

Adjustable Dump Orifice Rebuild Kit

This document explains how to replace the wear items in an OMAX[®] Adjustable Dump Orifice (ADO) using the OMAX rebuild kit, P/N 306500. See Figure 1.

Caution: *The Adjustable Dump Orifice was not designed to close completely as a “needle valve” would. NEVER screw the adjustment knob all the way in clockwise, forcing the tapered stem into the tapered seat. Doing so will jam the stem into the seat, requiring that the ADO be disassembled to unjam the components.*

Kit Contents

Verify that the following parts are included in your ADO rebuild kit:

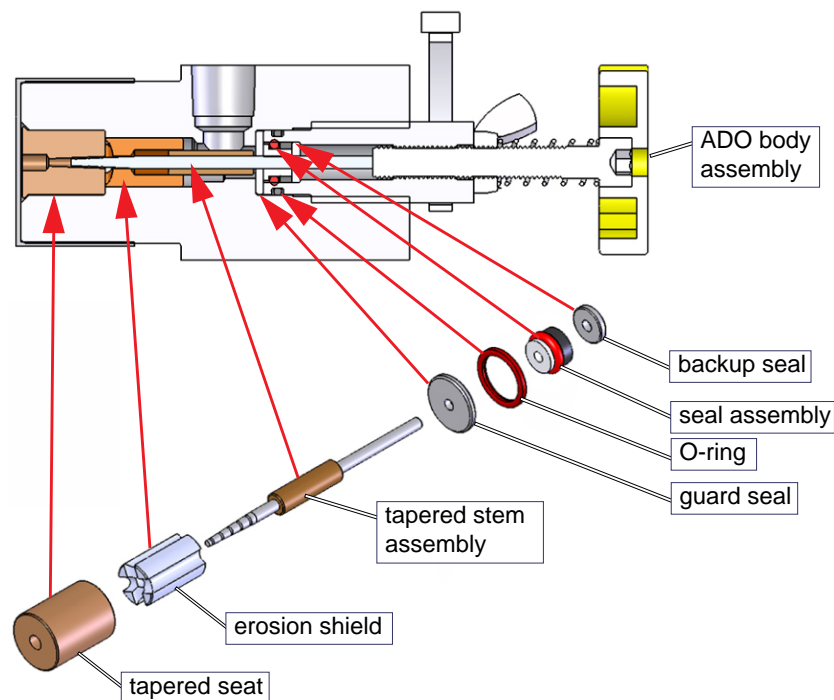


Figure 1: Adjustable Dump Orifice Rebuild Kit Components

Tools and Additional Items Required

Changing the seals in the ADO will require use of these tools and additional items:

- 1/2", 13/16", 7/8", 1", and 1-1/2" open-end wrenches
- 10" crescent wrenches, 2 ea.
- 8 mm and 3/16" Allen wrenches
- 3/8" flat-tipped screwdriver
- Extreme Pressure Lube
- Lubriplate[®]
- Anti-seize lubricant
- Blue Goop[®]
- ADO Component Diagram P/N 500549

Removing the ADO

Replacing seals requires that the ADO first be removed from the pump. Follow these procedures to complete your rebuild successfully.

1. Power down the abrasivejet table and pump using approved tag and lockout procedures.
2. Open the pump lid and remove the front side cover, enabling easy access to the ADO:

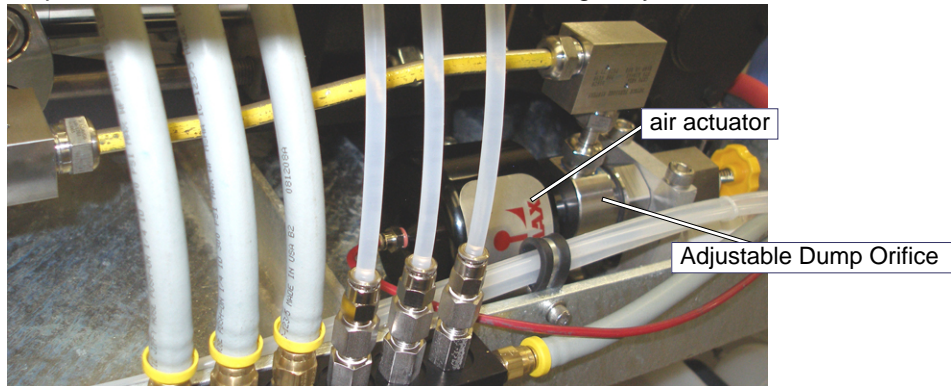


Figure 2: Location of the ADO in the OMAX Pump

3. Disconnect the nipple from the ADO by unscrewing the gland nut on the high-pressure tubing (Figure 3) using the 13/16" open-end wrench.

