



Installation, Operation, and Maintenance Manual

Welker[®] Constant Pressure Cylinder Model CP-87

***Drawing No.: AD870OA
Manual No.: IOM-167***

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[®] Constant Pressure Cylinder, CP-87. 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® CP-87 Constant Pressure Cylinder is a large cylinder designed to store high volumes of representative sample collected from flowing fluids. Cylinder size should be selected based on flow rate, sample frequency, length of sample period, collection head size and/or the number of parties collecting sample for analysis. The CP-87 uses customer-supplied nitrogen or other inert gas to maintain constant pressure on the sampled product to prevent escape of entrained gases. This cylinder allows for simple, thorough mixing through the use of a pneumatic supply, and has a draw-off valve for transferring mixed sample product into a smaller, transportable constant pressure container for transport to a testing laboratory.

1.3 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 CP-87	
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 Operating Pressure (MAOP):	2160 psi @ -20°F to 120°F (149 bar @ -29°C to 49°C)
Maximum Allowable Operating Temperature (MAOT):	-400°F @ 1270 psi (204°C @ 87 bar)
Viscosity Range:	8 - 50°API gravity
Connection:	1/4" NPT; others available
Pre-charge Tank Options:	Nitrogen, Helium, or other appropriate inert gas
Proximity Switch (Optional)	24 VDC Electrical Connection Class I, Div. 1, Groups A, B, C, and D Class II, Div. 1, Groups E, F, and G CENELEC Approved
Area Classification:	Can be used in hazardous areas

