

Date: \_\_\_\_\_ Instrument Serial # \_\_\_\_\_

**Description:** This Process Guide provides instructions to complete the Preventative Maintenance (PM) process for the ANKOM DELTA or the A2000 Automated Fiber Analyzer.

**This process guide assumes there are no current faults or leaks within the instrument.**

**Frequency:** The Preventative Maintenance process is recommended to be completed annually for instruments used daily or every 2—3 years for lesser used instruments.

**Supplies:** DELTA/A2000 Preventative Maintenance Kit (Part #: DELTA20)

### Preparation

This phase includes gathering the needed parts and tools.

#### 1. Kit Contents:

**DELTA/ A2000 Preventative Maintenance Kit (DELTA20):** Includes parts listed below appropriate for either the ANKOM DELTA or A2000 Automated Fiber Analyzer:

- F26—Packing Kit
- 640—Brass Packing Nut
- 632—Helical Coupler
- F11.5—Bag Suspender Kynar Tip
- Z541—Packing Installation Tool

#### 2. Gather the following tools:

- Hex (Allen) driver 1/8" (Included with instrument)
- 1 1/8" Open-end wrench (Included with Instrument)
- Small flat blade (standard) screwdriver
- 1/2" or 13mm Open-end wrench
- 7/64" Allen Wrench

**Prechecks Before You Start:** It is advisable to inspect the base of the instrument looking for signs of leakage from the vessel or the motor assembly. If signs of leaking are observed from the motor, it is recommended that the motor assembly be replaced (A08 for 110v instruments or A10 for 220v instruments) as part of the Preventative Maintenance. Pause the Preventative Maintenance and obtain the appropriate motor for the instrument configuration if leaking has occurred.

Also verify the efficiency of the level sensor by entering diagnostics and inspecting the level sensor reading (refer to Level Sensor Check procedure on pages 6 or 7 in this process guide). If the value is 5 or less, clean the glass tip on the level sensor probe in the vessel and check the reading again. Use a cotton swab with alcohol to wipe the tip of the level sensor. Cleaning Procedure can be found at [https://www.ankom.com/sites/default/files/document-files/DES007\\_Level\\_Sensor\\_Analog\\_Cleaning\\_and\\_Testing.pdf](https://www.ankom.com/sites/default/files/document-files/DES007_Level_Sensor_Analog_Cleaning_and_Testing.pdf)

If the value is still 5 or less, replace the level sensor assembly (A32) before starting the Preventative Maintenance process.

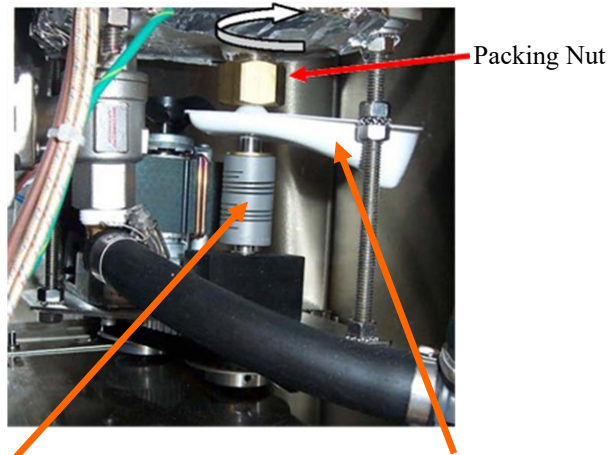
**Step One — Disassembly (Approx. 20 min)**

**Accessing the Assembly**

1. Turn off the power to the instrument, unplug the power cord and disconnect the hoses.
2. Place a piece of cardboard or other cushion on the work surface and lay the A2000 or DELTA on it's face on the cushion. Remove the nuts holding the clear back cover in place and remove the rear cover.
3. Remove the seven screws, four feet and the 1/2" nut on the bottom of the instrument using the 1/8" Hex driver supplied with the instrument. Then remove the bottom panel (Figure 1).
4. Loosen the brass packing nut until it is finger loose (Figure 2).
5. Loosen the upper 7/64" setscrew on the Helical Coupler.
6. Remove the three 1/2" nuts that secure the motor bracket in place (Figure 3).
7. Carefully place the motor on the work surface.
8. Remove the Maintenance Alert Inner Assembly (drip tray, Teflon apron and washer) and set aside for reassembly (Figure 4). Replacement parts are available as part of DELTA01.



