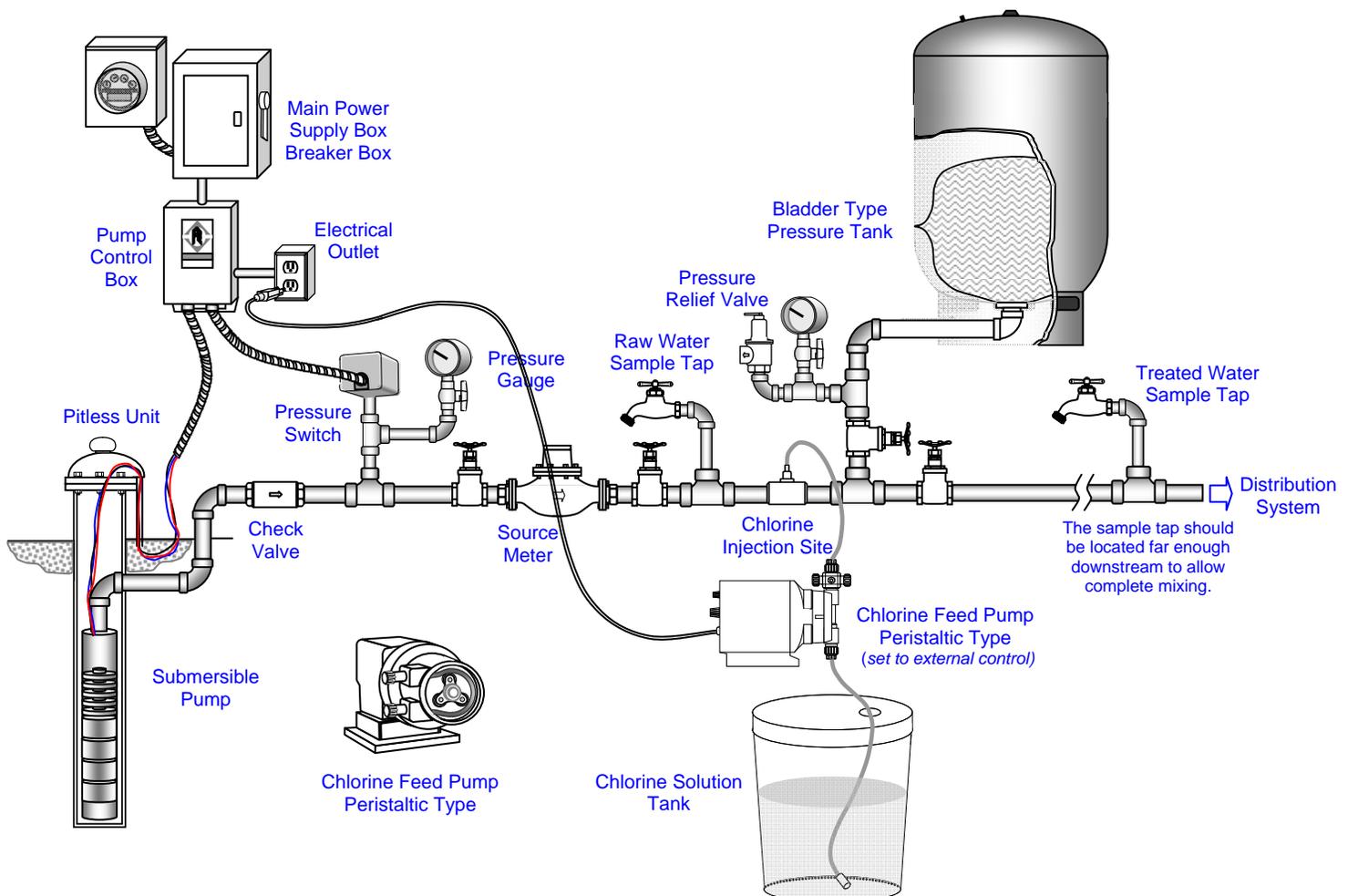


Many small public water systems use chlorine to protect against bacteriological contamination. Typical treatment systems use diaphragm or peristaltic pumps to inject sodium hypochlorite solution into the water supply. These systems must provide consistent, minimum free chlorine residual whenever the water system is operating to inactivate pathogenic organisms such as viruses and bacteria effectively.

