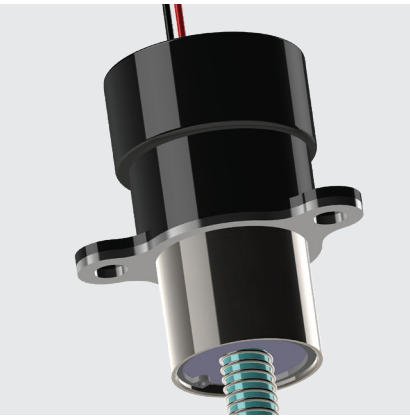
TECH BRIEF

Integrating Failsafe Technology with Electromagnetic Components

Combining Energy Savings & Safety into Component Design

ALTHOUGH LATCHING SOLENOIDS HAVE EXISTED for many years, they're receiving a new wave of interest lately. This renewed interest can be attributed to three main factors. The first is today's focus on energy efficiency, due in part to cost savings, environmental concerns, and low power availability. Second is the flexibility in the design of these solenoids, allowing them to work with a variety of product and application requirements. And, lastly, solenoid technology has now advanced enough to allow for greater "failsafe" functionality. This last reason will be the focus of this tech brief.

First, let's review how latching solenoids work. They operate with very low power draw, making them an excellent option for applications with a lower cycle rate. A pulse of power moves the armature into position. It is then held in place with either residual magnetism or a permanent magnet (both options requiring no additional power draw). In electromagnetic latching solenoids, a reverse polarity pulse cancels out this hold to bring the armature back to its base position by the force of a spring, but other options for managing the reset position are available as well.



Failsafe package size is based on power and application requirements.

Low power draw and low heat generation have always made latching solenoids attractive, but many designers have been concerned about safety issues related to the loss of power. For example, as we just mentioned, most solenoids' armatures are held in the latched position until a reverse polarity pulse is applied. If power is unavailable, the armature can't move. The only way to prevent this is to include a failsafe system.

This failsafe is a simple control system that leverages a circuit board and capacitor that both monitors power availability and also moves the armature into the base (or safe) position if power is lost. This control system can be customized to reset to a specific position when power isn't available—a critical capability in applications where the safe position isn't the same as the base position of the solenoid.

A truly trustworthy failsafe system requires additional customization beyond that of how the positioning is reset. At minimum, the solenoid's components should be custom sized for the cycle time and power use of the latching solenoid. Other helpful customizations are also available, such as whether the failsafe is located on the cord or attached to the solenoid itself. Attaching the failsafe to the solenoid eliminates any potential communication gaps between the two, in case the cord is cut or damaged. With all these available customizations, the failsafe capability is flexible enough to work with many different applications.

One application example is the system that holds a gate, door or turnstile in a locked position. This system uses a latching solenoid lock (which is popular in battery-driven security or in cases where energy savings and environmental considerations drive purchases). In the event of a fire or explosion, this system would lose power, keeping the gates/doors locked. But with the integration of a failsafe, the system would allow the gates/doors to be opened so people can exit the area safely.

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Written by Dennis Jensen | Business Development Manager, Advanced Products | sales@tlxtech.com