



***Welker[®] Light Liquid Hydrocarbon
Constant Pressure Sample Receiver with
SS09 Mini Sample Pump***

***Model
CPLS-7 with SSO-9Mini***

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.

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TABLE OF CONTENTS

| | | |
|-----------|---|-----------|
| 1. | GENERAL | 3 |
| 1.1 | INTRODUCTION | 3 |
| 1.2 | DESCRIPTION OF PRODUCT | 3 |
| 1.3 | IMPORTANT INFORMATION | 4 |
| 1.4 | SPECIFICATIONS | 4 |
| 1.5 | SYSTEM COMPONENTS | 5 |
| 1.6 | PRINCIPAL OF OPERATIONS | 6 |
| 1.7 | SYSTEM DIAGRAM 1 | 7 |
| 1.8 | SYSTEM DIAGRAM 2 | 8 |
| 2. | INSTALLATION & OPERATION | 9 |
| 2.1 | GENERAL | 9 |
| 2.2 | INSTALLATION INSTRUCTION | 9 |
| 2.3 | START-UP/OPERATIONS | 10 |
| 2.4 | MIXING & COLLECTION OF COMPOSITE SAMPLE | 12 |
| 2.5 | REMOVING LEFTOVER CONTENTS | 13 |
| 3. | MAINTENANCE | 14 |
| 3.1 | GENERAL | 14 |
| 3.2 | READY THE SYSTEM FOR MAINTENANCE | 15 |
| 3.3 | SSO-9 PUMP ASSEMBLY & DISASSEMBLY | 15 |
| 3.4 | CPLS-7 RECEIVER ASSEMBLY & DISASSEMBLY | 17 |
| 3.5 | FINAL SYSTEM MAINTENANCE & REASSEMBLY | 18 |
| 4. | TROUBLESHOOTING | 19 |
| | APPENDIX A | 20 |
| | APPENDIX B | 21 |

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SPECIFICATIONS

1. GENERAL

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 in the USA or 1-281-491-2331.

Notes, Warnings, and Cautions



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 alert users 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 Light Liquid Hydrocarbon Constant Pressure Sample Receiver with Mini SSO-9 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.

SPECIFICATIONS

1.3 IMPORTANT INFORMATION

N NOTE

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

N NOTE

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 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 |

SPECIFICATIONS

1.4 SPECIFICATIONS (CONTINUED)

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) |

Table 3

| Utilities Required | |
|--------------------------------|------------------------------|
| Air/Hydraulic Pressure: | 65-100 psig (4.5 - 6.9 barg) |
| Air Consumption: | 0.2 scf/cycle @ 75 psi |

1.5 SYSTEM COMPONENTS

Table 4

| | |
|---|---|
| <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 | <ul style="list-style-type: none"> • Draw off/sample outlet port/valve • Nitrogen tank port/valve • Outlet to drain/sump port/valve • Instrument Regulator • Lubricator • 4-way Versa solenoid • Manifold block • All associated fittings, tubing, etc. • Skid weld assembly |
|---|---|

