

# Pallsep™ Vibrating Membrane Filtration Technology



Above: Pallsep PS400 and a System



**Pallsep** filtration technology represents a significant innovation in membrane filtration. In the **Pallsep** system, controlled horizontal oscillation moves the membrane elements through the feed fluid over 50 times per second. The oscillation generates vibrational energy at the membrane surface, giving shear (higher than that typically generated in conventional TFF systems) that is limited to a small boundary layer above the membrane surface, and which is not applied to the bulk of the fluid. This ensures that even in high solids feed streams, the membranes do not cake with the retained species. Fluids are processed in a very gentle manner through an open flow path with minimal pressure drop and even transmembrane pressure distribution. Very high suspended solids levels can be achieved (> 60% w/v\*) maximizing recovery of the permeate. In some applications it is possible to concentrate solids in a single pass with no recirculation. Both the concentrated solids and the filtrate can be recovered from the system if required by the application.

All **Pallsep** machines consists of a stack of membrane elements, which are mounted on a torsion bar. Kinetic energy from a small motor is efficiently converted to vibrational energy in the stack

There are three **Pallsep** variants: PS10 and PS400 representing nominal installed membrane areas of 1, and 40 m<sup>2</sup> respectively per machine.

## Features and Benefits

- Very low recirculation rates
- Energy efficient
- Tolerant of viscous feeds
- Processing to high suspended solids
- Gentle processing
- Small system footprint
- Low system hold-up volume

## Applications

The technology can be successfully applied to clarification applications where high product transmission through the membrane is essential and not easily achieved with conventional TFF systems, and harvesting applications where product loss with conventional TFF/centrifugation is unacceptably high.

- Recovery of therapeutic proteins from recombinant mycelial cultures
- Clarification of high suspended solids fermentation broths such as *Pichia pastoris* and *Saccharomyces*
- Processing of plant and animal extracts from transgenic or natural sources

\* Wet cell weight – see Postlethwaite et al. *Journal of Membrane Science* 228 (2004), 89 – 101.



PS10 in use with a Pall System

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## Technical Specifications

### Pallsep Membrane Elements

The membrane elements are a composite of 0.45 µm PTFE coated onto flexible stainless steel plates.

### Materials of Construction<sup>(1, 2)</sup>

Membrane	Emflon PTFE <sup>®</sup>
Other Fluid Contact Materials	316L stainless steel Polyphenyl sulfide Polyethylene Ethylene propylene EPDM Silicone

<sup>(1)</sup> Full material traceability is available if required.

<sup>(2)</sup> All polymeric contact surfaces have passed USP XXI class VI testing.

<sup>(3)</sup> Contact Pall for further information.

### Pallsep PS10

The PS10 is an ideal device for process development departments to demonstrate the feasibility of **Pallsep** technology for larger scale processes. The unit can work with an installed area of between 0.1 and 1 m<sup>2</sup>. This range makes the device suitable for use with the QuattroFlow pump and several Pall systems.

### Operating Conditions

	Typical Range	Limit
System Pressure	0.4 – 3 barg (5.8 – 43.5 psi)	4 barg (58 psi)
Trans-membrane Pressure	0.2 – 1.5 barg (2.9 – 21.7 psi)	4 barg (58 psi)
Operating Temperature	4 – 50 °C (39 – 122 °F)	55 °C (131 °F)
Fluid Recirculation	0.5 – 10 L/m dependent on installed area	Dependent on feed and system

### Other Technical Information

Process Connections	<b>Feed, Retentate and Permeate:</b> 13 mm (½ in.) Sanitary Clamp
Electrical Requirement	<b>Base Machine:</b> Single phase, 240/110 volts, 50/60 Hz, 20 A
Nominal Dimensions	<b>Membrane Element:</b> Diameter 300 mm (12 in.) <b>Machine, Stack and Pipework:</b> Height 2108 mm (83 in.) Width 870 mm (35 in.) Depth 870 mm (35 in.)
Weight	<b>Base Machine:</b> 180 kg (397 lbs) <b>Membrane Housing:</b> 25 kg (55 lbs)

### Pallsep PS400

#### Operating Conditions

	Typical Range	Limit
System Pressure	0.4 – 3 barg (5.8 – 43.5 psi)	8.3 barg (120.3 psi)
Trans-membrane Pressure	0.2 – 1.5 barg (2.9 – 21.7 psi)	4 barg (58 psi)
Operating Temperature	4 – 50 °C (39 – 122 °F)	55 °C (131 °F)
Fluid Recirculation	60 – 120 L/m for 40 m <sup>2</sup> (400 ft <sup>2</sup> )	Dependent on feed and system

#### Other Technical Information

Process Connections	<b>Feed/ Retentate:</b> 38 mm (1.5 in.) Sanitary Clamp <b>Permeate:</b> 25 mm (1 in.) Sanitary Clamp
Electrical Requirement	<b>US:</b> 480V 440V, 400V, 60 Hz, 3 phase <b>Europe:</b> 380V, 50 Hz 3 phase
Nominal Dimensions	<b>Membrane Element:</b> Diameter 610 mm (24 in.) <b>Base Machine, Stack and Pipework:</b> Height 3338 mm (119 in.) Width 1600 mm (63 in.) Depth 1177 mm (46 in.)
Weight	<b>Base Machine Only:</b> 1452 kg (3200 lbs) <b>Assembled Membrane Stack:</b> 544 kg (1200 lbs)