

Innovative self-priming pump does double duty for dairies

Reduce total cost of ownership with Alfa Laval LKH Prime for CIP return and dairy product handling

Many industries have been looking for a self-priming pump that meets requirements for improved energy efficiency and reduced noise levels, as well as the latest hygienic design standards. Using airscrew technology, the Alfa Laval LKH Prime sets a new standard in self-priming pump technology. This bodes well for the dairy industry, offering a sound way to realize low cost of ownership and increased uptime.



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This new self-priming pump is based on the Alfa Laval LKH premium range of centrifugal pumps, which is world-renowned for hygienic design and gentle product treatment. The Alfa Laval LKH Prime is specially constructed for pumping liquids containing entrained air, making it an excellent choice as a CIP return pump. Depending on the duty point, the Alfa Laval LKH Prime is 60 to 70 percent more energy efficient than a conventional liquid-ring pump and operates at noise levels of 74 dB(A), a full 80 percent less than a conventional liquid-ring pump. Like the other pumps in the LKH family, the Alfa Laval LKH Prime is EHEDG certified and authorized to carry the 3-A symbol.

Versatile and efficient, the Alfa Laval LKH Prime is therefore of interest to dairy owners and operators who are concerned with:

- Reducing energy consumption
- Improving the work environment
- Reducing installation costs

Reducing energy consumption

The hydraulic efficiency of the Alfa Laval LKH Prime reaches over 50% (Image 1). This means the Alfa Laval LKH Prime offers an added advantage over liquid-ring pumps, which typically reach efficiencies of approximately 30 percent. Its high efficiency is easily attainable at a wide flow range, which translates into substantial savings no matter the duty point.

Energy efficiency is important for operations, and the Alfa Laval LKH Prime does not disappoint. It can be used as a Cleaning-in-Place (CIP) return pump for several different product lines so that the Alfa Laval LKH Prime is operational for several hours a day.

Its hygienic design means the pump may also be used to empty dairy product tanks, which further increases the pump's operating hours.

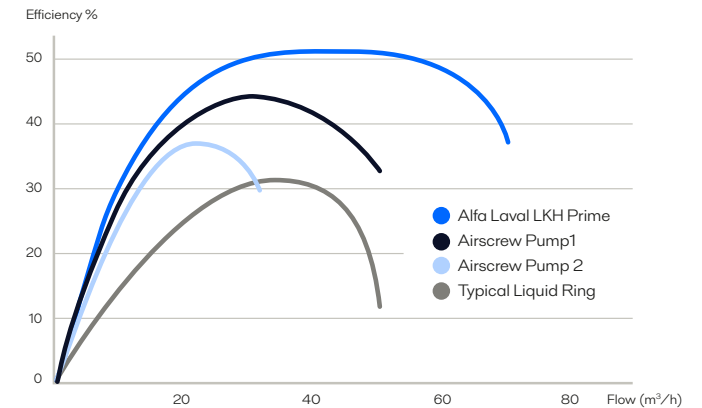


Image 1. Pump efficiency.



Improving the work environment

The Alfa Laval LKH Prime also contributes to a better work environment. It reduces the noise emission level by up to 80 percent compared to conventional liquid-ring pumps (Image 2). Whilst reliable, liquid-ring pumps have always posed the challenge of excessive noise. In an attempt to reduce the noise, enclosures around the liquid-ring pumps and installed devices have been built or air has been added to the CIP liquid (less air in the product means more noise from a liquid-ring pump). This makes installations with liquid-ring pumps inefficient, expensive and still very noisy. With a noise level of a mere 74 dBA, the Alfa Laval LKH Prime efficiently eliminates the need for these protective measures.

Reducing installation costs

While the Alfa Laval LKH Prime is designed for CIP return duties where the liquid contains entrained air, it may also be used to pump dairy products that require gentle treatment. This makes the Alfa Laval LKH Prime with its hygienic design ideal for handling milk products that may contain entrained air. For instance, the Alfa Laval LKH Prime is a solid reliable pump for emptying milk tanks. Because of the pump's ability to handle both CIP return liquid and dairy products, it is possible to eliminate the need for a separate liquid-ring pump (Image 3).

When emptying a milk tank, it is necessary to use either a pump that can transport entrained air or one that can be stopped before air is mixed into the milk. Liquid-ring pumps are capable of pumping milk containing entrained air but they are not hygienically designed and the high shear rates generated damage the milk fat membranes. For gentle pumping of milk, a centrifugal pump such as the ones in the Alfa Laval LKH range should be used. Centrifugal pumps will however stop pumping if air accumulates in the casing. The Alfa Laval LKH Prime combines the gentle product treatment and hygienic design of the LKH range with the liquid-ring principle. In many cases, this can reduce the number of pumps required for an installation from two to just a single pump.

Reducing the installation costs from two liquid-ring pumps to one Alfa Laval LKH Prime pump results in:

- Lower capital investment, one pump instead of two
- Lower piping, cabling and automation costs
- Lower spare parts and service costs

Service is a key element of any Alfa Laval offering and the commonality of spares, including the shaft seal, in the LKH range translates into reduced spare parts inventory and fast maintenance.