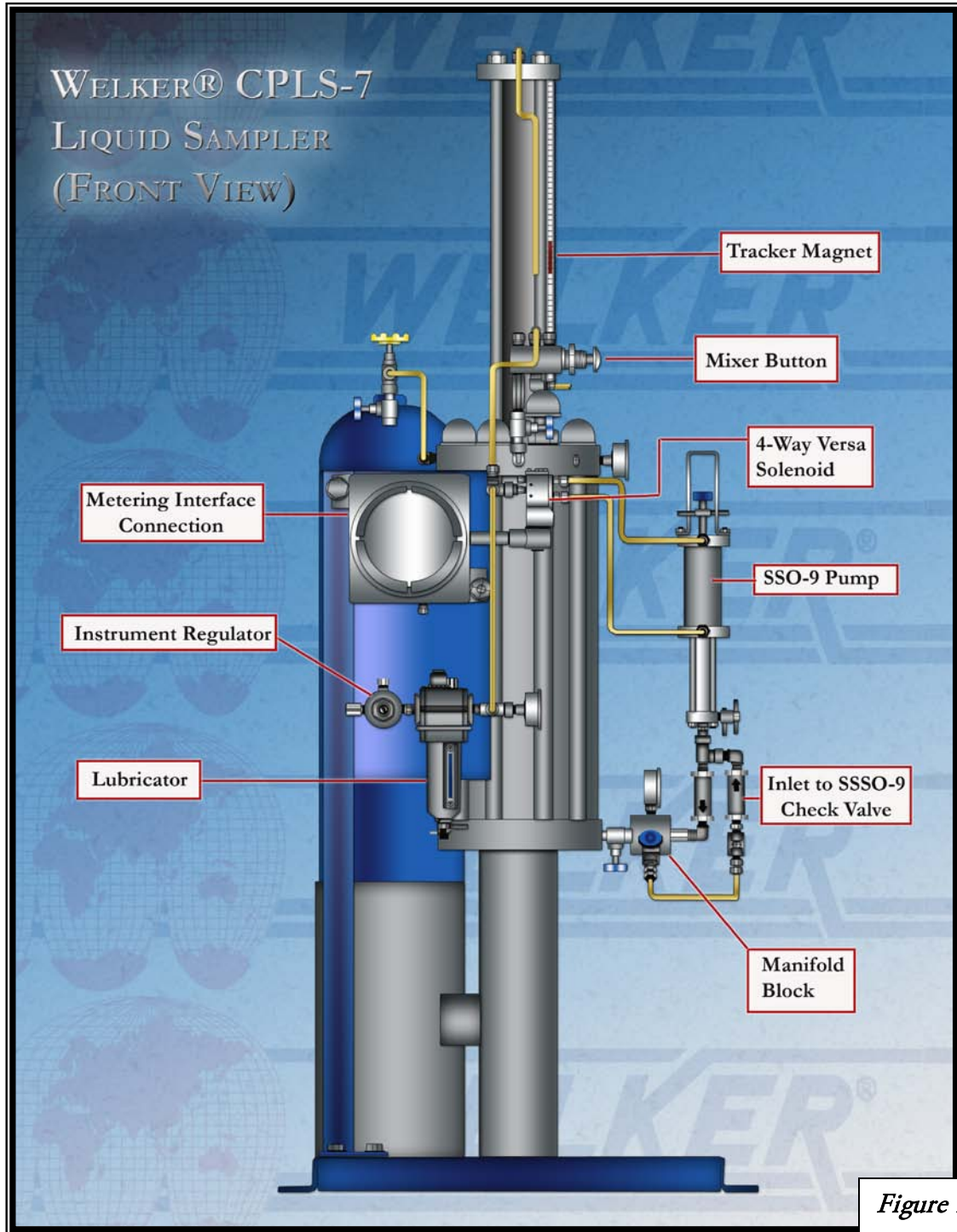
SPECIFICATIONS

1.6 PRINCIPAL OF OPERATIONS

- ◆ The out 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 down through the outlet check valve and pass through the manifold and its check valve into the LS-7 receiver.
- ◆ The LS-7 will be filled with nitrogen at 50-100 PSI above pipeline pressure on the precharge/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, that will displace the air pressure to press down the tracking piston, causing the mixing plate to go down. Deselecting the button will cause the plate to move back up, thus repeatedly pressing and depressing the button will insure that the collective sample is thoroughly mixed.
- ◆ After the mixing process is complete, the end user will open the draw off valve and collect some of the sampled product into a portable 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.

SPECIFICATIONS

1.7 SYSTEM DIAGRAM 1



Refer to above Figure throughout manual.

