

Alfa Laval MB 20 Bactofuge

Disc stack separation system for biopharma and fermentation processing

Introduction

For more than 100 years, Alfa Laval has been supplying separators for various industries. Today, Alfa Laval has the most complete and diverse offering of separators – each fully optimized for its specific duty and supplied with all auxiliary systems and key components.

The use of separators in biopharma and fermentation processes is not new. Based on long experience in these industries, Alfa Laval separators are specially designed for the requirements and demands of this industry.

Application

The MB 20 Bactofuge is a high-performance separation system, specifically designed and optimized for biopharma applications. It is used for removing suspended solids from a liquid having lower density than the solids. Applications involving liquids with tendency to foam generation or with products sensitive to shear forces can also take advantage of the hermetic feature offered by these machines.

Typical separation applications are the following:

- Bacteria separation
- Probiotics separation
- rDNA production
- Cell cultures separation
- Vaccines production
- Bio-based processing

Benefits

- Scalability to larger production volume
- Gentle treatment of the product
- Easy to operate
- Plug-and-play installation
- Small footprint
- Continuous heavy phase removal
- Sanitary design
- Low temperature pick up through the machine

Design

The pilot scale MB 20 Bactofuge system consists of a skid mounted disc stack separator with integrated direct drive, process & service liquid components, and electrical & control system with touch screen HMI.



The disc stack separator is based on Alfa Laval's fully hermetic concept with bottom fed inlet. This design is ideal for gentle processing of shear sensitive particles, preventing formation of emulsions, and preventing lyses of cells. The system also provides separation at the lowest possible power consumption. As Hermetic Design prevents air entrainment, any process issues caused by air/ oxygen pick-up is minimized. Moreover Hermetic Design together with discharge functionality with fixed volumes ensure efficient cleaning (CIP) of the product wetted surfaces.

The Bactofuge design allows for two separated phases (the light supernatant, and the heavy concentrated biomass) are continuously fed out through the two outlets on top of the separator. This feature broadens the separation capacity to process high density broth.

Bactofuge design together with the partial discharge volume of the separator, leads to minimum product loss.

All metal parts in contact with the process liquid are made of stainless steel. The bowl shell is made from corrosion resistant duplex stainless steel and all liquid-wetted gaskets are made of FDA or USP Class VI approved EPDM.

The separation system is available with main connections as sanitary tri-clamps. Special attention has been paid to a hygienic requirement and effective CIP with external bowl flushing.

The electric motor is suitable for variable frequency drive. The drive system is direct drive with pre lubricated bearings. The tools for assembly and disassembly of the bowl are made of stainless steel.

The machine is equipped with sensors monitoring vibration level, bowl speed and bearing temperatures.

All components are skid mounted to facilitate "Plug and Play" installation, which results in a small footprint. It can be configured from a selection of Bactofuge and clarifier.

The control system includes a PLC and a user-friendly HMI to monitor and control the separation process parameters.

The system can be connected to remote operation.

Scope of supply

The MB 20 Bactofuge skid mounted system includes the following main components:

- Disc stack separator
- Process & service liquid unit:
 - Valves, instruments and other components
 - Magnetic Flow meter
 - Sight glasses
 - Sample valves
 - Timer triggered solids discharge function
- Feed pump
- Electrical & control system (Siemens or Allen Bradley):
 - Control cabinet with PLC and HMI
 - Motor starter cabinet with VFD
- Commissioning spares
- Set of special tools (stainless steel)
- Documentation

Options

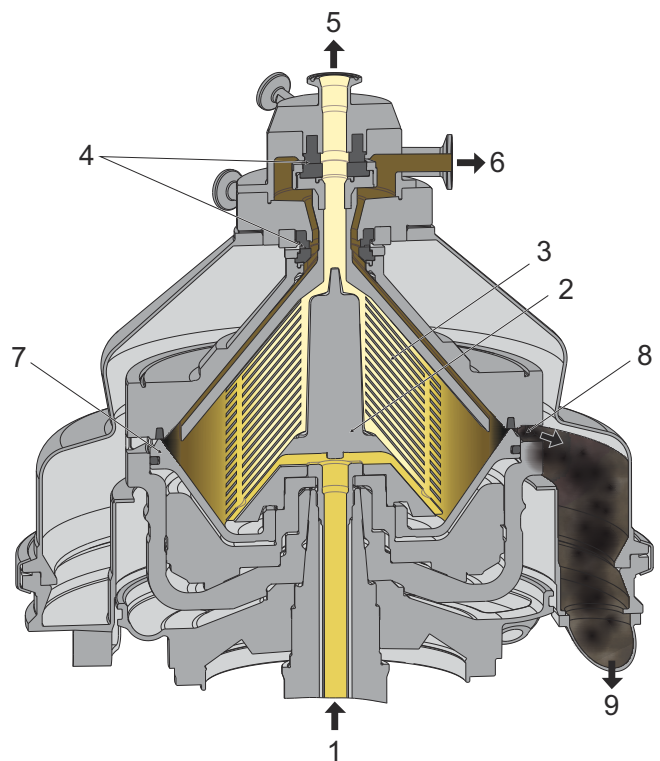
- Turbidity triggered solids discharge function
- Conversion to clarifier
- Mass flow meter
- Service options:
 - Commissioning
 - Operators training
 - Basic service agreement

