RF Reliability Performance Program
Process Guide

Description: This Process Guide provides instructions to complete the Baseline (Starting Point) for the Reliability Improvement Program. It also provides direction to maintain the improved performance.

Supplies:

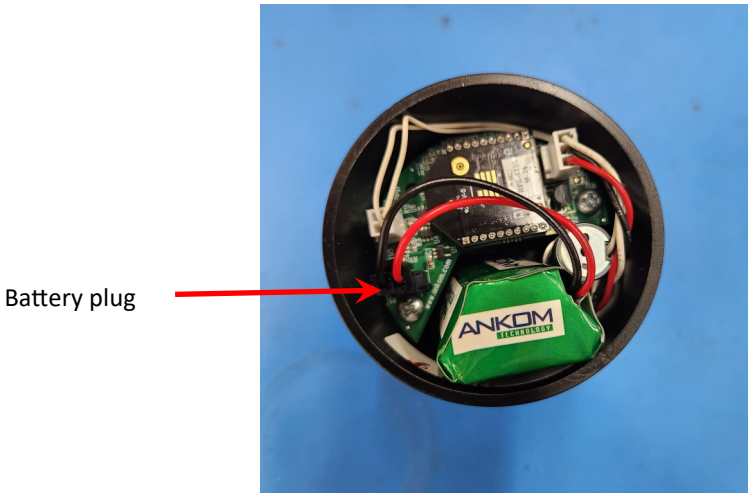
- Replacement chip set (Modules 1-5)
- RF72 kit(s) Each kit supports 5 modules
- Process Guide for Preventative Maintenance Process (Attached)

Process Overview Summary

1. Replace all 5 module chips.
2. Perform cleaning route. Instructions included in operator manual and these instructions.
3. Use system for 2-3 months before completing the Preventative Maintenance process.

Module Chip Replacement

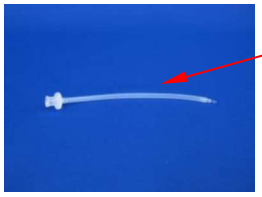
1. **Disconnect the module battery**. The black plug with one red and one black wire.
2. Remove the battery pack.
3. Match the module number with the appropriate replacement chip
4. Remove the existing chip.
5. Carefully install the replacement chip , ensuring that the pins line up correctly.
6. Connect a fully charged battery to the module and verify communications with the PC.



Next Steps

1. Due to the "stickiness of yeast", we recommend performing the Vent Valve Cleaning process (attached) after each measurement routine performed.

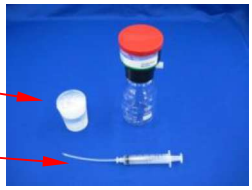
Appendix A – Vent Valve Cleaning Your ANKOM^{RF} Gas Production System comes with a Vent Valve Cleaning Kit (part #RF22) that includes a syringe and Vent Valve Adapter. To clean the vent valve you will need the Vent Valve Cleaning Kit, the Module Assembly, and some warm soapy water (see pictures below).



Vent Valve Adapter

Warm soapy water Vent

Valve Cleaning Kit



If the vent valve fails to operate properly, it can be cleaned by following the procedure below.

(1) Gently push the barbed end of the Vent Valve Adapter into the vent valve tube on the side of the housing.

(2) Remove the Glass Bottle from the Module.

(3) Fill the syringe with warm soapy water.

(4) Attach the syringe to the end of the Vent Valve Adapter by pushing it into the Luer fitting and rotating it clockwise.

(5) On your GPM screen, set the **Live Interval** to 1 sec to speed up the valve open and close operation.

(6) On your GPM screen, click the **Valve Open** box for the Module that requires cleaning. This places a check mark in the box (☑) and opens the valve.

WARNING: The solenoid will become hot if the valve open check box is left checked. Use caution and avoid leaving the valve open for more than 30 seconds.