SPECIFICATIONS

1.8 SYSTEM DIAGRAM 2

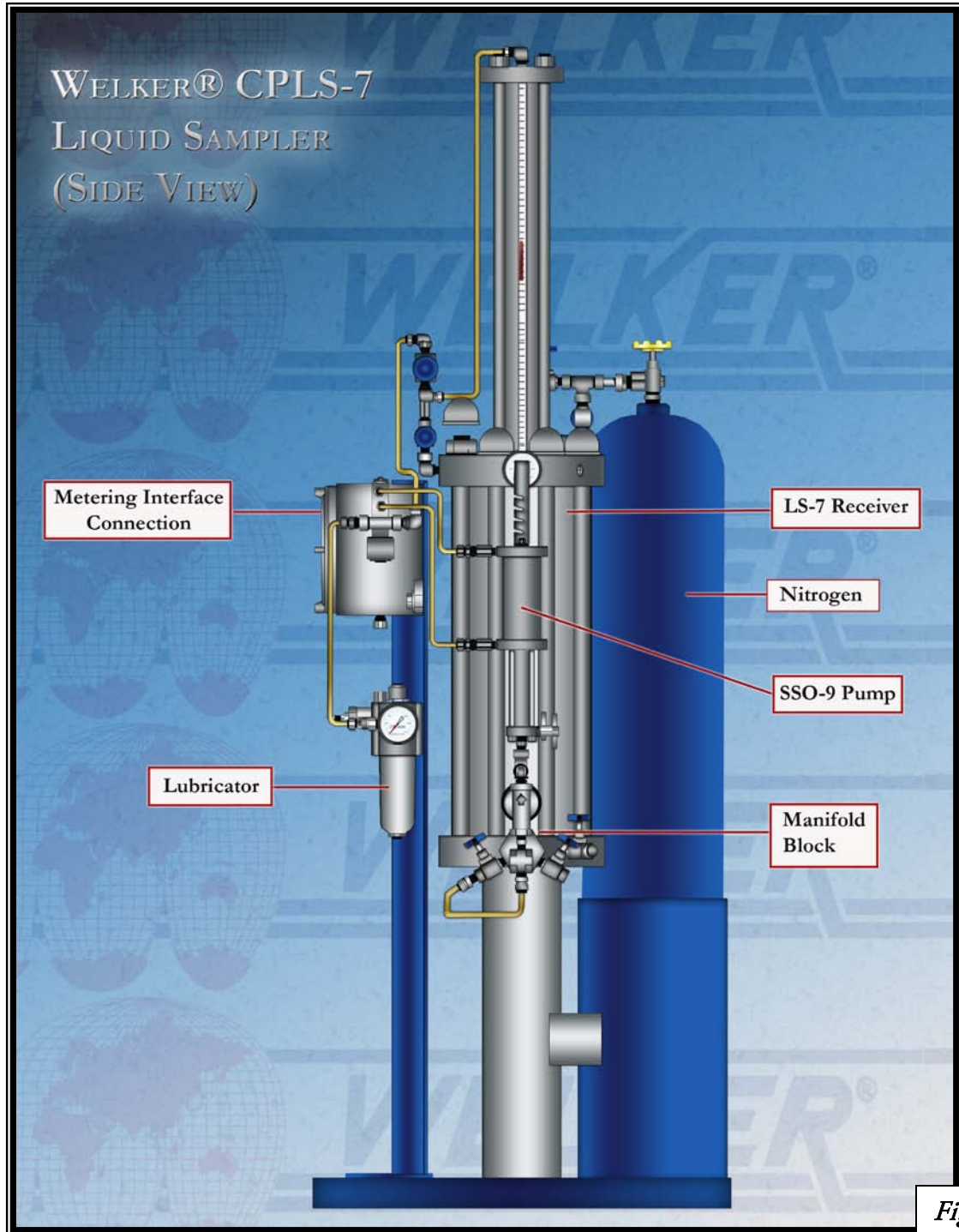


Figure 2

Refer to above Figure throughout manual.

INSTALLATION & OPERATIONS

2. INSTALLATION & OPERATION INSTRUCTIONS

2.1 GENERAL

After unpacking the unit, check it for compliance and for any damages that may have occurred during shipment.

N NOTE

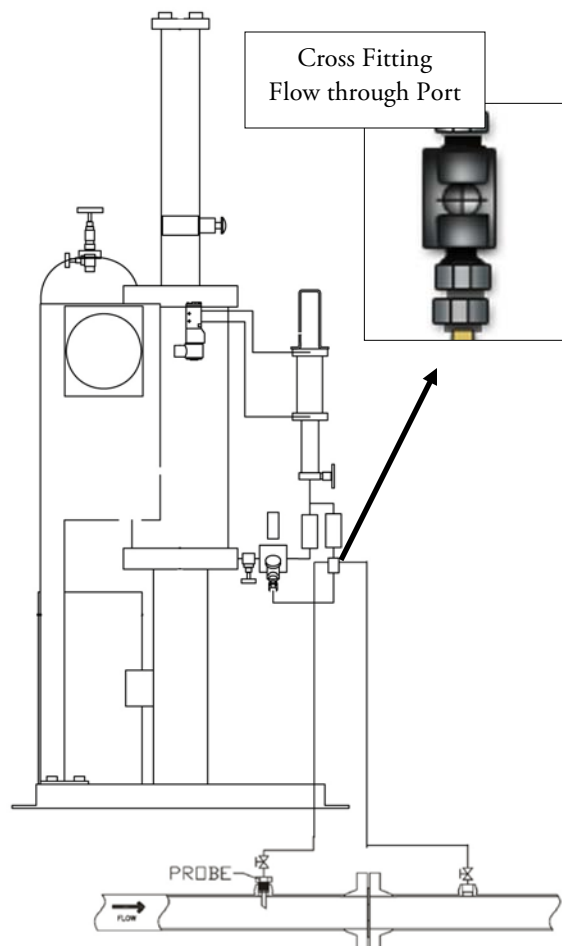
Claims for damages caused during shipping must be initiated by the receiver and directed to the shipping carrier. Welker is not responsible for any damages caused from mishandling by the shipping company.

