

In-Line Fluid Detection Eliminates Pump Damage

Progressing cavity pumps are used for conveying thick slurries and other process fluids with high solids content. These pumps rely on a constant supply of fluid for lubrication. If the pump runs dry, the internal components and motor can be damaged requiring expensive repairs and costly down time.

The solution to this costly problem is to monitor the pump suction and shut it down before it runs dry. A number of creative approaches to protecting against run dry have been used including measuring current draw of the motor or measuring torque on the drive shaft. Both these methods react to a change due to loss of material in the pump however, shut down will only occur after the pump has started running dry which is often too late to prevent damage. At a minimum it will decrease pump life. Also, since current and torque are not linear functions of friction, it is difficult to ensure pump shut down prior to damage.

Monitoring the process material being pumped is a much better approach and can shut down the pump when the up stream leg becomes empty. This will ensure that the pump will not be run in a dry condition. The most common methods for measuring the absence of fluid are pressure, flow, conductance, or RF Admittance switches.

You need to ask, “what is the total cost of an installed pump”? “What does a typical pump rebuild cost”? “What is the cost per hour of downtime”? A reliable monitoring switch is obviously a wise investment, which will pay for itself many times over by extending pump life and preventing costly damage.

Level Measurement Technologies

The following is an assessment of the most common point level switch technologies used for pump shut down control.

Pressure Switches

Pressure switches measure the increase or decrease in head pressure on a diaphragm. A reduction of head indicates an emptying or empty pipe and signals the pump to shut down. Pressure switches are notorious for failure due to material plugging the diaphragm. A plugged diaphragm will not respond to changes in the pipe emptying resulting in damage to the pump. Pressure switches are an unreliable choice for pump protection.

Flow Switches

There are several types of flow switches available including mechanical and thermal dispersion switches. Both of these technologies require a sensor inserted into the flow stream, which will contribute to pipe line plugging.

Mechanical flow switches utilize a paddle or target on the end of a pivot arm. Material flow deflects the target indicating flow. Mechanical devices have a major drawback in that they are mechanical. The pivot and spring assemblies are susceptible to wear and corrosion. Solids in the process material being measured can also damage the assembly.

Thermal dispersion switches are made up of two thermal wells inserted into the process material. The first thermal well contains a reference sensor that monitors the process temperature. The second thermal well includes a heater that is the active sensor. As material flows past the assembly, Heat is dispersed from the active sensor reducing the differential between the active and reference sensors and indicating process flow. Thermal dispersion sensors, being an insertion type technology, are subject to wear and impact damage from solids in the process material. Thermal dispersion sensors are also relatively slow in response time allowing the pump to run dry prior to shutting down, resulting in reduced pump life.

Conductivity

Conductivity switches are sometimes used in pump protection however; they are a poor choice for a number of reasons. Conductivity switches are notorious for material bridging between the active electrode and ground resulting in a false indication of level. This would allow the pump to run dry. The process material may leave a hard, insulating coating on the electrode as it dries or an oil coating, insulating the conductivity sensor. The insulation prevents the switch from passing current causing it to not “see” material shutting the pump down when there is plenty of lubricant available.

RF Admittance – The Best Choice!

The Drexelbrook® ClearLine™ switch is the best choice for pump protection. The ClearLine sensing element mounts between two flat-faced flanges in the process piping providing a flush, non-intrusive sensor that does not contribute to pipe blockages. The sensing element has no moving parts and is a robust, industrial design. The Drexelbrook Proven and reliable RF driven-shield circuitry ignores even heavy coatings on the sensing element eliminating false indication of process material. Thousands of units have been installed and many years of proven field results. The Clearline requires no routine maintenance. Sensors are available to fit most pipes from 1 inch up to 10 inches in diameter. Each ClearLine switch is factory calibrated to provide reliable, repeatable performance regardless of changes in process fluids and coatings, or variations in temperature or density.

The ClearLine from Drexelbrook is the most reliable, no-maintenance choice for pump protection applications.

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