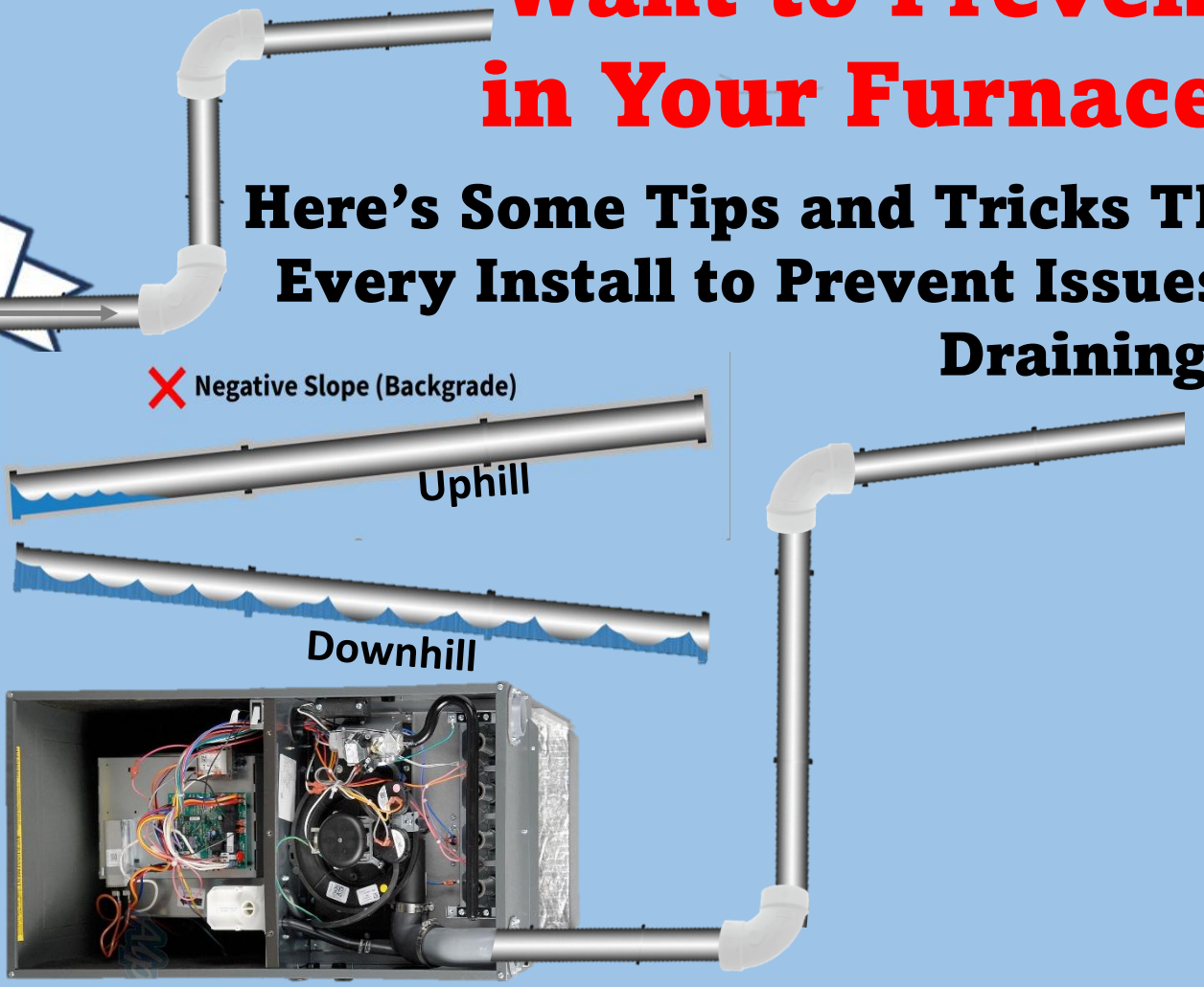




HVAC Training Video

Want to Prevent Water Issues in Your Furnace Installations?

Here's Some Tips and Tricks That Should Be Used On Every Install to Prevent Issues Caused by improper Draining



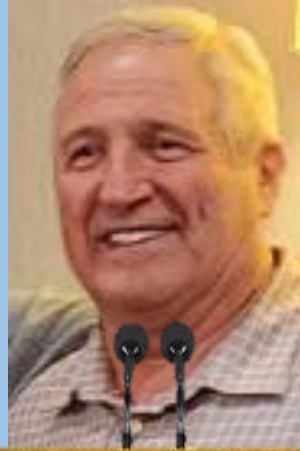
The Golden Rule of Draining



You know what and water flow down Hill



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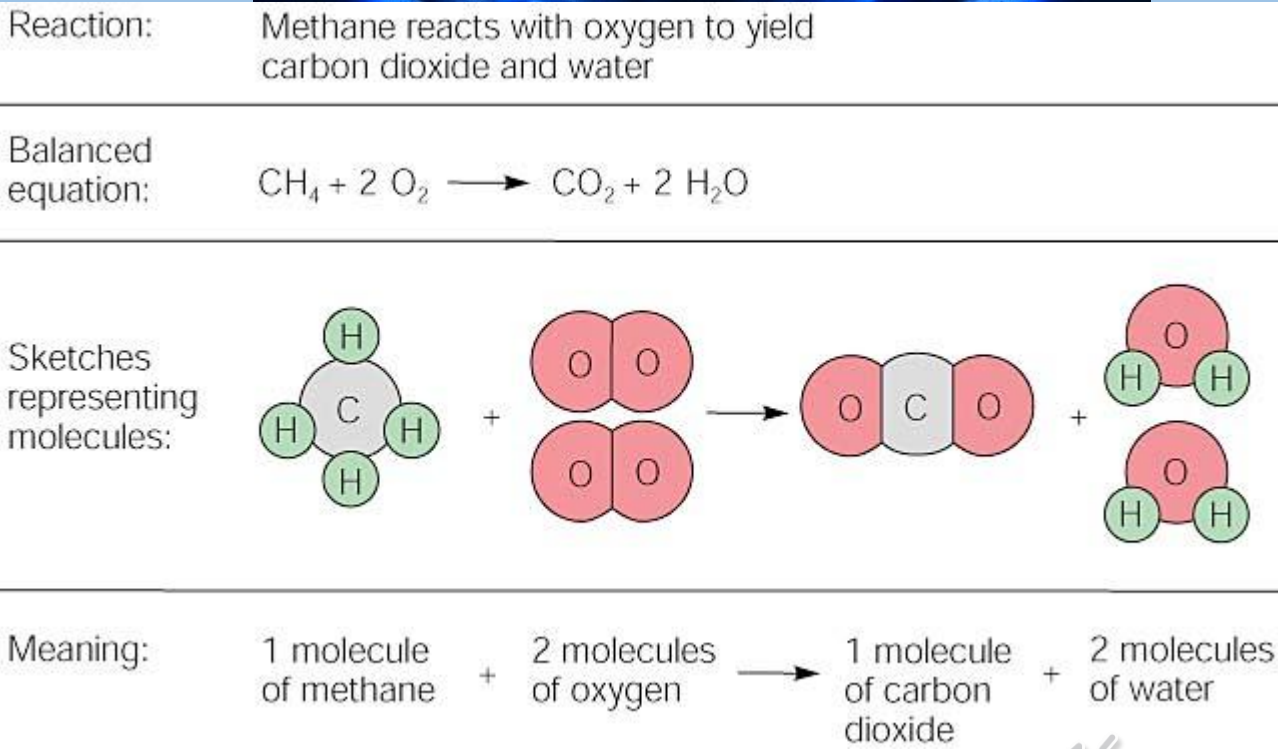
Technical
Support
Manager
&
Trainer



The blue color of a natural gas flame results from the combustion process that occurs when natural gas (methane) interacts with oxygen in the presence of heat.



During this reaction, methane combines with oxygen to produce carbon dioxide (CO₂) and water vapor (H₂O), releasing energy in the form of heat.



In 80+ Efficiency Furnaces this water vapor simply remains a vapor due to the temperature of the flue gasses and goes out the flue with the rest of the flue gasses



Vent Draining

Technicians need to understand that It's Crucial to Set Up Condensing Furnaces (vertical or horizontal) So That NO Condensate Can Build Up Anywhere in the System From the Secondary Heat Exchanger to the Exit of the Vent Pipe from the building



The draining of condensing furnaces to prevent water build up in the secondary heat exchanger and the vent pipe is important, because incorrect draining procedures will cause furnace operation issues.



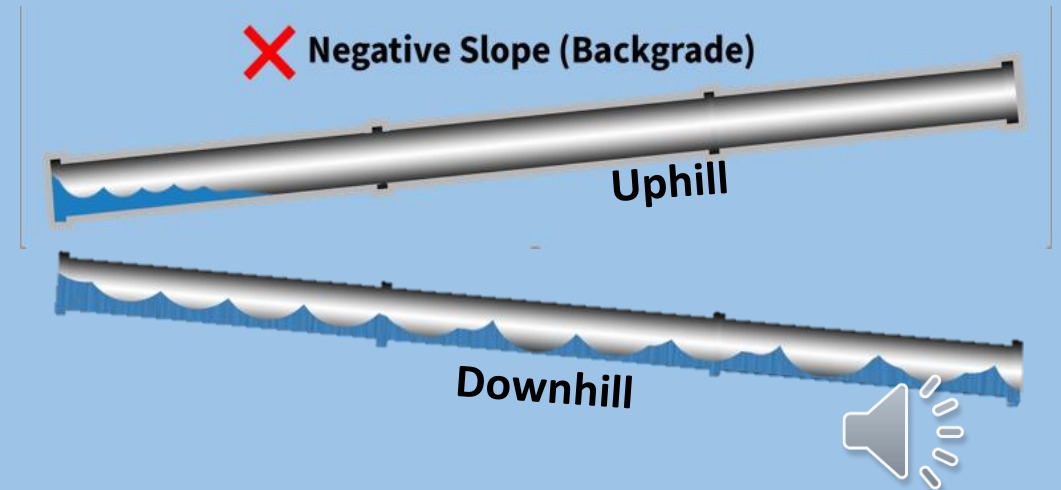
Hot on the left, Cold on the right



And you know what rolls
down Hill

The last part of this old plumber's joke can be applied to the draining of condensate from condensing gas furnace drains and vents. They must have a certain amount of pitch towards the direction you want the water to move in.