N NOTE

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.



INSTALLATION & OPERATIONS

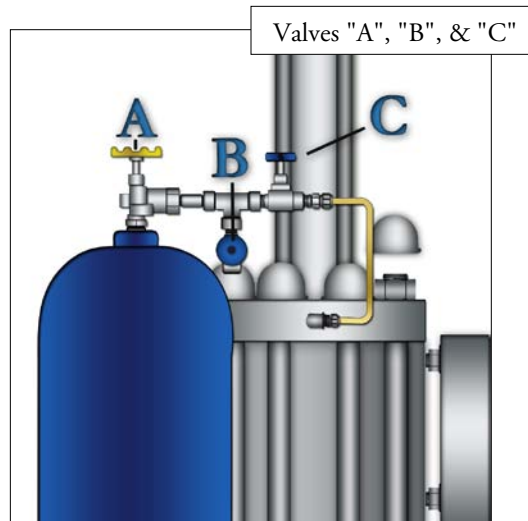
2.3 START-UP/OPERATIONS

W WARNING

Never fill the LS-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 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, valve "B", and valve "C" the nitrogen tank maintenance valve.
- ◆ Apply nitrogen to the system, until the pressure gauge located on the CPLS-7 reaches 100 psi above the maximum operating pressure of the pipeline.
- ◆ Once the desired pressure has been obtained, close valve "B" to fill and empty valve.
- ◆ Close transportable tank, and disconnect tubing from valve "B".
- ◆ Place a 1/4"NPT Hex plug into valve "B" inlet.



N NOTE

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.

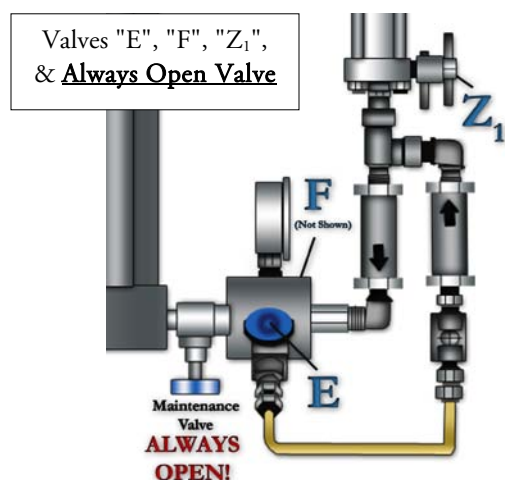
N NOTE

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

INSTALLATION & OPERATIONS

2.3 START-UP/OPERATIONS (CONTINUED)

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.



CAUTION

The valve between the LS-7 cylinder and the manifold should always be open except when performing maintenance to the manifold or sample pump during a sample period. The instrument supply should be closed prior to closing the valve between the LS-7 cylinder and the manifold because the sample pump could build excessive pressure and damage internal parts. Welker has installed a resettable RV2CP relief valve in the manifold burst disc port so if 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

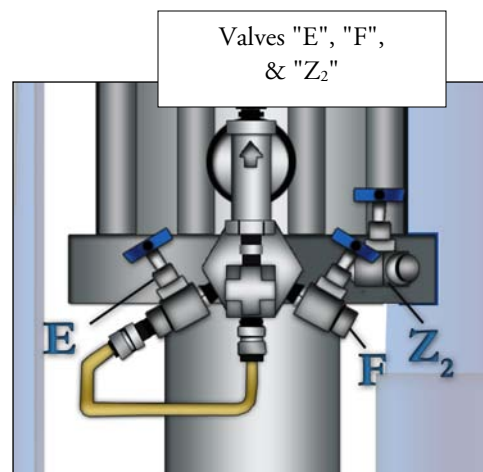
5. All other valves on the manifold should be shut off during a sample period.
6. Once the sampler has been actuated a few times, the pressure should build until equaling the pre-charge pressure. Once this happens, the LS-7 cylinder will slowly fill, thus moving the piston and piston indicator rod.
7. 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 Z_1 just enough to allow the product to bleed by. 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 Z_1 .
 - ◆ 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 Z_2 just enough to allow the product to bleed by, and then quickly retighten the purge valve Z_2 .
9. Check the manifold completely for leaks.

