



FDA-compliant pumps deliver consistent pressure and flow for reliable fluid processing

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Food and beverage end users have very specific criteria when selecting a diaphragm pump for the safe processing and transferring of fluids to best retain product quality, consistency and to provide rapid production for faster market delivery.

Like most things, having the right equipment results in a superior finished product. That holds true for having the right pump for FDA-compliant fluid and material processing. FDA-compliant diaphragm pumps are used in many food and beverage industry applications, including transferring and batching materials and fluids of various viscosities such as sugar, dough, juice concentrate, sauces, jellies, jams, beer and wine. Whether it's injecting food products into molds, dispensing sauces and syrups into mixing tanks, or transferring and filtering beer or wine, FDA-compliant pumps are a necessity for processing food and beverages.

Industries that manufacture products within sanitation and health sensitive environments rely on FDA-compliant air-operated diaphragm (AOD) pumps to ensure quality and product consistency. In addition to the food and beverage industry, the cosmetics, pharmaceutical and pet food industries also use FDA-compliant pumps. These pumps deliver greater efficiencies for companies looking to improve and expand productivity to maximize their bottom line.

Pump Design Innovations

ARO®, a brand of Ingersoll Rand® and a leader in fluid management for 87 years, manufactures pumps that deliver superior fluid safety, reliability and efficiency, thanks to innovative pump designs. The latest design update to the FDA-compliant pump is a single-piece diaphragm that minimizes the number of points where fluid or solids can collect. This prevents material from building up in the pump's crevices reducing contamination and bacterial growth. The design enhancement also allows for easier cleaning and speedier disassembly and reassembly.

The ARO® FDA-compliant pumps also:

- Pass large shear-sensitive solids without degradation or heat build-up
- Run dry to eliminate the risk of pump damage
- Pump fluid gently so as not to create froth or fluid separation
- Allow higher temperatures during operation through the use of ball valves.

The ARO® FDA-compliant pump is available with different center body options, including highly-durable stainless steel or polypropylene. Both configurations comply with FDA regulations concerning materials intended to come into contact with food. The pumps are fabricated using stainless steel exteriors with electroplated surfaces, providing 3.2um surface roughness and FDA-compliant materials that maintain the integrity of the product. When processing food-grade materials, pumps must be able to gently transfer fluids while attaining the desired levels of production. For example, ARO® pumps can yield up to 30 percent better flow rates than other pumps in its category, with lower material shear. The ability to deliver higher yields and lower material shear helps ensure careful transfer of materials, thus extending product shelf life and maintaining quality.

Moisture in a pump's air supply can cause severe pump damage, significantly harming motor components and requiring repair or replacement. A well-designed pump minimizes the effects of dirty air on major valve assemblies. Too much moisture can result in ice buildup and freezing of exhaust air due to an accumulation of ice particles that clog the motor area, causing the pump to slow, or even seize. A pump with exhaust valves that divert cold exhaust air from ice-prone components will prevent the pump from stalling or failing.

ARO® FDA-compliant pumps are now equipped with an electronic interface capability for precise control or remote monitoring. FDA-compliant pumps can be connected to the ARO® Controller or can quickly integrate with existing control systems, for batching and accurate control of the pump in a variety of food and beverage applications. This automated capability gives manufacturers flexibility to perform other activities instead of monitoring the pump.

Pump Reliability is Key

There are several things to look for in an FDA-compliant diaphragm pump that maximize its reliability and longevity, while minimizing problems associated with a contaminated air supply. For example, as with all ARO® EXP Series pumps, the FDA-complaint pump uses air-motor technology featuring a unique D-valve design. D valves are constructed with ultra-hard ceramic that is impervious to dirt and grit in the air (which helps maximize up-time regardless of air quality). This design ensures the valve is always shifted to one side or the other to eliminate stalling, and creates a more reliable and worry-free manufacturing process. The FDA-compliant pump's Quick Dump™ technology also prevents freezing by routing exhaust through the pump's center body, allowing the air to expand internally, then sends the air out into the atmosphere. By changing the air expansion mechanism and routing it through the center body, it prevents cold air from getting into the exhaust port. ARO® FDA-compliant pumps also use u-cups that are less likely to fail due to poor air, compared to glide rings, or lap fits, that are used in some pumps.

Running dry can be a major problem for some pumps. If material running through a gear pump or centrifugal pump runs dry, the pump can overheat and the gears can grind, potentially damaging the pump. However, with a diaphragm pump, if the material runs out, the pump will continue to run without harming the pump. ARO® pumps have a service life that is four times longer than traditional diaphragm pumps, and are known for their robust performance and low material shear. The quick-knock-down (QKD) design of the pump helps operators save time, as the pump disassembles rapidly for easy inspection, cleaning and maintenance, and then is quickly put back into service.

Instead of using bolts that thread on and off, the fluid intelligence experts at ARO® designed band clamps making it quick and easy to disassemble and reassemble the pump for "clean in place" washing. Operators can quickly and easily open the pump up for daily cleaning inside and out. This is particularly important for the food and beverage industry to keep labor costs down, while maintaining sanitary conditions, and keeping the manufacturing process moving.

The ARO® FDA-compliant pump is available in one-inch and two-inch sizes. The one-inch pump yields a maximum flow rate of 54 gallons per minute (gpm) (204.4 liters per minute) and the two-inch yields a maximum flow rate of 192.7 gpm (729.4 lpm).

Pumps can directly affect the quality of the final product

Two factors influencing product quality are pump pressure and flow rate. The ability to hold pressure between 0-120 pounds per square inch (psi) will allow an operator to control the pump pressure without harming the materials being processed. A pump's flow rate controls the speed at which materials are transferred. The ability to control pressure and flow rate helps avoid damaging materials. This can be a problem for centrifugal pumps that run on a continuous cycle. If the manufacturing operation needs to be stopped, the pumps impeller will continue

spinning, putting additional air into the product and increasing the product's temperature and potentially spoiling the end product, as we'll see in the customer example below.

Northwest Canning is a mobile canning operation that provides packaging solutions for microbreweries and craft breweries throughout the Northwest United States. As a young start-up company, Northwest Canning used an electric-powered centrifugal pump mounted in its mobile canning trailer. While the centrifugal pump provided significant power, it needed to be operational on a continuous cycle. Problems arose as the pumps impeller drew beer in and then dispensed it into the filler. When the operation needed to be stopped, the impeller continued spinning, causing foam in the beer within the filler, and also increased the liquid's temperature. The continual pumping introduced more oxygen into the beer, causing more foam, and ultimately ruined the flavor.

The company replaced the centrifugal pump with an ARO® FDA-compliant air-operated diaphragm pump that is designed to efficiently and safely transfer fluids and materials for beverages and spirits. The new pump created a more efficient canning process that was gentler on the beer, while extending the shelf life of the brew and maintaining its carefully crafted flavor. Using the ARO® pump, Northwest Canning achieved a 33 percent increase in productivity.

Air-operated diaphragm FDA-compliant pumps deliver the reliability, ease of use and time savings food and beverage industries need for processing product materials and fluids. ARO® FDA-compliant pumps are the right choice for achieving greater consistency, while maintaining the quality of the finished product.

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