



INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® INJECTION PUMP

MODEL

SS0-8

DRAWING NUMBERS

AD148CF

AD148CG

AD148CO

AD148CQ

AD500CA

MANUAL NUMBER

IOM-065

REVISION

Rev. A, 8/17/2016

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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® Injection Pump, SSO-8. 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 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 Injection Pump, 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® SSO-8 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 pipeline.

When incorporated into a Welker® sampling or injection system, the SSO-8 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 solenoids, which control the valves and pump action of the SSO-8.



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-8 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-8 to ensure proper personal protective equipment (PPE) is used and safe handling procedures are followed.

1.4 Principles of Operation

Automatic Operation: SSO-8 With 3-Way Ball Valve

1. From the PLC, activate the collection function remotely. Supply pressure enters below the internal power piston and supplies the valve actuator with the pneumatic supply. The valve actuator rotates the 3-way ball valve to make the pump port common with the inlet port, drawing sample/chemical into the SSO-8.



If the SSO-8 is equipped with a hydraulic oil reservoir, the hydraulic oil in the indicator tube will rise during collection.

2. From the PLC, activate the injection function. Supply pressure enters above the internal power piston and supplies the valve actuator with the pneumatic supply. The valve actuator rotates the 3-way ball valve to make the pump port common with the outlet port, injecting the sample/chemical into the sample container / pipeline.



If the SSO-8 is equipped with a hydraulic oil reservoir, the hydraulic oil in the indicator tube will fall during injection.

3. Operation continues automatically according to the frequency programmed into the PLC.

Manual Operation: SSO-8 With 3-Way Ball Valve

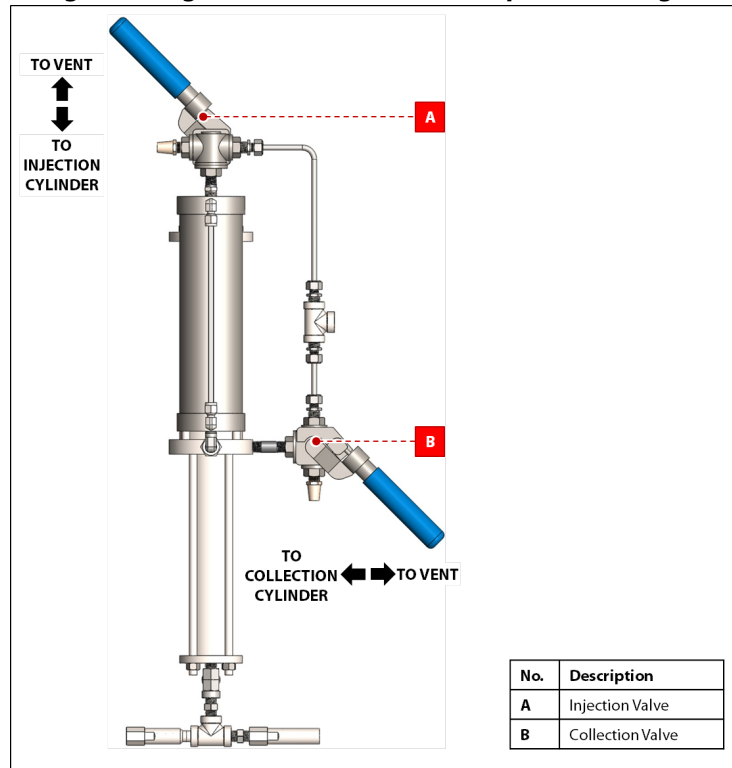
1. Press and hold the collection push-button valve to activate the collection function. Supply pressure enters below the internal power piston and supplies the valve actuator with the pneumatic supply. The valve actuator rotates the 3-way ball valve to make the pump port common with the inlet port, drawing sample/chemical into the SSO-8. Once the hydraulic oil in the indicator tube has stopped rising and is near the top, release the collection push-button valve.
2. Press and hold the injection push-button valve to activate the injection function. Supply pressure enters above the internal power piston and supplies the valve actuator with the pneumatic supply. The valve actuator rotates the 3-way ball valve to make the pump port common with the outlet port, injecting the sample/chemical into the sample container / pipeline. Once the hydraulic oil in the indicator tube has stopped falling and is near the bottom of the hydraulic oil reservoir, release the injection push-button valve.
3. To continue operation, repeat steps 1–2.

Manual Operation: SSO-8 With Check Valves

1. Press and hold the collection push-button valve to activate the collection function. Supply pressure enters below the internal power piston, allowing chemical to enter the SSO-8 through the inlet check valve. Once the hydraulic oil in the indicator tube has stopped rising and is near the top, release the collection push-button valve.
2. Press and hold the injection push-button valve to activate the injection function. Supply pressure enters above the internal power piston, injecting the sample/chemical into the sample container / pipeline. Once the hydraulic oil in the indicator tube has stopped falling and is near the bottom of the hydraulic oil reservoir, release the injection push-button valve.
3. To continue operation, repeat steps 1–2.

Manual Operation: High Pressure SSO-8 With Check Valves

Figure 1: High Pressure SSO-8 Valve Operation Diagram



1. Pull the handle of collection valve B to open the valve to the collection cylinder and activate the collection function. Supply pressure enters below the internal power piston, allowing chemical to enter the SSO-8 through the inlet check valve. Once the hydraulic oil in the indicator tube has stopped rising and is near the top, return the handle of collection valve B to its starting position.
2. Pull the handle of injection valve A to open the valve to the injection cylinder and activate the injection function. Supply pressure enters above the internal power piston, injecting the sample/chemical into the sample container / pipeline. Once the hydraulic oil in the indicator tube has stopped falling and is near the bottom of the hydraulic oil reservoir, return the handle of injection valve A to its starting position.
3. To continue operation, repeat steps 1–2.

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-8 Specifications

Applications	Bypass 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	Standard: 316/316L Stainless Steel Wetted Parts, Aluminum, PTFE, and Viton® High Pressure: 316/316L Stainless Steel, PTFE, Kalrez®, and Viton® Others Available
Pressure Limits: Standard	Actuation: 30–400 psig (2–27 barg) Injection: 1000 psig (68 barg), 1025 psig (70 barg), or 1050 psig (72 barg) Power End: 400 psig (27 barg)
Pressure Limits: High Pressure	Actuation: 30–570 psig (2–39 barg) Injection: 1480 psig (102 barg) Power End: 570 psig (39 barg)
Connections	3-Way Ball Valve Actuation Ports: 1/8" FNPT Inlet and Outlet: 1/4" FNPT Pneumatic Supply Inlet: 1/4" FNPT
Utility Requirement	Pneumatic Supply
Injection Volume	300 cc 500 cc 800 cc 1000 cc 1500 cc
Options	Actuation Valve Adjustable Injection Volume Check Valves Push-Button Valves Without Hydraulic Oil Reservoir

1.6 Equipment Diagrams

Figure 2: SSO-8 With Optional Volume Adjustment (Automatic Bypass Sampling)

