

## Troubleshooting A Vacuum Problem From Easiest to More Difficult

The dreaded **Inadequate Vacuum Error**.....It stops you in your tracks. There is really no convenient time for a vacuum error to occur but hopefully with this troubleshooting tree we can figure out the problem....or at least rule out some others. As frustrating as repairing a freeze dryer can be, I can assure you once you have a fully operational machine, there is nothing like it! We will start with the easiest solutions first and work our way into the more in depth. Please note that some or all of these repairs could potentially void your freeze dryer warranty. **If you are under warranty, contact Harvest Right first and follow their recommendations.** If your freeze dryer is not under warranty, any advice you take from this guide is strictly at your own risk.

### **Is it plugged in properly?**

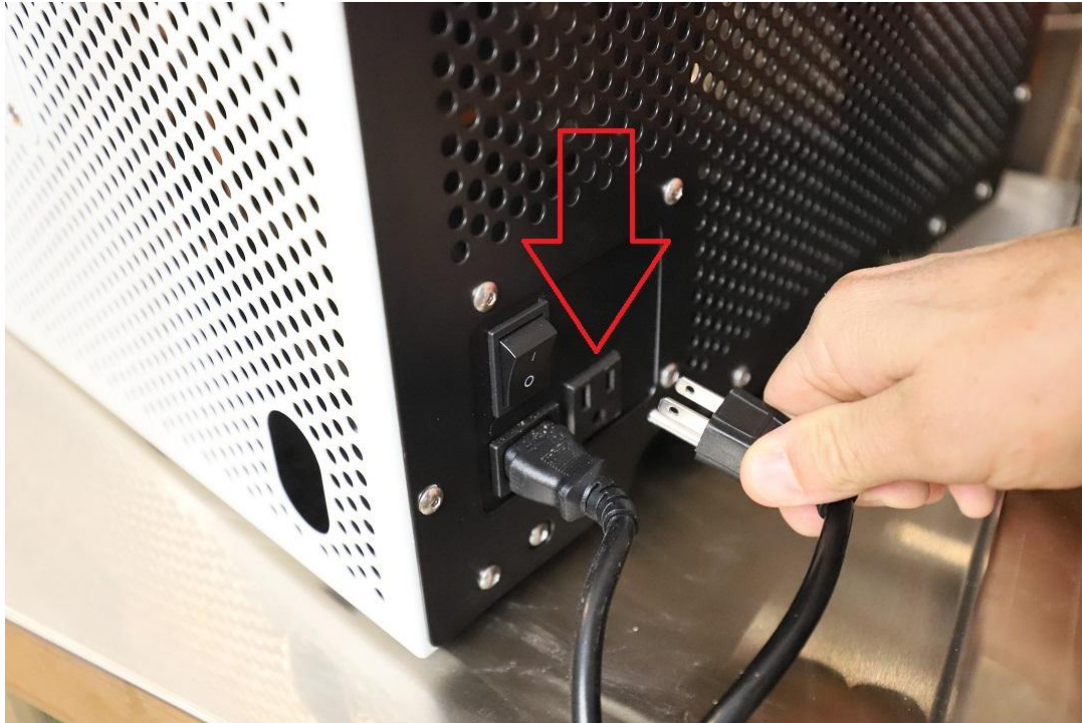
Before we get started, make sure that your vacuum pump is plugged into the freeze dryer itself, not plugged into the wall. (see picture)

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The outlet on the back of the freeze dryer is made for the vacuum pump to plug into. If your vacuum pump is not plugged into the freeze dryer, then it will not turn on when it is needed. Therefore, the inadequate vacuum error will show. This might sound silly, but it has happened to many, many people (including myself). You also need to make sure the switch on the pump is turned to the “on” position (see picture)

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## Do you have enough oil?

One thing that is commonly neglected is the correct amount of oil. I fill mine to the halfway point or slightly above. (see picture) When determining your oil level, the vacuum pump should be on a level and flat area, with cool oil. The vacuum pump should also be off (not running) Consult your owner's manual for your specific pump and always follow manufacturer's guidelines. Keep in mind that as you start to run your pump, the oil level will drop (sometimes dramatically). This is completely normal. Make sure that your vacuum pump has fresh, clean oil in it. The pump oil is not only a lubricator, but also a sealant for parts of the vacuum pump.

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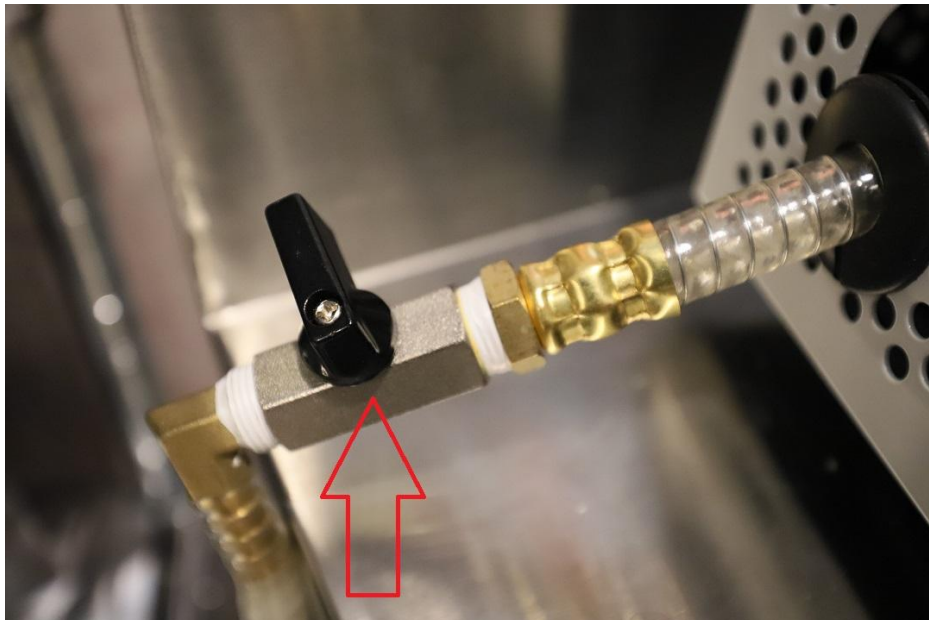
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### Is your valve closed?