Working principle

The process & service liquid unit monitors and regulates the flow and pressure of the feed and utility liquids in and out of the separator.

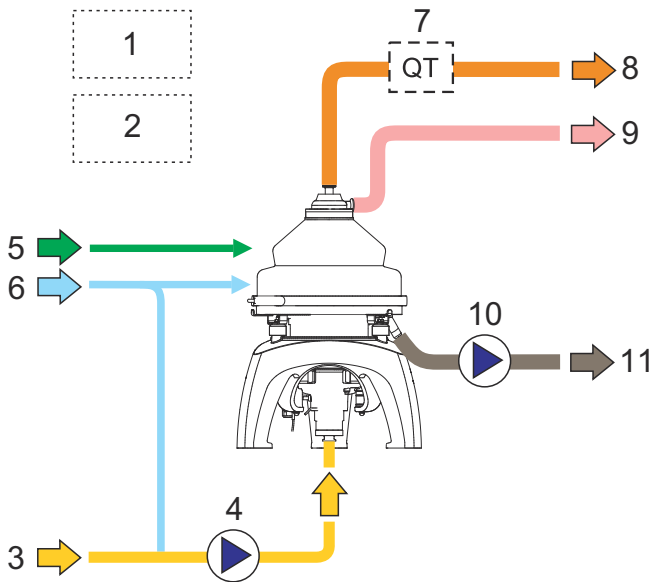
The process liquid is continuously fed from the bottom into the bowl through the hollow spindle (1), which assures gentle acceleration. Separation takes place in a solids-ejecting centrifuge bowl, between the discs (3).

However, the intermittent solids ejecting function is primarily used for the CIP of the separator. In normal production mode there are two continuous outlet flows from the top of the separator. One is clarified liquid (supernatant) (5) and the second is concentrated biomass (6). Both these flows are discharged under pressure. During production mode the bowl bottom is hydraulically pressed into a closed position, ensuring a tight seal against the bowl hood. Solids, which move toward the bowl periphery under centrifugal force, pass out of the separator over the top disc. During cleaning (CIP), the intermittent discharge function can be employed to clean the bowl internals. The separator is fed with cleaning solutions continuously. Periodically, at predetermined intervals, the sliding bowl bottom (7) is lowered hydraulically and waste residue is evacuated through the discharge ports (8). The bowl is then closed again by hydraulic action. The intermittent discharge is done without shutting off the feed of cleaning liquid. Mechanical seals on the inlet and outlet maintain a full hermetic condition.



Typical bowl drawing for a solids-ejecting separator. The details illustrated do not necessarily correspond to the separator described.

1. Inlet
2. Distributor
3. Disc stack
4. Hermetic seal
5. Light liquid phase outlet
6. Heavy liquid phase outlet
7. Sliding bowl bottom
8. Solids discharge ports
9. Solids outlet



Typical flow chart of a separator system. The details may differ based on the actual order.

1. Control cabinet
2. Main motor starter cabinet and VFD
3. Feed inlet
4. Feed pump (optional)
5. Utilities
6. Standby water
7. Turbidity meter for solids discharge (optional)
8. Light phase outlet
9. Heavy phase outlet
10. Solids receiving unit (optional)
11. Discharged solids outlet

Technical data

Performance data

Max capacity ¹	1000 litre/h (4.4 US gpm)
Maximum power consumption	2.7 kW (3.6 HP)

¹ Actual capacities depend on operating conditions

Connections

Feed inlet	Tri Clamps, ½ inch
Light phase/Heavy phase outlet	Tri Clamps, ½ inch
Solids outlet	Tri Clamps, ½ inch

