



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

WELKER® SAMPLE / INJECTION PUMP

MODEL
SSO-9MED

DRAWING NUMBERS
AD243DI
AD243DJ.1
AD243DK
AD243DK.K1

MANUAL NUMBER
IOM-175

REVISION
Rev. C, 08/14/2024

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IMPORTANT SAFETY INFORMATION

READ ALL INSTRUCTIONS



Notes emphasize information and/or provide additional information to assist the user.



Caution messages appear before procedures that could result in damage to equipment if not observed.



Warning messages appear before procedures that could result in personal injury if not observed.

This manual is intended to be used as a basic installation and operation guide for the Welker® Sample/Injection Pump, SSO-9MED. 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 Sample/Injection Pump is of a mechanical and electrical 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 Sample/Injection Pump, please contact a Welker® representative immediately.

Phone: 281.491.2331

Address: 13839 West Belfort Street

Sugar Land, TX 77498

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this equipment becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manuals* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call Welker® at 1-281-491-2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® SSO-9MED Sample/Injection Pump is designed to be incorporated into a liquid sampling system to collect and inject product into a sample container or to be incorporated into an injection system to collect and inject liquid chemical into a natural gas pipeline.

When incorporated into a Welker® sampling or injection system, the SSO-9MED is mounted and tubed by the manufacturer. In automatic operations, the system is pneumatically operated but electronically controlled from a Programmable Logic Controller (PLC) or other signal control system. Collection and injection in such systems may be performed manually or remotely by actuating the solenoid, which controls the pump action of the SSO-9MED.



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 SSO-9MED to suit the particular application and specifications of each customer.

1.3 Important Information: Chemical Injection

1. Refer to NFPA 58, *Liquefied Petroleum Gas Code* (National Fire Protection Association 2014), for regulations on the odorization of liquefied petroleum gas.
2. Consult the material safety data sheet (MSDS) on the product being injected by the SSO-9MED to ensure proper personal protective equipment (PPE) is used and safe handling procedures are followed.

1.4 Principles of Operation

1. From the PLC, activate the collection function. Supply pressure enters below the internal power piston, drawing sample/chemical into the SSO-9MED.
2. From the PLC, activate the injection function. Supply pressure enters above the internal power piston, injecting the sample/chemical into the sample container / pipeline.
3. Operation continues automatically according to the frequency programmed into the PLC.

1.5 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 customizations of your equipment.

Table 1: SSO-9MED Specifications

| | |
|--------------------------------------|--|
| Applications | Composite Sampling or Liquid Chemical Injection |
| Products | Clean Light Liquids, Gasoline, Jet Fuel, Liquid Chemicals Compatible With the Seal Material, Odorant, and Refined Products |
| Materials of Construction | 316/316L Stainless Steel Wetted Parts, Aluminum, PTFE, and Viton® Others Available |
| Maximum Allowable Operating Pressure | 150 ANSI Stainless Steel: 275 psig @ -20 °F to 100 °F (18 barg @ -28 °C to 37 °C) 300 ANSI Stainless Steel: 720 psig @ -20 °F to 100 °F (49 barg @ -28 °C to 37 °C) 600 ANSI Stainless Steel: 1440 psig @ -20 °F to 100 °F (99 barg @ -28 °C to 37 °C) 900 ANSI Stainless Steel: 2160 psig @ -20 °F to 100 °F (148 barg @ -28 °C to 37 °C) MNPT: 2160 psig @ -20 °F to 100 °F (148 barg @ -28 °C to 37 °C) |
| Actuation Pressure | 30–225 psig (2–15 barg) |
| Pipeline Connection | ¾" MNPT (Standard) 1" MNPT 1" – 150 ANSI RF 1" – 300 ANSI RF 1" – 600 ANSI RF 1½" – 900 ANSI RF |
| Utility Requirement | Pneumatic Supply |
| Sample Volume | 0.25–7.50 cc |
| Options | Filter Element Single Probe for Chemical Injection Spool and Static Mixer CE Compliance CRN Alberta Certification |

