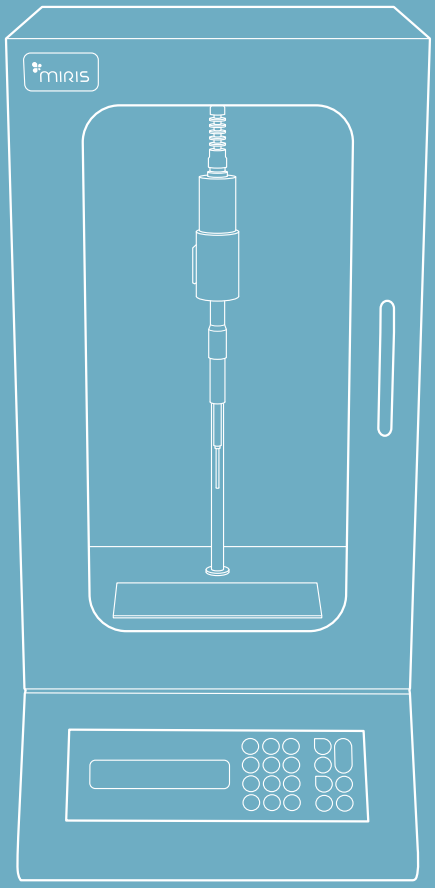
English

Miris Ultrasonic Processor



USER MANUAL

READ THE MANUAL BEFORE USING THE INSTRUMENT

PREFACE

Thank you for choosing the Miris Ultrasonic Processor.
Please read this manual carefully before starting to use the instrument.

S1 Miris Ultrasonic Processor is used for liquid processing, e.g. of milk. By the application of high-frequency ultrasonic waves, the milk samples will be homogenised in a simple and convenient manner.

Manufacturer contact information

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IMPORTANT USER INFORMATION

INTENDED USE OF THE MIRIS ULTRASONIC PROCESSOR

Miris Ultrasonic Processor reduces the particle size distribution in milk. This device is intended for use in laboratories by laboratory personnel.

WARRANTIES AND DUTIES

By operating this Miris Ultrasonic Processor, the USER and MIRIS agree to the following responsibilities, which constitute contractual warranties and conditions between MIRIS and USER for the maximum benefit and usefulness of the Miris Ultrasonic Processor.

MIRIS AB WARRANTS THAT IT:

- Knows of no defects in the construction of the Miris Ultrasonic Processor or its materials used
- Will replace or repair the Miris Ultrasonic Processor according to the guarantee in the product warranty

USER WARRANTS THAT:

- The Miris Ultrasonic Processor will be used according to the instructions given in the user manual
- The Miris Ultrasonic Processor will not be altered without written approval of MIRIS AB
- MIRIS will be notified immediately if any injury occurs in any association with the Miris Ultrasonic Processor, and will be allowed prompt and thorough examination of the Miris Ultrasonic Processor in question
- MIRIS will not be held responsible in cases of injury arising from use of the Miris Ultrasonic Processor:

    a. When the Miris Ultrasonic Processor is not used according to the instructions in this manual
    b. When MIRIS is not notified within 5 days of said injury

SAFETY INFORMATION ⚠

When mounting the probe, always clamp the converter housing. Never clamp the probe.

Make sure the Miris Ultrasonic Processor is properly grounded via a 3-prong outlet.

High voltage is present in the power supply. Do not remove the cover. Service can only be performed by an authorized service technician. Ask your local distributor or contact Miris.

Never operate the power supply unless it is connected to the converter.

Never secure anything to the probe.

Never touch a vibrating probe.

Never allow a probe to vibrate in air for more than 10 seconds.

Always use input voltage 100-132/198-264 V , 50/60 Hz.

SYMBOLS GLOSSARY

ISO 7000:2019 — Graphical symbols for use on equipment — Registered symbols

Symbol	Description
	Read the user manual
CE	Conformité Européene, European conformity
UK CA	United Kingdom Conformity Assessed
	Caution
	Manufacturer
REF	Catalogue number
SN	Serial number

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Chapter 1 INSTALLATION

S5

Figure 1. The Miris Ultrasonic Processor.

