

FUNDAWAVE®

Tangential crossflow filtration in a new design



DrM

FUNDAWAVE® Technology

The FUNDAWAVE® is a new filtration concept which targets applications that so far could not give satisfactory results with any type solid/liquid separation equipment. The equipment is based on the cross-flow principle with membrane-based filtering media adapted to specific filtration duties. The flow rate is maintained by constantly removing the solids layer forming on the membrane. In contrast to standard tangential flow filtration equipment (TFF) the cross-flow is accomplished by movement of the filter membrane across a stationary liquid.



FUNDAWAVE® with 3 modules



FUNDABAC® Candle Filter

FUNDAWAVE® vs. FUNDABAC®

For substances which are difficult to filter, the achievable flux rate is the decisive factor leading to a successful implementation of a filtration equipment. In a FUNDABAC® Filter with typical cycle times of 30-120 min., the long cake build-up time can cause diminishing flux rates due to the cake resistance.

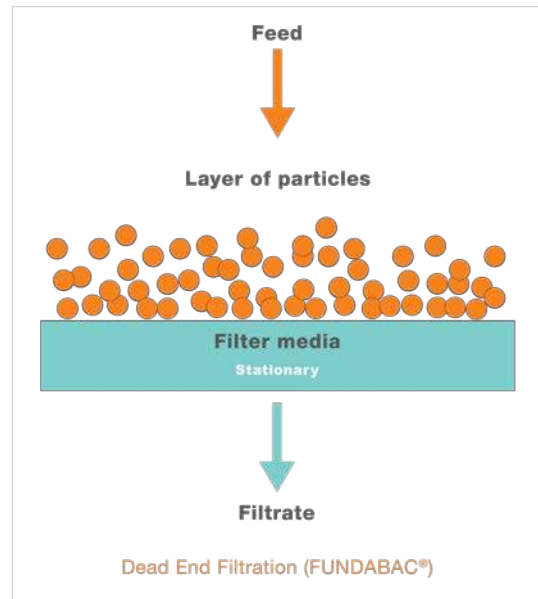
The CONTIBAC® Filter is an improvement to this shortcoming, as the cake build up time is reduced and the filtration cycles shorter. It can run at 5-10 cycles per hour, which increases the overall flux rate.

The FUNDAWAVE® goes one step further where the actual filtration cycles are reduced to a period many times shorter than a CONTIBAC®. As a matter of fact we are talking about cycles at a fraction of a second. In other words the cake is being removed many times per second. These extremely short cycles open up completely new possibilities. It allows filtration of solids which, under normal circumstances would very quickly block the filtering media once a cake layer is formed. The required pressure drops are factors lower than in a dead end filtration. This prevents build up of solid cakes which are difficult to remove. As there is essentially no cake being formed the filtering elements can be packed very closely which reduces module size and liquid hold up.

Comparison of Filtration Processes

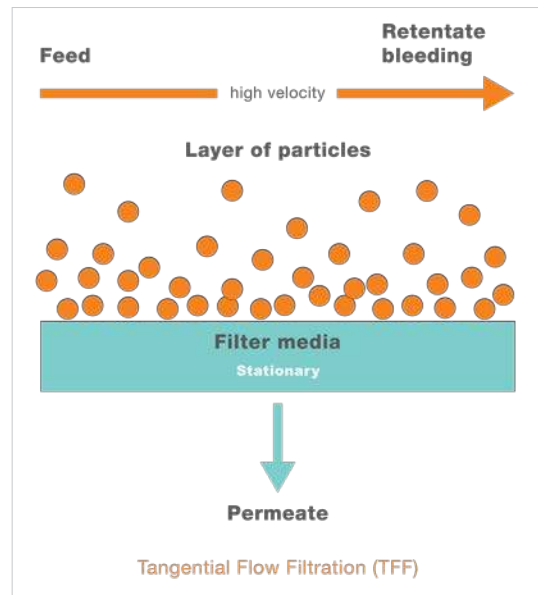
Dead End Filtration Process

The FUNDABAC® Filter is based on dead end filtration where the feed liquid is pressed through a stationary filter media which retains the solids and lets the liquid pass. The solids accumulate on the filter media and form a cake which is removed intermittently. Although normally an automatic operation, by design this type of filter is a batch equipment which runs in cyclic mode performing a set of sequence steps. The main advantage is its ability to process the cake with add on steps such as washing, extraction, steaming and drying. Additionally, its heel volume filtration assures minimum product loss.