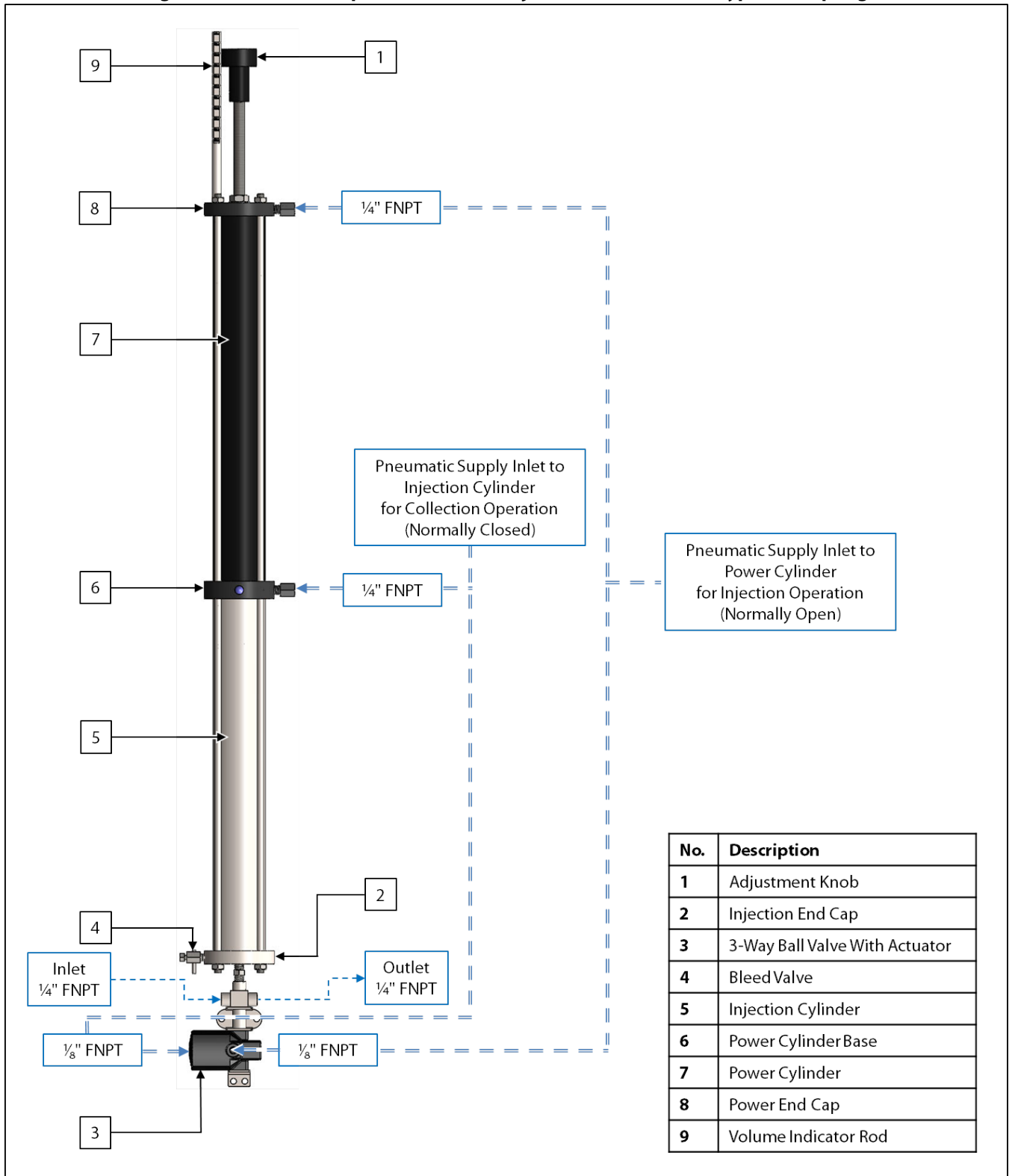


Figure 3: SSO-8 With Check Valves (Manual Chemical Injection, Vertical Mount)

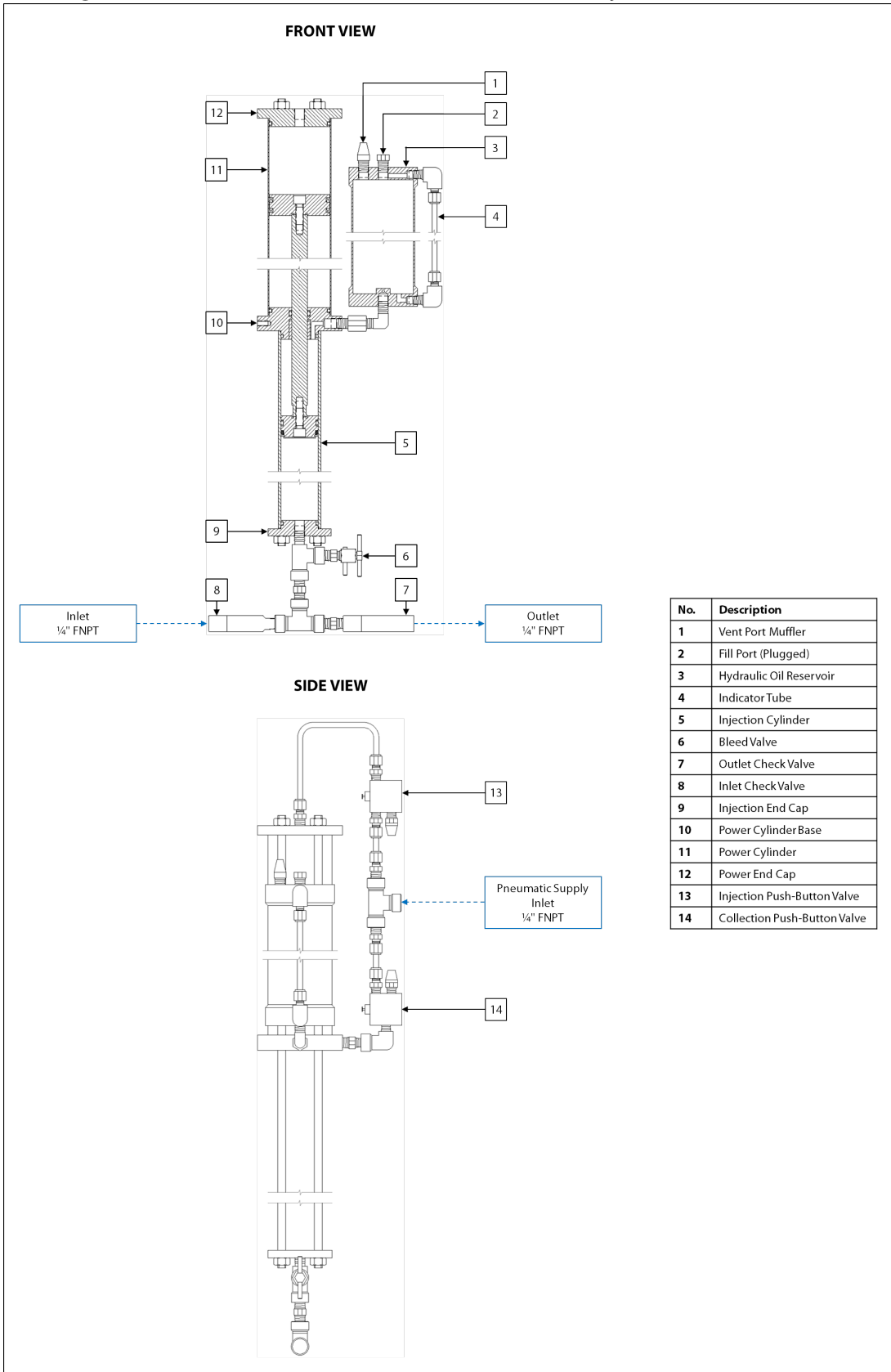


Figure 4: High Pressure SSO-8 With Check Valves (Manual Chemical Injection, Vertical Mount)