1. Sound reducing cabinet
2. Display and keypad

Figure 2. Inside the Sound reducing cabinet.

3. Height adjustment knob
4. Convertor housing
5. Probe

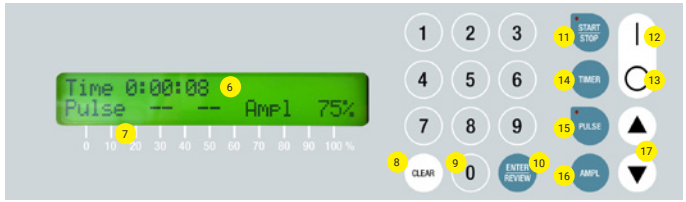

Figure 3. Display and keypad.

6. Display with current settings
7. Probe output power indicator
8. Clear
9. Digit input 0-9
10. Enter/Review
11. Start/Stop
12. On
13. Off
14. Timer
15. Pulse
16. Amplitude
17. Stepwise adjustment

ELECTRICAL REQUIREMENTS

The Miris Ultrasonic Processor requires a fused, single phase 3-terminal grounding type electrical outlet capable of supplying 50/60 Hz at 100-132 Volts, or 198-264 Volts, depending on the voltage option selected. For power requirements, check the label on the back of the unit.

Probe processing capacity
For efficient homogenisation, it is important to not exceed the processing capacity of the probe.
The 3 mm diameter probe is for milk volumes 3-10 ml.

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Chapter 2 SETTINGS

TIME

Processing time for human milk samples is 1.5 s/ml milk.
Calculate sample processing time in seconds by multiplying sample volume in ml by 1.5
Set sample processing time by pressing [Timer]
Use the key pad to enter sample processing time given as hours, minutes, seconds, in the format H:MM:SS, or use arrows (17) to step up/down in seconds
Press [Enter] to confirm
The set time is displayed

PULSE

Pulsating mode, Pulse, should be turned off.
Press [Pulse]
Press [Clear] to erase current setting
Press [Enter] to confirm
Pulse is now turned off, shown on the display as --

AMPLITUDE

Amplitude should be set to 75%.
Press [Ampl]
Use the key pad to enter 075
Press [Enter] to confirm
Amplitude is now set to 75%, shown on the display

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Chapter 3 OPERATING THE MIRIS ULTRASONIC PROCESSOR

This chapter describes how to use the Miris Ultrasonic Processor.
See Chapter 1 for start-up procedure and Chapter 2 for settings.

STANDARD OPERATING PROCEDURE

Equipment	Consumables
Miris Ultrasonic Processor	Miris Cleaner™ Emery cloth Sample container

Table 1. Standard Operating Procedure (SOP) for processing milk using Miris Ultrasonic Processor.

Set-up	Prepare working solution of Miris Cleaner™ Turn on the Miris Ultrasonic Processor by pressing [I]
Instrument preparation *See Chapter 2 and Chapter 4*	Check that amplitude is set to 75% and pulsating mode is turned off Set the processing time (1.5 s/ml) according to sample volume Make sure that the Miris Ultrasonic Processor probe is clean and that the tip is evenly polished
Sample processing	Use a sample container which will give a sample depth of at least 2 cm, see Figure 4, allowing some extra space for sample movement If using conical tubes, a tube holder is necessary to keep the tube upright and stable. If using a flat bottom or skirted tube, a tube holder or tube rack may not be necessary. Place the container with the sample in the Miris Ultrasonic Processor Sound reducing cabinet Adjust the probe height using the Height adjustment knob Immerse the probe into the sample Note! If the probe is lowered to an insufficient depth the sample will foam and/or splash, which should be avoided Centre the probe in the container Close the door of the Sound reducing cabinet Press Start [Start/Stop] The processing can be stopped at any time by pressing [Start/Stop] again After the processing is finished, remove the sample

Human milk (ml)	Time (s)
3	5
5	8
10	15

Cleaning *Full instructions in Chapter 4*	After each use of the Miris Ultrasonic Processor, wipe the probe with a tissue At the end of the day, wipe the probe and all contaminated areas with a cloth dampened with Miris CLEANER™ Polish the probe tip with a piece of emery cloth Turn off the Miris Ultrasonic Processor by pressing [O]