Make sure that your valve on the side of the machine is closed. The closed position will be a 90 degree angle to the valve (see picture).



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If the valve is open, your machine will not be under vacuum and give an inadequate vacuum error.

### **Everything is set up correctly, now what?**

If you check all of the above and everything is correct, the first step if your pump is under warranty is to download your log files from your machine and get them to Harvest Right. This will help them determine if the vacuum problem is caused by your pump. To do this, get a thumb drive and place it in the USB slot next to your screen. Files will automatically upload. You can also start researching some of these other diagnostics while you are waiting for a response.

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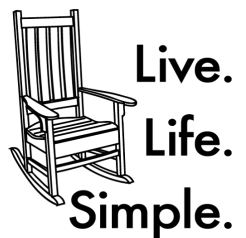
## Troubleshooting Step #1

The door gasket is the big black rubber type ring that gets squeezed between the vacuum chamber and the clear door. If there is any debris on the outer side or inner side of the ring, it can cause a slow leak. Remove the ring and pull apart the back slotted side apart to check for defects or debris. (see pictures)

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You can also run a cotton swab or other cleaning tool in the back crevice of the gasket several times to determine if there is an obstruction or debris. This gasket is the easiest place for vacuum to escape so it is best to clean this frequently. The best type of cleaner for all parts of the freeze dryer is soap and water. Check the front of the gasket as well and clean if needed.

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Before putting the gasket back on, ensure that there are no rough spots or debris on the stainless chamber protruding out from the freeze dryer. This is where the crevice of the gasket meets the chamber and if there are any imperfections on the chamber, that can affect vacuum as well. If you notice defects or white strings or threading in the gasket, you may want to consider a new gasket. Another way to be certain that the door gasket is not the culprit is with some soapy water. Run the vacuum with the door closed and the valve shut. You will start to notice a line where the gasket meets the door.



This line should not only be visible all around the gasket, but as the vacuum gets stronger, that line will get bigger. Once you have a good

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vacuum going, pour soapy water at the top of the gasket in between the freeze dryer and the door.



If there is a leak, the soapy water will be visible while it creeps its way into the vacuum chamber.

### **How to fix a gasket leak**

To fix the leak, you will need to adjust your door and where it meets up with the gasket. You want the gasket and door to meet as flush as possible all the way around. There are 4 vacuum chamber adjustment bolts (5/32"

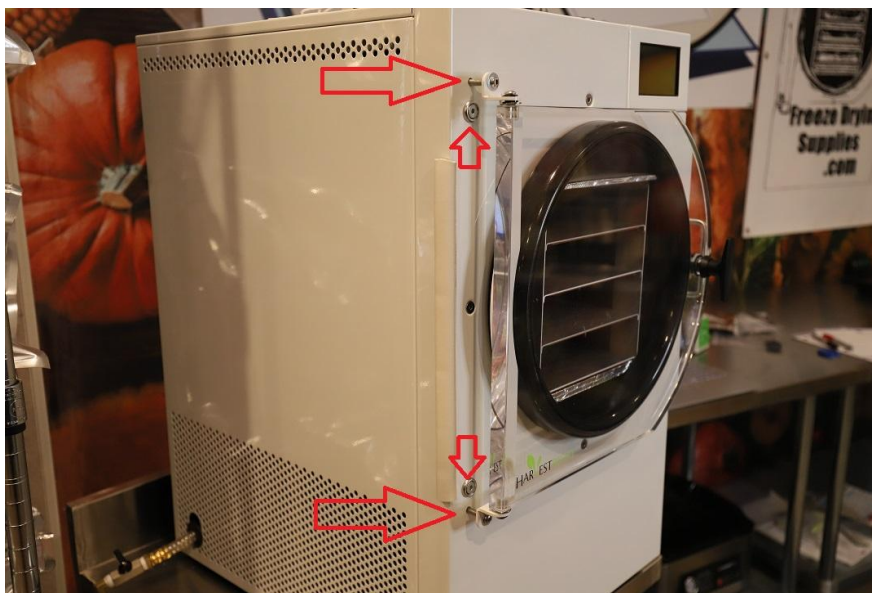
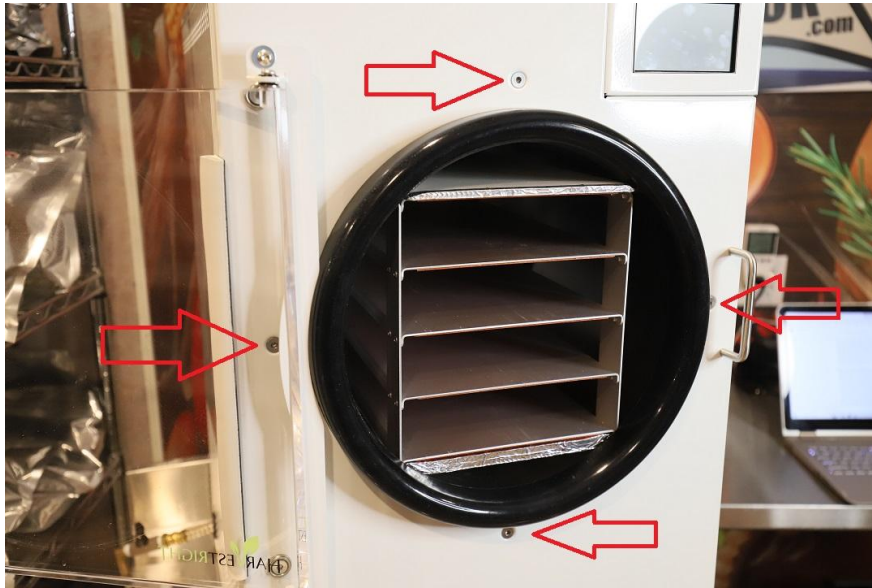
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Allen) as well as the 2 or 4 door adjustment bolts (5/32" Allen).



