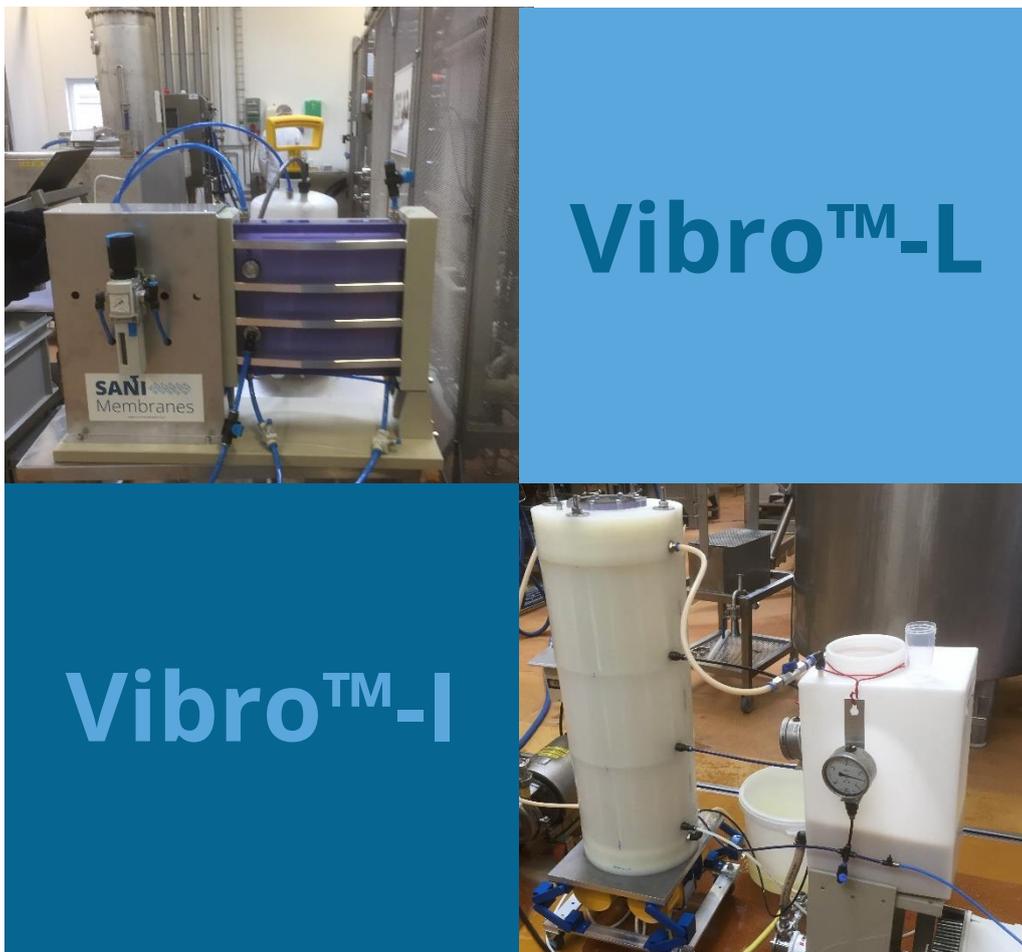


Vibro™

a unique filtration device 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.



The Vibro™ is a filtration system for continuous microfiltration, ultrafiltration and diafiltration applications. The Vibro is configured with rigid Hollow Plate™ membrane elements. The patented Vibro™ filter vibrates the rigid Hollow 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 and low fouling filtration process without the need of conventional tangential crossflow. The Vibro™ is perfect for process development, production and other applications where traditional dead-end filtration devices gives up and tangential crossflow solutions are expensive and energy consuming.

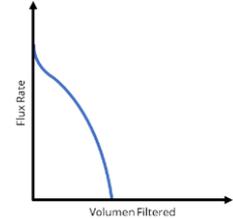
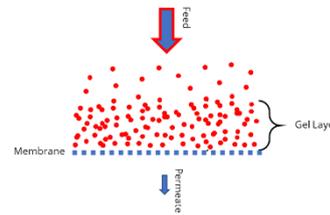
SANI 
Membranes

MORE FILTRATION, LESS ENERGY

Description of filtration principals

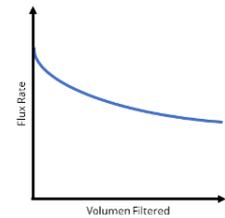
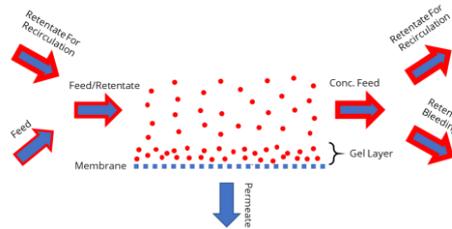
Dead-End Filtration

The feed is pressurized against the membrane. Particles and molecules held back by the pore size of the membrane form a growing gel layer that fouls the membrane and the membrane is clogged after a while.