Have you ever seen water move up hill without something pushing it? Me neither.



TECHNICAL SUPPORT LINE

Every heating season we get many calls from **Technicians in the field saying**, the furnace ignites, runs X amount of time, the flames goes out and the unit immediately goes into another ignition cycle

or pressure switches fail to close,

or pressure switches chatter (a clicking noise in the pressure switch),

or the furnace runs but sputters (the flames of the burners can start to recede and lengthen once to several times, which may or may not cause the flame to go out and the unit to recycle,


or high Carbon monoxide levels in the flue...



Many times, these issues are found to be caused by improper draining procedures

Now let's go through some furnace draining procedures that will keep the furnace from having draining issue from the beginning.

Some of these tips are common draining requirements from the installation manual and others are tips learned from issues in the field

Adding the tips learned from issues in the field should be done on every furnace you install to prevent draining issues/callbacks. They add very little time and/or cost to the job as you are already there installing the unit. 

Level Vertical units from side to side to prevent trapping of water in the secondary heat exchanger which can raise CO levels in the flue leading to soot build up



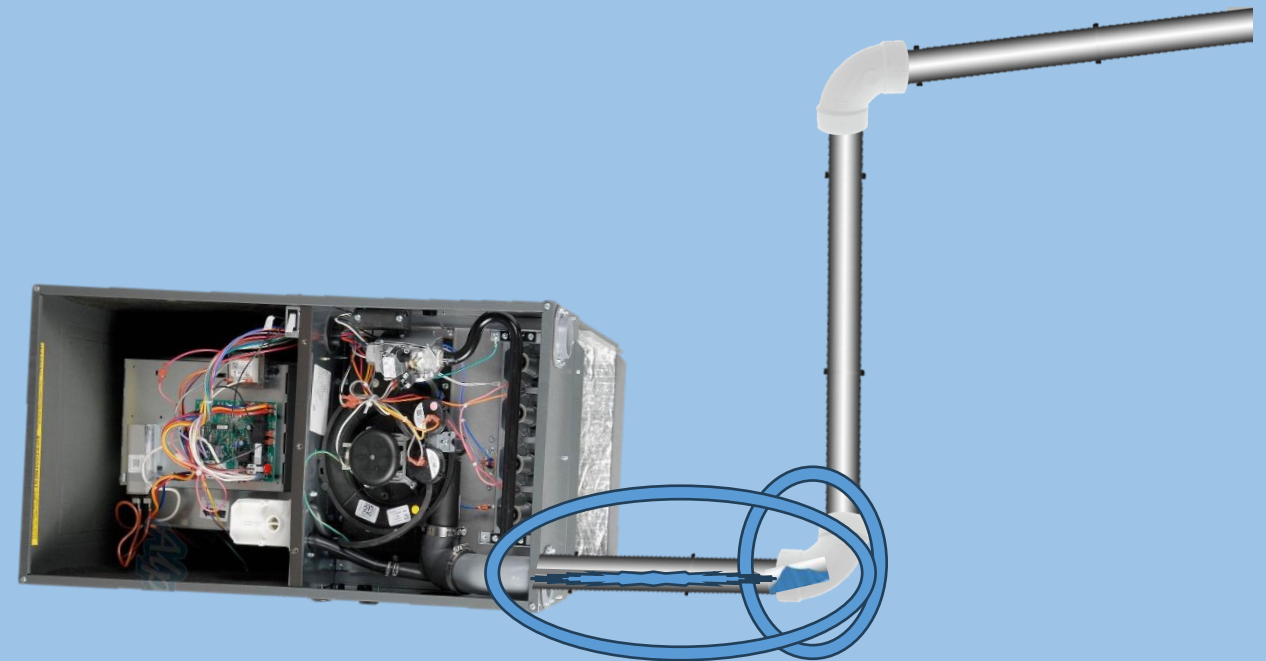
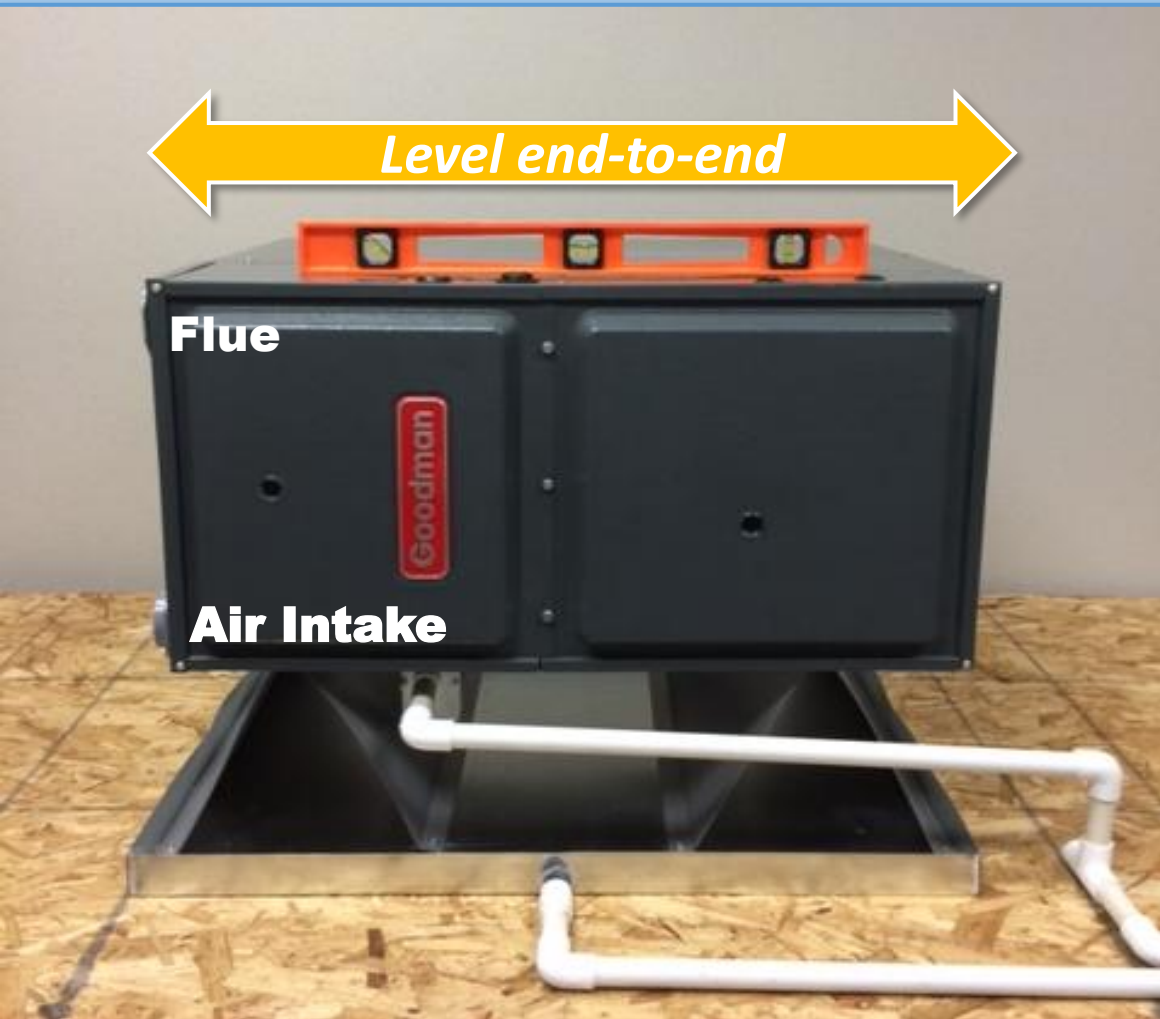
Trapping water in the secondary heat exchanger can also cause pressure switches to suddenly open or fail to close, due to a loss of vacuum pressure caused by water build up

Once you have leveled the furnace from side to side, place a piece or two of drive stock or wedges made of non-combustible material under each back corner to slightly raise the back of the furnace causing a slight tilt toward the front. This allows the condensate from the secondary heat exchanger to flow forward to the recuperator coil (secondary heat exchanger) front cover, and into drain trap.



Horizontal Furnaces – Level units lengthwise from end-to-end for proper flue pipe drainage.