1.6 Equipment Diagrams

Figure 1: Standard SSO-9MED

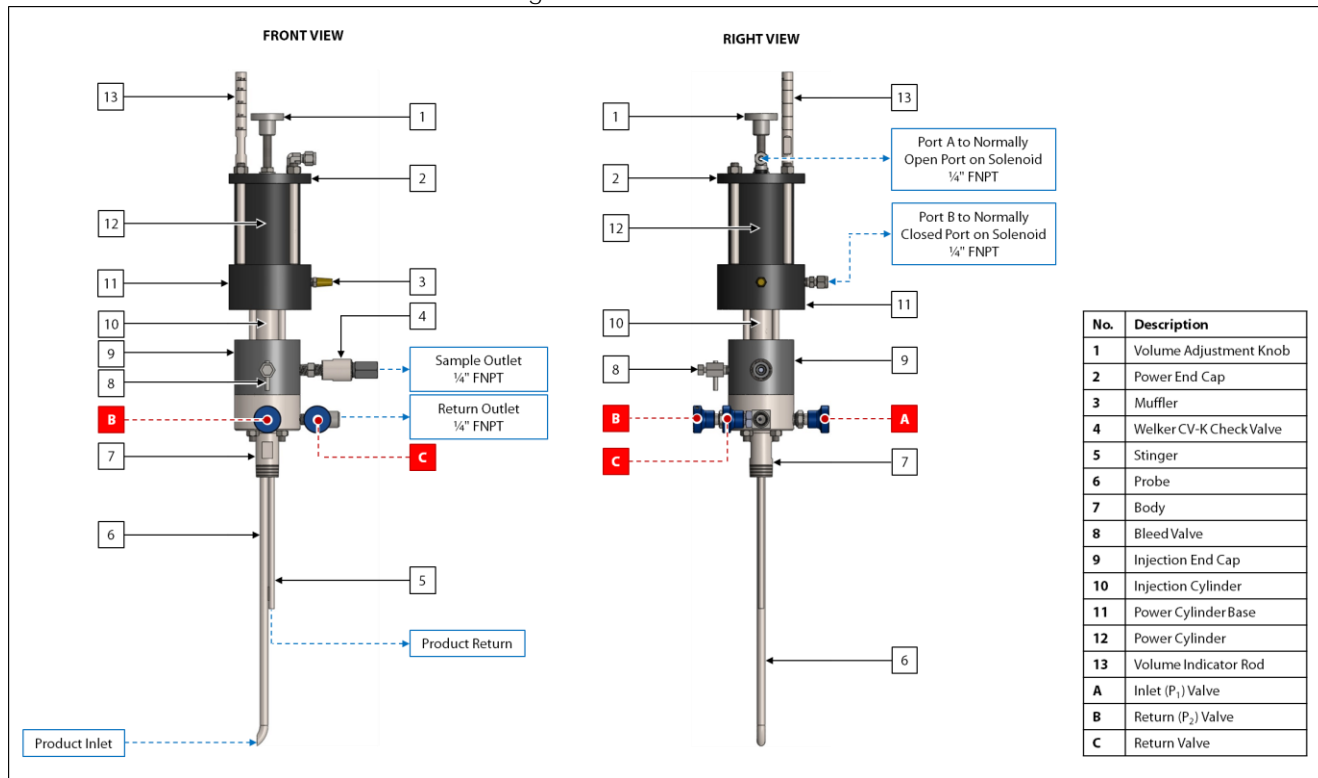


Figure 2: SSO-9MED With Flanged Pipeline Connection

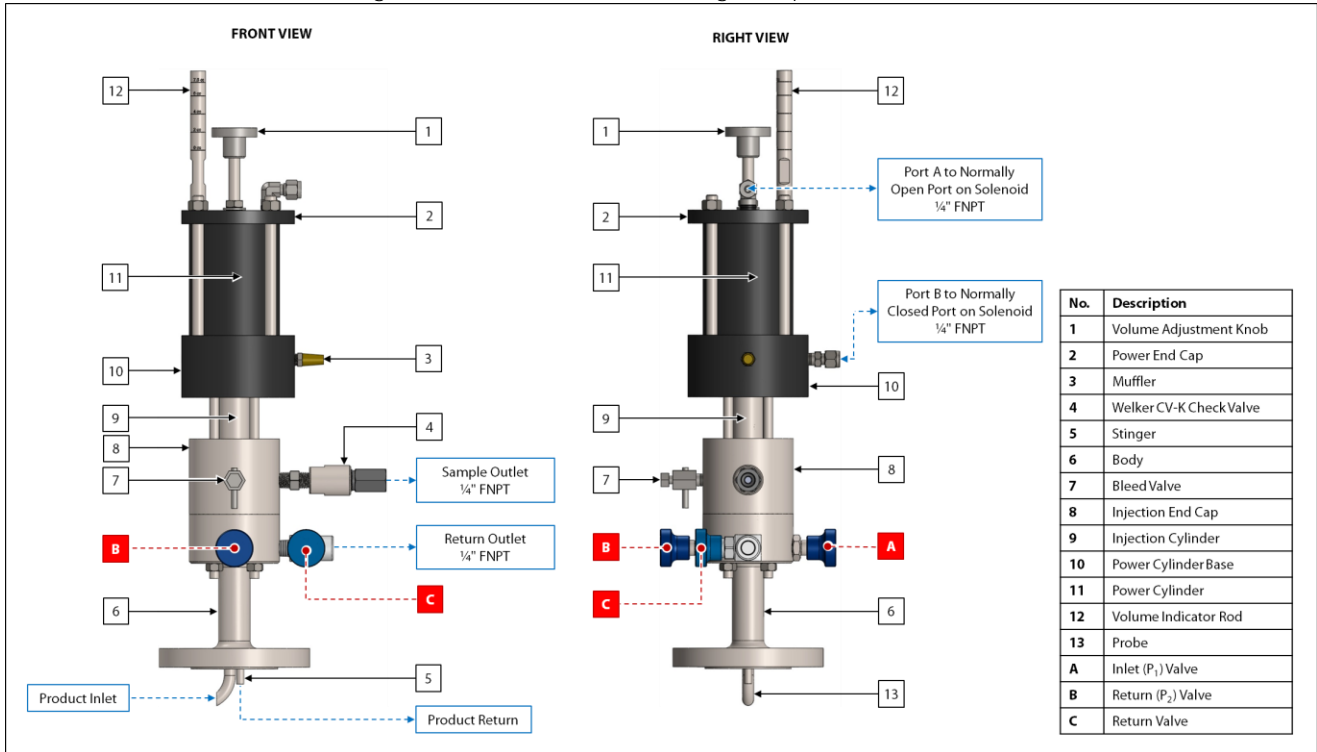
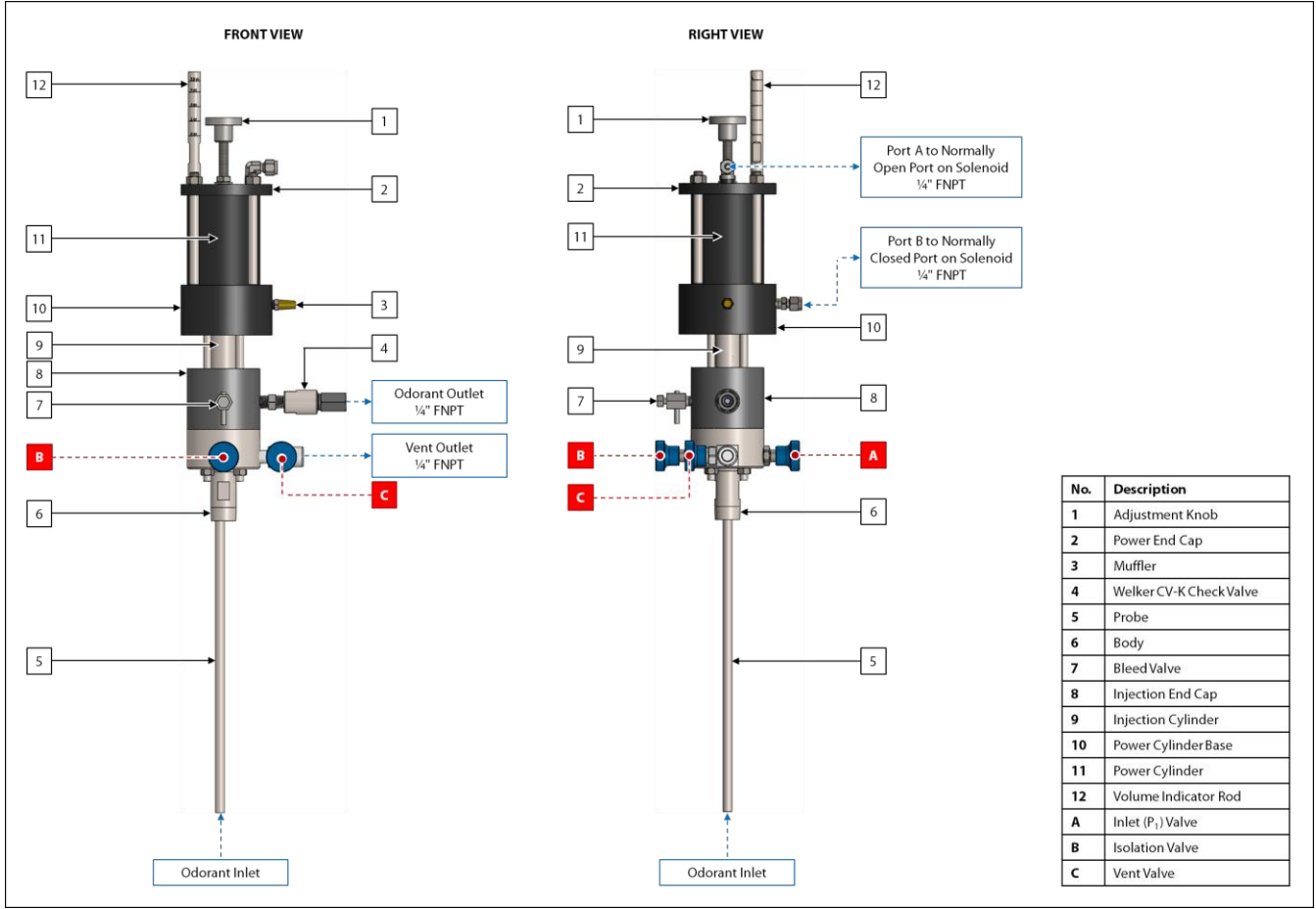


Figure 3: SSO-9MED for Chemical Injection



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.



The SSO-9MED may be used alone or as part of a complete system. Note that these instructions are written for an SSO-9MED used as part of a complete system. If used alone or with equipment from a company other than Welker®, the SSO-9MED should be installed and operated in a manner consistent with the instructions in this *Installation, Operation, and Maintenance (IOM) Manual*.

2.2 Installation for Composite Sampling



The pipeline must be depressurized prior to installing the SSO-9MED.



The SSO-9MED can be installed horizontally or vertically. Welker® recommends horizontal installation when the sample will be used to determine the watercut of the sampled product.

