Vibro™

unique filtration devices for micro- and ultrafiltration

Vibro™ is the perfect filtration solution for process development and industrial filtration applications where low energy consumption, high flux, sanitary function, low capital investment and gentle filtration are key words. Vibro™ systems deliver low fouling continuous filtration, where the filter is kept clean by vibration shear.

Vibro™-L

Vibro™-I

Disruptive in size, simplicity and process: sanitary, energy efficient, fully drainable, no dead volumes, easy to clean, easy to service and simple to operate.

The Vibro™ is a filtration system for continuous microfiltration, and ultrafiltration. The patented Vibro™ system vibrates the Free Flow Plate™ membrane element relative to the media. Thus, creating turbulence in the media on the membrane surface.

The turbulence created on the membrane surface ensures a fast filtration process without the need of a conventional tangential cross flow. Vibro™ is for applications where dead-end filtration fails, and cross flow solutions are too expensive and energy consuming.

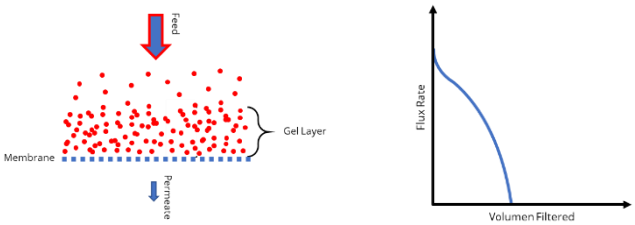
SANI Membranes

MORE FILTRATION, LESS ENERGY

Description of filtration principals

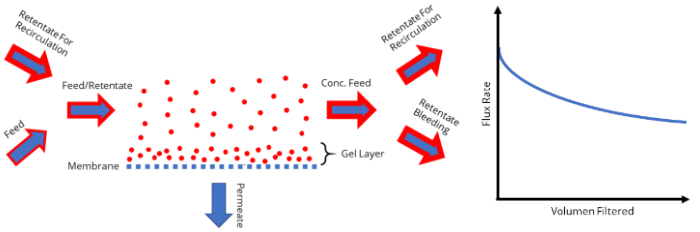
Dead-End Filtration

The feed is pressurized against the membrane. Particles and molecules form a growing gel layer that fouls and rapidly clogs the membrane.



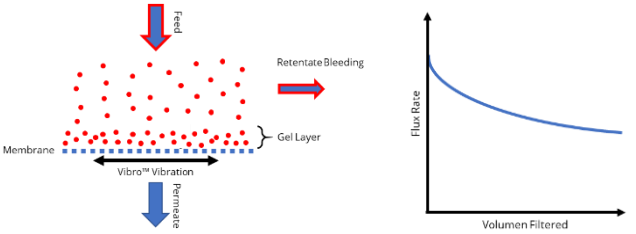
Tangential Crossflow Filtration

The pressurized feed flows fast along the membrane surface creating turbulence at the membrane surface. The turbulence keeps the gel layer from growing. The high shear created by the recirculation pump can destroy the sample and is very energy demanding.



Vibro™ Filtration

The feed is pressurized against the membrane. The vibrating motion of the membrane relative to the feed creates turbulence at the membrane surface. The turbulence keeps the gel layer from growing and there is no need for a high shear recirculation pump.



Vibro™ technology

A Free Flow Plate™ membrane element is fixed rigidly inside a flexibly supported retentate chamber. By vibrating the membrane element relative to the media, an optimal turbulence is created in the media at the membrane surface by the patented Vibro™ technology. The vibrating membrane enables the Vibro™ systems to filtrate the most demanding media with high viscosity and high solids with unpreceded results in terms of less fouling, higher flux, higher degree of up-concentration.

The Vibro™ can be operated as vibration driven dead-end-like filtration, where the media is concentrated in the retentate chamber and discharged continuously or at end of operation.

The Vibro™ can also be operated as continuous filtration, with a feed pump feeding in media and continuous discharging of permeate and retentate.

