DeBEE 2000

EMULSIFYING
CELL RUPTURE
DISPERSING
GRINDING

BEE INTERNATIONAL
ERATION HOMOGENIZERS

New Patented Technology

Ultra High-Pressure Homogenizer with Modular Homogenizing Cell

- Unprecedented Performance
- Unmatched Results!
- Size Reduction to Nanometers
- Cell Rupture with the Highest Yield
- Handles Abrasive and Viscous Materials

Important Information

Customer: SICOR Pharmaceuticals

Serial Number: 2527

Emulsifying Cell

Type: EC5

Nozzle: 0.15 mm (0.006"), Diamond

Seals: PEEK

Reactors: 1.0 mm

Software Version: 1.23

Special Options:

:OPT-EP1 Sanitary Electro-Polished System - Sanitary process system, including sanitary priming valve (OPT-SPV), sanitary back-pressure transducer (OPT-BPT3), and sanitary back-pressure controller (OPT-BPC1)

- Electro-polished product contact surfaces

- Special coating and alternate materials of construction eliminate need to use anti-seaze compound

Company Background

BEE International Co. specializes in micro mixing of fluids. In an innovative and highly advanced process, unmixable liquids of different material structure and viscosity are dispersed one in another, such that completely homogenous dispersions and emulsions are formed. Such products form the backbone of many industries such as the Pharmaceutical, Chemical, Biotechnology, Cosmetic and Food industries.

Our **DeBEE 2000 mixing system** is capable of producing exceptional results. A uniquely innovative design, the DeBEE 2000 can accommodate an extensive variety of types of material, in a mixing system of modular design, which is capable of handling almost any specific product requirement.

Compliance Standards

This document and the information contained herein are proprietary to **BEE International** and are furnished to the recipient solely for use in operating and maintaining **BEE International** equipment.

The information within may only be utilized as stated herein, and may not be disclosed to third parties without written permission from Bee International. **Bee International** reserves the right to make changes to any technical specifications in order to improve reliability, function or design.

Copies and Adaptations: This manual may not be copied or reproduced without permission from BEEI. BEEI is not responsible for unauthorized adaptations to this manual.

Design Modifications: BEEI has made every effort to provide you with an up to date version of this manual. However design changes and improvements are continuously made to the DeBEE 2000. This is part of our effort to provide the Best Emulsifying Equipment. Therefore, this manual is subject to change without notice. Contact your BEEI representative for the latest version of this document at any time.

Technical Specifications

1.	**Model No:**	DeBEE 2000 (Ver. 3)
2	**Overall Dimensions**	
	Width	134 cm (150 cm with open shelf)
	Depth	60 cm
	Height	121 cm (134 cm with inlet reservoir)
3	**Approximate Weight**	450 kg
4	**Maximum Operating Pressure**	3,100 kgf/cm^2 (45,000 PSI)
5	**Maximum Flow Rate** **Important** Actual flow rate will vary depending on operating pressure, product viscosity, and nozzle type.	1 liter/min.
6	**Maximum Product Inlet Temp**	80°C
7	**Product Inlet Connection**	1 liter Reservoir or 1" Tri-Clover
8	**Product Outlet Connection**	Tube, 1/4" O.D.
9	**High Pressure Pump**	Two Single-Acting Intensifiers
10	***Pre Heating (Optional)***	
	Heating Element	*220V, 50/60/Hz, 3kW*
	Heating Medium.	*Oil*
	Max Allowable Temperature	*200°C*
	Product Tubing	*(2) 3/8" H/P Coil, Each 6 m Lg.*

11	**Post-Cooling – Heat Exchanger**	
	Coolant (customer supplied)	Chilled Water @ 10 °C maximum
	Product Tubing	(1) Coil, 1/4"M/P x 6-m lg
	Coolant Ports	1/4" BSP (suitable for 1/4" MNPT)
12	**Seals Materials:**	UHMWPE, Viton, PTFE
13	**Materials of Construction:**	
	Direct Product Contact	Type 316 SS, Type 17-4 PH SS, Tungsten Carbide, Alumina, Zirconia
	Indirect Product Contact	300 Series Stainless Steel, PEEK, Glass-filled PEEK
14	**Electric Motor**	220/380 V, 50/60Hz, 3-phase, 7.5 kW
15	**Hydraulic Pump**	Variable Displacement Piston Pump, Pressure Compensated
16	**Accumulators**	
	1) 0.75 liter capacity	30 kgf/cm2 Nitrogen Pre-charged Pressure
	2) 0.75 liter capacity	80 kgf/cm2 Nitrogen Pre-charged Pressure
	3) 1.5 liter capacity	4 kgf/cm2 Nitrogen Pre-charged Pressure
17	**Required oil**	
	Hydraulic Power Unit	
	Capacity	80 Liter
	Viscosity	310 SSU @ 38°C
	Type (examples):	Mobil DTE-26, Shell Tellus 68, Texaco Rando HD-68
18	**Required Electric Supply**	