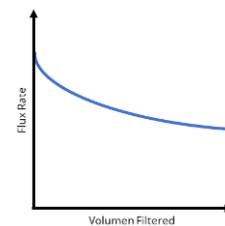
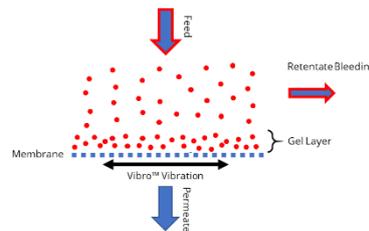
Tangential Crossflow Filtration

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. There is no need for a high shear recirculation pump. A 'slow' recirculation pump can be employed if homogenization of the retentate is favorable.



Product information

Vibro™ systems are disruptive in size, simplicity and process: sanitary, energy efficient, fully drainable, no dead volumes, easy to clean, easy to service and simple to operate.

A Hollow 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 unprecedented 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 on a timer function or at end of operations. The vibrating membrane will keep fouling levels to a minimum and give you unimpeded fluxes and retentate concentrations.

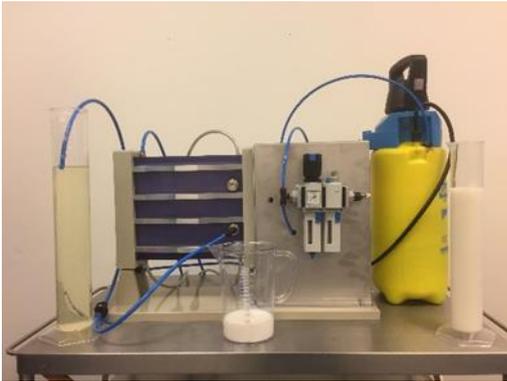
The Vibro™ can also be operated as continuous filtration, with a feed pump feeding in media and continuous discharging of permeate and retentate. The vibrating membrane will diminish fouling and create a higher flux than conventional cross flow filtration.

A 'slow' circulation pump with minimum shear can be mounted for homogenization of the retentate if necessary.

Typical applications

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

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



Vibro™-L: A benchtop model with 0,35 m² membrane area for process development and small production set-ups.



Vibro™-I: An industrial version with 7,5 m² membrane area per unit for industrial MF and UF filtration.

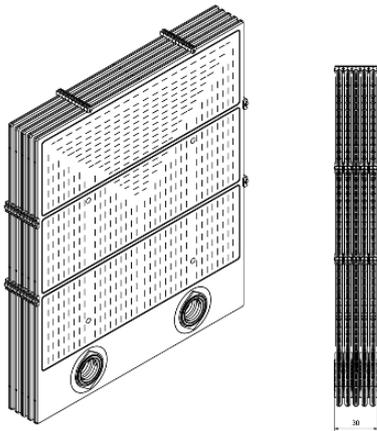
The performance of a Vibro™ system is application and membrane dependent. The fluxes range from 1 to 1000 LMH (liters/m²/hour).

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

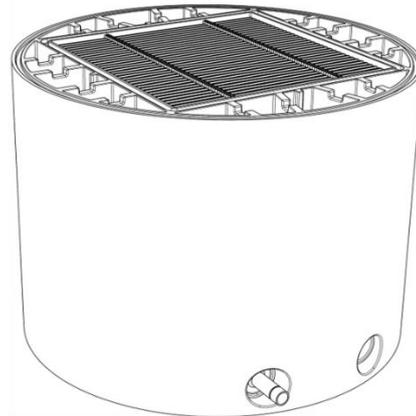
1000 LMH: Swimming pool water with a 5 µm woven filter at 0,4 bar.