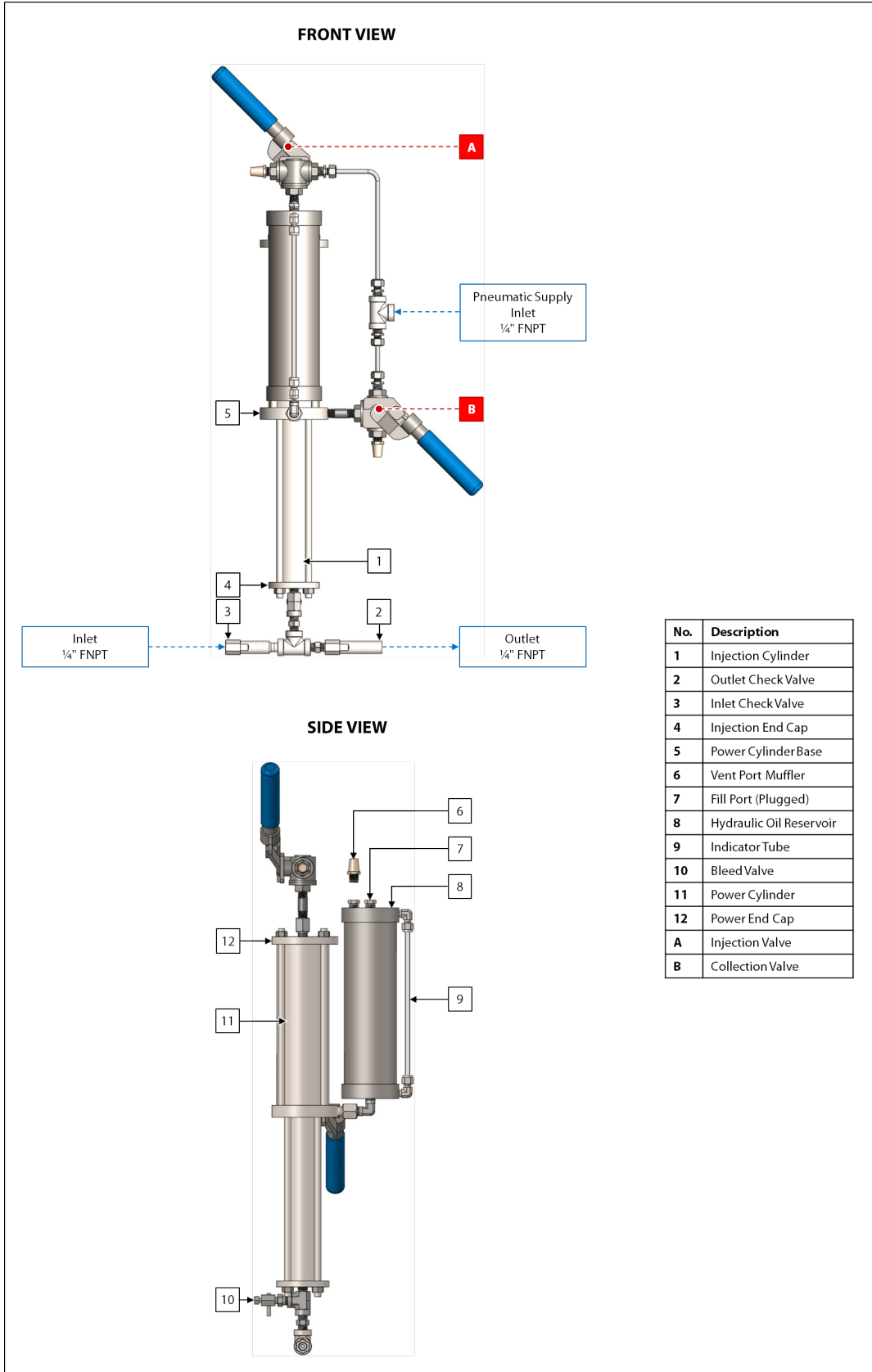
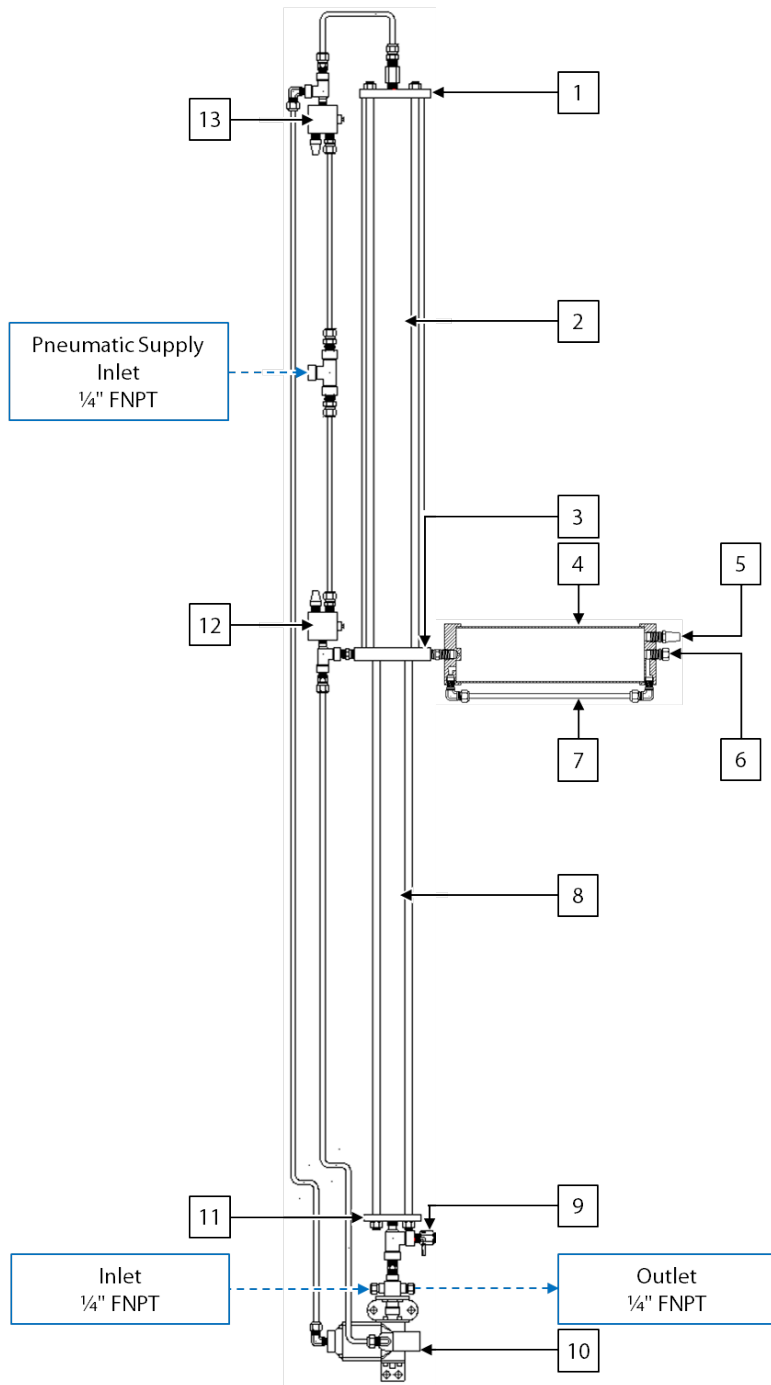


Figure 5: SSO-8 With 3-Way Ball Valve (Manual Chemical Injection, Horizontal Mount)



No.	Description
1	Power End Cap
2	Power Cylinder
3	Power Cylinder Base
4	Hydraulic Oil Reservoir
5	Vent Port Muffler
6	Fill Port (Plugged)
7	Indicator Tube
8	Injection Cylinder
9	Bleed Valve
10	3-Way Ball Valve With Actuator
11	Injection End Cap
12	Collection Push-Button Valve
13	Injection Push-Button Valve

Figure 6: SSO-8 With 3-Way Ball Valve (Automatic Chemical Injection, Vertical Mount)