	when optional Heater is NOT installed	220V, 50/60 Hz, 3 phase, 30 A ; OR 380V, 50/60 Hz, 3 phase, 20 A
	when optional Heater is installed	220V, 50/60 Hz, 3 phase, 45 A ; OR 380V, 50/60 Hz, 3 phase, 35A
19	**Required Oil Cooling** (for continuous operation of more than one hour)	
	Coolant	Water
	Min. Coolant Flow Rate	1 l/min
	Max. Coolant Temperature	30°C
	Inlet/Outlet Ports	1/2" BSP
20	**Recommended Intensifier Seal Purging** (for applications containing solids)	
	Coolant	Solvent compatible with seals material
	Min. Flow Rate	10 ml/min
	Max. Fluid Temperature	30°C
	Inlet/Outlet Ports	1/8 FNPT

How to Read this Manual

In this manual, the following symbols are used:

WARNING:
This symbol indicates a potentially hazardous situation that might result in death or serious injury when you misuse the machine without following instructions under this symbol. Be sure to read the instructions.

CAUTION:
This symbol indicates a potentially hazardous situation that might result in minor or moderate injury or property damage when you misuse the machine without following instructions under this symbol. Be sure to read the instructions.

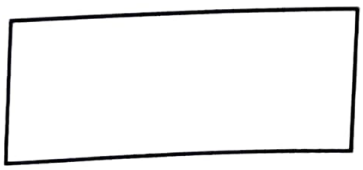
* The statements above are notes for your safety.

Important
This symbol indicates an important instruction, which, if not followed may result in a problem. Be sure to read this.

Note
This symbol indicates something you should take notice of.

Contact
This symbol indicates you should contact your BEEI representative to questions specific to your application.

Reference
This symbol indicates a reference.



This box indicates the PLC display. Text within this box will be displayed on the PLC screen.

Important Safety Information

WARNING:
This manual should be read in its entirety before operating the DeBEE 2000. Everyone working with the DeBEE 2000 should be familiar with all the machine's functions and controls.

Contact
Contact your BEEI representative with any questions you may have before attempting to install or operate the DeBEE 2000.

WARNING:
The weight of the DeBEE 2000 is approximately 450 kg. Never attempt to lift this equipment without the appropriate equipment, such as a suitable forklift.
Reference
Refer to Technical Specifications for more accurate weight.

CAUTION:
Do not make any unauthorized alterations to the equipment or components.

CAUTION:
Do not use damaged BEEI equipment.

Contact
If there is any chance that your equipment may be damaged, and you are not sure, contact your BEEI representative.

WARNING:
For personal safety, take the following precautions near moving parts on the DeBEE 2000 system:

- Keep loose clothing, hanging materials and hair away from moving parts.
- Keep hands, fingers and other body parts away from moving parts of the system.

CAUTION:
Always operate the DeBEE 2000 with all protective covers in place.

CAUTION:
Follow the manufacturer's recommendations and procedures for servicing the equipment.

CAUTION:
Only use replacement parts supplied or approved by BEEI.

WARNING:
Before performing any service or maintenance, (including tightening or adjusting fittings), always ensure:

- The system is turned OFF.
- The system pressure is relieved.
- The electric power supply is disconnected.

CAUTION:
Before connecting the electric plugs, always ensure that the main power switch on the DeBEE 2000 is turned OFF.

CAUTION:
Do not unplug the electric plug while the machine is operating.

CAUTION:
The priming valve must always be either fully opened or tightly closed. A small leakage through the valve will cause permanent damage to the valve in a few seconds.

CAUTION:
All high-pressure components have weep holes for leaking fluid. Regularly inspect the system for leaks, and stop operation immediately when noticing any leaks. Due to the high pressures under which this system operates, even very small leaks will destroy sealing surfaces in few minutes.

CAUTION:
To stop leakage, tighten the leaking fitting/s to the torque specified in the appropriate section of this document. Do not over-torque.

CAUTION:
Product outflow from the DeBEE 2000 may be extremely hot.

