



*Installation, Operation, and
Maintenance Manual*

***Welker[®] Constant Pressure Validation Receiver
Model
CP-78***

***Drawing No.: AD852BB.CRN5
Manual No.: IOM-133***

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 Validation Receiver CP-78. 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 Validation Receiver is a large receiving cylinder designed to provide high volume storage of a sampled product for calibration checks on analyzing equipment during product sample analysis. This unit is designed to maintain collected product in its original composition and phase state, which allows the collected product to be the same for repeated uses. Because of this, product stored in the validation receiver can be analyzed to produce a “known” value that is repeatable and can be utilized in the future for analyzing equipment calibration, rather than using more expensive certified liquid standard products.

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: Equipment Specifications	
Products Sampled	Light liquid hydrocarbons, refined products, liquid petroleum gas, natural gas liquids, light crude and condensate
Materials of Construction	316 Stainless Steel, aluminum, Viton®, and PTFE. Others available upon request.
Maximum Allowable Operating Pressure	300 psi
Sample Outlet Connections	¼" NPT
Power Connections	Level Transmitter ½" NPT
Temperature Range	-20 to 250°F (-28 to 121°C)
Viscosity Range	8 to 50° API Gravity
Area Classification	Can be used in hazardous areas

Table 2: Utility Requirements	
Air Pressure	100 psig (6.9 barg) Mixer
Nitrogen	300 psig (20.6 barg) maximum

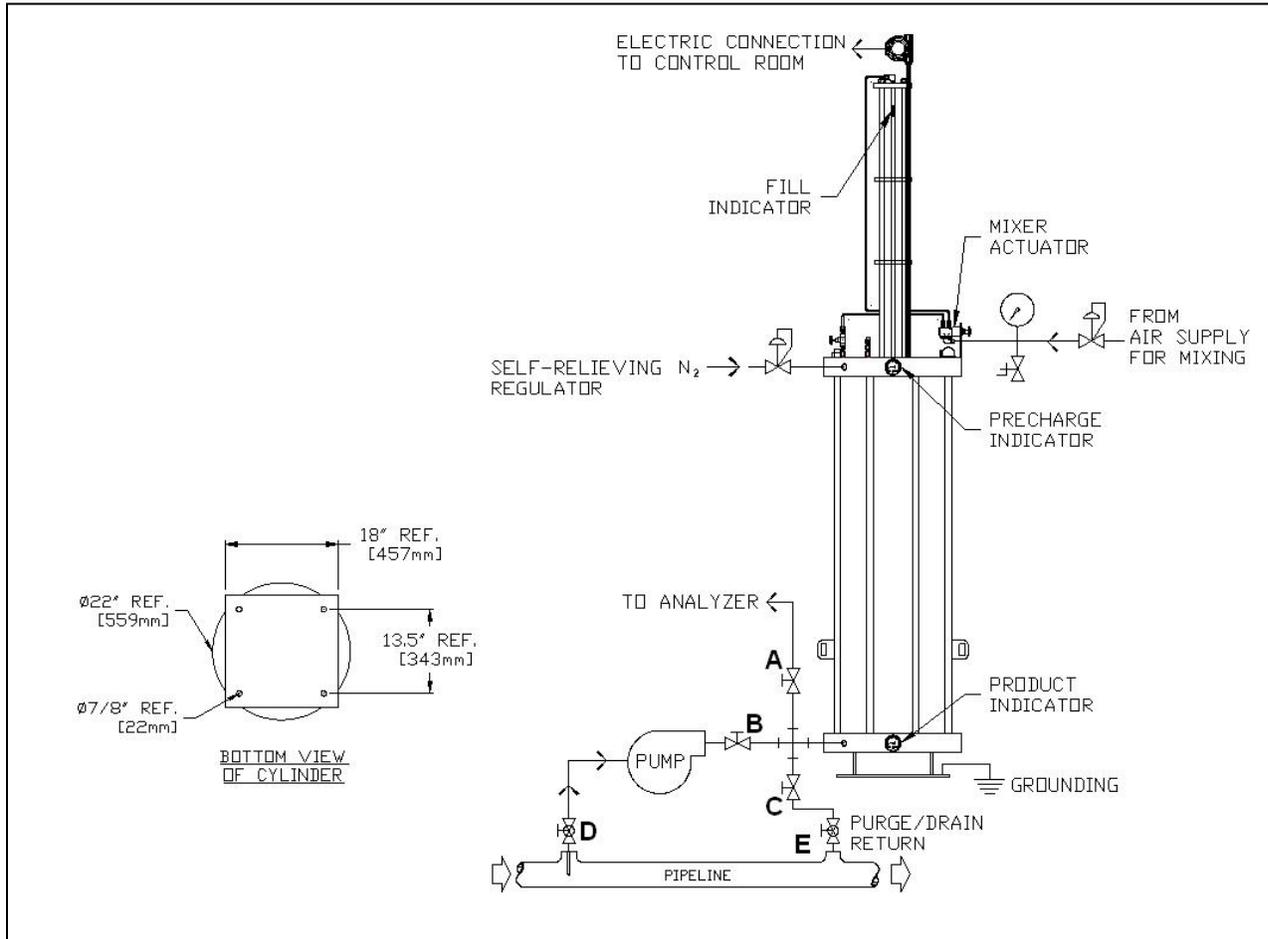
Table 3: Options
Other materials of construction
Other volumes
Higher or lower pressure ranges
Special coatings
Electric Mixer



