Alfa Laval MIB 503

Highly efficient and compact separation systems and modules for marine applications

Introduction

The Alfa Laval MIB 503 systems and modules offer a highly efficient and compact separation solution for vessels with limited space. MIB 503 is the smallest separator in Alfa Laval's solid bowl series designed for removal of particles and water from fuel and lube oil. The separator improves the reliability of fuel and oil systems and protects the engine from serious wear and damage.

The MIB 503 systems and modules can be configured to fit different marine and diesel applications including distillate fuels, biofuels, and lubricating oils.

MIB 503 is a flexible solution that can be delivered as a single separator, a separator with system components, or as a complete module. The design is extremely compact and lightweight, making it suitable to fit any engine room.

Application

The MIB 503 separator consists of a solids-retaining bowl which can operate both as a purifier and a clarifier. Because of the flexible design, it can be used to clean all of the following:

- Distillate fuels
- Biofuels
- Lubricating oils

MIB503 separators clean distillates (GO/MDO) and lubricating oils with densities up to 920 kg/m3 at 15°C and viscosities up to 150 cSt at 40°C.

The separator can treat distillate fuels according to ISO 8217 comprising FAME or HVO in any blend ratio,

- where FAME at the time of blending shall be in accordance with the requirements of EN 14214 or ASTM D6751.
- where HVO at the time of blending shall be in accordance with the requirements of EN 15940.

Other types of biofuels, such as vegetable oils or blends of FAME and HVO components outside the above-mentioned standards, should be evaluated on a case-by-case basis. For these types of fuels, please consult your local Alfa Laval office.

Benefits

- *Easy to install and start up* – the system consists of a few components and a few modules to secure an easy installation.
- *Easy to operate* – the operation is limited to pressing the stop and start buttons.
- *High separation efficiency* – an optimized design ensures the best possible separation efficiency from the bowl and disc stack.
- *Extremely lightweight design* – the outer parts of the bowl are manufactured in surface-coated aluminium and most of the inner parts i.e. the disc stack, the bottom disc and the inlet cone are manufactured in a high grade polymer composite to reduce weight.
- *Small footprint, high flexibility* – the systems and modules are compact and flexible to fit any engine room setup.
- *Long service intervals* – due to the high reliability of the separator and system components.
- *Low operation cost* – due to long service intervals and few spare parts used for the maintenance.

Design

The MIB 503 separation concept is very flexible and offers a wide range of alternatives. Depending on the requirements, a MIB 503 separator can be supplied as a single separator, a system with separator and ancillaries, or as a customer-specified module.

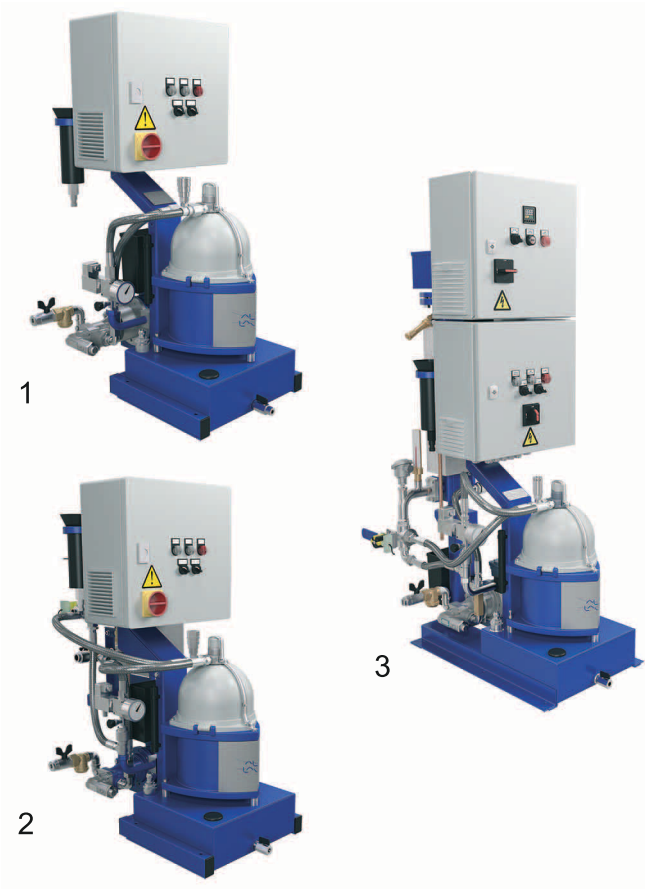
The unique drive technology of the MIB 503 separator is based on an electric motor mounted directly to the bowl, controlled by a frequency converter located in the control cabinet. It is equipped with the feed pump of a positive displacement type and dependent on the application, it can be supplied with or without heating system.