1.4 SYSTEM DIAGRAMS

Figure 1: Manifold Block Diagram

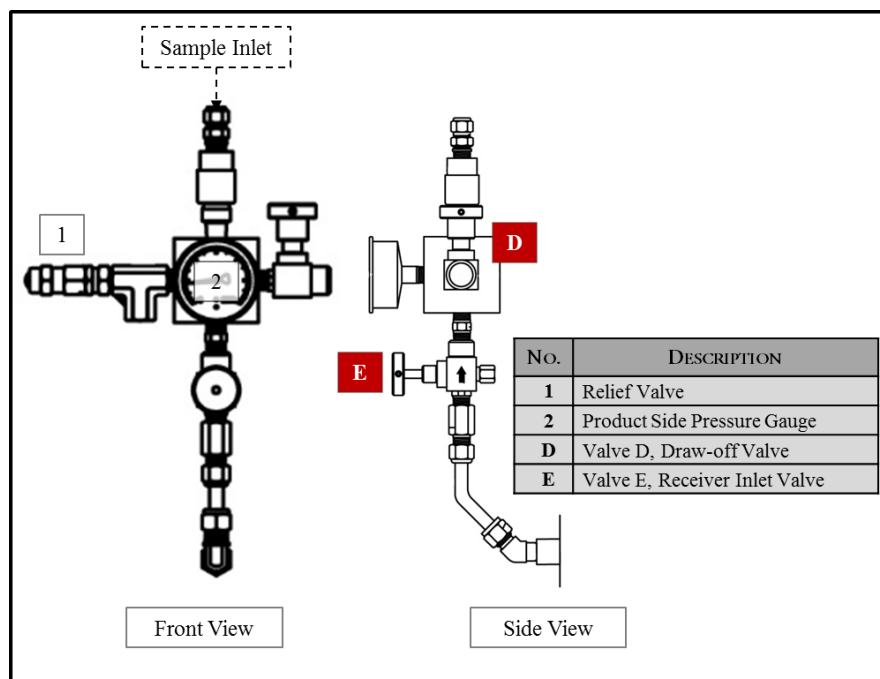
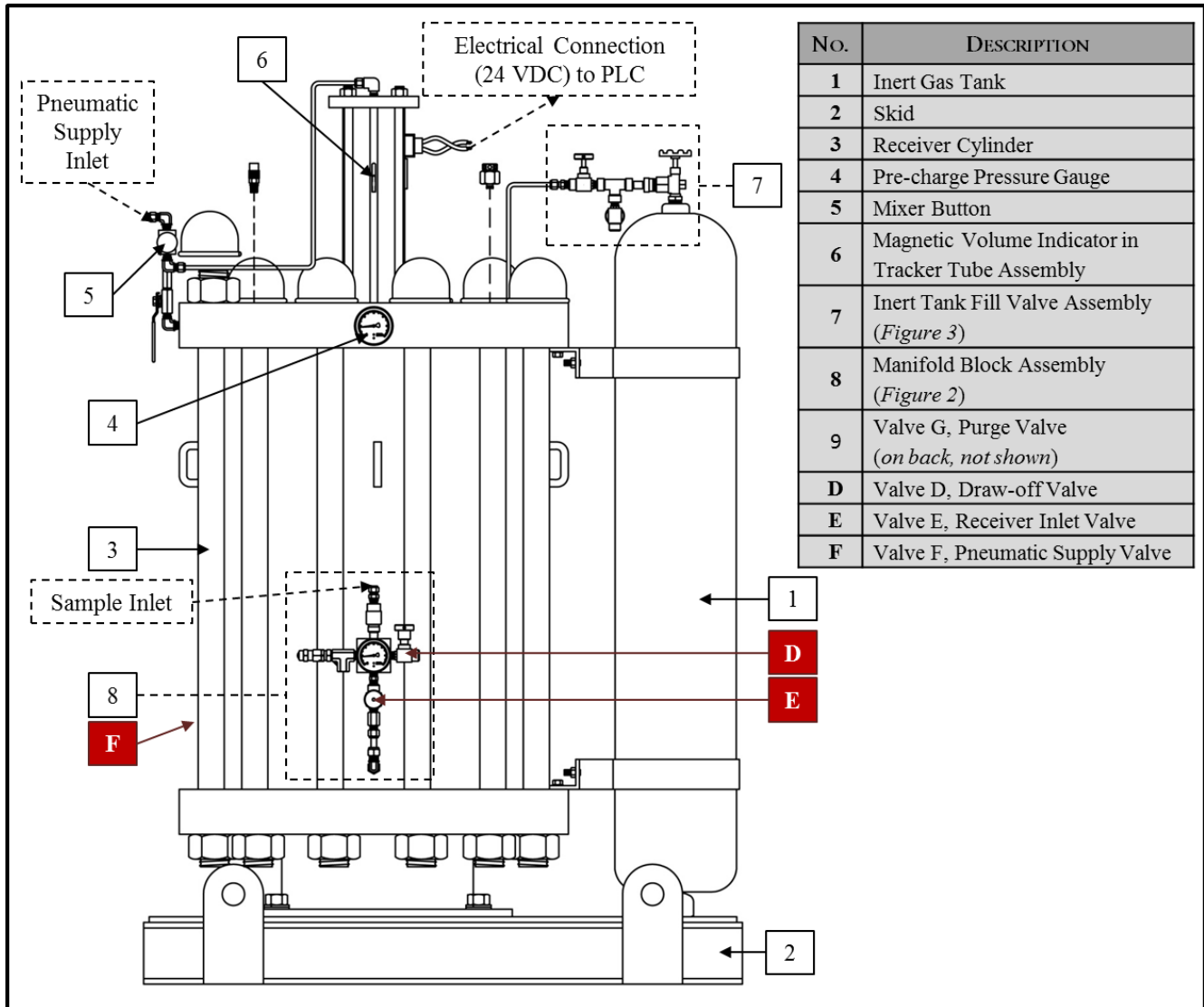


Figure 2: System Diagram



REFER TO FIGURES 1 & 2 AND DRAWING AD8700A 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.