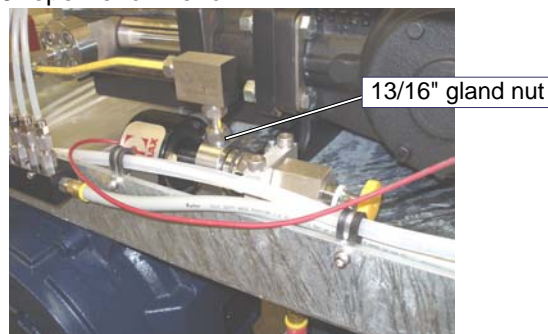


Figure 3: Remove the Gland Nut from the ADO.

4. Remove the air hose from the top of the on/off valve air actuator.
5. Remove the drain hose beneath the ADO using the 7/8" open-end wrench (Figure 4).

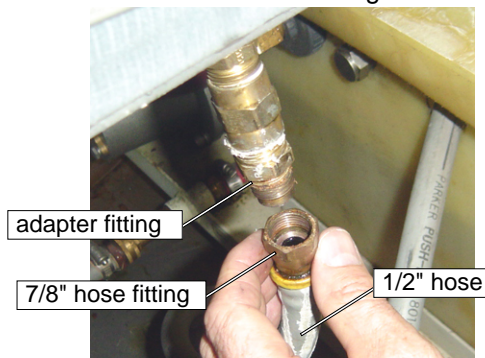


Figure 4: Remove the Drain Hose from the ADO

6. Remove the two mounting clamp screws that secure the ADO to the pump chassis (8mm Allen wrench).

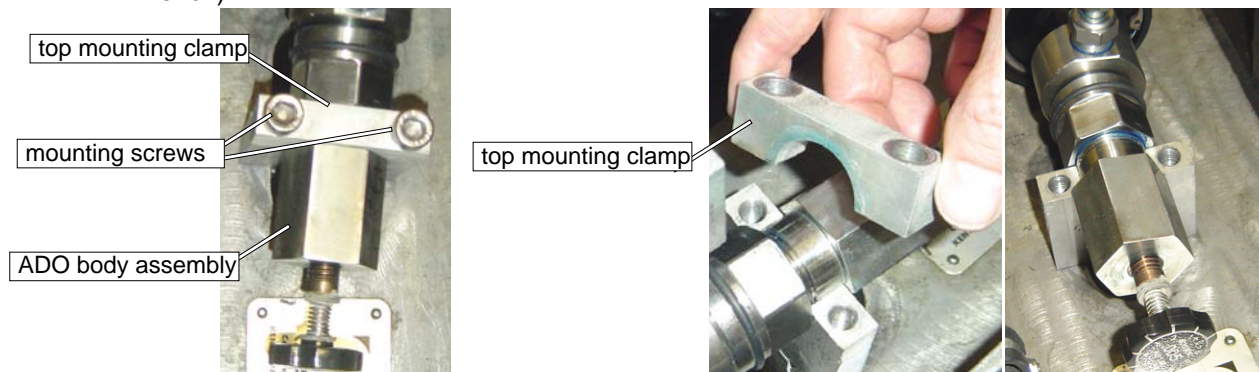


Figure 5: Remove the Top ADO Mounting Clamp

7. Lift the ADO from its mount and place it on a workbench for disassembly.

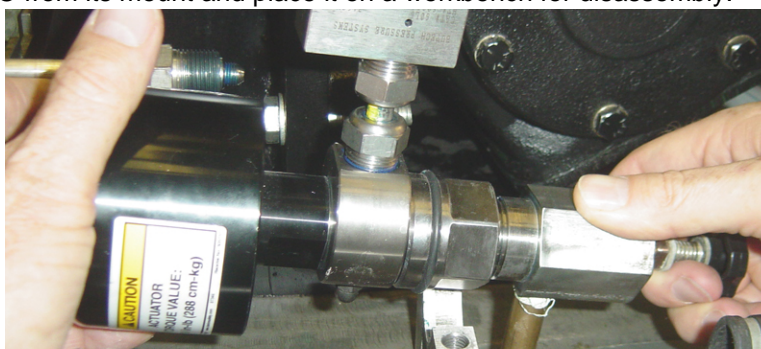


Figure 6: Remove the ADO from the Pump for Disassembly and Seal Replacement

Disassembling the ADO

Once the ADO has been removed from the pump, use the following procedure to install components from the rebuild kit.

Note: ADO disassembly involves disconnecting the on/off valve with the air actuator attached and removing all internal components of the body assembly that are being replaced in the retrofit kit. See Figure 11 for components:

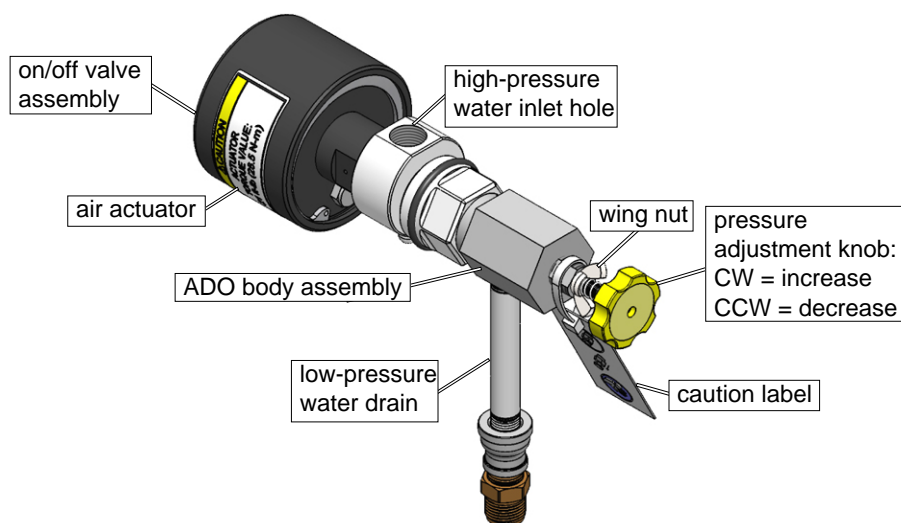


Figure 7: Remove the On/off Valve from the ADO Body Assembly

Caution: *Ensure that all garnet and other contaminants are cleaned from the ADO assembly prior to rebuilding.*

1. With the ADO assembly on a workbench, remove the body assembly using a 1-1/2" wrench on the on/off valve and a 1-1/2" wrench on the body assembly:

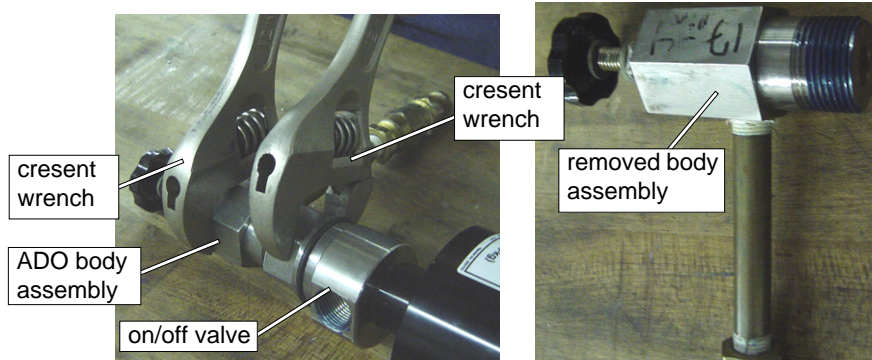


Figure 8: Remove the Body Assembly from the On/off Valve

2. Unscrew the stem adjuster from the body assembly using a 1/2" open-end wrench.

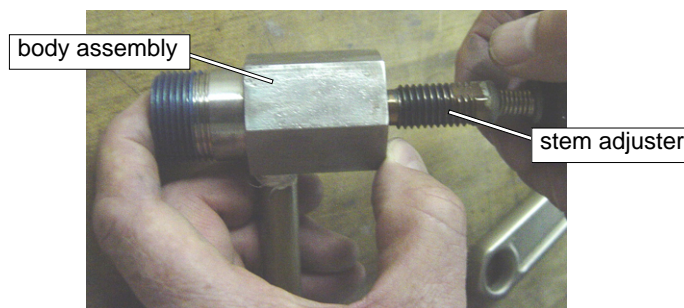


Figure 9: Remove the Stem Adjuster with the Pressure Adjustment Knob from the Body Assembly

3. Pull the stem adjuster from the body assembly along with the tapered stem and attached seals.
4. Using a thin diameter tool such as a small Allen wrench, push out the tapered seat and erosion shield from the body assembly. See Figure 10:

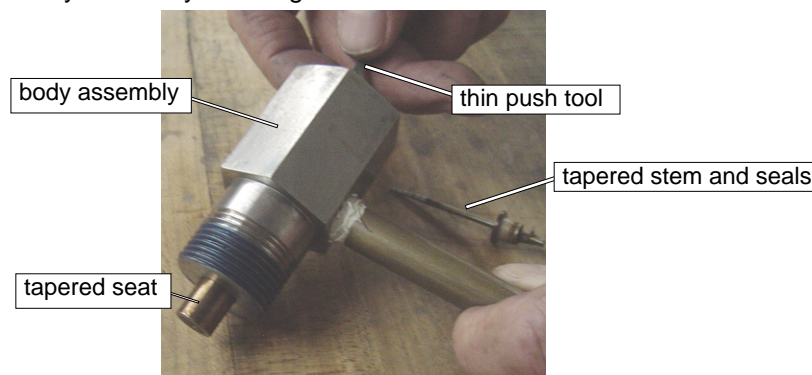


Figure 10: Push Tapered Seat and Erosion Shield out of Body Assembly

5. Remove and discard each seal component identified below (Figure 11), replacing them with the parts provided in the ADO rebuild kit (see Figure 1).