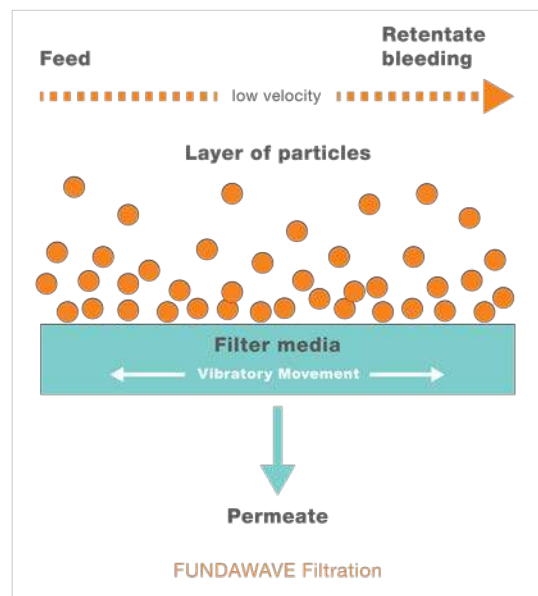
TFF Process

Crossflow filtration, or also called tangential flow filtration (TFF) works with a principle similar to the FUNDAWAVE®. The bulk of the feed passes tangentially across a stationary filtering media at high speeds. The retentate recycles to the feed pump while constantly removing the filtering layer in the process. At the same time a pressure build up is used to press a small part of the liquid through the membrane. The main difference is the fact that the TFF filter itself is stationary while the liquid needs to be pumped at high volumes to create the necessary tangential velocities. This results in a high energy consumption. Additionally, the resulting solids concentrations in the retentate is usually limited by its pumpability.



FUNDAWAVE® Process

The FUNDAWAVE® does not rely on large pumps. Neither does it need high pressure drops. It has a vibratory device which creates the movement of the filtering modules with respect to the stationary liquid. The resulting solids concentration in the retentate is not dependent on the flow restrictions and viscosities as experienced in tangential flow systems. Hence, it is possible to reach significantly higher concentration factors.



FUNDAWAVE® Filter

The FUNDAWAVE® is an industrial filtration solution specifically targeted for applications where flux rates, capital investments, gentle filtration conditions, energy consumption and sanitary design play an important role. It continuously delivers low fouling filtration by keeping the media clean by vibrating shear forces.

The filtering membranes are arranged in modules which vibrate vertically while keeping the liquid feed stationary. The relative velocity changes direction many times per second and creates turbulence on the membrane surface, thereby minimising the fouling layer. The vibrating mass is reduced to a minimum which also minimises the required energy input. The resulting heat input is significantly lowered and even for temperature sensitive products cooling may not be required.

The FUNDAWAVE® handles the feed solution very gently as no large circulation pump is needed. A conventional circulation pump can damage cells, molecules or other sensitive substances during operation and by eliminating the circulation pump the FUNDAWAVE® is the most product gentle industrial scale MF and UF system available. Additionally, the elimination of the circulation pump produces uniform trans-membrane pressures throughout the unit and results in the sharpest membrane cut-offs of any industrial system.

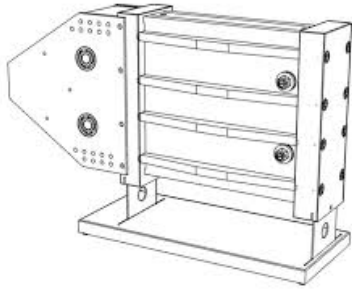
Due to this design the FUNDAWAVE® can handle very difficult products with high viscosities, high mass loadings as well as high solids concentrations. When extremely difficult feeds are processed, it is possible to homogenise the retentate in the FUNDAWAVE® by adding a small recirculation pump. The FUNDAWAVE® is fully drainable of both retentate and permeate, thus reducing product loss and increasing CIP cycles.

The FUNDAWAVE® utilizes stacked 2.5 m² modules and comes in tower units with configurations of 7.5, 15 or 20 m² filtration area. The towers can be connected in series or parallel depending on the needs.

The tower configuration eliminates circulation pumps, cooling aggregates, booster pumps and the simplified piping layout gives the FUNDAWAVE® system a small footprint. All media contacting parts are in durable polymeric materials or stainless steel. The FUNDAWAVE® conforms to FDA materials and sanitary resp. GMP standards if required. An extensive set of filtering membranes are available to adapt to the product feeds.