The vibrating membrane will diminish fouling and create a higher flux than conventional cross flow filtration.

A 'slow' circulation pump with minimum shear can be used for mixing/homogenizing the retentate in the system if necessary.

Typical applications

Sanitary:	Biotech, pharma, cell harvesting, broth filtration, enzyme concentration, biomass fractionation etc.
Food & Beverages:	Dairy, milk fractionation, whey concentration, wine filtration, beer filtration, juice filtration, juice concentration etc.
Water:	Sterile water, drinking water, pre-filtration, industrial waste water, municipal waste water etc.
Industrial:	Fuel oil, lubrication media, gear box oils, hydraulic oils, waste streams etc.

The Vibro™ systems are available in a benchtop model and an industrial version:

Vibro™-L: A benchtop model with 0,35 m^2 membrane area and a 9 L batch feed system for process development and small production set-ups.

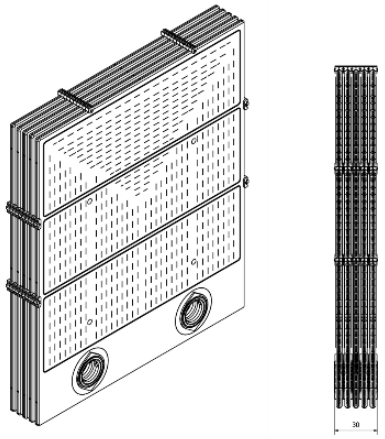
Vibro™-I: An industrial version with 15 m^2 membrane area for industrial micro- and ultrafiltration.

The performance of a Vibro™ system is application and membrane dependent. The fluxes range from 1 to 1000 LMH (liters/m^2/hour).

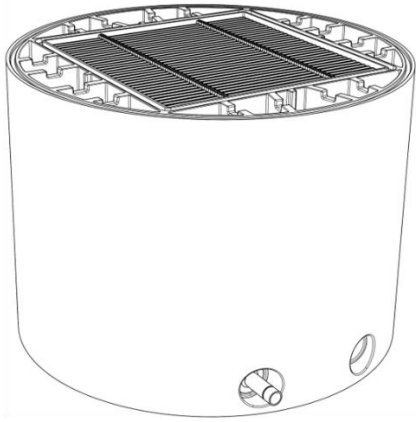
1 LMH: 3 x concentration of yogurt with a 5 kDa membrane at 3 bar.

1000 LMH: Swimming pool water with a 5 µm woven filter at 0,4 bar.

Benchmarking a Vibro™ system with a conventional spiral wound cross flow system results in 50-100% higher flux/area on the Vibro, while the energy consumption is reduced by typically more than 50%. Benchmarking a Vibro™ system with a conventional plate-and-frame cross flow system results in similar flux, while the energy consumption is reduced by typically more than 80%!!!



0,35 m^2 Free Flow Plate™ Laboratory Element (HPL)



2,5 m^2 Free Flow Plate Module (HP1)

The Vibro™ systems utilizes Sani Membranes newly developed Free Flow Plate™ technology membrane elements and modules. The membrane elements are developed with a sanitary focus and are extremely energy efficient.

The membrane is fused to the surface of the polymeric Free Flow Plates™ by welding. The Free Flow Plates™ are then welded together - forming the Free Flow Plate™ membrane elements with superior functionalities.

The Free Flow Plate™ membrane element configuration with 1,7 mm free flow channels eliminates the need for pre-filtration in many applications, as it handles high solids loading and high viscosity media effortlessly.

The Free Flow Plate™ membrane elements have an integrated and open permeate channel design. Thus, the retentate as well as the permeate can be drained completely - no product loss and faster cleaning cycles.

The Free Flow Plate™ membrane element can be configured with virtually any commercially available MF or UF membrane.

The Free Flow Plate™ membrane elements can also be used in cross flow settings, resulting in higher fluxes and lower energy consumption than conventional systems.