Benchmarking a Vibro™ system with a conventional spiral wound cross flow system results in 50-100% higher flux 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 m² Hollow Plate™ Laboratory Element (HPL)



2,5 m² Hollow Plate Module (HP1)

The Vibro™ systems utilizes Sani Membranes newly developed Hollow 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 Hollow Plates™ by welding. The Hollow Plates™ are then welded together - forming the Hollow Plate™ membrane elements with all their functionalities.

The Hollow Plate™ membrane element configuration with 1.7 mm free flow channels allows for filtration with no need for pre-filtration even for high solids loading and high viscosity media.

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

The Hollow Plate™ membrane elements are also used in cross flow settings with higher fluxes and lower energy consumption than conventional systems.

The Hollow 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 continues 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.

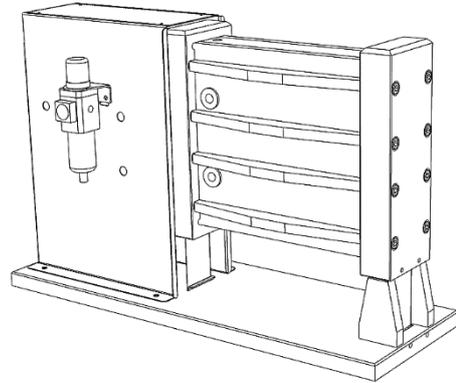
The Vibro™-L can be operated as continues filtration with a feed pump or as batch filtration where no feed pump is necessary. This means that valuable samples can be filtered extremely gentle without any damage from pump shear.

The Vibro™-L systems are easy to operate and can be set-up to run any MF and UF applications automatically including washing cycles etc.

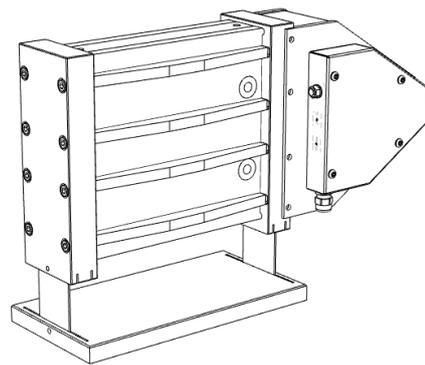
Due to the open design of the 0,35 m² Hollow Plate™ membrane element, the Vibro™-L can handle very difficult samples with high viscosity, high mass loadings and even high particulates. It is possible to attach a homogenization pump to the retentate chamber if you work with difficult feeds.

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.

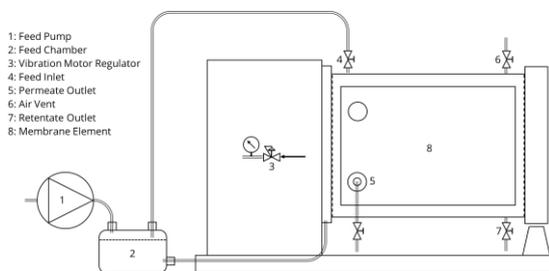
The vibration motor in the Vibro™-L can either be pneumatic or electrical driven.



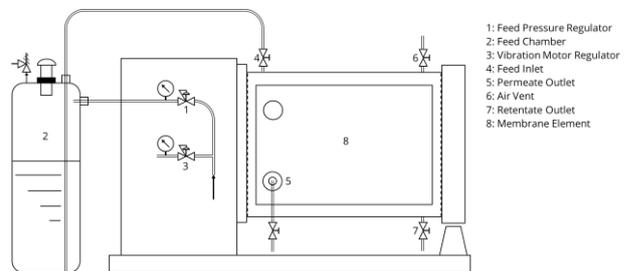
Vibro™-LP: pneumatically driven vibration and options in feed system



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



Continues filtration set-up with a low shear feed pump



Batch filtration set-up with no feed pump – 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 often eliminated which again adds to the energy savings.

The Vibro™-I handles the feed solution very gentle as no big circulation pump is needed. A conventional circulation pump can be harmful to most media as it damages cells, molecules etc. during operation. By eliminating the need for a conventional circulation pump Vibro™-I is the most product gentle industrial scale MF and UF system on the market.

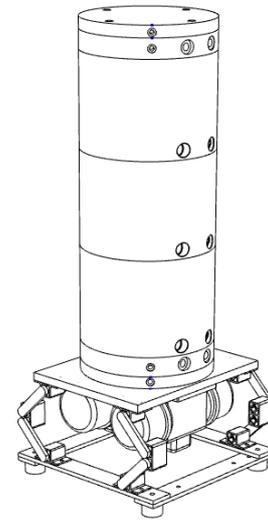
The elimination of the circulation pump also gives you virtually uniform feed pressures throughout the unit. The uniform feed pressure gives you the sharpest membrane cut-offs of any industrial system.

