



*Installation, Operation, and
Maintenance Manual*

***Welker[®] Constant Pressure Sample Receiver
with SS09 Mini Sample Pump
Model
CPLS-7 with SSO-9Mini***

***Drawing No.: AD191BPCRN5, AD640BO.CRN 5 Rev A
Manual No.: IOM-102***

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 above. Correct operating and/or installation techniques, however, are the responsibility of the end user. Welker[®] reserves the right to make changes to this and all products in order to improve performance and reliability.

This manual is intended to be used as a basic installation and operations guide for the Welker[®] CPLS-7 with SSO-9 Mini. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is given in the Appendix section of this manual.

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SECTION 1: SPECIFICATIONS

1.1 INTRODUCTION

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this product becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance (IOM) Manual* 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 1-800-776-7267 (USA) or 1-281-491-2331.

Notes, Cautions, and Warnings



Notes emphasize information or set it off from the surrounding text.



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



Warnings are alerts to a specific procedure or practice that, if not followed correctly, could cause personal injury.

*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 DESCRIPTION OF PRODUCT

The Welker® Constant Pressure Sample Receiver CPLS-7 with SSO-9 Mini pump is designed with a 1.5-gallon receiver to provide the adequate volume necessary to collect a representative sample of the flowing fluid. The cylinder sizes vary in volume based on flow rates, sample frequency, length of sample period, collection head size and/or the number of parties involved at the location that requires an individual portion placed in a transportation cylinder for analysis. Welker®'s original designed mixing system (an industry first) provides the best sample cylinder mixing capabilities along with an ease of operation and maintenance.

1.3 IMPORTANT INFORMATION



Cleaning or purging of the system between batches is important to assure that each sample volume has the integrity and is solely representative of that batch.

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. However, please note that **the specifications may vary depending on the customization of your product.**

Table 1: Specifications for CPLS-7PM	
Products Sampled:	Light liquid hydrocarbons, refined products, liquid petroleum gas, natural gas liquids, light crude and condensate
Materials of Construction:	Carbon steel, 316 stainless steel, aluminum, Viton, and PTFE; others available.
Maximum Allowable Line Pressure**:	2,160 psi (147 bar)
Sample Outlet Connection:	1/4" NPT; others available
Viscosity Range*:	8 - 50 °API gravity
Temperature Range*:	-20°F to 200°F (-28.9°C to 121.1°C)
Area Classification*:	Can be used in hazardous areas

Table 2: Specifications For SSO-9 Pump	
Wetted Parts	316 Stainless Steel
Pneumatic Parts:	6061 TE Aluminum
Air Supply:	100 psi (std)
Discharge Pressure (psig):	820 @ 100 (psi)
Injection Volumes:	0-5 cc
Air Usage (FT3):	5cc - .0025 @ 100 (psi) 10cc - .013 @ 100 (psi)
Air/Hydraulic Pressure:	65-100 psig (4.5 - 6.9 barg)

Table 3: System Components	
<ul style="list-style-type: none"> • LS-7 sample receiver with plate mixer • SSO-9 sample pump • Nitrogen tank • Controller (Terminal block, 4P timer) • Pressure relief valves • Pressure gauges • Mixer actuation valve & button • Sample inlet port/check valve • Return to pipeline port/valve • Drawoff/sample outlet port/valve • Nitrogen tank port/valve 	<ul style="list-style-type: none"> • Outlet to drain/sump port/valve • Instrument Regulator • Lubricator • 4-way Versa solenoid • Manifold block • All associated fittings, tubing, etc. • Skid weld assembly <p>Options:</p> <ul style="list-style-type: none"> • Bite Verification • Level Transmitter

1.5 PRINCIPLES OF OPERATION

- ◆ The outlet from pipeline source/probe (P_1) and the return to pipeline source/probe (P_2) will be installed using a method so that (P_1) will maintain a higher pressure than (P_2). This differential of the pipeline pressure will push the product through a bypass that will be tubed from the pipeline sample point through a cross fitting (connected to the SSO-9 pump) and back out to the pipeline return point.
- ◆ The metering interface will pace the SSO-9 sample pump to take a ratio of sample bites in proportion-to-flow of the pipeline, from the cross fitting, and direct a set volume into the LS-7 container until the desired volume of sample has been obtained. To do so, the metering device will activate the 4-way Versa solenoid to apply air pressure to the bottom of the SSO-9 piston, thus injecting a bite of sample up through the inlet check valve and into the SSO-9 cylinder. The 4-way solenoid will then be deactivated, causing the sample to be displaced out through the outlet check valve and pass through the manifold and check valve into the LS-7 receiver.
- ◆ The LS-7 will be filled with nitrogen at 50-100 PSI above pipeline pressure on the pre-charge/top side of the piston. When product enters the LS-7 from the bottom, the sample will push the piston up, causing the tracking piston/tracker tube indicator to move up also. The sample will remain above pipeline pressure so that a true representative composite sample will be collected and maintained in the LS-7 receiver.
- ◆ When a desired number of sample bites have been collected, the end user will activate the mixing solenoid by pressing the mixer button, which will displace the air pressure to press down the tracking piston, causing the mixing plate to go down. Releasing the button will cause the plate to move back up. Repeatedly pressing and releasing the button will ensure that the collective sample is thoroughly mixed.
- ◆ After the mixing process is complete, the end user will open the draw off valve and collect the desired amount of sampled product into a transportable constant pressure cylinder for transport to the lab.
- ◆ Once the entire sampling collection process is complete, the end user will open the return to pipeline valve, and the nitrogen will force any remaining product out of the LS-7 and back through the cross fitting into the pipeline.