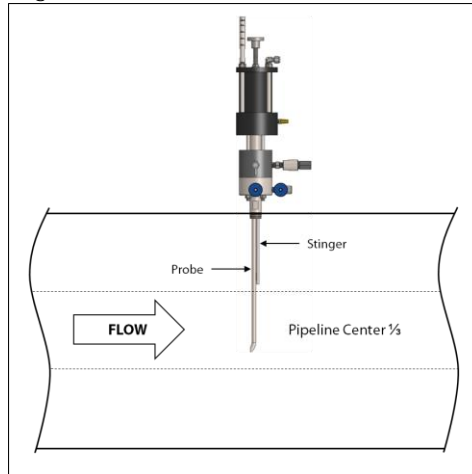


If the SSO-9MED has the standard MNPT connection, continue to step 1.
If the SSO-9MED has a flanged connection, proceed to step 12.

Standard MNPT Connection

1. Ensure that all valves are closed.
2. Wrap the threads of the threaded pipeline connection with PTFE tape.
3. Determine the direction of product flow in the pipeline. For the SSO-9MED to function correctly, it must be installed so that the stinger is downstream of the direction of product flow (*Figure 4*).

Figure 4: Correct SSO-9MED Installation



4. Mount the SSO-9MED directly to the mating FNPT connection on the pipeline.
5. Tighten the SSO-9MED to the proper NPT gauge depth.
6. Pressurize the pipeline.
7. Open inlet (P_1) valve A and return (P_2) valve B (*Figure 1*). Check for leaks at the pipeline connection and repair as necessary.



Note that inlet (P_1) valve A and return (P_2) valve B must be open to create product flow through the SSO-9MED.

8. Connect a pre-charged constant pressure cylinder to the sample outlet. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the constant pressure cylinder used for instructions on pre-charging the cylinder.



If sampling from the SSO-9MED into a transportable or stationary crude oil container, an external relief valve must be installed to the outlet of the SSO-9MED.



If desired, a valve may be installed to the sample outlet check valve prior to installing a constant pressure cylinder. This would allow the operator to close one valve to isolate the constant pressure cylinder from pipeline pressure instead of closing inlet (P_1) valve A and return (P_2) valve B.

9. As necessary, install a relief valve or connect a nitrogen cylinder to the pre-charge end of the constant pressure cylinder. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the constant pressure cylinder for instructions.



A relief valve or a pressurized volume chamber (i.e., a nitrogen cylinder) should be installed to the pre-charge end of the constant pressure cylinder to relieve pressure as product fills the constant pressure cylinder.

10. As necessary, use appropriately sized tubing to connect from the normally open port on the customer-supplied solenoid to port A on the power end cap (*Figure 1*). Use appropriately sized tubing to connect from the normally closed port on the solenoid to port B on the power cylinder base (*Figure 1*).
11. Proceed to *Section 2.3, Preparing for Operation*.

Flanged Connection

1. Ensure that all valves are closed.
2. Determine the direction of product flow in the pipeline. For the SSO-9MED to function correctly, it must be installed so that the stinger is downstream of the direction of product flow (*Figure 4*).
3. Mount the SSO-9MED to the mating flange connection on the pipeline.
4. Install the bolts and nuts to the flanges, and then tighten the nuts to the appropriate torque.
5. Pressurize the pipeline.
6. Open inlet (**P₁**) valve A and return (**P₂**) valve B (*Figure 2*). Check for leaks at the pipeline connection and repair as necessary.



Note that inlet (**P₁**) valve A and return (**P₂**) valve B must be open to create product flow through the SSO-9MED.

7. Connect a pre-charged constant pressure cylinder to the sample outlet. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the constant pressure cylinder used for instructions on pre-charging the cylinder.



If sampling from the SSO-9MED into a transportable or stationary crude oil container, an external relief valve must be installed to the outlet of the SSO-9MED.



If desired, a valve may be installed to the sample outlet check valve prior to installing a constant pressure cylinder. This would allow the operator to close one valve to isolate the constant pressure cylinder from pipeline pressure instead of closing inlet (**P₁**) valve A and return (**P₂**) valve B.

8. As necessary, install a relief valve or connect a nitrogen cylinder to the pre-charge end of the constant pressure cylinder. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the constant pressure cylinder for instructions.



A relief valve or a pressurized volume chamber (i.e., a nitrogen cylinder) should be installed to the pre-charge end of the constant pressure cylinder to relieve pressure as product fills the constant pressure cylinder.

9. As necessary, use appropriately sized tubing to connect from the normally open port on the solenoid to port A on the power end cap (*Figure 2*). Use appropriately sized tubing to connect from the normally closed port on the solenoid to port B on the power cylinder base (*Figure 2*).
10. Continue to *Section 2.3, Preparing for Operation*.

2.3 Preparing for Operation

1. Ensure that the normally open pressure port of the solenoid is connected to port A on the power end cap.
2. Ensure that inlet (P₁) valve A and return (P₂) valve B are open.



Note that inlet (P₁) valve A and return (P₂) valve B must be open to create product flow through the SSO-9MED.

3. Purge the SSO-9MED of any trapped air by pressurizing the product line and then slightly opening the bleed valve on the SSO-9MED. Once liquid appears, close the bleed valve.
4. Check for leaks and repair as necessary.
5. As necessary, verify the sample volume. See *Section 2.6, Verifying the Sample Volume*, for instructions.
6. From the PLC, activate the sample function so that correct collection and injection of product by the SSO-9MED can be verified.
7. Visually verify the correct collection and injection of product by the SSO-9MED.

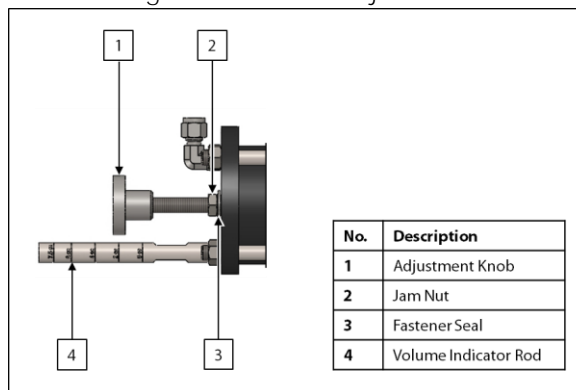


Collection and injection of the SSO-9MED can be visually verified by referring to:

- a sight glass installed between the SSO-9MED and the injection point,
- a flow indicator or flow switch, or
- the volume indicator on the connected sample container.

8. Check for leaks and repair as necessary.
9. As necessary, adjust the sample volume of the SSO-9MED (*Figure 5*).

Figure 5: Volume Adjustment



Loosen the jam nut on the adjustment screw.

To increase the volume, turn the adjustment knob counterclockwise. To decrease the volume, turn the adjustment knob clockwise.

Tighten the jam nut on the adjusting screw to secure the adjusting screw at the desired volume.



Ensure that the jam nut is tightened to the fastener seal prior to beginning operation, as the pump will not operate correctly unless the jam nut is properly tightened. A leak check may be performed to verify that the jam nut has been properly tightened.

10. Once the SSO-9MED is collecting and injecting properly, purge the SSO-9MED of any trapped air and/or contaminants. See *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED.
11. After the purge cycle, the SSO-9MED may be put into operation.

2.4 Purging the SSO-9MED



The SSO-9MED should be purged prior to each new round of sampling.

1. Ensure that the constant pressure cylinder connected to the sample outlet is pre-charged.
2. Pressurize the product line.
3. Slightly open the purge valve on the constant pressure cylinder. Once liquid begins to purge, close the purge valve on the constant pressure cylinder.
4. A new round of composite sampling may begin.

2.5 Operation

1. Ensure that the constant pressure cylinder connected to the sample outlet is pre-charged.
2. Set the PLC to the desired sampling frequency based on the sampling actuation equations provided (Figure 6).

Figure 6: Sampling Frequency Equations

| Liquid Sampling, Proportional to Flow Collection | |
|--|--|
| Equation 1: Number of Samples Needed | |
| $\text{Number of Samples Needed to Fill to 80\%} = \frac{(\text{Cylinder Size (cc)} * 0.8)}{\text{Bite Size (cc)}}$ | |
| 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>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> | |



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



Note that the sample volume of the SSO-9MED is adjustable between 0.25–7.50 cc per actuation.