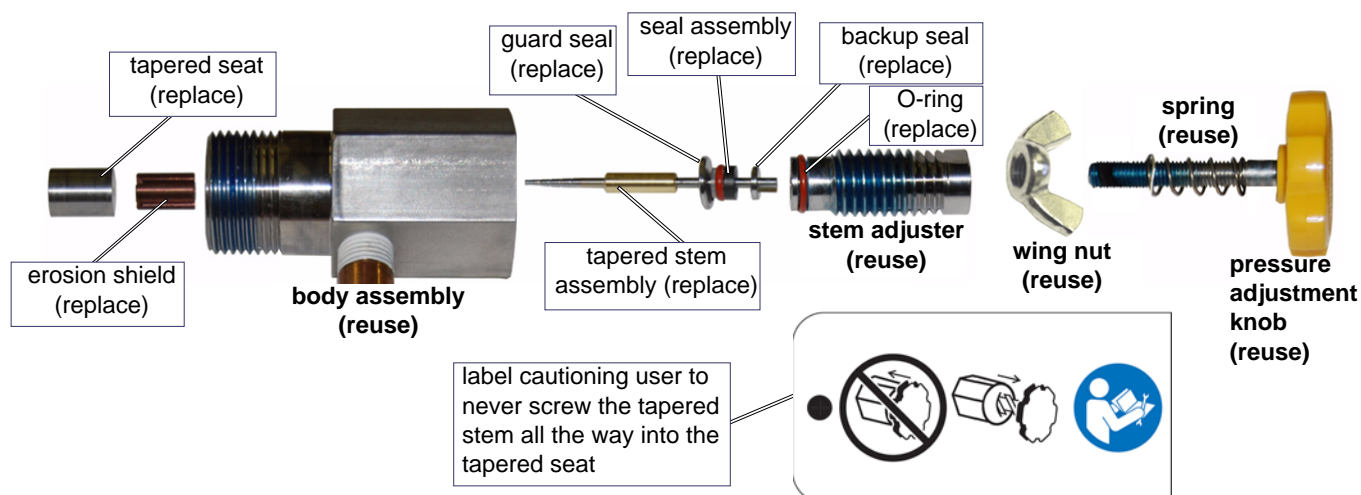


Figure 11: Replaceable ADO Components

Caution: *Correct orientation of the seal assembly must be observed during assembly. The O-ring on the seal assembly must face toward the tapered seat. See Figure 12:*

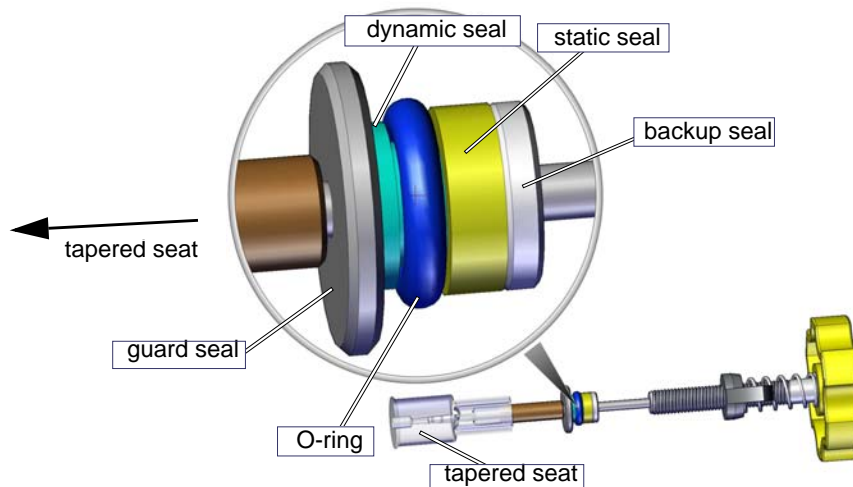


Figure 12: Correct Orientation of the Tapered Seat and Seal Assembly

6. Install the new erosion shield into the body assembly, inserting the large diameter bore end in first (Figure13).

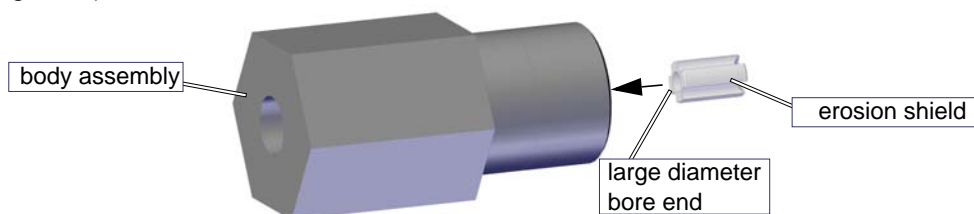


Figure 13: Insert the erosion shield into the body assembly

7. Apply a thin film of Extreme Pressure Lube to the outside diameter of the tapered seat (Figure13).
8. Place the seat in the body assembly.

