



APV Cavitor Technology in Brewery, Beverage and RTD Processing

A NEXT GENERATION MICROSCOPIC MIXING AND SCALE-FREE HEATING TECHNOLOGY

The powerful forces of cavitation produce results that far exceed those of conventional technology

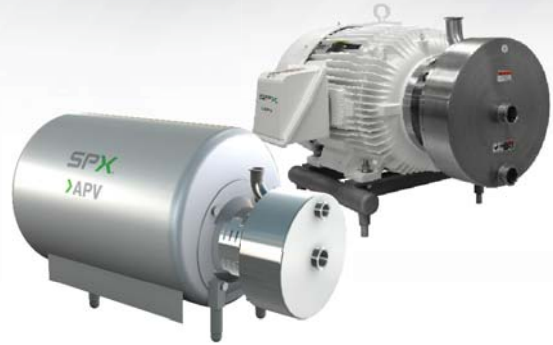
The APV Cavitor is a new breakthrough technology for very efficient microscopic mixing and scale-free heating based on controlled hydrodynamic cavitation. The Cavitor has a number of multiple functions and features that benefit beverage, beer and RTD (Ready-To-Drink) producers.

Controlled cavitation is an excellent solution for extraction of starch, which was commercialized in ethanol production years ago. This is also highly relevant in the brewery mashing process to release starch from the grains which becomes more available for fermentation, thus increasing the alcohol yield. Extraction of essence from the hops is another option for the Cavitor, as well as dispersion of hop oils in beer in the final stage of the process.

Gas dispersion is a unique feature of the Cavitor. Thanks to its efficient gas dispersion, ideal micro-bubbles are generated in the carbonation (CO₂) or the nitrogenation (N₂) processes in the final beer. O₂ is essential for yeast and a good dispersion of the O₂ promotes the fermentation process.

The CO₂ and N₂ enhance flavor, mouth-feel and shelf life in soft drinks, beer and cider, etc. when well dispersed as micro-bubbles. A potential exists to avoid foaming during filling, resulting in faster speed on the filling lines and reduced loss of beer. Enhanced quality and taste of coffee foam is another option.

Other key applications including the hydration of powder ingredients such as tea powder, dispersion and emulsification of citrus oils as well as gentle mixing of fruit pulp fibers. For drinks with high proteins and other fouling components, scale-free heating is another beneficial feature of the APV Cavitor.



Examples of APV Cavitor applications and benefits in brewery, beverage and RTD's processing

GEAR SIZE	KEY PROCESS / PRODUCT BENEFITS
Starch extraction in wort production	Increased starch yield in the brew house increases the alcohol yield
Powder mixing and hydration	Fast and gentle dissolving of ingredients like hydrocolloids, proteins, tea powders and others
Protein (WPC) functionalization	Microparticulation of WPC for enhanced functionality and taste in protein-enriched nutritional
Oil dispersion and homogenization	Efficient emulsification of citrus oil flavor and other oils/essences in beverages and RTD products
Mixing of pulp with fibers and further particulates	Efficient and gentle mixing of fruit pulp. E.g. citrus maintaining the fibers and secure stability
Gas dispersion in beer and beverage - CO ₂ , N ₂ and O ₂	Ideal micro-bubbles enhance beer fermentation and flavor, mouth-feel and shelf life of beer and beverage. It also enables increased speed of filling lines with less loss of products. Enhance coffee foam quality / taste
Scale-free heating / pasteurization	Pasteurization of protein drinks without fouling means long run time and lower CIP cost and OpEx.

The principle of the APV Cavitor

The heart of the technology is a rotor spinning in a liquid chamber. The rotor has a number of radial holes and the spinning action generates internal liquid frictions (disk friction) while the holes generate hydrodynamic cavitation. The cavitation creates high shear, ensuring a very efficient microscopic mixing effect and friction which generates controllable scale-free heating.



Use of the APV Cavitor in beer and beverage processing

Examples of Cavitor applications in beer, beverage, RTD and nutritional drinks appear in the table overview. There are undoubtedly more applications in pre-processing and in the main processing steps as well as mixing of post additions before filling.

The APV Cavitor can work as a single operation unit for functionalization of ingredients including hydration, pulp mixing and emulsification, or it can be fully integrated in a process line for gas dispersion and scale-free-heating. A unique and beneficial feature of the Cavitor is its ability to perform multi-functions in one single process step, e.g. scale-free heating in combination with dispersion, homogenization or emulsification.

SPX provides technical guidance for the most optimal process set up and process integration to obtain maximum overall benefits and value of the Cavitor.

Features and benefits of the APV Cavitor in beer, beverage and RTD processing

- Controlled cavitation can be used for extraction of starch to increase alcohol yield. Extraction of essence from the hops and dispersion of hop oils in beer are also a couple of other options.
- The Cavitor is very efficient for dispersion of any gas media like CO₂ and N₂ resulting in formation of micro-bubbles which enhance flavor, mouth-feel and shelf life in soft drinks, beer and cider. As it reduces foaming during filling, the speed of the filling line can be increased and the loss of beer reduced.
- Pre-emulsification of citrus and other oils helps reduce homogenization pressure and produces a more stable emulsion.
- The efficient and gentle microscopic mixing of e.g. gums, proteins and tea powders results in a complete hydration thus creating product savings, a shorter process cycle and lower OpEx. Gentle mixing of fruit pulps, maintaining fibers and ensuring stable products is another benefit.
- The Cavitor has no heat transfer surface, making the Cavitor a potential heating device for high fouling and heat-sensitive products like nutritional drinks with high protein, chocolate drinks, etc. The result is longer run time and shorter CIP cycles with lower OpEx.
- Other key features and benefits of the APV Cavitor:
 - Highly reliable and sanitary design meeting 3A and EHEDG standards
 - Low maintenance time and cost also contribute to the overall reduced OpEx.



SPX

SPX Flow Technology

611 Sugar Creek Road Delavan, WI 53115

P: +1 (262) 728-1900 F: +1 (2662) 728-4904

E-mail: ft.amer.info@spx.com

For more information about our worldwide locations, approvals, certifications, and local representatives, please visit www.spx.com.

SPX Corporation reserves the right to incorporate our latest design and material changes without notice or obligation. Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing.

16027-01-07-2013-US Issued 02/2015 COPYRIGHT © 2015 SPX Corporation