IMPORTANT: Holding the vent valve open will reduce battery voltage. Before clicking the **Record** button on your GPM screen to start a study, replace batteries that show 6.6 volts or lower.

(7) Flush the liquid through the vent valve tube and repeat. If the water does not flow out of the bottom vent port, the software may not have opened the valve. If this is the case, on your GPM screen, click the **Valve Open** box again to ensure that the proper Module is selected.

(8) Flush a full syringe of warm to hot water through the vent valve tube and repeat.

(9) Follow the rinse with an air flush to clear out the water.

(10) On your GPM screen, click the **Valve Open** box to close the vent valve. This removes the check mark from the box (☐).

(11) Remove the Vent Valve Adapter by holding the vent valve tube against the housing with your finger (to avoid stretching it), and pulling the adapter out.

Part #	Part Name	Quantity per Assembly	Part #	Part Name	Quantity per Assembly
RF11	Viton Tube Assembly	5	7074	Viton Ring Gasket	5
RF41	Synthetic Grease	1	RF70	RF Positive Control Capsule Set (package of 5 capsule sets)	1

Description: This Process Guide provides instructions to complete the Preventative Maintenance (PM) procedure for the ANKOM RFS system utilizing the RF72 kit.

Frequency: The PM process is recommended to be completed annually or anytime you have a functional issue with the modules. While the **Vent Valve Cleaning process (pg 7) should be used after every test**.

Before you start: Verify RF overall functionality by using to the GPM software on your PC.

Tools needed: Antistatic surface, Antistatic wrist band (RF50 or similar) or exam gloves, Flat-blade screwdriver, Standard Pliers, Hemostat or Needle-Nose Pliers.

Supplies: One RF72 kit will provide the parts needed to perform a PM for 5 modules.

1. With either the anti-static wrist band around one wrist or exam gloves on both hands, disconnect and remove the battery pack in each module you will be servicing (Figure 1).
2. Disconnect the solenoid (white plug with 2 white wires) and the pressure sensor (white plug with red, black and white wires) by grasping the clip and pulling up gently (Figure 1).
3. Using a Phillips head screw driver, remove the two screws that secure the circuit board into the module. Keep the screws for reassembly (Figure 1). Place the circuit board on antistatic surface.

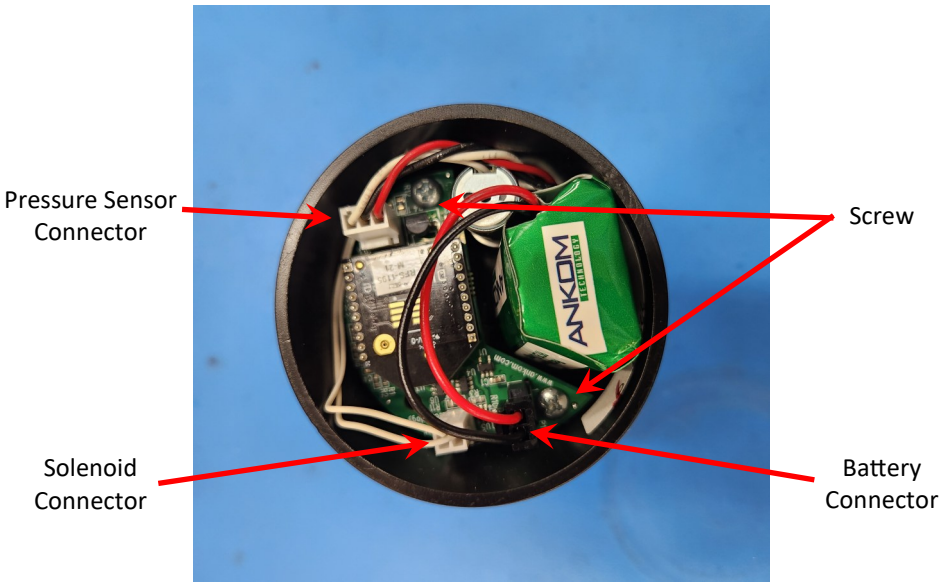
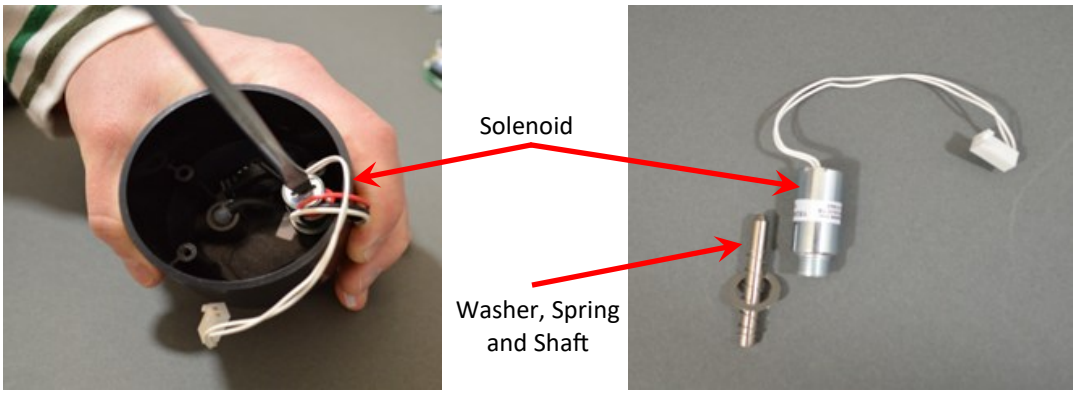