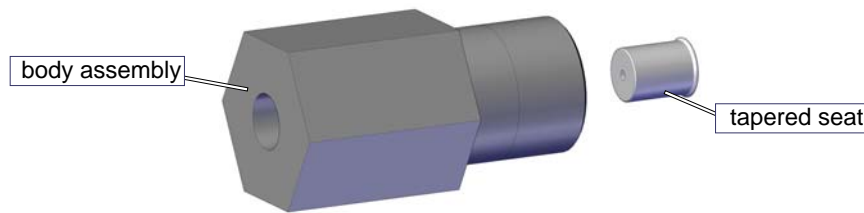


Figure 14: Insert the tapered seat into the body assembly

9. Place guard seal on the stem assembly (Figure15).

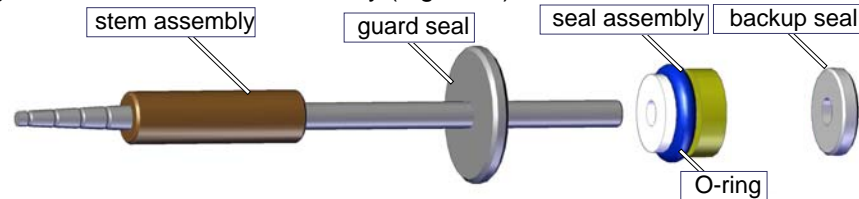


Figure 15: Install the stem assembly components

10. Apply a light film of Lubriplate on the stem assembly and carefully slide on the seal assembly with the white end toward the guard seal (Figure15).
 11. Place the backup seal on the stem assembly.
 12. Apply a thin film of Lubriplate on the seal assembly.
 13. Carefully push the tapered stem assembly and components in the stem adjuster until the brass sleeve and guard seal contact the bottom of the stem adjuster.

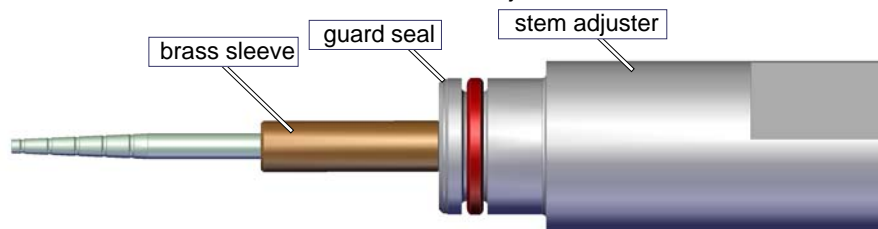


Figure 16: Insert the stem assembly into the stem adjuster

14. Place the spring and Wing nut on the pressure adjustment knob and screw the wing nut on until the spring is half compressed:

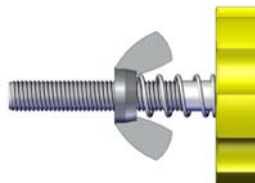


Figure 17: Install the spring and wing nut then tighten until the spring is half compressed

15. Apply a light film of anti-seize lubricant to the threads of the adjustment knob and screw it into the stem adjuster until a 0.03" gap opens between the guard seal and the stem adjuster.

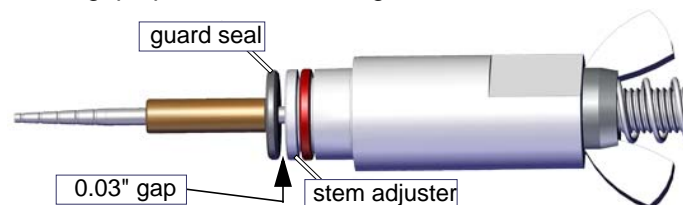


Figure 18: Screw in the adjustment knob to achieve a 0.03" gap between the guard seal and stem adjuster

16. Holding the pressure adjustment knob, screw the wing nut down to lock the adjustment screw in position.



Figure 19: Tighten the wing nut to secure the adjustment screw

17. Apply a light film of Blue Goop to the threads of the stem adjuster and screw it into the body assembly.

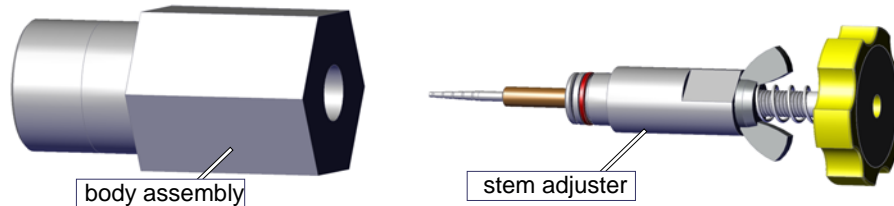


Figure 20: Screw the stem adjuster into the body assembly

18. With a 1/2" open-end wrench, lightly tighten the stem adjuster (about 20 ft-lb).

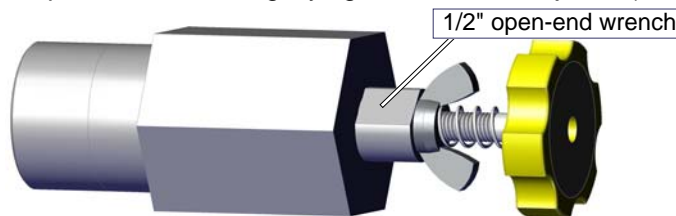


Figure 21: Torque the stem adjuster to the body assembly at approximately 20 ft-lb