If the Furnace is not level from end to end, water will build up in the elbow



Or can build in the whole pipe from the unit to the first 90

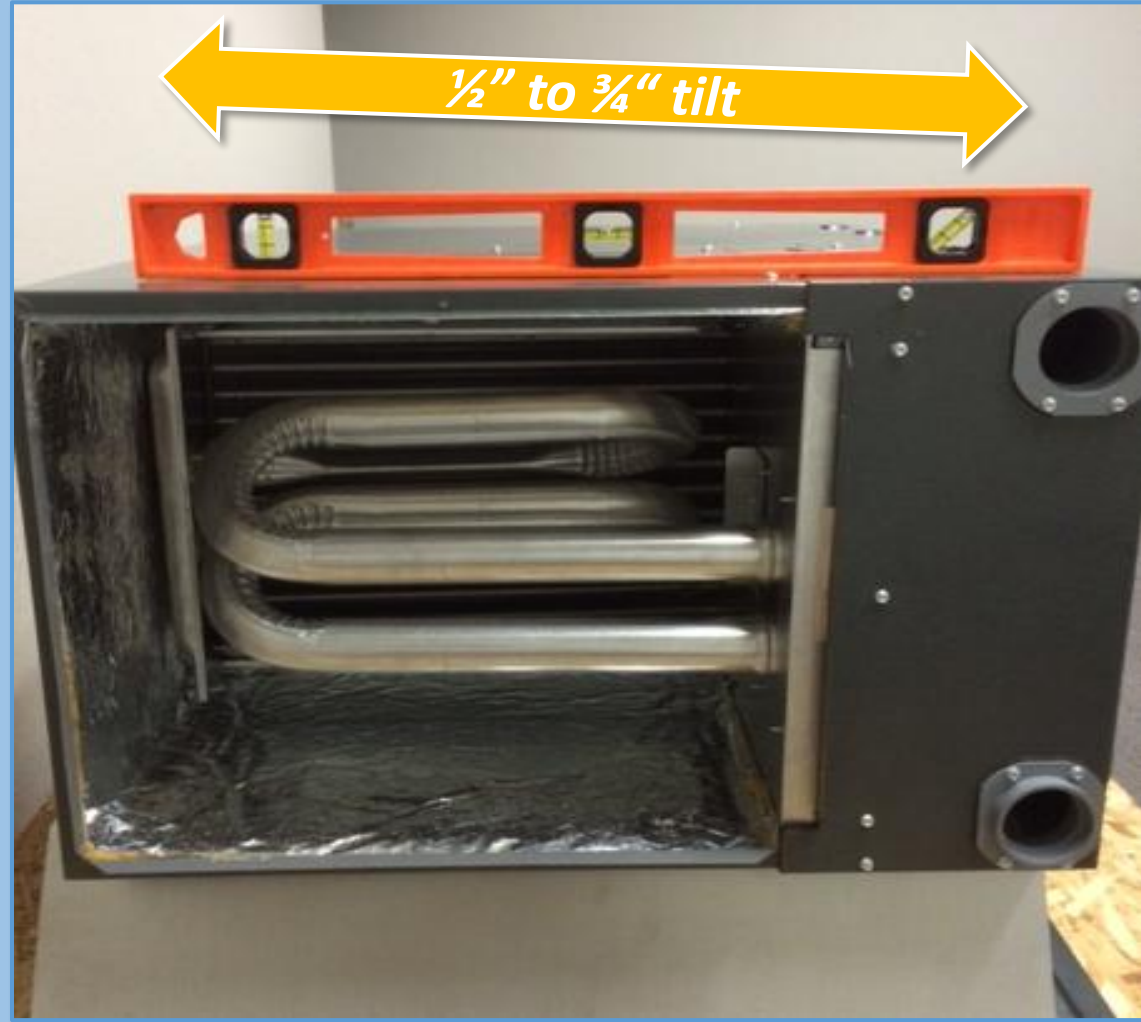


Furnace Leveling

Horizontal:

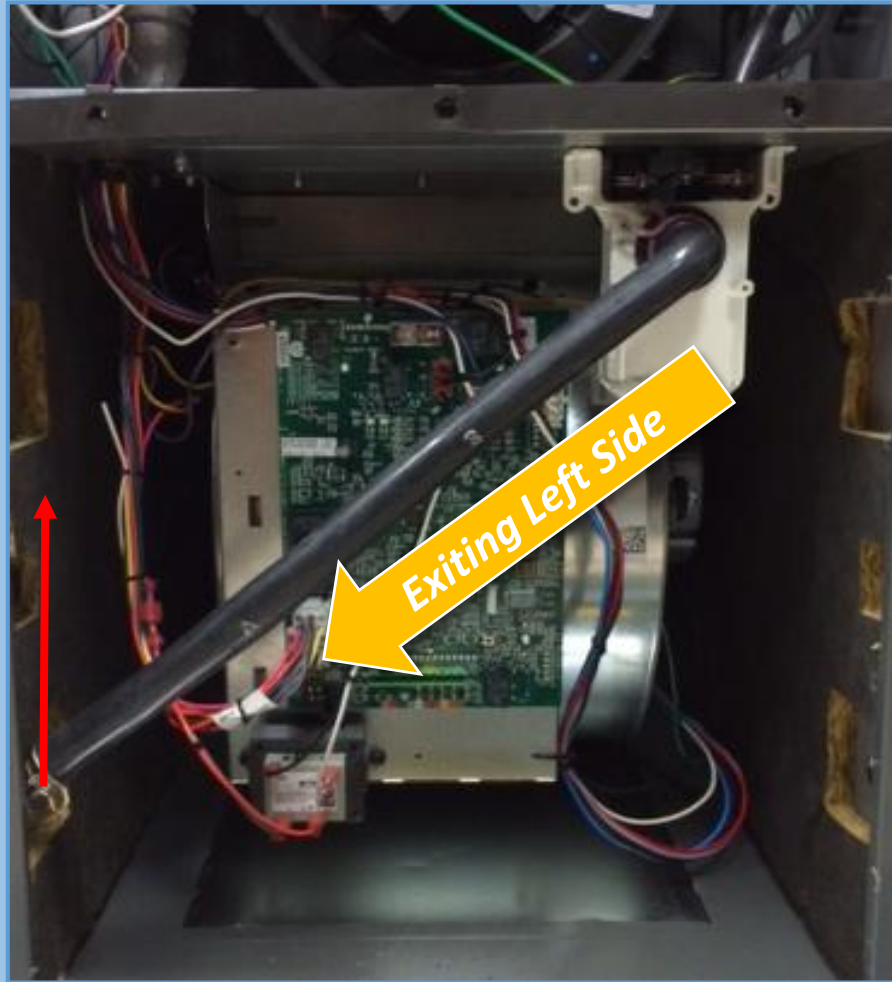
Install the furnace with a slight tilt (approximately $\frac{1}{2}$ " to $\frac{3}{4}$ " from back to front with the access doors downhill from the back panel.

The slight tilt helps the condensate from the secondary heat exchanger to **flow forward to the recuperator coil front cover**, and into the drain trap.



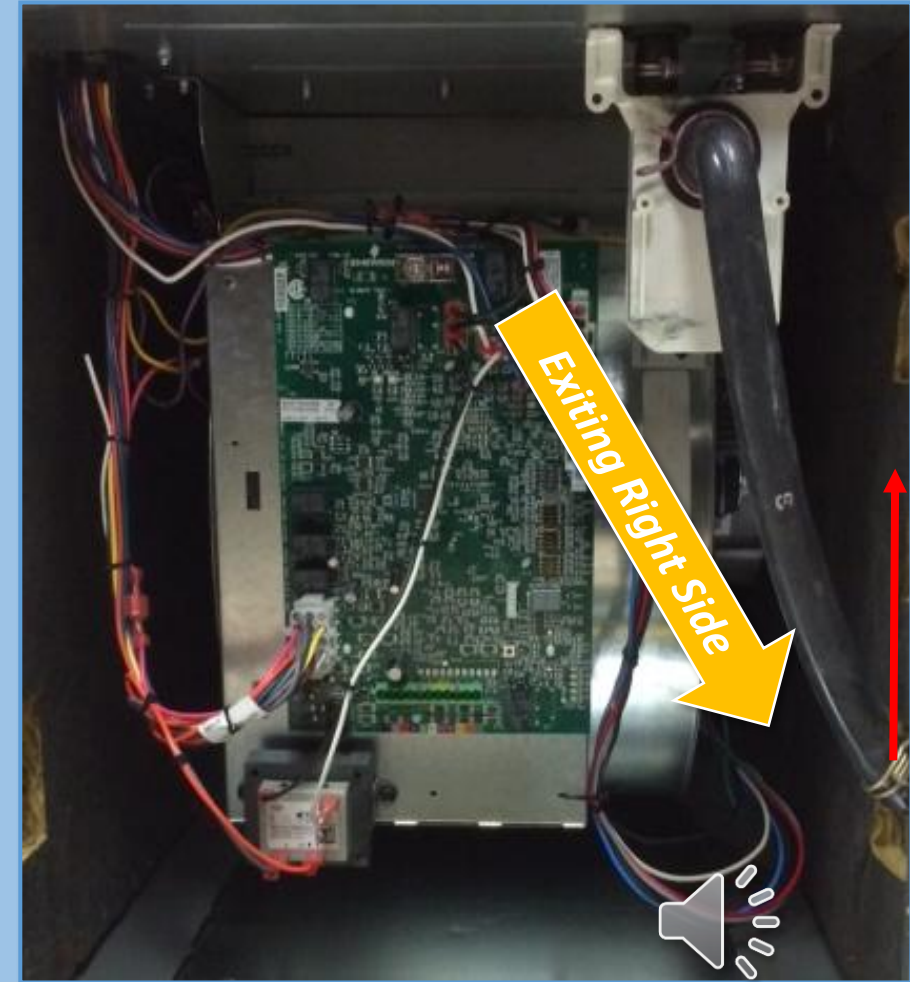
Drain Trap Installed in Vertical Upflow Furnace

- Drain Exiting Left Side



The drain hose from the trap to the exit of the furnace can be moved up to accommodate the height of the condensate pump but enough pitch needs to be left to allow for the condensate to drain

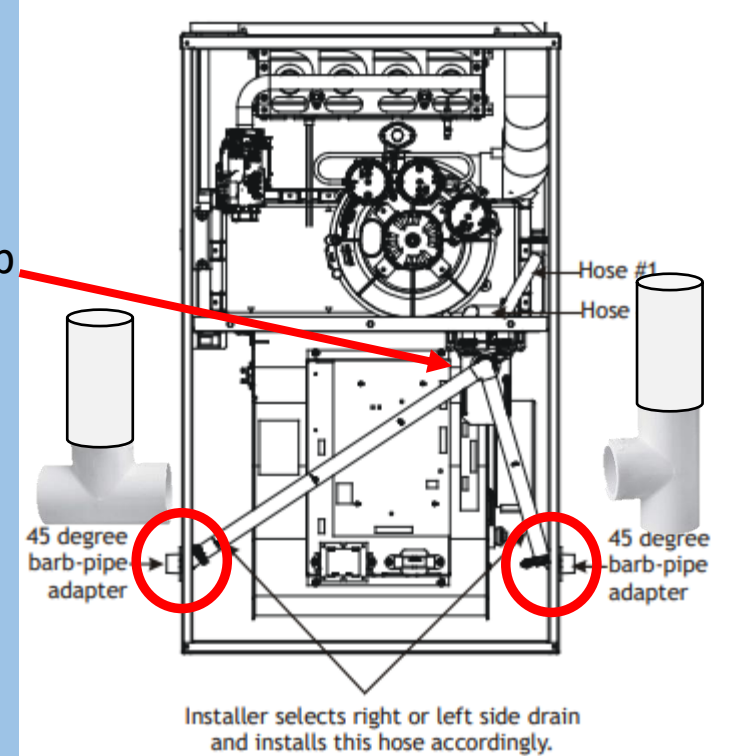
- Drain Exiting Right Side



Install a PVC tee on the 45-degree barb-pipe adaptor with a 1" to 2" standpipe to prevent vacuum lock on the drain trap