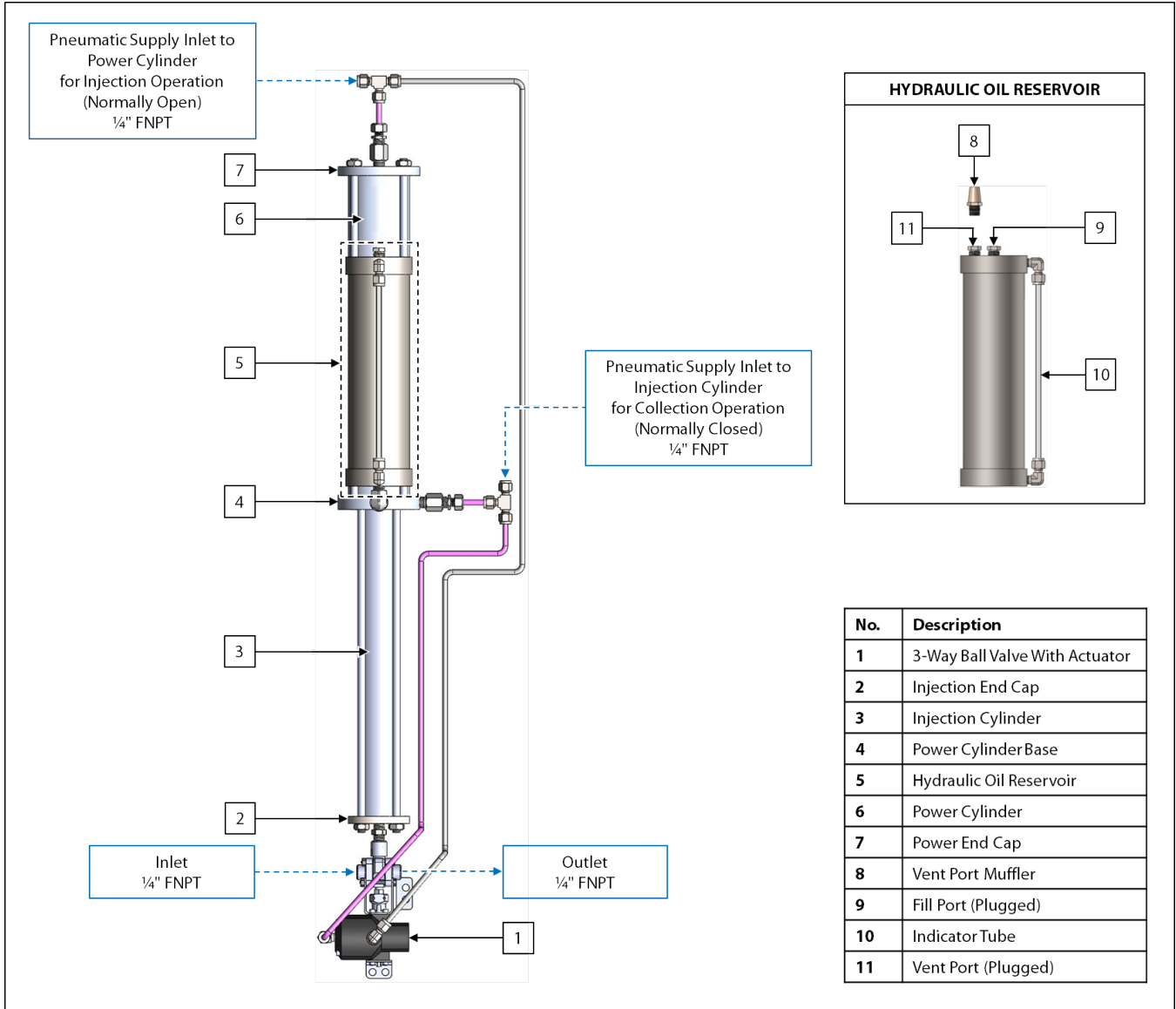
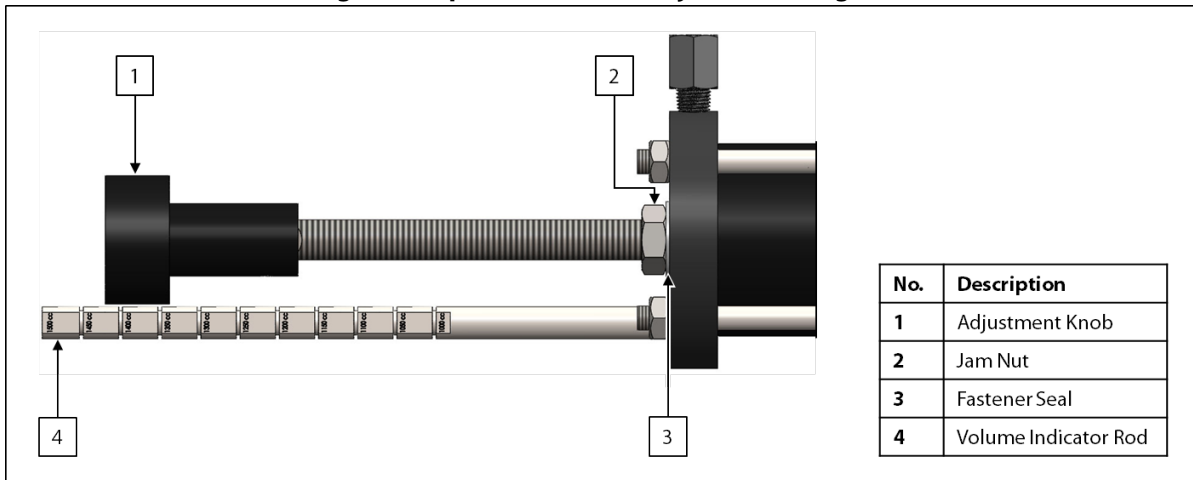


Figure 7: Optional Volume Adjustment Diagram



SECTION 2: INSTALLATION & OPERATION: BYPASS SAMPLING

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-8 may be used alone or as part of a complete system. Note that these instructions are written for a SSO-8 used as part of a complete system. If used alone or with equipment from a company other than Welker, the SSO-8 should be installed and operated in a manner consistent with the instructions in this *Installation, Operation, and Maintenance (IOM) Manual*.

2.2 Installation for Bypass Sampling

1. Prior to installing the SSO-8, ensure that the 3-way ball valve is normally open to the outlet as necessary.
2. As necessary, vertically mount the SSO-8 on a product fast loop.
3. Connect from the outlet of the customer probe to the inlet of the SSO-8 (*Figure 2*).
4. Connect from the outlet of the SSO-8 to the desired sample container (*Figure 2*).
5. Install a customer-supplied 4-way solenoid valve between the customer pneumatic supply and the SSO-8.
6. Connect the pneumatic supply to the customer-supplied 4-way solenoid valve.
7. Connect from the customer-supplied solenoid valve to the PLC. Refer to industry standards for appropriate electrical connections to interface with the PLC.
8. Check all fittings for leaks and repair as necessary.

2.3 Preparing for Automatic Operation

1. Purge the SSO-8 of any trapped air by pressurizing the product line and then slightly opening the bleed valve on the SSO-8. Once liquid appears, close the bleed valve.
2. Check for leaks and repair as necessary.
3. Set the pneumatic supply pressure for the customer-supplied 4-way solenoid valve.



The pneumatic supply should be set to approximately 30 psig.

4. As necessary, verify the injection volume. See *Section 2.5, Injection Volume Verification*, for instructions.
5. From the PLC, activate the sample function so that correct collection and injection of product by the SSO-8 can be verified.
6. Visually verify the correct collection and injection of product by the SSO-8.



Collection and injection of the SSO-8 can be visually verified by referring to:

- a sight glass installed between the SSO-8 and the injection point,
- a flow indicator or flow switch, or
- the volume indicator on the connected sample container.

7. Check for leaks and repair as necessary.
8. If the SSO-8 is equipped with the optional volume adjustment, adjust the injection volume on the SSO-8 as necessary (*Figure 7*).



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



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.

9. The SSO-8 may now be put into operation.

2.4 Automatic Operation



The SSO-8 should always be left in the inject position when not in use. In the inject position, the hydraulic oil level should be near the bottom of the hydraulic oil reservoir.

1. Program the PLC to energize the solenoid when a sample is required.
2. The PLC will automatically activate the solenoid to collect product in the SSO-8 and inject the product into the connected sample container.
3. Once sampling is complete, sampled product collected in the sample container can be removed and prepared for transportation to a laboratory for analysis in accordance with company policy and procedure.
4. Prior to starting a new round of sampling, purge the system and the SSO-8. Refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the system for purge instructions.
5. Once the system and SSO-8 have been purged of any contaminants, a new round of sampling may begin.

2.5 Injection Volume Verification

1. If safe, tube from the outlet of the SSO-8 to a graduated beaker.
2. From the PLC, activate the sample function so that the collection and injection volume of the SSO-8 can be verified.
3. Capture product in the graduated beaker.
4. Once product has been captured in the graduated beaker, stop product flow to the SSO-8.
5. As necessary, adjust the injection volume on the SSO-8 (*Figure 7*).



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



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.

SECTION 3: INSTALLATION & OPERATION: CHEMICAL INJECTION

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-8 may be used alone or as part of a complete system. Note that these instructions are written for a SSO-8 used as part of a complete system. If used alone or with equipment from a company other than Welker, the SSO-8 should be installed and operated in a manner consistent with the instructions in this *Installation, Operation, and Maintenance (IOM) Manual*.

3.2 Installation for Manual Operation

1. Prior to installing the SSO-8, ensure that the 3-way ball valve is normally open to the outlet as necessary.
2. As necessary, mount the SSO-8 in a location convenient for chemical injection.



The SSO-8 must be installed so that the hydraulic oil reservoir remains vertical. The hydraulic oil reservoir will not function properly if oriented horizontally.

3. As necessary, remove the plug from the hydraulic oil reservoir vent port and install a muffler in its place.
4. Connect from the chemical supply to the inlet of the SSO-8 (*Figure 3* or *Figure 5*).



The line between the chemical supply and the inlet of the SSO-8 should include a check valve, such as the Welker® CV-K. Welker recommends installing the check valve directly to the inlet of the SSO-8. This is an added safety measure to ensure that the chemical is entering the SSO-8 and to prevent backflow of the chemical from the SSO-8 to the chemical supply.

