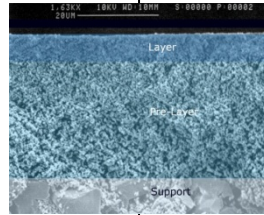


Membranes and Modules



Kleansep™ : High Flux Rate Ceramic Monolith

Kleansep membranes are available in a wide range of cut-off for the separation of organic molecules, water soluble polymers, emulsions and specific inorganic products.

The ceramic monolith together with the highly selective coating produce high output and a high separation quality.

Membranes and Cut-off

SPECIFICATIONS		
Support:	monolithic TiO ₂ – Al ₂ O ₃	Microfiltration
External diameter/length:	25 mm / 1178 mm	
Number of channels:	7 - 8 - 12 - 19 - 31 - 52 - 61	
Membrane code:	X - E - D - W - H - C - S	
Diameter of channels:	6 - 5 - 4,5 - 3,5 - 2,95 - 2,2 - 2,0 mm	Ultrafiltration
Membrane:	ZrO ₂ / TiO ₂	
Bursting pressure:	80 bar	
Service pressure:	10 bar	
pH range:	0 – 14	Nanofiltration
Sterilization:	121°C	
Sterilization by oxidants:	yes	
Solvents / radiations:	unaffected	
Temperature limitation:	up to 150°C	

Modules

GEOMETRY OF MODULES		Number of channels - Membrane area in sqm						
Modules	Quantity of membranes	7	8	12	19	31	52	61
Module K01	1 membrane	0,16	0,2	0,2	0,25	0,33	0,5	0,45
Module K03	3 membranes	0,48	0,6	0,6	0,75	0,99	1,5	1,35
Module K07	7 membranes	1,12	1,4	1,4	1,75	2,31	3,5	3,15
Module K19	19 membranes	3,04	3,8	3,8	4,75	6,27	9,5	8,55
Module K37	37 membranes	5,92	7,4	7,4	9,25	12,21	18,5	16,65
Module K72	72 membranes	11,52	14,4	14,4	18	24,48	36	32,4
Module K99	99 membranes	15,84	19,8	19,8	24,75	32,67	49,5	44,55
Module K138	138 membranes	22,08	27,6	27,6	34,5	45,54	69	62,1

The modules are available in different types of steel: 316L, 316Ti, Uranus B6, Hastelloy C22, Hastelloy C276 ...

Separation

KLEANSEP™ Ceramics membranes

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Kleansep™: the best choice of performance

ROBUST MEMBRANE OFFERING A LONGER LIFE-TIME EXPECTANCY

- Unrivalled performance in microfiltration
- Quickest return on investment
- Very high flux rate
- Compact design
- Very high physical resistance
- Unaffected by chemicals, solvents and radiations
- Back flushing capability

Kleansep™: the best choice for your needs

- A wide range of cut-off from nanofiltration to microfiltration
- Orelis Environnement process expertise
- Adaptable to varying viscosities and concentrations with a choice of channel geometries
- Laboratory scale testing facility
- Process support and technical assistance available for both pre-contact and after sales

Kleansep™: applications

- Membrane bioreactor
- On-board membrane treatment
- Bilge water
- Chemical industry
- Nuclear industry
- Agro food industry
- Paper industry
- Rolling mills
- Pre-treatment cleaner
- Washing machine tanks
- Oily waste water
- Surface treatment industry
- Automotive industry
- Laundry waste water



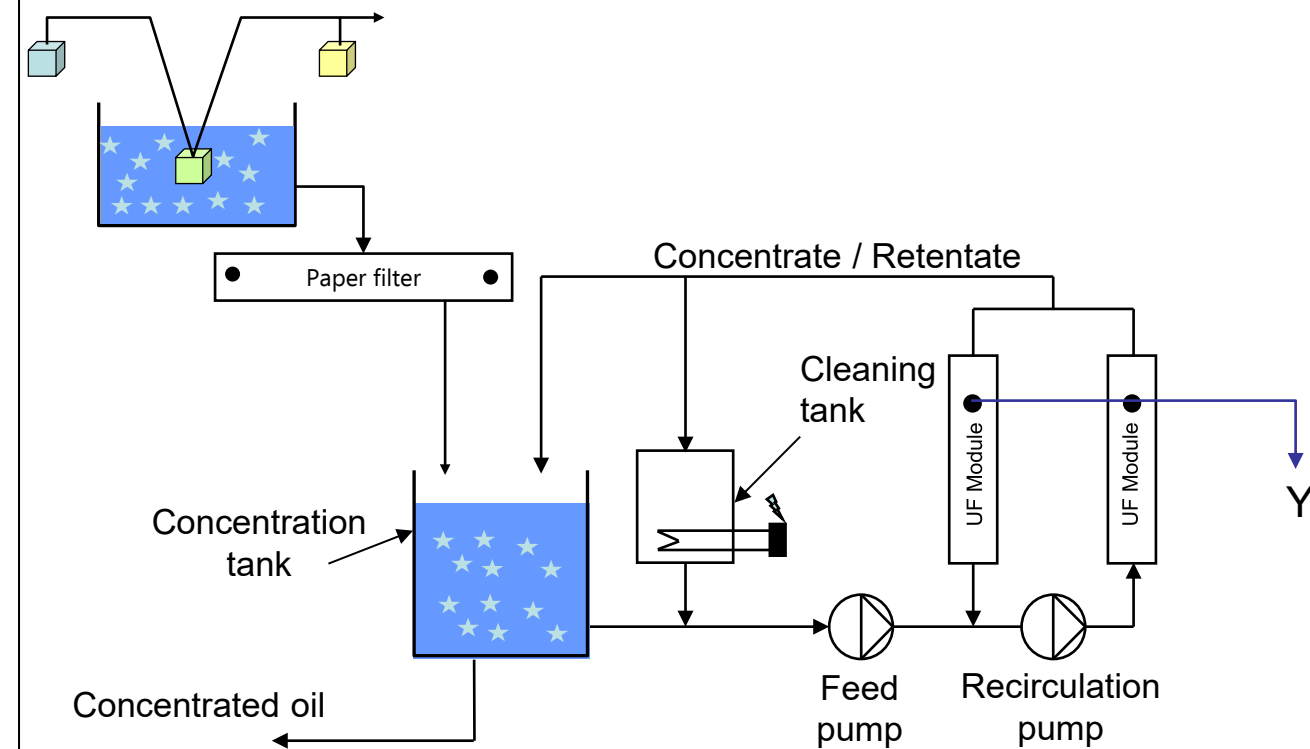
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Technical advantages

