Before You Begin	15
3.2	Maintenance	16
3.3	Troubleshooting	22
	APPENDICES	24
	A: Referenced or Attached Documents	24
	B: D-Style Collection Head Maintenance	25

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

The *inLoop™ ACE* was specifically designed to be installed as part of a fast loop, which will provide the sampler with a continuous supply of product. 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 *inLoop™ 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 *inLoop™ ACE* even further. The external adjustment allows the operator to adjust the sample volume without having to remove the *inLoop™ ACE* from the fast loop.



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 inLoop™ 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: inLoop™ 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, Aluminum Non-Wetted Parts, PTFE, Kalrez® Wetted Seals, and Viton® Non-Wetted Seals Others Available
Maximum Allowable Operating Pressure	1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C)
Fast Loop Connection	1" – 600 ANSI RF
Sample Outlet Connection	¼" FNPT
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

1.5 Equipment Diagrams

Figure 1: inLoop™ ACE Diagram

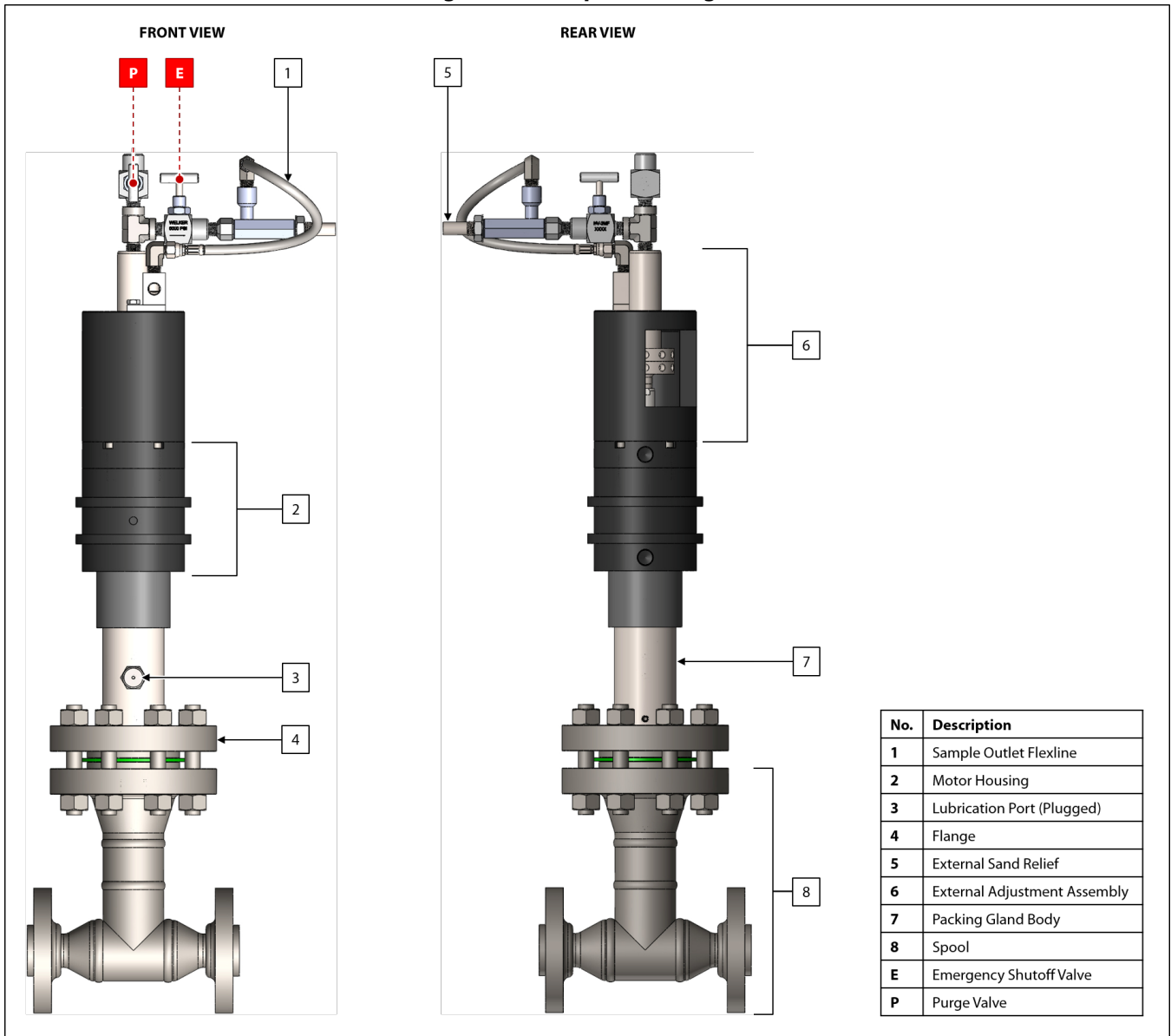
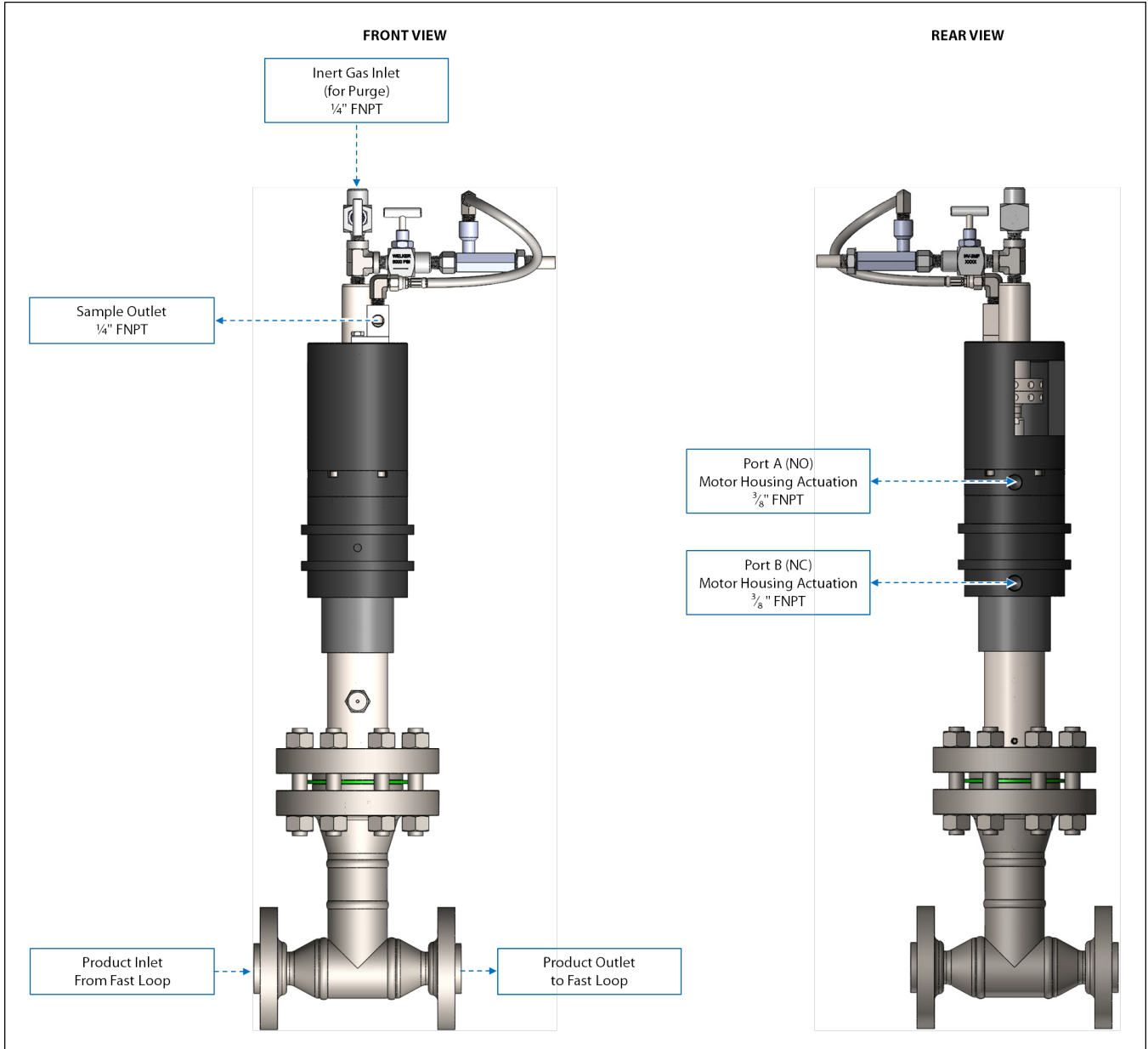


