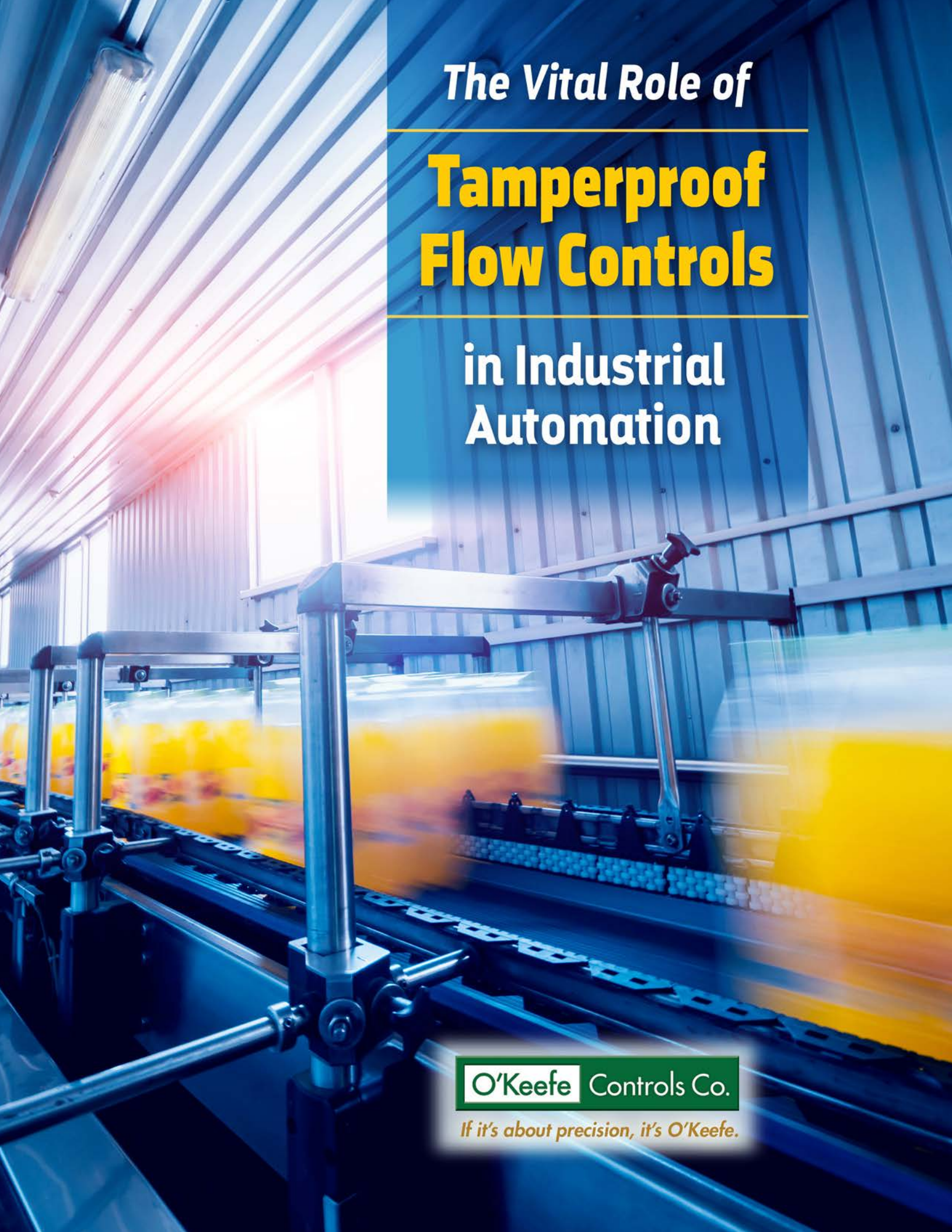


The Vital Role of Tamperproof Flow Controls in Industrial Automation

O'Keefe Controls Co.

If it's about precision, it's O'Keefe.

The Vital Role of
Tamperproof Flow Controls
in Industrial Automation

Whether boxing orders at a warehouse and moving them down the conveyor line, dispensing exact quantities of yogurt into containers in a dairy factory, or controlling the speed of metal-stamping machinery, Flow Controls play a key role in keeping automated processes moving without worry. Many flow control devices consist of an active component, such as a check valve, and a variable orifice set by a knob or a screw mechanism. This variable adjustment can be quite handy where field setting or frequent changes are required; however, in OEM applications where system parameters are well known and consistency and repeatability are valued, the adjustable aspect of the Flow Control can be undesirable.