5. Connect from the outlet on the SSO-8 to the injection probe installed in the pipeline (*Figure 3* or *Figure 5*).



Welker recommends installing the following equipment at the injection point:

- an injection probe with a spray nozzle, such as the Welker® AP-3MI,
- a sight glass, such as the Welker® SG-3, for visual verification of chemical injection, and
- a check valve, such as the Welker® CV-K, to ensure that the injection chemical enters the pipeline and to prevent backflow of the injection chemical from the pipeline to the SSO-8.

6. Connect the pneumatic supply to the pneumatic supply inlet between the valves (*Figure 3*, *Figure 4*, or *Figure 5*).



The pneumatic supply should be set to approximately 30 psig.

7. Check all fittings for leaks and repair as necessary.

3.3 Preparing for Manual Operation



When operating the SSO-8, the collection and injection valves must remain open until the pump makes a complete stroke, as indicated by the hydraulic oil level in the indicator tube on the hydraulic oil reservoir. Push-button valves must be pushed and held, and valves with handles must remain open to the SSO-8.

1. Connect a small hose to the bleed valve on the SSO-8 to collect any chemical that may appear at the purge outlet (*Figure 3, Figure 4, or Figure 5*).



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

2. To purge the line from the chemical supply to the inlet, press and hold the collection push-button valve, or open collection valve B to the collection cylinder (*Figure 1, Figure 3, or Figure 5*). Once the hydraulic oil in the indicator tube has stopped rising and is near the top of the hydraulic oil reservoir, release the collection push-button valve, or return the handle of collection valve B to its starting position.
3. Press and hold the injection push-button valve, or open injection valve A to the injection cylinder (*Figure 1, Figure 3, or Figure 5*). Once the hydraulic oil in the indicator tube has stopped falling and is near the bottom of the hydraulic oil reservoir, release the injection push-button valve, or return the handle of injection valve A to its starting position.
4. Check for leaks in the line from the chemical supply to the inlet and repair as necessary.
5. To purge the line from the outlet to the injection point, slightly open the bleed valve. As necessary, repeat steps 2–3 until all air has been purged from the line.



If the distance between the outlet of the 3-way ball valve and the injection point is greater than twelve inches (12"), several cycles may be needed to fill this tubing with chemical.

6. Check for leaks in the line from the SSO-8 outlet to the injection point and repair as necessary.
7. As necessary, verify the injection volume. See *Section 3.8, Injection Volume Verification*, for instructions.
8. Visually verify the correct collection and injection of chemical by the SSO-8.



Collection and injection of the SSO-8 can be visually verified by referring to:

- a sight glass installed between the SSO-8 and the injection point,
- a flow indicator or flow switch, or
- the volume indicator on the connected sample container.



If the chemical is injected into a container with volume indicator to verify that the SSO-8 is correctly injecting chemical, ensure that the chemical is disposed of properly.



Welker recommends the use of a verification system, such as the Welker® AVA Volume Analyzer, to verify the injection of the correct volume of chemical into the pipeline.

9. Check for leaks and repair as necessary.
10. If the SSO-8 is equipped with the optional volume adjustment, adjust the injection volume of the SSO-8 as necessary (*Figure 7*).



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



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. The SSO-8 may now be put into operation.

3.4 Manual Operation



The SSO-8 should always be left in the inject position when not in use. In the inject position, the hydraulic oil level should be near the bottom of the hydraulic oil reservoir.



When operating the SSO-8, the collection and injection valves must remain open until the pump makes a complete stroke, as indicated by the hydraulic oil level in the indicator tube on the hydraulic oil reservoir. Push-button valves must be pushed and held, and valves with handles must remain open to the SSO-8.

1. Ensure that chemical is flowing to the inlet of the SSO-8.
2. Press and hold the collection push-button valve, or open collection valve B to the collection cylinder (*Figure 1, Figure 3, or Figure 5*). Once the hydraulic oil in the indicator tube has stopped rising and is near the top of the hydraulic oil reservoir, release the collection push-button valve, or return the handle of collection valve B to its starting position.
3. Once the SSO-8 has collected the full volume of chemical, press and hold the injection push-button valve, or open injection valve A to the injection cylinder (*Figure 1, Figure 3, or Figure 5*). Once the hydraulic oil in the indicator tube has stopped falling and is near the bottom of the hydraulic oil reservoir, release the injection push-button valve, or return the handle of injection valve A to its starting position.
4. To continue manual injection, repeat steps 2–3.

3.5 Installation for Automatic Operation

1. Prior to installing the SSO-8, ensure that the 3-way ball valve is normally open to the outlet as necessary.
2. As necessary, mount the SSO-8 in a location convenient for chemical injection.



The SSO-8 must be installed so that the hydraulic oil reservoir remains vertical. The hydraulic oil reservoir will not function properly if oriented horizontally.

3. Connect from the chemical supply to the inlet on the SSO-8 (*Figure 6*).



The line between the chemical supply and the inlet of the SSO-8 should include a check valve, such as the Welker® CV-K. Welker recommends installing the check valve directly to the inlet of the SSO-8. This is an added safety measure to ensure that the chemical is entering the SSO-8 and to prevent backflow of the chemical from the SSO-8 to the chemical supply.

4. Connect from the outlet on the SSO-8 to the customer injection probe installed in the pipeline (*Figure 6*).



Welker recommends installing the following equipment at the injection point:

- an injection probe with a spray nozzle, such as the Welker® AP-3MI,
- a sight glass, such as the Welker® SG-3, for visual verification of chemical injection, and
- a check valve, such as the Welker® CV-K, to ensure that the injection chemical enters the pipeline and to prevent backflow of the injection chemical from the pipeline to the SSO-8.

5. Install a customer-supplied 4-way solenoid valve between the customer pneumatic supply and the SSO-8.
6. Connect the pneumatic supply to the customer-supplied 4-way solenoid valve.
7. Connect from the customer-supplied 4-way solenoid valve to the PLC. Refer to industry standards for appropriate electrical connections to interface with the PLC.
8. Set the pneumatic supply pressure for the customer-supplied 4-way solenoid valve.



The pneumatic supply should be set to approximately 30 psig.

9. Check all fittings for leaks and repair as necessary.

3.6 Preparing for Automatic Operation

1. Connect a small hose to the bleed valve on the SSO-8 to collect any chemical that may appear at the purge outlet.



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

2. Purge the line from the chemical supply to the injection point. From the PLC, activate the collect function.



If the SSO-8 is equipped with a hydraulic oil reservoir, the hydraulic oil in the indicator tube will rise during collection.

3. From the PLC, activate the inject function.



If the SSO-8 is equipped with a hydraulic oil reservoir, the hydraulic oil in the indicator tube will fall during injection.

4. Check for leaks in the line from the chemical supply to the inlet and repair as necessary.
5. To purge the line from the outlet to the injection point, slightly open the bleed valve. As necessary, repeat steps 2–3 until all air has been purged from the line.



If the distance between the outlet of the 3-way ball valve and the injection point is greater than twelve inches (12"), several cycles may be needed to fill this tubing with chemical.

6. Check for leaks in the line from the SSO-8 outlet to the injection point and repair as necessary.
7. As necessary, verify the injection volume. See *Section 3.8, Injection Volume Verification*, for instructions.
8. Visually verify the correct collection and injection of chemical by the SSO-8.



Collection and injection of the SSO-8 can be visually verified by referring to:

- a sight glass installed between the SSO-8 and the injection point,
- a flow indicator or flow switch, or
- the volume indicator on the connected sample container.



If the chemical is injected into a container with volume indicator to verify that the SSO-8 is correctly injecting chemical, ensure that the chemical is disposed of properly.



Welker recommends the use of a verification system, such as the Welker® AVA Volume Analyzer, to verify the injection of the correct volume of chemical into the pipeline.

9. Check for leaks and repair as necessary.

10. If the SSO-8 is equipped with the optional volume adjustment, adjust the injection volume of the SSO-8 as necessary (Figure 7).



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



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. The SSO-8 may now be put into operation.

3.7 Automatic Operation



The SSO-8 should always be left in the inject position when not in use. In the inject position, the hydraulic oil level should be near the bottom of the hydraulic oil reservoir.