Caution: *Never close the ADO valve completely prior to operating the pump or at any time during operation. This is not a shutoff valve! Doing so will jam the stem into the seat requiring disassembly to correct.*

19. Re-attach the caution label to the knob shaft to remind operators to never screw the stem completely closed.

Reinstalling the ADO

1. Prepare the on/off valve for reattachment to the ADO body assembly.

Note: *Before tightening the on/off valve to the body assembly, rotate the fitting ring and on/off valve assembly to align the threads of the fitting ring with the high-pressure water inlet hole in the on/off valve assembly (Figure 22). The water inlet hole aligned with the gland nut threads must be positioned to point up, 180 degrees from the side with the brass nipple pointing down. Refer to Figure 7. This alignment enables later installation of the nipple ring (Figure 25).*

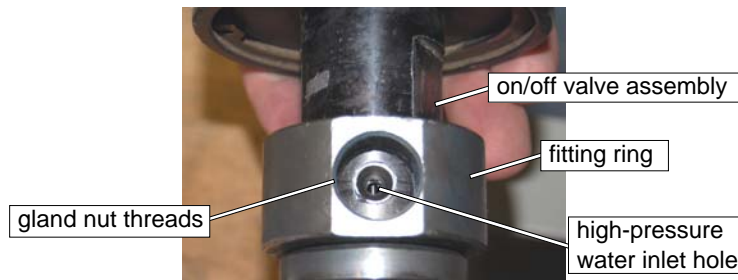


Figure 22: Aligning the Gland Nut Threads with the High-pressure Water Inlet Hole

2. Once the water inlet hole and fitting ring are aligned 180 degrees opposite the body assembly's brass nipple, place the body assembly in a soft-jawed vice and tighten the on/off valve assembly to the ADO body assembly.

Caution: *Ensure that the water inlet hole and fitting ring remain in alignment while tightening.*

3. Place the ADO assembly back onto the mounting clamp as illustrated in Figure 23 with the on/off valve pointing towards the safety valve (Figure 25) and the brass nipple inserted into the chassis hole:

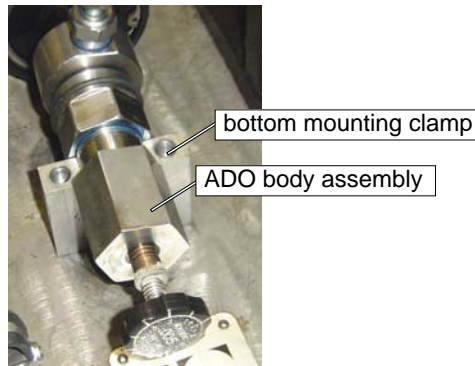


Figure 23: Place the Body Assembly into the Bottom Mounting Clamp

4. Place the top mounting clamp over the body assembly, insert the two M10 screws, and hand tighten both securely (8 mm Allen wrench).

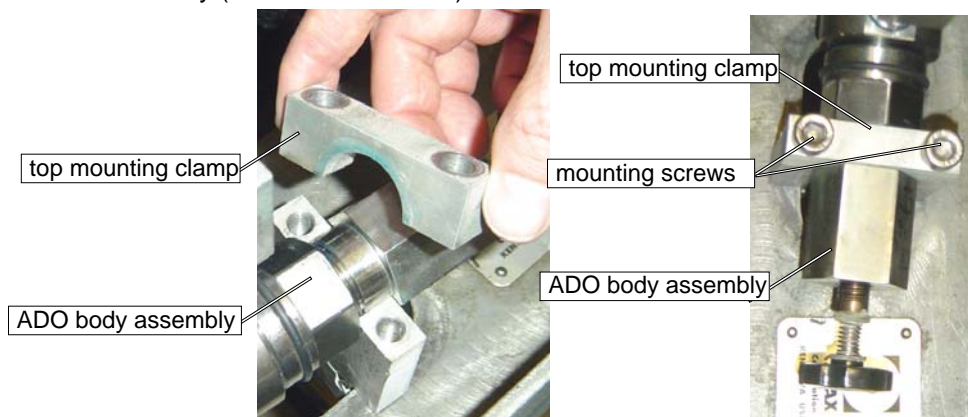


Figure 24: Install the Top Mounting Clamp to Secure the ADO

5. Insert the nipple assembly's gland nut into the fitting ring in the on/off valve. Finger tighten only at this time. Refer to Figure 25.