This unit requires proper storage. The CP-78 unit is shipped upright (in the vertical position) from Welker® and should be stored and installed in the same orientation to prevent any potential damage to the validation cylinder.

1.4 SYSTEM DIAGRAM

Figure 1: System Diagram (Recommended Layout)



REFER TO *DRAWING AD852BB.CRN5 REV. D* AND *FIGURE 1* 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.**



The Welker® Constant Pressure Validation Receiver will ship “hard tube” connected with manufacturer-supplied fittings and hardware. However, the customer may need to supply some tubing and fittings in order to complete the installation of the system.



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

2.2 INSTALLATION (FIGURE 1)

1. Locate the skid as close to the analyzing equipment as possible.
2. Secure the base using the appropriate nuts and tie bolts.
3. Connect a grounding wire to the grounding lug nut to ground the equipment.
4. Connect a self-relieving regulator supplied with nitrogen to the pre-charge port of the tank.
5. Adjust the regulator to add nitrogen to the pre-charge side of the tank. Watch the pre-charge indicator as you adjust the regulator. Fill the tank to approximately 15 to 20 psi above pipeline pressure.



Monitor pressure gauges to ensure the system does not exceed 250 psi, as the unit is equipped with 300 psi rupture discs.



In case of a high-power pump, it may be necessary to add a valve prior to the self-relieving regulator that may be opened to help quickly relieve nitrogen pressure in the tank in the event of high pressure build-up during filling.

6. Connect a regulated air supply to the mixer actuator. Air should be supplied at approximately 50 to 60 psi.
7. Connect the K-Tek® remote level indicator (*Refer to K-Tek® IOM*).
8. Connect valve A to the analyzing equipment.
9. Connect valve C to the pipeline or a sump.
10. Install a line from valve B to valve D on the product pipeline.



Welker® recommends the installation of a pump motor upstream of valve B to help pipeline pressure overcome the nitrogen pre-charge pressure to allow the tank to fill.



Welker® recommends the use of a probe inserted into the pipeline upstream of valve D to draw representative sample product from the center third (1/3) of the pipeline.

2.3 OPERATIONS (FIGURE 1)

To Fill the Validation Receiver Tank

1. Begin with all valves closed.
2. Ensure that the tank is filled with nitrogen (N₂) at 15-20 psi above pipeline pressure.
3. Open valves D, B, C, and E (in that order) to purge air from the bypass (a.k.a. hot loop, fast loop, etc.)
4. Start pump.
5. Close valves C and E.
6. Continue running the pump until the tracker magnet on the tracker tube on the validation receiver indicates that the tank is 80% full.



In order to allow for expansion of sample fluid in case of temperature changes, do not fill the cylinder to more than 80% capacity. Over-pressurizing the sample cylinder may cause the burst discs to break.