The Free Flow Plate™ membrane elements and modules conform to FDA materials and sanitary standards.

Vibro™-L

a unique 0,35 m² filtration device for micro- and ultrafiltration

The perfect benchtop filtration solution for process development and small-scale filtration applications. Low fouling continuous filtration where the filter is kept clean by vibration shear.

The retentate chamber and the membrane element vibrates horizontally while the patented Vibro™ technology makes the media inside the retentate chamber stationary. The relative vibration of media and membrane creates turbulence on the membrane surface and thereby keeps the fouling layer at a minimum.

The clear plastic of the retentate chamber gives excellent visibility of the membrane during operation and cleaning. A groundbreaking feature that makes it possible to visually follow fouling build-up and membrane cleaning processes.

The Vibro™-L is exceptional for gaining insight into filtration processes, for selecting the right membranes and for filtering or separating almost any media with continuous membrane filtration in a laboratory or even a small production set-up. The ability to work with small samples makes it the perfect tool for process development in biotech, pharma, food etc.

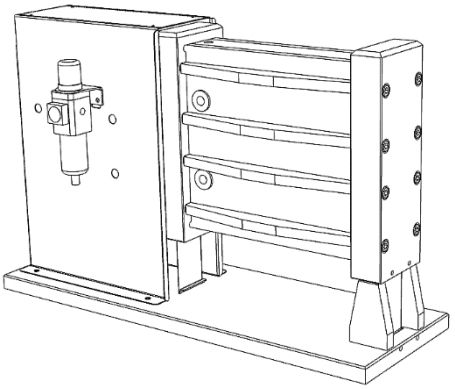
The Vibro™-L can be operated as continuous filtration with a feed pump or as batch filtration where no feed pump is necessary. This means that valuable samples can be filtered extremely gentle without any damage from pump shear.

Due to the open design of the 0,35 m² Free Flow Plate™ membrane element, the Vibro™-L can handle very difficult samples with high viscosity, high mass loadings and even high particulates. It is possible to attach a homogenization pump to the retentate chamber if you work with difficult feeds.

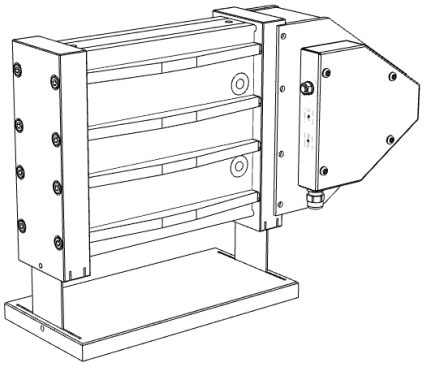
The Vibro™-L system can be cleaned-in-place with your preferred CIP chemicals and cleaning conditions.

All media contacting parts are in durable polymeric materials or stainless steel. The Vibro™-L can conform to FDA materials and sanitary standards if required.

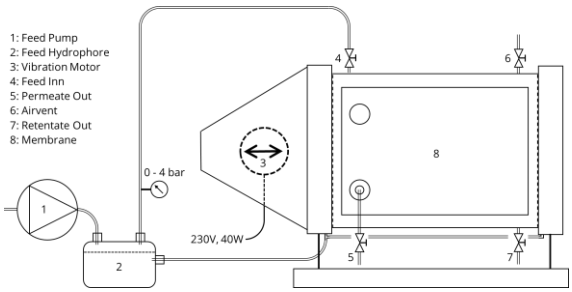
The vibration motor in the Vibro™-L can either be a pneumatic motor (Vibro™-LP) or an electrical motor (Vibro™-LE).