1.6 SYSTEM DIAGRAMS

Figure 1: CPLS-7 (Front View)

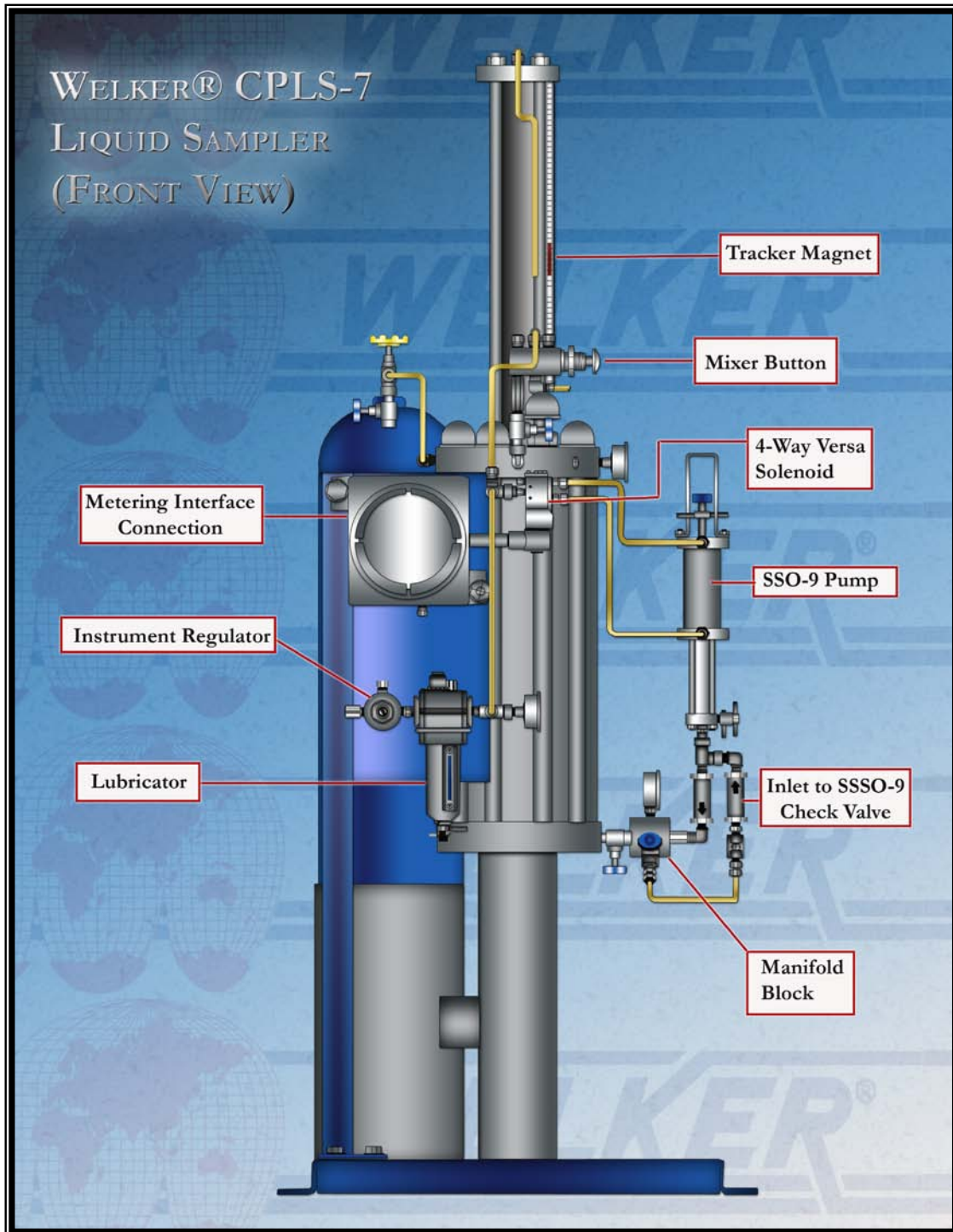
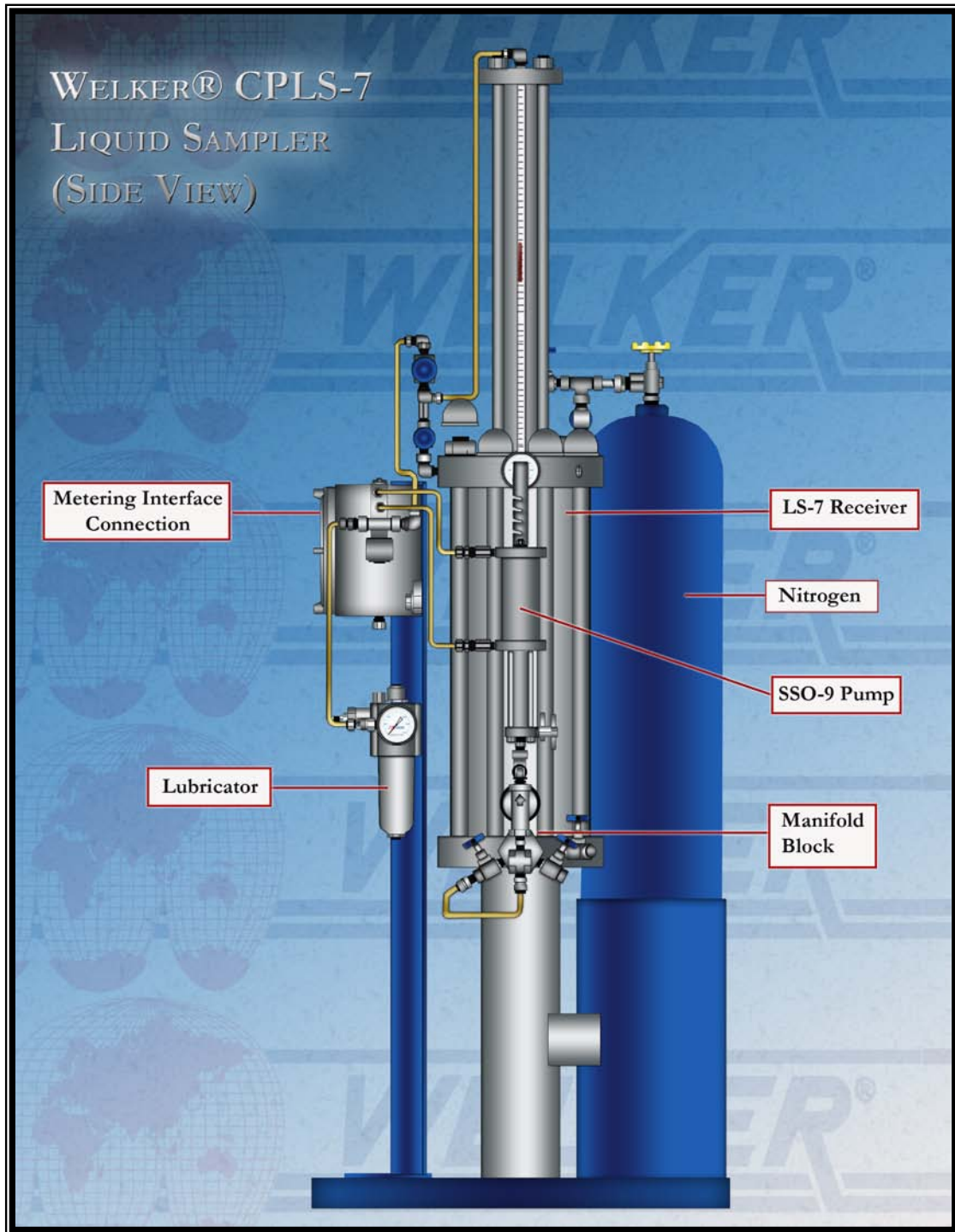