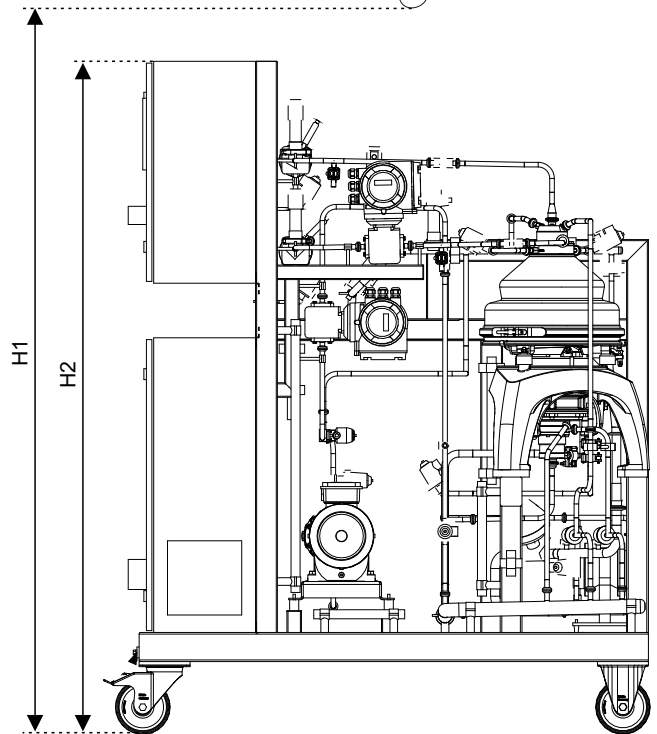
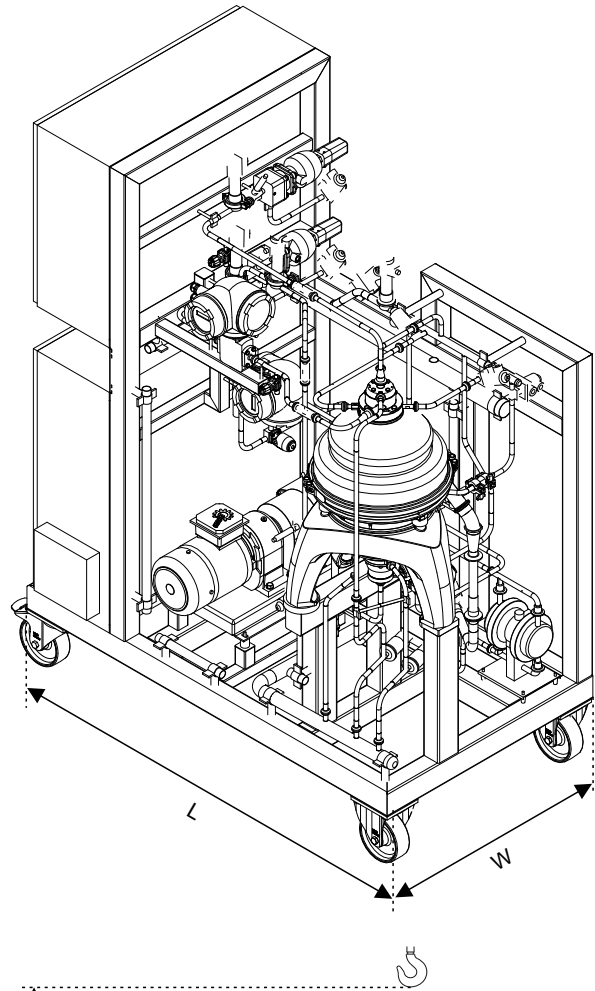
Material data

Bowl body	Stainless steel EN 1.4462
Frame top part	Stainless steel 316, EN 1.4401
Frame bottom part	Stainless steel 316, EN 1.4401
Skid frame and cabinet	Stainless steel AISI 304
Piping	Stainless steel AISI 316L
Gaskets (product wetted)	EPDM FDA, EPDM USP VI

Weights

System incl, separator without bowl	393 kg (866 lbs)
Bowl	40 kg (88 lbs)

Dimensional drawing



Dimensions

H1 (minimum lifting height)	1100 mm (3 ft 7 5/16 inch)
H2	1630 mm (5 ft 4 3/16 inch)
W1	1750 mm (5 ft 8 7/8 inch)
W2	945 mm (3 ft 1 3/16 inch)

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