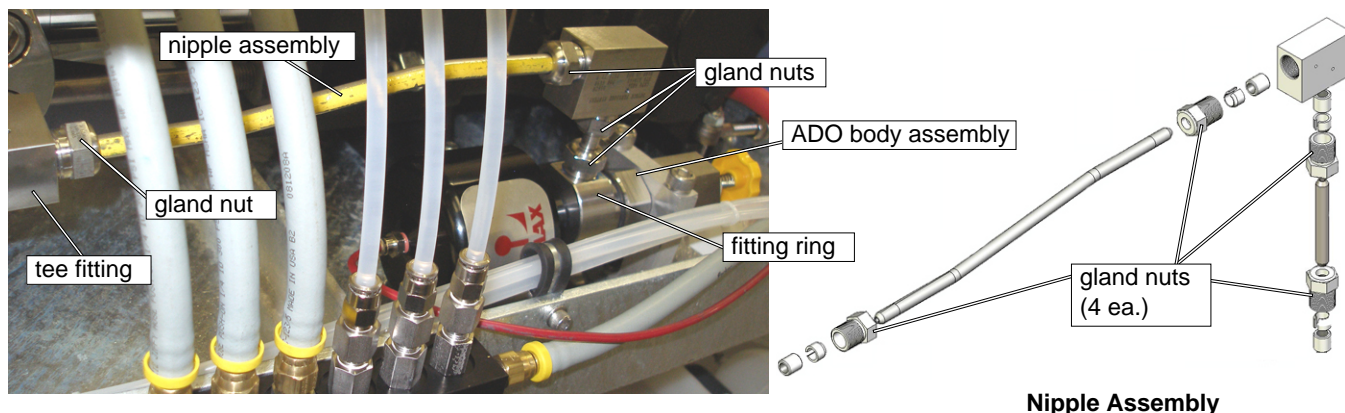


Figure 25: Hand-tighten the Gland Nut in the On/off Valve

Note: It may be necessary to rotate the ADO assembly slightly until the gland nut can be threaded into the fitting ring.

6. Tighten the gland nut on the fitting ring by placing a 13/16" open-end wrench on the gland nut and a 1" open-end wrench on the fitting ring.
7. Tighten the two ADO mounting screws (Figure 24).
8. Reconnect the air hose removed earlier to the air fitting located on top of the air actuator.
9. Reconnect the 1/2" water hose using a 7/8" open wrench to the adapter fitting beneath the ADO (Figure 26).

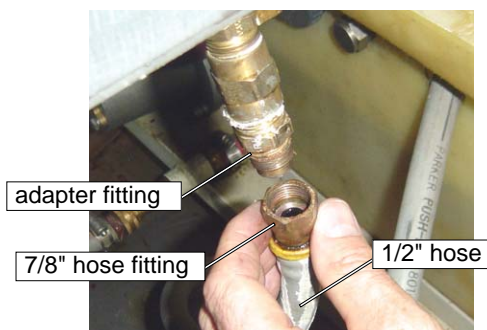


Figure 26: Connect the Hose Fitting to the Adapter Fitting.

10. Installation of the ADO is complete. Next, see *Adjusting the ADO Pressure*.

Adjusting the ADO Pressure

Follow these procedures to equalize the ADO pressure with the nozzle cutting pressure.

1. Power up both the pump and PC Controller.
2. Open the pump's top lid to access the knob on the ADO.
3. Hold the knob, preventing it from turning, and screw the wing nut back towards the knob, leaving approximately a 1/4th inch gap between the ADO body and wing nut. This gap provides the necessary adjustment room for the knob. If not enough gap is available, the wing nut will contact the ADO body too soon, preventing the knob from being adjusted any further. If this happens, simply unscrew the wing nut away from the ADO body to allow more adjustment travel.

Caution: The Adjustable Dump Orifice was not designed to close completely as a “needle valve” would. NEVER screw the adjustment knob all the way in clockwise and force the tapered stem into the tapered seat. Doing so will jam the stem into the seat, requiring that the ADO be disassembled to unjam the components.

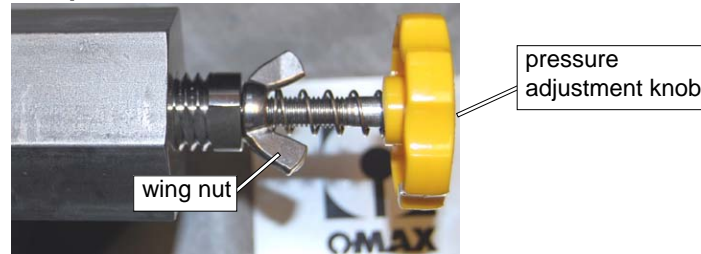


Figure 27: Adjustable Dump Orifice adjustment

Caution: The pump will dead head and the safety valve will fire due to excessive pressure if the pump runs with the nozzle shut off and the ADO valve completely closed.