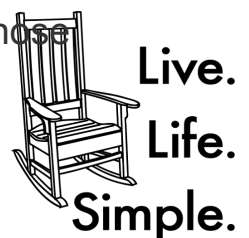
There is no “sure” method for adjusting these, it will depend on how your door and seal meet together. It may take some time to get the right combination of adjustments, but your end goal is to have a snug seal against the door forming a visible circular line where the gasket is sealed. DO NOT OVERTIGHTEN bolts or the door.

### **Troubleshooting Step #2**

The second easiest diagnosis is to remove the hose going from the freeze dryer to the vacuum pump. It is very important that the fittings on that hose  
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are only hand tight and that **no sealant or Teflon tape has been used**. If you used a tool to tighten the fitting or if sealant of any kind was used, remove it or loosen the fitting so it is only hand tight and free of sealant. Once the fitting is loose and unscrewed, examine the O-rings inside of the fittings. They are typically black rubber gaskets.



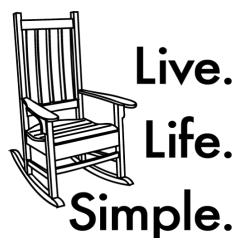
If there is debris, damage or a break, replace the O-ring. They can be found at any hardware store.

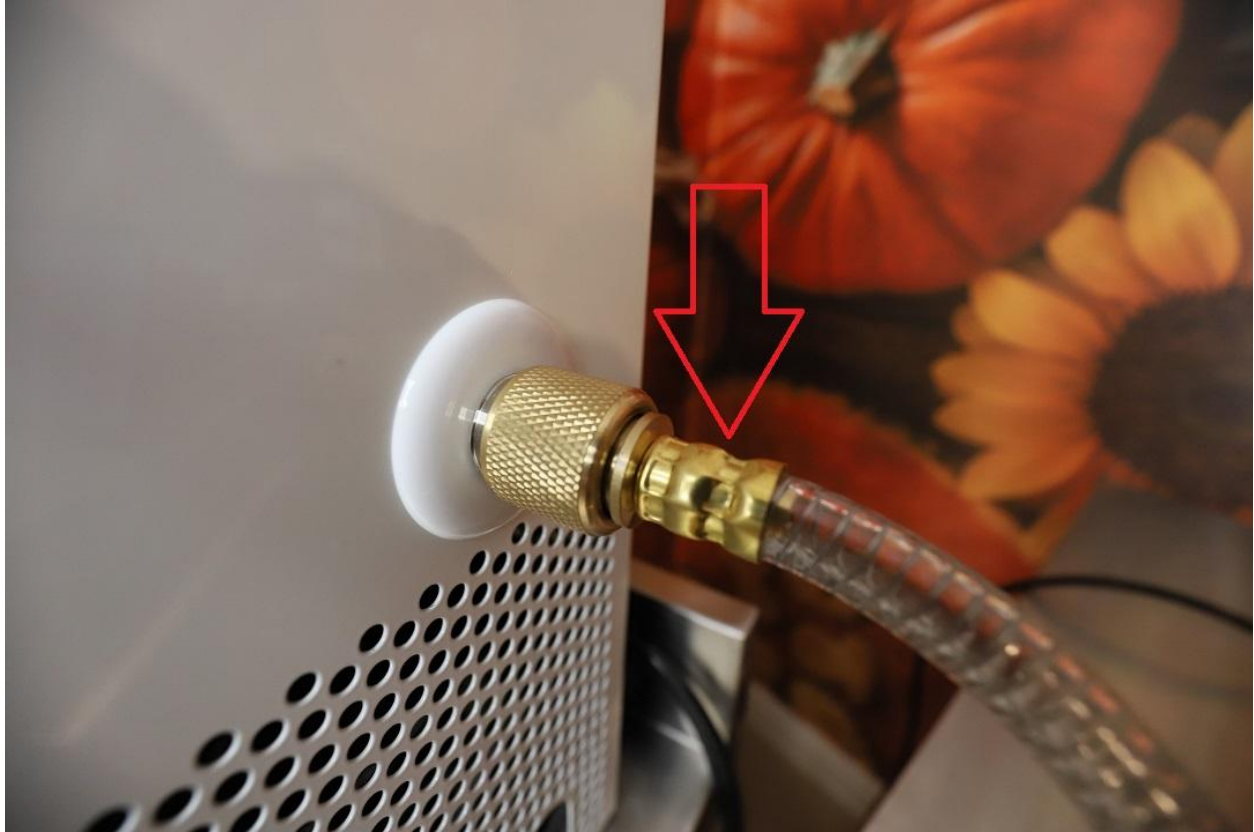
You also might want to check the hose crimps as they can fail.

