

# LEAK TEST PROCEDURE

POWER TILT [PT] MODEL LIFTERS WITH AIR POWER SYSTEMS



***TESTING AND MAINTENANCE MUST BE  
DONE BY A QUALIFIED PERSON***

**KEEP FOR FUTURE REFERENCE**



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# SYMPTOMS OF VACUUM LEAK

A severe leak is evidenced by a lifter's inability to draw full vacuum while attached to a clean, smooth, nonporous surface. In such cases, the vacuum level shown on the vacuum gauges will be less than 16" Hg [-54 kPa], the red zone of the vacuum gauge.

A moderate leak is indicated if the lifter loses more than 4" Hg [-13.5 kPa] in 5 minutes during a vacuum test when the power is off. This amount of lost air is serious enough to warrant repairing the lifter's vacuum system.

## DETERMINING LEAK EXISTENCE

To determine if lifter has a vacuum leak, perform the Vacuum Test as described in the Maintenance section of lifter's instruction manual.

During vacuum test it is recommended that you take notes on amount of air lost in time increments (i.e. "Lost 5" Hg [-17 kPa] in 5 minutes"). This assists in diagnosing the location of the leak because there may be more than one component leaking vacuum. For example, if an isolated section tests positive for a leak but the leak rate is less than that of the whole lifter, then there is still one or more vacuum leak elsewhere in the system.

## ADDRESSING LEAK

If the leak is sufficient to warrant repair:

Locate the cause of leak beginning by inspecting the vacuum pads, fittings and hoses of the entire vacuum system. Look for contamination, cuts or abrasions on pad faces, cracks in the pad suction stem, cracks, abrasions or cuts in hoses, damaged fittings and loose hoses at connection points. If leak is severe, the cause is often a visibly damaged part.

**Caution:** Do not apply soapy water to fittings or vacuum hoses in an attempt to find leaks, since it will only be drawn inside the vacuum system.

If the leak's source is not immediately evident, the various sections of the entire vacuum system must be systematically isolated and tested to determine the leakage point. The process to accomplish this is described in the tests to follow.

Note: The information gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools used are capable of completely sealing the isolated parts of the vacuum system when tested.

Recommended tools<sup>1</sup>: Plugs for hoses and fittings, ball valve with vacuum gauge attached, appropriate hose adapters and extra vacuum hose.<sup>2</sup>

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<sup>1</sup> If needed, test equipment is available from Wood's Powr-Grip. Contact us for additional information.

<sup>2</sup> Procedure assumes operator has access to appropriate tools

## BASIC REPAIR TIPS

- 1) When removing a hose from a barbed fitting, avoid damaging the barbs of the fitting to which the hose is attached. Cuts or nicks in fitting barbs can create a leak that did not previously exist.
- 2) If a hose is removed from a barbed fitting, cut approximately 1/8" to 1/4" [3 to 6 mm] off the end of the hose before reinstalling it on the fitting, in order to remove damaged hose ends.

Note: In release mode, the vacuum system of this lifter provides quick release using a “blow off” feature, where air is pumped into the pad system for faster load release. When testing for leaks, it is often necessary to seal off the system by capping off, plugging fittings and lines, or closing all pad shut-offs. Due to this, the **use of the release function is not recommended during the repair process**. Release mode will cause pressure to build in the sealed off section and may damage components.

- 3) To release the lifter when testing with capped or closed off sections: Remove or open the item used to close off the vacuum system. **Do not use the lifter’s release mode.**

# PRELIMINARY TEST

*Note: The following assumes operator has access to suitable plugs to seal off the section being tested.*

This test determines whether leakage is located in the vacuum generating system or the pad system.

- 1) Remove the hose from the vacuum filter that attaches to the vacuum pad system. Using a cap plug (1A) cap off the fitting of the vacuum filter as shown in **FIGURE 1**.

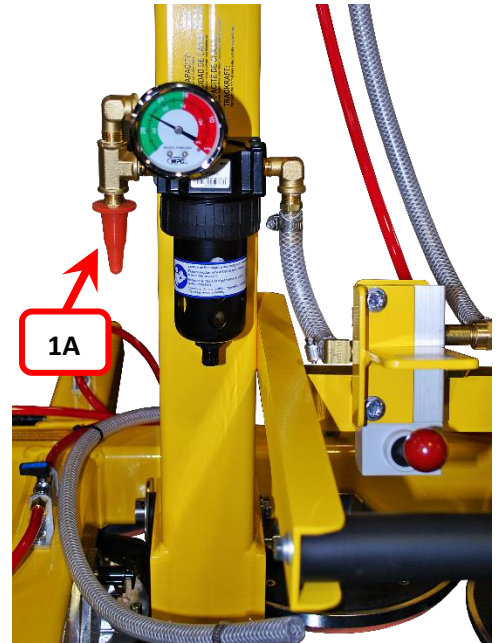
Note: The size plug needed may vary with lifter model.