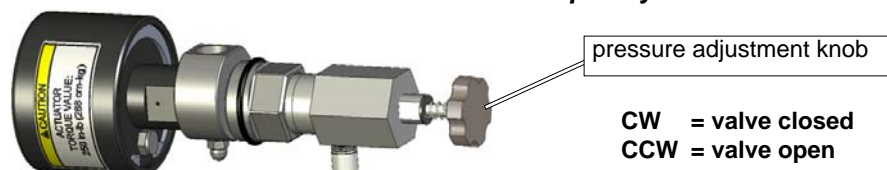


Figure 28: The ADO Pressure Adjustment Knob

4. Launch the OMAX **Make** software and position the nozzle to accommodate a high-pressure, water-only test.
5. In **Make**, click the **Test** button to view the **Test Pump and Nozzle** window options:

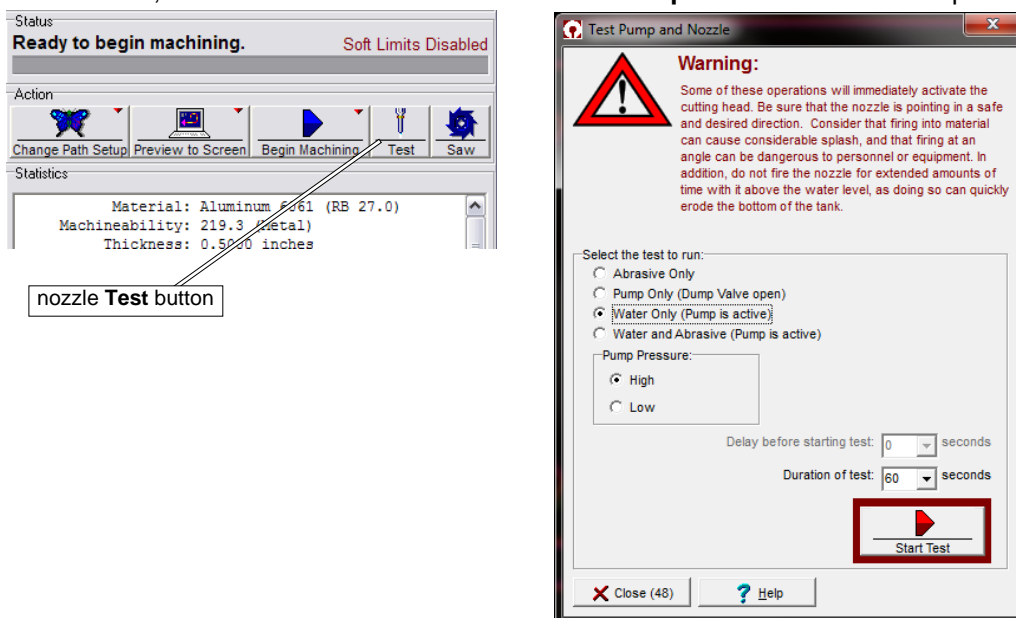


Figure 29: Click the **Test** button to open the **Test Pump and Nozzle** dialog box

6. In **Test Pump and Nozzle**, select **Water Only (Pump is active)** and pressure.

WARNING! The cutting head is about to turn ON. For safety, ensure that the nozzle is positioned correctly and everyone is clear of the cutting area.

7. Click the **Start Test** button to start the pump and fire the nozzle.

8. On the pump control panel, use the **UP** and **DOWN** arrow keys to set your desired cutting pressure while the nozzle test is active:



Figure 30: Set the KSI for **WaterPres** on the Pump's LCD

9. When your desired water cutting pressure is set, click **STOP** to halt the test and remove nozzle pressure:



Figure 31: Click the Test **STOP** Button After Setting Your Desired Pump Pressure

10. Click the **Test** button (Figure 29) and this time select **Pump Only (Dump Valve open)** and pressure.

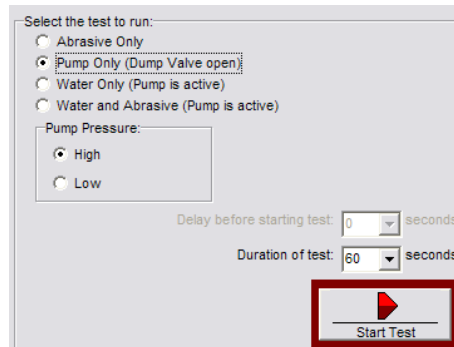


Figure 32: Click **Start** to Pressurize the Adjustable Dump Orifice

11. Click the **Start Test** button to activate the pump.
12. At the ADO, turn the Pressure Adjustment Knob (Figure 33) until the pressure indicated on the pump's control panel LCD (Figure 30) equals, but does not exceed the **KSI** set previously in Step #8 above.

Note: A 3/16" Allen wrench inserted into the end of the knob will assist in fine tuning the ADO pressure adjustment.



Figure 33: Using a 3/16" Allen Wrench to Adjust the ADO Pressure

Caution: The ADO pressure should equal the nozzle pressure, but must never be allowed to exceed nozzle pressure. Also, ADO pressure should not be more than 2 KSI below nozzle pressure.

WARNING! Never continue unscrewing the adjustment knob until it's able to detach itself from the ADO body while the water is under pressure.

13. Once the correct pressure is set, hold the knob in place to prevent it from rotating, then tighten the wing nut to lock the knob in position.
14. Click the **Stop** button (Figure 31) to halt the test.
15. Replace all removed pump panels and close the pump lid.
16. Adjustment of the ADO pressure is complete.

Note: *The ADO pressure will require readjusting anytime a different sized orifice is installed in the nozzle, or a defective or worn jewel is replaced with a new one.*