Figure 1



Helical Coupler

Figure 2

Maintenance Alert Inner Assembly

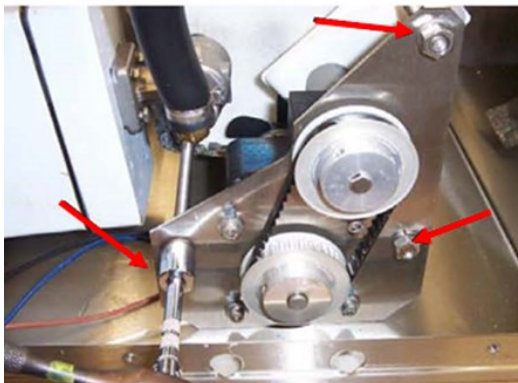


Figure 3



Figure 4

**Step Two —Removing Old Packing Material (Approx. 20 Minutes)**

*Note: A video demonstrating this procedure is available at: <https://youtu.be/F8pFZYaPus>*

9. Twist and pull up to remove the agitator in the base of the vessel (Figure 5).
10. Check the agitator for wear and pitting in the shaft surface. The shaft surface should be very smooth without grooves, pits or thinning of the shaft (Figure 6). Agitator can be replaced if



Figure 5



Figure 6

11. Remove the Brass Packing Nut and the PEEK bushing (Figure 7).
12. Using a small screwdriver, remove the two carbon ropes and the one compressed graphite cylinder (Figures 8 & 9). When removed, the old packing will look like the items in Figure 10. Ensure that both ropes have been removed or the new packing will not fit or seal properly.

Brass Packing Nut      PEEK Bushing

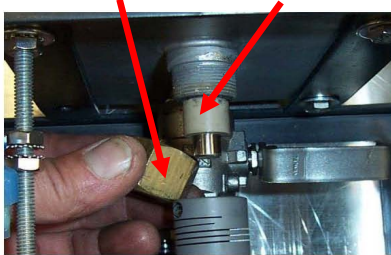


Figure 7

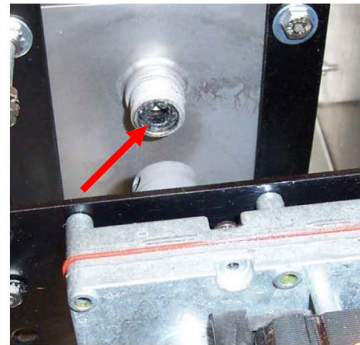


Figure 8

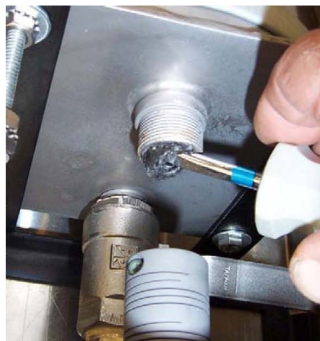


Figure 9



Figure 10

**Step Three —Replacing Packing (Approx. 30 Minutes)**

13. Reinstall the agitator in the base of the vessel.
14. Take the first piece of carbon rope and wrap it around the shaft of the agitator and push the coil into the nipple on the bottom of the vessel (where the previous packing was removed). Then take the graphite cylinder over the end of the shaft and like the carbon rope, press the cylinder into the nipple (Figures 11 & 12).
15. Place the previously removed PEEK bushing over the end of the shaft and install the Brass Packing nut on the end of the shaft and temporarily tighten the Packing Nut with your hand. This will uniformly compress the packing elements that have been put in place (Figure 13).
16. Remove Packing Nut and PEEK Bushing. Install the second carbon rope around the end of the shaft. Once again install the PEEK Bushing and the packing nut. Confirm that the agitator is seated at the base of the vessel by lightly pressing the agitator against the base of the vessel and hand tighten the packing nut. The packing is correctly installed when the bushing is flush with the nipple bottom after the second rope is installed (Figure 14).