MIB 503 System

The system consists of the MIB 503 separator, standard components and the ancillaries including sensors, inlet and outlet flexible hoses.

MIB 503 Module

The MIB 503 module is a complete solution, with the separation system and the collection tank built on a common skid, ready for plug-and-play installation.



1. Module without heater
2. Module with CMB heater
3. Module with EHM heater

Scope of supply

The MIB 503 systems and modules are designed to suit the application. MGO and HVO configurations consist of the separator, the control cabinet, the pump and the ancillaries including flexible hoses and alarm sensors.

MDO and FAME may require heating, therefore configurations with heater are available.

In lube oil configurations, the oil must reach the right temperature before the separation process starts. To accomplish this, a heater, a three-way valve and temperature sensors are included.

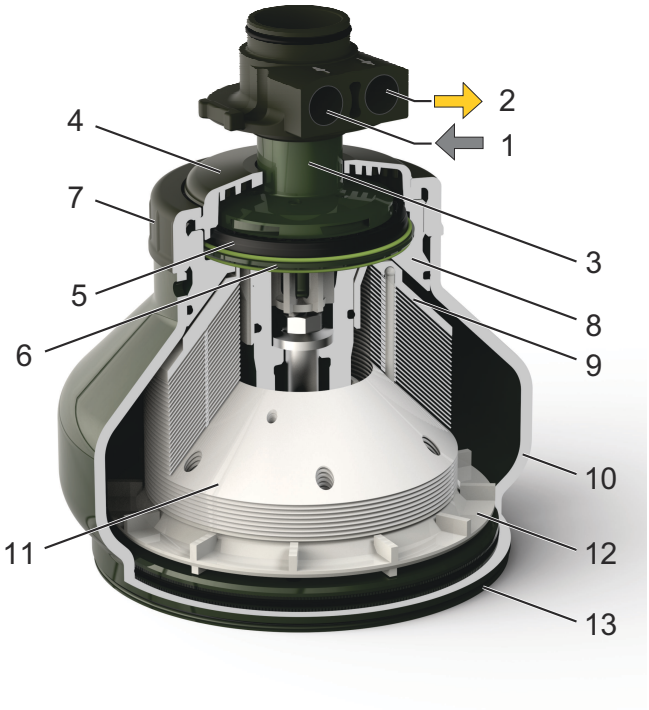
Options

The following optional equipment is available:

- A control cabinet with an integrated frequency converter to start/stop the separation process as well as troubleshoot alarms.
- A positive displacement pump and inlet kit including strainer, which is connected to the separator through flexible hoses.
- A pressure switch kit to indicate if the water seal interface is lost.
- A collecting tank with an integrated level switch to protect the system from overflow.

- A heater block including an Alfa Laval CBM plate heat exchanger or an Alfa Laval EHM electric heater of 7 kW or 14 kW. The heater block is also equipped with a three-way valve and a temperature switch that allow the system to warm up the oil by running in recirculation mode.
- A transformer from 100/110 V or 400/440 V to 230 V.
- A drip tray to collect oil leakage.
- An emergency stop button.
- Wheel set and trolley.

Working principle



The MIB 503 section drawing illustrates the basic parts of the separator bowl

1. Inlet
2. Outlet
3. Paring disc
4. Paring disc chamber
5. Lever ring
6. Paring chamber lower
7. Lock nut
8. Centre rod
9. Inlet cone
10. Bowl wall
11. Bowl discs
12. Bottom disc (clarifier version)
13. Bottom disc (purifier version)
14. Bowl bottom

In the configuration without heater, the fuel oil is transferred directly from the pump to the separator. In the configuration with heater, a heater and a three-way valve are installed between the pump and the separator. The three-way valve used recirculates the oil until the correct separation temperature is reached.

The separation process takes place within the bowl. Due to the centrifugal forces, oil, water, and particles are being separated based on their specific gravity. The heavy phases, water, and particles move to the periphery of the bowl while the light phase, oil move towards the centre of the bowl.