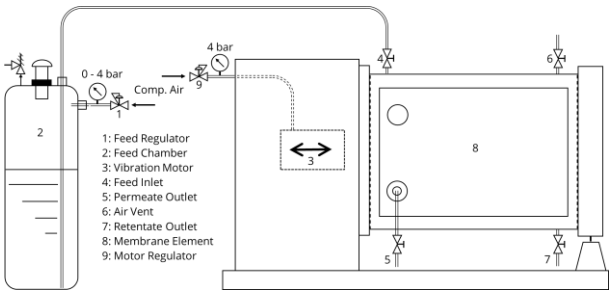
Vibro™-LP: pneumatically driven vibration and options in feed system



Vibro™-LE: Electric motor driven vibration and options in feed system



Example of a continuous Vibro™-LE set-up for ultrafiltration



Example of a batch Vibro™-LP set-up for microfiltration - The gentlest filtration possible

Vibro™-I

a unique 7,5 – 60 m² filtration device for micro- and ultrafiltration

The Vibro™-I is an industrial filtration solution for applications where low energy consumption, high flux, sanitary function, low capital investment and gentle filtration are key words. The Vibro™-I delivers continuous low fouling filtration where the filter is kept clean by vibration shear.

The membrane module vibrates vertically while the patented Vibro™ technology makes the media inside the module stationary. The relative vibration of media and membrane creates turbulence on the membrane surface and thereby keeps the fouling layer at a minimum. The turbulence is only created at vertical surfaces. Thus, the energy required to create the turbulence at the membrane surfaces is minimized. Because the Vibro-I only creates turbulence at the membrane surfaces the need to cool the retentate is reduced and most often eliminated which again adds to the energy savings.

The Vibro™-I handles the feed solution very gently as no large circulation pump is needed. A conventional circulation pump can damage cells, molecules etc. during operation. By eliminating the circulation pump Vibro™-I has become the most product gentle industrial scale MF and UF system on the marked.

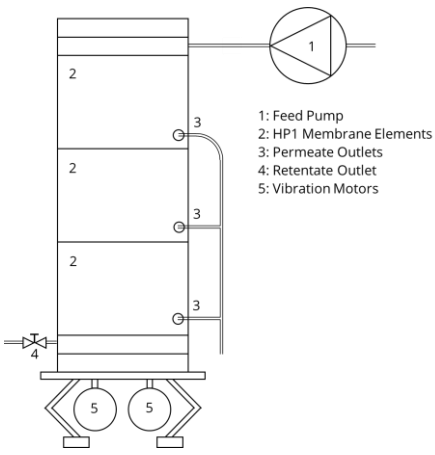
The elimination of the circulation pump also gives you virtually uniform trans membrane pressures throughout the unit. The uniform TMP gives you the sharpest membrane cut-offs of any industrial system.

Due to the open design of the Free Flow Plate™ Module (HP1), the Vibro™-I can handle very difficult products with high viscosity, high mass loadings and even high particulates. When extremely difficult feeds are processed, it is possible to homogenize the retentate in the Vibro™ systems by attaching a “slow” circulation pump.

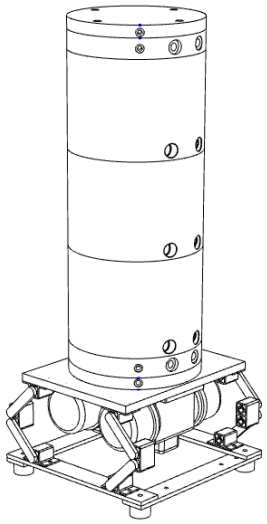
The Vibro™-I is fully drainable of both retentate and permeate. Thus, no product loss and faster CIP cycles.

The Vibro™-I utilizes the 2,5 m² Free Flow Plate™ module (HP1) and comes with 7,5; 15 or 20 m² membrane as 1-tower units and with 60 m² membrane as a 4-tower unit. Units can be connected in series or parallel depending on your needs.

