

Oct. 17, 2017

## **INSTRUCTIONS FOR REPLACING THE SEALS, SHAFT SUPPORT BUSHING AND SHAFT SUPPORT BEARING IN A MODEL PBF-3 PROPELLER WASHED BEAD FILTER**

### **Parts for 5/8" Seal Replacement Kit (PBF-SK5/8-PBF-3)**

- 2 qty 5/8" seals
- 1 qty 5/8" shaft support bearing
- 1 qty 5/8" delrin shaft support bushing
- 2 qty 1/4" 316 ss lock washers
- 2 qty 1/4"x1" 316 ss bolts (used on old style seal wells)
- 2 qty 1/4" 316 ss nuts (used on new style seal wells)
- 1 qty 1/2" SAE flat washer (used to install seals)

### **Tools Required (Note this is a two person job)**

- 9/16" box end wrench
- 7/16" box end wrench
- 7/16" socket and ratchet drive
- 1/8" Allen wrench
- 5/32" Allen wrench
- 3-5 qty 11.5" cable ties
- Seal Puller
- Rubber Hammer (do not use a metal hammer)
- 3/4" dia. x 30" long wooden dowel
- 3/4" x 12" piece of PVC pipe
- 1 qty wooden pencil with eraser
- Grease gun w/ food grade grease
- Torque wrench (capable of measuring 35 ft-lbs)

### **TIPS**

1. Do not carry the filter head by the shaft, it will bend the shaft.
2. When removing the seals be sure you do not scratch or gouge the inside wall of the seal well as this will result in leakage.
3. Check each seal after it has been installed to be sure it did not deform during installation.

4. Use a guide when re-installing the shaft. If you ram the shaft into the underside of the bottom seal it may cause the retention spring to fall off the seal. This will result in seal failure.
5. If you push the shaft through the seals to fast it can cause the lip on the seal to roll backwards. This will result in seal failure.
6. Do not twist the shaft while pushing it through the seals, the keyway on the shaft can cut the seals and cause them to fail/leak.

## **Removing the Seals**

1. Drain the filter until the entire shaft can be seen through the window.
2. Remove the four 3/8" bolts which attach the motor to the motor mount using a 9/16" box end wrench.
3. Remove the 1/4" bolts and nuts that attach the filter head to the filter body using a 7/16" box end wrench and 7/16" socket with ratchet drive.
4. Insert four cable ties around the perimeter of the filter head through the bolt holes in the bottom gasket, the bead retention screen and the top gasket to fasten the entire screen assembly to the head.
5. Carefully remove the head of the filter and set it on a solid padded surface so it will not be damaged.

**Note: Do not carry the filter head by the shaft, it will bend the shaft.**

6. Loosen the set screw (1) on the Love-joy coupling using the 5/32" Allen wrench and remove the Love-joy coupling and key from the shaft.
7. Loosen the set screws (2) on the support bearing using the 1/8" Allen wrench.
8. Remove the shaft by gently pulling it from the underside of the head. If required you can carefully tap the end of shaft using a block of wood and a rubber hammer.
9. To Remove the Shaft Support Bearing:  
**Old Style:** Unscrew the two (2) bolts which fasten the support bearing to the filter head using 7/16" box end wrench.  
**New Style:** Unscrew the two 1/4" nuts using the 7/16" box end wrench and lift the bearing off of the embedded studs.
10. Remove the support bearing.
11. Use a seal puller to remove the two oil seals from the filter head.

**Note: Be careful when removing the seals so as not to damage the seal well. Do not worry about damaging the seals themselves as you will not be reusing them.**

### **Removing the Delrin Shaft Support Bushing**

1. Insert the ¾" x 30" wooden dowel through the motor mount, slide it down through the seal well until the end rests on the bushing. Tap the dowel with the rubber hammer on alternate sides of the bushing until it slides out of the support pipe.