INSTALLATION & OPERATIONS

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 the 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.

N NOTE

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.

N NOTE

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.

INSTALLATION & OPERATIONS

2.4 MIXING & COLLECTION OF COMPOSITE SAMPLE (CONTINUED)

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.

N NOTE

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.

MAINTENANCE

3. MAINTENANCE

3.1 GENERAL

Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit handy for the system in case of unexpected wear or faulty seals.

N NOTE

We recommend that the unit have annual maintenance under normal operating conditions. In the case of severe service, dirty conditions, excessive cycling usage, or other unique applications that may subject the equipment to unpredictable circumstances, a more frequent maintenance schedule may be appropriate.

Recommended Tools

It would be advisable to have the following tools available for installation of the unit. However, tools used will vary depending on cylinder model and connectors used.



- 6" adjustable wrench
- 12" adjustable wrench
- External snap ring pliers
- Internal snap ring pliers
- 1⁷/₁₆ wrench

N NOTE

New seals supplied in spare parts kits are not lubricated. They should be lightly coated with lubrication grease (silicone grease or other) before they are installed into the equipment. This helps in the installation of the seals while reducing the risk of damage when positioning them on the parts. After the seals are installed, some additional lubrication can be applied to shafts or cylinder inner diameters to allow smooth transition of parts.

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.

MAINTENANCE

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 10).

3.3 SSO-9 PUMP ASSEMBLY AND DISASSEMBLY

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.

N NOTE

Refer to Appendix A, cross-Sectional drawing of the pump.

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.

MAINTENANCE

3.3 SSO-9 PUMP ASSEMBLY AND DISASSEMBLY (CONTINUED)

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.

N 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 precede to Section 3.4 CPLS-7 Assembly and Disassembly.

MAINTENANCE

3.4 CPLS-7 RECEIVER ASSEMBLY AND DISASSEMBLY

1. Disconnect the tubing from the mixer portion and the tubing between the nitrogen cylinder and the LS-7 top flange #10.
2. Disconnect manifold block from LS-7.
3. Remove the nuts #20 (4) from the mixer actuator cylinder tie bolts #21 (4) and remove the top cap #19 of the mixer actuator.
4. Remove the tracker tube #14. Do not lose the tracker magnet #16 in the tracker tube, or the rubber end pieces #12 (2).
5. Replace the seal #18 on the top cap.
6. Slowly slide the mixing cylinder #13 up and off the mixing piston #23.
7. Remove the magnet retainer #22, magnet #17 and mixing piston from the mixer rod #5.
8. Replace the seals #'s 15 (2) and 24 on the mixing piston.
9. Remove the nuts #11 (8) from the LS-7 cylinder tie bolts #3 (8).
10. Lift the top flange straight up and completely clear the mixing rod before pulling it away from the cylinder #4.
11. Replace the seals #'s 2, 18, 25 and 26 (2) on the top flange.
12. Make sure that the bearing in the top flange is clean and smooth. Replace if necessary.
13. Remove the LS-7 tie bolts and carefully lift the cylinder off the bottom flange #1 and replace that flange seal #2.



The cylinder is HEAVY!

14. Remove the mixer shaft from the piston #9 in the cylinder.



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

15. Slowly push the sample piston out of the sample cylinder by reaching inside the pre-charge side. Make note of the top and bottom positions of the piston and cylinder. It may be helpful to have something to help push the piston out of the cylinder (2" X 4", length of pipe with a padded end, etc.)
16. Replace the seals #'s 2, 6 (2), 8, 26 (2) and 48 (3) on the piston.
17. Make sure that the bearing in the piston is clean and smooth. Replace if necessary.