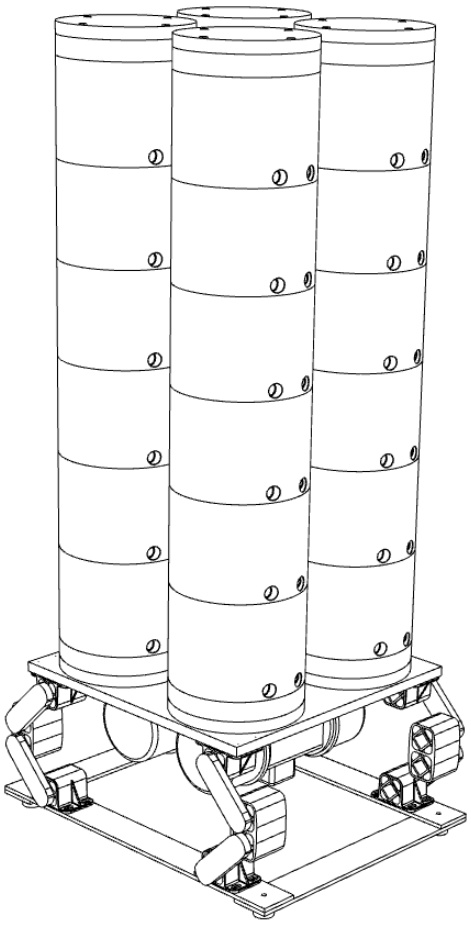
The tower configuration and the elimination of circulation pumps, cooling aggregates, booster pumps and intricate piping layout gives the Vibro™-I systems a small footprint. All media contacting parts are in durable polymeric materials or stainless steel. The Vibro™-I can conform to FDA materials and sanitary standards if required.



An example of a Vibro™-I system in operation

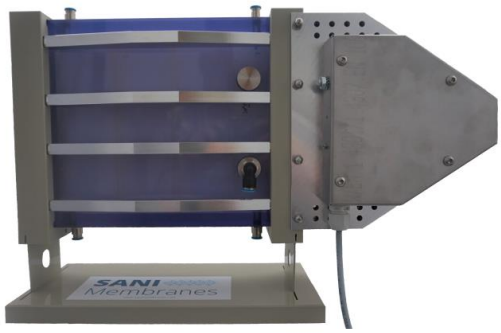


A 7,5 m² Vibro™-I system



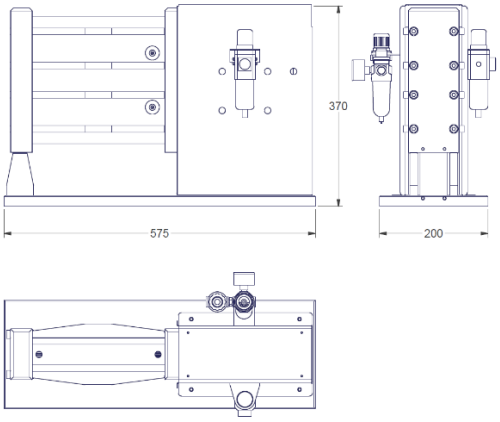
A 60 m² Vibro™-I system

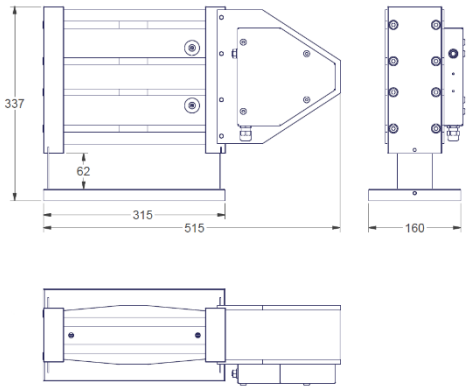
Technical Data Vibro™-LP and Vibro™-LE



Vibro™-LP Data	
Weight	10 kg
Dimensions (L x W x H)	575 mm x 200 mm x 370 mm
Membrane	0,35 m^2 HPL element
Internal Retentate volume	500 ml, Fully drainable
Internal Permeate volume	50 ml, Fully drainable
Operating Pressure	0-4 bar
Vibration Motor	Pneumatic
Compressed air consumption	4-10 bar, 20-40 L/min incl. feed system
Noise Level	50-65 dBA