1. Program the PLC to inject the desired amount of chemical into the pipeline at the desired frequency.
2. The PLC will automatically begin operation once a flow signal is received.
3. The PLC will automatically activate the solenoid to collect the chemical in the SSO-8 and inject the chemical into the pipeline.
4. Chemical injection continues automatically according to the programmed frequency.

3.8 Injection Volume Verification

1. If safe, tube from the outlet of the SSO-8 to a graduated beaker.
2. From the PLC, activate the injection function so that the collection and injection volume of the SSO-8 can be verified.
3. Capture chemical in the graduated beaker.
4. Once product has been captured in the graduated beaker, stop chemical flow to the SSO-8.
5. As necessary, adjust the injection volume on the SSO-8 (Figure 7).



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



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.

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 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. 10" Wrench
 - b. Hex Key Set
 - c. Seal Pick

4.2 Maintenance



If the SSO-8 is equipped with a 3-way ball valve, Welker recommends tagging tubing and noting how it is connected to the 3-way ball valve before removing the SSO-8 from its installation to ensure correct reinstallation.

1. Prior to disassembly, ensure that the system is depressurized.
2. Ensure that the SSO-8 has been purged of all sample/chemical.
3. Place the SSO-8 in the collection position. The hydraulic oil in the indicator tube should be near the top of the hydraulic oil reservoir. If the SSO-8 is designed for manual operation, see *Section 3.4, Manual Operation*, for instructions. If the SSO-8 is designed for automatic operation, *Section 2.4, Automatic Operation*, or *Section 3.7, Automatic Operation*, for instructions.
4. Ensure that the power and injection cylinders of the SSO-8 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 of the injection push-button valve (*Figure 3* or *Figure 5*).
5. Disconnect all tubing from the SSO-8.
6. As necessary, drain the hydraulic oil from the hydraulic oil reservoir, and then remove the hydraulic oil reservoir from the SSO-8.
7. For complete and proper maintenance on the valve(s), refer to the *Installation, Operation, and Maintenance (IOM) Manual* for the appropriate valve type.



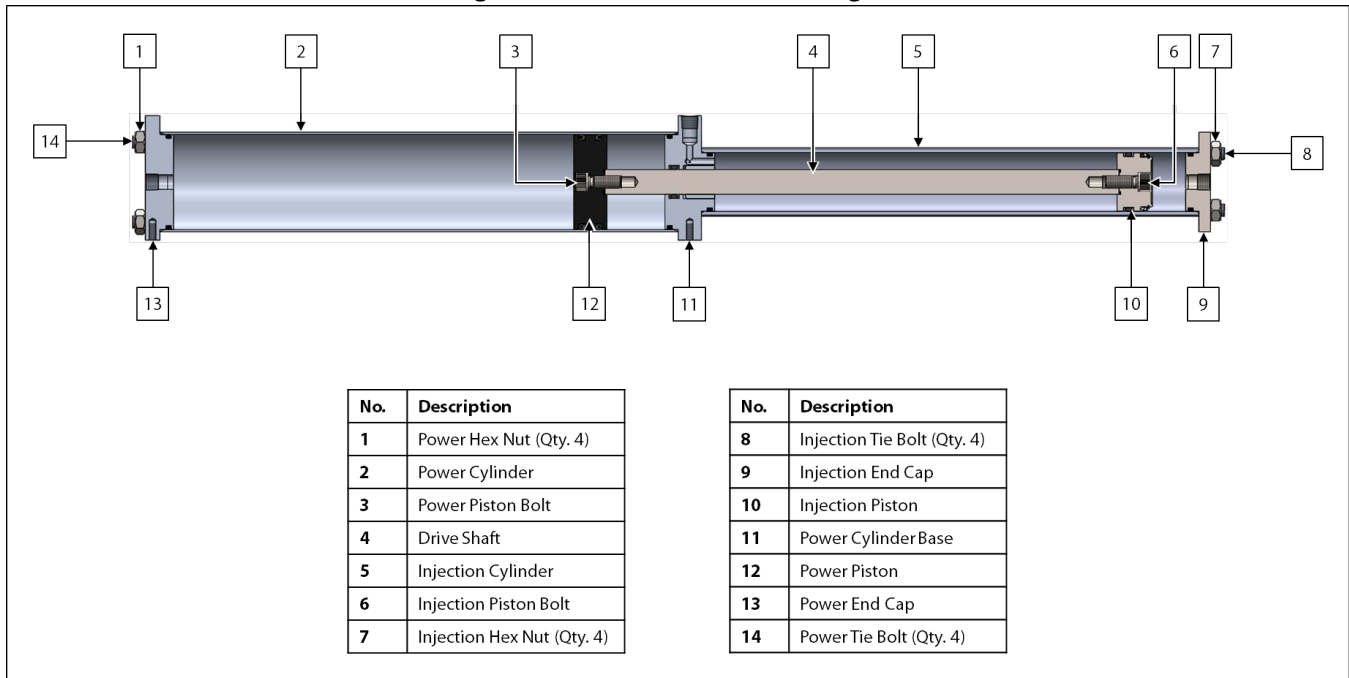
If the ball in the 3-way ball valve needs to be replaced, contact Welker for replacement parts.



If maintenance is performed on the 3-way ball valve, ensure that it is normally open to the outlet prior to reinstallation.

Disassembly

Figure 8: SSO-8 Maintenance Diagram



8. Remove the power hex nuts, and then remove the power tie bolts.
9. Remove the injection hex nuts, and then remove the injection tie bolts.
10. Remove the power end cap from the power cylinder.
11. Remove the power cylinder from the power cylinder base. Carefully slide the power cylinder off the power piston, taking care not to scratch the inner diameter of the cylinder.
12. Unscrew the power piston bolt from the power piston, and then remove the power piston from the drive shaft.
13. Remove the injection end cap from the injection cylinder.
14. Remove the injection cylinder from the power cylinder base. Carefully slide the injection cylinder off the injection piston, taking care not to scratch the inner diameter of the cylinder.
15. Unscrew the injection piston bolt from the injection piston, and then remove the injection piston from the drive shaft.
16. Carefully remove the drive shaft from the power cylinder base, taking care not to scratch the drive shaft.

