Understanding how a regulator functions

by the technical team, Ziggity Systems, Inc, 101 Industrial Parkway East, Middlebury, Indiana 46540, USA.

We have frequent discussions with poultry farmers about watering issues and one thing has become clear: many producers lack a clear understanding of how an enclosed, nipple type watering system actually functions. In this article we will discuss how a regulator operates and its impact on water levels and pressure in the system.

For the sake of clarity, everything that comes before the regulator is the supply system. This includes the water's source, the supply line, any filters and any medicators. Everything that comes after the regulator is the watering system.

The water that comes to the poultry house usually has a pressure of 20-40psi (1.4-2.8 Bar). This is simply too much pressure for the watering system.

Pressure this high can damage the system and cause the drinkers to leak and spray water. Also, at 20-40psi the pressure is too high for the birds to activate the trigger pin on the drinker.

Pressure reduction

All modern watering systems require pressure reduction to function properly and that is the main purpose of the regulator.

An adjustment knob, generally found on the bottom of the regulator, allows you to regulate the water pressure in the watering system. The pressure is measured in column height, according to how high water stands in the riser tube.

The knob is attached to a spring that puts pressure on a diaphragm. The diaphragm, in turn, controls the inlet valve, which allows water to enter the watering system.

When a drinking line is fully charged, the water pressure is consistent from the regulator all the way to the other end of the line.

At the same time, the spring's upward pressure against the diaphragm and the downward water system pressure are equal and the inlet valve is closed.

As the birds drink, water is drawn from the system and the water pressure on the outlet side of the regulator is slightly reduced.

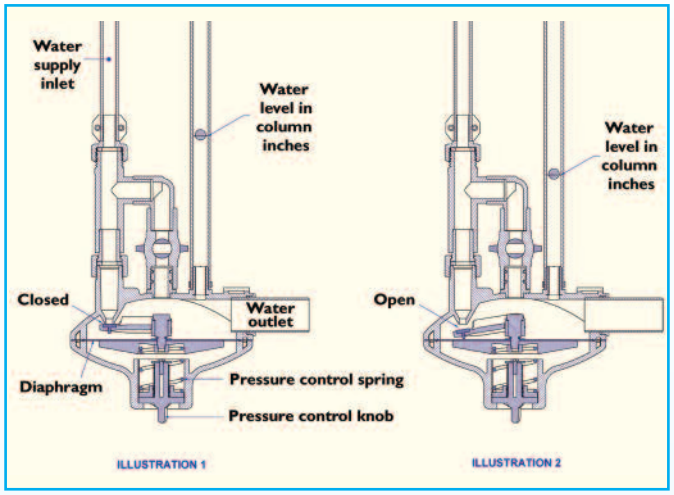

Fig. 1. Two regulators. Left, with the inlet valve closed and, right, with the inlet valve open.

Pressure exerted by the spring forces the diaphragm up to compensate for the reduced water pressure and this opens the inlet valve enough to allow in more water, bringing the system back to the correct pressure. This action takes place almost continuously as the birds drink.

Modern enclosed watering systems operate on low pressure. In fact, Ziggity recommends starting chicks at day one at 1" (2.5cm) of column pressure. Using this very low starting pressure allows even a weaker day old chick to activate the drinker.

A higher pressure could prevent the chick from activating the trigger pin and it would put out more water than the chick can hold in its beak, resulting in wet litter.

Most enclosed watering systems operate at pressures ranging from 0.25-0.75psi (6.9 column inches or 17.5cm to 20.8 column inches or 52.8cm).

Producers must realise that high volume delivery does not require high pressure. Water will always be present in the watering line. It does not take high pressure to provide adequate supply.

Common misconceptions

A common misconception is that there can be different water pressures in the watering system – that the water level might be 10" at the riser tube of the regulator and only two inches at the end assembly because of heavy water consumption by the birds close to the end assembly area.

In a normal situation – a level, non-sloped house – this cannot happen. Think of the water between the regulator and the end assembly as a long, narrow lake.

Water is never higher at one end of a lake than at the other. Even if a large amount of water drains from the lake at one end, the entire water level of the lake comes down at the same rate.

In other words you would never find a lake with water being drawn off to be 10ft high at one end and only 2ft high at the other end. Just as water in a lake seeks its own level, so too does the water in a watering system.

Having said that, there are some exceptional circumstances in which a watering system can exhibit different water levels.

Again, we will employ the long lake example from above. This time, we will divide the lake with a dam into areas A and B. In the dam is a 2ft diameter pipe allowing water to flow from one side to the other. If we open a 3ft diameter drain pipe on side A of the lake, the water level of side B would be higher during draining process than side A. Why?

The water volume draining from the 3ft pipe is greater than the water volume flowing from side B to side A.

Once the drainpipe is closed, the water levels on both sides will equalise. This effect can happen in a watering system as well. For example, if an air pocket divides the watering system, it will restrict the amount of water that can flow around it.

This is much like the 2ft diameter pipe in the dam in the example above. If the birds drink more water on one side of the air pocket than on the other, you again would have uneven levels of water in the system.

As soon as the birds stop drinking on the one side, the water level will restore to equilibrium.

Another situation is the watering line has a high point and water just trickles over the top of the high spot to the other end. This too can cause water level differential.

We hope this clears up some of the mystery surrounding enclosed, nipple type watering systems and how they function.

Knowing how the components actually work can help you make better decisions when managing your watering system. ■