3. The PLC will automatically begin operation once a flow signal is received.
4. The PLC will automatically activate the solenoid to collect product in the SSO-9MED and inject the product into the connected constant pressure cylinder.
5. Sampling continues automatically until the desired volume of sampled product has been collected in the constant pressure cylinder.
6. Once sampling is complete, the constant pressure cylinder can be removed and prepared for transportation to a laboratory for analysis in accordance with company policy and procedure.
7. Prior to removing the constant pressure cylinder from the SSO-9MED, isolate the SSO-9MED from pipeline pressure by closing inlet (**P₁**) valve A and return (**P₂**) valve B or the customer-supplied valve installed to the sample outlet check valve.



Failure to isolate the SSO-9MED from pipeline pressure prior to removing the connected constant pressure cylinder could result in free flow of product through the check valve.



If desired, a valve may be installed to the sample outlet check valve prior to installing a constant pressure cylinder. This would **allow the operator to close one valve to isolate the constant pressure cylinder from pipeline pressure instead of closing inlet (P₁) valve A and return (P₂) valve B.**

8. Prior to starting a new round of sampling, purge the system and the SSO-9MED. See *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED.
9. Once the system and SSO-9MED have been purged of any air and/contaminants, a new round of sampling may begin.

2.6 Verifying the Sample Volume

1. Connect a graduated constant pressure cylinder to the sample outlet of the SSO-9MED if one is not already connected.



Welker® recommends using a graduated constant pressure cylinder with volume indicator to ease verification of the sample volume.

2. Decide how many actuations will be taken into the graduated constant pressure cylinder to verify the sample volume.



Welker® recommends a minimum of ten (10) actuations to verify the sample volume.

3. Activate the sample function manually or remotely so that the collection and injection volume of the SSO-9MED can be verified. The sample function can be activated manually by pushing the manual override button on the solenoid or remotely from the PLC.
4. Capture product in the graduated constant pressure cylinder until the pre-determined number of actuations has been taken.
5. Once the pre-determined number of actuations has been taken, release the manual override button on the solenoid or de-activate the sample function from the PLC.
6. Calculate the sample volume by dividing the volume of product captured in the graduated constant pressure cylinder by the number of actuations taken.
7. As necessary, adjust the sample volume.



Loosen the jam nut on the adjustment screw.
To increase the volume, turn the adjustment knob counterclockwise. To decrease the volume, turn the adjustment knob clockwise.
Tighten the jam nut on the adjusting screw to secure the adjusting screw at the desired volume.



Ensure that the jam nut is tightened to the fastener seal prior to beginning operation, as the pump will not operate correctly unless the jam nut is properly tightened. A leak check may be performed to verify that the jam nut has been properly tightened.

3.1 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.



The SSO-9MED may be used alone or as part of a complete system. Note that these instructions are written for an SSO-9MED used as part of a complete system. If used alone or with equipment from a company other than Welker®, the SSO-9MED should be installed and operated in a manner consistent with the instructions in this *Installation, Operation, and Maintenance (IOM) Manual*.

3.2 Installation for Chemical Injection

1. Ensure that all valves are closed.
2. Wrap the threads of the threaded connection with PTFE tape.
3. Mount the SSO-9MED directly to the mating FNPT connection on the odorant supply tank.
4. Tighten the SSO-9MED to the proper NPT gauge depth.
5. Using appropriately sized customer-supplied tubing, connect from the odorant outlet on the SSO-9MED to the injection point.



Welker® recommends using stainless steel tubing for all natural gas process lines, as plastic tubing can absorb odorant from the gas.



Welker® recommends installing a valve between the system odorant outlet and the injection point.

6. As necessary, use appropriately sized tubing to connect from the normally open port on the customer-supplied solenoid to port A on the power end cap (*Figure 3*). Use appropriately sized tubing to connect from the normally closed port on the solenoid to port B on the power cylinder base (*Figure 3*).
7. Using ¼" tubing, connect a customer-supplied instrument air supply to the solenoid.
8. If desired, use ¼" tubing to tube from the vent outlet on the SSO-9MED to an area away from personnel and equipment (*Figure 3*).



If the vent outlet tubing will terminate outdoors, Welker® recommends installing a screen or muffler to prevent dust and insects from entering the tube and restricting the flow.

9. Ensure that all fittings, connections, and bolts are tightened.
10. Connect the solenoid to a PLC to enable remote automatic operation.

3.3 Preparing for Operation

1. Ensure that the odorant supply tank has been filled.
2. Ensure that the regulated blanket pressure supply source is open to the odorant supply tank.
3. Slowly open vent valve C to purge the SSO-9MED body of any trapped air (*Figure 3*).
4. Once all air has been purged from the SSO-9MED body, close vent valve C.



Welker® recommends plugging this valve when not in use.

5. Slowly open inlet (P₁) valve A (*Figure 3*).
6. Slowly open any valves between the odorant outlet on the SSO-9MED and the injection point.
7. Check for leaks and repair as necessary.

Purging the SSO-9MED

8. Using a wrench, slowly loosen the cap on the bleed valve to purge the injection chamber of any trapped air (*Figure 3*).



Take the necessary precautions and wear appropriate personal protective equipment (PPE) to protect from potential harm caused by exposure to the injection chemical.



If desired, a small hose may be connected to the bleed valve to collect any chemical that may appear at the purge outlet.

9. Once all air has been purged from the injection chamber, tighten the bleed valve cap.
10. As necessary, adjust the injection volume.



Loosen the jam nut on the adjustment screw.
To increase the volume, turn the adjustment knob counterclockwise. To decrease the volume, turn the adjustment knob clockwise.
Tighten the jam nut on the adjusting screw to secure the adjusting screw at the desired volume.



Ensure that the jam nut is tightened to the fastener seal prior to beginning operation, as the pump will not operate correctly unless the jam nut is properly tightened. A leak check may be performed to verify that the jam nut has been properly tightened.

11. As necessary, open any valves restricting the flow of odorant to the pipeline.

Verifying Pump Operation

12. Pump operation can be verified by energizing the solenoid to actuate the SSO-9MED. Manually or remotely energize the solenoid and repeatedly actuate the SSO-9MED to verify pump operation.
13. As the SSO-9MED strokes, verify liquid odorant is being injected into the pipeline.



Collection and injection of the SSO-9MED can be visually verified by referring to:

- a sight glass installed between the SSO-9MED and the injection point,
- a flow indicator or flow switch, or
- the volume indicator on the connected sample container.

14. Once pump operation has been verified, manually or remotely de-energize the solenoid.

Controller Configuration

15. Program the PLC to inject the desired amount of chemical into the pipeline at the desired frequency. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the PLC for instructions.
16. Once the PLC has been configured and the pump operation has been verified, chemical injection may begin.

3.4 Operation

1. The PLC will automatically begin operation once a flow signal is received.
2. The PLC will automatically activate the solenoid to collect the chemical in the SSO-9MED and inject the chemical into the pipeline.
3. Chemical injection continues automatically according to the programmed frequency.

4.1 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 these 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. 10" Wrench
 - b. Hex Key Set
 - c. Seal Pick
 - d. Torque Wrench

4.2 Standard Maintenance



If maintenance on a leaking valve is required, the SSO-9MED must be isolated from pressure and removed from the pipeline or odorant supply tank before maintenance can be safely performed.