Due to the open sanitary design of the Hollow Plate™ Module (HP1), the Vibro™-I 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 Vibro™-I system to homogenize the retentate while filtrating if you work with difficult feeds.

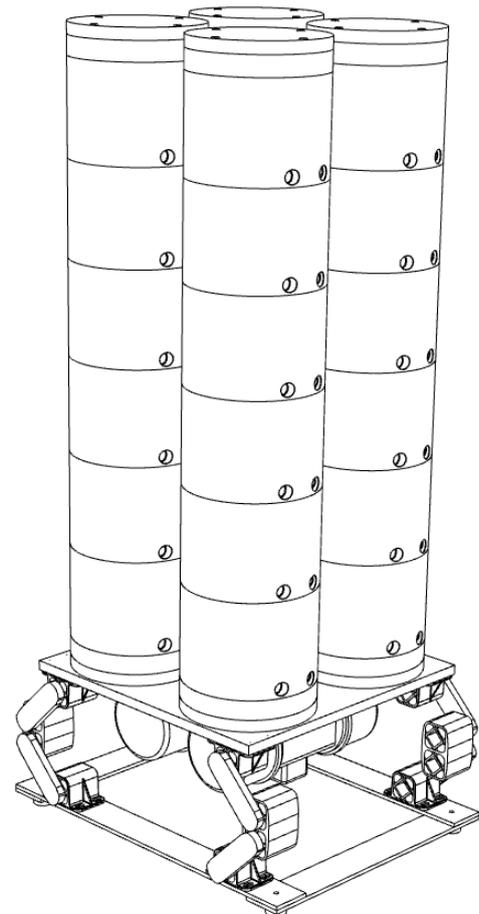
The Vibro™-I is fully drainable of both retentate and permeate. Thus, no product loss and faster CIP cycles.

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

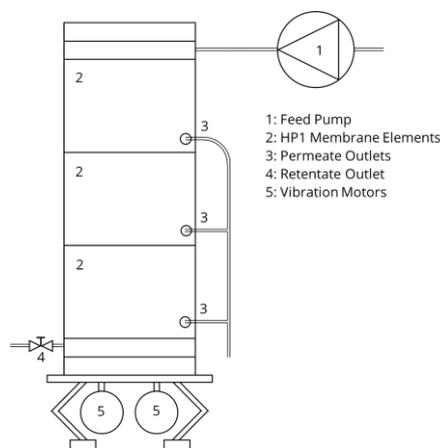
The tower configuration and the elimination of circulation pumps, cooling aggregates, booster pumps and intricate piping layouts from conventional cross flow filtration systems gives the Vibro™-I systems a small footprint. All media contacting parts are in durable polymeric materials or stainless steel.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