Power End Cap

Figure 9: Power End Cap

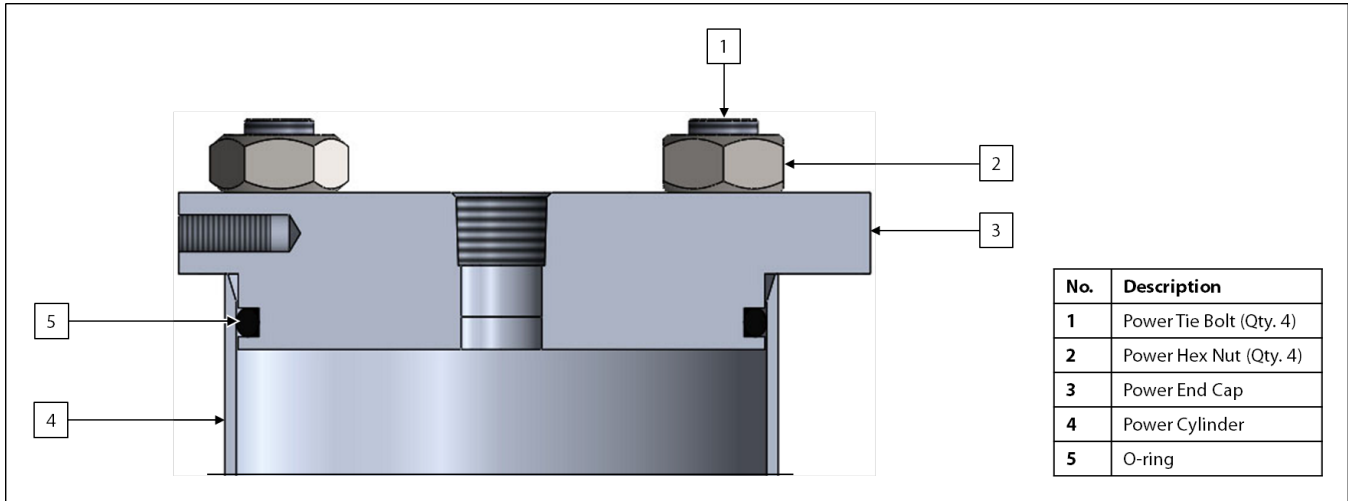
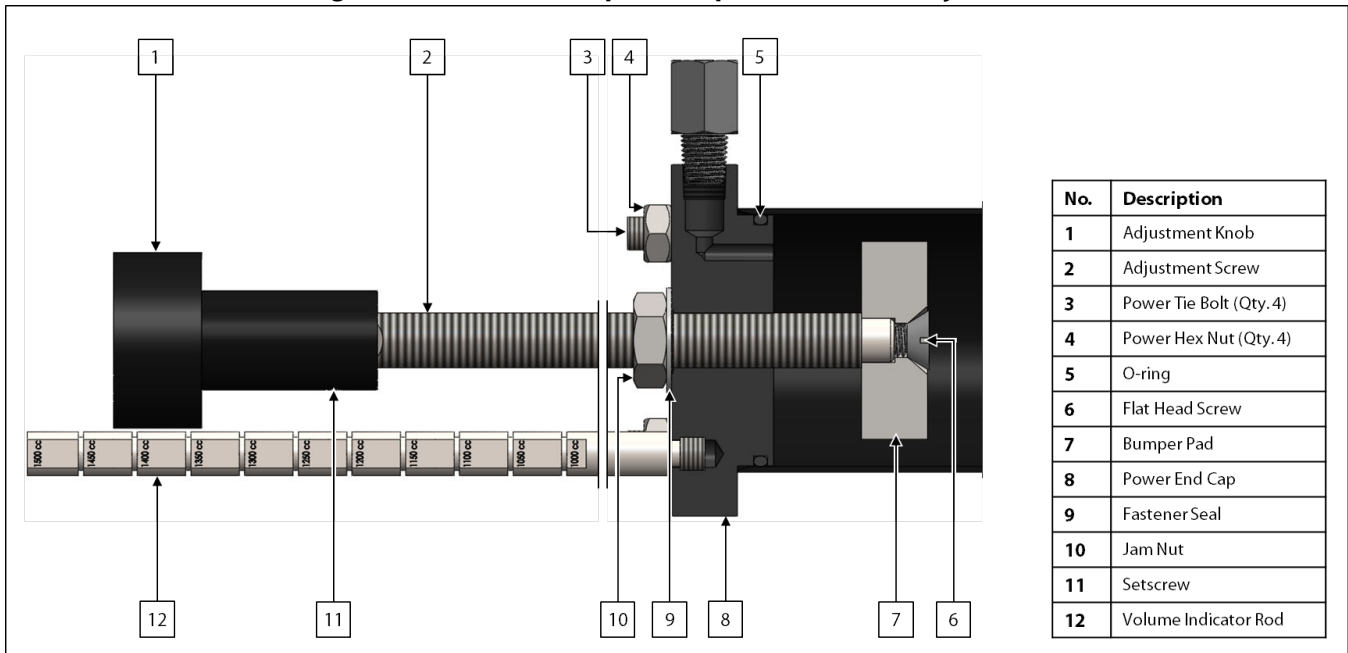


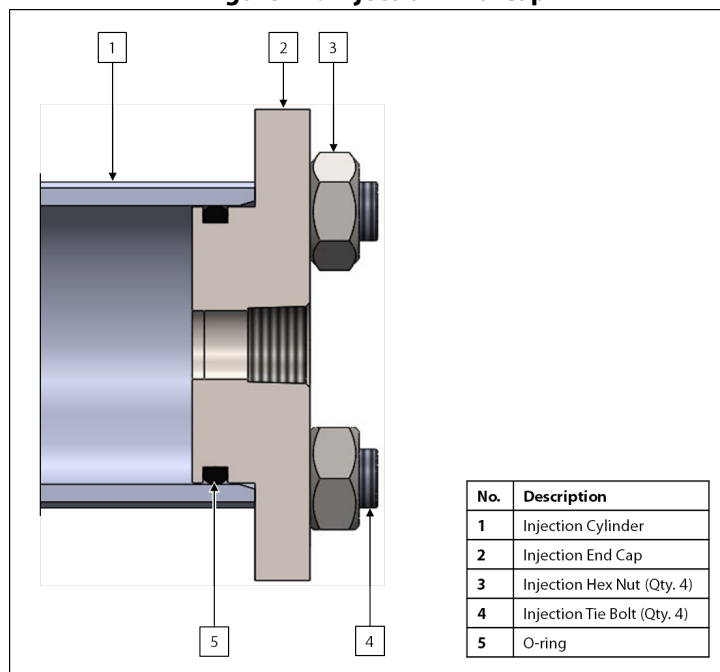
Figure 10: Power End Cap With Optional Volume Adjustment



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

Injection End Cap

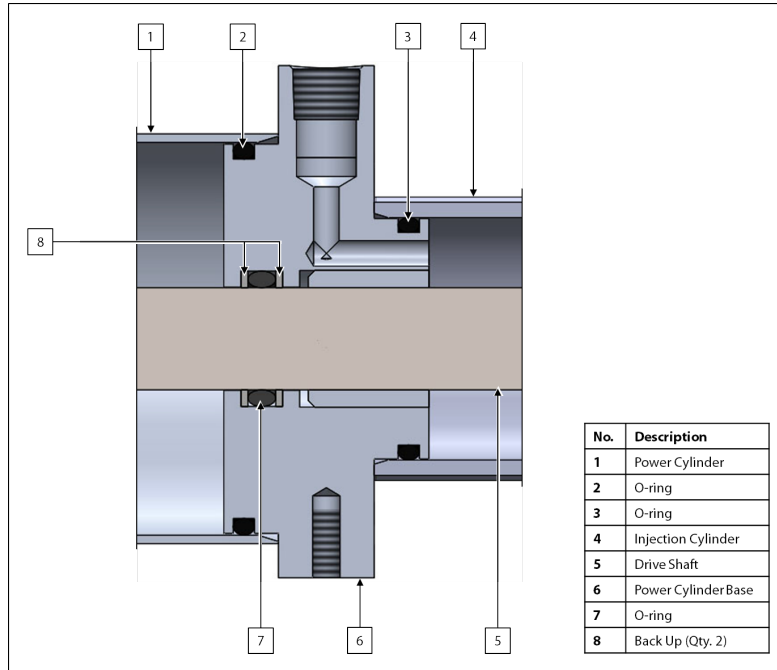
Figure 11: Injection End Cap



19. Remove the O-ring from the injection end cap and wipe the O-ring groove clean.
20. Replace the O-ring on the injection end cap.

Power Cylinder Base

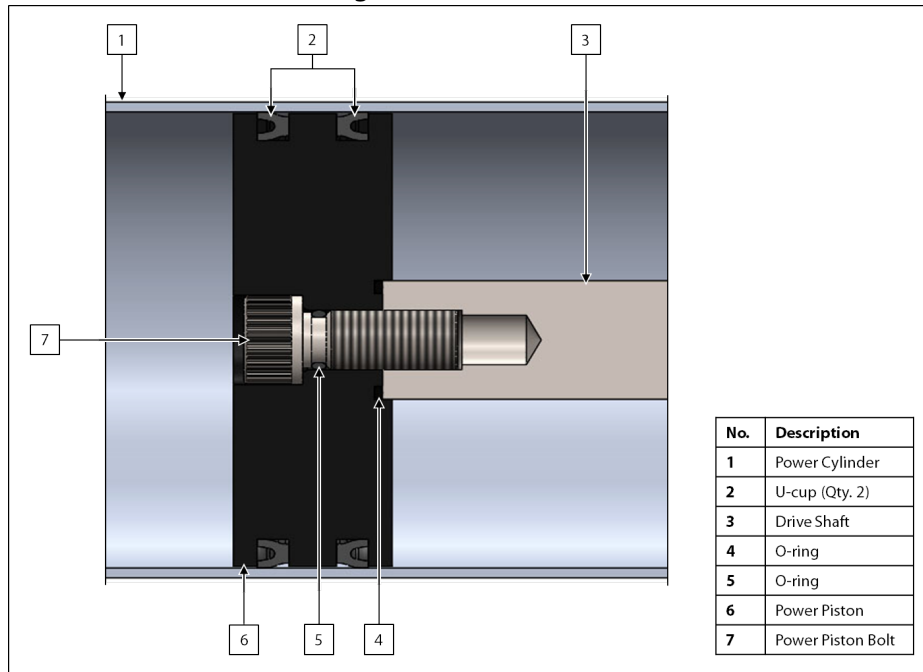
Figure 12: Power Cylinder Base



21. Remove the O-rings and back ups from the power cylinder base and wipe the seal grooves clean.
22. Replace the O-rings and back ups in the power cylinder base.

