AAA Products Int'l Valve Troubleshooting

Most valves are replaced because of unexpected performance or system errors during day to day operations. It is our experience, that often the valve is replaced first due to low cost and ease of replacement. We have also determined that most of the time, failure of the system is not due to a faulty valve but to other issues. This document is to help narrow down the potential replacement of a valve when it does not need to be replaced.

We tried to sort the various issues by the most calls and questions asked by our distributors and their customers.

Air continually comes out an exhaust port of the valve operating my cylinder.

There is an amount of air that is expected to flow through the exhaust port during the shifting of a cylinder. This is the amount contained in the cylinder and air lines that needs to be vented. If air continually comes out the exhaust, 90% of the time the problem is with cylinder by-pass and not related to the valve. Check the cylinder exhaust line for internal by-pass.

Air continually comes out an exhaust port of the valve operating my rotary air motor.

This is expected and correct. Most often, people place muffler/flow controls on these ports to control the speed of the air motor.

I have a solenoid operated valve that does not shift.

Some of the many common reasons why a solenoid valve may not shift:

1) Standard solenoid valves cannot be bench tested. That is to say, the valve will not operate if you simply put 50 psi air in port #1 and apply a voltage to the coil. Standard solenoid models are assembled for "Internal Pilot" operation; they derive shifting pressure for the spool from the valve inlet port. When testing an internally piloted solenoid valve, do not let air free flow through the cylinder port. This flow is normally so great, that back pressure to shift the spool cannot be adequately generated. To test an internally piloted valve, loosely place plugs in the cylinder ports to generate a slight back pressure to shift the valve.
2) If the valve is equipped with manual locking overrides, verify that the overrides are turned counter clockwise; "OFF" position.
3) Low or no pilot pressure. For valves that are spring centered, or spring return, the minimum shifting pressure is 50 psi, for non-spring models the minimum shifting pressure is 25 psi.
4) Residual current in coil. Some circuits may allow the coil to keep a magnetic field and not release the internal plunger. Remove the power from the circuit to check. Do not remove the coil from valve while there is power applied. This will cause rapid overheating and can damage the coil.
5) Incorrect coil voltage or burned out coil. Verify the correct electrical characteristics of your circuit and verify coil resistance.
6) We do not recommend using a flow control on a common exhaust system if the flow is restricted more than 50%. Resize the valve or use dual exhausts.

There is air coming out of the solenoid sleeve exhaust.

When the coil is energized, the internal plunger in the solenoid is lifted to allow pressure to shift the internal spool in the valve. The plunger should seal the sleeve so air does not exit through the solenoid sleeve. When the coil is de-energized, then the plunger is lowered to seal the internal air passage and allow any residual pressure to be momentarily vented to atmosphere through the solenoid sleeve exhaust. If there is constant air venting out of the sleeve exhaust, check the following:

1) No residual current in the solenoid preventing sealing of the plunger.
2) Solenoid tube is not bent or crushed preventing sealing of the plunger.
3) Audibly check that the internal plunger is free to move by pulsing the coil.
4) Solenoid pressure is too high, 150 psi on standard valves, 160 psi on “Classic”.
5) Carefully disassemble solenoid to check for internal contamination or seal damage.

My remote pilot or differential pilot valve is slow to shift.

The valve response rate is based on the flow rate of the remote pilot and differential pilot valves. To improve response rate, decrease tube length or increase tube diameters between the remote valve and the pilot port or increase the flow rate of the remote valve.

Cylinder and Valve By-Pass

General Information

On an air system, if air is detected escaping from a 4-way valve exhaust while the cylinder is stopped, this air is either blowing by worn-out piston seals or is leaking across the spool in the 4-way valve. These two by-pass paths are shown in the figure.

Most air cylinders and valves have soft seals and should be leak tight.

If by-pass is noted, it is more likely to be coming through the cylinder than across the valve spool and the cylinder should be tested first.

Cylinder By-Pass

Run the piston to one end of its stroke and leave it stalled in this position under pressure. Remove the fitting on the opposite end of the cylinder to check for air by-pass. After checking, tighten the fitting and run the piston to the opposite end of the barrel and repeat the test.

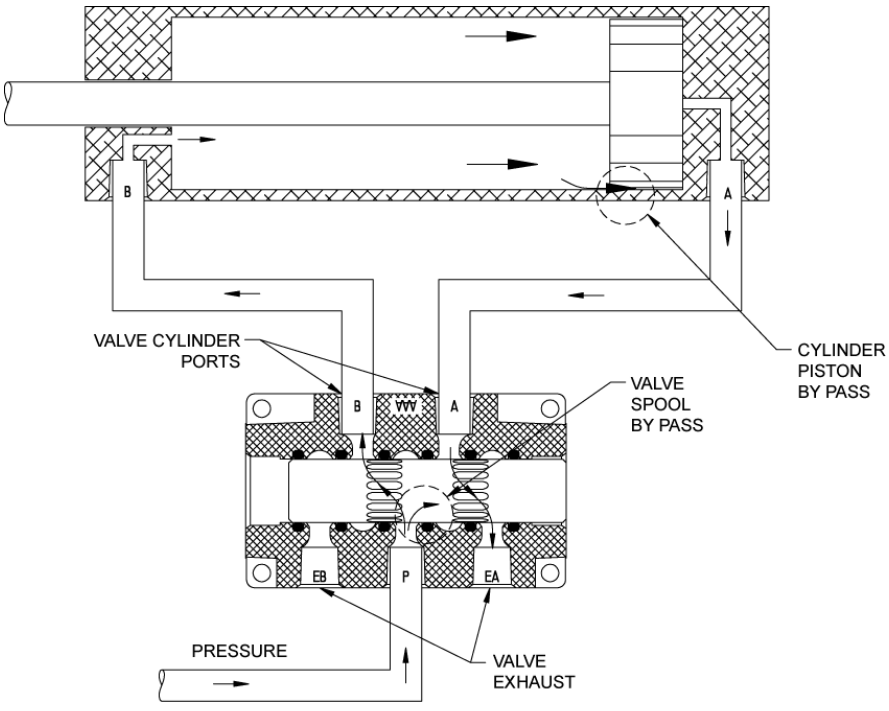

Figure 1: Air By-Pass

Occasionally a cylinder will leak at one point in its stroke due to a scratch or dent in the barrel. Check suspected positions in mid stroke by installing a positive stop at the suspected position and run the piston rod against it for testing. Once in a great while a piston seal may leak intermittently. This is usually caused by a soft packing or O-ring moving slightly or rolling into different positions on the piston and is more likely to happen on cylinders of large bore. Pistons with metal ring seals can be expected to have a small amount of by-pass across the rings and even those “leak-tight” soft seals may have a small by-pass during break-in of new seals, insufficient lubrication or after seals are well worn.

4-Way Valve By-Pass

For testing 4-way valves, it is necessary to obtain access to the exhaust ports so that the amount of by-pass can be observed. To make the test, disconnect both cylinder lines and plug these ports on the valve. Start up the system and shift the valve to one working position. Any flow out the exhausts while the valve is under pressure is the amount of by-pass. Repeat the test in all other working positions of the valve.

Run air cylinder to the point that air is leaking out of the exhaust. If leaking exhaust on the valve is on the same end of valve that the cylinder is not pressurized, then most likely it is cylinder by-pass. Remove or pinch the line on the cylinder. If air stops leaking out of the valve exhaust, then the cylinder has bypass. If air is leaking out of the valve with hose removed or pinched, then the valve has by-pass.