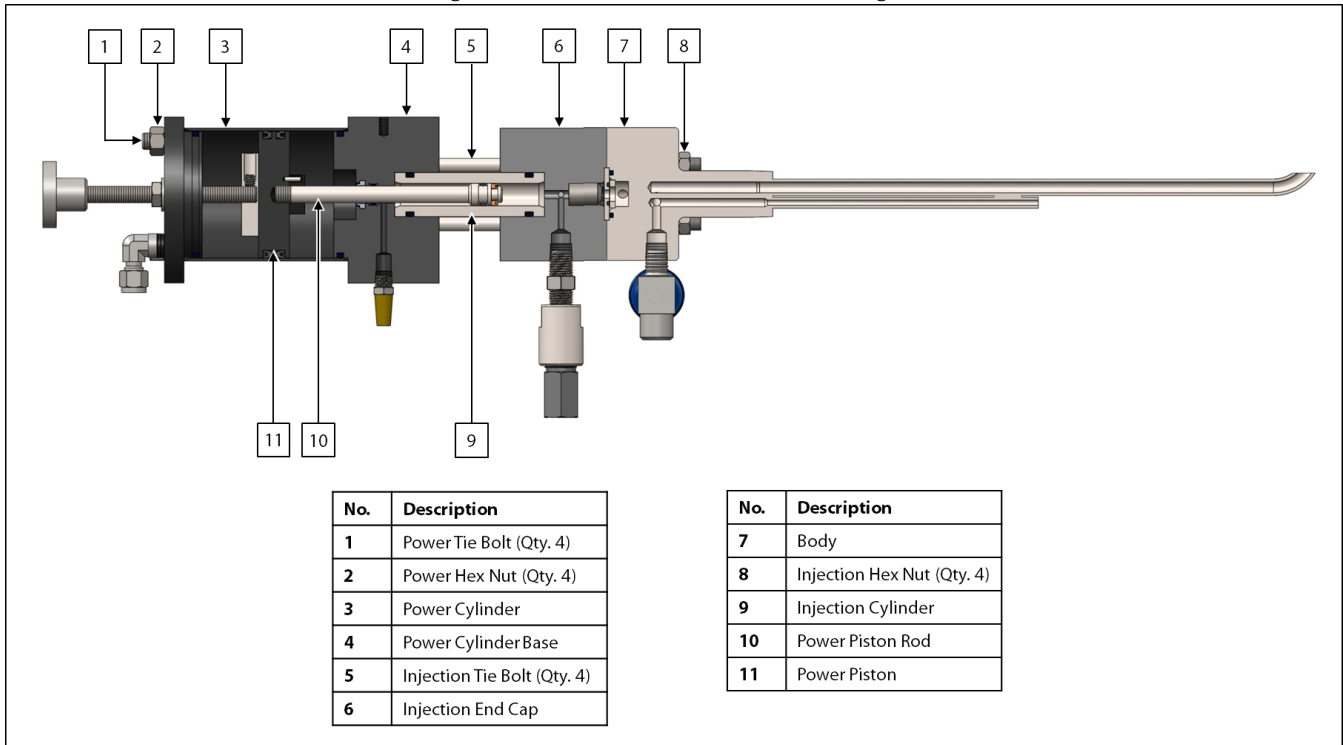


Prior to performing standard or preventative maintenance, the SSO-9MED must be isolated from pressure. However, the SSO-9MED does NOT need to be removed from the pipeline or odorant supply tank to perform standard or preventative maintenance.

1. Close inlet (**P₁**) valve A and return (**P₂**) / isolation valve B to isolate the SSO-9MED from pressure.
2. Ensure that the SSO-9MED has been purged of all sample/chemical. If the SSO-9MED is designed for composite sampling, see *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED. If the SSO-9MED is designed for chemical injection, see *Section 3.3, Preparing for Operation*, for instructions on purging the SSO-9MED.
3. Ensure that the power and injection cylinders of the SSO-9MED have been depressurized by loosening any tubing connected to the power cylinder or by turning off the connected pneumatic supply and then actuating the solenoid.
4. Disconnect all tubing from the SSO-9MED.

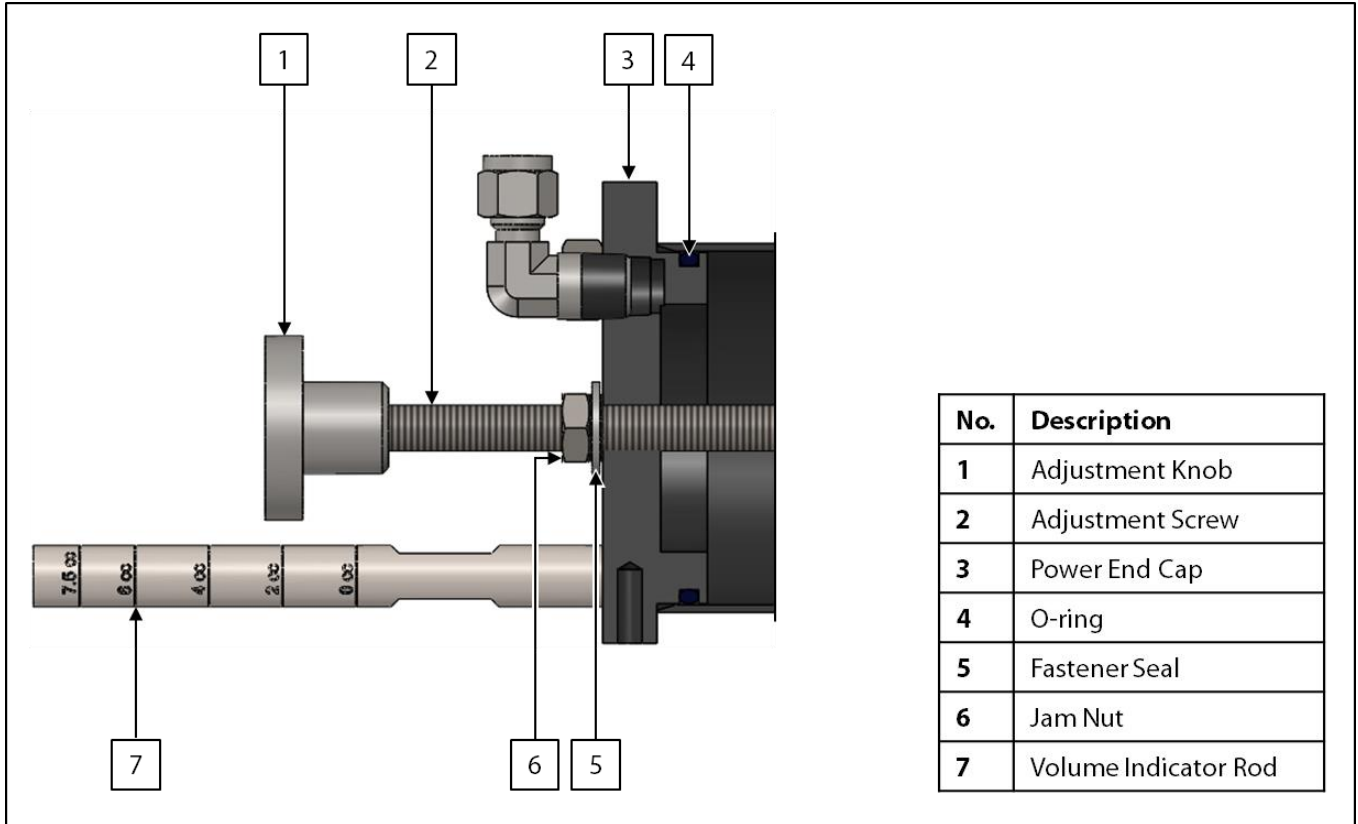
Disassembly

Figure 7: SSO-9MED Maintenance Diagram



5. Remove the injection hex nuts.
6. Remove the power end cap from the power cylinder. Note that the indicator rod with bumper pad will be removed with the power end cap.
7. Carefully remove the power cylinder from the power cylinder base, taking care not to damage the honed surface of the cylinder. Note that the power piston will remain inside the power cylinder.
8. Gently push the power piston out of the power cylinder.
9. Carefully separate the injection end cap from the body, taking care not to misplace the seats or screen / optional filter element.