Vibro™-LE Data	
Weight	10 kg
Dimensions (L x W x H)	515 mm x 160 mm x 337 mm
Membrane	0,35 m^2 HPL
Internal Retentate volume	500 ml, Fully drainable
Internal Permeate volume	50 ml, Fully drainable
Operating Pressure	0-4 bar
Vibration Motor	Electric
Power consumption	40 W excl. feed system
Noise Level	50-65 dBA





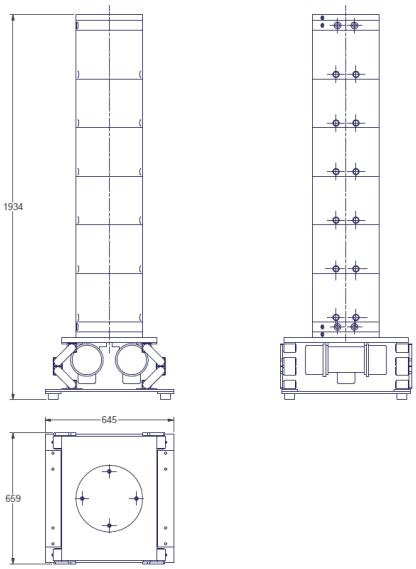
Free Flow Plate™ Laboratory Element (HPL) Data	
Generic Design	Free Flow Plate™. Fused Polypropylenes
Membrane Type	Most organic membranes (MF, UF, and other filter types)
Membrane Area	0,35 m^2
Dimensions (L x W x H)	242 mm x 30 mm x 202 mm
Viscosity Range, Apparent	1-1000 cP (e.g. Cream Cheese+)
Temperature Range	5-85°C (Membrane dependent)
pH Range	1-14 (Membrane dependent)
Operating Pressure	0-4 bar
Free Chlorine	Membrane dependent

The HPL can be equipped with your membrane of choice. SANI Membranes have a line of standard MF and UF membranes from Synder, Microdyn-Nadir and others on stock. Most commercial available membranes can however also be used with the HPL. Please, do not hesitate to contact us with your membrane wishes.

Technical Data Vibro™-I

Vibro™-I 7,5 m² Data

Weight	120 kg
Dimensions (L x W x H)	478 mm x 400 mm x 1170 mm
Membrane	3 x 2,5 m² Free Flow Plate Modules (HP1)
Internal Retentate volume	16 L, Fully Drainable
Internal Permeate volume	3 L, Fully Drainable
Operating Pressure	0-4 bar
Vibration Motor	Electric, 480 W