Figure 2: CPLS-7 (Side View)



Refer to Figures 1 & 2 throughout this manual.

SECTION 2: INSTALLATION & OPERATIONS

2.1 BEFORE YOU BEGIN



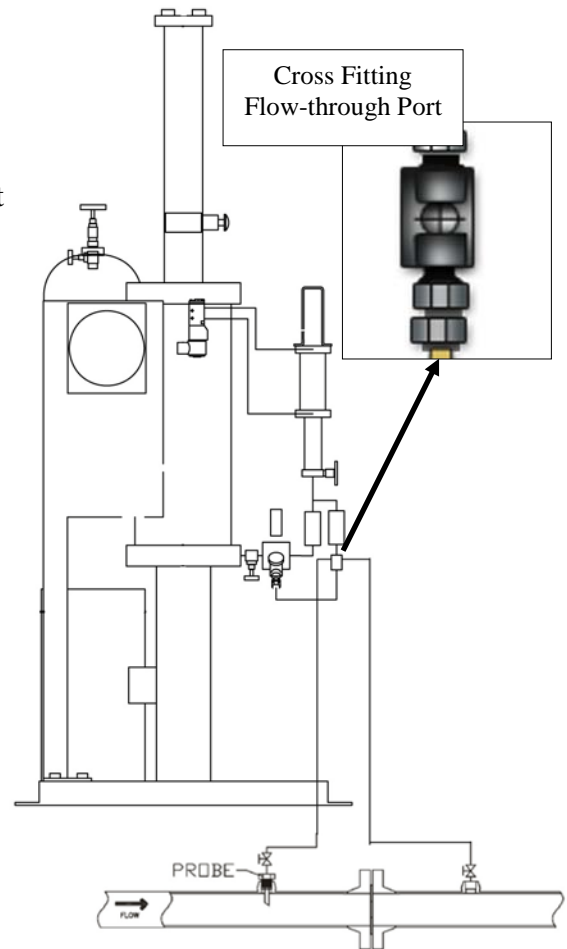
After unpacking the unit, check the equipment for compliance and for any damage that may have occurred during shipment. **Claims for damage caused during shipping must be initiated by the receiver and directed to the shipping carrier.** Welker® is not responsible for any damage caused by mishandling by the shipping company.



