VALVE ACCESSORIES & CONTROLS, INC.

Fail Freeze / Fail in Place / Fail Last Position

There are many industrial control valve applications that require the valve to stay at the last set point as a failure state. This is frequently called out as Fail Last Position, Fail in Place, or Fail Freeze. These terms are interchangeable; we will use Fail Freeze for the rest of this paper.

When specifying a positioner for these applications it is important to understand that with a positioner there are two separate failure modes.

1. Loss of Signal is when the signal that provides the set point from the control system is interrupted.
2. Loss of Air Supply is when the instrument air supply that provides the motive power for the pneumatic actuator is interrupted.

These must be treated as independent conditions. With Fail Freeze it is imperative that you understand which failure mode the end user needs. Is the application “Fail Freeze on Loss of Signal”, “Loss of Air Supply”, or *both*? The answer will let you specify the correct positioner and/or accessories.

Fail Freeze on loss of Signal:
This is accomplished using a positioner configured with an I/P module specifically designed to hold the air pressure in the actuator when the voltage of the signal drops below the minimum required to operate the I/P, this is typically in the range of 9-12 VDC. When the signal is lost the valve will be held at or near the set point and will not drift. When the signal is restored the positioner will resume normal operation without operator intervention.
Fail Freeze Positioners or I/P’s cannot be converted from Fail Freeze to Fail Safe or vice versa. You must purchase the correct positioner for your application.

Fail Freeze on loss of Air Supply:
This is a less well understood failure condition. It is commonly thought that using a double acting actuator will accomplish this. While this may work with an On/Off application, Control Valves using a positioner operate differently. Loss of air can occur in two different ways.
1. Sudden air loss: Air pressure can fail suddenly such as the instrument airline is broken close to the control valve and air is exhausted from the positioner/actuator combination quickly. In this failure mode the valve MAY stay at the set point or close to it. Process forces, Valve & Actuator type, and the speed of air loss will greatly affect the actual valve position after loss of signal. It is possible for the valve position to drift under these conditions.
2. Slow air loss: Air pressure that fails slowly such as a compressor trip, will cause the valve to drift as air pressure slowly drops and the actuator doesn’t have the power to hold the valve in place. The pressure on both sides of the actuator is no longer balanced and the valve will be forced to close because the positioner can’t maintain the pressure balance. The valve will absolutely drift under this condition.

The only way to reliably provide Fail Freeze on loss of air supply is accomplished using a pneumatic lockup valve between the positioner and actuator. This valve has a sensing port that is connected to the instrument air supply a short distance from the valve. There is also an adjustable set point. By adjusting the set point to approximately 10% below the supply pressure, the lock up valve will shift to hold the air in the actuator when the supply pressure falls below the set point. After the valve has locked up the valve will not drift.
When air pressure is restored the lock up valve will shift automatically to restore air supply to the actuator. No operator intervention is needed.

Summary:
When a customer specifies Fail Freeze there are three possible configurations you can supply.
1. Fail Freeze on loss of Signal ONLY, use a Fail Freeze Positioner.
2. Fail Freeze on loss of Air Supply ONLY, use a standard positioner with a Pneumatic Lockup Valve.
3. Fail Freeze on loss of Signal OR Air Supply, use a Fail Freeze Positioner AND a Pneumatic Lockup Valve.

For assistance with positioner applications please contact your VAC Stocking Distributor, or call VAC direct.

Valve Accessories & Controls 200 Jade Park Chelsea, AL 35043
info@valveaccessories.com P: (205) 678-0507 F: (205) 678-0510