FUST Lab.

DEBREX

Pharmaceutical Industry

Manufactured by FUST Lab. distributed in the UK and Ireland by **analytik**.

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DEBREX Nano Emulsion and Nano Dispersion

DEBREX is a specialized ultrasonic equipment designed for nano emulsions and nano dispersion, overcoming the limitations of conventional ultrasound technology. This ultrasonic device is capable of upscaling from lab-scale R&D, pilot projects into production scale.

- > Optimized drug stability in the body
- > Allows development of emulsifier-free formulation
- > Expertise in nanomedicine and drug delivery system
- > Designed for advanced manufacturing formulation and efficient production

Enhanced Stability in the Body

- > Capable of producing nanoscale particles
- > Capable of producing highly stable and uniformly dispersed nanoparticles

Drug Stability Increase

- > High stability through highly uniform nano distribution
- > Development of liposomes and drug delivery systems with **room temperature stability secured.**

Drug Efficiently & Bioavailability Increase

- > **Increasing bioavailability** through nano-medicine development
- > Increase transdermal absorption with **sub-50nm** formulation development

Improved dosing and absorption rate

- > **Uniform dosage control** through uniform nano particle distribution
- > **Emulsifier-free formulation** with minimal side-effect

Emulsifier-Free Formulation Development

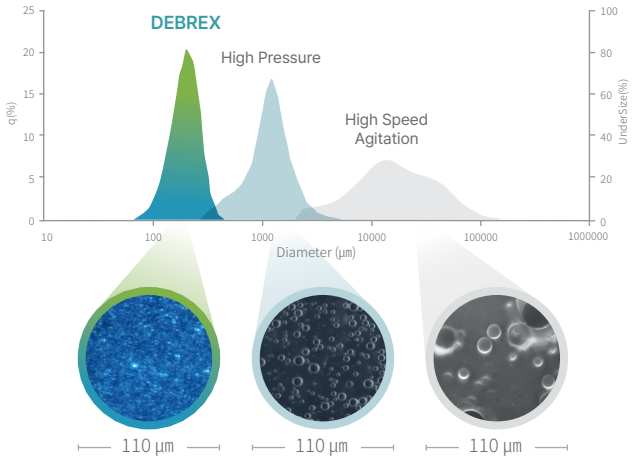
- > Stable emulsifier-free formulation production
- > Minimizes negative impacts of emulsifiers: allergenicity and enhance ingredient performance
- > High stability emulsifier-free formula

Optimized & Continuous Production Scale

1. Precise control via frequency and power controllers
2. Automatic resonant frequency detection for consistent result
3. Separate sample inlets to prevent cross-contamination
4. Integrated cooling system for controlled sample temperature
5. Automated cleaning system for efficient maintenance

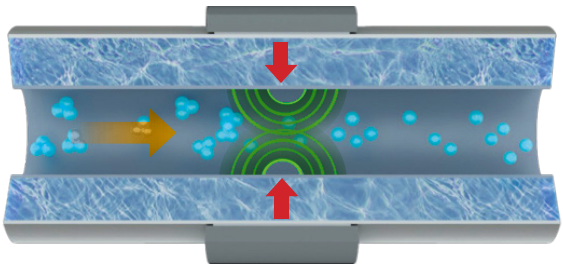
DEBREX Performance Data

More uniform and smaller in nano scale compared to other technology



DEBREX Ultrasonic Technology

FUST Lab's cylindrical ultrasonic processor concentrates energy at the center for uniform emulsification and dispersion under a controlled flow rate. The surrounding cooling system stabilizes temperature, preventing overheating and protecting the sample.



Display Control
- All functions controllable
- Flow rate control, Power/Frequency Control, Washing function, Real-time tracking, Cumulative usage time display

Metering Pump
- Accurate dosage control possible

Standard Pump

DEBREX LAB Lab Scale Equipment

(Specialized in Dispersion/Emulsion Formulation Development)

Dimensions & Weight

Focused Ultrasonic Processor	512mm(W) * 362mm(D) * 470mm(H) | 42kg
Generator	461mm(W) * 420mm(D) * 342mm(H) | 34kg
Display Controller	461mm(W) * 420mm(D) * 241mm(H) | 19kg