When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.

2.2 INSTALLATION INSTRUCTIONS

1. Make sure that all valves on the unit are closed.
2. Locate the skid as close to the pipeline or sample point as possible.
3. Mount the skid base to a flat level surface.
4. Install a pitot probe in the pipeline in a horizontal position. This reduces the effect of gravity that must be overcome if the probe is mounted vertically.
5. If single probes are used (preferred method), install one of them upstream of a pressure drop and the other one downstream of that pressure drop (i.e., an orifice plate).
6. Tube from P_1 to the cross fitting located in front of the SSO-9 pump, and from P_2 to the port opposite on the cross fitting. Use 3/8" stainless steel tubing.



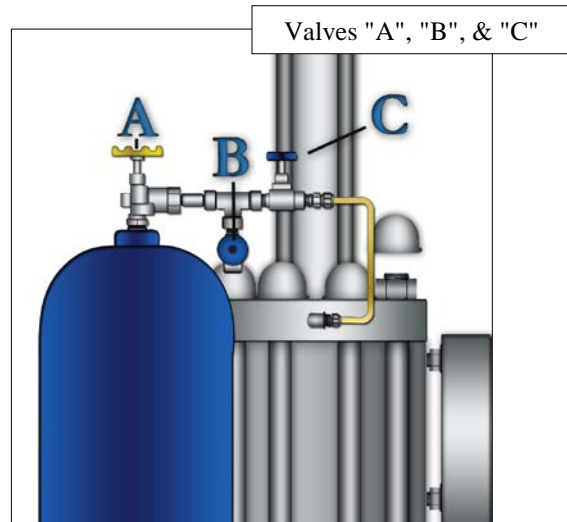
2.3 START-UP/OPERATIONS



Never fill the CPLS-7 sample cylinder to capacity. Eighty percent capacity is recommended. This leaves room for expansion of the product.

1. The LS-7 pre-charge will need to be pressurized to above (about 50 to 100 psi higher) pipeline maximum operating pressure. The nitrogen tank is shipped from the manufacturer empty. To fill the system with nitrogen:

- ◆ Use tubing to connect the fill and empty valve "B" to a transportable container filled with nitrogen.
- ◆ Open valve "A" the nitrogen tank valve "A", valve "B", and valve "C".
- ◆ Apply nitrogen to the system, until the pressure gauge located on the CPLS-7 reaches 50 to 100 psi above the maximum operating pressure of the pipeline.
- ◆ Once the desired pressure has been obtained, close valve "B".
- ◆ Close transportable tank, and disconnect tubing from valve "B."
- ◆ Place a ¼" NPT Hex plug into valve "B" inlet.



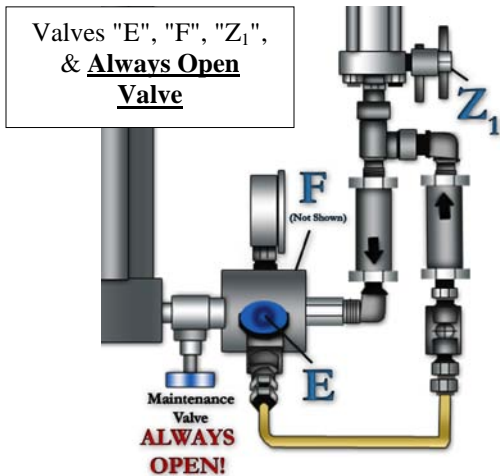
The system must at least be pre-charged to a pressure above the vapor pressure of the lightest liquid to be sampled. Also, the nitrogen should not need recharging unless maintenance is required or a leak is present. At all other times, valves "A" and "C" will remain open, and valve "B" will remain closed.

2. Check all fittings for leaks and plug the fill and vent valve "B".
3. A qualified electrician will need to connect the appropriate timing system to the sampler.



The pressure required for actuation of the SSO-9 pump is 65 psi and should never exceed 95 psi. Gas or air are suitable supplies for the sample pump.

4. Connect the instrument supply to the air inlet port of the instrument regulator. The regulator is shipped from the manufacturer set at 65 psi, however setting changes may occur during shipment. Please refer to manufacturer Installation, Operation, and Maintenance manual for further connection and setting instructions.



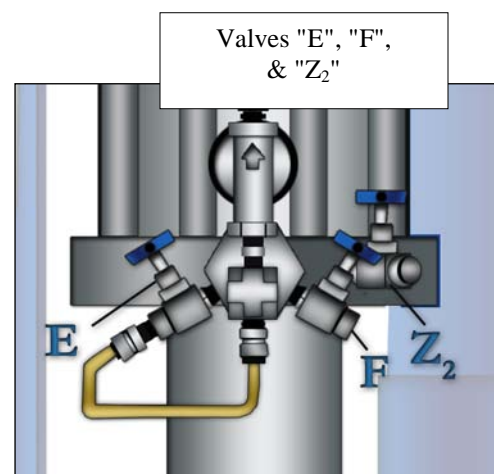
The valve between the LS-7 cylinder and the manifold should always be open, except when performing maintenance to the manifold or sample pump. The instrument supply should be closed prior to closing the valve between the LS-7 cylinder and the manifold because the sample pump may build excessive pressure and damage internal parts. Welker[®] has installed a resettable RV2CP relief valve in the manifold burst disc port, so that in the event sample pump is actuated, no damage will be incurred by the pump because pressure will relieve to ambient below the manifold. When this valve is closed, it will protect the collected sample during a maintenance procedure. Following maintenance of the sample pump or the manifold, reopen the valve prior to reactivating the instrument supply.