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If you suspect that this is the problem, Harvest right can sell or provide you with a new hose or you can use self fusing silicone tape to wrap the crimps. This can be found at any hardware store.

Before you reinstall the hose, also examine the fittings on the vacuum pump and the freeze dryer itself where the hose connects. If there is any movement or looseness, tighten or diagnose what is causing the fitting to move.

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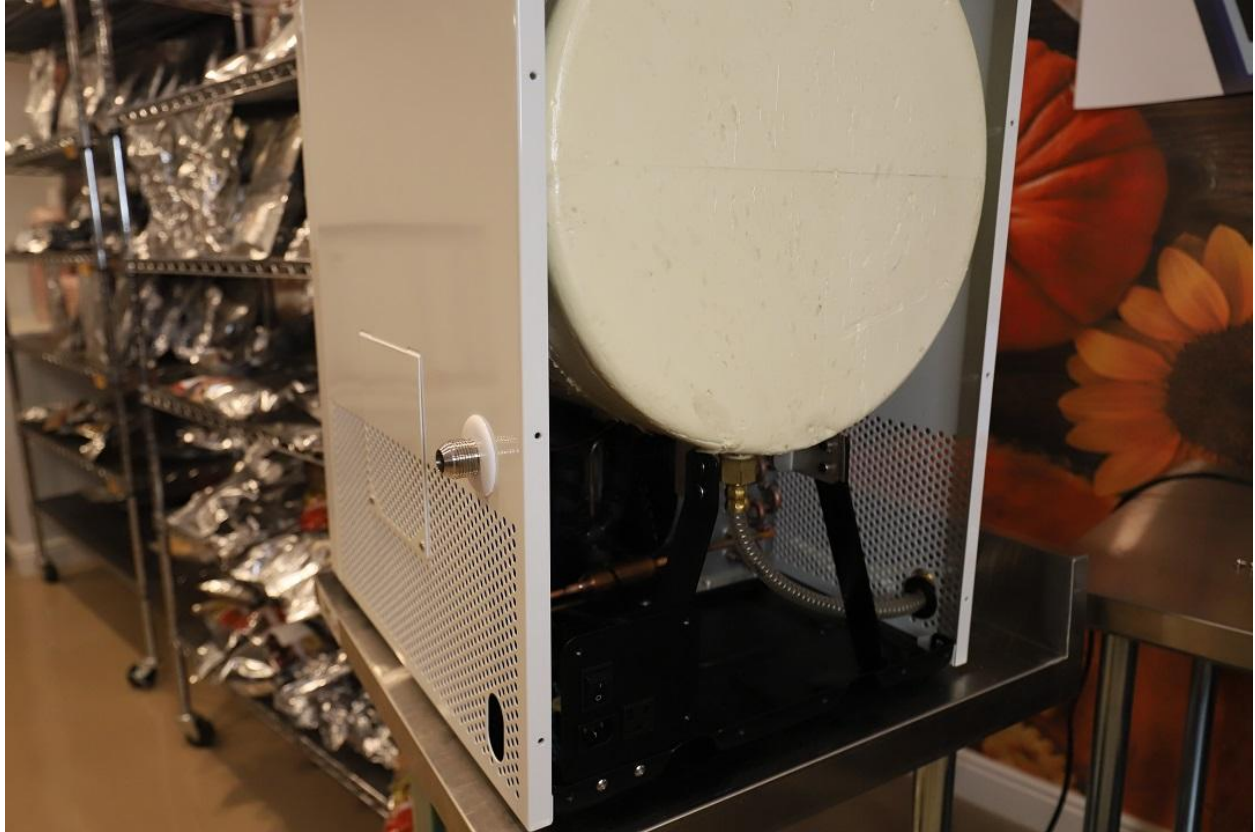
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There is also an o-ring inside the fitting of the 90 degree elbow. This can fail and cause a leak. The elbow can be found by removing the back panel ( $\frac{1}{8}$ " Allen).



In newer models, the elbow is integrated into the chamber. The o-rings can be found at any hardware store. If the problem is beyond tightening these or replacing the o-ring, continue on.

### **Troubleshooting Step #3**

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PRESS and hold the leaf on the upper left of the screen and you will see a functional testing screen that will allow you to manually turn on and off various parts of the freeze dryer.



(If you have an older version of Freeze dryer, you may not have this option.) If you have older software, you can press TEST and manually turn on the vacuum from there. If your Harvest Right is even older, you may not have the ability at all. However, you can still plug your vacuum pump into a wall outlet and do this manually.