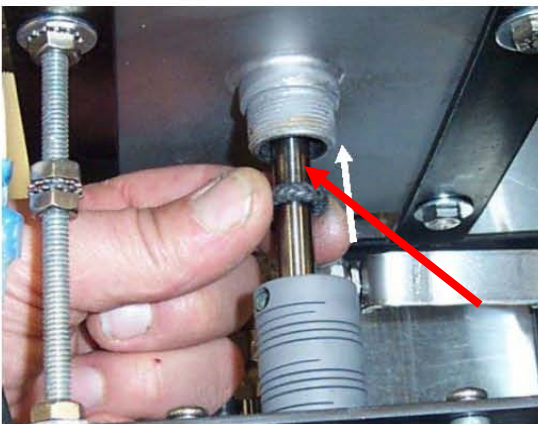


Figure 11

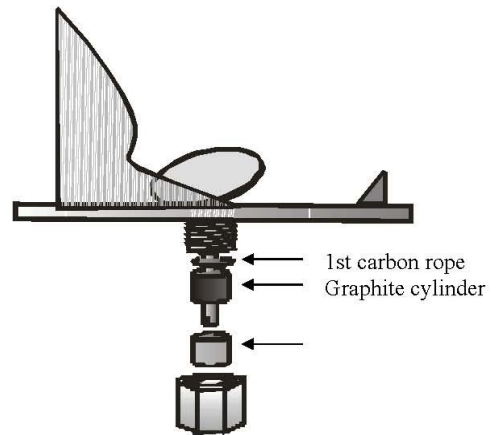


Figure 12

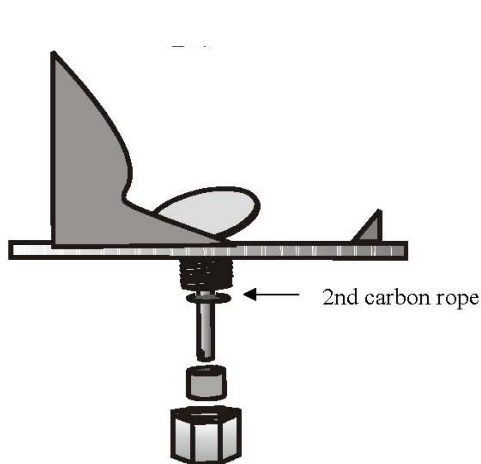


Figure 13

Brass Packing Nut

PEEK Bushing



Figure 14

### Step Four — Reassembly (Approx. 20 Minutes)

17. Reinstall Maintenance Alert Inner Assembly (drip tray) in order; apron closest to packing nut, followed by tray and finally brass washer as seen in Figure 15. Finger tighten the two nuts holding the drip tray in place.

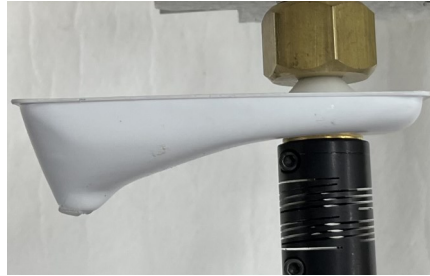


Figure 15

18. Reinstall motor assembly and replace the bottom panel using all the screws, feet and the 1/4" nut (if applicable). Stand the unit up on it's feet but leave the rear cover off for now.

#### Initial Packing Adjustment

19. Turn on the agitator motor in diagnostics (A2000, select "Flush" mode, DELTA select "Q5 Agitator").
20. With agitator motor turning, tighten the packing nut using the 1 1/8" wrench (supplied with the instrument). Slowly tighten the nut until you hear the motor change sounds (slowing sound) and then loosen slightly. The Packing will need to be readjusted after the initial 4 hours of use (by repeating these steps) and then return to the normal scheduled adjusting.

**Note:** *Neglecting routine adjustment of the packing and the packing nut will result in vessel leaking and subsequent motor failure.*

### Step Five — Bag Suspender Maintenance

21. Inspect the bag suspender for any signs of heat related damage. All individual parts are available from ANKOM or the entire unit can be ordered under part number F11.
22. Remove existing Kynar tip on the bottom of the bag suspender and replace with the new tip found in the Preventative Maintenance kit.
23. Turn power on for the instrument. Ensure that there are no faults displayed.