- 2) Repeat the vacuum test with the filter capped-off.
  - If the vacuum level of the lifter's vacuum gauge holds steady and does not drop, this indicates that the leak is located in the vacuum pad system between the filter and vacuum pads.

## **Proceed to Pad System Tests.**

- If the vacuum level of the lifter's vacuum gauge starts and continues to drop, this indicates that the leak is located in the vacuum generating system.

## **Proceed to Vacuum Generating System Test.**



**FIGURE 1**

# VACUUM GENERATING SYSTEM TEST

*Note: The following assumes operator has access to suitable plugs, a ball valve with vacuum gauge, and additional hose and adapter fittings for connecting the ball valve to the lifter's vacuum lines and fittings.*

The most likely leak points in the vacuum generating system are the check valve, the filter, or the control valve. Leave the filter disconnected (capped-off) from the pad system and test:

- 1) Isolate the check valve from the system.

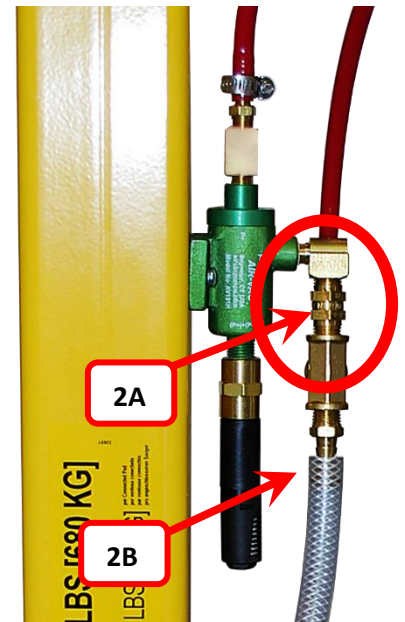
The check valve (2A) is attached to the venturi assembly.

See **FIGURE 2**.

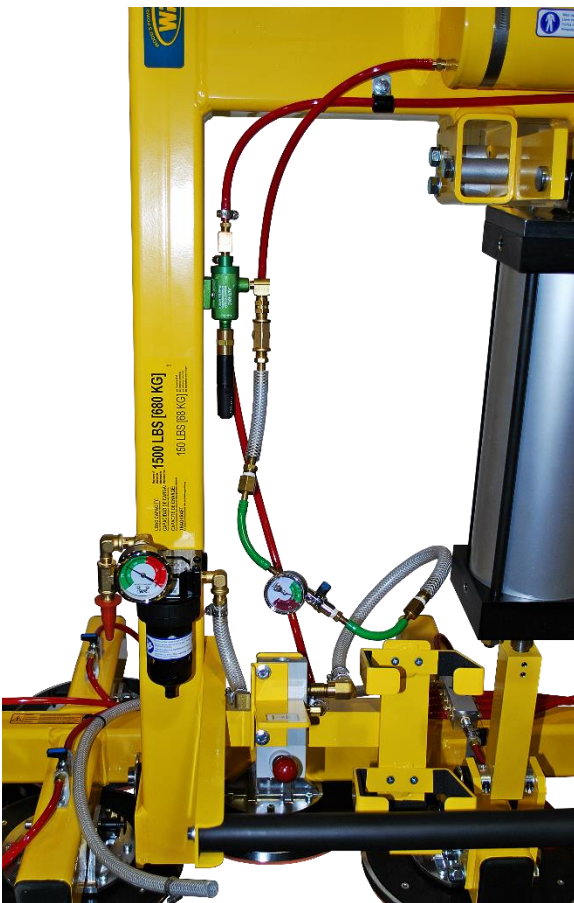
- 2) Remove the hose (2B) from the venturi assembly connected to the fitting with the check valve.

Using the ball with vacuum gauge and appropriate hose adapters, attach the ball valve (end with vacuum gauge attached) to the fitting where the hose was removed. Attach the other end of the ball valve to the hose that was removed from the fitting.

See **FIGURE 3**.