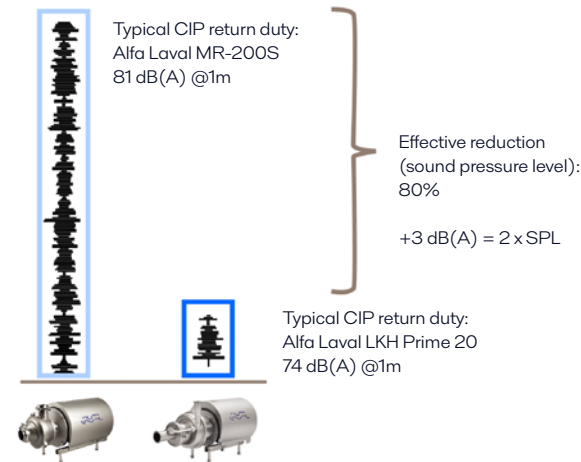


Image 2. Noise emission levels.

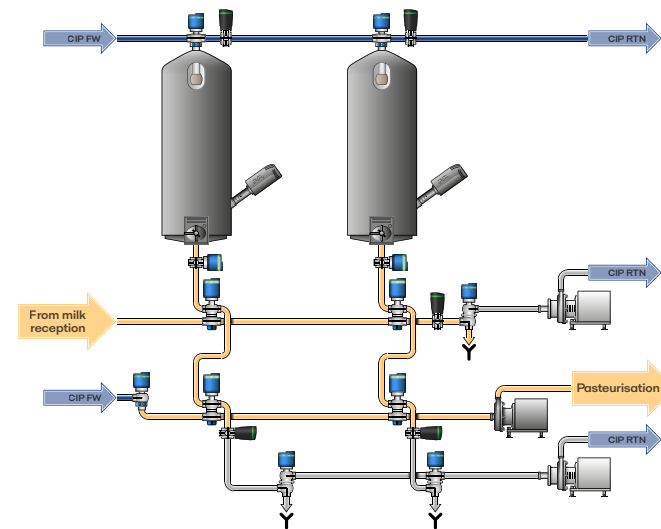


Image 3. Cleaning-in-Place.

Reduce capital expenditures and annual costs

Dairy owners and operators looking to cut initial investment costs as well as operating and maintenance costs should consider using the Alfa Laval LKH Prime Pump (Image 4). This advanced self-priming pump is a hygienic workhorse handling for CIP return duties where the liquid contains entrained air just as easily as other duties where require gentle product treatment is required.

Why use two pumps when a single Alfa Laval LKH Prime is versatile enough to do both jobs and deliver measurable savings to your plant.

As the Alfa Laval LKH Prime pump starts up, the centrifugal force generated from the rotation of the airscrew and the initial priming liquid causes the formation of a liquid ring in the pump head canister (1). This also fills the recirculation pipe (2), thereby achieving the initial prime.

This liquid ring is formed in the space between the diameter of the inlet pipe, therefore also to the centrifugal stage and the outer diameter of the canister housing the airscrew.

By design, the canister is offset from the center of the airscrew and the resultant liquid ring creates a water seal between the airscrew hub and the top of the canister (3).

Due to the offset design, an air column is created between the airscrew hub and the liquid ring at the bottom of the canister (1). The rotating vanes of the airscrew separate the air column into air pockets, which are forced through the canister into the impeller's suction stage.

Some of the initial priming liquid re-circulates from the casing discharge into the airscrew casing through the recirculation pipe (2). Until all the air has been evacuated, air pockets will continue to be generated.

When the air content is just a few percent, the air is contained as bubbles in the liquid. No air pockets are generated. Instead the liquid/air mix passes through the canister into the impeller's suction stage (4). Here, the pump acts as a traditional centrifugal pump, transferring the liquid through the discharge (5) at a higher velocity and pressure (image 5).

When there is no air present, the canister and recirculation loop have no function and are completely filled with liquid. The liquid passes through the canister into the impeller's suction stage. Here again, the pump acts as a traditional centri-fugal pump, transferring the liquid through the discharge at a higher velocity and pressure.

Saving energy, costs and improving the work environment

In summary. Compared to traditional liquid-ring pumps, the Alfa Laval LKH Prime Pump significantly contributes to three common focus areas in modern dairy processing:

- Reducing energy consumption
- Improving working environment
- Reducing installation cost

With the further benefit of spare parts commonality with the Alfa Laval LKH pump range and operational flexibility the Alfa Laval LKH Prime Pump is the obvious choice for pumping liquids containing entrained air.



Image 4. Alfa Laval LKH Prime Pump.



Watch how
the Alfa Laval
LKH Prime works

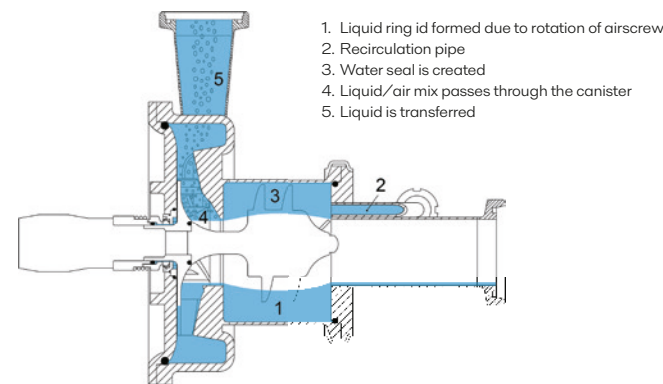


Image 5. Alfa Laval LKH Prime Pump.

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