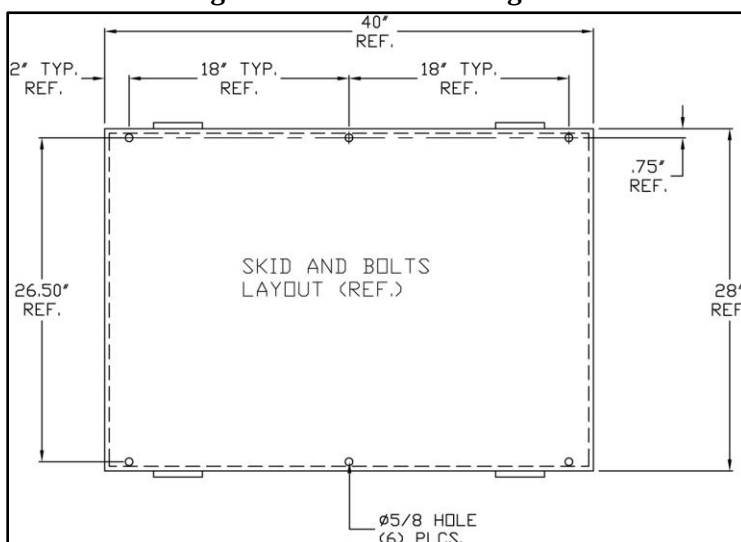


When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.

2.2 INSTALLATION INSTRUCTIONS

1. Ensure 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 securely to a flat, level surface in accordance with the skid mounting diagram (Figure 3).

Figure 3: Skid Mount Diagram



4. If the CP-87 is equipped with an optional proximity switch or any other electrical device, bolt a grounding lug to the skid and ground the skid properly.
5. If the CP-87 is equipped with an optional proximity switch, connect the switch to a terminal box with a 24 VDC electrical supply, and connect the output signal to the PLC or other signal control unit.



For this manual, the term “PLC,” or programmable logic computer, will be used to refer to the PLC, DCS, or other signal control system used by the customer to activate and operate the solenoid.

6. The pre-charge side of the CP-87 will need to be pressurized to approximately 50 to 100 psi above maximum operating pipeline pressure. The inert gas tank is shipped empty from the manufacturer. To fill the system with inert gas (*Figure 4*):

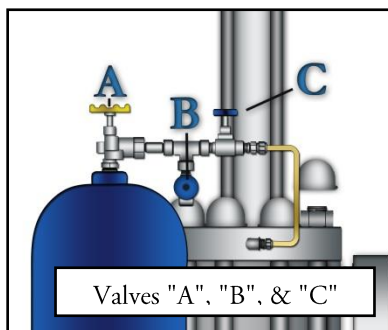
- Connect valve B to a transportable tank filled with an appropriate inert gas.
- Open valves A, B, and C.
- Apply inert gas to the system until the pre-charge pressure gauge on the CP-87 reaches 50 to 100 psi above the maximum operating pipeline pressure.
- Once the desired pressure is reached, close valve B.
- Close valve A on the transportable tank and disconnect the tank from valve B.



The system must be pre-charged to a pressure greater than the vapor pressure of the lightest liquid sampled. The inert gas tank should not need to be recharged unless a leak is present. At all times other than filling or refilling, valves A and C should remain open, and valve B should remain closed.

7. Check all fittings for leaks, and plug valve B inlet with a 1/4" NPT hex plug.

Figure 4: Inert Gas Valves



8. Connect a clean, dry pneumatic supply to the inlet on the mixer.
9. Apply the pneumatic supply to the mixer inlet at approximately 75 psi. The pneumatic supply should not exceed 125 psi.
10. Connect a sampler to the sample inlet on the manifold block.
11. Connect the purge valve G on the CP-87 to a safe vent or sump.
12. Actuate the sampler several times to apply pressure to the manifold and check for leaks. If any leaks are found, repair as necessary prior to proceeding.
13. Open valve G to relieve any trapped air.
14. Close the valve G.
15. Open the mixer valve F.
16. Open the receiver inlet valve E.
17. Installation is now complete. For sampling operation procedures, refer to the *Installation, Operation, and Maintenance Manual* of the specific sampler used.



