Correct Pressure Switch Placement Stops "Bouncing or Telegraphing"

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Many instructions and diagrams for the locating of the pressure switch when using one or more bladder tanks are simply incorrect. Placing the tap for the pressure switch anywhere on the main line is incorrect. Following are examples of where to place a pressure switch.

#1

The small pipe that goes over to the bladder tank from the main line should never be larger than the manufactured inlet to the tank. Most of these bladder tanks will have 1" or 1 1/4" inlet elbow. You can use a 1" or 1 1/4" pipe to connect the main line to the 1 1/4" bladder tank. Never use a 1 1/4" line to connect to a 1" tank inlet. Never start with a larger size for any distance and then change over to a smaller size pipe before the tank. Always have at least 12" of pipe from the main line to the tank. Install the pressure switch tap on a tee at the end of this length of pipe as close to the tank as possible. You can screw the pressure switch directly onto this tap or a length of copper tube or poly line can connect this tap to the pressure switch or switches. If multiple tanks are used you must pick one, and install the pressure switch as stated on this one tank. The tank used should always be at the end of the small water line, or without water flowing past or through it. When the switch is placed in this location, the volume of water inside the bladder tank must change before the pressure switch will see any difference in pressure. This eliminates hydraulic shock that the switch would experience if it were tapped directly into the main line.

The main line sees considerable dips and surges in pressure when pumps are started or stopped. Just the velocity of the flow going past a tap on the main line can cause turbulent variations in pressure. This is what causes a pump to bump as the pressure switch turns it off almost immediately after it was started. A pressure switch on the main line will see a decrease in pressure before the tank has had a chance to express any water. This causes the pump to bump on before the water has been used from the tank. A pressure snubber should not be needed. Placing a switch in the correct place with a bladder tank will completely eliminate the bump.

#2

Larger systems that never get to a zero flow condition are said to have a "continuous demand". Because the small pump will run continuously, a very small pressure tank may be all that is needed. When using a Cycle Stop Valve, systems can be set up to allow the smallest pump in the system to run continuously. There is always a demand so the Cycle Stop Valve on the small pump maintains a constant pressure. No pressure switch is even needed for the

small pump in this situation. A small pressure relief valve for safety is set to relieve the minimum flow from the small pump, if demand drops to zero flow and the pressure ever rose above the setting of the Cycle Stop Valve.

The pressure switches on the main pumps will still need a cushion. On these large systems where there is little need for a pressure tank. A tiny bladder tank that holds 1/4 to 1/2 of a gallon can be used as a shock absorber. Plumb this tank in conjunction with the pressure switches, then use a small line to connect to the main line tap. The small line can be 1/8" or 1/4" or can have an adjustable restricting device such as a needle valve. Controlling the amount of flow into and out of this small tank with the pressure switches is a mechanical timer. This gives a few seconds between the different pressures of the pressure switches, even if pressure in the mainline changes quickly. This is a good way to take pressure switch bounce out of multiple pump systems.

#3

Some bladder type pressure tanks may have too small an opening. This happens when there is a 1" or 1 1/4" elbow or inlet to the tank but the actual hole going into the tank is smaller. In these situations the tank is unable to accept water as fast as the 1" or 1 1/4" line is feeding, causing the pressure switch to bounce. We do not recommend using tanks with these small openings. However, you may be able to make it work as follows. Connect a nipple to the tank inlet elbow that is the same size as the tank connection. Just at the edge of the tank, connect a tee that is also the same size as the tank inlet connection. Reduce the top of this tee to 1/4" and place the pressure switch directly on top of the tee. You can use a long copper or poly tube to connect the pressure switch if you wish to hang the switch on the wall or other location. However, the copper or poly tube must sense pressure from the tee just outside the tank. To connect this tee to the main line, use a pipe that is smaller than the actual hole inside the tank. This means you may need to use a 3/4" pipe from the 1" or 1 1/4" tee with the pressure switch to the main line.

#4

Large hydro pneumatic tanks have been used with pressure switch controls on pump stations for many years. Installing the pressure switch on the top or air side of these hydro tanks has been the norm. Placing the pressure switch on the air side of the tank eliminates any possibility of hydraulic shock on the pressure switch. Newer systems using bladder type tanks rarely have this option. With bladder tanks, placing the pressure switch on the air side of a bladder tank can create problems.

The diaphragm in a pressure switch will not allow water molecules to pass through easily. However, air molecules are much smaller and will pass through most materials. When the pressure switch is installed on the air side of a bladder type tank, eventually all the air will escape from the tank through the pressure switch. A waterlogged situation occurs and the pump system will fail.