# Description Evodos 10

## Spiral plate technology

To make the mechanical separation of fine particles in the micron range such as algae possible, the Evodos *Spiral Plate Technology®* (SPT®) has been developed. The challenge for Evodos was to design a technology where the path that particles need to travel before they settle, is minimized. Evodos achieved this through the development of its *Spiral Plate Technology®*. This novel *Spiral Plate Technology®* uses the principle of thin layer laminar flow. This principle is implemented by mounting curved plates at close distance between each other. This reduced the travelling distance of the particles in the flow between the curved plates. The settling speed is furthermore accelerated by applying increased artificial gravity. The combination of a small settling distance in laminar flow conditions and under increased artificial gravity results in an optimal set of conditions to provide superior settling conditions for very small size particle (cut-off rate approximately 1 micron). Also, through the application of curved plates, the energy transfer between machine and the process feed fluid is optimized.
*Spiral Plate Technology®* has not only in the separation cycle but in the discharge cycle as well. The Evodos discharge technology is very gentle and even sticky materials are discharged in the form of an almost dry consistent cake.
The theory of Evodos *Spiral Plate Technology®* is very much alike the theory of a static settler. And through applying artificial gravity, the separation process is transformed has moved from a static to adynamic process. Therefore, we call them Evodos *dynamic settlers®.*

## Application description - Algae harvesting

Our customers achieve excellent results in harvesting algae with our Evodos *dynamic settlers®*. Today we have over 100 customers worldwide in the algae market. Additionally, Evodos is a partner in many large R&D (grant) projects of the European Union and the Department of Energy (DOE) in the United States of America.
The Evodos *dynamic settlers®*, with our unique *Spiral Plate Technology®*, outperform the competition. With Evodos, even the smallest algae (species of *Nannochloropsis*), fragile algae (species of *Dunaliella* and *Diatoms*) and both fresh and marine water algae are harvested successfully, including e.g. *Spirulina, Chlorella, Tetraselmis, Scenedesmus, Phaeodactylum, Haematococcus, Isochrysis.*
The separation efficiency is typically over 95%, and the Dry Weight (DW) of the output algae paste is generally 150% – 200% higher compared to traditional centrifuges. The high DW of the algae paste saves significant costs in the downstream process e.g. less water has to be evaporated in the drying process.
Even more important, the algae paste is of excellent quality, all algae cells are harvested intact, un-damage and without changes in structure and in temperature. Evodos offers the only algae harvesting solution where all valuable components (ingredients) inside the algae cells are fully retained. This significantly increases the value of the output algae biomass.
The Evodos *dynamic settlers®* are easy to connect and operate. As an additional advantage, the Evodos in operation produces minimal noise.

Summary of main reasons why clients choose for Evodos:

- Clients harvest a top-quality alga paste with a high dry weight percentage
- Even the smallest and most fragile algae are harvested successfully
- All algae cells are harvested intact and undamaged
- All valuable components inside the algae cells are retained
- Clients minimize the energy consumption in the downstream process

# Technical description Evodos 10 rev 4

## Description

The Evodos 10 is designed for small scale solid/water separation tests.
The machine is a *dynamic settlers®*that deploys *Spiral Plate Technology®*. The highly effective separation process takes place at 3,000xG and can be discharged manually within 15 minutes.

## Characteristics

- Low shear through smooth automatic discharge process
- Harvesting a top-quality alga paste with a high dry weight content
- High separation effectiveness through *Spiral Plate Technology®*
- Designed for small scale processing (research/test/pilot)

## Process steps:

Algae dewatering

Change over to discharge

Algae discharge

# Technical datasheet Evodos 10 rev 4

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| **Capacity**<br><br>- Maximum feed flow: 750 litres per hour.<br>- The unit can discharge up to 3 kg. paste during each run | **Power requirements**<br><br>- Standard suitable for 380-480 V, 50-60 Hz.<br>- Control voltage 24 Volts DC.<br>- Drive motor 3 kW / 4 HP. |
| **Estimated Dimensions**<br><br>Height 1350 mm (4'5")<br>Width 800 mm (2'7")<br>Length 1250 mm (4'1")<br>Weight 350 kg (770 lbs) | **Operations**<br><br>- Integrated frequency controller for the main drive and controlled stop.<br>- The process is PLC controlled. |
| **Drive**<br><br>- Direct drive, variable frequency controlled | **Main materials**<br><br>- Wet surfaces, 316L stainless steel.<br>- Other metal surfaces, 304L stainless steel.<br>- NBR seals. |
| **Noise**<br><br>- <80 dB (A), measured at 1 meter distance. | **Discharge**<br><br>- The discharge method is manual and an operator can perform a discharge cycle within ±10-15 minutes.<br>- The discharged paste contains a minimum amount of extracellular water (up to 25-30% DW).<br>- The paste is collected and disposed via a collecting bin |
| **Process fluids**<br><br>- The machine can cope with both fresh and marine water.<br>- Fluids can be processed from 5°C. to 45°C.<br>- Feed pump and transfer pump for the effluent are included. | **Feed pump**<br><br>- The feed pump is a flexible impeller type pump.<br>- Pump capacity: 750 litres per hour.<br>- The pump pressure is less than 0.2 bar.<br>- Pump is variable frequency controlled |
| **Certification**<br><br>- CE standard | |