**FIGURE 2**



**FIGURE 3**

- 3) With ball valve in the open position (handle in-line with valve), apply vacuum. When a sufficient level of vacuum is reached, close the ball valve (turn handle perpendicular to the valve) and close the air supply valve to the venture air pump.
- 4) Observe both the lifter's and ball valve's vacuum gauges:
  - If the vacuum level of the lifter's vacuum gauge starts and continues to drop, a leak is located in either the vacuum filter or control valve assembly. **Proceed to step 5.**
  - If the vacuum level of the ball valve's vacuum gauge starts and continues to drop, or if both the vacuum gauges hold steady and do not drop, this indicates that the check valve leaks.

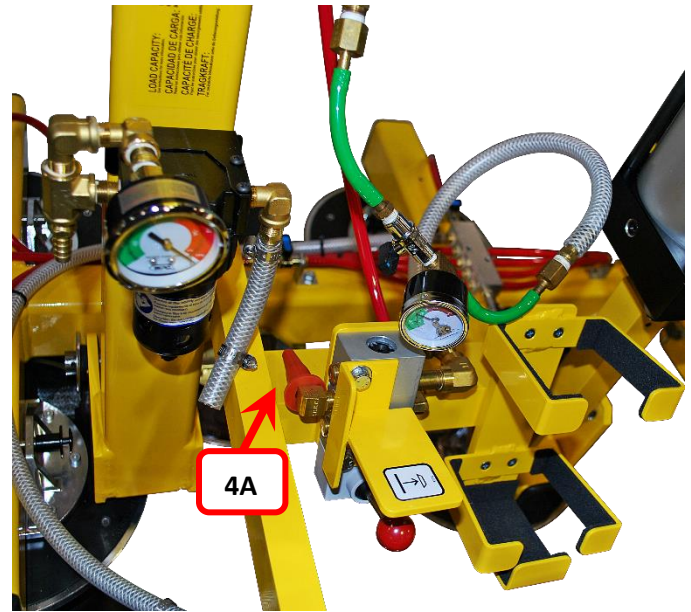
Note: The check valve may leak intermittently, so if both vacuum gauges hold steady and do not drop, the check valve is indicated as the cause.

- If the ball valve's vacuum gauge did drop and indicates a leak: Check the attached fittings and line connecting to the vacuum tank for loose connections or indication of damage or cracks to the fittings or lines. If there is no visible damage or neither vacuum gauge indicates a leak during the test, replace the check valve.

- If the vacuum level of **both** the lifter and ball valve's vacuum gauges start and continue to drop: The check valve leaks and needs to be replaced **and** there is a leak located in either the filter or control valve assembly.

First, replace the check valve then **proceed to step 5**.

- 5) If it is determined that a leak exists in either the filter or control valve assembly: Remove the ball valve from the hose and reinstall it so that the vacuum gauge is now in the line connected to the control valve.
- 6) Remove the hose that connects the control valve to the vacuum filter and cap off the fitting (4A). See **FIGURE 4**.
- 7) With the ball valve in the open position (handle in-line with the valve), apply vacuum. When a sufficient level of vacuum is reached, close the ball valve (turn handle perpendicular to the valve) and close the air supply valve to the venturi pump.
- 8) Observe the ball valve's vacuum gauge:



**FIGURE 4**

- If the vacuum level of the ball valve's vacuum gauge starts and continues to drop: The control valve assembly is the source of the leak.

Examine the hose connection to the control valve and the fittings for any indications of loose connections, cracks or damage. If there is no visible damage, replace the control valve.

- If the vacuum level of the ball valve's vacuum gauge holds steady and does not drop: The vacuum filter is the cause.

**Proceed to step 9.**



9) To individually test the filter, leave the ball valve connected to the venturi pump. Connect the end of the ball valve connected to the control valve directly to the hose of the vacuum filter assembly.

Cap off the fitting of the filter that was connected to the vacuum pads if it is not capped-off. See **FIGURE 5**.

10) Move the handle of the control valve to the apply position and open the air supply valve.

11) When a sufficient level of vacuum is reached, close the ball valve and the air supply valve.

12) Observe the lifter's vacuum gauge:

- Based on the previous tests it is expected that the vacuum level of the lifter's vacuum gauge will start and continue to drop, verifying that the vacuum filter assembly does leak.
- If confirmed, examine the hose connection to the vacuum filter and the fittings for any indications of loose connections, cracks or damage.
- The twist drain plug located at the base of the filter bowl should never be used when the filter is used on a vacuum system.
- Verify that the drain plug is tight and has not been used. If the twist drain has been used it will need to be removed and cleaned before reinstalling.
  - Remove the filter bowl from the filter and remove the plastic nut that attaches the drain plug to the filter bowl.
  - Remove the drain plug and the O-ring located in the bottom of the filter bowl.
  - Clean out the bottom of the filter bowl where the O-ring is located.
  - Clean the O-ring and apply a light film of rubber compatible grease.
  - Reinstall the drain plug and secure it with the retaining nut.