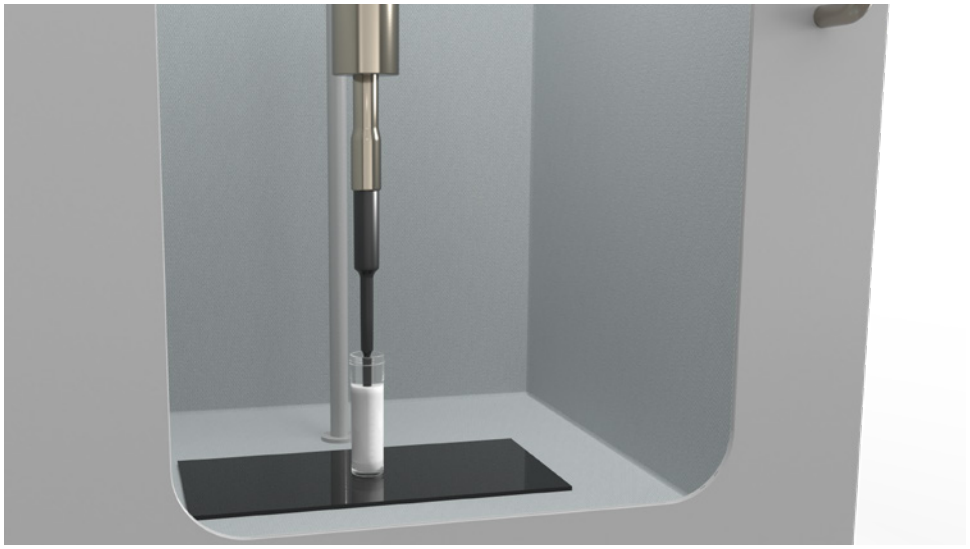

Figure 4. Sample container placement.

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Chapter 4 CLEANING ROUTINES

Miris Cleaner™ and emery cloth are necessary for proper maintenance of the instrument.

REQUIRED CONSUMABLES

MIRIS CLEANER™

Description: Cleaning solution (liquid concentrate).

Application: For cleaning of Miris instruments.

Storage: Store the concentrate dark, at room temperature (20-30°C, 68-86°F), sealed in the container in which it is supplied. Store the diluted solution in glass or plastic containers, out of direct sunlight. Do not freeze.

Instructions: Dilute 50 ml concentrate (1 tube) with 950 ml distilled or deionized water and mix. Follow the instructions in the section Instrument Maintenance.

The estimated time for preparation is 5 minutes for mixing the ingredients. The ready to use dilution should have a faint odour (soapy, chemical) and no colour.

Materials provided:	Materials required but not provided:
Liquid concentrate in 50 ml container	1000 ml glass or plastic container
	950 ml distilled or deionized water

Do not use if the liquid is cloudy or precipitations are visible.

Use before: Expiry date for unopened tubes is stated on the product label. Use solution within 3 months of preparation.

Environment and health: Small spillages may be flushed away with plenty of water to a drain or sewer. Miris Cleaner™ is biodegradable. Ready biodegradability by OECD 301E (ISO method 7287 - 1986(E)).

Non-hazardous. May be mildly irritating on the skin, in the eyes and in the respiratory system. In case of contact with eyes, rinse opened eye for several minutes under running water. Keep eyelids apart. Remove contact lenses if present. Consult a doctor if symptoms persist. In case of contact with skin, rinse with soap and water. If ingested, rinse the mouth with running water. Drink a few glasses of water. Consult a doctor if symptoms persists.

EMERY CLOTH

Description: Fine grit emery cloth.

Application: For polishing the Miris Ultrasonic Processor probe tip.

INSTRUMENT MAINTENANCE

To maintain the homogenisation efficiency of the Miris Ultrasonic Processor, it is important to clean and polish the probe after each use. Homogenisation efficiency is determined by the capability of the probe to transmit energy into the milk, and this capability will degrade in proportion to the degree of roughness of the tip surface. Any erosion of the probe tip, visible as dark spots or a ring round the outer edge of the tip, must therefore be removed by careful polishing with fine grit emery cloth. Polish off the eroded part only and no more, or the probe will wear out quicker.