5. All other valves on the manifold should be shut off during a sample period.
6. Once the sampler has been actuated a few times, the pressure should build until equaling the pre-charge pressure. Once this happens, the LS-7 cylinder will slowly fill, thus moving the piston and piston indicator rod.
7. In order to maintain the integrity of the sample, it will be necessary to purge the system of any trapped air:
 - ◆ Open the purge valve Z₁ just enough to allow the product to bleed off. Actuate the SSO-9 twice to displace any air that might be trapped in the lower pump connection fitting, and then quickly retighten the purge valve Z₁.
 - ◆ Bleed a small amount of product from the draw-off valve F, then close the valve. This will purge the manifold of any air.
8. Open the purge valve Z₂ just enough to allow the product to bleed by, and then quickly retighten the purge valve Z₂.
9. Check the manifold completely for leaks.

2.4 MIXING & COLLECTION OF COMPOSITE SAMPLE

At the end of a sample period, observe the following steps:

1. Turn off the power/signal to the sampler.
2. Connect a transportation cylinder to the draw-off valve F on the manifold block. The cylinder should have a pre-charge pressure equal to 100 psi above the product pressure in the LS-7 cylinder (*See Welker[®] Constant Pressure Cylinder IO&M for additional information*).
3. When product needs to be drawn off the LS-7 cylinder, the operator should fully cycle the mixer 4 to 5 times by alternately pressing and depressing the mixer button.



- ◆ The mixer housing is rated to 125 psi. However, 75 psi should be enough pressure to provide a good mix.
- ◆ When operating the 4-way mixing valve, do so such that the mixer travels the full distance of the liquid capacity in the LS-7 cylinder. If the LS-7 cylinder is only ½ full, the magnet on the mixer should not be expected to travel the complete length of the cylinder to provide mixing. When the cylinder travels down and up once, that is a complete cycle.



If the LS-7 cylinder is equipped with a proximity switch, then it should be swiveled back during the mixing operation so that it does not give a false signal.

4. When the mixing is complete, the mixing rod plate should be up against the bottom of the piston. The last air pressure from the 4-way mixing valve should be applied to the bottom of the LS-7 mixer actuation cylinder.



The proximity switch should be turned back to its reading position, when the transfer is completely finished.

5. Product is now ready to be removed from the LS-7 cylinder. The pre-charge pressure should be watched closely so that pressure can be added to keep the product at pipeline pressure. If the system is free of leaks, this will not be of concern.
6. Open the draw-off valve on the receiver, and open the inlet of the transportation cylinder.
7. Slowly crack open the purge valve on the transportation cylinder to purge any air, and shut the valve completely when liquid appears.
8. Actuate the mixer for another 3 or 4 full cycles.
9. Slowly open the pre-charge valve on the transportation cylinder and allow liquid to enter until the cylinder is 80% filled, maintaining constant pressure during the transfer.



This should be done slowly, so as to not take a pressure drop in the cylinder.

10. Close all valves and disconnect the transportation cylinder.
11. After the transfer is complete, all valves should be checked for leaks and plugged as a precaution. Record all required information onto the proper paperwork for sample transfer.
12. This procedure can be repeated to get full use of the sample in the LS-7 cylinder.

2.5 REMOVING LEFTOVER CONTENTS

To remove the remaining contents in the LS-7 cylinder, follow these steps:

1. Open the bypass valve "E" on the sample manifold. If the pre-charge pressure is above pipeline pressure, it will force the contents back into the pipeline through the probe.
2. When the magnetic indicator is all of the way down, crack the draw-off valve momentarily to purge the manifold.
3. Close the draw-off valve and the bypass valve.
4. The unit is ready to resume sampling procedures once the instrument supply is reactivated.

SECTION 3:

MAINTENANCE

3.1 BEFORE YOU BEGIN

1. **Welker® recommends that the unit have annual 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 on hand for repairs of the system in case of unexpected wear or faulty seals.



New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease before installation. Welker® recommends silicone grease or an equivalent lubricant for use with this unit. **In the case of Constant Pressure Cylinders, the lubrication grease should be applied sufficiently but lightly (Krytox® is preferred). When using lubrication other than Krytox®, wipe excess lubrication from the seals as it may have an adverse effect on some analytical instrument results.**

3. All maintenance and cleaning of the unit should be done on a smooth, clean surface.
4. Before attempting to service the CPLS-7, the nitrogen cylinder valve should be closed to preserve the nitrogen in the CPLS-7 cylinder.
5. Ensure that the pipeline isolation valves are closed and the system has been completely depressurized.

