



MIRIS ULTRASONIC PROCESSOR™

Technical specifications

	Dimensions (HxWxL)	64 x 32 x 42 cm
	Weight	11 kg
S7	Power supply	110 V/240 V, 50/60 Hz
	Net power output	130 Watts
	Frequency	20 kHz
	Display	LCD
S6	Probe Titanium alloy	Ti-6Al-4V
	Probe size Length	138 mm, diameter Ø 3 mm
S4	Probe processing capacity	3-10 ml
	Standards	2014/30/EU Electromagnetic Compatibility Directive 2014/35/EU Low Voltage Directive 2011/65/EU RoHS 2 Directive UL/CSA/EN 61010-1:2013 3rd Edition

PRINCIPLE OF OPERATION

The power supply converts 50/60 Hz voltage to high frequency energy, which is transmitted as mechanical vibrations from the converter. The vibrations are intensified by the probe and make the probe tip oscillate in the length direction, creating pressure waves. Due to these pressure waves, microscopic air bubbles are created and disrupted within microseconds, a phenomenon called cavitation. When the air bubbles disrupt, the release of kinetic energy will break large fat globules into smaller ones. Small fat globules have less creaming tendencies and stay homogeneously distributed in the milk.

MILK HOMOGENISATION

Fat and proteins are the main structural elements of the milk system, and their chemical characteristics affect the milk as a solution. Milk fat is considered an oil-in-water emulsion, with fat droplets covered by a hydrophilic membrane. The milk proteins are a colloidal solution or dispersion in the milk plasma. Time, temperature and gravitation are some parameters that affect the chemical characteristics of these components, i.e. the milk fat will separate when allowed to stand, known as creaming [1]. Creaming of milk fat is faster at low temperatures due to cold agglutination [2].

Miris Ultrasonic Processor homogenises the milk using the cavitation phenomenon. Cavitation is the formation and collapse of air bubbles caused by pressure fluctuations. The collapse of air bubbles releases shock waves, causing damage to the surrounding particles [1]. The energy output from the Miris Ultrasonic Processor is approximately 20 J/s per ml of milk.

In milk, cavitation causes disruption of milk fat globules into smaller ones, and proteins are adsorbed onto the fat droplets, which improves the stability of the fat globules [1]. Ultrasound is more efficient when combined with heating [2].

REFERENCES

- [1] P. Walstra, J. Wouters, T. Geurts. Dairy Science and Technology, second edition, Taylor and Francis Group, Boca Raton, 2006.
[2] M. F. Ertugay, M. Sengul, M. Sengul, "Effect of Ultrasound Treatment on Milk Homogenisation and Particle Size Distribution of Fat", Turkish Journal of Veterinary Animal Science, vol. 28, pp. 303-308, 2004