MAINTENANCE

3.4 CPLS-7 RECEIVER ASSEMBLY AND DISASSEMBLY (CONTINUED)

18. Examine all of the polished and honed surfaces on the mixer shaft and sample cylinder. Deep pits and scratches will cause product and pressure to leak past the seals.
19. Lightly lubricate the inside of the sample cylinder.
20. Reinsert the sample piston into the sample cylinder.
21. Lightly lubricate the mixer shaft.
22. Reinsert the shaft into the sample piston carefully to avoid damaging the seals. Rotate the threads through the seals.
23. Place the cylinder back onto the lower flange with the correct orientation.
24. Reinsert and tighten the tie bolts.
25. Carefully replace the top flange.
26. Replace and tighten the tie bolt nuts.
27. Replace the mixing piston, magnet (correctly oriented) and magnet retainer.
28. Slide the mixing cylinder back down into place. Do not forget to replace the tracker magnet in the tracker tube.
29. Replace and tighten the mixing cylinder tie bolts.
30. Replace the top cap.
31. Replace and tighten the mixing cylinder tie bolt nuts.
32. Proceed to Section 3.5 Final System Maintenance and Reassembly.

3.5 FINAL SYSTEM MAINTENANCE AND REASSEMBLY

33. Reconnect the tubing from the mixer portion and the tubing between the nitrogen cylinder and the LS-7 top flange #10.
34. Reconnect manifold block to LS-7.
35. Reconnect all tubing to SSO-9 pump.
36. Check entire system for leaks or loose fittings. Tighten all fittings, and replace when necessary.
37. Maintenance is now complete. System is ready for reinstallation.

TROUBLESHOOTING

4.0 TROUBLESHOOTING GUIDE

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

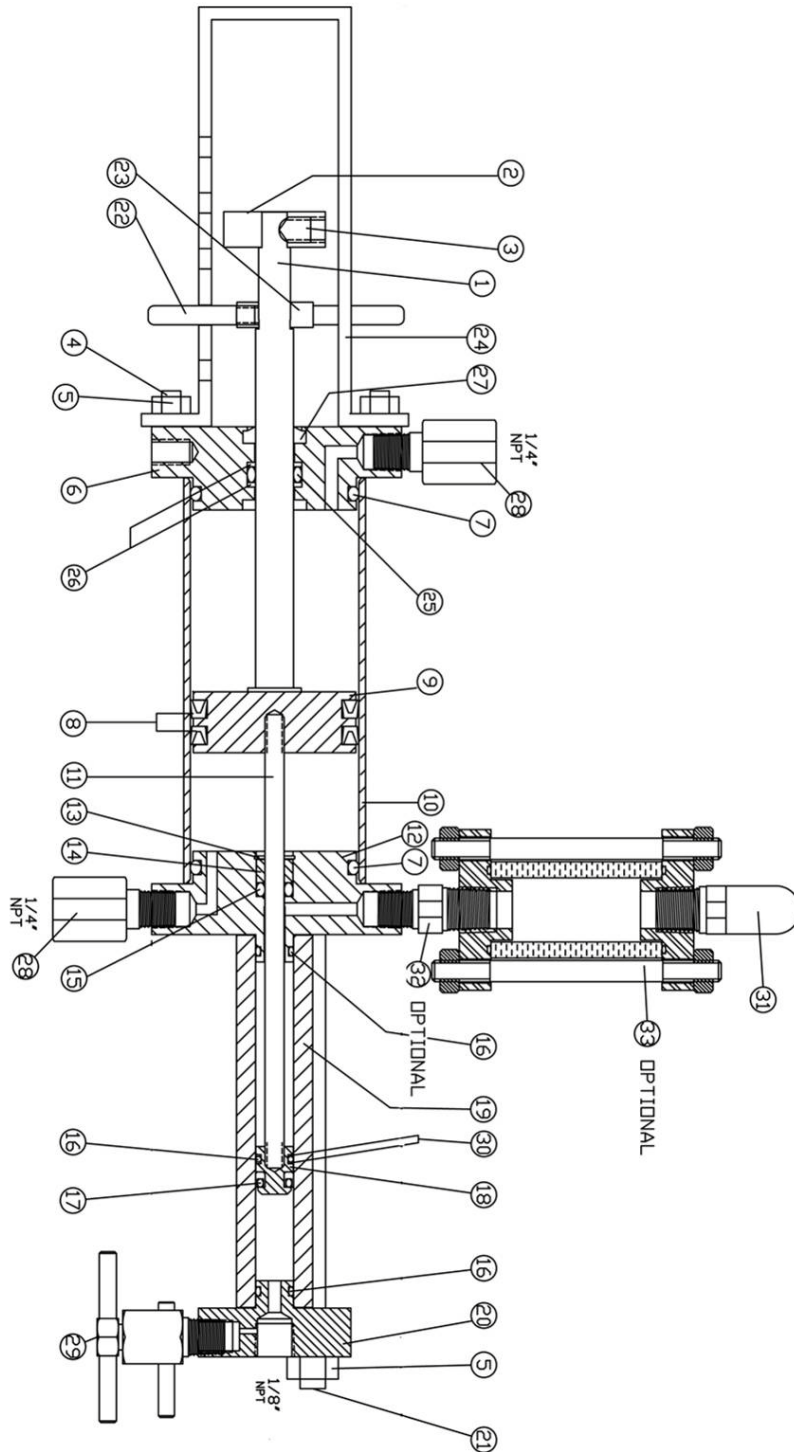
- ◆ Pipeline is open to sample pump.
- ◆ Controller is functioning.
- ◆ Signal from meter is being received by controller.
- ◆ Solenoid is operating.
- ◆ Instrument supply is not off.
- ◆ Instrument supply is supplied to sample pump.