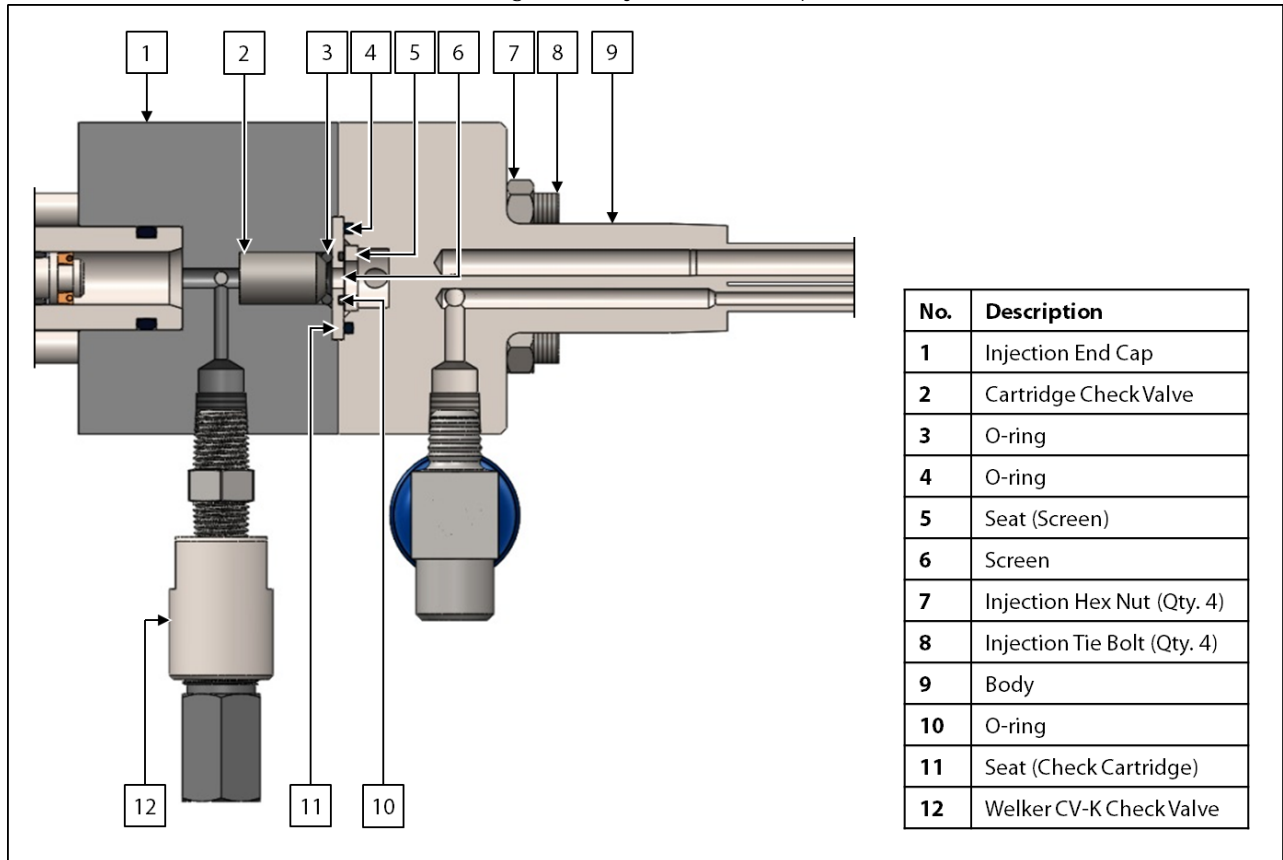
Figure 8: Power End Cap



10. Remove the O-ring from the power end cap and wipe the O-ring groove clean.
11. Replace the O-ring on the power end cap.

Injection End Cap

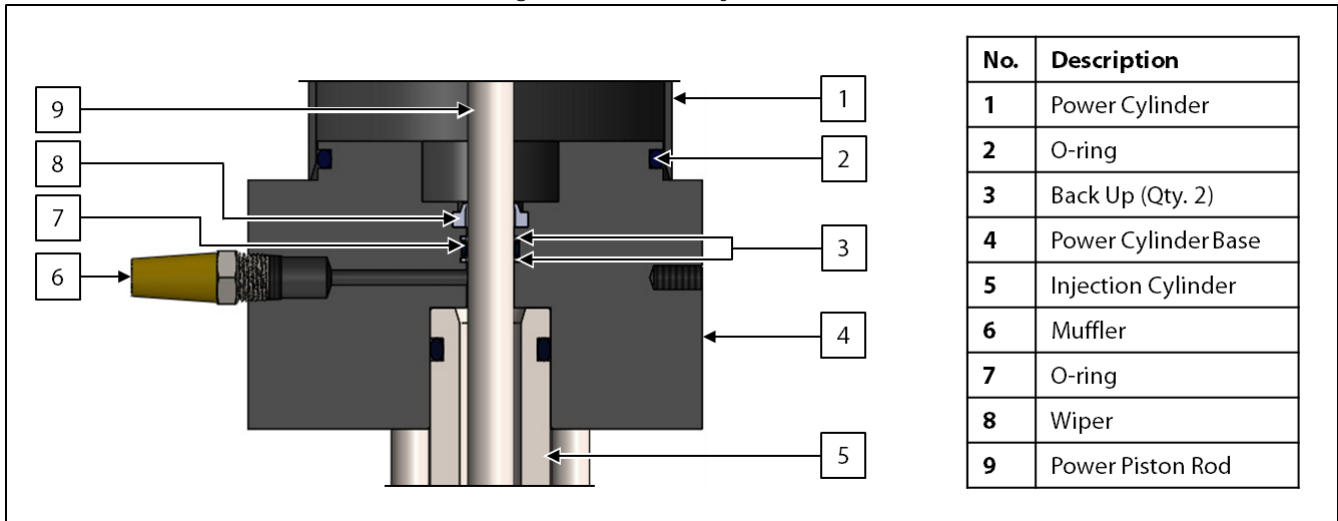
Figure 9: Injection End Cap



12. Remove the cartridge check valve, seat, and O-ring from the injection end cap and wipe the seal grooves clean.
13. Remove the O-ring, seat, and screen / optional filter element from the body and wipe the seal grooves clean.
14. To perform maintenance on the cartridge check valve, refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the cartridge check valve.
15. Inspect the seat and screen / optional filter element for damage. Replace as necessary.
16. Replace the O-rings in the injection end cap and body.
17. To perform maintenance on the check valve, refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the Welker® CV-K Check Valve.

