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Selecting Advanced Automation Solutions for On-Off Valves: Reduce Costs, Improve Reliability and Functionality

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Manufacturers of on-off valves and accessories have made significant advances in the realm of design, materials selection and manufacturing techniques to reduce both the unit and total ownership costs of their products. To further reduce costs and improve both reliability and functionality, manufacturers are now looking at integration at the automated on-off valve network and component level.

At the network level, integration borrows extensively from lessons learned using control valves with bus architecture. Bus networks can dramatically reduce the cost of hard-wiring automated on-off valves. What's more, smart on-off valve automation packages collect performance data captured at the on-off valve for analysis by a remote computer for more effective asset management. While this sort of integration has a great deal of appeal and merit for anticipated future applications, it is not a reality today for most processing plants.

At the component level, integration is all about taking the various pieces used to construct a valve automation package, optimizing them for cost and reliability, and delivering them in a complete, seamless package. Users of automated on-off valves can realize savings from this type of integration immediately. After they become confident with the exceptional reliability of the integrated solution, users will benefit from additional cost reductions as the result of the advantages that advanced networking and diagnostic capabilities offers.

Reliability is the Key to Valve Automation

When selecting advanced automation solutions for on-off valves, there are several things to consider, with reliability being foremost. No feature of the device you are looking at to deliver advanced on-off valve automation should detract from reliability and, ideally, it should improve reliability.

To determine if an integrated automation package passes the reliability hurdle, three areas should be evaluated:

- Determine to what extent the product you are considering relies on robust, field proven sub-components, particularly communications electronics, positioner and actuator.
- Review test data, with emphasis on accelerated aging studies to see how the product stands up to testing administered in a laboratory setting.
- Field test a small number and watch them closely. Most on-off valves today are expected to operate for hundreds of thousands, even millions of cycles before they fail. Fortunately, most failures due to a manufacturing or design flaw occur early in a product's operating life.

If these three areas meet your objectives for cost savings, test data and operating results, you can feel confident about installing more units.

Once it has been determined that integrated on-off valve automation has little if any downside for an application, focus can shift to what advantages are associated with making the switch. These advantages will be derived from the inherent benefits of integration as well as the design innovations manufacturers incorporate into their version(s) of this new class of product.

Value Added by Integration

When upgrading to integrated automation packages, rather than individual components, – such as solenoids, communications terminals, and actuators – a processing plant should expect to gain:

- Improved reliability – all subcomponents are factory-assembled and fully enclosed in a single unit and subjected to rigorous quality assurance standards.
- Lower cost – due to package pricing and reduced inventories of components at the plant
- Faster installation – since all of the tubing and connections previously required are accommodated within the integrated automation package.

In addition to the generic benefits of integration, the meticulous process of designing and engineering a new valve automation package offers the manufacturer an opportunity to evaluate and implement new and unique components to improve the reliability and usefulness of the product. Some of the features plant engineers will encounter when they begin to evaluate this type of advanced valve automation system, especially when compared to competitive integrated on-off valve automated packages, include:

- **Swappable Parts.** Parts that snap in and out for fast repairs in the field.
- **Universal Power Input**. Built-in rectifiers allow automation packages to be plugged into any voltage source up to 120 V.
- **Bus Network Capable.** In addition to communicating via standard wiring, units may be supplied with cards that make them "plug and play" with any commonly used bus network (e.g., ASI, DeviceNet, ModBus and Foundation FieldBus).
- **Push-Button Switch Setting.** Calibration is a simple matter of pneumatically or manually moving the valve to full open (as indicated by a sensor light), pushing a membrane button, then moving it to full closed and pushing another. This simple procedure that takes seconds accurately sets the limits of travel for the soft limit switches.
- **Soft Limit Switches.** Contact-free soft limit switches eliminate surface contact and mechanical switches to substantially improve reliability of the device. Soft switches sense a magnetic field to determine when limits stored in non-volatile EPROM flash memory have been reached.
- **Magnetic Direction Sensing.** Most contact-free limit switches depend on a magnetic field strength sensor that will produce a distorted signal when there is axial thrust on the ball. An alternate approach is to use a contact-free sensor that monitors rotational direction instead of magnetic field strength. This type of sensing is not distorted by axial thrust.
- **Internal corrosion protection**. There is no external tubing on the integrated automation package. Instead, air is transferred via the spool in and out of the actuator.
- **Certifications.** Standard products available with a wide range of NEMA and other certifications eliminate the need to inventory a large number of special automation packages for difficult environments.