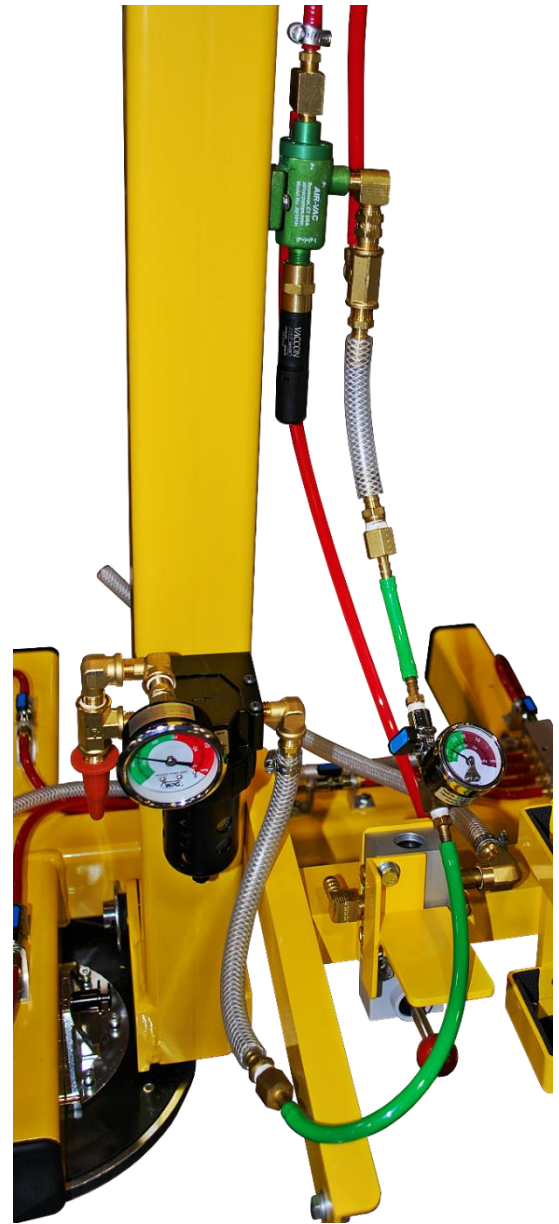
Note: Do not over-tighten the retaining nut; this is a plastic nut and part. It is the O-ring that creates the seal to the bowl.

Service the filter according to the lifter's maintenance instructions, giving particular attention to the O-ring located between the filter bowl and body.

Re-test the filter assembly.

If the leak continues, replace the filter.

Repair or replace any parts identified to leak and repeat the Preliminary Test.



**FIGURE 5**

Once the vacuum generating system is confirmed to hold (no significant leaks noted per the vacuum readings), re-connect the pad system, proceed to system confirmation and retest the vacuum system as described.

## PAD SYSTEM TESTS

*Note: The following assumes operator has access to suitable plugs, a ball valve with vacuum gauge, and additional hose and adapter fittings for connecting the ball valve to the lifter's vacuum lines and fittings.*

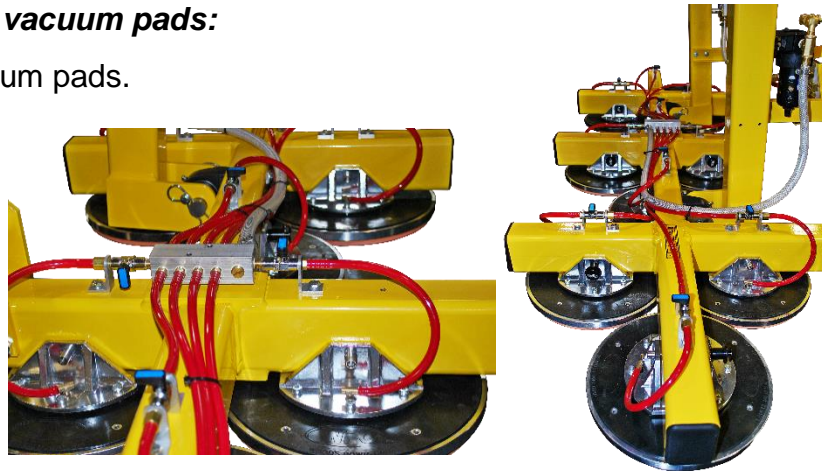
If it was determined that the vacuum generating system does not leak, or if any existing leaks in the vacuum generating system have been repaired, proceed with the following:

Isolate the vacuum pads, fittings and vacuum line sections until the leak point can be located:

### **Lifter models with shut-off valves on all vacuum pads:**

- 1) Close the shut-off valve to all the vacuum pads.

