

FUNDAMIX®

Silent

Low noise agitation by oscillation without rotation



DrM

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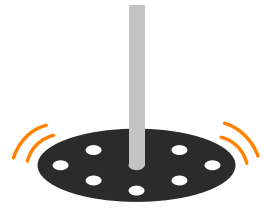


FUNDAMIX® **Silent**

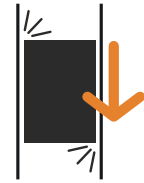
WHERE LIQUIDS
ARE SHAKEN,
NOT STIRRED

The FUNDAMIX® Silent is a sophisticated mixing device where the mixing effect is generated by high frequency vibration from an electromagnetic drive. The vibration is transferred through the length of a shaft to a perforated mixing plate with conical bores. The oscillation of the plate causes the liquid to be pumped through the conical holes, creating a vertical flow according to the Bernoulli effect.

Key Advantages



Effective & efficient vertical mixing



Low shear force



Very low noise levels



Simple installation



Long service life



No mechanical seal



No friction



No rotating parts



No vortex

And more:

- Reduced residual liquid volume due to low positioning of the plate
- Perfectly suitable for CIP/SIP
- High degree of containment suitable for pathogens and demanding applications
- No baffles required
- No lubricants required
- No damaging of life cells
- Low installation cost
- Low maintenance cost
- Low energy consumption

Main product features

Some of the main characteristics of the FUNDAMIX® Silent are low shear forces, the absence of rotating parts (no mechanical seal needed), very low power consumption, low maintenance costs, a simplified tank design (no baffles and no vortex breakers are required), as well as high reliability and a long life span.

The vertical mixing effect generates fast, homogenous product dispersion without a vortex. If no surface movement is desired, for example to reduce foam formation, a type B plate with downward flow is the best option. Alternatively, an extremely strong surface movement can be achieved in applications with light or even floating materials using type A mixer plate with upward flow.

The product is equipped with a simple membrane sealing unit that is perfectly suited for sterile environments thanks to the absence of friction and the ease of CIP/SIP. It can be used for pressures from full vacuum up to 5 bar g or even higher upon request.

If needed, an amplitude control system with a piezo sensor allows for measurement and adjustment of the amplitude to 0.1 mm accuracy.



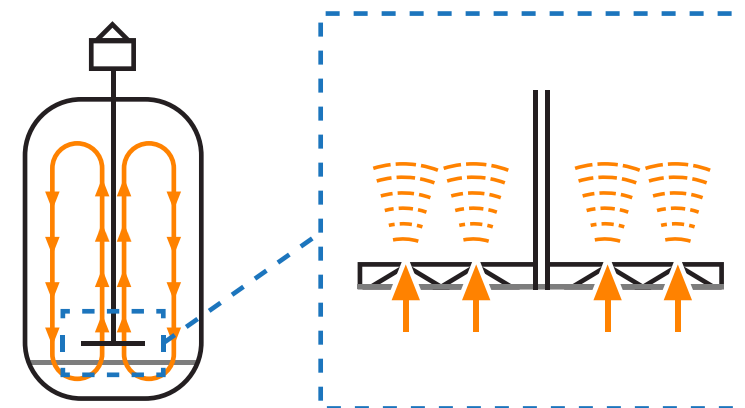
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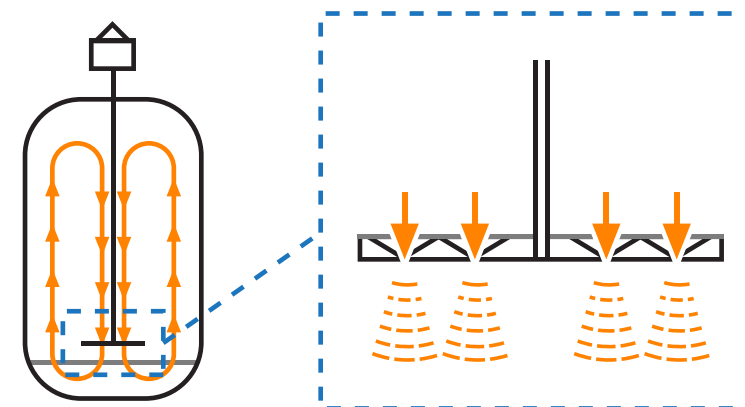
Function principles

Depending on the orientation of the conical bores and additional injections, different mixing types are available:



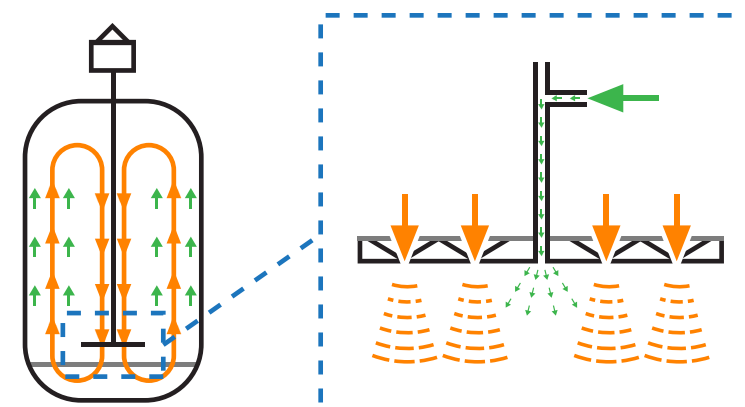
Mixing plate Type A

Type A with the conical bores facing upwards is the preferred standard. Type A has higher efficiency due to upward flow through the whole vessel. The plate can be mounted very low, so the mixable heel volume is reduced to a minimum.



Mixing plate Type B

Mixer type B with the conical bores facing downwards is chosen if the product tends to sediment, creates foaming or if no air is to be introduced during mixing. The distance to the bottom of the vessel is about the diameter of the plate.



Mixing plate Type B with gas dispersion

If gas is required then it can be injected through the shaft with mixer plate type B. The liquid flows downwards distributing the fine gas bubbles in the vessel generating an excellent gas dispersion. Another well proven set up is to inject the gas between two plates to break the bubbles.

Applications and industries



Chemical

- suspending of solids such as filter aid
- Fluidization of solids
- Dissolution of flavors and fragrances
- Catalysts, activated carbon or bentonite in liquids
- Precipitation or crystallization of solids during neutralization
- Gas/liquid batch reactions like hydrogenations and chlorinations

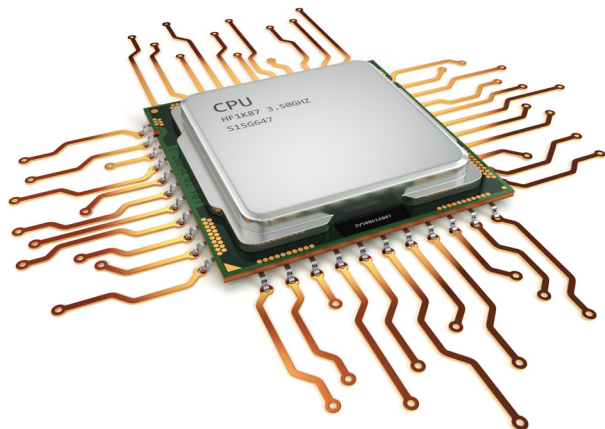
Agroscience

- Algae cultivation
- Animal health products
- Seed preparation



Electronics

- Preparation of solvents
- Dissolution of Copper with Sulfuric acid under high temperatures
- Plasma coating of fluorescent materials in fluidized bed reactor (CVD process)
- Mixing of anode materials in Lithium battery production
- LED production



Food & Beverage

- Mixing of soft drinks
- Blending alcoholic beverages
- Agitation of milk
- Beer ingredients preparation
- CO₂ saturation
- Addition of flavors, salt, sugar, vitamins and dyestuff

Pharmaceutical and cosmetics

- Insulin production
- Blood fractionation
- Preparation of sterile solutions
- Oil emulsification
- Cannabis extraction
- Homeopatics activation processes
- Mixing of injectable suspensions in sterile vessels for filling of vials



Microbiological and Biochemical

- Anaerobic/aerobic fermentations
- Submerge culture of mammalian cells
- Protein solutions
- Human tetanus and plant cells trypsinization
- Vaccines production
- Tetanus production



Supply capabilities

The FUNDAMIX® System is developed, designed and fabricated from the ground up in our production facility in Switzerland. Every unit is function tested and run for a specified period of time in water to make sure it fully complies to our stringent quality standards. Complete packages including mixing vessels and add-on equipment are built up according to client specifications and made ready for FAT in our workshop.

Production units

Our experienced engineers can assist for testing and scale up from the lab to the pilot plant and into the production environment. DrM with its worldwide network and partners offers a variety of services from simple design studies to turn key solutions.

Laboratory units

Every new application is developed in the lab. Our lab sets are equipped with various plates, all necessary accessories are available off the shelf and can be rented. We supply a basic laboratory set for installation on an existing vessel or a fully equipped system option, both standard FM-1 variants.