7. Shut off the pump.
8. Shut valve B.
9. Push the button on the mixer actuator until the tracker magnet reaches the bottom of the tracker tube, then release. Repeat this step 3 to 4 times, or to company standards, to thoroughly mix the product.



This should be done every time any product is to be taken from the validation tank.

10. Open valve A to allow product to flow to the analyzing equipment.
11. Analyze and calibrate according to company standards and procedures.

To Empty the Validation Receiver Tank



This may be done any time the validation tank needs to be refilled or taken apart for maintenance.

1. Close valve A.
2. Open valves C and E to allow product to drain to the pipeline or sump. The tank is empty when the piston reaches the bottom of the tank.
3. Close all valves. The validation tank is now ready for operation or maintenance.

SECTION 3:

MAINTENANCE

3.1 BEFORE YOU BEGIN

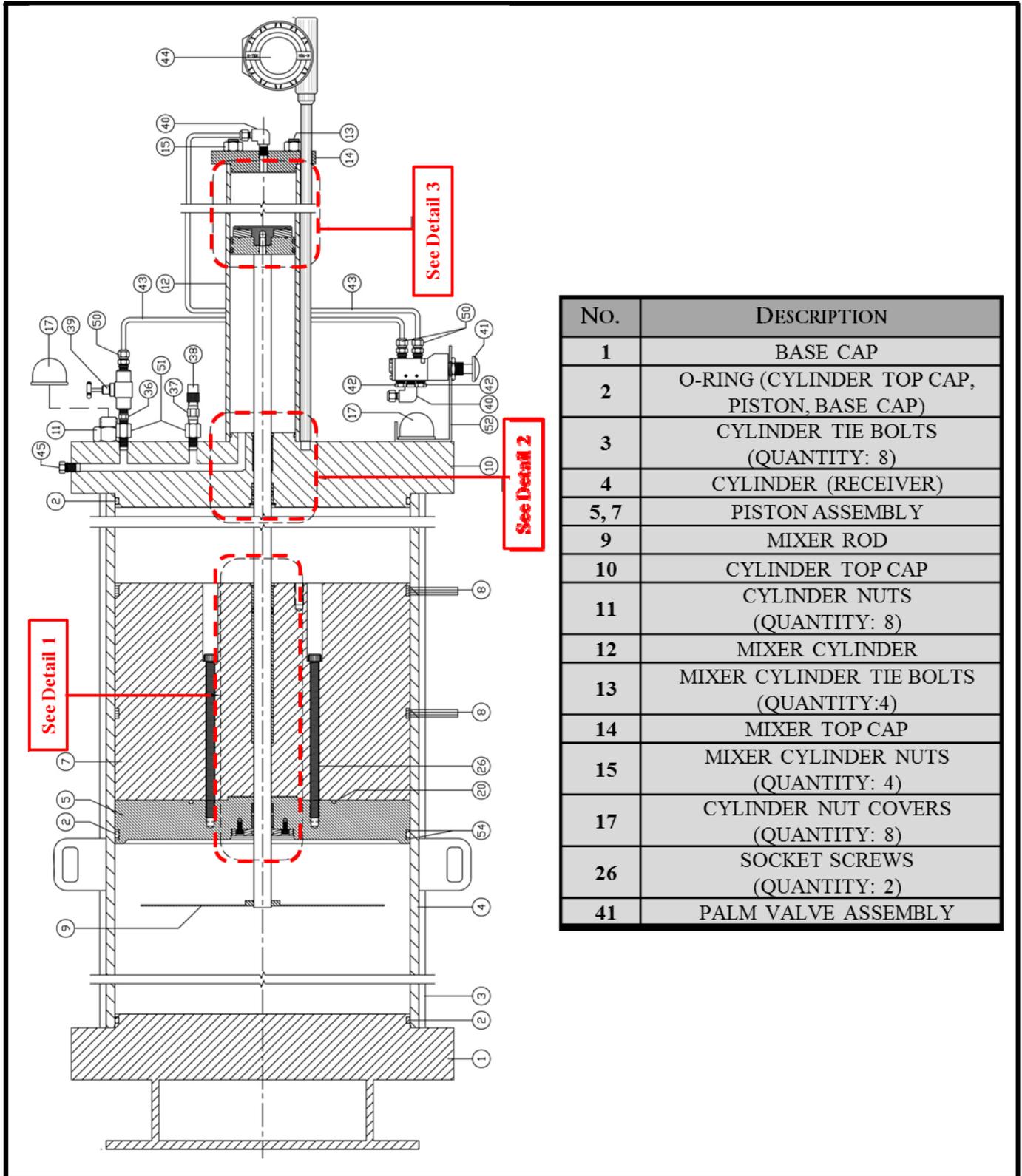
1. **Welker® recommends that the unit have annual maintenance under normal operating conditions.** In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may be appropriate.
2. Prior to 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.
3. All maintenance and cleaning of the unit should be done on a smooth, clean surface.
4. Before attempting to service the validation tank, the nitrogen cylinder valve should be closed to preserve the nitrogen in the tank.
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
- Small Allen wrenches