In the Flow Control products offered by O'Keefe Controls Co. the variable orifice is replaced by a fixed precision orifice, which makes the device ***tamperproof.*** Several variations of series or parallel connection of the check valve and precision orifice allow for unique functionality.

Meeting the Demands of Different Process Flow Requirements

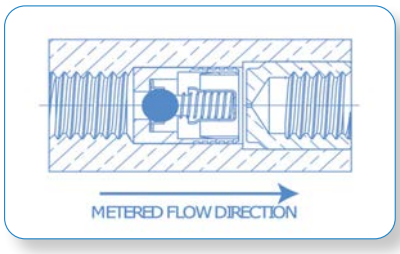
As different processes have unique requirements in how motion is controlled, various Flow Controls, each with specific characteristics, have been developed to address the challenges present in industrial applications. O'Keefe Controls Co. manufactures three types of Flow Controls:

- **Checked Orifices**
- **Fixed Flow Controls**
- **Bidirectional Fixed Flow Controls**

Let's look at each of these in terms of function and how they are commonly used in industrial applications.

Checked Orifices

Incorporated in a single construction, a **Checked Orifice** consists of a check valve and precision orifice in *series*. This configuration of components allows **metered flow in one direction and no flow in the opposite direction.** Fluid flows first through the check valve mechanism and is then metered by the precision orifice; reverse flow is prevented by the integral check valve mechanism.



Liquid Dispensing and Mixing

Liquid dispensing is a common application for a Checked Orifice. The device allows a metered flow in one direction to dispense the fluid; dripping is prevented by the check valve mechanism when the source is shut off. Checked Orifices are also useful when the process demands metering out a very specific amount of a substance and the portions are critical. While this functionality can be achieved using a combination of other valves, having two components in one body offers a definite advantage in terms of simplification of design, as well as maintenance.

Additionally, mixing of liquids or gases with fluid source isolation can be achieved by using multiple Checked Orifices connected in parallel.

Checked Orifices, useful in plasma cutting technology, allow mixing precise quantities of different working gases from isolated sources.

Employed in the Food & Beverage industry, Checked Orifices allow metering out specific amounts of a substance— with no drips.

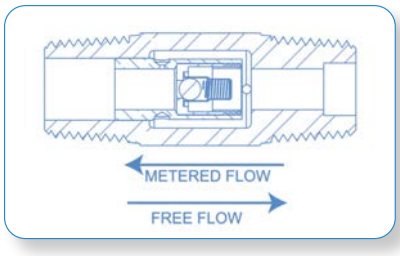
Fixed Flow Controls

Incorporated in a single construction, **Fixed Flow Controls** are a check valve and a precision orifice in parallel, allowing **metered flow in one direction and free flow in the opposite direction.** Metered flow is achieved by a precision orifice and free flow is achieved by an opened check valve mechanism along with the contribution of the precision orifice. Fixed Flow Controls are used extensively in automated machinery, most commonly for both speed control and time delay applications.

Speed Control

Controlling the rate at which an actuator moves is crucial to optimum operation of pneumatic machinery. A common example is controlling a double-acting pneumatic cylinder. Simply put, pressurized fluid enters a port in the cylinder causing extension of the rod and at the same time allows the opposite cylinder port to vent. The opposite pressure and vent condition causes cylinder rod retraction. Control of the speed of extension and retraction of the cylinder rod is achieved using Fixed Flow Controls which can allow free flow into the extend and retract ports while restricting the exhaust rates. In this example, two Fixed Flow Controls are required, one for each cylinder rod direction.

By regulating the speed of the cylinders' operation, we are able to achieve the optimum rate of motion for the process — meaning product moves through and operations are carried out at a speed which maximizes production and minimizes error or waste. Additionally, speed control of cylinders prevents slamming and reduces machinery wear and tear. These same principles apply for rotary cylinders and actuators, making speed control a top application for Fixed Flow Controls.



Time Delay

In automated processes, the timing of certain actions can be critical. Timing allows for sequences to complete before the next step, or to start only after certain conditions have been met. Thus, time delay is another common use of Fixed Flow Controls in process automation. A Fixed Flow Control used in series with a volume chamber can provide a time delay on startup of a pneumatic circuit, or as the circuit is depressurized. On-delays or off-delays can be used to prevent immediate change-in-state in pressurized circuits.

Fixed Flow Controls regulate the action of cylinders in an automated robotic arm.

Fixed Flow Controls can be employed to regulate movement of product on conveyors without risking damage.