The PVC tee can be installed either of the ways show in the picture to the right

Drain Trap

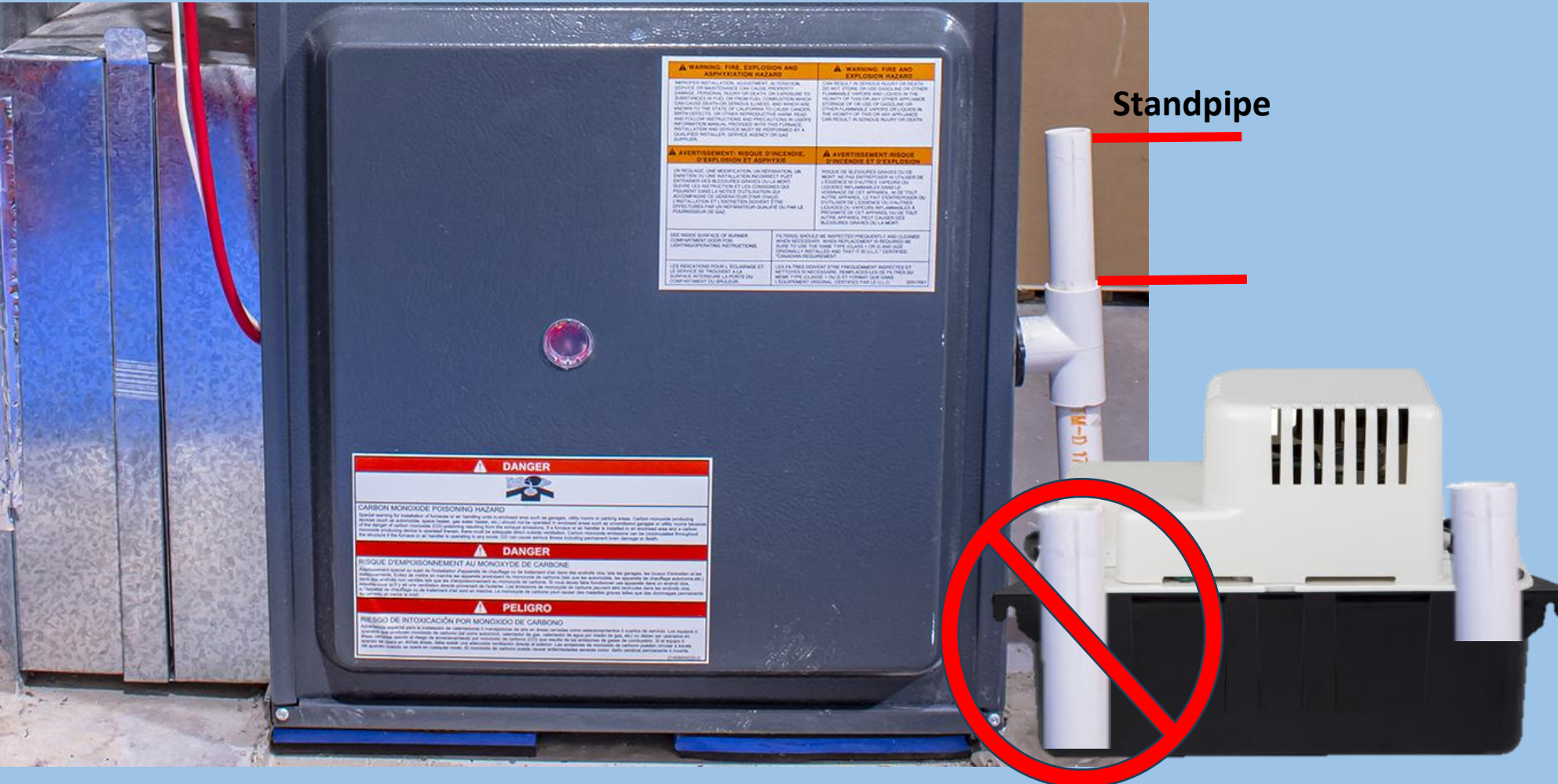


Standpipe

45 Degree Barb Adaptor



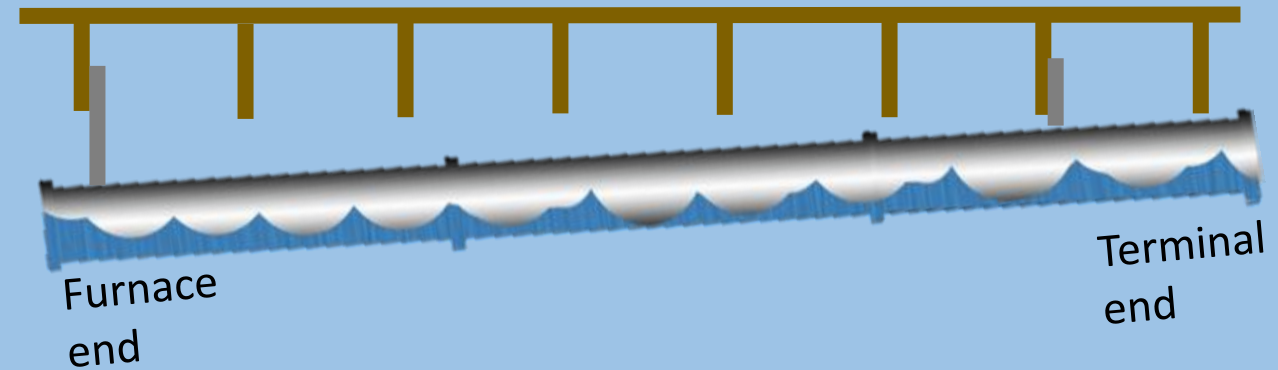
The drainpipe does not need to be inserted more than $\frac{3}{4}$ " into the pump tank. This is enough to keep water from spilling out onto the floor



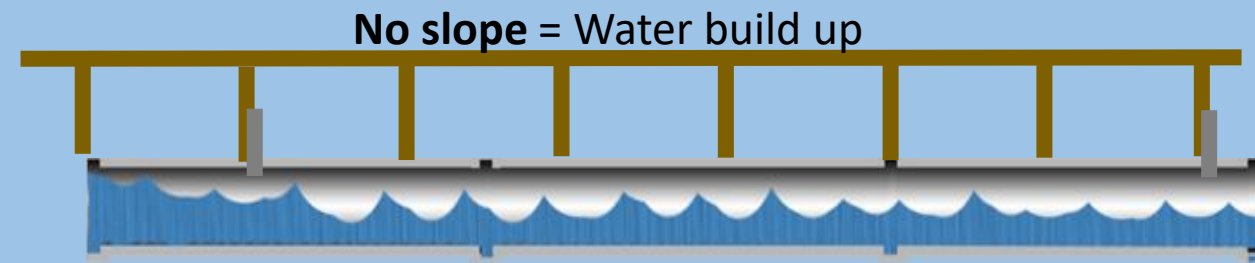
Vent Draining

The most important rule of vent draining is the vent pipe must have a pitch of $\frac{1}{4}$ " per linear foot of pipe sloped back toward the Furnace

A 20' linear run at $\frac{1}{4}$ " of slope per linear foot of pipe would require the furnace end to be 5" lower than the terminal end



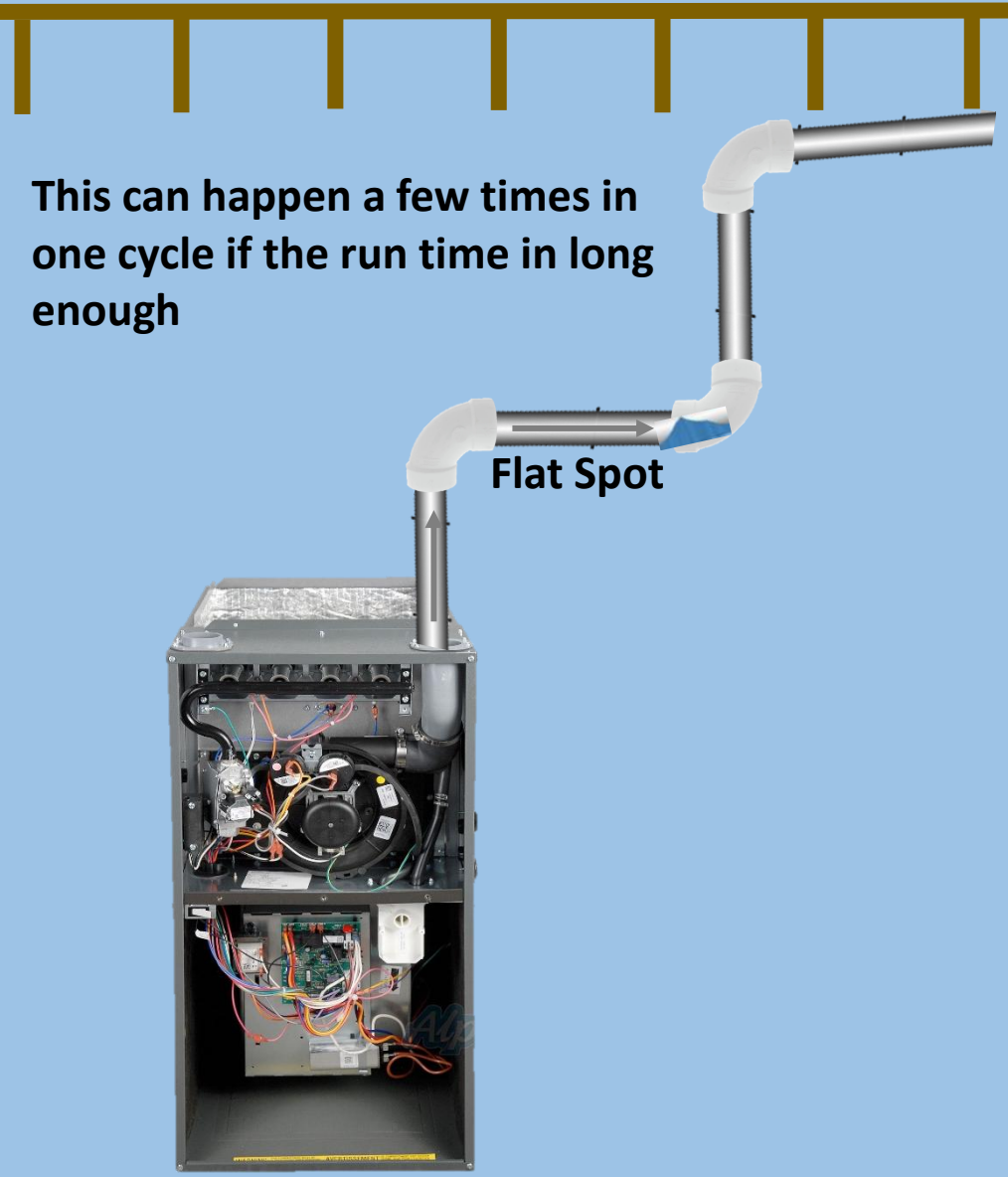
No Slope in the vent pipe will cause water to build up in the pipe. This causes a restriction in the flow of the vent gasses and will lead to pressure switch issues causing the unit to shutdown