Figure 2: Maintenance Diagram

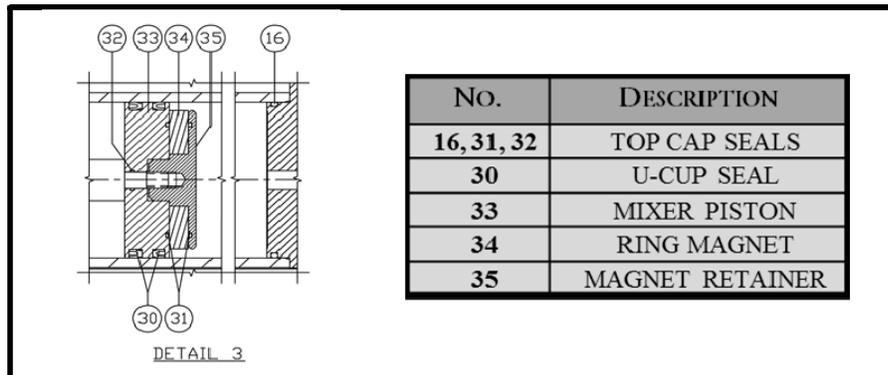


NO.	DESCRIPTION
1	BASE CAP
2	O-RING (CYLINDER TOP CAP, PISTON, BASE CAP)
3	CYLINDER TIE BOLTS (QUANTITY: 8)
4	CYLINDER (RECEIVER)
5, 7	PISTON ASSEMBLY
9	MIXER ROD
10	CYLINDER TOP CAP
11	CYLINDER NUTS (QUANTITY: 8)
12	MIXER CYLINDER
13	MIXER CYLINDER TIE BOLTS (QUANTITY:4)
14	MIXER TOP CAP
15	MIXER CYLINDER NUTS (QUANTITY: 4)
17	CYLINDER NUT COVERS (QUANTITY: 8)
26	SOCKET SCREWS (QUANTITY: 2)
41	PALM VALVE ASSEMBLY