Desiccant Air Drying

Compressed air used in automation processes often must be treated to remove excess water vapor. A common solution for removing water in its vapor form from a compressed air system is known as a desiccant air dryer.

A typical desiccant air dryer system consists of two towers, one for drying the air and the other for regenerating the desiccant. The drying tower contains a porous desiccant material that adsorbs water molecules as compressed air from the inlet passes over it. To regenerate the desiccant material, a small portion of dried air is expanded and blown over the desiccant bed in the offline tower. The water vapor is exhausted out.

O'Keefe Controls Co. Fixed Flow Controls are ideal for this type of operation. The Fixed Flow Control allows free flow through the drying tower in the forward direction and metered flow in the reverse or purging direction. The precision of the device, its repeatability, along with its vital tamperproof nature ensure that the essential function of drying out the towers is properly carried out, time and time again, without variation.

The requirement for moisture-free air occurs across a wide variety of industries with specialized uses, from laser cutting and marking to thermal testing of circuit boards. To meet these needs, desiccant drying units are available in a variety of physical configurations, materials, and sizes. O'Keefe Controls Co. manufactures Fixed Flow Controls in a wide choice of sizes and connections, allowing us to handle applications from large dryers in factory settings to small appliances employed for point-of-use dry air, requiring sub-miniature Fixed Flow Controls.

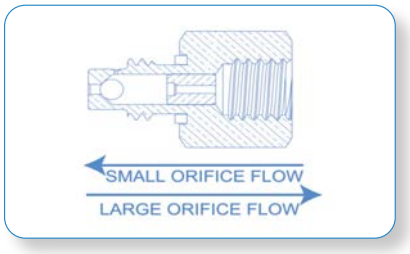
Moisture-free air required for laser cutting operations provides another common application for the use of Fixed Flow Controls in desiccant drying.

Fixed Flow Controls are ideal for use in regenerative desiccant drying systems.

Bidirectional Fixed Flow Controls

Incorporated in a single construction, the **Bidirectional Fixed Flow Control** is a checked orifice and a precision orifice in parallel. This configuration allows a metered flow in one direction and another metered flow in the opposite direction. Metered flow is achieved by a precision orifice within the checked orifice portion and metered flow in the opposite direction is achieved by a separate precision orifice.

Applications for Bidirectional Fixed Flow Controls are similar to those of Fixed Flow Controls. However, the feature of flow metering in both directions offers a distinct advantage for specific applications. What is known as free flow in a Fixed Flow Control is replaced by a metered flow, allowing precise fluid control in both directions. For example, this can be helpful in dampening actuators using a three-way valve as a pressure source.



Speed Control

When using a spring-return actuator, the Bidirectional Flow Control allows metering into and metering out of a single actuator port — at a same or different controlled rate. Speed control of a single acting, spring return cylinder using a single fixed flow control may provide an excessive speed in the free flow direction, resulting in unwanted slamming. Addition of a second Fixed Flow Control in series can eliminate the slamming — but at additional cost and space. Instead, the application can be simplified using a Bidirectional Fixed Flow Control. Proper selection of forward and reverse flow capacities will keep actuation rates within desired times.

Use of Bidirectional Fixed Flow Controls allows one device to control both the extension and retraction rates for spring-return cylinders.

The Advantages of O'Keefe Controls Co. Flow Controls

As we've covered, Flow Controls are responsible for controlling the motion of various cylinders and actuators doing the work in our automated processes. As such, they play an extremely crucial role in how our process measures up in terms of productivity and profitability. Optimum actuation rates of cylinders and other actuators can reduce wear and tear on the machinery, increase overall equipment lifetime and reduce cost in replacing worn parts and equipment.

Tamperproof Construction: The Ultimate "Set It and Forget It" Solution

The tamperproof aspect of O'Keefe Controls Co. Flow Controls is a key feature. These Flow Controls do not contain any adjustment knobs or screws. This ensures that the flow characteristics are consistent and repeatable. Ideal for OEM applications where unwanted adjustments can negatively affect machine performance, O'Keefe Controls Co. Flow Controls are a perfect solution.

Each Flow Control is manufactured to stringent quality standards for superior accuracy and repeatability, with tamperproof designs to eliminate alteration in flow, once installed. Due to these outstanding performance factors, OEMs the world over confidently specify Flow Controls from O'Keefe Controls Co. in their designs.

To find out more visit okeefecontrols.com.

O'Keefe Controls Co.

If it's about precision, it's O'Keefe.

4 Maple Drive
Monroe, CT 06468
203.261.6711