Recommended Tools

It is advisable to have the following tools available for maintenance of this unit. Tools needed may vary depending on the product model.

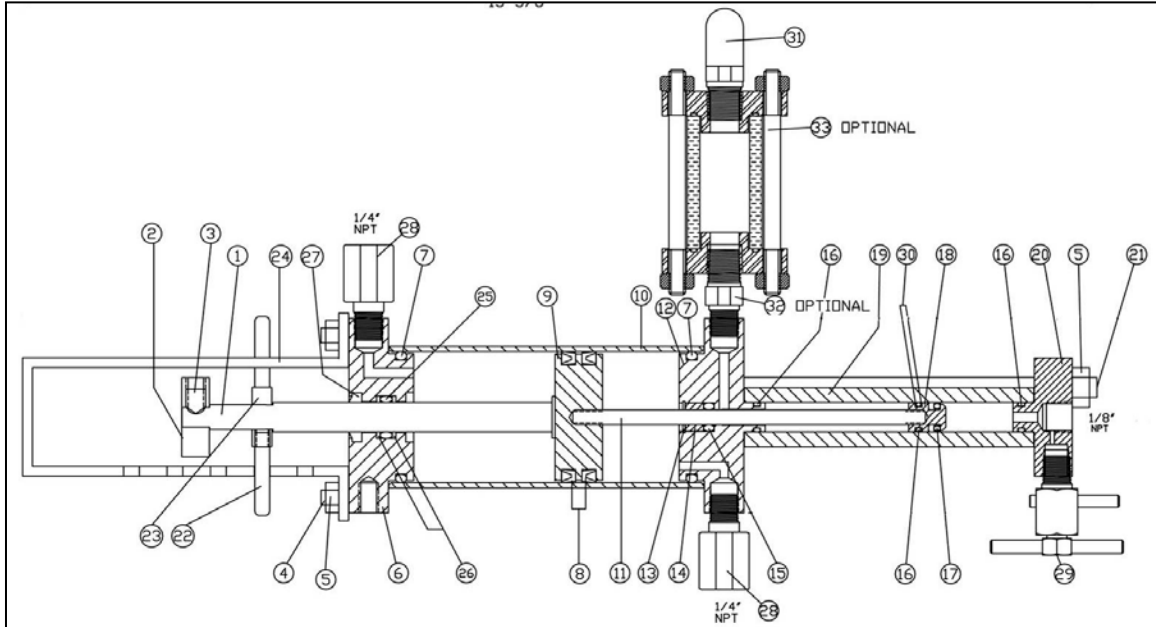
- 6" adjustable wrench
- 12" adjustable wrench
- External snap ring pliers
- Internal snap ring pliers
- 1-5/8" box end wrench

3.2 READY THE SYSTEM FOR MAINTENANCE

1. Before attempting to service the system, the nitrogen cylinder valve should be closed to preserve the nitrogen in the cylinder. Then, make sure that the pipeline isolation valves are closed and the system has been completely depressurized.
2. Disconnect or shut off the instrument air supply.
3. Make sure that all pressure has been released from the system.
4. Depressurize the pre-charge by opening valves "B" & "C" (See page 9).

3.3 SSO-9 PUMP MAINTENANCE

Figure 4: SSO-9 Maintenance Diagram



Before removing sampling pump from its installation, tag the tubing and identify how it is tubed. This is important to assure proper reinstallation of the unit.

1. Make sure all product has been purged from the sample pump.
2. Make sure pressure has been relieved from both the power and the sample cylinders.
3. Remove all tubing from the sample pump.
4. Remove tie bolts from both ends of the sample pump.
5. Remove end caps.
6. Carefully, slide the cylinders off the pistons.
7. Remove both pistons from the drive shaft by holding the back portion up with a wrench on the flats provided on the shaft. Slide drive shaft out of cylinder base.
8. Closely examine the honed surface on both cylinders, and examine the surface finish on the drive shaft.
9. Remove all of the old seals, making note of orientation.
10. Wipe clean all of the O-ring grooves and sealing surfaces.
11. Replace all seals on the end caps, pistons, and cylinder base in the same orientation as when removed.



Note Coat all seals lightly with O-ring lubricant or silicone grease.