Power Piston

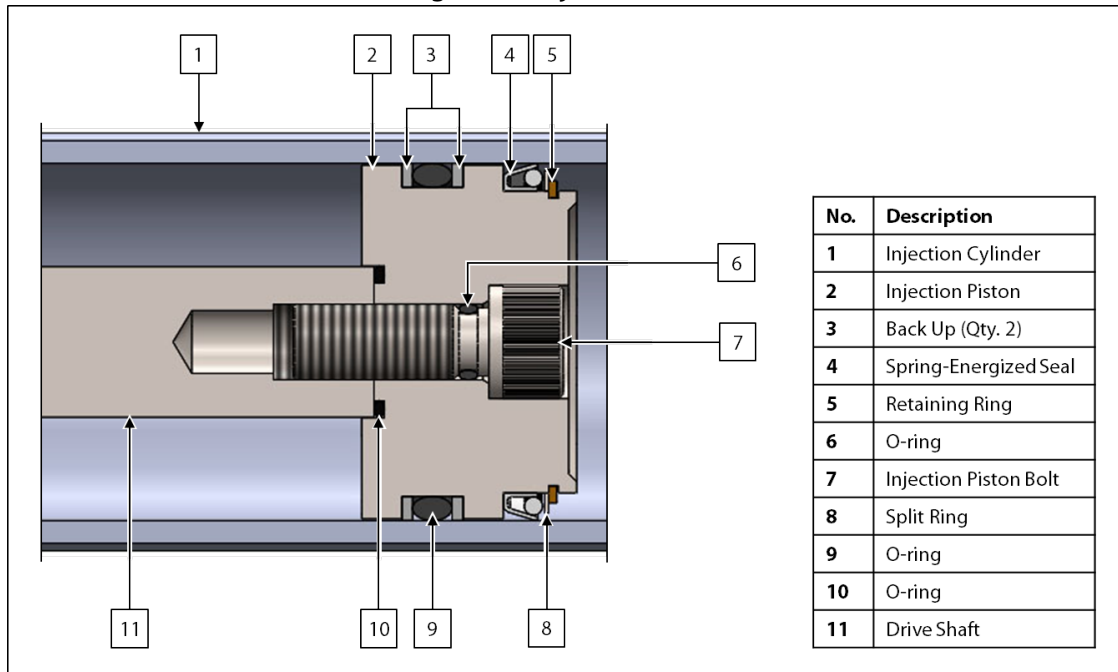
Figure 13: Power Piston



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

Injection Piston

Figure 14: Injection Piston



25. Remove the O-rings, back ups, spring-energized seal, split ring, and retaining ring from the injection piston and wipe the seal grooves clean.
26. Replace the O-rings, back ups, spring-energized seal, split ring, and retaining ring on the injection piston.

Drive Shaft

27. Remove the O-rings from the power piston bolt and injection piston bolt, and then wipe the seal grooves clean (*Figure 13* and *Figure 14*).
28. Inspect the surface finish of the drive shaft. Scratches or pits may cause the seals to leak. If scratches or pits are present, the unit may need to be repaired or replaced. Contact Welker for service options.
29. Replace the O-rings on the power piston bolt and injection piston bolt (*Figure 13* and *Figure 14*).

Cylinders

30. Inspect the honed inner diameters of the power and injection cylinders. 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

31. Install the injection piston to the drive shaft and secure it using the injection piston bolt.
32. Insert the injection piston into the injection cylinder, drive shaft-end first. Take care not to damage the cylinder bore with the drive shaft.
33. Carefully install the power cylinder base to the injection cylinder. Take care not to damage the drive shaft.
34. Install the power piston to the drive shaft and secure it using the power piston bolt.
35. Tighten the pistons to the drive shaft.



The pistons can be tightened to the drive shaft using two (2) hex keys. Use one (1) hex key as a backup and the other to tighten the piston bolts against each other.

36. Install the injection end cap to the injection cylinder.
37. Following a cross-bolting sequence, install the injection tie bolts and tighten the injection hex nuts to the appropriate torque (*Figure 15* and *Table 2*).

Figure 15: Cross-Bolting Sequence

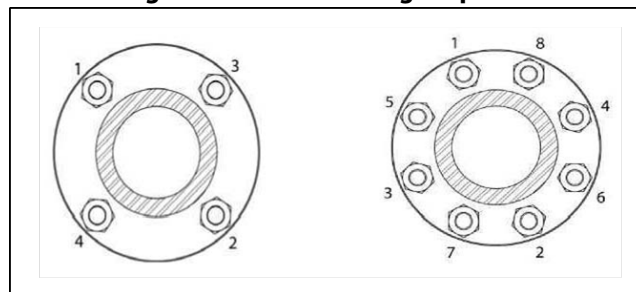


Table 2: Torque Specifications for Tie Bolts

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

38. Carefully slide the power cylinder over the power piston onto the power cylinder base. Take care not to damage the U-cups on the power piston.
39. Install the power end cap to the power cylinder.
40. Following a cross-bolting sequence, install the power tie bolts and tighten the power hex nuts to the appropriate torque (*Figure 15* and *Table 2*).
41. As necessary, install the hydraulic oil reservoir to the SSO-8.
42. As necessary, fill the hydraulic oil reservoir with hydraulic oil compatible with Viton®.
43. If the SSO-8 will be used for bypass sampling, see *Section 2.2, Installation for Bypass Sampling*, for installation instructions. If the SSO-8 will be used for chemical injection and will be manually operated, see *Section 3.2, Installation for Manual Operation*, for installation instructions. If the SSO-8 will be used for chemical injection and will be automatically operated, see *Section 3.5, Installation for Automatic Operation*, for installation instructions.

4.3 Troubleshooting

Table 3: SSO-8 Troubleshooting		
Issues	Possible Causes	Solutions
Product/Chemical is not flowing through the SSO-8.	The valve between the pipeline / chemical supply and the SSO-8 may not be open.	Ensure that the valve between the pipeline / chemical supply and the SSO-8 is open.
The SSO-8 is not actuating properly.	The pneumatic supply may be too high, too low, or not operating.	Check the pneumatic supply to ensure that air is supplied at the appropriate pressure.
	The solenoid may not be operating properly.	Check the solenoid using the manual override button to ensure proper operation. If operating improperly, refer to the <i>Installation, Operation, and Maintenance (IOM) Manual</i> for the solenoid.
	The solenoid ports may not be installed properly.	Connect the pneumatic supply to the correct normally open and normally closed ports (<i>Figure 2 or Figure 6</i>).
The SSO-8 is not collecting the correct injection volume.	Air is trapped in the SSO-8.	Open the bleed valve on the SSO-8 to remove any air from the pump.
	The adjustment knob is not set correctly.	Turn the adjustment knob on the SSO-8 clockwise or counterclockwise until the desired injection volume has been set, and then tighten the jam nut to the fastener seal (<i>Figure 7</i>).

APPENDIX A: REFERENCED OR ATTACHED DOCUMENTS

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

- IOM-041: Welker® AVA-1 and AVA-2 Volume Analyzers
- IOM-054: VL439 Pneumatically Operated Ball Valve
- IOM-073: Welker® CV-1 Check Valve
- IOM-182: Welker® CV-K Check Valve

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

- Humphrey® TAC³ Air-Piloted Valves (Welker® IOM-V089)
- Swagelok® Ball Valves 60 Series (Welker® IOM-V018)
- Swagelok® Bleed Valves and Purge Valves (Welker® IOM-V208)
- Swagelok® One-Piece Instrumentation Ball Valves 40G Series and 40 Series (Welker® IOM-V085)
- Universal Components, Inc. S2S/S2F - TT & TL Series Ball Valves (Welker® IOM-V298)

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

- Assembly Drawing: AD148CF (SSO-8 With Check Valves)
- Assembly Drawing: AD148CG (SSO-8 With 3-Way Ball Valve)
- Assembly Drawing: AD148CO (SSO-8 With Push-Button Valves and 3-Way Ball Valve)
- Assembly Drawing: AD148CQ (High Pressure SSO-8)
- Assembly Drawing: AD500CA (SSO-8 With Optional Volume Adjustment)