Sagging in the vent pipe will cause water to build up in the pipe. This causes a restriction in the flow of the vent gasses and will lead to pressure switch issues causing the unit to shutdown



Vent Draining



This can happen a few times in one cycle if the run time is long enough

Flat Spot

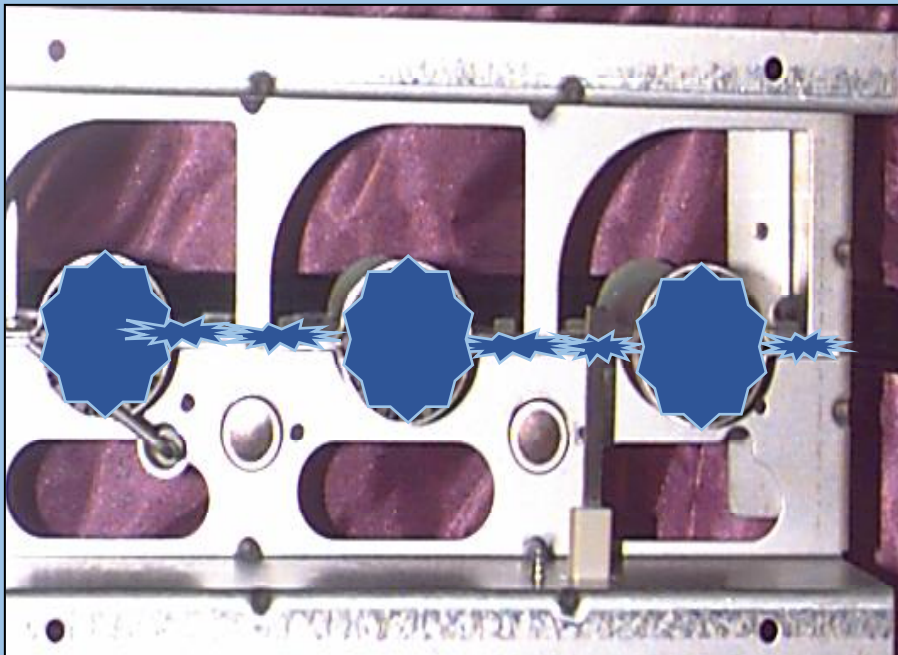
This is a positive pressure vent and there can be no flat spots.

If there is a flat spot, the positive pressure from the vent motor will push against the water and hold it until the weight of the water is too heavy for the pressure to hold



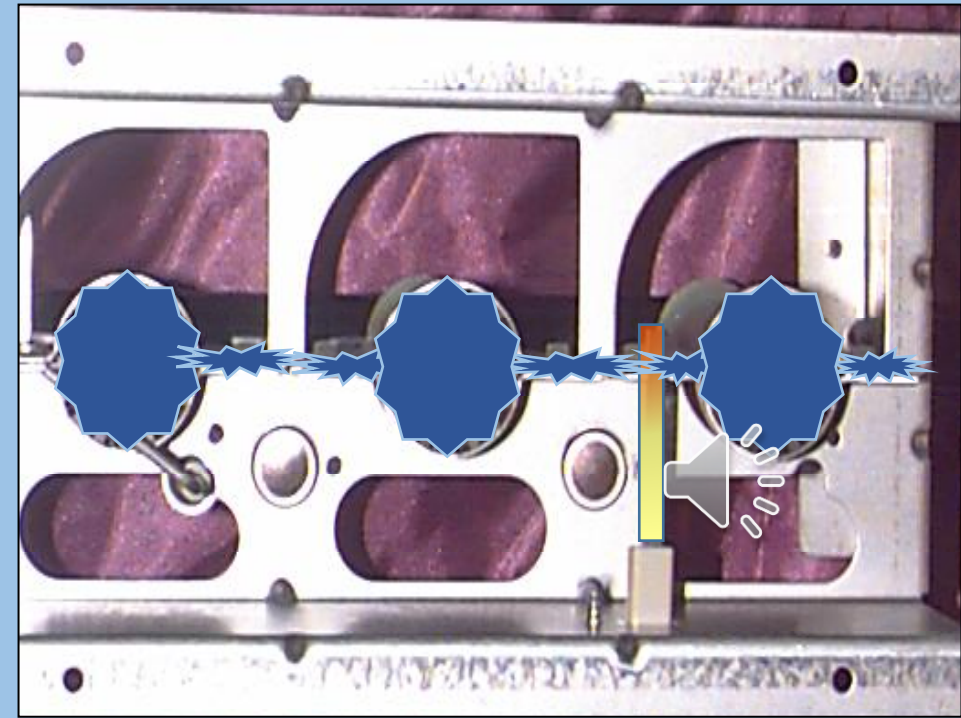
Vent Draining

This causes the water to collapse and a momentary pressure flutter that knocks the burner flames out