Performance Specification

Power	• Controller Input Voltage : AC100V ~ 240V, 50/60Hz • Generator Input Voltage : AC220V, 50/60Hz • Power Consumption : AC220V(1.1kW) • Current : AC220V(5.0A) • Power Type : Single-phase
Operating Frequency	350kHz ~ 420kHz
Output Power	MAX 100W
Solvent Pump	Flow Rate : 0~100mL/min(resolution: 5mL/min)
Syringe Pump & Syringe	• Input Flow Rate : 0.5 ~ 5.0mL/min (resolution: 0.1mL/min) • Output Flow Rate : 0.3 ~ 5.0 mL/min (resolution 0.1mL/min) • Syringe Volume: 5mL
Cooling System	External Cooling Circulator Required

DEBREX SS Pilot Scale Production

Basic Specification

Specification	Details
Dimensions & Weight	• Focused Ultrasonic Processor - 915mm(W) * 520mm(D) * 340mm(H), 42kg • Generator_V2 - 915mm(W) * 520mm(D) * 340mm(H), 42kg • Controller_V2 - 485mm(W) * 530mm(D) * 230mm(H), 19kg

Performance Specification

Specification	Details
Power Specifications	• Input Voltage: AC100V ~ 240V, 50/60Hz • Power Consumption: 880W(AC220V), 700W(AC100W) • Current: 4A(AC220V), 7A(AC100V) • Power Type: Single-phase
Operating Frequency	350kHz ~ 420kHz
Output Power	MAX 100W
Solvent Pump	• Flow Rate: 0~500mL/min
Syringe Pump & Syringe	• Input Flow Rate: 0.5 ~ 500mL/min • Output Flow Rate: 0.5 ~ 100mL/min • Syringe Volume: 50mL
Cooling System	External Cooling Circulator Required, see specifications

DEBREX PX Production Scale Equipment

Continuous Production System

> Capable of producing more than 500kg of nano formulation per day
> 8 different inlets to eliminating extra step of pre-processing
> High room temperature stability formulation to decrease cold-chain logistic costs
> Can provide necessary documents for GMPcertification

Increased Efficiency with Automation

> Automated washing feature to increase productivity
> Auto resonant frequency check eliminating staffing
> In-line continuous process that reduces loss-rate
> +30 days operation through temperature control

DEBREX PX Production Scale Equipment

Basic Specification

Specification	Details
Dimensions & Weight	• Focused Ultrasonic Processor - 1250mm(W)* 900mm(D) * 1530mm(H)(Door Open: 2200mm(H)). 313kg • Control RACK : 700mm(W) * 900mm(D) * 1820mm(H), 1SET(260kg) - Generator_V2 : 580mm(W) * 530mm(D) * 230mm(H), 25kg * 4SET - Controller_V2 : 580mm(W) * 530mm(D) * 230mm(H), 19kg * 1SET - Power Supply : 580mm(W) * 530mm(D) * 125mm(H), 12kg * 1SET

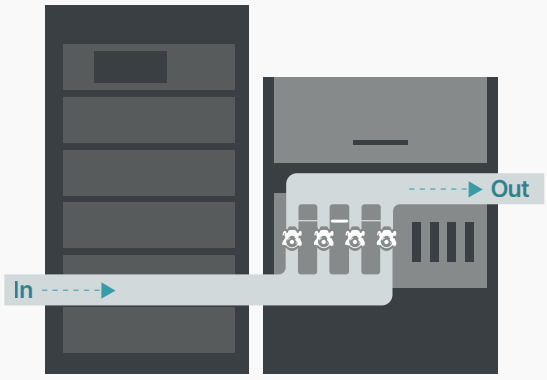
Performance Specification

Specification	Details
Power Specifications	• Input Voltage : AC100V ~ 240V, 50/60Hz • Power Consumption : 3.5kw(AC220V), 2.9kw(AC100V) • Current : 16A(AC220V), 29A(AC100V) • Power Type : Single-phase
Operating Frequency	350kHz ~ 420kHz
Output Power	MAX 100W
Solvent Pump	• Flow Rate : 0~500mL/min • Solvent Pump : 4ea
Syringe Pump & Syringe	• Input Flow Rate : 0.5 ~ 500mL/min • Output Flow Rate : 0.5 ~ 100mL/min • Syringe Volume : 50mL • Syringe Pump : 4ea
Cooling System	External Cooling Circulator Required, see specifications

Applications

> Can be seamlessly linked to an existing batch production line

> Once the equipment specification has been optimized into the manufacturing **process, in-line continuous operation possible**