If the water flow rate is relatively constant, adding chlorine at a **fixed injection rate** may be adequate. If the water flow fluctuates significantly, adding chlorine at a **variable injection rate** is more appropriate. In either case, operators adjust the chlorine residual by changing the injection rate of the **chlorine feed pump**, and by changing the strength of the chlorine solution.

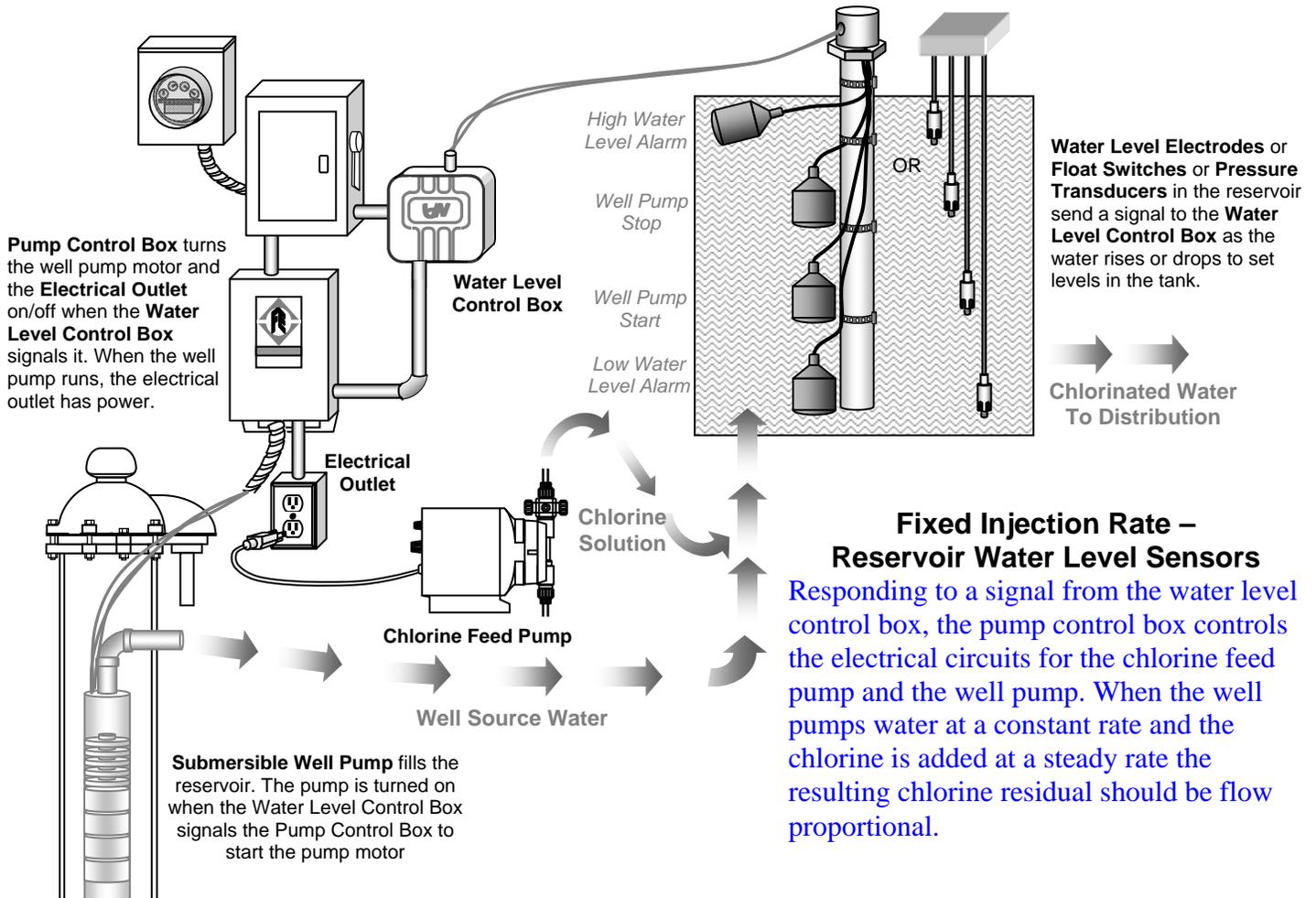
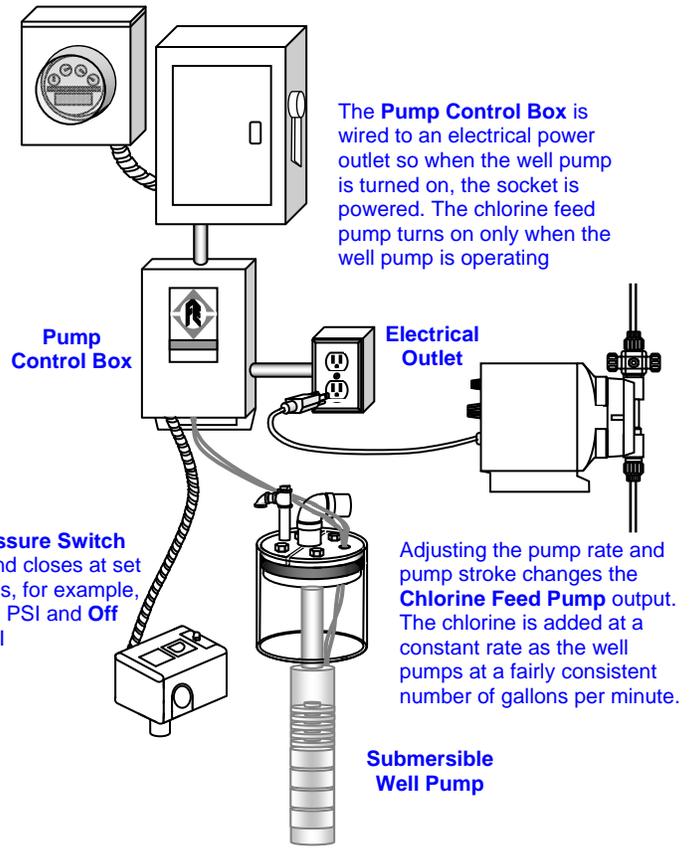
*The example diagrams in this **Tech Tip** are not design recommendations. Licensed professional engineers must design chlorination systems and the Department of Health must approve them.*