Power Cylinder Base

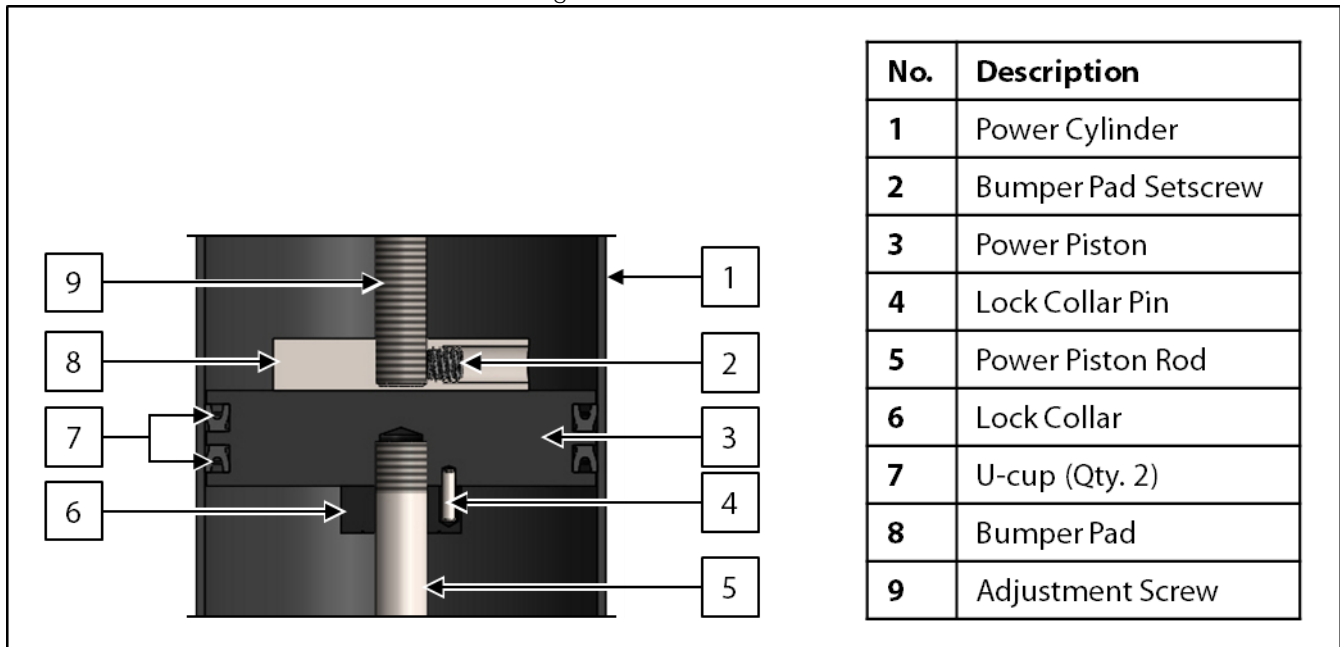
Figure 10: Power Cylinder Base



18. Remove the O-rings, back ups, and wiper from the power cylinder base and wipe the seal grooves clean.
19. Replace the O-rings and back ups in the power cylinder base.
20. Inspect the wiper for any damage. Replace as necessary.
21. Closely examine the honed surface of the power cylinder, as scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker for service options.

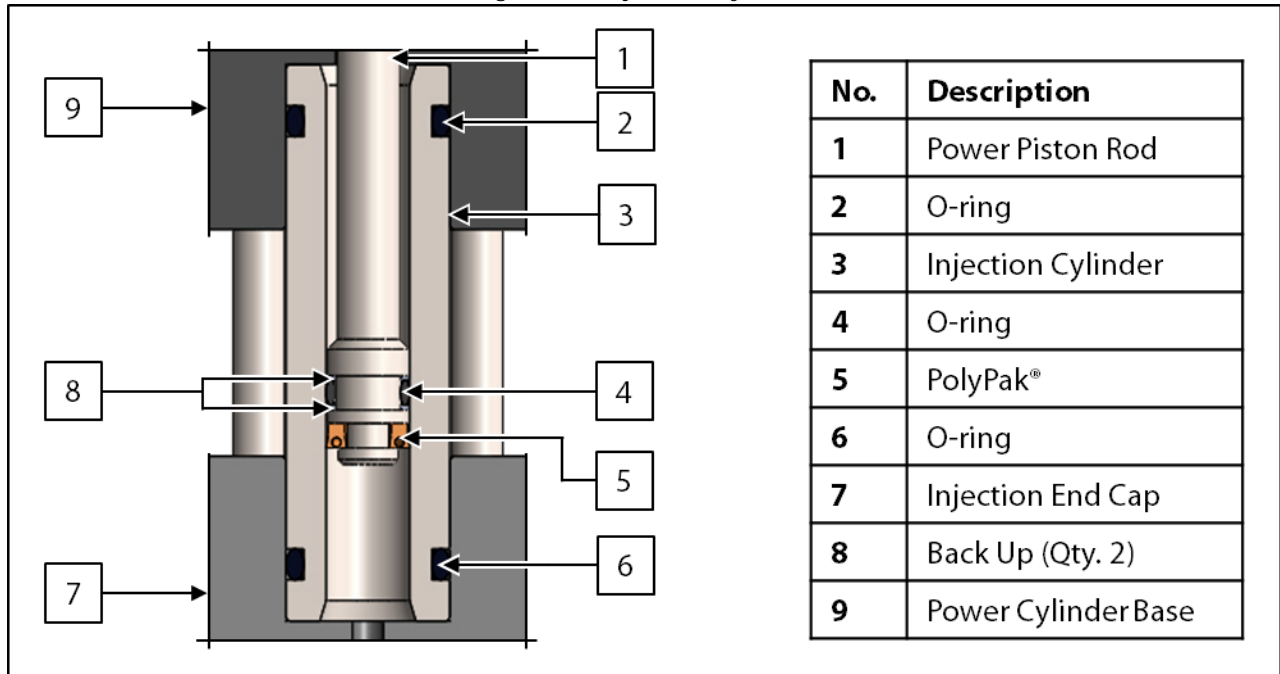
Power Piston

Figure 11: Power Piston



22. Remove the U-cups from the power piston and wipe the seal grooves clean.
23. Replace the U-cups on the power piston. The U-cups should be installed so that they face opposite directions.

Figure 12: Injection Cylinder

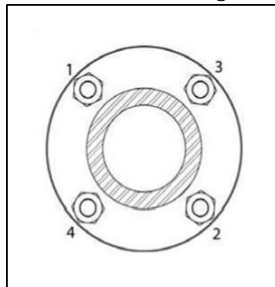


24. Remove the O-ring, back ups, and PolyPak® from the power piston rod and wipe the seal grooves clean.
25. Remove the O-rings from the injection cylinder and wipe the seal grooves clean.
26. Replace the O-ring, back ups, and PolyPak® on the power piston rod.
27. Replace the O-rings on the injection cylinder.
28. Closely examine the surface finish on the injection cylinder, as scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker® for service options.

Reassembly

29. Install the screen / optional filter element and seats to the body.
30. Install the cartridge check valve to the injection end cap.
31. Fit the injection end cap onto the top seat to connect it to the body.
32. Slide the injection cylinder into the injection end cap. Gently push the injection cylinder until it seals with the injection end cap.
33. Carefully slide the power cylinder base onto the injection cylinder. Gently push the power cylinder base until it seals with the injection cylinder.
34. Following a cross-bolting sequence, install the injection tie bolts through the body to the power cylinder base, and then tighten the injection hex nuts to 15–20 ft·lb with a torque wrench (*Figure 13*).

Figure 13: Cross-Bolting Sequence



35. Gently push the power piston assembly with the power piston rod end first into the injection cylinder until the power piston rests on the power cylinder base.
36. Slide the power cylinder over the power piston and onto the power cylinder base. Gently push the power cylinder until it seals with the power cylinder base.
37. Gently push the power end cap into the power cylinder until it seals with the power cylinder.
38. Following a cross-bolting sequence, install the power tie bolts through the power end cap to the power cylinder base, and then tighten the power hex nuts to 10–15 ft·lb with a torque wrench (*Figure 13*).
39. If the SSO-9MED is designed for composite sampling, see *Section 2.2, Installation for Composite Sampling*, for installation instructions. If the SSO-9MED is designed for chemical injection, see *Section 3.2, Installation for Chemical Injection*, for installation instructions.

4.3 Preventative Maintenance



Prior to performing standard or preventative maintenance, the SSO-9MED must be isolated from pressure. However, the SSO-9MED does NOT need to be removed from the pipeline or odorant supply tank to perform standard or preventative maintenance.



To perform preventative maintenance on the power cylinder base, continue to step 1.
To perform preventative maintenance on the cartridge check valve and check valve, proceed to step 13.
To perform preventative maintenance on the power piston rod, proceed to step 29.

Power Cylinder Base



If product leaks from the muffler on the power cylinder base, the following steps should be performed to stop further leakage and prevent damage to the unit.