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Make sure your valve is closed and close your door. You also need to ensure that the chamber is free of food and / or water. To remove as many variables as possible, you will also need to remove your shelving unit. To do this, remove the black door gasket, slide the shelf out of the vacuum chamber and disconnect your electronics plug. (see picture)



Put the gasket back on, close the door and make sure that it is getting good contact, and ensure that the pump is plugged into the outlet on the freeze dryer and pump switch is at the “on” position. Make sure that your pump has clean, fresh oil as well. The oil in the pump serves many purposes other than lubrication. It also helps seal parts and pieces for vacuum. (as mentioned earlier)

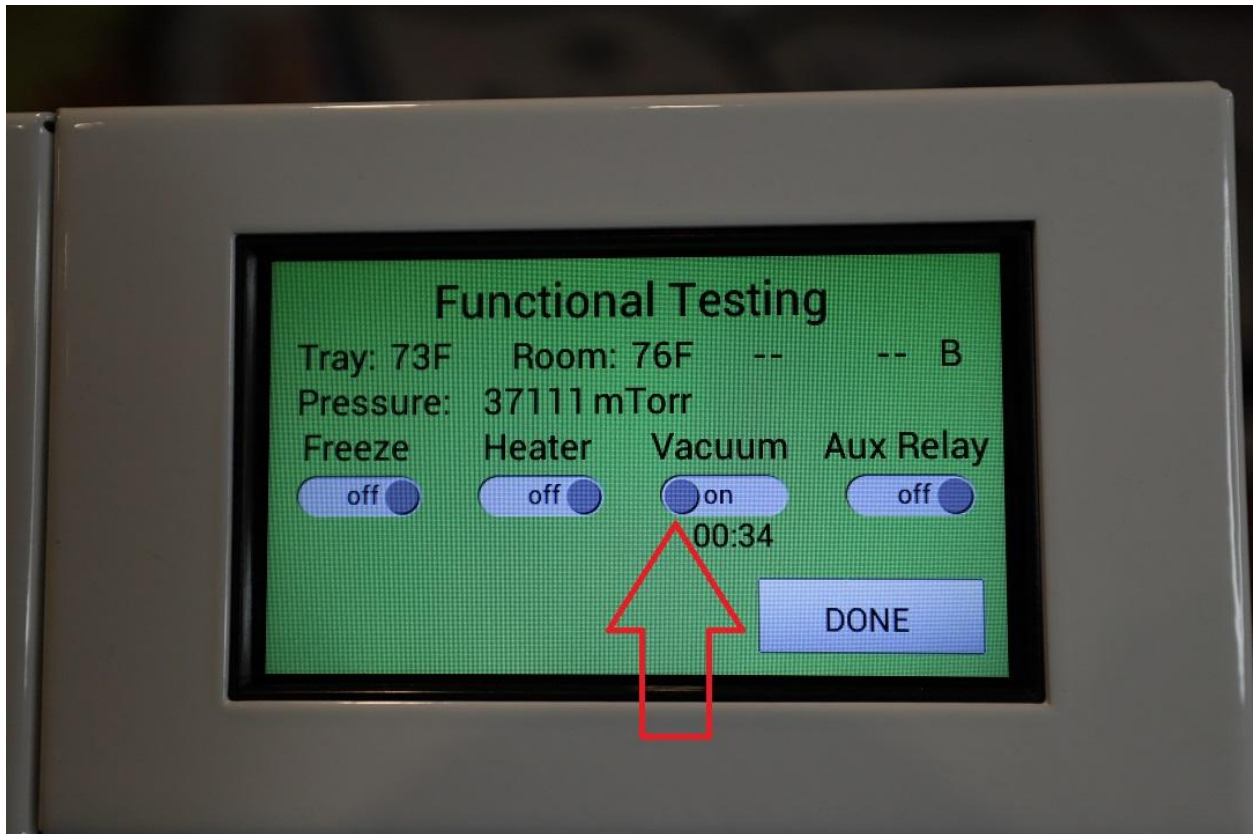
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Manually turn on the vacuum by pressing the touch screen button for “vacuum”. (see picture)



NOTE: this screen is very helpful for many things, not just the vacuum. This screen also allows you to turn on heaters and the cooling system. There is also an auxiliary, I would imagine for future add ons or diagnosis.

There will be a small lag time before you hear the pump click on. Let this run for several minutes and you will see the real time mTorr on the screen. The mTorr will drop rapidly at first and then slowly stop or the number will drop slowly. You are ideally looking for an mTorr below 500.

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You should also notice the gasket contact point in the glass will get thicker and look smashed. (see picture) If not, your door is not seating properly to the gasket and could be your vacuum problem. Refer back to Step #1 on how to adjust your door as this may solve the issue.



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## Troubleshooting Step #4

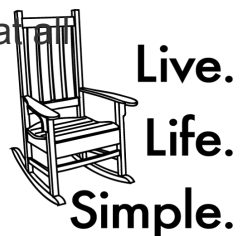
While your machine is still holding a vacuum, the next test will be to determine whether your valve is functioning properly. To do this, fill up a cup or container with water and place your drain tube into the water (see picture). IF YOU HAVE ADDED any anti siphon y's to your drain line, you will need to remove them BEFORE you do this test, and put your longer piece of drain line back on the valve connection.



If you have a larger leak in the valve, you will notice water start to creep up the drain tube. It will certainly be the valve because if the valve was functioning properly it would allow very little or “0” vacuum to escape. The water creeping up the tube (similar to drinking from a straw) is the valve allowing air back into the vacuum chamber. Let the tube sit in water for at least 1 minute to allow for any changes. If the mTorr has not changed at all. This information is provided by Live.Life.Simple.