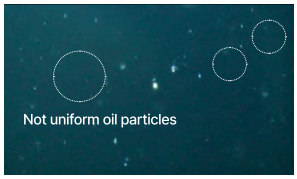
Pharmaceutical Industry

Surfactant-free eye-drop

Testing condition

> Oil : tocopheryl acetate
> Solvent: distilled water
> **No surfactant**

Tocopherol dispersion test result
-Microscopic image of tocopherol dispersion-



Eyedrop with surfactant for sale

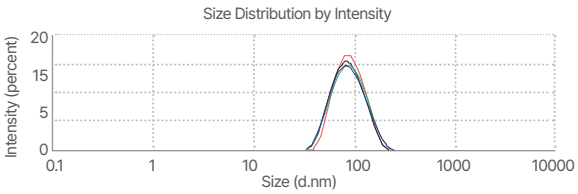
Surfactant-free eyedrop produced using DEBREX

Conventional eyedrop's tocopherol content: 0.05%
+ Surfactant must be added

DEBREX
- High concentration tocopherol (0.5~1%) content without surfactant

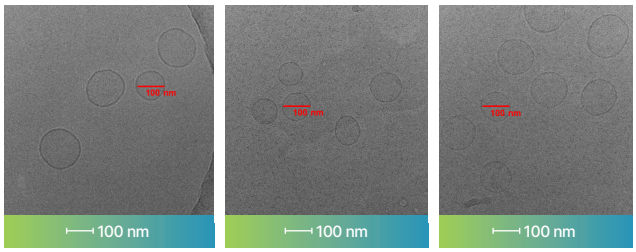
Nano Liposome production

Stability Test Result : 3 months of room-temperature stability secured without reaggregation Size Distribution by Intensity



	Z-Average(d.nm)	PDI
Stay 3 days	81.76	0.102
Stay 30 days	81.83	0.114
Stay 60 days	80.61	0.129
Stay 90 days	80.14	0.129

Uniform 80nm sized liposome production

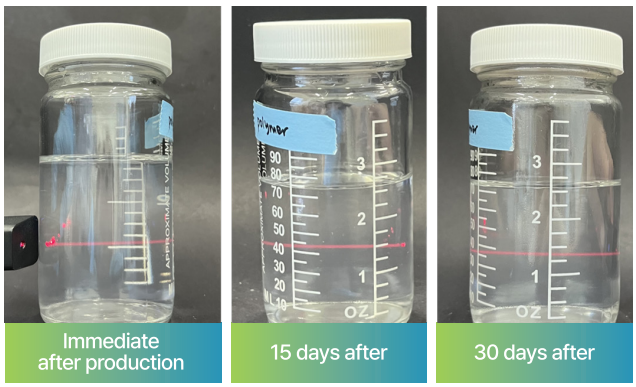


Cryo-TEM image analysis of Nanoliposome produced by DEBREX

Polyethylene glycol (PEG) lipid production

> LNP capsule development
> LNP capsules ensure the stability of lipid nanoparticles in the body
> Uniform size and stability after manufacturing are crucial

Storing Period	Particle Size	Distribution
Post-Manufacture	82.4 nm	0.32
Post 15 days	89.2 nm	0.25
Post 30 days	76.1 nm	0.29



Maximized Drug Absorption and Stability with High-Performance Emulsification and Dispersion Technology

> Emulsification and dispersion technology is a core manufacturing process that not only plays a crucial role in **Drug formulation development, determines drug stability and rate of absorption and bioavailability**

> FUST Lab's DEBREX utilizes high-performance emulsification and dispersion technology to achieve **uniform dispersion of substances without surfactants**

> Furthermore, DEBREX **maximizes drug absorption** and **stability in the body**, ensuring a **more stable** and sustained therapeutic effects.

Sales Representative

Our sales team go beyond simply selling equipment-we strive to be a true partner to our customers. By deeply understanding our clients' needs and leveraging our technical expertise, we help maximize the performance and impact of our technology, ensuring the best possible outcomes together.

Application Team

With years of accumulated expertise and research experience, we actively contribute to formulation development across various industries. We are committed to continuous R&D, always striving to exceed customer expectations

Equipment Team

Our dedication to innovation drives us to develop increasingly advanced equipment with ongoing updates and improvements for our clients.

Quality Assurance and Manufacturing

Through a rigorous quality control and assurance system led by experienced QC & QA professionals, we maintain full transparency in our manufacturing process and uphold strict quality standards. We are committed to delivering equipment with the highest level of reliability and stability.

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