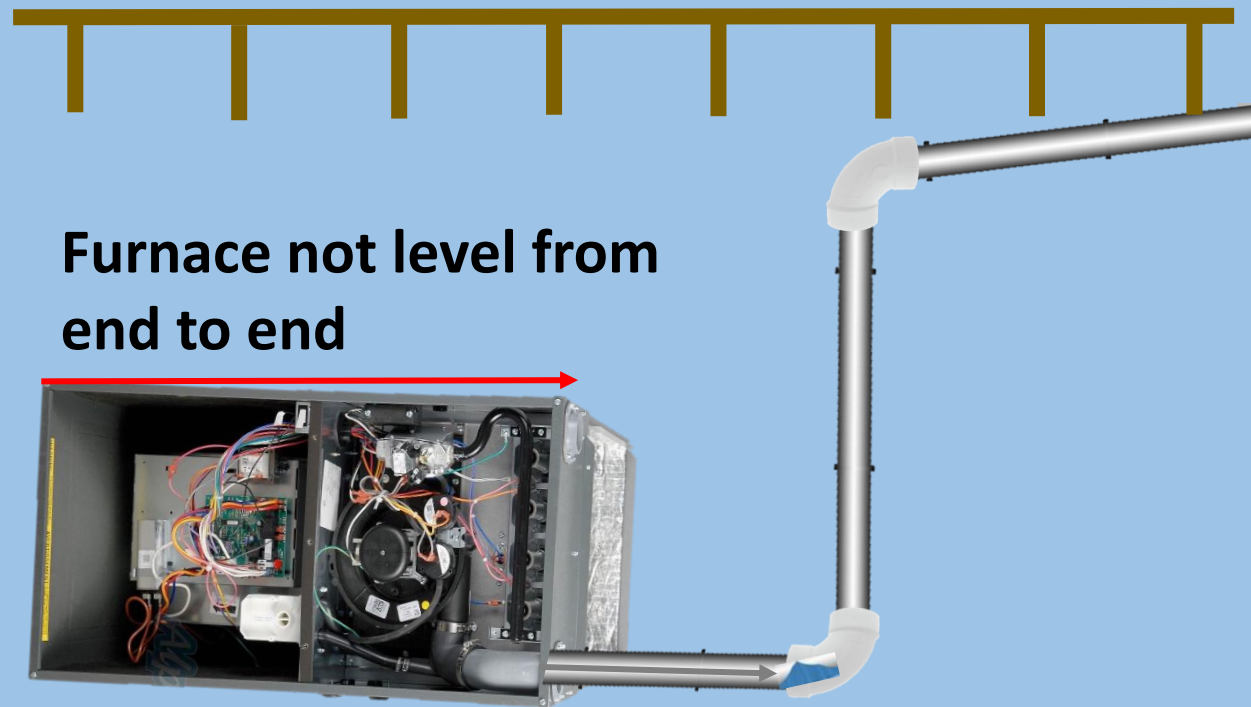
Vent Draining

and causes the furnace to recycle

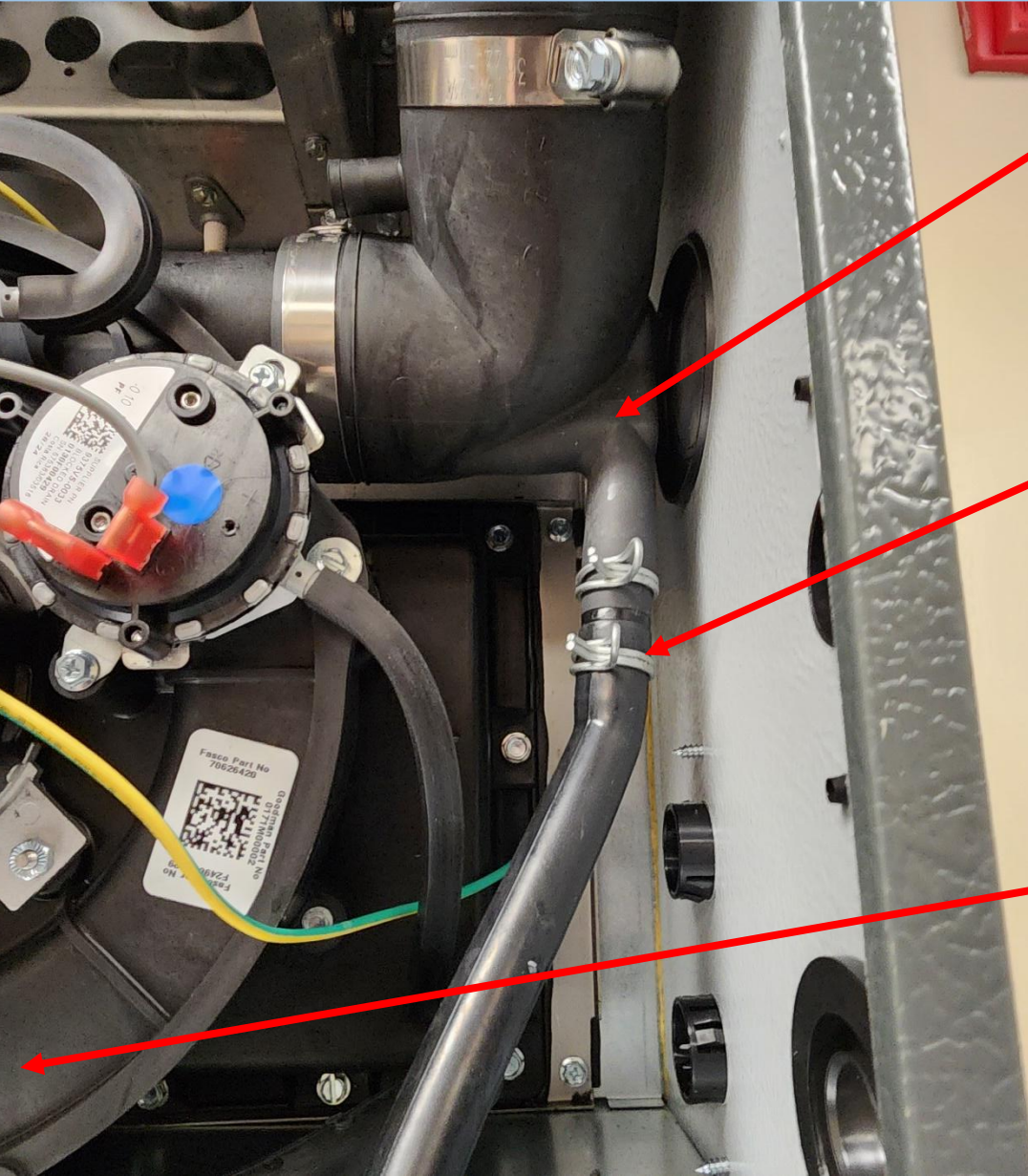


Vent Draining

Because the furnace is pitched downward towards the vent, there is going to be issues with the furnace running and water getting back to the drain



The Drain Elbow on the Vent

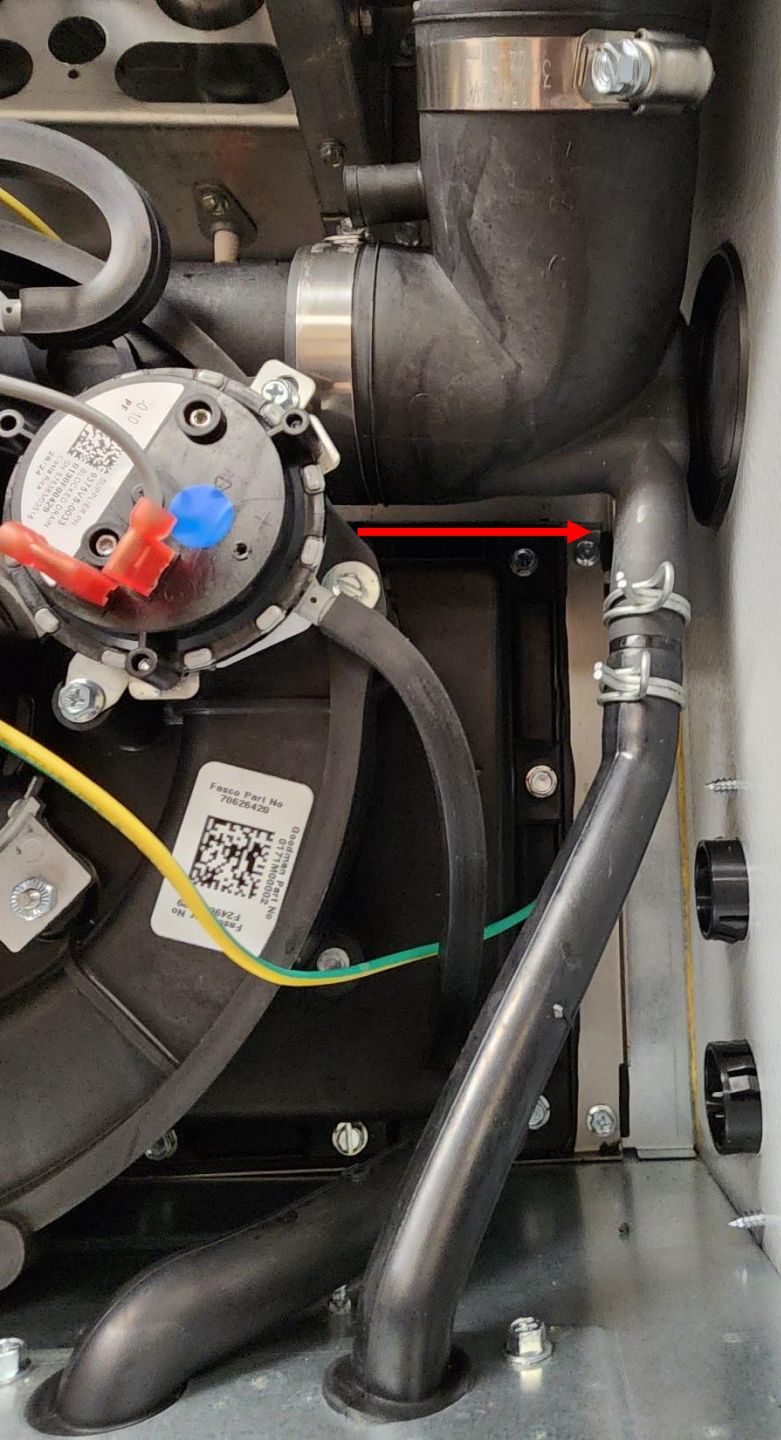


1. Is there PVC shavings, dirt, etc. plugging the entrance to the drain in the elbow.

Disconnect this hose and insert a screwdriver or anything that will fit into the drain elbow, wiggle it around and see if water and/or PVC shavings come out

If you are getting water in the inducer housing, it can be only two things:



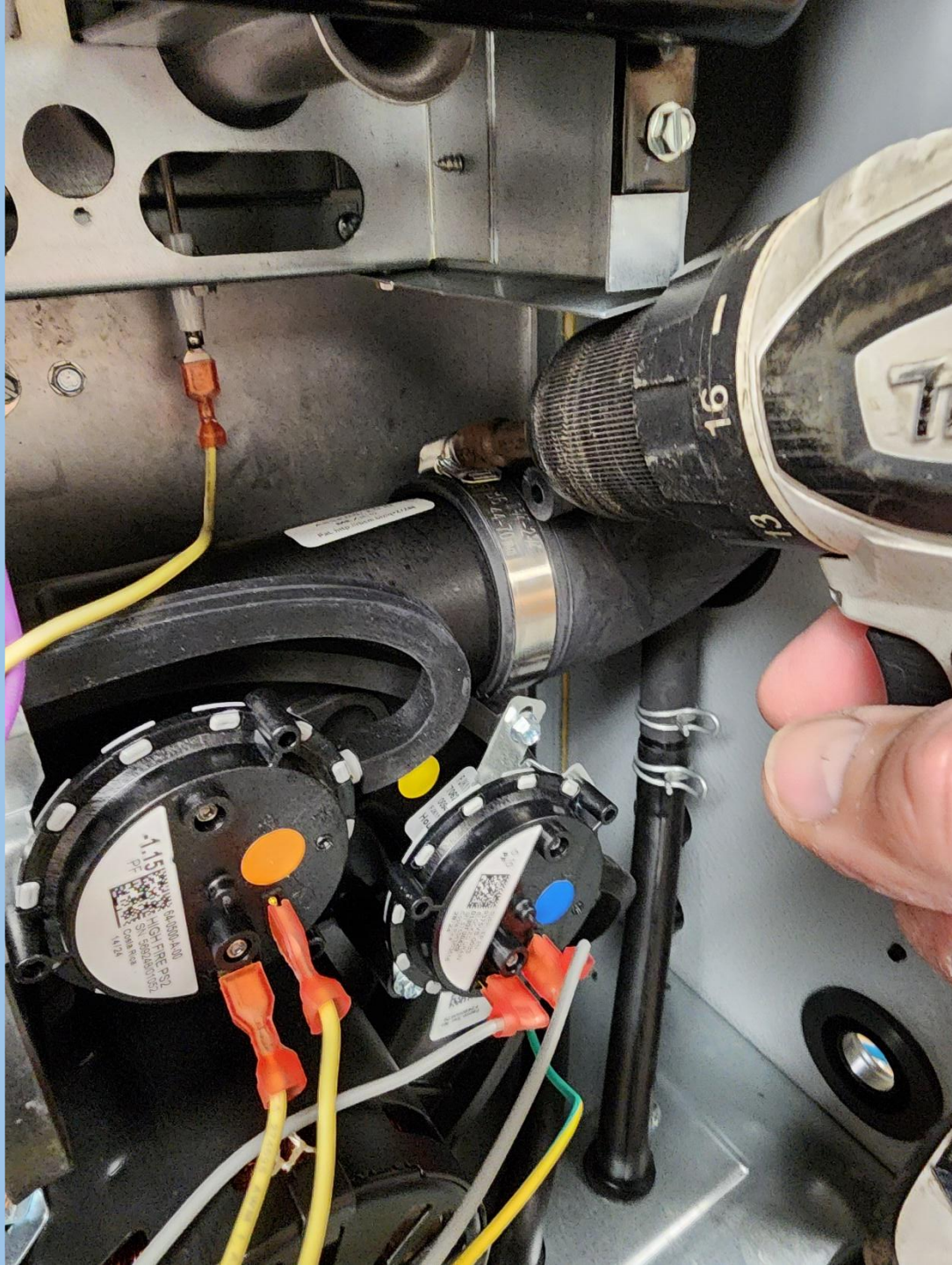


If the vent elbow drain is not plugged, you will need to lower the drain elbow like the one on the right to get the water flowing into the drain