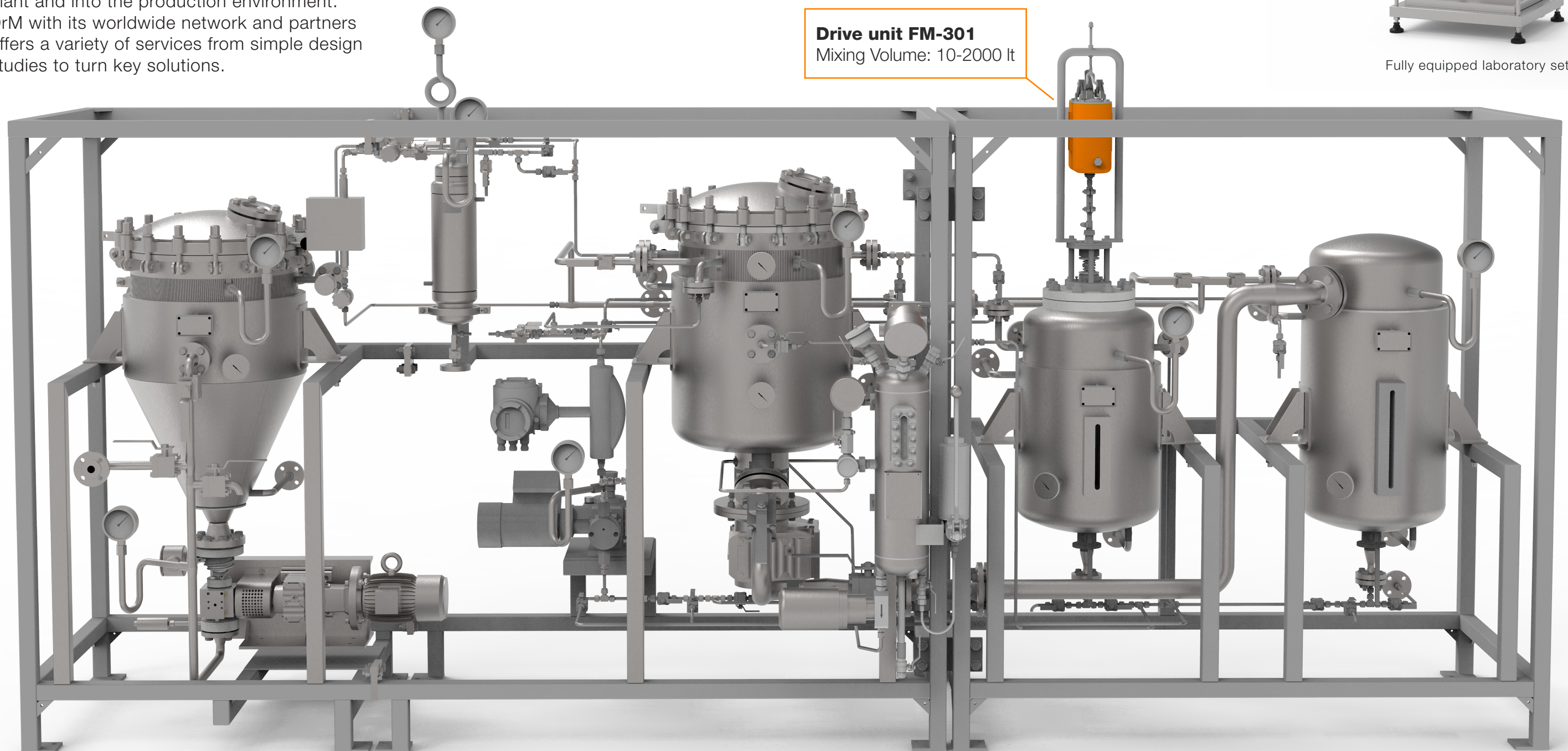
Basic laboratory set

Drive unit FM-1
Mixing Volume: 1-10 lt



Fully equipped laboratory set

Drive unit FM-301
Mixing Volume: 10-2000 lt

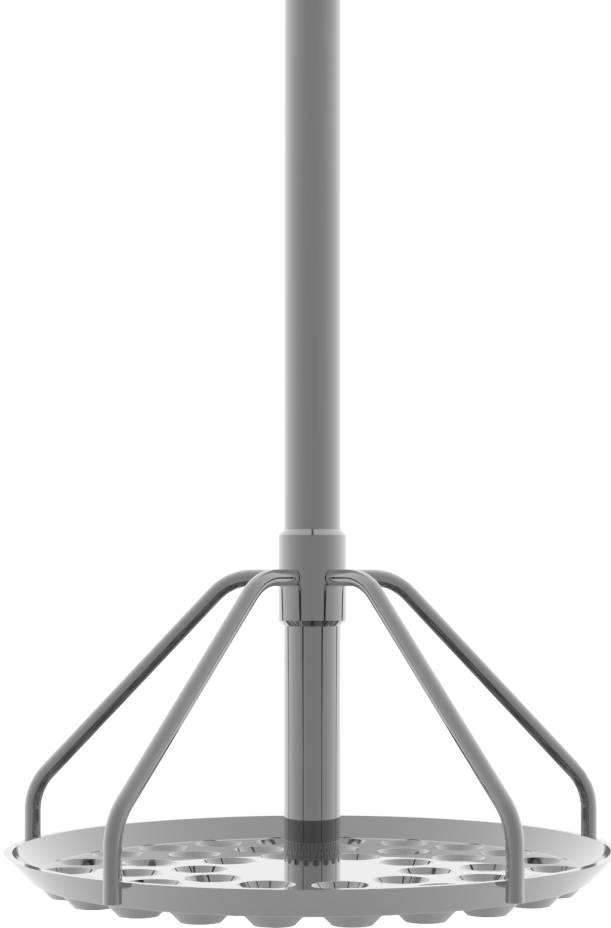


Key unit elements

Mixing device

FUNDAMIX® mixing devices are to be used for mixing, emulsifying, dispersing and homogenising liquids, to suspend solids in fluids or crystallisation and precipitation of solids, and for gas reactions such as fluid saturation.

The mixing plate is equipped with conical holes, and the fluid is conveyed upwards or downwards depending on the cone direction (tapered either upwards or downwards), due to Bernoulli's principle.



Membrane sealing units

The FUNDAMIX® membrane sealing unit range accommodates atmospheric, pressurised and vacuumed vessel conditions, from full vacuum to pressures up to 5 barg (higher protection available upon request).

The membranes and o-rings are available in a variety of materials to suit the application requirements.

For sterile environments, FDA, USP Class VI and 3.1 material certificates are available.



Suspension systems

The FUNDAMIX® drive is suspended from above via an assembly of rubber strips that dampen the drive vibrations and avoid excessive vibration transfer to the surrounding equipment.

Bespoke suspension systems can be supplied to accommodate difficult installations.



The FUNDAMIX® Silent Drive (pat.)

The FUNDAMIX® Silent drive applies the same and well-proven oscillation principle as its predecessor. However, the internal mechanics have been reengineered from the ground up. The original steel springs have been replaced with a very effective carbon composite material on a new suspension design which allows for a significantly improved operating frequency and amplitude range. Additionally, the unit runs extremely silent which makes it ideal for places with operator interactions.

The mixing intensity is defined by the frequency and amplitude in which the mixing device oscillates. By altering the supply voltage, the electromagnetic forces increase/decrease resulting in a higher or lower oscillating vertical motion.