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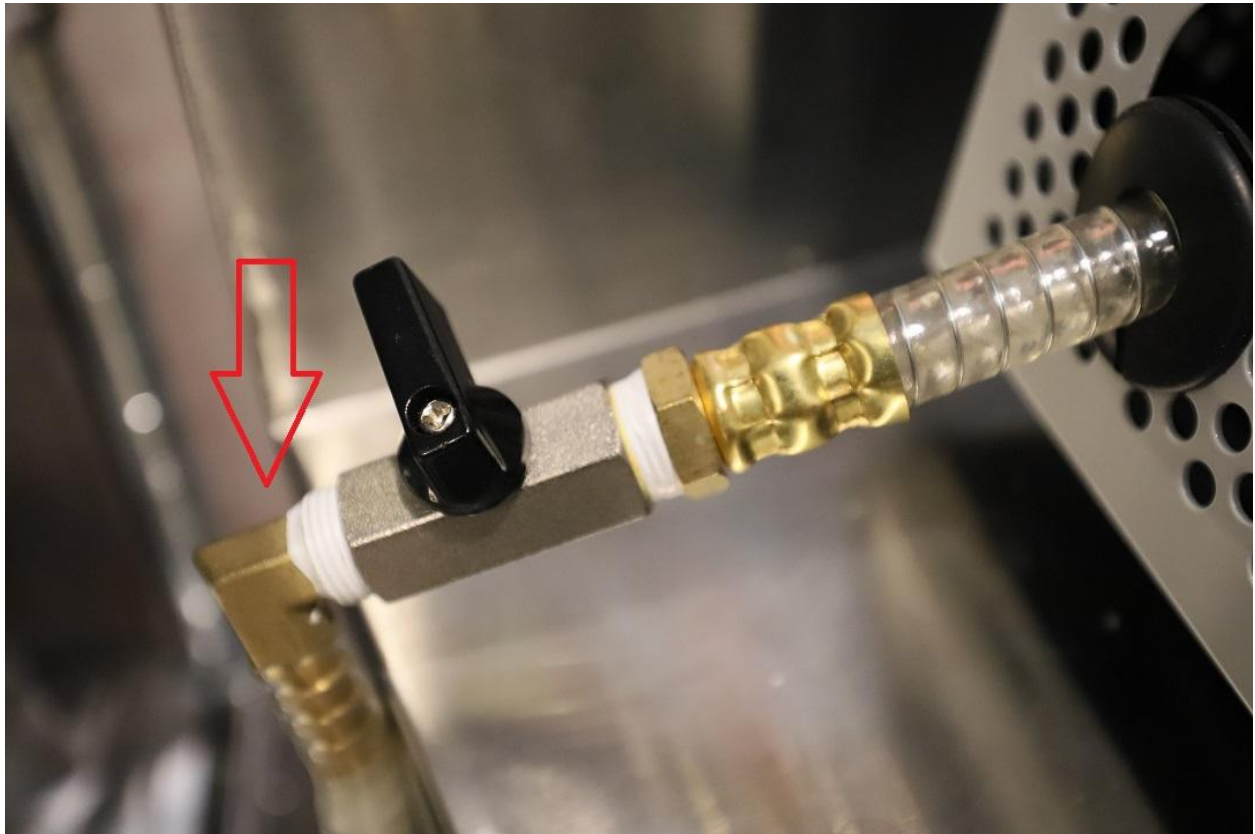




or significantly, remove the elbow or barbed brass fitting along with the tube. (see picture) The next step may help determine whether the Teflon or sealant on the brass fitting is bad or whether we need to keep tracking down the leak.

### **Troubleshooting Step #5**

For the next step, you will need some Windex cleaner or carb cleaner. Remove the brass barbed fitting from your valve.



With the brass barbed fitting removed you will have one open threaded end of the valve showing. Spray Windex or carb cleaner in the open end of the valve as well as the knob or turn switch of the valve (these are usually black). Watch your mTorr level for the next minute. If it has not moved, your barbed brass fitting is leaking. If the mTorr does increase significantly, your valve is potentially bad.

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Let's try one last thing before replacing the valve. Spray the other end of the valve (the side that has a hose going into the machine) with Windex or carb cleaner and watch for significant rise in mTorr.



If spraying that area causes a change in mTorr, the teflon or sealer needs to be replaced. Also pay attention to the knob and tighten if necessary. In my opinion, these valves are not great quality and you can find a way better quality replacement at any hardware store. Drain water from the freeze dryer can be slightly acidic and will deteriorate a low quality valve. Make sure it will handle the pressure of a freeze dryer, but most will be sufficient.

