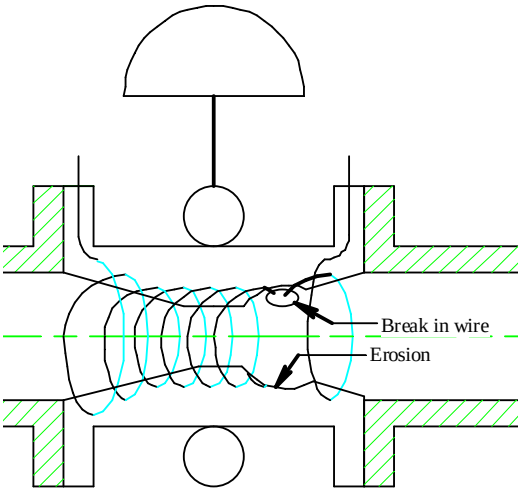
Pinch Valve Sleeve “Wear Wire” Systems

Onyx Valve Co offers pinch valves with an embedded “Wear-Wire” molded into the sleeve. The purpose of the “wear wire” is to indicate when the rubber lining inside the sleeve has eroded through to the fabric.

The concept behind this design is simple enough: During the manufacturing process, a conductive wire is inserted into the sleeve between the inner rubber lining and the fabric. The wear-wire protrudes from the flanges on each end of the sleeve.

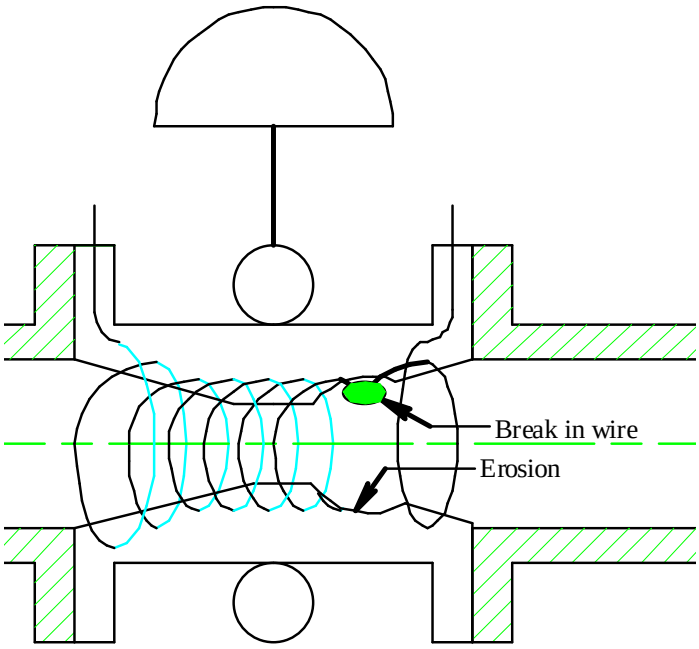


When the inner lining erodes to the point where the fabric is exposed, the wire breaks. The loss of continuity in the wire signals that the sleeve is in the checkout line and needs to be replaced soon.

The pinch valve is typically purchased with just the wear-wire in place. The customer makes his own provisions for integrating this into his control system, driving the circuit with either 120 volt or 24 volt power to the I/O module in an integrated SCADDA system.

However, as often happens in life, what seems simple on first inspection turns out to be more subtle and nuanced on further examination.

The first consideration is the nature of the process fluid itself. Is the process fluid an insulator or a conductor? Or, perhaps, it lies somewhere in-between?

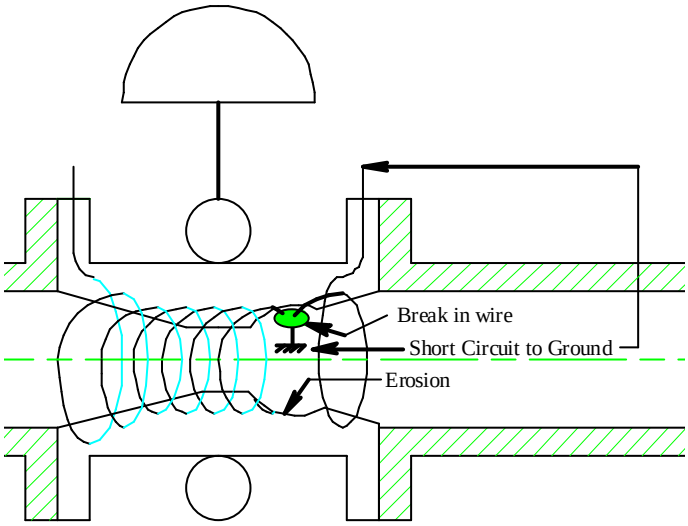


If the process fluid is a perfect insulator the wear-wire functions exactly as intended: The wire breaks, conductivity goes to zero, the change in state signals the SCADDA system that the sleeve is worn and needs replacement.

But process fluids that are perfect insulators are rare. Water based fluids including sewerage and water based slurries are either conductors or semi-conductors. Now what happens?

If the process fluid is conductive, the fluid inside the pipe completes the circuit between the broken wire ends and there is no change in conductivity! Now the status of the wear-wire is the same whether the wire is intact or broken.

But this situation can get stickier: What if the piping in the plant is grounded (as it normally is)? In this case, when the wear-wire is exposed to the process fluid, the I/O electric potential is shorted directly to ground.



The controls engineer has to consider the ramifications of this permutation. Will a direct short to ground trip breakers or fuses in the control system? Will it take an I/O module off line unexpectedly?

Onyx Valve offers a control package to circumvent this. It is based on ground-fault technology and an isolator relay. It reliably changes state from closed circuit to open circuit (or vice verse) regardless of whether the process fluid is an insulator, conductor, or semi-conductor, and it isolates the I/O circuit from the wear-wire to protect sensitive SCADDA components.

On a more fundamental level, however, the process engineer has to consider how critical the pinch valve sleeve failure detection is. Wear-wire technology ***seems*** simple at first, but it introduces a very high level of complexity that may not be justified by the application. Remember that pinch valves all come with a drain plug on the bottom housing. If you simply leave the drain plug out, when the sleeve wears through, process fluid starts to drip out from the drain hole. Yes, it's a little messy and it's primitive, but it is simple and effective.

Comments or questions? Contact:

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