Figure 2: inLoop™ ACE Connections Diagram



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.

2.2 Setting the Sample Volume

1. Locate the exposed external adjustment chamber in the motor top (*Figure 3*).

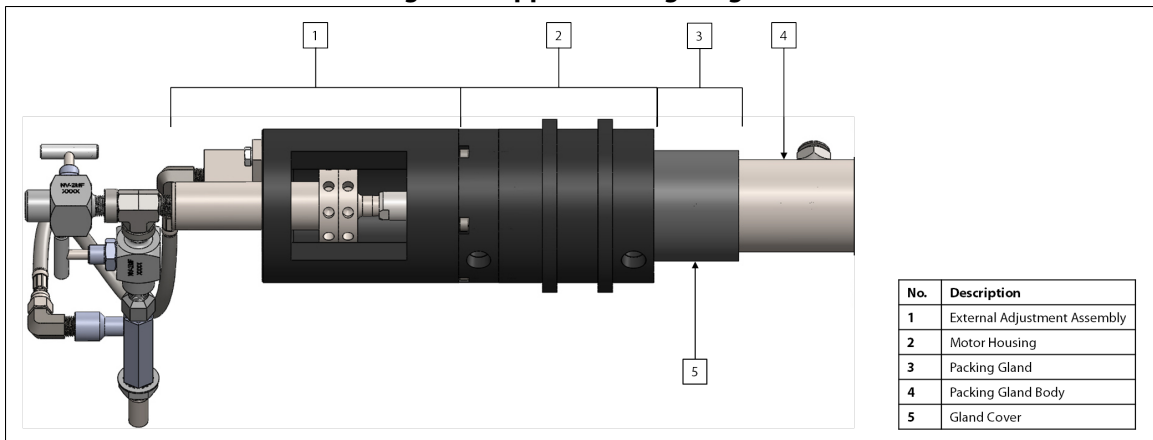


Setting the sample volume is accomplished by rotating the upper external adjustment ring to attain the desired sample volume.