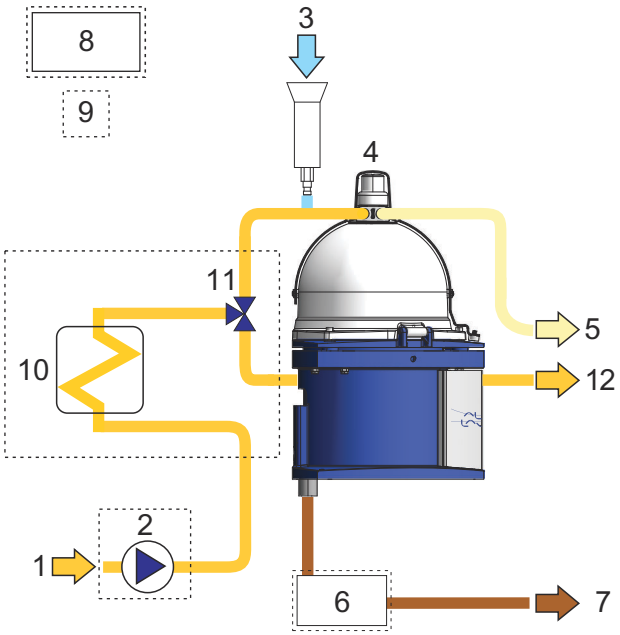
When the separator acts as a purifier, the water seal needs to be created during start-up, before the oil feed is started. The water collects in the water seal and is drained via a water channel below the bowl to the collecting tank.

During the clarification process, the oil normally does not contain any free water. The separation principle is similar to the purifier, however there is no water seal, no water outlet and the water handling capacity is limited.

The separated particles need to be cleaned periodically by hand. The clean oil is pumped by a paring disc out of the separator and from there to the daily service fuel tank or the lube oil sump.

A pressure sensor is installed in the oil outlet after the separator and it triggers low pressure alarms, e.g. if the water seal is lost.

A level sensor is installed on the collecting tank of the module. The level sensor triggers an alarm if the separator overflows.



General flow chart of a separator system. The details may differ slightly between different configurations.

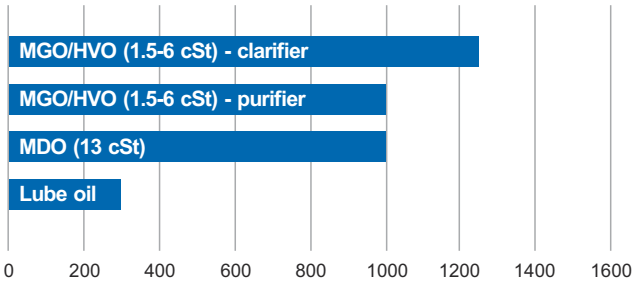
1. Feed inlet
2. Pump
3. Water for water seal (only for purifier)
4. Separator
5. Clean oil outlet
6. Collecting tank
7. Drain
8. Control cabinet
9. Emergency stop box (optional)
10. Heater (for configuration with heater)
11. Three way valve (for configuration with heater)
12. Recirculation

Service

A preventive maintenance programme based on service kits has been developed to extend the lifetime of the equipment.

- Maintenance intervals:
  - Once per year.
  - Every second year.
- Service kits contain all necessary parts for each service and maintenance checkpoint:
  - O-ring service kit containing O-rings and seals for separator bowl, inlet and outlet.
  - Disc stack service kit containing disc stack and O-rings for replacement.
  - Vibration damper service kit containing a set of vibration dampers for replacement.
- The System Manual in electronic or printed form includes detailed information about:
  - Safety
  - System description
  - Operating instructions
  - Alarms and troubleshooting
  - System reference
  - Installation instructions
  - Spare part catalogue
- Commissioning and technical services including start-ups, are available from all Alfa Laval offices.
- All services can be incorporated into specially tailored Nonstop Performance packages. Details are available from local Alfa Laval offices.