Environmental conditions

Usage	Indoor, outdoor (upon request)
Protection Class	IP65
Ambient Temperature (operating)	0 / 45°C
Humidity range (operating)	0-95% (non-condensing)

Technical specifications

Motor type	Electromagnetic Vibratory Drive
Electrical connection	230 VAC, 50/60 Hz
Current rating	Max. 3.5A
Operating Voltage*	0-230 V
Operating frequency**	30-120 Hz
Amplitude range***	0-6 mm
Cable length	5 metres (Standard)
Construction material (housing)	Stainless Steel

*The operating voltage controls the amount of amplitude, the higher the voltage the higher the magnetic forces.

**It is recommended to operate the drive unit at the resonance frequency of the mixing system for optimal performance and energy efficiency.

***The amplitude range differs depending on the configuration and requirements of the mixing application, the mentioned range is a general indication of the achievable range.



Additional key unit elements

Amplitude Controller

The FUNDAMIX® Amplitude Controller is an instrument used to control and monitor the variable parameters that control the FUNDAMIX® drive unit, more specifically the amplitude and frequency at which the mixing device oscillates. With the addition of a piezo sensor the amplitude of the FUNDAMIX® is measured in real-time and three possible control configurations are predefined for integrating a PLC.

The Amplitude Controller can be ordered as a panel-mountable control box or integrated into a stainless steel control cabinet both of which are operated via a resistive LCD touch screen



Panel mounted unit



Control cabinet



Amplitude Monitor

The purpose of this hand-held instrument is to monitor the amplitude of the FUNDAMIX® plate.

This is done by measuring the change in distance from the instrument to a measuring plate connected to the shaft of the FUNDAMIX® at a rate of 1.5 ms.

The distance measurements are converted into a sine curve and through non-linear regression the amplitude and frequency are calculated.

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