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.

APPENDIX A

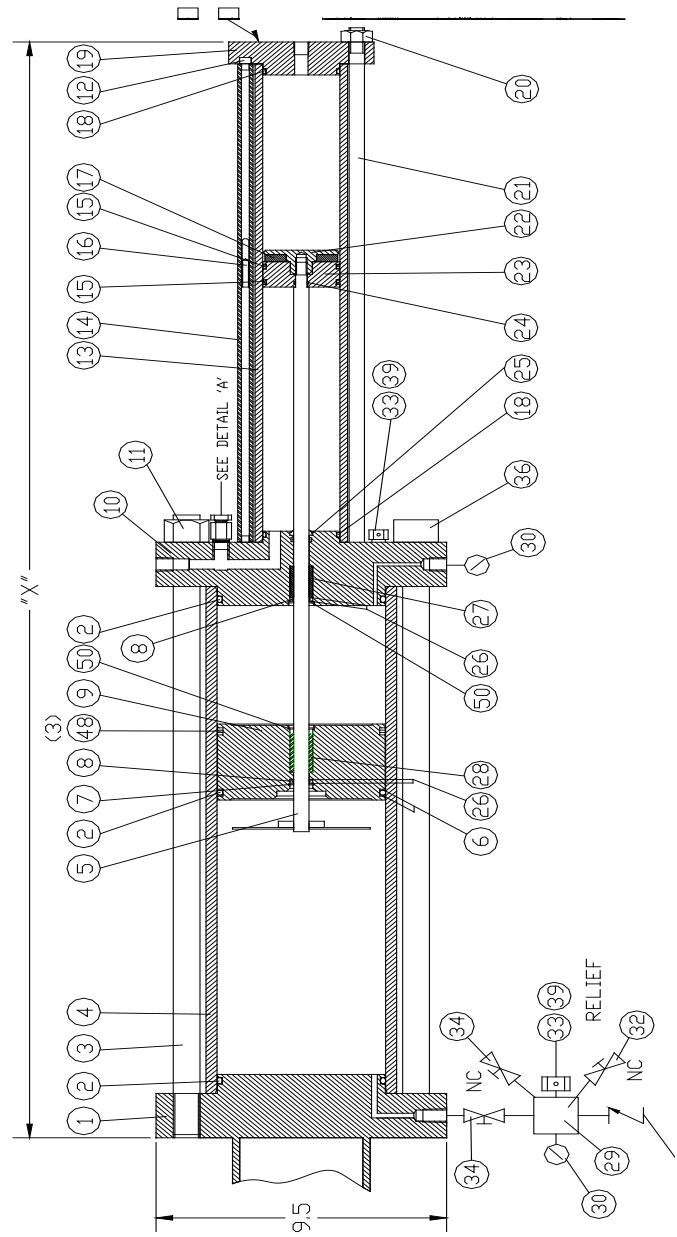
DIAGRAM SSO-9 PUMP



APPENDIX B

CROSS SECTIONAL DIAGRAM CPLS-7

EXPLODED PARTS





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