1. Close inlet (**P₁**) valve A and return (**P₂**) / isolation valve B to isolate the SSO-9MED from pressure.
2. Ensure that the SSO-9MED has been purged of all sample/chemical. If the SSO-9MED is designed for composite sampling, see *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED. If the SSO-9MED is designed for chemical injection, see *Section 3.3, Preparing for Operation*, for instructions on purging the SSO-9MED.
3. Ensure that the power and injection cylinders of the SSO-9MED have been depressurized by loosening any tubing connected to the power cylinder or by turning off the connected pneumatic supply and actuating the solenoid.
4. Disconnect all tubing from the SSO-9MED.
5. Remove the injection hex nuts.
6. Carefully remove the power cylinder and power cylinder base from the injection cylinder. Note that the power end cap and power piston will also be removed at this time.
7. Remove the power hex nuts and tie bolts.
8. Carefully remove the power cylinder base from the power cylinder, taking care not to damage the honed surface of the cylinder. Note that the power piston will remain inside the power cylinder.
9. Remove the O-ring, back ups, and PolyPak® from the power piston rod and wipe the seal grooves clean.
10. Replace the O-ring, back ups, and PolyPak® on the power piston rod.
11. Closely examine the surface finish on the injection cylinder, as scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker® for service options.
12. Reassemble the SSO-9MED. See *Section 4.2, Standard Maintenance*, for instructions on reassembling the SSO-9MED.

Cartridge Check Valve and Check Valve



If the SSO-9MED is not building pressure, the cartridge check valve may require maintenance.



If the indicator on an installed pressure gauge spikes when actuating the SSO-9MED but then falls to process pressure, the check valves may be leaking. Maintenance may need to be performed on the check valves.

13. Close inlet (**P₁**) valve A and return (**P₂**) / isolation valve B to isolate the SSO-9MED from pressure.
14. Ensure that the SSO-9MED has been purged of all sample/chemical. If the SSO-9MED is designed for composite sampling, see *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED. If the SSO-9MED is designed for chemical injection, see *Section 3.3, Preparing for Operation*, for instructions on purging the SSO-9MED.
15. Ensure that the power and injection cylinders of the SSO-9MED have been depressurized by loosening any tubing connected to the power cylinder or by turning off the connected pneumatic supply and actuating the solenoid.
16. Disconnect all tubing from the SSO-9MED.
17. Remove the injection hex nuts and tie bolts.
18. Carefully remove the power cylinder and injection cylinder from the injection end cap. Notes that the power end cap, power piston, and power cylinder base will also be removed at this time.
19. Carefully separate the injection end cap from the body, taking care not to misplace the seats or screen / optional filter element.
20. Remove the cartridge check valve, seat, and O-ring from the injection end cap.
21. Blow instrument air into one end of the cartridge check valve and then into the other. If instrument air blows through both ways, the cartridge check valve needs to be replaced. Contact Welker® for service options. If instrument air does not blow through both ways, the cartridge check valve is functioning properly.



If an excessive amount of trash is blown from the check valve, the filter in the injection end cap may need to be replaced.

22. As necessary, replace the cartridge check valve.
23. Return the cartridge check valve, seat, and O-ring to the injection end cap.



Ensure that the flow arrow on the cartridge check valve points in the direction of product flow. Incorrect installation of the cartridge check valve will prevent the SSO-9MED from operating properly.

24. Unscrew the check valve from the injection end cap.
25. Blow instrument air into one end of the check valve and then into the other. If instrument air blows through both ways, the check valve needs to be replaced. Contact Welker® for service options. If instrument air does not blow through both ways, the check valve is functioning properly.



If an excessive amount of trash is blown from the check valve, the filter in the injection end cap may need to be replaced.

26. As necessary, replace the check valve.

27. Reinstall the check valve to the injection end cap.
28. Reassemble the SSO-9MED. See *Section 4.2, Standard Maintenance*, for instructions on reassembling the SSO-9MED.

Power Piston Rod



If the power piston rod is damaged, it can be replaced, and then the SSO-9MED can be put back into service.

29. Close inlet (**P₁**) valve A and return (**P₂**) valve B to isolate the SSO-9MED from pressure.
30. Ensure that the SSO-9MED has been purged of all sample/chemical. If the SSO-9MED is designed for composite sampling, see *Section 2.4, Purging the SSO-9MED*, for instructions on purging the SSO-9MED. If the SSO-9MED is designed for chemical injection, see *Section 3.3, Preparing for Operation*, for instructions on purging the SSO-9MED.
31. Ensure that the power and injection cylinders of the SSO-9MED have been depressurized by loosening any tubing connected to the power cylinder or by turning off the connected pneumatic supply and actuating the solenoid.
32. Disconnect all tubing from the SSO-9MED.
33. Remove the power hex nuts and tie bolts.
34. Remove the power end cap from the power cylinder. Note that the indicator rod with bumper pad will be removed with the power end cap.
35. Carefully remove the power cylinder from the power cylinder base, taking care not to damage the honed surface of the cylinder. Note that the power piston will remain inside the power cylinder.
36. Gently push the power piston out of the power cylinder.
37. Remove the setscrew from the lock collar, and then remove the power piston rod from the power piston, taking care not to misplace the lock collar pin.
38. Replace the power piston rod.
39. Reassemble the SSO-9MED. See *Section 4.2, Standard Maintenance*, for instructions on reassembling the SSO-9MED.

4.4 Troubleshooting Guidelines

Table 2: SSO-9MED Troubleshooting Guidelines

| Issues | Possible Causes | Solutions |
|--|--|---|
| (Composite Sampling) Product is not flowing through the SSO-9MED. | <p>Inlet (P₁) valve A and return (P₂) valve B may not be open.</p> <p>The valve between the SSO-9MED and the constant pressure cylinder may not be open.</p> | <p>Ensure that inlet (P₁) valve A and return (P₂) valve B are open.</p> <p>Ensure that the valve between the SSO-9MED and the constant pressure cylinder is open.</p> |
| (Chemical Injection) Chemical is not flowing through the SSO-9MED. | <p>Inlet (P₁) valve A may not be open.</p> <p>The valve between the SSO-9MED and the pipeline may not be open.</p> | <p>Ensure that inlet (P₁) valve A is open. Isolation valve B must remain closed.</p> <p>Ensure that the valve between the SSO-9MED and the pipeline is open.</p> |
| The SSO-9MED is not actuating properly. | <p>The pneumatic supply may be too high, too low, or not operating.</p> <p>The solenoid may not be operating properly.</p> | <p>Check the pneumatic supply to ensure that air is supplied at the appropriate pressure.</p> <p>Check the solenoid using the manual override button to ensure proper orientation. If operating improperly, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the solenoid.</p> |
| The SSO-9MED is not collecting the correct sample volume. | <p>Air is trapped in the SSO-9MED.</p> <p>The adjustment knob is not set correctly.</p> | <p>Open the bleed valve on the SSO-9MED to remove any air from the pump.</p> <p>Turn the adjustment knob on the SSO-9MED clockwise or counterclockwise until the desired volume has been set, and then tighten the jam nut to the fastener seal (<i>Figure 5</i>).</p> |

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

- IOM-105: Welker® NV-1 and NV-2 Instrument Valves
- IOM-182: Welker® CV-K Check Valve

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

- Kepner Products Company Kepsel® Cartridge Insert Valves (Welker® IOM-V078)
- Swagelok® Bleed Valves and Purge Valves (Welker® IOM-V208)

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

- Assembly Drawing: AD243DI (SSO-9MED With Flanged Pipeline Connection)
- Assembly Drawing: AD243DK (Standard SSO-9MED)
- Assembly Drawing: AD243DK.K1 (SSO-9MED for Chemical Injection)