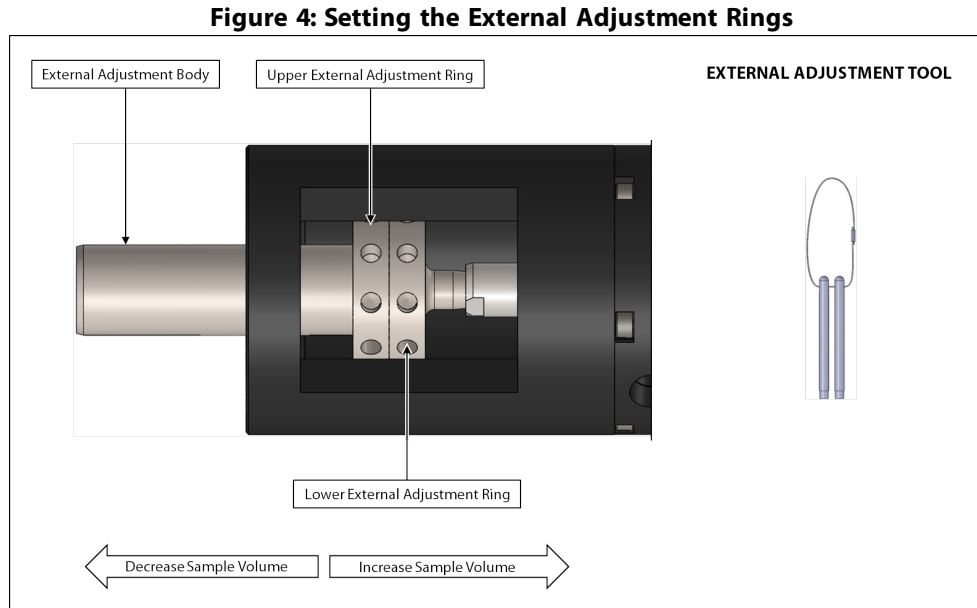


Once the desired volume is set, the sample volume can be changed at any time externally without removing the inLoop™ ACE from the fast loop.

Figure 3: Upper Housing Diagram



2. As necessary, gently push down on the external adjustment body so that the external adjustment rings are accessible through the chamber (Figure 4).



3. Begin with the upper external adjustment ring at the top of the external adjustment body (Figure 4).



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 adjustment ring to the desired volume (Figure 4).



One full rotation of the upper external adjustment ring is approximately 1 cc if the inLoop™ 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. 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.



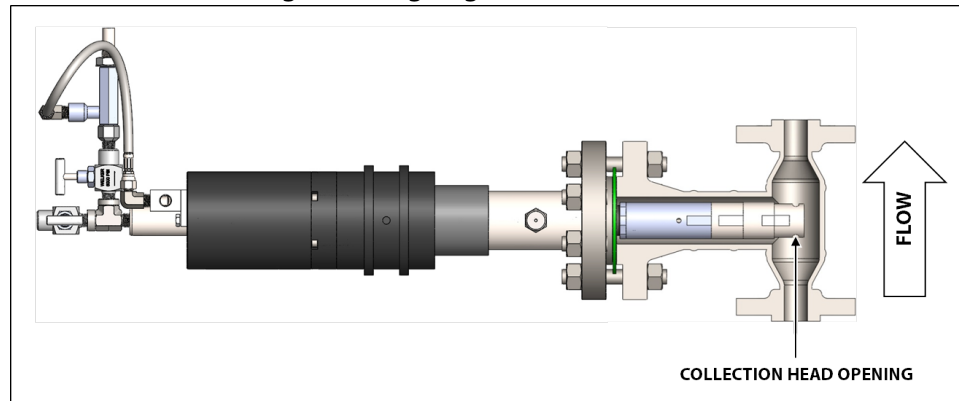
Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for use with this unit.

7. As necessary, repeat steps 1–6 to further adjust the sample volume.

2.3 Preparing the Unit for Installation

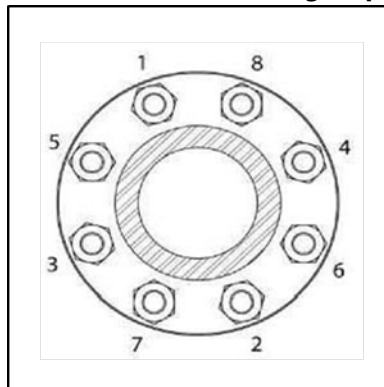
1. Determine the direction of product flow in the fast loop.
2. Look through the spool to visually determine if the collection head is in correct alignment. The opening in the collection head should face the direction of product flow so that the flowing stream will pass through the opening (*Figure 5*).

Figure 5: Aligning the Collection Head



3. If the opening in the collection head faces the direction of product flow, proceed to *Section 2.4, Installing the Unit*. If the opening in the collection head does not face the direction of product flow, continue to step 4.
4. Remove the nuts and bolts from the flange, and then turn the sampler within the spool until the opening in the collection head faces the direction of product flow and the flange holes align with the holes in the mating spool flange.
5. Look through the spool to visually ensure that the collection head is in correct alignment. If correct alignment has been achieved, continue to step 6. If the collection head is still misaligned, repeat steps 4–5.
6. Following a cross-bolting sequence, install the bolts and nuts to the flange to secure it to the spool (*Figure 6*).

Figure 6: 8-Bolt Cross-Bolting Sequence



2.4 Installing the Unit

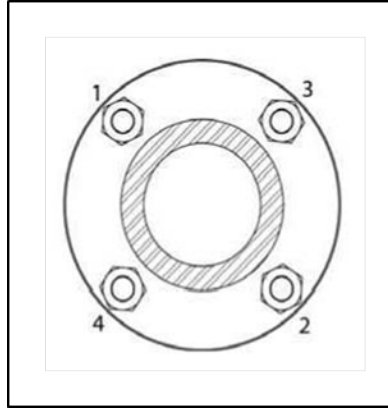


The fast loop must be depressurized prior to installing and removing the unit.

1. Close all valves on the inLoop™ ACE.
2. Position an appropriately sized gasket on the mating flange connection for the product inlet spool flange (*Figure 2*).
3. Install the product inlet spool flange to its mating flange connection.

4. Following a cross-bolting sequence, install the bolts and nuts to the product inlet spool flange (*Figure 7*).

Figure 7: 4-Bolt Cross-Bolting Sequence



5. Position an appropriately sized gasket on the mating flange connection for the product return spool flange (*Figure 2*).
6. Install the product return spool flange to its mating flange connection.
7. Following a cross-bolting sequence, install the bolts and nuts to the product return spool flange (*Figure 7*).
8. 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 inLoop™ ACE to the sample container.