CAUTION:
The following are important safety precautions concerning hydraulic oil and your DeBEE 2000 system:

- The DeBEE 2000 system is shipped without hydraulic oil in the reservoir.
- The reservoir must be filled with compliant hydraulic oil before the machine is turned on.
- Damage to the pumping system may occur if the DeBEE 2000 is turned on without the proper amount of hydraulic oil in the system.
- The hydraulic oil must be removed from the system before it is tilted or shipped.
- Never add or remove hydraulic oil while the machine is operating.

- Do not open the valve on the hydraulic oil tank while the machine is operating.

Important
The DeBEE 2000 should always be stored in a clean condition without product materials left in the system.

DeBEE 2000 Homogenizing System

A versatile device, the DeBEE 2000 provides the product developer with a high level of flexibility and ease in formulating new and novel emulsions, dispersions, and liposomes and for cell rupture. In pilot or small production facilities, the DeBEE 2000 is efficient, reliable and capable of producing unmatched results in mixing, blending and size reduction.

DeBEE 2000 Processing

Power is supplied to the DeBEE 2000 by its **Hydraulic Power Unit**. This unit consists of standard components such as a pressure-compensated variable-displacement piston pump and an electric motor.

Our unique **High Pressure Pumping System** takes the power supplied by the Hydraulic Power Unit and increases it by an order of magnitude. Product is pulled in from the product inlet, through the high-pressure cylinders, and pumped out as a high-velocity jet strong enough to cut metal.

This powerful jet enters BEEI's patented **Emulsifying Cell, (EC)**. Inside the EC the forces of shear, cavitation and impact break down, mix and blend, producing a thoroughly mixed product with significantly smaller particles and a uniform distribution.

Guide to Components and Connections

Front View

Note

Optional equipuipment are shown in the Appendix section.

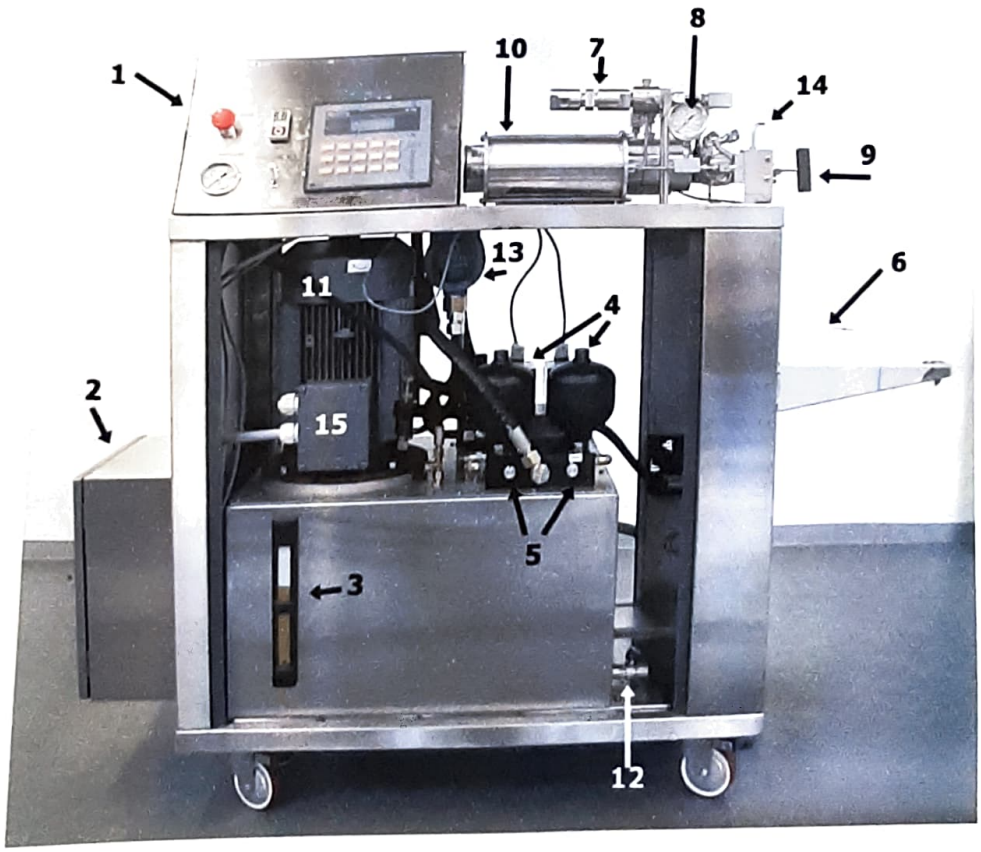


Figure 1: Front View

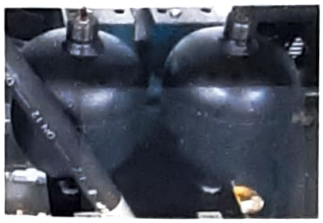
Front View Legend:

1 Control Panel – described in detail below

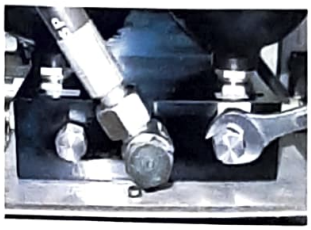
2 Electrical box

3 Hydraulic oil levl gauge with temperature gauge

4 Hydraulic accumulators



5 Manual Valve 1 and Valve 2



6 Shelf

7 EC

8 Back pressure gauge

9 Metering valve

10 Standard Heat Exchanger |(HX)

11 Motor

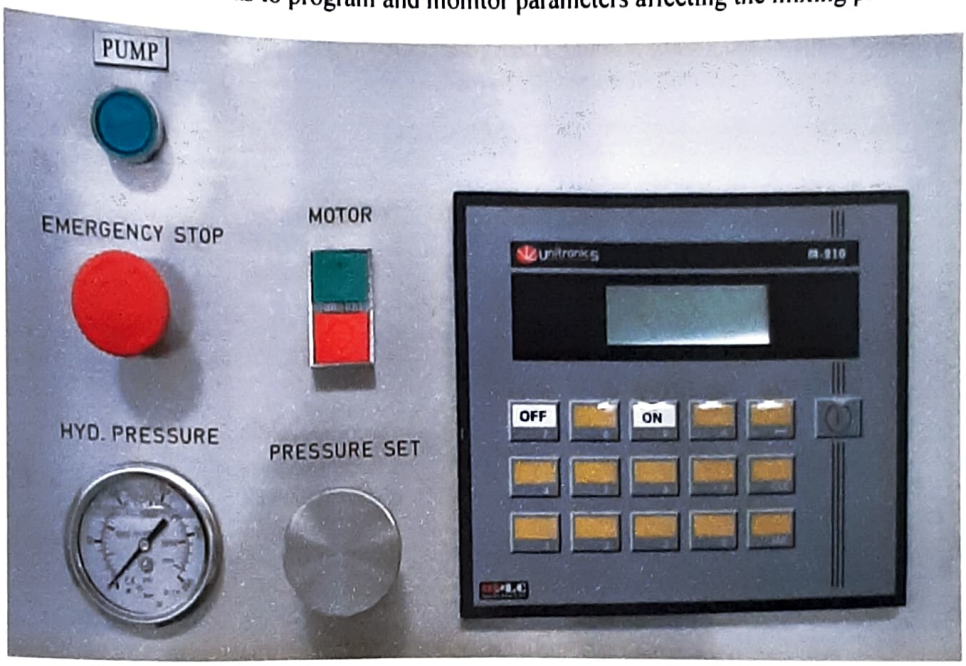
12 Hydraulic oil valve (for draining the hydraulic oil tank)

13 Hydraulic cooler

14 Product outlet

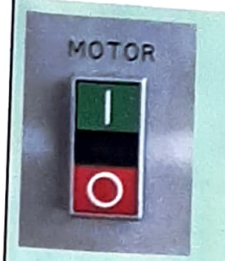
15 Motor connection box

The DeBEE 2000 control panel provides the operator with a user-friendly way to operate the machine, as well as to program and monitor parameters affecting the mixing process.



The Control panel includes the following devices:

	**Emergency Stop**	This red button is used to quickly end all operation and disconnect power from the machine. Push this button to halt operation. To continue operating the machine, turn the button clockwise, as indicated by arrows, and the button will pop up. To allow normal operation, press on the PLC the [i] key and the [←→] key at the same time.
	**Programmable Controller (PLC)**	The PLC provides numerous control and monitoring functions. It is described in detail below.
	**Dual Feed Pump (Optional)**	If your system includes the Dual Feed option, this button will be on your control panel. This button is used to turn the Dual Feed pump on and off.



Motor

The MOTOR switch turns on and off the electric motor and the hydraulic pump. Press the green (I) button to turn the motor ON, and the red (0) button to turn the motor OFF.

Pressure Setting

This stainless steel knob is used to determine the operating pressure of the DeBEE 2000. Turn this knob clockwise to increase operating pressure, and counter-clockwise to decrease pressure.

Hydraulic Pressure Gauge

This pressure gauge displays the pressure of the hydraulic system.

Rear View

Note

Optional equipuipment are shown in the Appendix section.