PROBE MAINTENANCE

Wipe off the probe after every milk sample using a tissue.

Clean the probe with a cloth dampened with Miris Cleaner™ after finishing for the day.

Polish the tip (the flat end) of the probe with an emery cloth after each use. Make sure to polish the probe evenly, avoiding bevelled edges, and to completely remove any milk residues, see Figure 5.

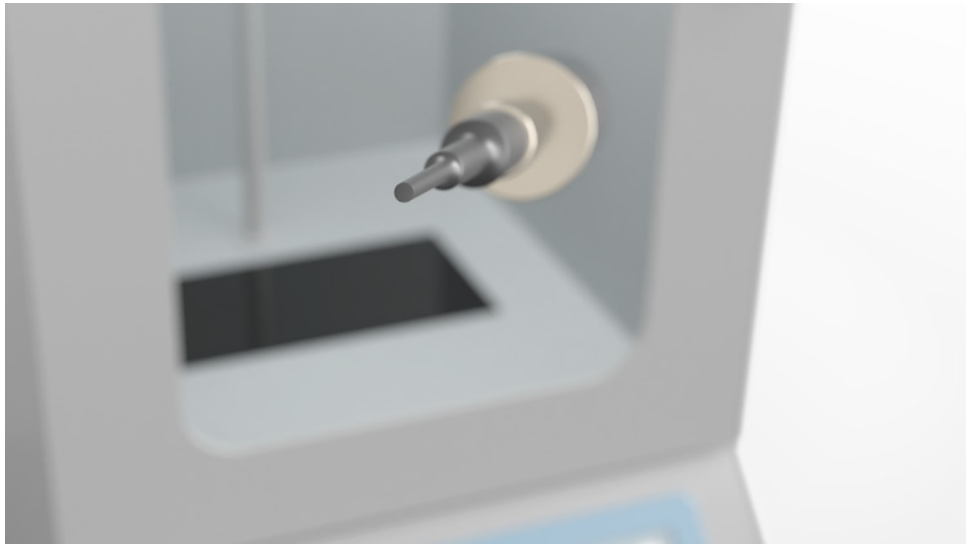

Figure 5. Polished probe tip.

INSTRUMENT SURFACE

Wipe spillages immediately. Clean the instrument surface and inside using a cloth dampened with Miris Cleaner™.

If necessary, a mild disinfectant can be used to clean the probe and the instrument surfaces.

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Chapter 5 TROUBLESHOOTING AND PROBLEM SOLVING

If any problem occur that you are unable to solve by referring to this manual, please contact your local distributor or Miris. When doing so, please include the serial number of your instrument. The serial number is printed on the label placed at the back of the Miris Ultrasonic Processor.

TROUBLESHOOTING

Table 2. Trouble shooting guide.

Error	Probable cause	Action	If the error persists
Error message "OVERLOAD" or the instrument stops working	The unit was plugged into an electrical outlet that provides a different voltage from that required The probe is not secured properly A fuse has failed	Check the voltage on the back of the instrument Make sure the probe is properly attached. Use two wrenches, hand-tightening is not sufficient Restart the instrument	Contact Miris (support@mirissolutions.com) or your local distributor
Foamy sample, uneven homogenisation	The probe is immersed at an insufficient depth Uneven probe tip Milk residues on the probe tip Eroded probe tip	Press [Start/Stop] to interrupt the current processing, adjust the distance of the probe so it is close to the bottom of the tube and start the processing again Clean and polish the probe tip as described in Chapter 4	Consider increasing the sample volume Contact Miris (order@mirissolutions.com) or your local distributor to buy a new probe

ABOUT MIRIS ULTRASONIC PROCESSOR

TECHNICAL SPECIFICATIONS

Table 3. Technical specifications of the Miris Ultrasonic Processor

Dimensions (HxWxL)	64 x 32 x 42 cm
Weight	11 kg
S7 **Power supply**	100-132 V/198-264 V, 50/60 Hz
S3 **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 61010-1:2010+A1:2019

WORKING PRINCIPLE OF THE INSTRUMENT

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 homogenously 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].

S2

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.

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