Two shut-off valves are attached to the central manifold and the remaining shut-off valves are located in the pad lines to the individual vacuum pads. (See **FIGURE 6**.)



**FIGURE 6**

- 2) Repeat the vacuum test.

- If the vacuum level of the lifter's vacuum gauge holds steady and does not drop: The vacuum pad system does not leak between the vacuum filter and the shut-off valves.

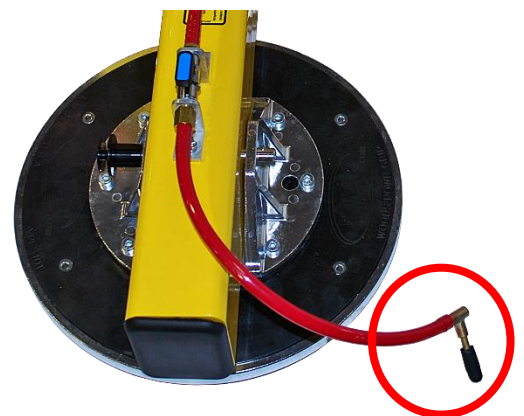
### **Proceed to step 3.**

- If the vacuum level of the ball valve's vacuum gauge starts and continues to drop: A leak does exist between the vacuum filter and the shut-off valves.
  - Examine the hoses, hose connections and fittings for any indication of loose connections, cuts or abrasions, cracked or damaged fittings. If there is no visible damage, use the ball valve with gauge and/or cap plugs to cap off individual fittings and lines to determine where the leak is.

See **step 6** for more information on this process.

### **For lifter models without shut-off valves or if it was determined that there is no leak up to the shut-off valves:**

- 3) Remove the pad fitting from each of the vacuum pads. Cap off the pad fittings. See circled detail in **FIGURE 7**.
- 4) Open the air supply valve and apply the lifter.



**FIGURE 7**

5) Observe the vacuum gauge.

- If the vacuum level of the lifter's vacuum gauge holds steady and does not drop: The leak is located in one or more of the vacuum pads.

Re-attach one pad at a time to determine which vacuum pads are leaking. Repair or replace as needed.

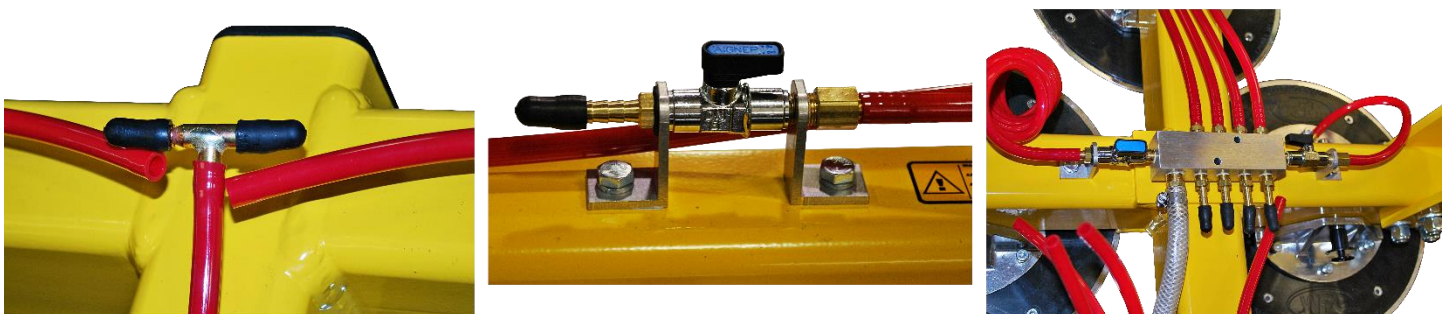
- If the vacuum level of the lifter's vacuum gauge starts and continues to drop: Either a leak exists between the pad fittings and the filter **or** if the lifter has shut-off valves to all the pads and **step 2** determined that the lifter does not leak up to the shut-off valves, then the leak is located between the pad fittings and the shut-off valves.