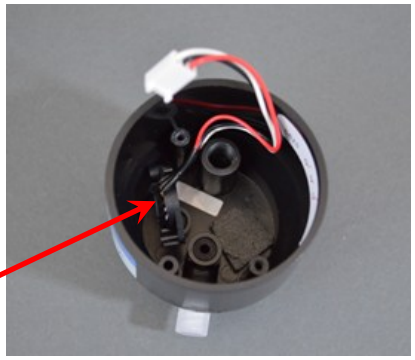
Figure 1

4. Using a flat head screwdriver, unscrew the solenoid (silver cylinder) by placing the screwdriver into the slot in the top of the cylinder and turning it counterclockwise.
5. Gently remove the solenoid by lifting it up slowly.
6. Remove the washer, spring and shaft that were underneath the solenoid.
7. Place all these parts off to the side.

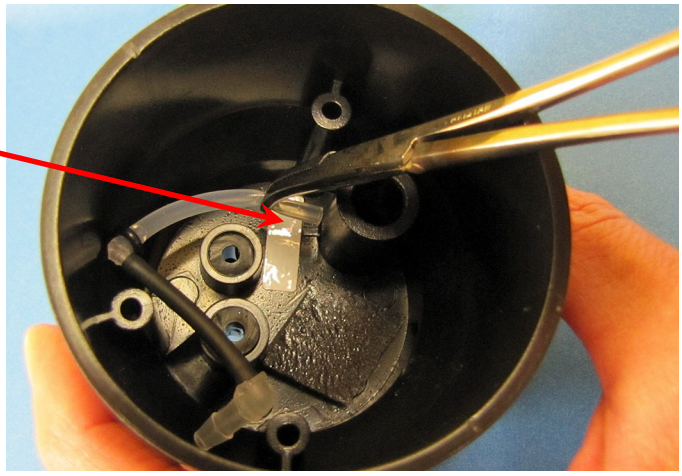


8. Using pliers, grasp the barbed elbow that is at the end of the black tube which is inserted into the bottom of the module, and pull directly up. **Note**: You may need to apply a bit of force for the barbed elbow to release from the seal in the bottom of the module.
9. Once removed, the black Viton Tube Assembly (RF11) can be discarded and replaced.