3.2 DISASSEMBLY (*FIGURE 2*)

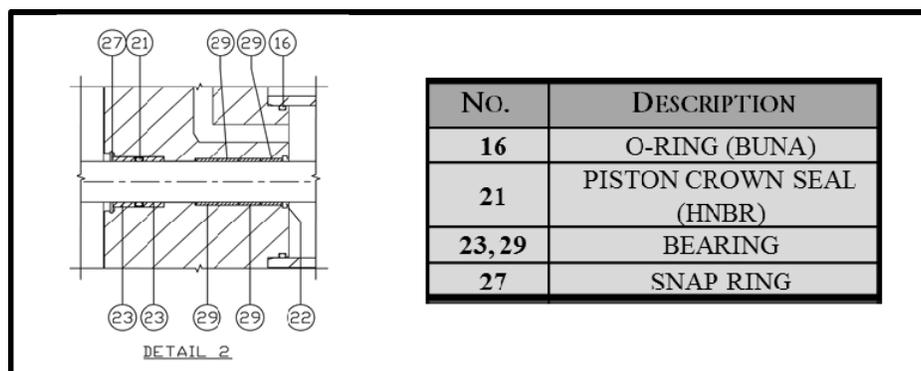
1. Disconnect or shut off the instrument air supply.
2. Ensure that all pressure has been released from the system and the system is empty.
3. Ensure that valves A, B, and C (*Figure 1*) are closed.
4. Disconnect the tubing from the mixer portion and the tubing between the nitrogen cylinder and the top flange.
5. Remove the K-tek[®] level transmitter.
6. Remove the 4 mixer cylinder nuts from the 4 mixer cylinder tie bolts and remove the mixer top cap of the mixer actuator (upper flange).
7. Remove tracker tube holders. To remove, loosen the Allen screws and slide the tracker tube holders up and off.
8. Remove the 4 mixer cylinder tie bolts.
9. Remove the tracker tube. Be careful not to lose the tracker magnet, tracker tube, or tracker magnet housing (inside, not pictured).
10. Slowly slide the mixer cylinder up and off the mixer piston.
11. Remove the magnet retainer, magnet, and mixer piston from the mixer rod (*Figure 3*).

Figure 3: Maintenance Diagram, Detail 3



12. Remove the 8 cylinder nuts from the 8 cylinder tie bolts on the cylinder (*Figure 2*).
13. Set the palm valve assembly aside (*Figure 1*).
14. Lift the cylinder top cap (midsection) straight up. Lift off of the mixer rod completely before pulling it away from the cylinder.
15. Remove snap ring (*See Figure 4, Part #27*).
16. Remove bearing (*See Figure 4, Part #23*).
17. Remove crown seal (*See Figure 4, Part #21*).

Figure 4: Maintenance Diagram, Detail 2



18. Connect appropriate chains or straps to the eyelets on the cylinder (*Figure 2*).



Smoothly lift directly up to avoid scratching or otherwise damaging the cylinder.

19. Carefully lift the cylinder off the base cap (bottom flange) with piston and mixer rod inside.



Use caution when lifting; the receiver cylinder is extremely heavy.

20. Remove the mixer rod assembly from the cylinder piston.



Be careful not to bend the shaft when removing it from the piston.

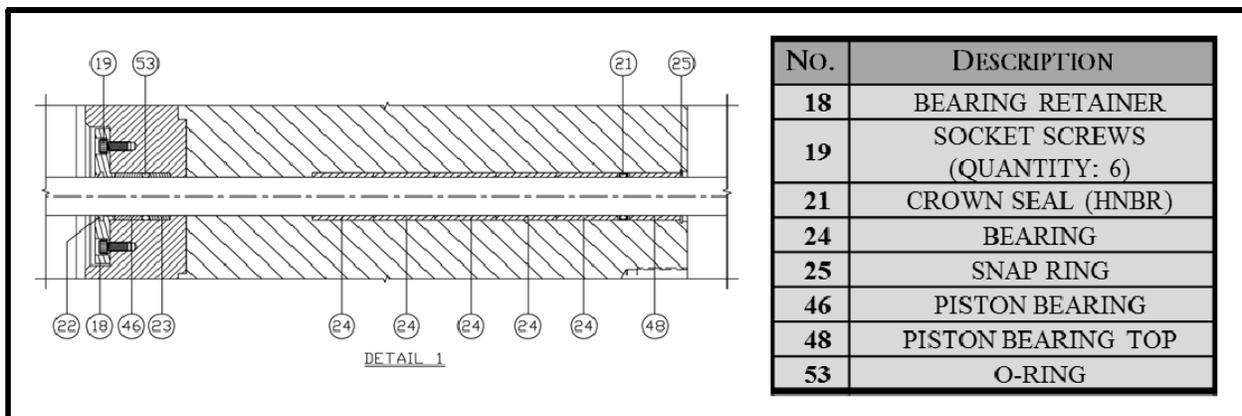
21. Slowly push the piston assembly out of the cylinder by reaching inside the pre-charge side. Note the top and bottom of the piston and cylinder for ease of reassembly.