9. 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."

10. Pressurize the fast loop.
11. Open emergency shutoff valve E (*Figure 1*).
12. Adjust the external sand relief. With emergency shutoff valve E open, tighten the jam nut on the external sand relief until no product emerges from the outlet (*Figure 11*).



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 2.7, Emergency Shutoff*.



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

2.5 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 8).

Figure 8: Sampling Frequency Equations

Liquid Sampling, Proportional to Flow Collection
<p>Equation 1: Number of Samples Needed $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Container Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$</p> <p>Equation 2: Proportional-to-Flow $\text{Volume of Flow Between Sample Grabs} = \frac{\text{Batch Size (Total Volume to be Sampled)}}{\text{Number of Samples Needed (Eq. 1)}}$</p> <p style="text-align: center;"><i>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.</i></p>
Liquid Sampling, Timed Collection
<p>Equation 1: Number of Samples Needed $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Container Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$</p> <p>Equation 2: Timed Sampling $\text{Time Between Sample Grabs} = \frac{\text{Total Time in Sample Period}}{\text{Number of Samples Needed (Eq. 1)}}$</p> <p style="text-align: center;"><i>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.</i></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.
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.

2.6 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 inLoop™ 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 2*).



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 inLoop™ 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 inLoop™ ACE to drain. Monitor the sample container for under- or over-purging.



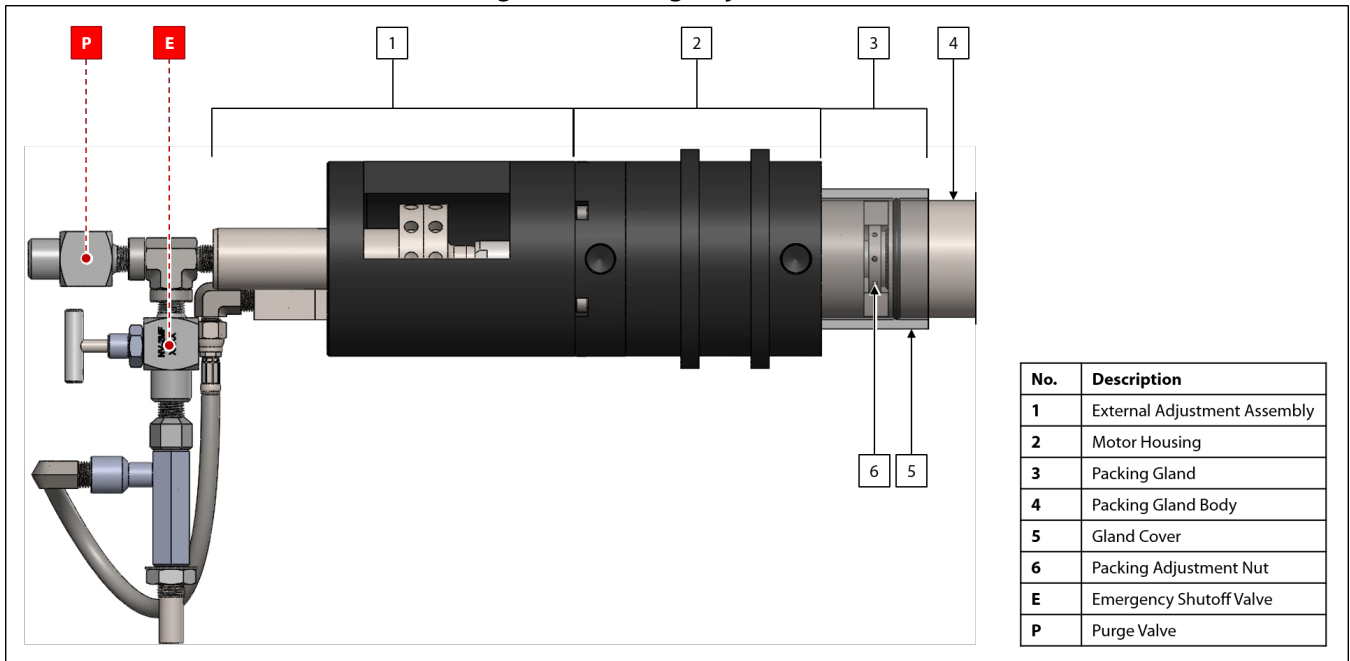
If no inert gas is heard entering the sample container, the purge pressure has been set too low and previous product remains in the sampler.

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*).

2.7 Emergency Shutoff

Figure 9: 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 inLoop™ 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.

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. Hex Key Set
 - b. Large Crescent Wrench (Qty. 2)
 - c. Medium Crescent Wrench (Qty. 2)
 - d. Seal Pick
 - e. Small Flat Head Screwdriver
 - f. Snap Ring Pliers
 - g. Spanner Wrench
 - h. Strap Wrench
 - i. Welker Great Barrier Sealant™

3.2 Maintenance



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



If maintenance is to be performed on the fast loop, the inLoop™ ACE must first be removed from the fast loop. Failure to remove the unit from the fast loop prior to performing maintenance could damage the unit.

