Bypass applications are commonly used in constant flow systems where full flow across the coil is not required because of partial load system conditions. The control of the flow through the terminal unit is typically accomplished by using a three-way valve. There are two basic types of three-way valves: mixing valves (two inlets, one outlet) and diverting valves (one inlet, two outlets). The type of three-way valve selected will determine its location in the system.

Diverting valves in bypass applications are placed upstream of the coil. The supply water enters the inlet port and is directed to either the coil branch or the bypass branch depending on the signal from the controller to the valve actuator. In the above example, when the valve is in the fail position the supply water is bypassed around the coil. As the stem position modulates from 0-100%, the flow reduces in the bypass and increases in the coil until full flow to the coil is achieved at a stem position of 100%.

A mixing valve can also be used in a bypass application to control the flow through the coil by placing the valve downstream of the coil. The flow through the coil is still controlled by the stem position of the mixing valve.

The location of the three-way valve will not affect the operation of the system. In both scenarios, the valves are controlling the amount of flow to the coil. Other valve characteristics, such as the valve authority, valve flow characteristic, and rangeability will have more of a bearing on the system performance. Consult the Valve section of the Engineering Data Book for additional information on these topics.

For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.