**Proceed to step 6.**

6) The ball valve with gauge and/or cap plugs can be used to test individual lines, sections, fittings or parts.

In **FIGURE 8**, caps are used to cap individual sections where, in the first two views, a tee fitting and a shut-off valve are shown capped-off. Vacuum is then applied so the line up to the capped off section will be tested. If the leak is no longer present, it indicates that the leak is in the section past the capped-off part **or**, if the leak continues, that the leak is between the capped-off part and the filter.

In the right view, caps were used to seal off four pad lines at the manifold.



**FIGURE 8**

7) Check individual fittings and parts by attaching the ball valve to any active vacuum line (see **FIGURE 9**, where a tee fitting has been removed from its line and attached directly to the ball valve.) After vacuum is applied, the ball valve is closed so the only part being tested is the tee fitting itself. A drop in vacuum on the ball valve's vacuum gauge indicates that the tee fitting leaks. If the vacuum level holds steady and does not drop the tee fitting does not leak.

**This process can be used to test any individual part, assembly, or section.**



**FIGURE 9**

Once all leaks have been identified and repaired, proceed to System Confirmation and retest the vacuum system.

# SYSTEM CONFIRMATION

Once all leaks have been identified and repaired, reassemble all parts of the lifter.

A vacuum test, as described in the instruction manual, should be performed following any repair or service to a vacuum lifter.

Note: If system is equipped with shut-offs or quick connects, a vacuum test should be performed with these parts in every manner of use (i.e. shut-off valves should be tested in both the open and closed position, quick connect valves should be tested both when connected and disconnected).

All parts must be verified in relation to their function and the lifter must pass all vacuum tests before returning to operation.

# **DIAGNOSTICS**

## **VENTURI AIR POWERED PUMP DIAGNOSIS:**

A problem with the venturi air pump is indicated when the lifter cannot attain sufficient vacuum (>16" Hg [54 kPa]) but does not leak when a vacuum test is performed.

### **Requirements:**

The power requirements of the venturi is designated by a pressure rating (in psi or kPa) and a flow rating (in SCFM or liters/minute). This information is located on the serial number label and in the specifications of the lifter's instruction manual.

Verify that compressor can provide a continuous flow at the required pressure.

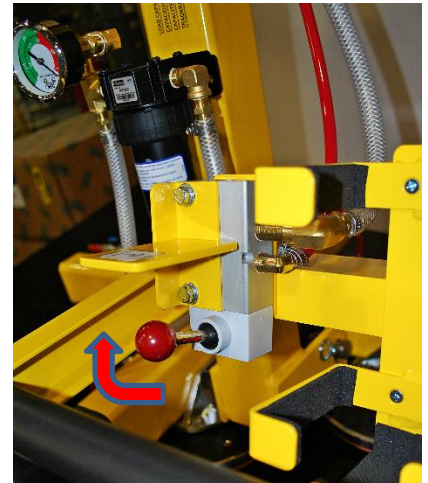
Note: Compressor must be of a capacity that will provide the required air flow and pressure to the lifter even if there are other demands on the compressor (e.g. if there are other demands for compressed air, the compressor must be of a size that can meet those demands and still supply the lifter's power requirement).

### **Setting the pressure:**

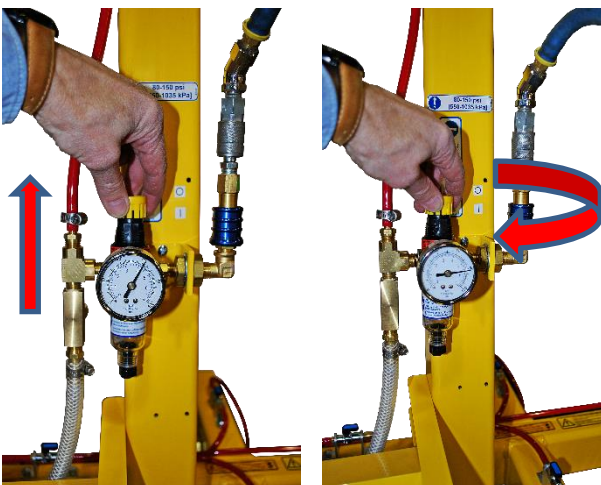
Attach the airline to the air pressure regulator of the lifter.

Open the air supply valve. Note: The type valve may vary with lifter model and age.