1. Depressurize the fast loop.
2. Deactivate or turn OFF the hydraulic or pneumatic supply.
3. Depressurize, drain, and disconnect the hydraulic or pneumatic supply lines.
4. Back off the jam nut on the external sand relief and open purge valve P to relieve any trapped pressure (*Figure 10* and *Figure 11*).
5. Remove the nuts and bolts from the flange, and then carefully remove the inLoop™ ACE from the spool.
6. Lay the inLoop™ ACE on a smooth, clean surface

Collection Head Assembly

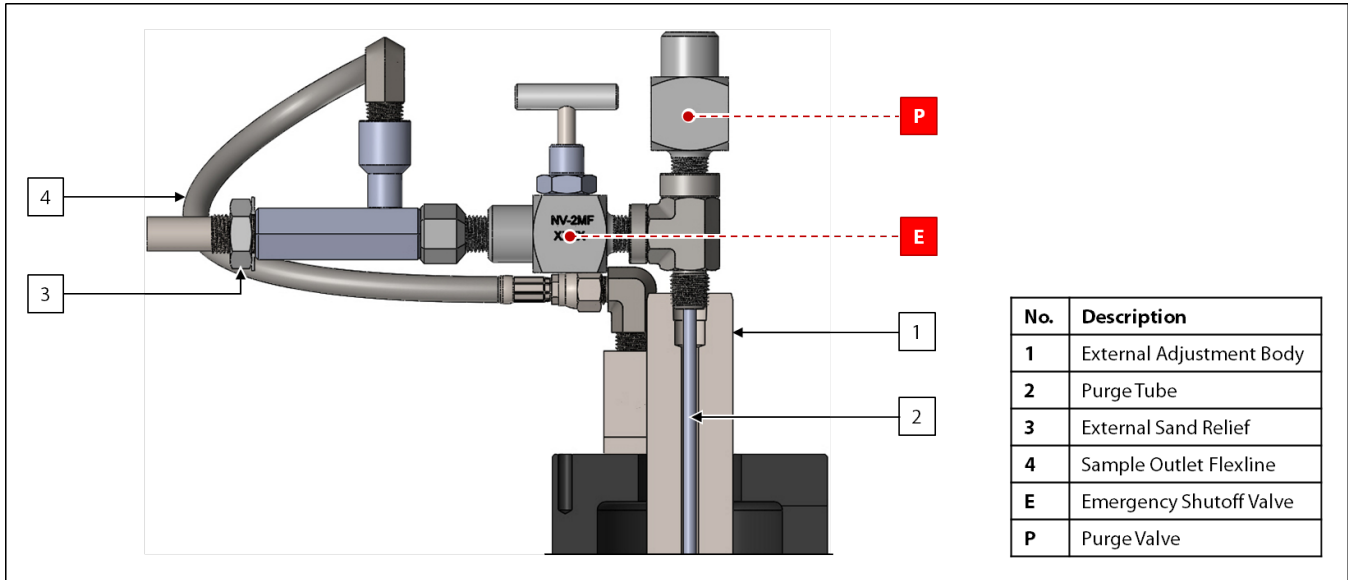


Welker recommends noting the position of the jam nut on the flange to ease reassembly.

7. As necessary, cut the safety wire from the relief cap to the jam nut, and then remove the safety wire.
8. Unscrew and remove the collection head assembly from the flange.
9. Refer to *Appendix B, D-Style Collection Head Maintenance*, for instructions on performing maintenance on the collection head.

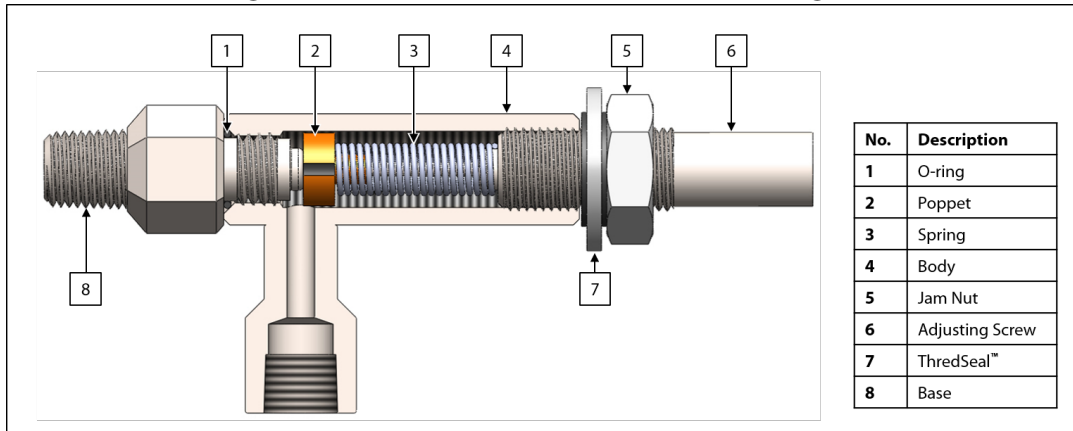
Purge Assembly

Figure 10: Outlet Assembly With Purge



10. Unscrew the sample outlet flexline from the elbow above the sample outlet.
11. Unscrew the purge assembly at the tee connecting it to the external adjustment body. Note that the long purge tube is attached to the purge assembly and will also be removed at this time. Take care not to bend or otherwise damage the purge tube.
12. Unscrew the external sand relief from emergency shutoff valve E.
13. Unscrew the flexline from the elbow in the external sand relief.
14. Unscrew the base of the external sand relief from the body (Figure 11).

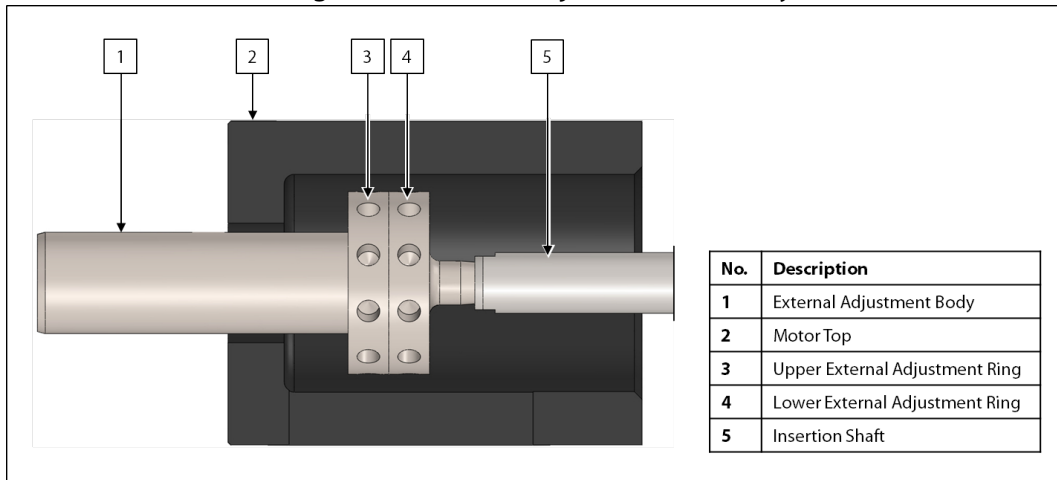
Figure 11: External Sand Relief Maintenance Diagram