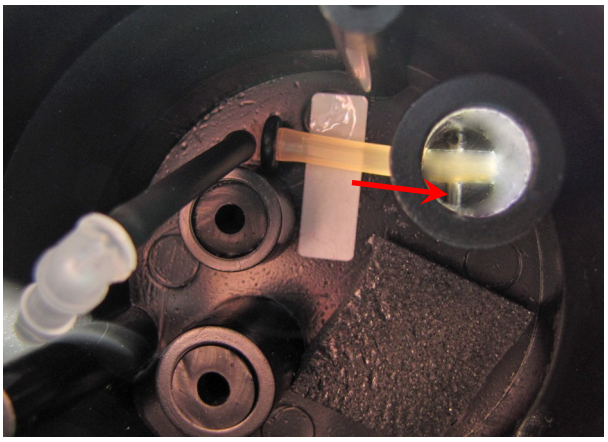
10. Remove the pressure sensor (black sensor with red, black, and white wires) by grasping it with pilers, and pulling directly up. **Note**: It is very important that you pull straight up and not side-to-side because this may break the barbed end off of the pressure sensor.

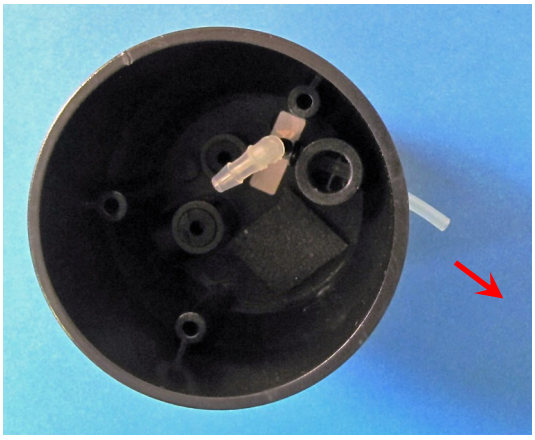


11. Take one RF11 Viton-Silicone Tube Assembly and insert the assembly into the RF Housing using a hemostat or needle nose pliers. Feed the Silicone end of the tube through the 0.16" diameter side hole in the solenoid shaft as shown.

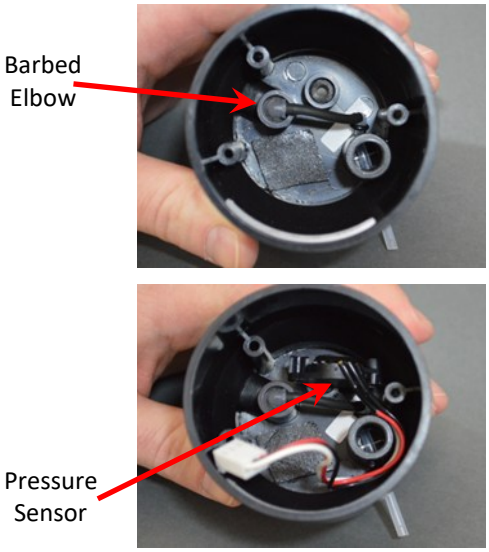


12. Continue to feed the RF11 Viton-Silicone Tube Assembly through the solenoid shaft housing, then up and over the dowel pin at the base of the channel. Pull the tube through the second 0.16" hole that leads to the outside of the RF Housing until the Black O-Ring on the RF11 is touching the solenoid shaft housing.