Place the control valve in the APPLY position: Pull up on the control valve lever and move it forward, to the APPLY position (see **FIGURE 10**). Verify that the regulator pressure is set to a minimum of 80 psi when running (80 to 90 psi typical operating pressure). If lower than 80 psi, increase the pressure to the lifter.



**FIGURE 10**



**FIGURE 11**

To set the regulator: Pull up on the yellow locking cap of the regulator and turn clockwise to increase the pressure reading on the gauge. (See **FIGURE 11**.)

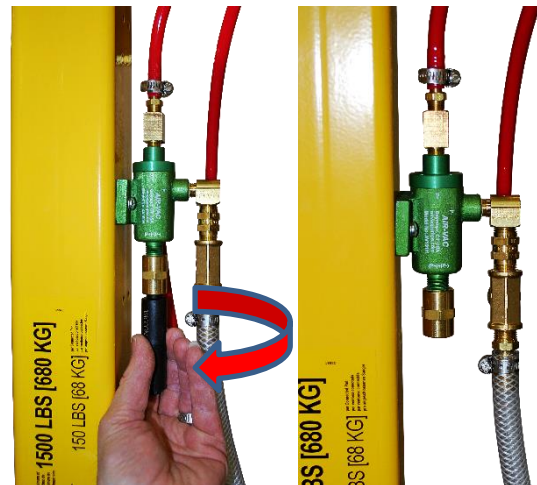
Perform a vacuum test.

If the vacuum level still does not reach a sufficient level (>16" Hg. [54 kPa]) remove the muffler (unscrew counter-clockwise) from the venturi assembly to determine if a restriction exists. (See **FIGURE 12**.)

Repeat the vacuum test.

If the lifter does pull sufficient vacuum (> 16" Hg. [54 kPa]) replace the muffler.

If the lifter still does not pull sufficient vacuum replace the venturi.



**FIGURE 12**

### **ACTUATOR TILTS AFTER STOPPING:**

If, when tilted to a position, the actuator continues to move or begins to move back towards its original position, the issue will typically be with the tilt control valve or the flow valves mounted to the actuator. The exception to this would be if the internal seals of the actuator have worn to the point of leaking across the seals.

The flow valves (**12A** and **12B**) are mounted directly to the actuator ports. The flow valves should be checked first.

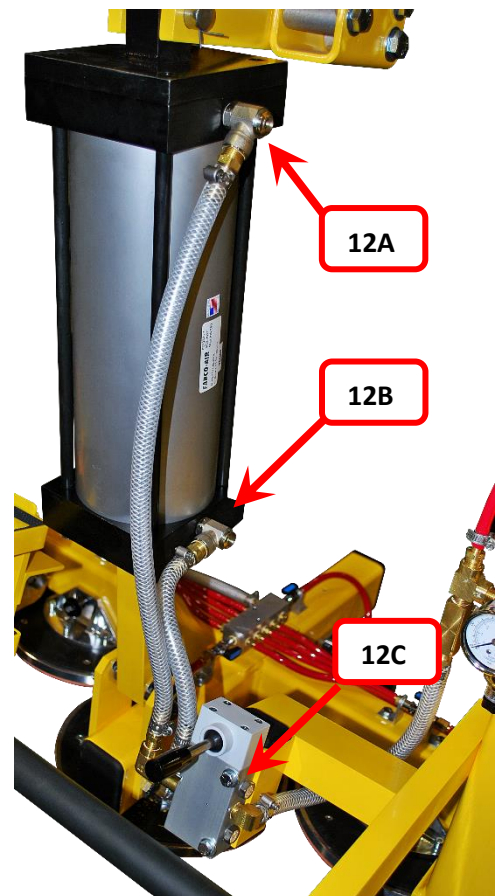
The flow valves may leak past the seals that allow the valves to pivot. When this happens, air can typically be felt along the seams of the collar/body of the flow valve. With the air supply valve open, tilt the lifter to the position where it drifts and check to see if air can be felt leaking around the body of the flow valve.

Note: If the drift causes actuator to retract (pad frame moving to flat position) the upper flow valve is indicated. If the drift causes actuator to extend (pad frame moving to vertical position) the lower flow valve is indicated.

Since this is a pressure port, a soap and water solution can be used to check for leaks. Spray a small amount of soapy water around the flow valve that is indicated by the direction of the drift. Bubbles will indicate a leak.

Replace any flow valve determined to leak.

If it is determined that the flow valves are not the cause, the tilt control valve (**12C**) should be checked.



**FIGURE 12**

The tilt control valve consists of an incoming airline (13A), two vent plugs (13B) and two feed lines (13C).