15. Replace the O-ring on the base.
16. Unscrew the jam nut from the adjusting screw.
17. Inspect the poppet for scratches or other damage. If scratches or other damage are present on the poppet (face) seat, replace the poppet.
18. Reassemble the external sand relief.
19. Screw the external sand relief into emergency shutoff valve E (Figure 10).
20. Screw the flexline into the elbow in the external sand relief (Figure 10).

Disassembling the Upper Housing

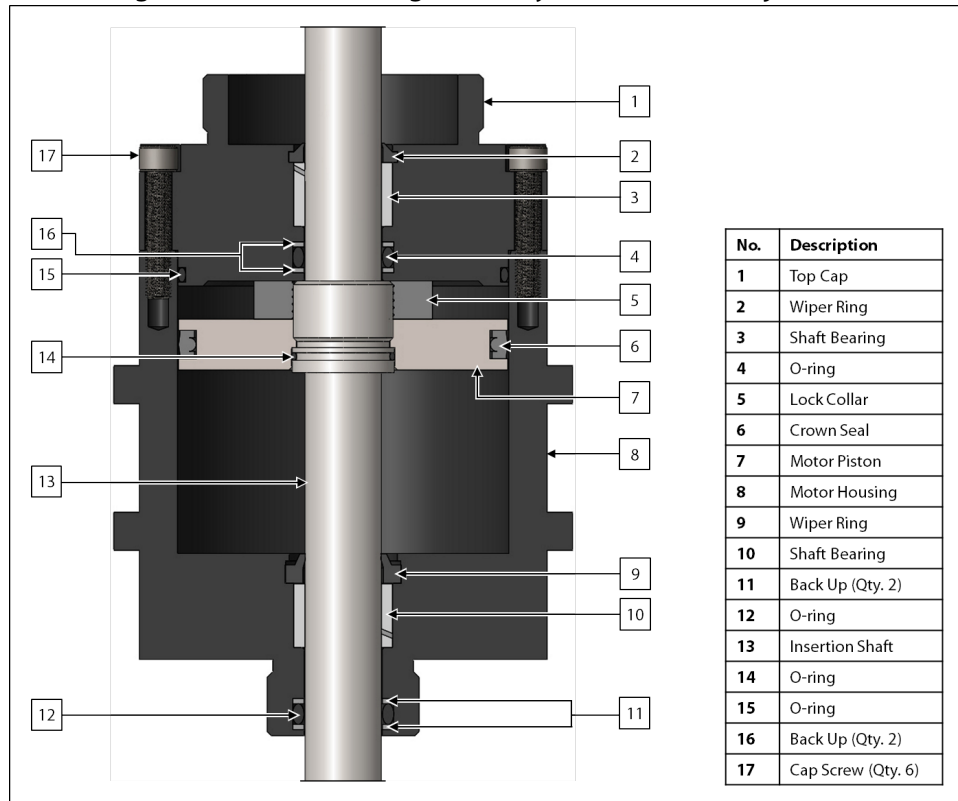
Figure 12: External Adjustment Assembly



21. Unscrew the motor top from the motor housing.
22. Carefully remove the motor top from the external adjustment body.
23. Carefully unscrew the external adjustment body from the insertion shaft. Note that the external adjustment rings will remain attached to the external adjustment body and will also be removed at this time.
24. Unscrew the cap screws from the top cap and carefully remove the top cap from the motor housing (Figure 13).
25. Unscrew the setscrews from the base of the packing gland body (Figure 14).
26. Unscrew the flange from the packing gland body.
27. 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.
28. Carefully pull the insertion shaft out through the motor housing.