### **Replacing the Shaft Support Bushing**

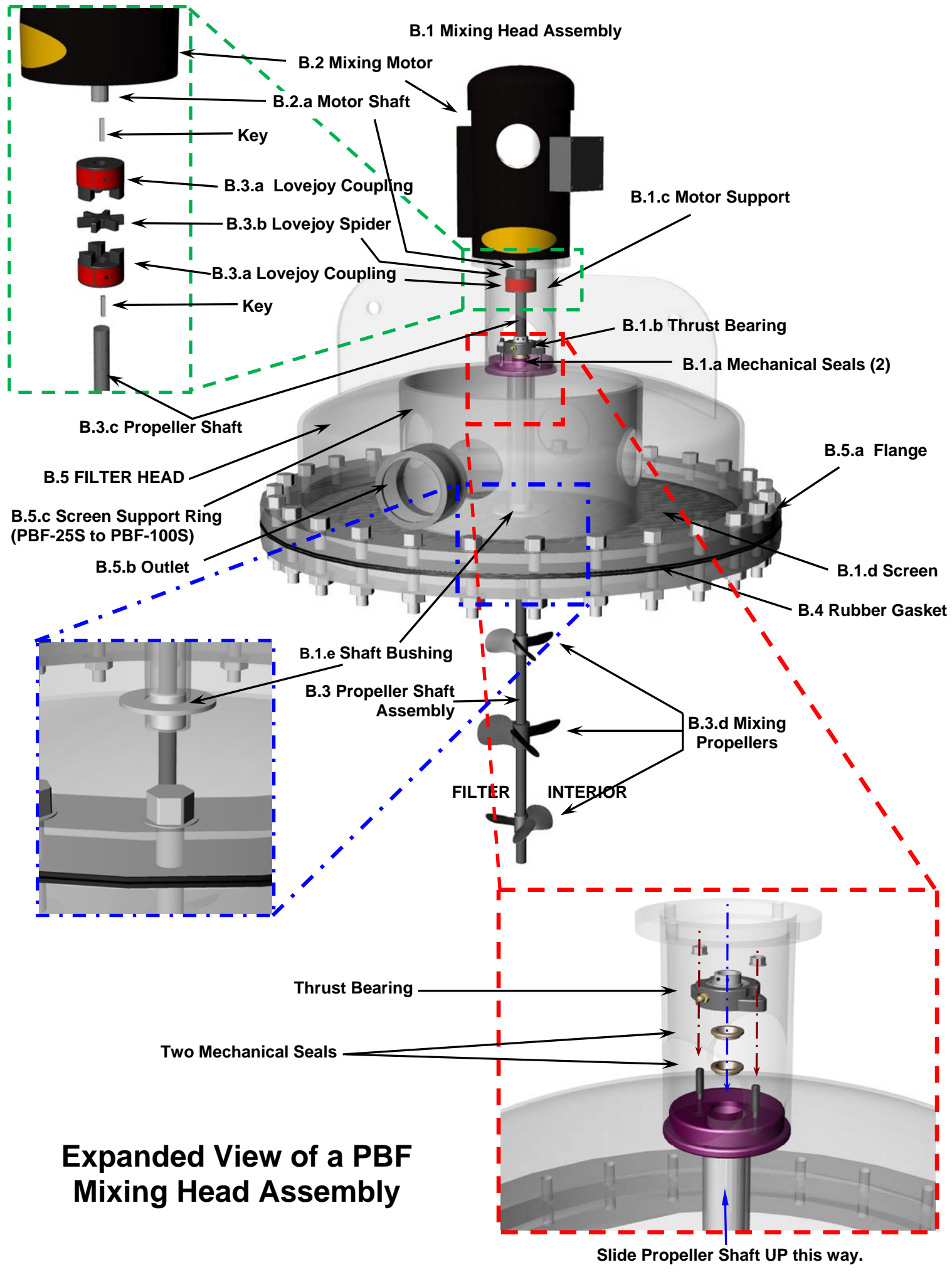
1. Place the NEW Delrin Shaft Support Bushing in the freezer or on ice for 20 minutes. This will cause it to contract in size.
2. Line the bushing up with the center of the support pipe. Using a rubber hammer and a piece of wood tap the new shaft support bushing into the pipe until it is flush with the bottom of the pipe.
3. Test the bushing by gently pushing the keyed end of the shaft 2" into the bushing. The shaft should spin freely in the bushing. If the shaft is difficult to turn the bushing should be reamed out slightly.

