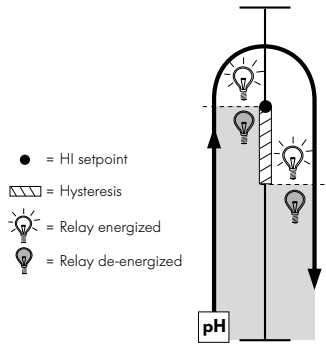


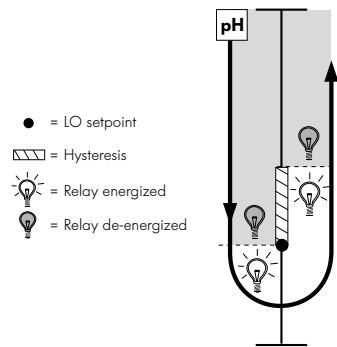
Relay Information

The two most common methods of controlling a process are “on/off” and “proportional” control. In on/off control, relay setpoints are defined as either high or low limits on the process variable. When the measurement value reaches a limit the relay is energized, typically for the purpose of opening a valve or starting a pump to introduce a chemical reagent to the process. This should cause the measurement value to change in the direction of the setpoint as shown in these on/off control diagrams:

High limit on/off relay control



Low limit on/off control



Notice the relay will not de-energize until the setpoint is exceeded by the hysteresis value. This is a programmable value and is primarily used to prevent “relay chatter”, which occurs if a relay is set to energize and de-energize at the same value. Because of hysteresis, and because reagent delivery is fairly constant while the relay is energized, a condition known as “overshoot” is inherent to the on/off control method. Overshoot refers to the introduction of more chemical reagent than is absolutely necessary for achieving a desired adjustment to the process value, and can be expensive over time.

Proportional control is a popular alternative to the on/off control method. This method typically makes use of variable-rate metering pumps to reduce overshoot and improve precision. Establishing a proportional control scenario requires the selection of setpoint(s), deviation range(s) and maximum pulse

rates. The example shown here illustrates how two relays in “pulse mode” can be used to proportionally control pH within a desired range, or to a single setpoint. This is called “Dual Proportional Control”. Of course, a single relay in proportional pulse mode can be used to establish a high or low limit and will also reduce overshoot.

Metering pumps are idle at and between setpoints. When a setpoint is exceeded, the pump begins delivering reagent at a rate proportional to the difference between the measurement value and the setpoint. The larger the difference, the faster the delivery. The programmed deviation value defines how quickly the maximum pulse rate is reached. Depending on the input requirements of the metering pump, proportional control can also be accomplished with scaleable 4 to 20 mA outputs instead of pulsing relays or open collectors.

Dual proportional pulse relay control