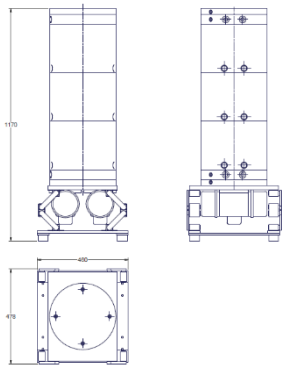


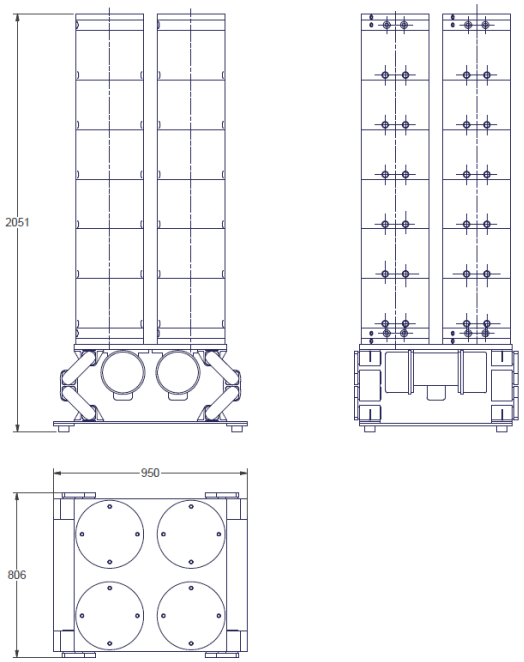
Vibro™-I 15 / 20 m² Data

Weight	190 kg
Dimensions (L x W x H)	659 mm x 645 mm x 1934 / 2420 mm
Membrane	6 / 8 x 2,5 m² Free Flow Plate Modules (HP1)
Internal Retentate volume	28 / 38 L, Fully Drainable
Internal Permeate volume	6 L, Fully Drainable
Operating Pressure	0-4 bar
Vibration Motor	Electric, 700 W

Vibro™-I 60 m² Data

Weight	650 kg
Dimensions (L x W x H)	950 mm x 806 mm x 2051 mm
Membrane	24 x2,5 m² Free Flow Plate Modules (HP1)
Internal Retentate volume	112 L, Fully Drainable
Internal Permeate volume	24 L, Fully Drainable
Operating Pressure	0-4 bar
Vibration Motor	Electric, 1800 W





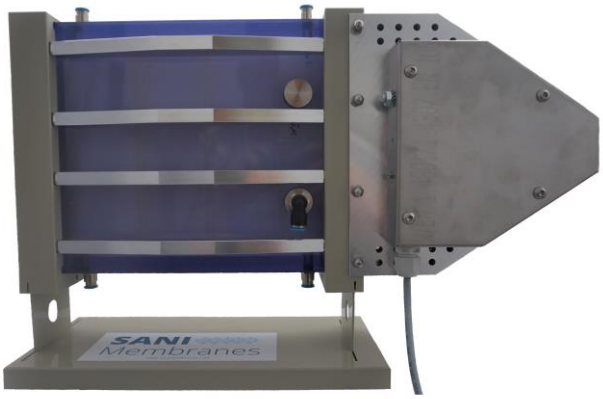
Free Flow Plate™ Module (HP1) Data

Generic Design	Free Flow Plate™. Fused Polypropylenes
Membrane Type	Most organic membranes (MF, UF, and other filter types)
Membrane Area	2,5 m²
Dimensions (D x H)	333 mm x 245 mm
Viscosity Range, Apparent	1-1000 cP (e.g. Cream Cheese+)
Temperature Range	5-85°C
pH Range	1-14
Operating Pressure	0-4 bar
Free Chlorine	Membrane dependent

The HP1 can be equipped with your membrane of choice. SANI Membranes have a line of standard MF and UF membranes from Synder, Microdyn-Nadir and others on stock. Most commercial available membranes can however also be used with the HP1. Please, do not hesitate to contact us with your membrane wishes.

Disruptive in size, simplicity and process

Compact Solution
Vibro™ systems has a small footprint and comes in 0,35 m^2 - 60 m^2 units with virtually any commercial available MF or UF membrane
Patented filtration process
The Vibro™ filtration process gives you low fouling filtration with unimpeded flux and the sharpest cut-off
Energy efficient
The Vibro™ systems are extremely energy efficient. The energy reduction is in the range of 50-80% = No cooling needed!
Sanitary
The Vibro™ systems and the Free Flow Plate™ technology is designed with a sanitary focus and reduces cleaning time, chemical use and water usage.
Easy to use
Easy and simple manual or automatic operation of all functions ensures good reliable filtration
Fully drainable for maximum product yield
Vibro™ systems has no high shear pump destroying your valuable product and are completely drainable for maximum product yield



0,35 m^2 Vibro™-LE

15 m^2 Vibro™-I

For more information see sanimembranes.com

SANI Membranes

MORE FILTRATION, LESS ENERGY

SANI Membranes ApS
Solvang 23A | DK-3450
Allerød
Denmark
info@sanimembranes.com