A 7,5 m² Vibro™-I system

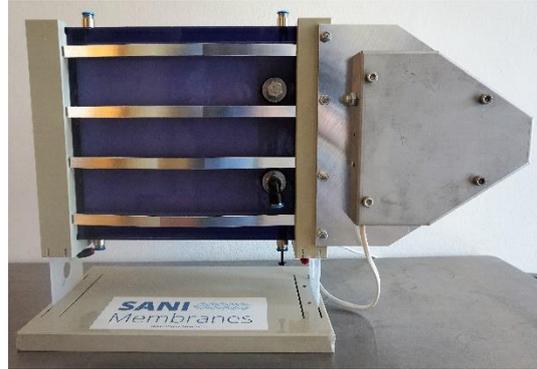


A 60 m² Vibro™-I system



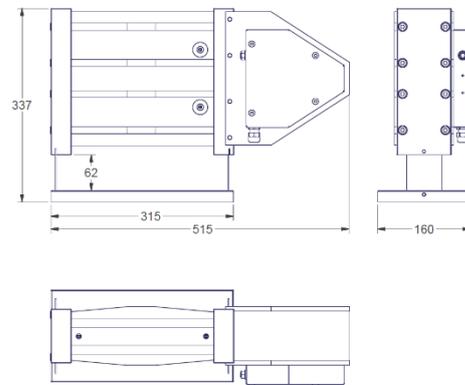
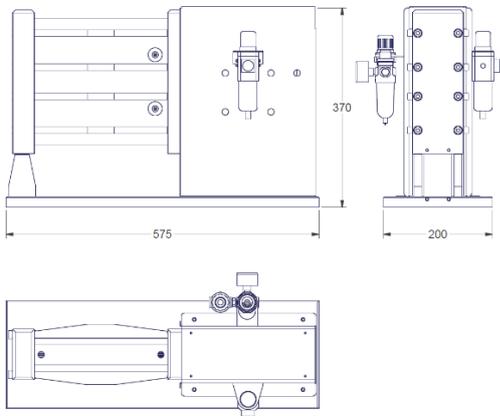
An example of a Vibro™-I system in operation

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



Hollow Plate™ Laboratory Element (HPL) Data	
Generic Design	Hollow 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
pH Range	1-14
Operating Pressure	0-10 bar
Free Chlorine	Membrane dependent

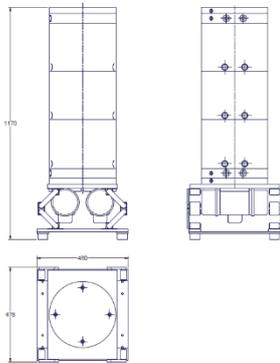
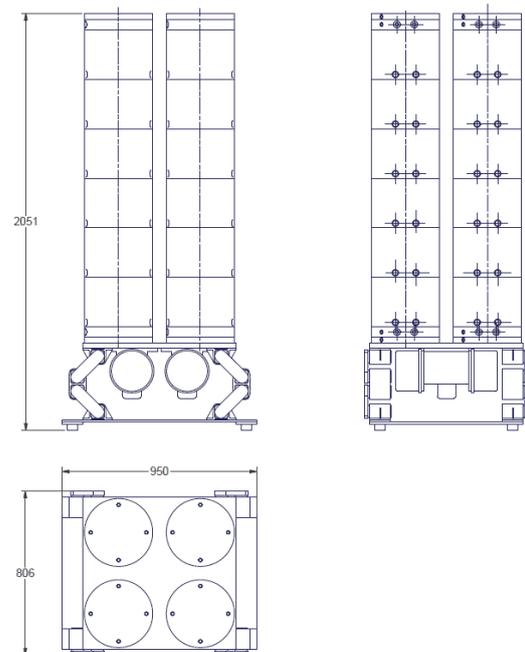
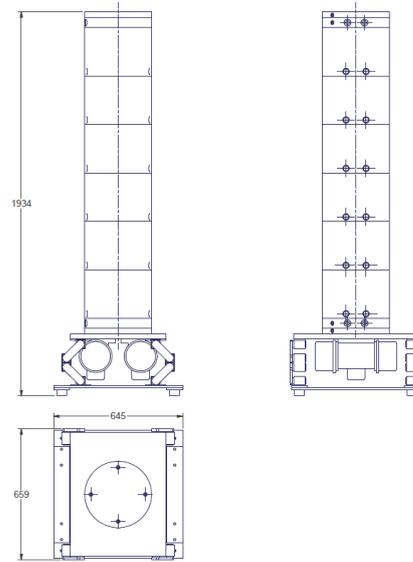
The HPL can be equipped with your membrane of choice. SANI Membranes have a line of standard MF and UF membranes from Synder, Microdyn-Nadir and others on stock. Most commercial available membranes can however also be used with the HPL. Please, do not hesitate to contact us with your membrane wishes.

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 m ² Hollow 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 m² Data	
Weight	190 kg
Dimensions (L x W x H)	659 mm x 645 mm x 1934 mm
Membrane	6 x 2,5 m ² Hollow Plate Modules (HP1)
Internal Retentate volume	28 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 x 2,5 m ² Hollow 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



Hollow Plate™ Module (HP1) Data	
Generic Design	Hollow Plate™. Fused Polypropylenes
Membrane Type	Most organic membranes (MF, UF, and other filter types)
Membrane Area	2,5 m ²
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 m² - 60 m² 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%

Sanitary

The Vibro™ systems and the Hollow 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

Completely drainable, and Vibro™ filtration has no high shear pump destroying your valuable product.



0,35 m² Vibro-LE



7,5 m² Vibro-I

For more information see sanimembranes.com

SANI 
Membranes

MORE FILTRATION, LESS ENERGY

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