Motor Housing Assembly

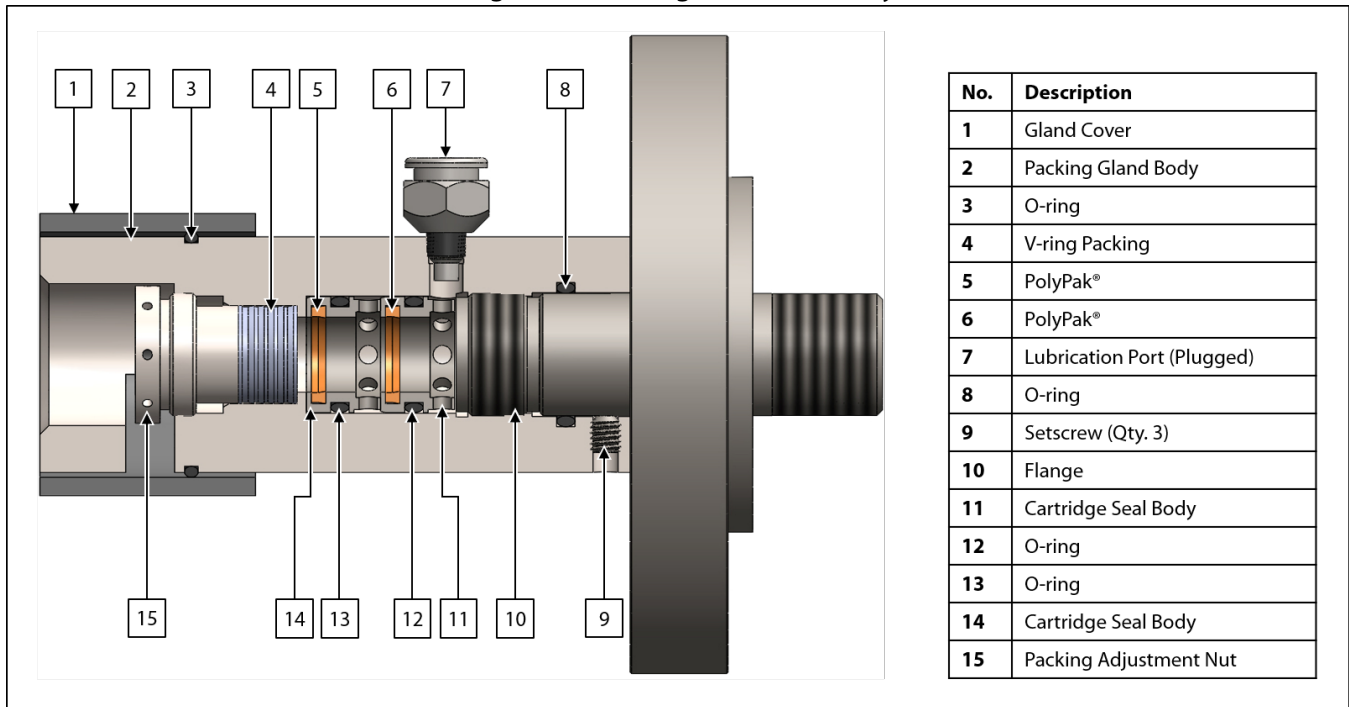
Figure 13: Motor Housing Assembly With External Adjustment



29. Replace the O-rings and back ups on the top cap.
30. Inspect the wiper ring and shaft bearing in the top cap. Replace them if they show signs of wear or damage.
31. Replace the O-ring and crown seal on the piston.
32. Replace the O-ring and back ups in the motor housing.
33. Inspect the wiper ring and shaft bearing in the motor housing. Replace them if they shows signs of wear or damage.
34. Inspect the polished portion of the insertion shaft. If any scratches or damage are present, repair or replace as necessary.

Packing Gland Body

Figure 14: Packing Gland Assembly

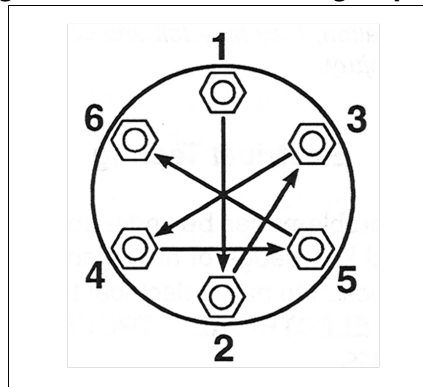


35. Slide the gland cover off the packing gland body.
36. Replace the O-ring on the packing gland body.
37. Unscrew the packing adjustment nut from the packing gland body.
38. Inspect the wiper ring in the packing adjustment nut. Replace it if it shows signs of wear or damage.
39. Replace the V-ring packing in the packing gland body. The V-ring packing should be installed so that the "V" is open against the direction of product flow.
40. Remove the cartridge seal bodies from the packing gland body.
41. Install replacement cartridge seal bodies to the packing gland body. The cartridge seal bodies should be installed with the grease holes closest to the lubrication port.
42. Screw the packing adjustment nut into the packing gland body.
43. Replace the O-ring in the packing gland body.

Reassembling the Upper Housing

44. Slide the gland cover onto the packing gland body.
45. Carefully screw the motor housing into the packing gland body.
46. Carefully insert the insertion shaft through the motor housing and packing gland body, taking care not to scratch the shaft.
47. Return the top cap to the top of the insertion shaft and carefully slide the top cap down to the motor housing.
48. Following a cross-bolting sequence, install the cap screws to the top cap and secure the top cap to the motor housing (*Figure 15*).

Figure 15: 6-Bolt Cross-Bolting Sequence



49. Screw the external adjustment body with external adjustment rings into the insertion shaft.
50. Return the motor top to the top cap, and then screw the motor top onto the top cap.
51. Set the upper housing and insertion shaft assembly aside.

Reassembly

52. With the upper housing assembly attached to the insertion shaft, insert the insertion shaft into the flange.
53. Screw the flange into the packing gland body, and then tighten the setscrews in the base of the packing gland body to secure the upper housing assembly to the flange.
54. Insert the purge tube into the external adjustment body, and then screw the purge assembly into the external adjustment body.
55. Reconnect the flexline at the sample outlet.
56. Ensure that the collection head has been installed to the flange.
57. Return the sampler to the spool, ensuring that the opening in the collection head faces the direction of product flow.
58. Following a cross-bolting sequence, install the bolts and nuts to the flange to secure it to the spool (*Figure 7*).
59. Remove the plug from the lubrication port, and then install an appropriately sized grease fitting (*Figure 14*).
60. Inject Welker Great Barrier Sealant™ into the grease fitting.
61. Once properly lubricated, remove the grease fitting, and then reinstall the plug to the lubrication port.
62. The unit is now ready for installation.

3.3 Troubleshooting

Table 2: inLoop™ ACE Troubleshooting		
Issues	Possible Causes	Solutions
The inLoop™ 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 inLoop™ ACE is not collecting the correct sample volume.	Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for verifying the sample volume of the inLoop™ ACE. See <i>Section 2.2, Setting the Sample Volume</i> , for instructions on adjusting the sample volume.
	The inLoop™ ACE may be set at a slower sampling frequency than desired.	Adjust the inLoop™ ACE to sample at the desired rate. Ensure that the calculations used to determine the sample frequency are correct (<i>Figure 8</i>).
	The relief on the inLoop™ ACE may be set too high.	Check the setting on the relief and adjust as necessary.