### **Replacing the Seals**

1. Liberally paint the inside of the seal well with the food grade grease.
2. Place a NEW seal on the entrance to the seal housing, making sure the seal is seated level.
3. Place the ½" SAE flat washer on top of the seal. Then using the ¾" dia. x 12" long piece of PVC pipe and rubber hammer gently tap the seal until it sits flush with the top of the seal well. STOP. Check the seal to be sure it is going in level and is not deformed. Continue to tap the seal into the well until it reaches the lip at the bottom of the seal well. Remove the flat washer.
4. Place the second seal on the entrance to the seal well, making sure the seal is seated level. Place ½" SAE flat washer on top of the second seal. Then gently tap the second seal into the seal well using the same procedure as above until it sits flush or slightly below the top of the seal well. Remove and discard the flat washer.
5. Starting at the keyed end of the propeller shaft, apply a liberal coating of food grade grease approximately 6" to 8" down the length of the shaft.
6. Place the shaft (key end) in the delrin bushing and gently push it upwards but not through the seals yet. Have your helper insert the pencil eraser end down into the depression in the center of the end of the shaft. Then have your helper

position the shaft in the center of the seals and guide it as you gently and slowly push it upwards and through the seals. **(Do not twist the shaft while pushing it through the seals, the keyway on the shaft can cut the seals and cause them to leak).** You should push the shaft upwards until the end extends through the motor mount.

7. Slide the NEW Support Bearing over the end of the shaft and fasten to the filter head. Tighten the two set screws using the 1/8" Allen wrench to lock the shaft in place. Do not worry at this point about the shaft/motor placement.
8. Install the key and Love-joy Coupling on to the end of the shaft. Tighten the single screw on the Love-joy Coupling using the 5/32" Allen wrench to lock the coupling to the shaft. Install the rubber spider into the Love-joy coupling.
9. Raise the filter head so the shaft end will clear the flange. Again, do not put any pressure on the shaft when moving the filter head, as it is easily bent. Orient the filter discharge ports in the direction of your choice making sure the bolt holes line up. Cut and remove the cable ties. Use the original bolts with washers and nuts to fasten the filter head to the filter hull. Make sure to put a washer on the top and the bottom of every bolt. After inserting the bolts, washers (two standard flat washers per bolt), and attaching the nuts, tighten the nuts by hand until they are snug. Establish a uniform pressure over the flange face by tightening the bolts in 5 ft. lbs. increments according to the standard 180 deg opposing sequence. **Torque all the bolts to 35 ft/lbs.**
10. The motor should be mounted after the head is bolted to the filter hull. The rubber spider should already be fitted into the Love-Joy coupling on the propeller shaft. The second Love-Joy coupling is already in place on the motor shaft. With the shaft sticking out above the motor mount, align the two Love-joy Couplings (be sure not to crush the rubber spider). Once the motor and shaft Love-joys are mated loosen the two set screws on the support bearing using the 1/8" Allen wrench then **slowly and gently** allow the propeller shaft to slide into the filter head until the motor sits flush on the motor mount. Be sure the motor sits on the mount with the wiring box facing the direction of your power supply. Tighten the two set screws on the support bearing to lock the shaft in place using the 1/8" Allen wrench.
11. Bolt the motor to the motor mount with the four 3/8" bolts and lock washers using the 9/16" box end wrench.



**Expanded View of a PBF Mixing Head Assembly**