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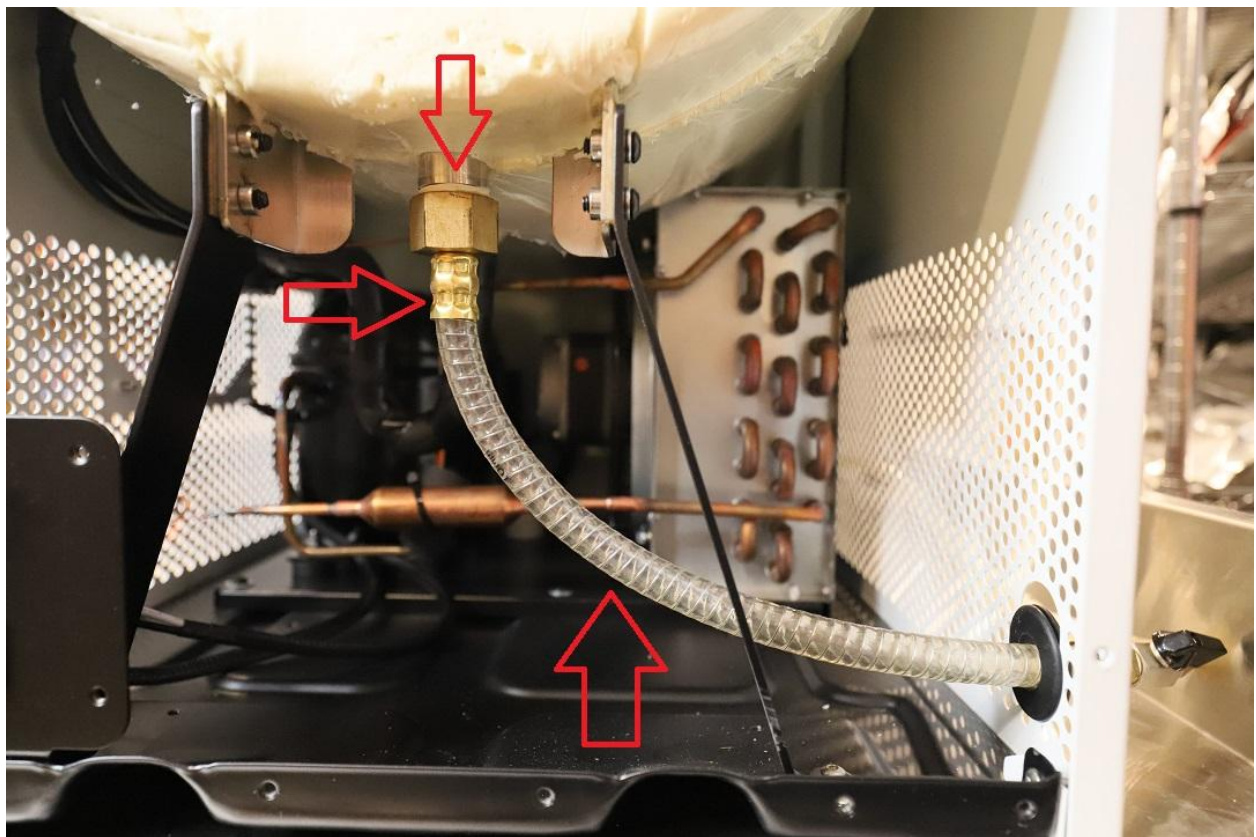


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If in doubt, and you already have the valve pulled off anyway, I would consider replacing it with a better one anyway. The valve size needed is  $\frac{3}{8}$ " pipe thread, not  $\frac{3}{8}$ " compression.

### **Troubleshooting Step #6**

If you have determined that the valve is fine, we need to keep traveling up the system to determine if the internal drain hose is leaking. Depending on the year and model of the freeze dryer, you may need to remove a cover panel. This will expose the internal drain hose and fitting (see figure 6). Repeat the same process as earlier, spraying the hose itself with Windex or carb cleaner, the fitting and crimping and watch for a change in mTorr.



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If you find that this is your leak, contact Harvest Right and they can send you or sell you a new assembly. You may also be able to find the parts and fittings you need at a hardware store. The hose is a 3/4" size.

### **Troubleshooting Step #7**

If you have made it this far, I feel for you. You are probably upset and have used some choice words about the freeze dryer and your choices. I have some good news and some bad news. Which would you like first? The good news of course because we are staying positive so we can start using this amazing machine!!! The good news is, if you are 100% certain that your vacuum pump is working properly and you have done all of these diagnostics, there is only one thing it can be. The bad news. You more than likely have an epoxy leak. The epoxy vacuum feed that seals to the vacuum chamber is not fully sealing and needs to be addressed. (see picture)

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You may want to remove the top and side panels to get access to diagnose. Once panels are removed, reinstall your vacuum hose back to the fitting and vacuum pump. Make sure you are using a vacuum pump that is functioning properly. You will also need to confirm that the oil level is correct, the oil is fresh and your hose is hand tight with no teflon or sealant. You then need to bottom out your mTorr level the same way you have done in earlier steps. Make sure you do all of the same things like removing the shelf and dropping the mTorr level down to its stopping point. Once you have done that, pull back the foam insulation and use carb cleaner to spray the epoxy vacuum feed in various places. There are different versions of how these attach and the overall looks. My version is a 2022 (pictured)

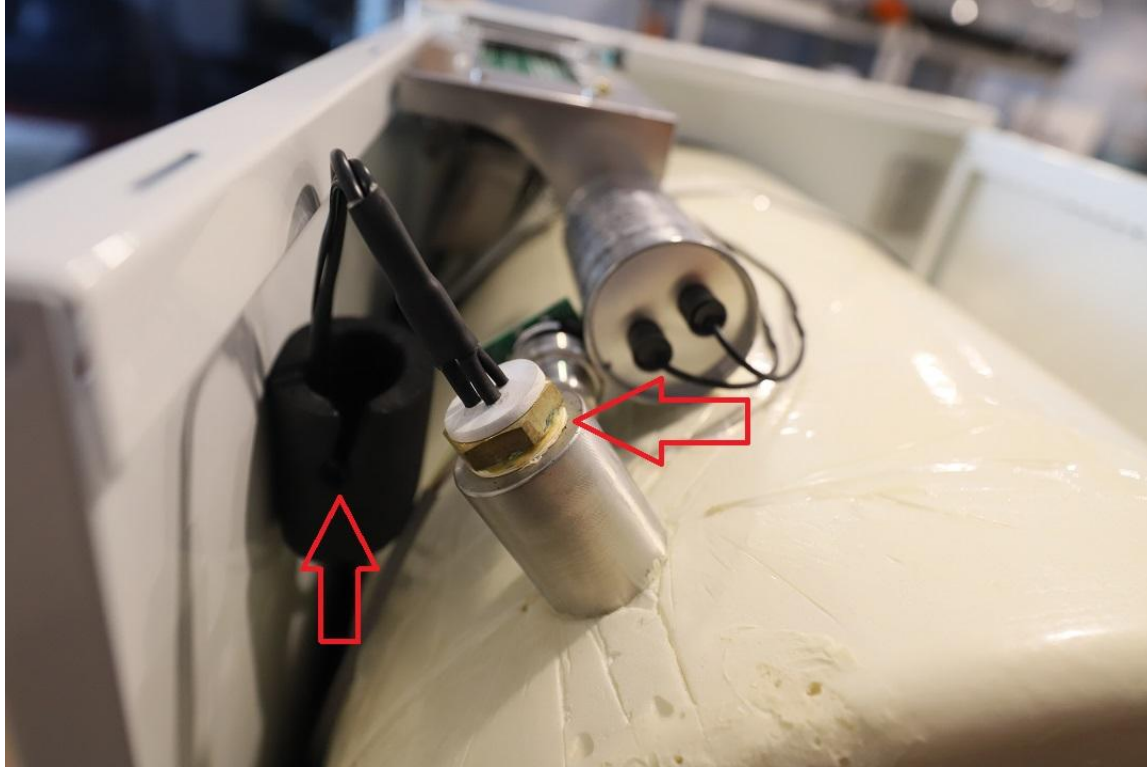
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If you see a spike in mTorr levels, you have found your leak. You will need to contact Harvest Right to find out the appropriate epoxy or I have heard of some freeze dryers using 100% silicone as well. Please note that if you do not contact Harvest Right before trying this, you will possibly void your warranty or they may not help any further.