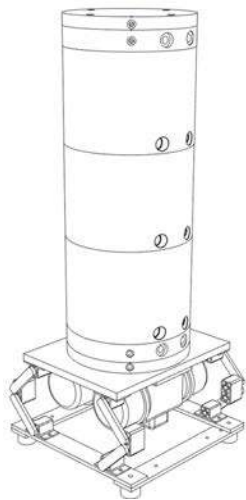


FUNDAWAVE® Data Sheet



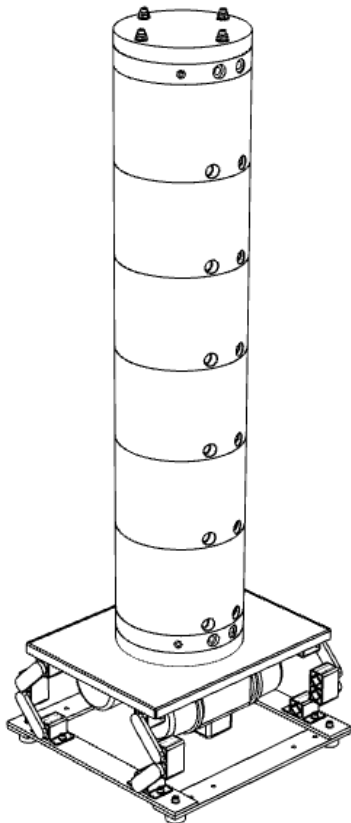
FUNDAWAVE® LABORATORY UNIT

Filter Area	0.35 m ²
Housing PVC max.	55 °C, 3 barg
Filter Elements	Polypropylene
Membrane	full range as for industrial size
Motor	230 VAC / 40 W
Oscillation Frequency	20 Hz



FUNDAWAVE® INDUSTRIAL FILTER

Filter Area	2.5 m ² per module
Housing PP max.	4 barg max. 35°C
	3 barg max. 55°C
	1 barg max. 80°C
Oscillation Frequency	20 Hz
With 3 Modules	7.5 m ² 400 VAC 0.44 kW
With 4 Modules	10 m ² 400 VAC 0.44 kW
With 6 Modules	15 m ² 400 VAC 0.74 kW
With 8 Modules	20 m ² 400 VAC 0.74 kW



AVAILABLE MEMBRANES	APPLICATION	MATERIAL
1 kDa	UF	PES
3 kDa	UF	PES
5 kDa	UF	PES
5 kDa	UF	PESH
10 kDa	UF	PS
10 kDa	UF	CA
10 kDa	UF	PES
30 kDa	UF	PES
30 kDa	UF	PESH
100 kDa	UF	PES
100 kDa	UF	PVDF
300 kDa	UF	PES
400 kDa	UF	PAN
500 kDa	UF/MF	PVDF
800kD/ 0.08 micron	UF/MF	PVDF
0.2 micron	MF	PVDF / PP
0.2 micron	MF	PVDF / PE
0.45 micron	MF	PTFE_HF
1 micron	MF/filter	PET, woven
5 micron	MF/filter	PET, woven

FUNDAWAVE® Benefits

FUNDAWAVE® benefits compared to other cross flow systems.

1

Ideal Separation

The FUNDAWAVE® improves separation due to a sharper cut-off. Eliminating the cross flow pump leads to a system with no pressure loss. The result is a uniform TMP in the entire system securing a completely uniform cut-off over the entire membrane surface.

2

Unique Microfiltration

The FUNDAWAVE® ensures the ability to run efficient microfiltration at extremely low pressure in the entire system (e.g. 0.1 bar). The low pressure reduces fouling and compaction, and delivers low fouling microfiltration with extremely high transmission of your target molecules.

3

Less Energy

The FUNDAWAVE® reduces the energy consumption by 50-90%. A cross flow system creates turbulence in the entire system whereas The FUNDAWAVE® only creates turbulence on the membrane surface where it is needed to reduce fouling.

4

High Concentration, Viscosity and Solid Load

The FUNDAWAVE® is ideal for membrane filtration of high viscous media and media with a high solid load due to the modules which have a fully open free flow channel design with no spacers.

5

Better Product Quality

The FUNDAWAVE® handles the product very gently as the elimination of the cross flow pump eliminates the pump shear.

6

Higher Yield

The modules are fully drainable of both permeate and retentate which means that all product can be recovered.

7

Sanitary

The FUNDAWAVE® sets a new sanitary standard with the open and clean design of the modules with no spacers and no flow dead areas. Fouling starts later on flat surfaces and is easier to remove when formed.

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.

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