Technical data



Max. recommended capacity, l/h at 40°c

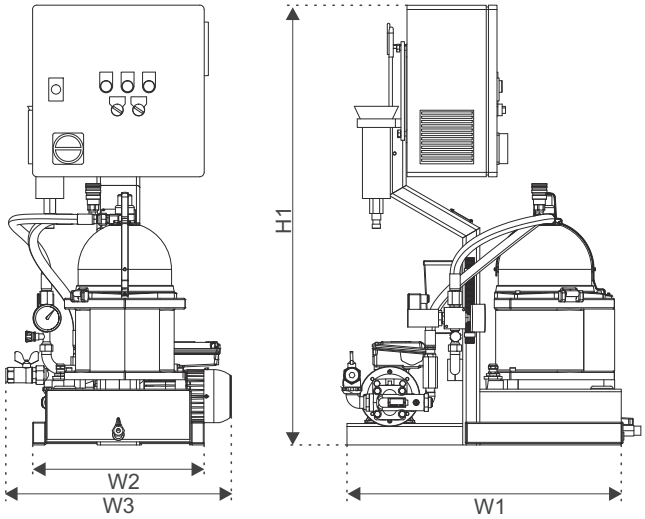
Performance data	
Separator motor power consumption	0.45 kW (0.6 HP)
Pump motor power consumption	0.25 kW (0.33 HP)
EHM Power	7/14 kW — LO/MGO-MDO
Feed temperature	Max. 95°C
Voltage (power supply for separator in all modules)	110 V, 230 V, 440 V
Voltage (power supply for electric heater)	380 – 440 V
Heating media	Hot water / electricity

Weights (approximate)	
Bowl weight	4 kg (8,8 lbs)
Separator incl. bowl and motor	18 kg (40 lbs)
Module without heater (net/gross)	68/98 kg (150/216 lbs)
Module with CBM heater (net/gross)	82/114 kg (181/251 lbs)
Module with EHM heater (net/gross)	95/130 kg (209/287 lbs)

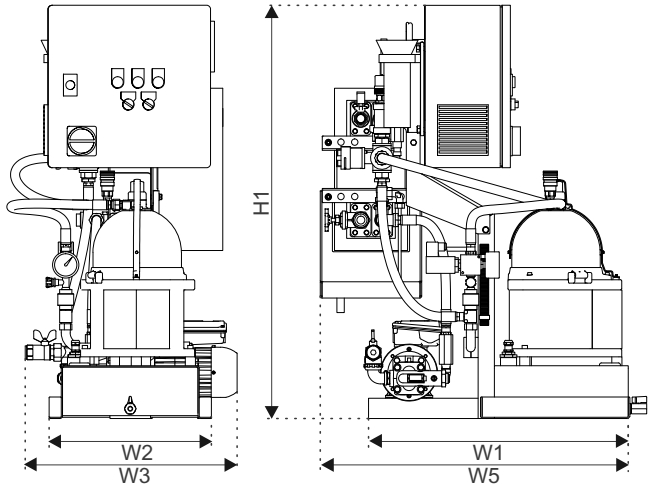
Dimensional drawing

Dimensions	
H1	1026 mm (3 ft 4 3/8 inch)
H2	1465 mm (4 ft 10 7/16 inch)
W1	640 mm (2 ft 1 3/16 inch)
W2	400 mm (1 ft 3 3/4 inch)
W3	525 mm (1 ft 8 11/16 inch)
W4	585 mm (1 ft 11 7/32 inch)
W5	760 mm (2 ft 5 15/16 inch)
W6	770 mm (2 ft 6 11/16 inch)

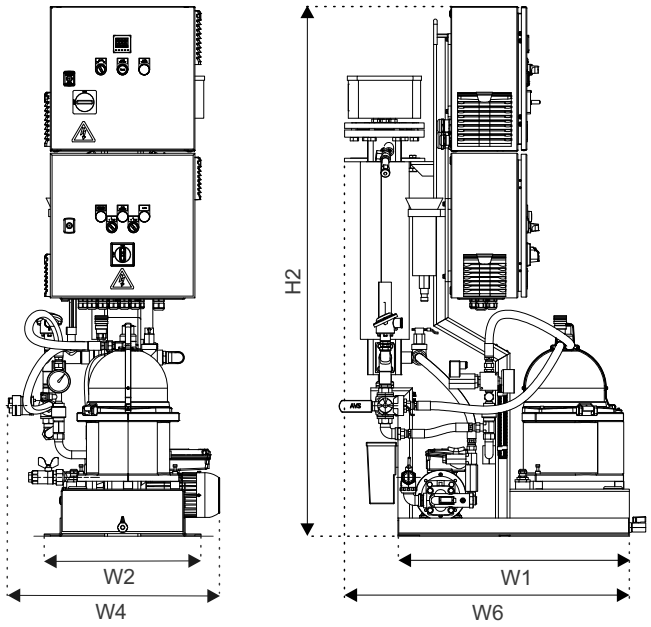
Module without heater



Module with CBM heater



Module with EHM heater



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How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com