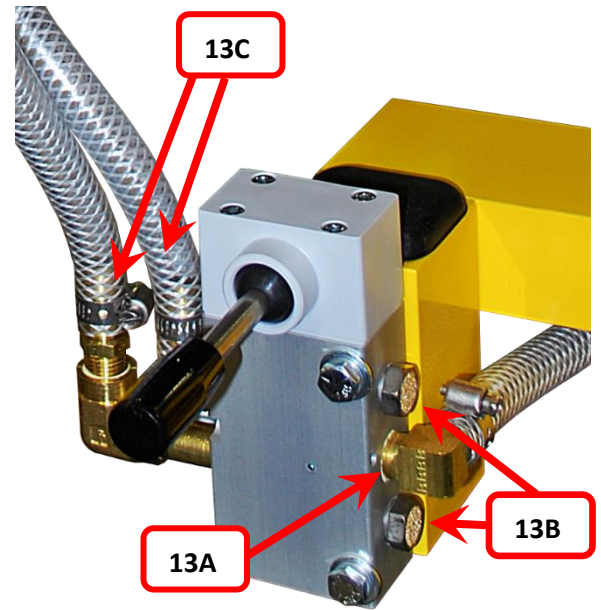
When the handle is in the center position, all the ports are closed.

A leak is indicated when the handle is in the center and air is flowing from the vent ports or from the ports to the feed lines of the actuator.

Begin by checking the ports with the vent plugs (13B).

With the air supply valve open, tilt the lifter to the position where it drifts and lightly spray the vent plugs with a soap and water solution. Bubbles indicate a leak.

If there is no indication of a leak at the vent plugs, the feed lines to the actuator should be checked.



To check the actuator feed line ports:

- Disconnect the air supply from the lifter.
- Disconnect the hoses from the tilt control valve that connect to the flow valves of the actuator.
- Reconnect the air supply to the lifter.

Note: Do not engage the handle of the tilt valve assembly with the hoses removed.

Wrap a smooth towel (14A) tight over the end of either of the ports that connect to the actuator.

Spray the area covering the open port with a soap and water solution. Bubbles indicate a leak. If there is no leak when the first port is tested, test the second port.



FIGURE 14

If there is any indication of a leak through either port of the tilt control valve, replace the valve.

If neither the flow valves nor the tilt control valve leak, the issue is likely to be the internal seals of the actuator. Contact Wood's Powr-Grip for additional information.



## ADDITIONAL INFORMATION

- 1) When requesting information on a particular lifter, please have the model number and serial number available.
- 2) **CAUTION:** Always proceed with caution when opening enclosures containing electrical wiring. Wiring is often connected to components in the cover, as well as the enclosure itself.
- 3) In some cases a leak may be identified in an assembly (such as a filter or valve assembly) but the actual cause is not apparent (neither the filter nor the valve itself are the cause). In these cases, the leak may be caused by a cracked fitting. Cracks in fittings may be visible but are often virtually impossible to locate except under factory test conditions. They may appear as dark lines along the seam of female fittings, along the hex nut section of female hose nipples, or at the base of the threads on male fittings. If a leak is traced to an assembly and the cause is not visibly apparent, it may be best to simply replace the whole assembly rather than a single component.
- 4) If any metal fittings are disassembled during testing, **always** apply thread sealant (Teflon tape or similar product) to the male threads prior to reassembly, in order to avoid vacuum leaks.

For plastic fittings use only Teflon tape. Liquid or paste sealants must not be used because they may damage plastic parts.

- 5) When assembling fittings, do not over-tighten. After first applying adequate thread sealant or tape, the fitting should be finger-tightened as much as possible.

A straight fitting should be tightened no more than two additional revolutions with a wrench. An elbow fitting should be tightened no more than one and one-half additional revolutions with a wrench.

Once an elbow or tee fitting is tightened with a wrench, the fitting should be aligned clockwise with a wrench

- 6) Please note: The information that is gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools you use are capable of completely sealing your system.

If needed, test equipment is available from Wood's Powr-Grip Co.

For further suggestions or information, please contact our staff at:

**Wood's Powr-Grip Co., Inc.**  
**908 West Main**  
**Laurel, Montana 59044**  
**800.548.7341**  
**406.628.8231**  
**406.682.8354 (fax)**  
**www.WPG.com**



**ALL LIFTERS MUST BE TESTED AFTER MAINTENANCE**  
**SEE INSTRUCTION MANUAL**