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

2.3 MIXING & COLLECTION OF COMPOSITE SAMPLE (AFTER SAMPLING)

1. Turn off and isolate the sampler.
2. Connect a constant pressure transportation cylinder to the draw-off valve on the manifold block. The transportation cylinder should have a pre-charge pressure of approximately 100 psi above the product pressure in the CP-87 cylinder. Refer to the *Installation, Operation, and Maintenance Manual* of the constant pressure transportation cylinder for pre-charging instructions.
3. Before drawing sampled product from the receiver, the operator should fully cycle the mixer 4 to 5 times by alternately pressing and releasing the mixer button.
 - When operating the 4-way mixing valve, actuate the mixer for the full distance of the liquid capacity in the receiver. For example, if the receiver is half full, the mixer should travel half the length of the receiver up and down to complete one mixing cycle.
 - If the receiver is equipped with a level indicator (optional), it should be turned off during mixing to avoid giving a false signal. It may be reactivated after mixing.
4. When mixing is complete, the mixing rod plate should be at the bottom of the piston.
5. Open the draw-off valve on the receiver and the inlet valve of the transportation cylinder.
6. Slowly open the purge valve on the transportation cylinder to purge any air, and shut the valve completely when liquid appears.
7. Actuate the mixer for another 3 to 4 complete cycles.
8. **Slowly** open the pre-charge valve on the transportation cylinder and allow liquid to enter until the transportation cylinder reaches the desired volume.



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

9. Close all valves and disconnect the transportation cylinder.
10. After the transfer is complete, all valves should be checked for leaks and then plugged.
11. Record necessary information for the transportation cylinder according to company policy.
12. This procedure can be repeated to get full use of the sample in the CP-87 receiver. Once the pneumatic supply is reapplied to the cylinder, the unit is ready to resume sampling.
13. When all desired samples have been collected, open the purge valve on the receiver to drain any remaining product.



Cleaning or purging of the system between batches is important to ensure that each tested sample is wholly representative of the sample batch.

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 available 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 Dow Corning 111 [DC 111] or an equivalent lubricant for use with this unit.



Welker® recommends the use of Krytox® lubrication grease for Constant Pressure Cylinders. The lubrication grease should be applied sufficiently but lightly. When using lubrication other than Krytox®, wipe excess lubrication from the seals as it may have an adverse effect on some analytical instrument results.

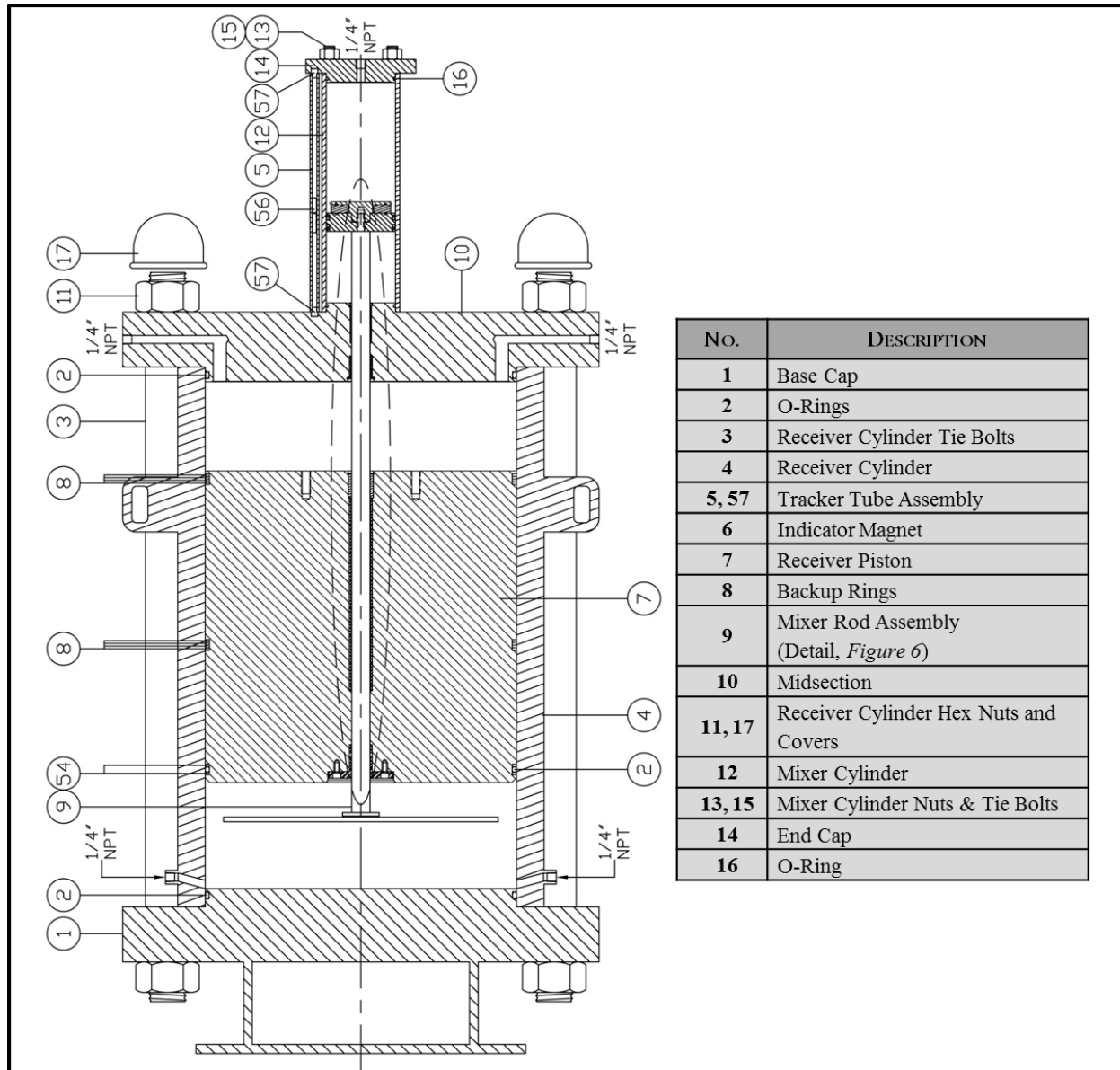
3. All maintenance and cleaning of the unit should be done on a smooth, clean surface.
4. Before attempting to service the CP-87, the inert gas cylinder valve should be closed to preserve the inert gas in the CP-87 cylinder.
5. Ensure the pipeline isolation valves are closed and the system has been completely depressurized. Depressurize the pre-charge side of the cylinder by opening valves B and C.