Table 2: inLoop™ ACE Troubleshooting (Continued)

Issues	Possible Causes	Solutions
The sample container is filling too quickly.	<p>The inLoop™ ACE is not collecting the correct sample volume.</p> <p>The inLoop™ ACE may be set at a faster sampling frequency than desired.</p> <p>The relief on the inLoop™ ACE may be set too low.</p>	<p>Welker recommends the Welker Checkpoint™ Sample Bite Verification Panel for verifying the sample volume of the inLoop™ ACE. See <i>Section 2.2, Setting the Sample Volume</i>, for instructions on adjusting the sample volume.</p> <p>Adjust the inLoop™ ACE to sample at the desired rate. Ensure that the calculations used to determine the sample frequency are correct (<i>Figure 8</i>).</p> <p>Check the setting on the relief and adjust as necessary.</p>

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

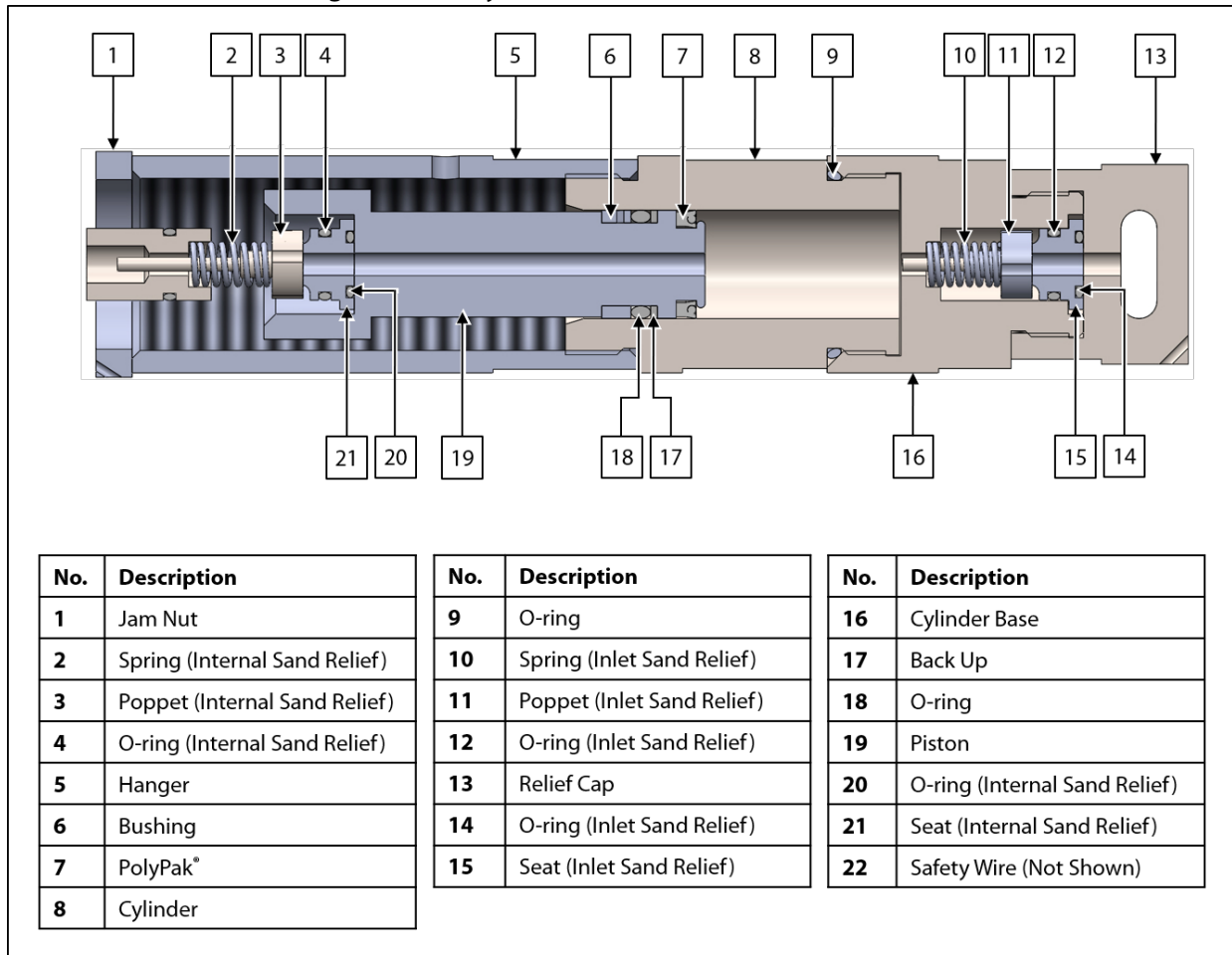
Other *Installation, Operation, and Maintenance (IOM) Manuals* suggested for use with this unit:

- 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: AD905BL
- Collection Head Drawing: AD224BW.1K (D-Style Collection Head)

Figure B1: D-Style Collection Head With Sand Reliefs



1. Loosen the jam nut and unscrew the collection head assembly from the flange.
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 for signs of wear. Replace as necessary.
8. Replace the O-ring, back up, and PolyPak® on the piston.
9. Inspect the nickel-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 collection head.
19. Insert the internal sand relief into the piston.
20. If performing full maintenance on the inLoop™ 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 into the insertion shaft, and then screw the collection head onto the flange. Tighten the jam nut to lock the collection head in place. For maximum sample volume, ensure that the bottom of the jam nut is flush with the bottom of the flange threads.
21. Connect a safety wire from the opening in the relief cap to the jam nut. 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.