To repair the vacuum sensor, I must first tell you that this is at your own risk! I am just giving my opinion on how to do this repair. Any repair that you do at this point is based on your choice to do so and assumption of your abilities and skill level. Make a funnel or dam (with masking tape) at

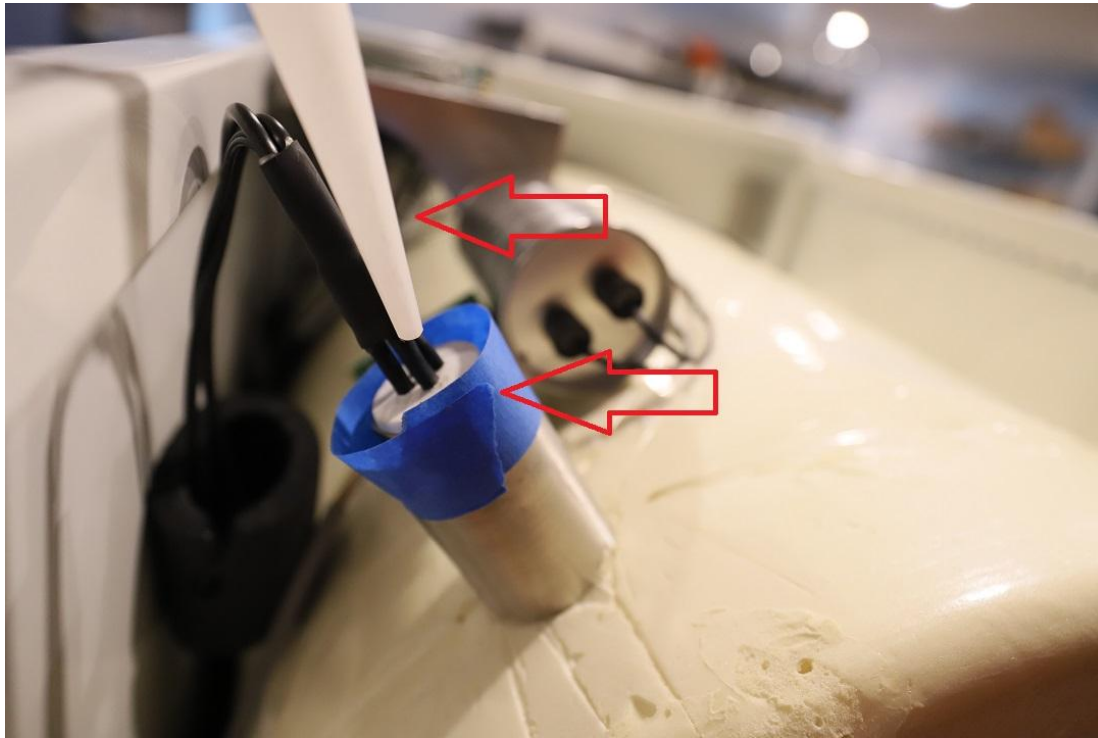
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the top of the sensor or where you have determined the leak is.



While your machine is still under vacuum, fill the dam or funnel with the recommended epoxy or silicone and release the vacuum slowly. This will pull the sealant into the leak. Let the sealant cure for an extended period of time. Follow dry time instructions of the product you are using.

Fingers crossed for you. This can be extremely frustrating, especially if you just purchased your freeze dryer or you are in the middle of a freeze dry cycle. I have heard that if you are scheduling an appointment with Harvestright for help with diagnosis, set up an ongoing appointment (for the next day or the soonest available) before you even talk to a person. That way you are not drawing out the troubleshooting and diagnosis. The longer it takes for them to get back to you or you go on with your life for a few days, the tougher it is to remember where you left off or what happened on the last phone call or email. I have also had good results with positivity (not just for Harvest Right). If you call into customer service with a bad attitude or showing discouragement, you will get an equal reaction. If your attitude is one willing to learn and experiment, most of the people I have dealt with at HR love these machines and take pride in their work and product

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