It may be helpful to have something, such as a length of wood, to help push the piston out of the cylinder. DO NOT use metal piping, as this could scratch or otherwise damage the equipment.

22. Remove snap ring and piston bearing top, then crown seal (*See Figure 5*).

Figure 5: Maintenance Diagram, Detail 1



23. Unscrew the 6 socket screws on the piston.

24. Remove the bearing retainer on the piston.

25. Remove the piston bearing.

26. Remove the O-ring on the piston.

27. All O-rings and seals should be removed so they may be replaced during reassembly.

28. Examine all the polished and honed surfaces on the mixer rod and cylinder. Deep pits or scratches may allow leakage around seals.

3.3 REASSEMBLY (*FIGURE 2*)

1. Lightly lubricate the inside of the cylinder.
2. Replace the O-ring and seals on the piston (*See Figure 2*).
3. Ensure that the bearing in the piston is clean and smooth. Replace if necessary. Reinsert the piston bearing (*See Figure 5*).
4. Reattach the bearing retainer onto the piston.
5. Screw the 6 hex screws onto the piston.
6. Replace the crown seal on the piston.
7. Reinsert the bearing and then reattach the snap ring on the piston.
8. Reinsert the piston into the cylinder (*See Figure 2*).
9. Lightly lubricate the mixer rod.
10. Reinsert the mixer rod into the piston carefully to avoid damaging the seals. Gently rotate the threads through the seals.
11. Replace the seal on the base cap.
12. Carefully lower the cylinder onto the base cap. Ensure that the cylinder is oriented correctly.
13. Reinsert and tighten the cylinder tie bolts.
14. Replace the seals on the cylinder top cap (*See Figure 4*).
15. Ensure that the bearing in the cylinder top cap is clean and smooth. Replace if necessary.
16. Carefully place the cylinder top cap onto the cylinder (*See Figure 2*).
17. Place and tighten the cylinder nuts onto the cylinder tie bolts.
18. Replace the seals on the mixer piston (*See Figure 3*).
19. Place the mixer piston, magnet (correctly oriented) and magnet retainer.
20. Reinsert the tracker magnet into the tracker tube (*See Figure 2*).
21. Slide the mixer cylinder down into place.
22. Place and tighten the mixer cylinder tie bolts onto the mixing cylinder.
23. Slide the tracker tube holders into place and tighten in place with Allen screws.
24. Replace the seals on the mixer top cap.
25. Place the mixer top cap onto the mixer cylinder.
26. Place and tighten the mixer cylinder tie bolt nuts.
27. Pressurize the receiver tank with an inert gas or air and check for leaks.
28. Release the pressure.
29. Reconnect the tubing to the mixer cylinder.
30. Reconnect the K-tek[®] level indicator to the validation tank (*Refer to K-Tek[®] IOM*).
31. Re-pressurize the nitrogen system. The validation tank is now ready for operation.

SECTION 4: TROUBLESHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	SOLUTION
Gauge indicates a loss of pressure.	<ul style="list-style-type: none"> • There is a leak from one of the fittings. • There is a leak from the burst discs. • The cylinder experienced a temperature drop. • There is a defective valve. 	<ul style="list-style-type: none"> • Check all fittings for leaks with leak detector. Replace thread sealant. • Make sure the burst discs are torqued properly. If the problem persists, the discs may need replacement. • Restore the temperature to pipeline temperature. • Repair or restore the defective valve.
Pressure is leaking across the piston.	Seals in the piston are leaking.	Disassemble and clean the unit. Inspect cylinder for scratches. Replace seals in the piston and reassemble.
The pre-charge or product end cap is leaking.	<ul style="list-style-type: none"> • The burst disc is leaking. • There is a loose fitting. • The seat on purge valve is leaking. 	<ul style="list-style-type: none"> • Replace the burst disc. • Tighten the fittings. • Replace the seat.

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:

- K-Tek[®] AT200 Magnetostrictive Level Transmitter

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

- Assembly Drawing: AD852BBCRN5
- Suggested Arrangement Schematic: AD852BB.CRN5.1



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