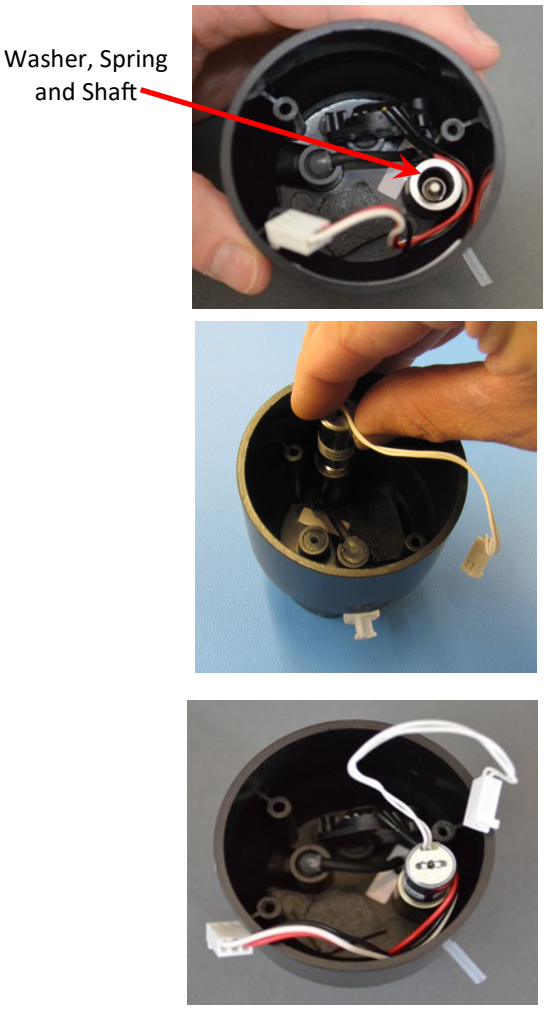




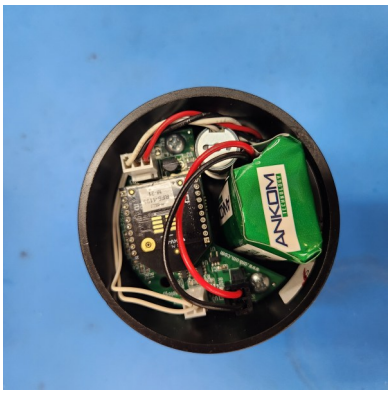
13. Plug the other barbed elbow from the RF11 assembly back into the seal in the bottom of the module by grasping the barbed elbow with pliers and forcing the elbow into the seal until the elbow sits flat on the seal.
14. Reinstall the pressure sensor with the pliers and push it down into the seal in the bottom of the module until it sits flat on the seal. Be sure to only push straight down and not side-to-side. Route the Pressure Sensor wires around the solenoid shaft housing as shown here.



15. Look inside the solenoid shaft housing of the RF module. Verify that Silicone Tubing and the dowel pin cross at the center of the solenoid shaft.
16. Reinstall the solenoid shaft, with the spring around it, into the solenoid shaft housing.
17. Place the thin washer on the top of the shaft housing.
18. Start to screw the solenoid back into the hole **by hand** to avoid cross-threading. Don't use a screwdriver at this point. While screwing the solenoid in place, pull the tube and hold it against the RF Module outer edge. This will keep the silicon tube in place below the solenoid shaft.
19. Once you have tightened the solenoid as much as you can by hand. Use the screwdriver to finish. Do not over-tighten.



20. Place the circuit board back inside the module housing.
21. Using the two screws previously removed to secure the circuit board in place.
22. Route the wires around the edges of the module. Do not connect the battery until you are ready to run the final test.
23. Apply a thin coat of RF41 Silicon Grease to a Viton ring gasket and replace the existing gasket.
24. The Preventative Maintenance is complete.



Validation Test

1. Connect the coordinator to a PC using a USB cable.
2. Plug the batteries into all modules to be tested.
3. Start the GPM software application and set the global release pressure to 1psi.
4. Add 100ml of distilled water to each of the bottles used to test the modules and then add to each bottle 1-BLUE RF Positive Control Capsule and 1-CLEAR RF Positive Control Capsule.
5. Press the “record” button in the GPM application.
6. Place modules in oven at 40°C, making sure the antenna extension from the RF2X base coordinator is located inside the oven.
7. Let the test run for 8 - 12 hours.
8. Save the data. The GPM software will automatically generate an Excel spreadsheet. From that sheet you can plot the results.
9. The results from the modules being tested should all be within a band (example below). If there are any modules significantly lower than the others in the band, investigate for a leak in that module.