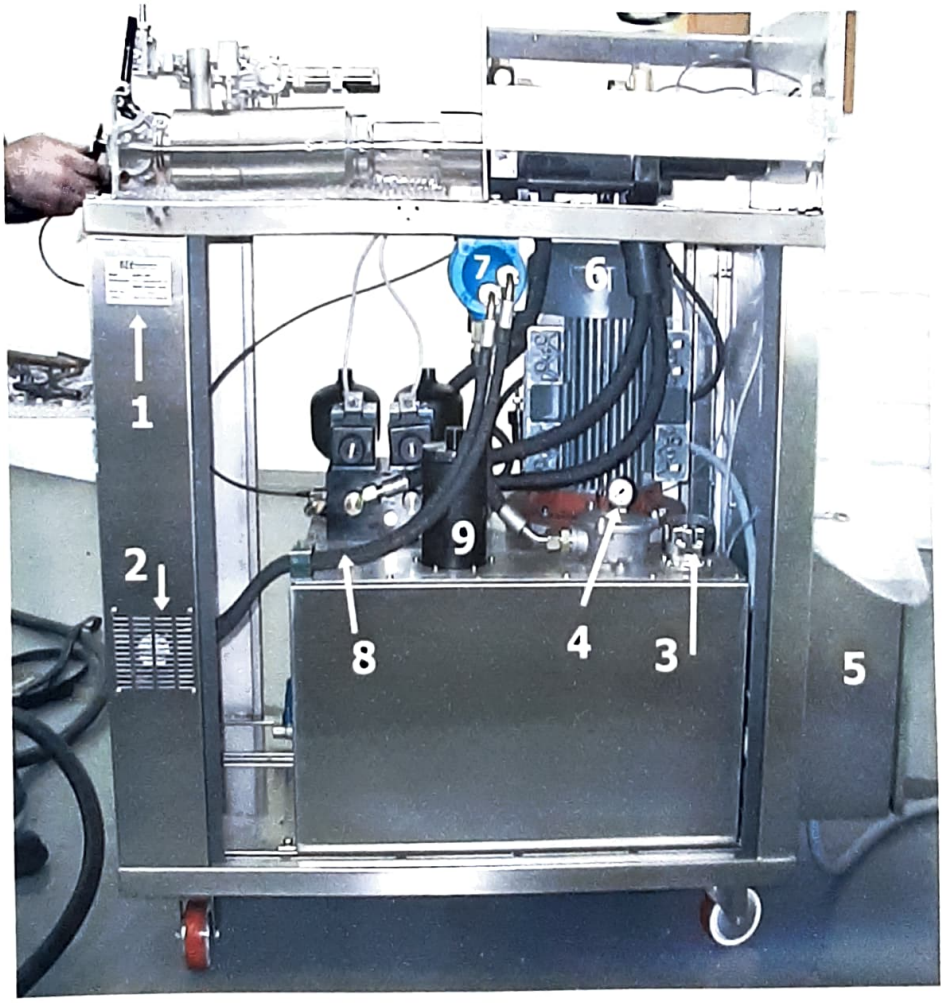


Figure 2 : Rear View

Rear View Legend

1 BEEI Label – contains important product information

2 Fan (for cooling the DeBEE enclosure)

3 Hydraulic oil filler / breather

4 Hydraulic oil filter

5 Electric box•

6 Motor

7 Hydraulic cooler

8 Hydraulic cooler water hose

9 Accumulator for the Return Stroke Circuit (RSC)

Side View (left of front view)

Note

Optional equipuipment are shown in the Appendix section.

Legend:

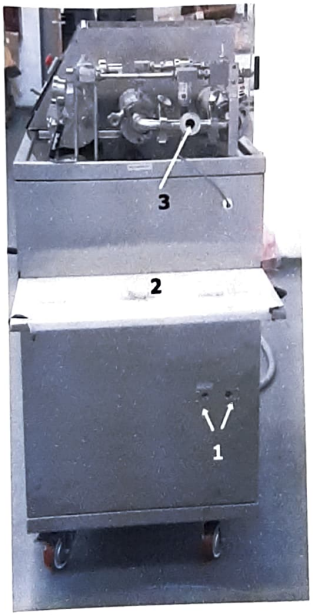
1	Electric box
2	Electric box locks
3	Main ON/OFF switch
4	Electric cable
5	Service holes

Figure 3: Left Side View

Side View (right of front view)

Note

Optional equipuipment are shown in the Appendix section.



Legend:

1 Hydraulic coolant Ports (1/2" BSP)

2 Shelf

3 Product Inlet (1" Tri-Clover)

Figure 4: Side View - right