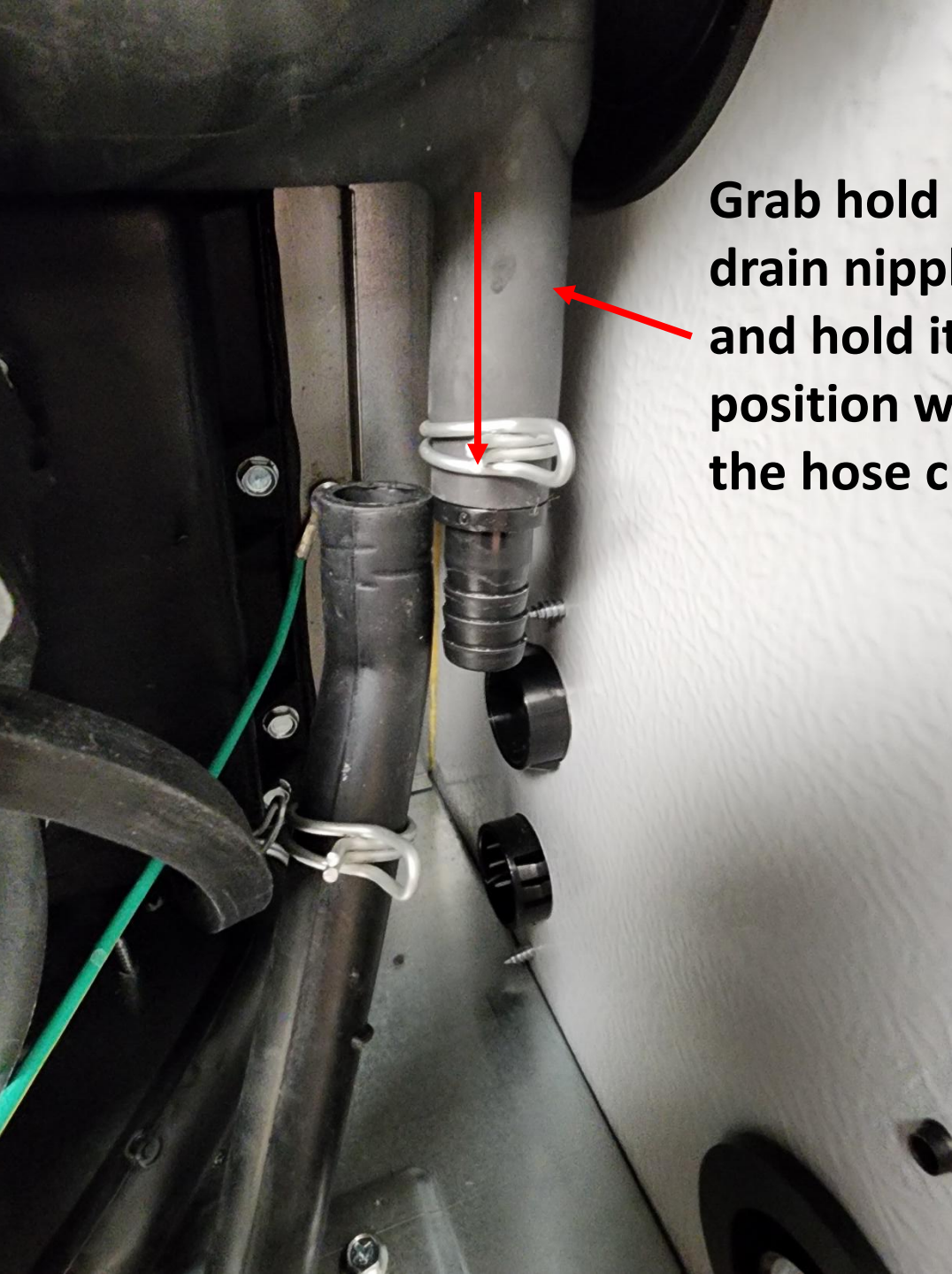
Some elbows have been factory installed too far up on the vent pipe, making the drain port higher and allowing condensate to enter the inducer.

Notice the elbow on the left has no pitch to it while the one on the right slopes towards the drain

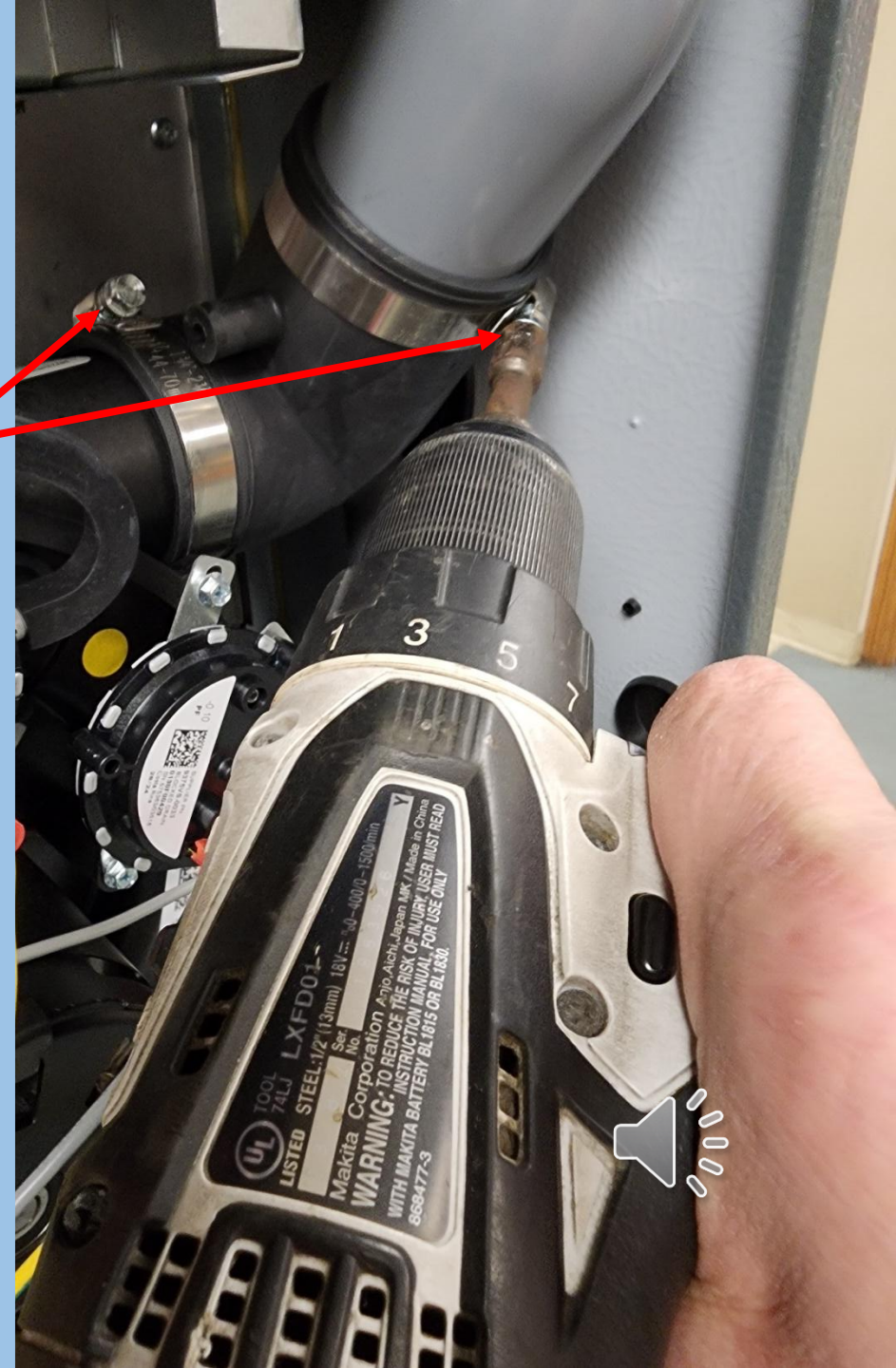








Grab hold of the vent elbow drain nipple, pull down on it and hold it in this new position while you retighten the hose clamps



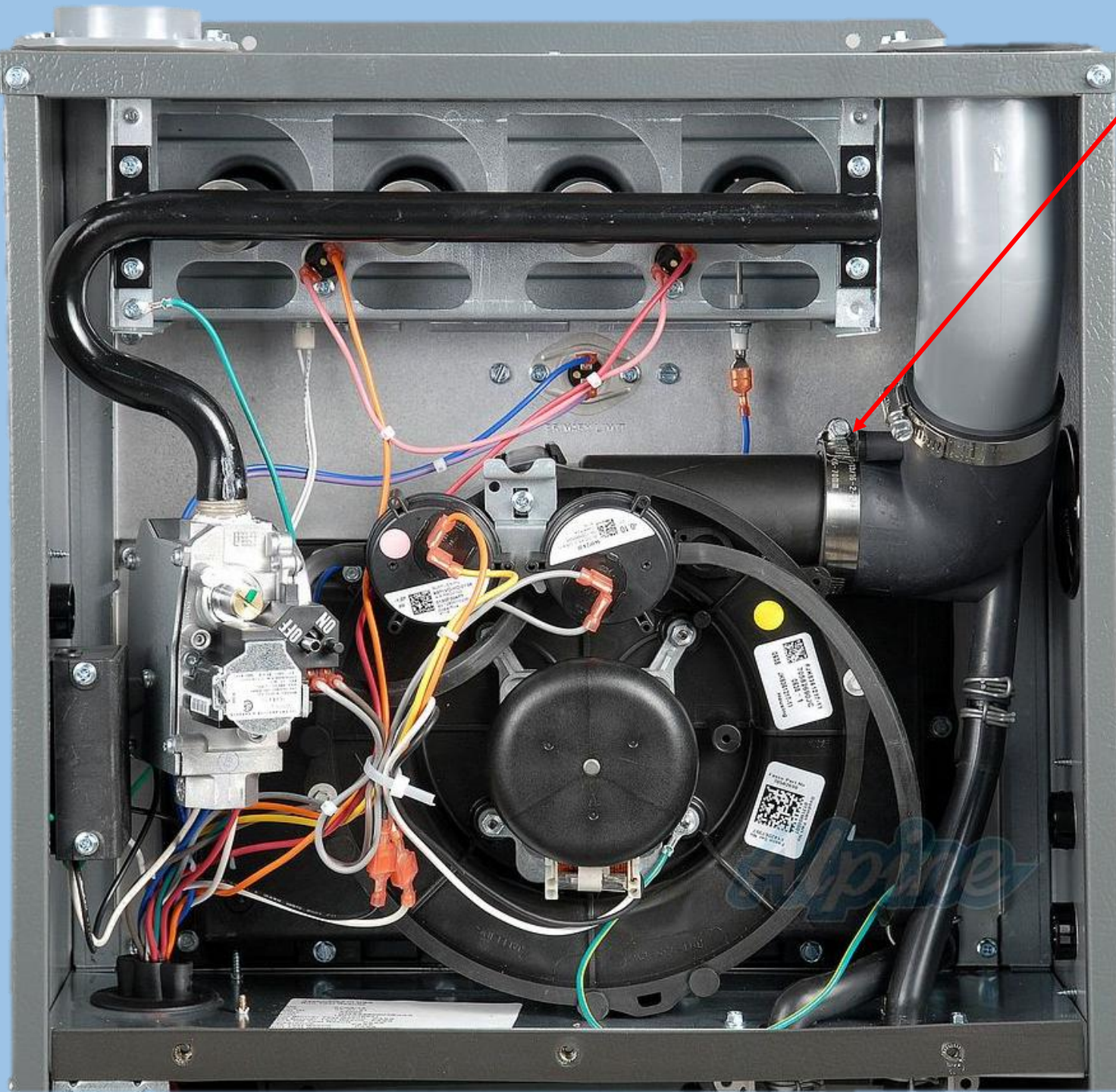


You know you have pulled it down some if the drain stem and the hose to the trap now look like the picture on the right