## Step Six —System Test for DELTA (Approx. 30 Minutes)

24. Press the down arrow on the control console repeatedly until you reach the “Run Analog” message and then press “Enter”. Observe the readings on the screen and compare to the readings below:
  - LVL (Level Sensor) should read 6v or greater
  - PV (Pressure in Vessel) should read 0 (psi)
  - PM (Pressure in Manifold) should read 0 (psi)
  - Temp approx. 20°C (Room temperature)
  - Temperature on the controller on the side approx. 20°C
25. **Drain Verification:** With the bag suspender removed, pour about 1” of water into the vessel. Turn the power for the instrument off, wait a moment and turn it back on. Observe the drain opening in the bottom of the vessel and water draining out. Contact ANKOM if this does not occur.
26. **Level Sensor Check:**
  27. Connect water line and turn on water.
  27. Insert the bag suspender and the weight into the vessel. Leave the vessel open for the start of this test.
  28. Press the down arrow repeatedly again until the message “Boil Test” is displayed. Press the START button. Water should start to fill the vessel and observe the LVL value on the display. Once the vessel is filled this reading should go from greater than 5v to less than 1v. Contact ANKOM if this does not occur.
29. **Agitator System Check:**
  30. Once the vessel has filled, observe the bag suspender. It should be rising and falling with a consistent pattern. If it is not moving, turn power off and loosen the Brass Packing Nut slightly.
  31. Once you have loosened the nut turn the unit back on and the vessel will again empty. Restart the Boil Test and again observe the bag suspender. Repeat if required to get the bag suspender moving.
32. **Boil Test:**
  33. NOW CLOSE THE VESSEL and allow the instrument to continue with the boil test.
  34. Observe the temperature in both locations (display and the controller on the side) as well as the pressure on the display. Within 20 minutes the pressure should be greater than 4psi and the temperature should reach 100c. Once the temperature and pressure targets have been achieved, press STOP.
35. This completes the Preventative Maintenance process and the System Test. Ensure all covers have been reinstalled. The instrument can be returned to testing samples.

If any of these final tests have failed, contact ANKOM at the web link below.

## Step Six —System Test for A2000 (Approx. 30 Minutes)

24. Press the down arrow on the control console repeatedly until you reach the “Run Analog” message and then press “Enter”. Observe the readings on the screen and compare to the readings below:
  - LVL (Level Sensor) should read 6v or greater
  - P (Pressure in Vessel) should read 0 (psi)
  - Temp approx. 20°C (Room temperature)
  - Temperature on the controller on the side approx. 20°C
25. **Drain Verification:** With the bag suspender removed, pour about 1” of water into the vessel. Turn the power for the instrument off, wait a moment and turn it back on. Observe the drain opening in the bottom of the vessel and water draining out. Contact ANKOM if this does not occur.
26. **Flush Mode & Agitator Test:**
  27. Disconnect the solution supply lines.
  28. Repeatedly press the DOWN arrow button on the console until you see “Flush Mode” on the display and then press the “ENTER” button. Look in the vessel to confirm that the agitator is turning freely in the bottom of the vessel.
  29. If the agitator is not turning freely, turn the instrument off and slightly loosen the Brass Packing Nut. Then repeat the previous procedure until the agitator turns in the vessel.
  30. While in “Flush Mode”, attach the Amylase container to the A port on the left side of the instrument. Fill the container with hot water. Observe that water is entering the vessel and going out of the drain. Repeat this procedure for the B port. Water should flow freely throughout the test.
  31. Ensure that the water supply line is connected and turned on. Then press and hold the “Start” button and verify that water flows into the vessel.
  32. Exit “Flush Mode” by pressing “Enter”.
33. **Level Sensor Check:**
  34. Fill a pitcher with 2 L of hot water and set it aside for a later step.
  35. With the bag suspender and weight installed, select “Crude Fiber”.
  36. Select “Enter” and then press “Start” when the message displays “Insert Samples”. Do not close the lid yet.
  37. Observe the “LVL” reading on the display. It should be greater than 5v.
  38. Now carefully pour the 2L of water into the vessel while watching the display. Once the water covers the level sensor tip, the voltage should go to less than 1v.
39. **Boil Test:**
  40. Close and tighten the vessel lid and continue the “Crude Fiber” run.
  41. Observe the temperature in both locations (display and the controller on the side) as well as the pressure on the display. Within 20 minutes the pressure should be greater than 5psi and the temperature should reach 100c. Once the temperature and pressure targets have been achieved, press STOP.
  42. This completes the Preventative Maintenance process and the system test. Ensure all covers have been reinstalled. The instrument can be returned to testing samples.

If any of these final tests have failed, contact ANKOM at the web link below.