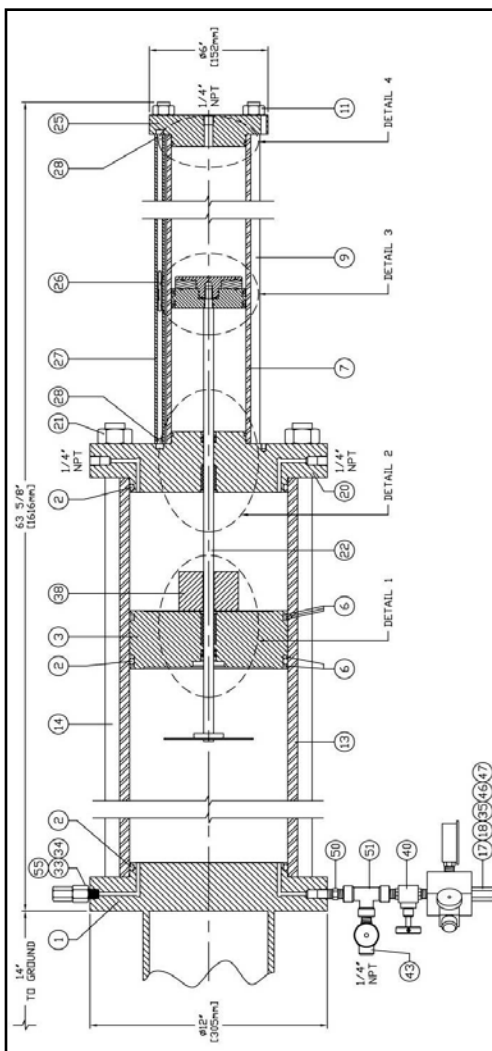
12. Install the small sample piston onto the drive shaft. Tighten the piston that is holding the screw by holding the back portion up with a wrench on the flats provided on shaft.
13. Insert the drive shaft end of the piston into cylinder. Be sure not to damage the cylinder bore with the drive shaft. It must be installed this way so that the bal-seal "U" will be facing the fluid.
14. Slide the drive shaft through the cylinder base and slide the cylinder onto the cylinder

base seal.

15. Replace the large power piston onto the drive shaft. Push power piston against cylinder base, holding the sample cylinder to keep the sample cylinder on the cylinder base. Tighten the power piston on the shaft, holding the back portion up by using a second Allen wrench in the sample piston holding screw.
16. Replace the end cap.
17. Install the tie bolts and tighten the nuts to 6-ft. per lbs. torque.
18. Carefully, slide the power cylinder onto the piston so as not to damage the U-cups with the "U" facing towards air/gas.
19. Cylinder must be pushed down until it seals onto the cylinder base.
20. Replace end cap on the power cylinder.
21. Install tie bolts and tighten nuts to 6-ft.-lbs.
22. Set aside SSO-9 pump, and proceed to Section 3.4 (CPLS-7 Maintenance).

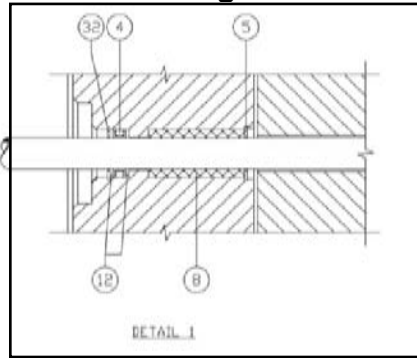
3.4 CPLS-7 RECEIVER MAINTENANCE

Figure 4: CPLS-7 Maintenance Diagram



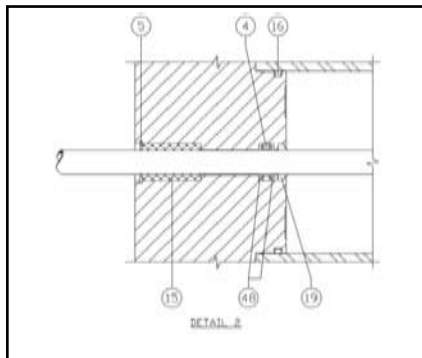
No.	DESCRIPTION
1	BASE CAP
2	O-RING (CYLINDER TOP CAP, PISTON, BASE CAP)
3	PISTON
7	MIXING CYLINDER
9	MIXING CYLINDER TIE BOLTS (QUANTITY: 4)
11	MIXING CYLINDER NUTS (QUANTITY: 4)
13	CYLINDER (RECEIVER)
14	CYLINDER TIE BOLTS (QUANTITY: 8)
20	CYLINDER TOP CAP
21	CYLINDER NUTS (QUANTITY: 8)
22	MIXER ROD
25	MIXER TOP CAP
26	TRACKER MAGNET
27	TRACKER TUBE
28	RUBBER PINS (QUANTITY: 2)

Figure 5: Maintenance Diagram Detail 1



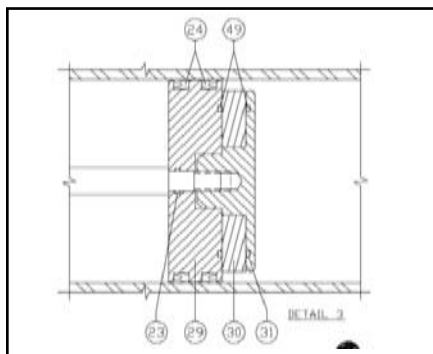
No.	DESCRIPTION
4	PISTON SEAL (BUNA CROWN SEAL)

Figure 6: Maintenance Diagram Detail 2



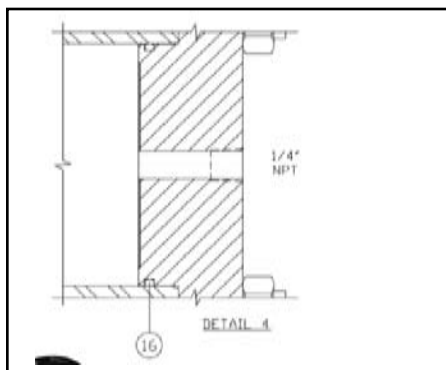
No.	DESCRIPTION
4, 16, 19, 48	TOP CAP SEALS
15	TOP CAP BUSHING