Fixed Injection Rate - An electrical outlet, wired to have power only when the source pump is running, often controls fixed-rate chlorine injection pumps. The chlorine feed pump injects at a fixed rate. When the system is operating, the water flow rate and the chlorinator output should be relatively constant. After mixing, the chlorine residual at the point of entry should be stable.

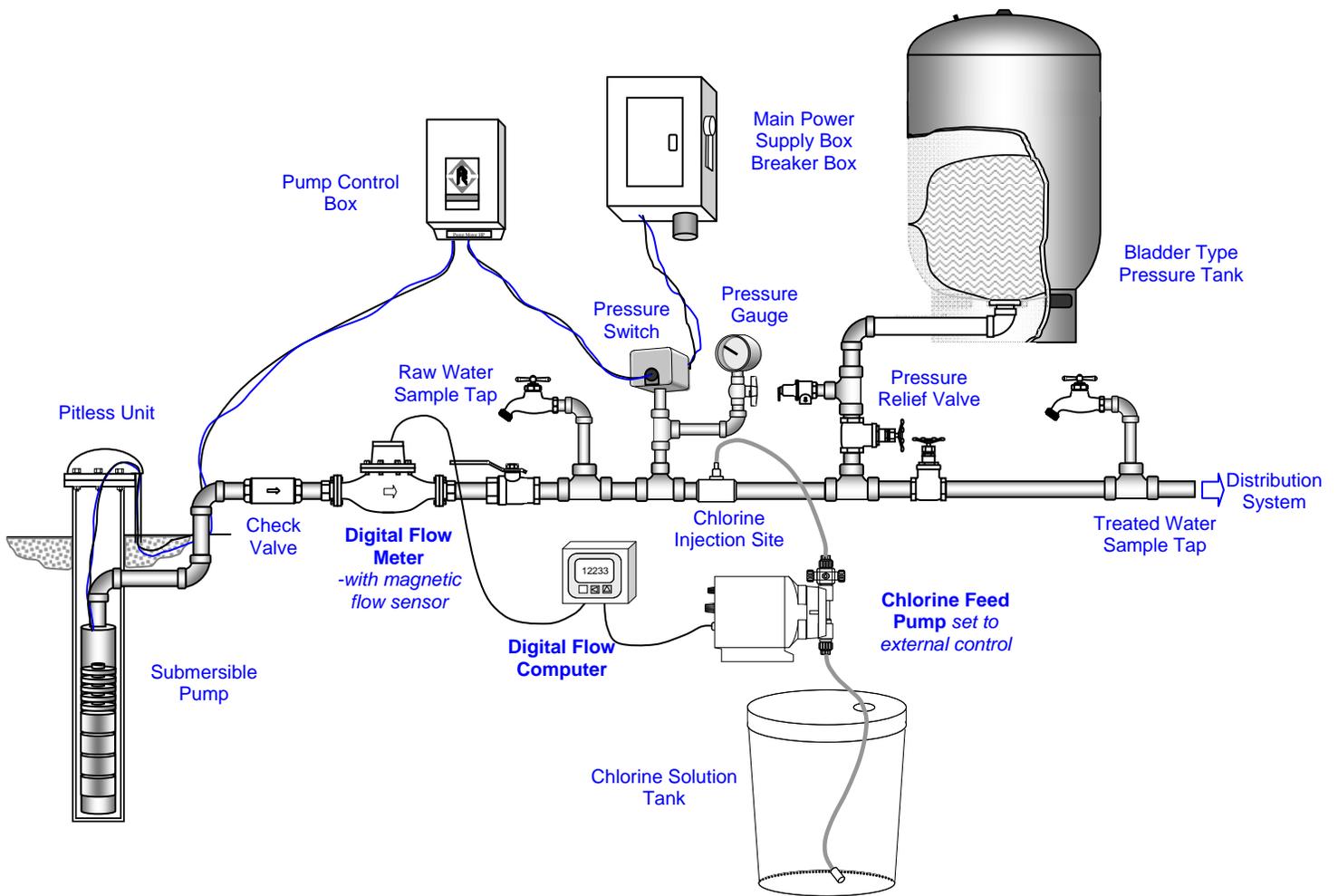


Fixed Injection Rate - Pressure Switch

The pressure switch turns the submersible well pump motor on and off. The pump control box turns the electrical outlet on and off at the same rate. When the system is operating, the water flow rate and the chlorinator output should be relatively constant. After mixing, the chlorine residual at the point of entry will be stable. Booster pumps can be controlled by pressure switches in the same way.



Variable Injection Rate – Variable-rate chlorine injection is more appropriate when flow rates fluctuate significantly, such as when a source has multiple pumps. A **digital flow meter** controls these chlorination systems by generating digital pulses proportionate to the flow-rate the source or booster pumps produce. These pulses control the amount of chlorine the feed pump injects into the water system. As the water passing through the digital flow meter increases, more chlorine is injected. This ensures the finished water is “flow proportional.”



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Variable Injection Rate – Two Sources

This water system has two well sources. They can operate alone or together, producing significantly different flow rates. The **digital flow meter** on the combined source water pipe keeps the output of the chlorine feed-pump proportionate to the water flow.

Without the flow meter, the chlorine feed pump injects a constant amount of chlorine but water volume varies. This creates unreliable chlorine residual levels. **Systems must investigate inconsistent free chlorine levels.**

There are different duplex chlorinator designs. For example, there could be a chlorine injection pump on each well. You can usually find out how a chlorination system works by tracing signal and power lines to the pump or asking operators how they maintain the desired level of free chlorine residual.