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
- 2³/₄" box end wrench
- 2" x 4" length of wood or PVC pipe (Optional)

Figure 5: CP-87 Maintenance Diagram



3.2 DISASSEMBLY

1. Disconnect or shut off the instrument air supply.
2. Depressurize the system.
3. Disconnect the tubing from the end cap and the tubing between the inert gas tank and midsection.
4. Remove the 4 mixer cylinder nuts from the 4 mixer cylinder tie bolts and remove the end cap.
5. Remove the tracker tube. Be careful not to lose the indicator magnet or tracker tube pins.
6. Slowly slide the mixer cylinder up and off the mixer piston.
7. Remove the magnet retainer, tracker magnet, and mixer piston from the mixer shaft.
8. Remove the 12 receiver cylinder nuts from the 12 receiver cylinder tie bolts on the receiver cylinder.
9. Carefully lift the midsection straight up and off the mixer shaft.

10. Carefully lift the receiver cylinder off the base cap with the receiver piston still inside.



Equipment is HEAVY. Bolt holes and lifting handles have been provided for heavy lifting. Use appropriate lifting equipment, and lift with caution.

11. Remove the mixer shaft from the receiver piston.



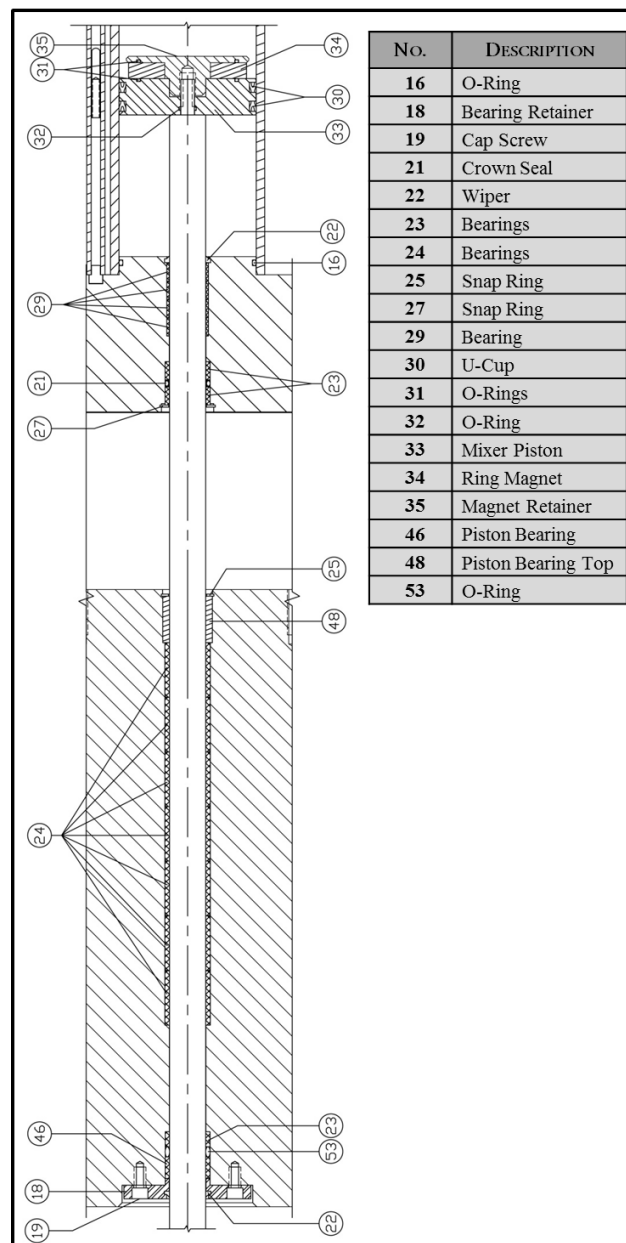
Remove gently. Do not bend the mixer shaft when removing it from the piston.

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



Use a length of wood or PVC pipe as needed to gently push the piston out of the cylinder. Do NOT use metal objects, which may scratch and damage the equipment.

Figure 6: CP-87 Mixer Rod Detail Diagram



3.3 REASSEMBLY

1. Examine all the polished and honed surfaces on the receiver cylinder. Deep pits or scratches may allow leakage around seals.
2. Lightly lubricate the inside of the receiver cylinder.
3. Ensure the bearing in the receiver piston is clean and smooth. Replace if necessary.
4. Replace the seals on the receiver piston.
5. Reinsert the receiver piston into the receiver cylinder.
6. Examine all the polished and honed surfaces on the mixer rod assembly. Deep pits or scratches may allow leakage around seals.
7. Replace the O-rings and back-up rings on the mixer rod assembly.