Figure 7: Maintenance Diagram Detail 3



No.	DESCRIPTION
24	MIXING PISTON U-CAP SEALS
29	MIXING PISTON
30	MAGNET
31	MAGNET RETAINER

Figure 8: Maintenance Diagram Detail 4



No.	DESCRIPTION
16	TOP CAP SEAL

DISASSEMBLY (FIGURE 4)

1. Disconnect the K-tek[®] level indicator if equipped (*Refer to K-Tek IOM*).
2. Disconnect or shut off the instrument air supply.
3. Make sure that all pressure has been released from the system.
4. Disconnect manifold block from CPLS-7.
5. Disconnect the tubing from the mixer portion and the tubing between the nitrogen cylinder and the CPLS-7 top flange.
6. Remove the 4 mixing cylinder nuts from the 4 mixing cylinder tie bolts and remove the mixer top cap (upper flange) of the mixer actuator.
7. Remove the tracker tube. Be careful not to lose the tracker magnet, tracker tube, or rubber pins.
8. Slowly slide the mixing cylinder up and off the mixing piston.
9. Remove the magnet retainer, magnet, and mixing piston from the mixer rod (*See Figure 7*).
10. Remove the 8 cylinder nuts from the 8 cylinder tie bolts on the cylinder.
11. Lift the cylinder top cap (midsection) straight up. Lift off of the mixer rod completely before pulling it away from the cylinder.
12. Carefully lift the cylinder off the base cap with the piston still inside (bottom flange).



Be careful: the receiver cylinder is extremely heavy.

13. Remove the mixer rod from the cylinder piston.



Make sure not to bend the mixer rod when removing it from the piston.

14. Slowly push the piston out of the cylinder by reaching inside the pre-charge side. Note the top and bottom of the piston and cylinder for ease of reassembly.



It may be helpful to have something to help push the piston out of the cylinder (Ex.: 2" X 4" length of wood or PVC pipe). Do NOT use metal objects.

REASSEMBLY (FIGURE 4)

1. Lightly lubricate the inside of the cylinder.
2. Ensure that the bushing in the piston is clean and smooth. Replace if necessary.
3. Replace the seals on the piston (*See Figure 5*).
4. Reinsert the piston into the cylinder.
5. Lightly lubricate the mixer rod.
6. Examine all the polished and honed surfaces on the mixer rod and cylinder. Deep pits or scratches may allow leakage around seals.
7. Reinsert the mixer rod into the piston carefully to avoid damaging the seals. Gently rotate the threads through the seals.
8. Replace the seal on the base cap.
9. Place the cylinder onto the base cap. Ensure that the cylinder is oriented correctly.
10. Reinsert and tighten the cylinder tie bolts.
11. Replace the seals on the cylinder top cap (*See Figures 5 and 7*).
12. Ensure that the bushing in the cylinder top cap is clean and smooth. Replace if necessary.

13. Carefully place the cylinder top cap onto the cylinder.
14. Place and tighten the cylinder nuts onto the cylinder tie bolts.
15. Replace the seals on the mixing piston (*See Figure 7*).
16. Place the mixing piston, magnet (correctly oriented) and magnet retainer.
17. Reinsert the tracker magnet into the tracker tube.
18. Slide the mixing cylinder down into place.
19. Place and tighten the mixing cylinder tie bolts onto the mixing cylinder.
20. Replace the seals on the mixer top cap.
21. Place the mixer top cap onto the mixing cylinder.
22. Place and tighten the mixing cylinder tie bolt nuts.
23. Pressurize the CPLS-7 cylinder with an inert gas or air and check for leaks.
24. Release the pressure.
25. Reconnect the tubing to the mixing cylinder.
26. Re-pressurize the nitrogen system.
27. The cylinder is now ready to be reused.

3.5 FINAL SYSTEM MAINTENANCE AND REASSEMBLY

1. Reconnect the tubing from the mixer portion and the tubing between the nitrogen cylinder and the LS-7 top flange.
2. Reconnect manifold block to LS-7.
3. Reconnect all tubing to SSO-9 pump.
4. Check entire system for leaks or loose fittings. Tighten all fittings, and replace when necessary.
5. Maintenance is now complete. System is ready for reinstallation.

SECTION 4:

TROUBLESHOOTING GUIDE

4.0 TROUBLESHOOTING GUIDE

If the sample pump is not taking a sample, check for the following:

- ◆ Pipeline is open to sample pump.
- ◆ Controller is functioning.
- ◆ Signal from meter is being received by controller.
- ◆ Solenoid is operating.
- ◆ Instrument supply is not off.
- ◆ Instrument supply is supplied to sample pump.

After all above have been satisfied, maintenance on the pump will be necessary.

If help is required on a problem with the operation of the sampling pump, please contact Welker[®] at 1-800-776-7267 or 1-281-491-2331.

Section 5:
APPENDIX A

ATTACHED DOCUMENTS:

Welker[®] *Installation, Operation, and Maintenance* Manuals suggested for use with this unit:

- NONE



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