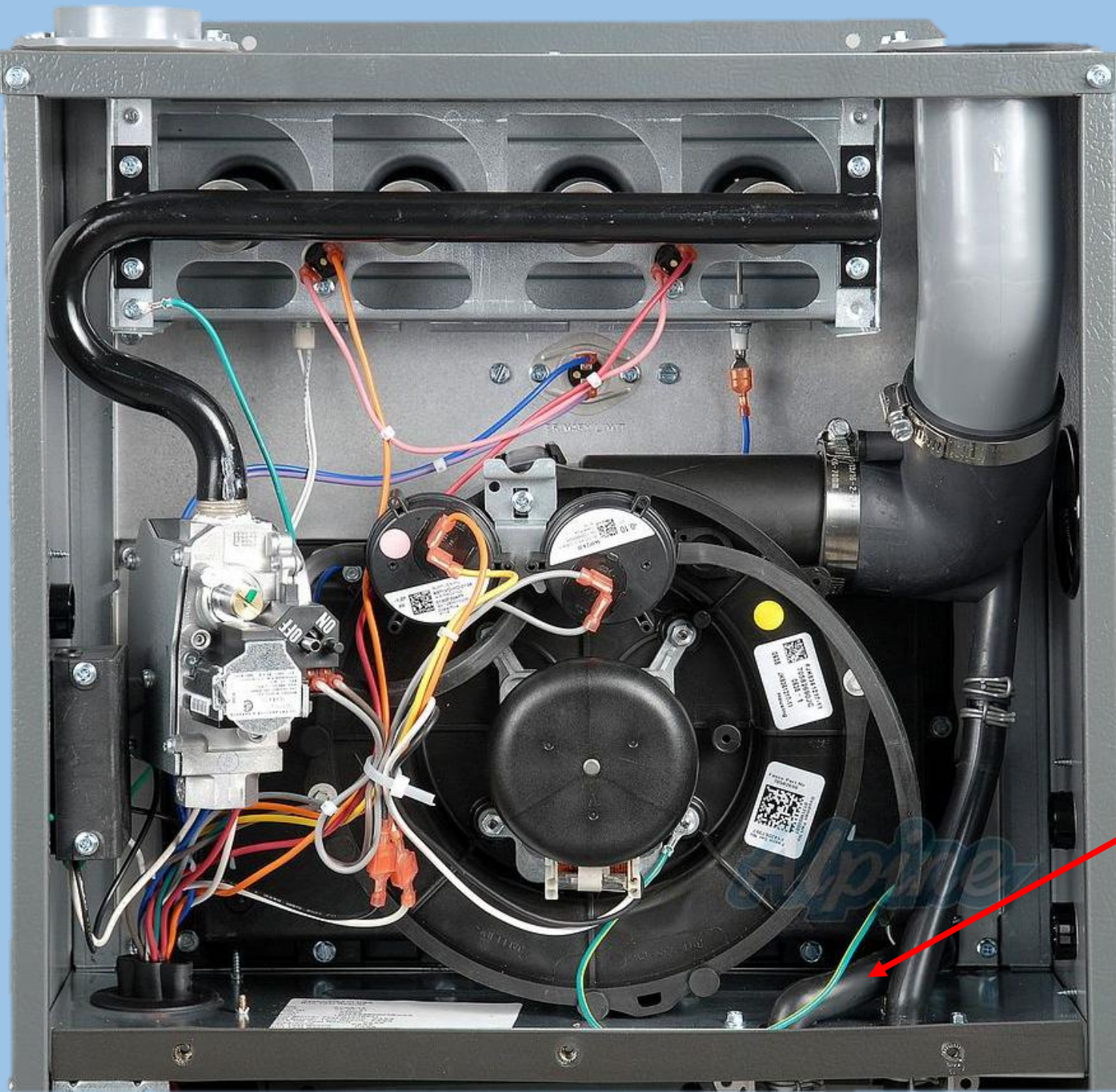
**Cut the excess tubing
and reconnect the
drain.**





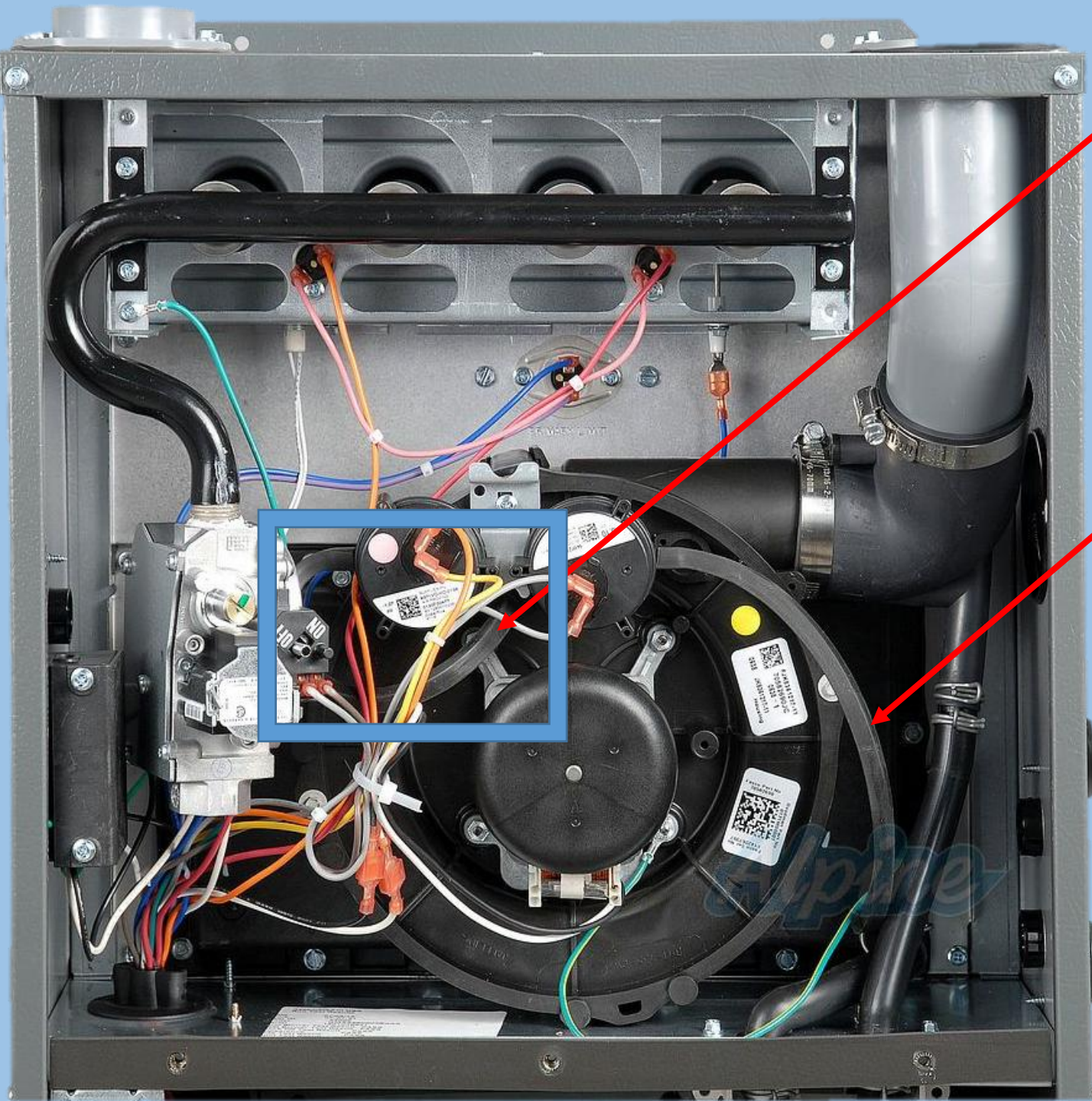
Clamp on the inducer side of the upflow models (upflow installation) should have the clamp screw on the top of the elbow, not the bottom.





Make sure this hose maintains a downward pitch from the front cover drain exit toward the trap. Sometimes the hose is a little long, causing the hose to bow up and slow the drain down





Make sure all vacuum hoses are not sagging like the one in this picture. Reroute and/or trim the vacuum hoses, if necessary, so there is no possibility of moisture building up in them.

Notice how the front cover pressure switch hose is trimmed so that from the pressure switch to the front cover there is a continuous downward slope so even if some water vapor gets in the tube on the off cycle, when it condenses, it will drain out



You Tube



Like

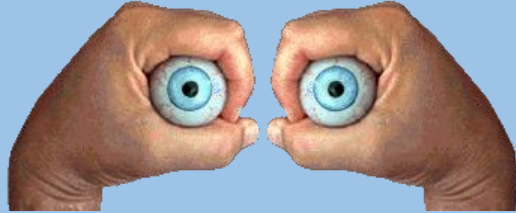
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