8. Examine the bearings, wipers, snap rings, and U-cup on the mixer rod assembly. If any damage is present, replace the necessary components.
9. Lightly lubricate the mixer rod.
10. Reinsert the mixer shaft into the receiver piston carefully to avoid damaging the seals. Gently rotate the threads through the seals.
11. Replace the seal on the base cap.
12. Place the receiver cylinder (correctly oriented) onto the base cap.
13. Reinsert and tighten the receiver cylinder tie bolts.
14. Replace the seals on the midsection.
15. Ensure that the bearing in the midsection is clean and smooth. Replace if necessary.
16. Carefully place the midsection onto the cylinder.
17. Place and tighten the receiver cylinder nuts onto the receiver cylinder tie bolts.
18. Replace the seals on the mixer piston.
19. Reassemble the mixer piston, tracker magnet (correctly oriented) and magnet retainer.
20. Ensure that the indicator magnet is still inside the tracker tube, and reattach the tracker tube.
21. Slide the mixer cylinder down into place on the mixer shaft.
22. Place and tighten the mixer cylinder tie bolts onto the mixer cylinder.
23. Replace the seals on the end cap.
24. Place the end cap onto the mixer cylinder.
25. Place and tighten the mixer cylinder nuts onto the mixer cylinder tie bolts.
26. Reconnect the tubing to the end cap and the tubing between the inert gas cylinder and the midsection.
27. Re-pressurize the inert gas system.
28. Check entire system for leaks or loose fittings. Tighten all fittings, and replace where necessary.
29. Open Valve C on the manifold block. Maintenance is now complete. Refer to Section 2, Installation and Operations, to return the system to operational readiness.

APPENDIX

ATTACHED DOCUMENTS:

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

- None

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

- Applicable Constant Pressure Transportation Cylinder
- Applicable Sampler
- GO Switch Series 21: GO Switch® Proximity Switch (OPTIONAL)

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

- Assembly Drawing: AD870OA (With Optional Proximity Switch)



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