- Easy operating
- Accepts variations in pollutant load
- Real physical barrier for all types of emulsions
- Automatic cleaning

Process flow diagram



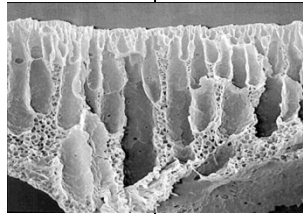
Environmental advantages

- Water savings through permeate reuse
- Production of a low volume of oily concentrates
- Fullfills strenghtest regulations – High water quality

Economical advantages

- Savings on chemical products
- Savings on concentrate treatment

Membranes and Modules



Pleiade MP4®

MP4 modules incorporating ultrafiltration membranes provide high performance, reliability, longevity and a low operating cost. The most cost effective organic membrane for demanding applications.

Membranes and Cut-off

	PVDF	PAN	PES
Microfiltration			
0,25 µm	v		
0,20 µm	v		
0,15 µm	v	v	
0,10 µm	v	v	v
Ultrafiltration			
50 nm	v		v
10 nm	v		v
10 kD			v
5 kD			v

PVDF: Polyvinylidene fluoride - PAN: Polyacrylonitrile - PES: Polyethersulfone

EXCLUSIVE RANGE

Fabric supported

3038 (-) grafted PAN 40 kD

3042 (+) grafted PAN 40 kD

3050 (-) grafted PAN 50 kD

Module type

RANGE				
3S10P	2S14P	3S14P	3S8P	5S8P
Gasket	Gasket	Gasket	Gasket	Gasket
1,4 mm	1,4 mm	1,4 mm	3 mm	1,4 & 3 mm



Compact

MP4® modules

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MP4®

Orelis Environnement Pleiade® plate and frame system was first introduced over 25 years ago and is used by many of the world's leading automotive and environment industries. To meet the changing demand of the market, the MP4 retains the proven benefits of plate and frame technology with improved maintenance and operation.

Advantages

SUPERIOR DESIGN

- Free liquid flow path
- No paint flow obstruction
- Proven and reliable plate and frame technology
- Visual identification of the permeate of each membrane

EASILY ADAPTABLE

- MP4 can directly replace spiral wound filters on existing skids

EFFICIENCY

- High output performance
- Low energy requirement

EXCEPTIONAL RELIABILITY

- Long membrane lifetime

MP4 UNIQUE DESIGN

- Each membrane has a shutoff valve
- Damaged membranes can be identified and isolated

READY TO USE

- No pre-conditioning of the membrane required

EASY TO CLEAN

- No spacer grill
- Modules can be individually isolated for maintenance without stopping production

ENVIRONMENTALLY FRIENDLY

- Entirely recycled by Orelis Environnement
- No disposal costs

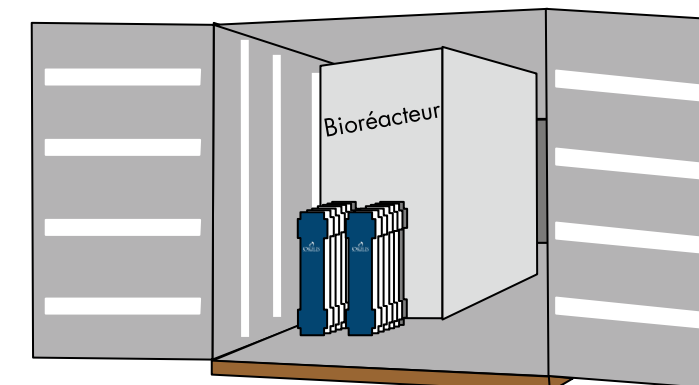
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P4-BIO

P4-BIO, for the treatment of small communities wastewater such as base camps and resorts, it excels for its simplicity and robustness

Diagram and photo of the P4-BIO in a container

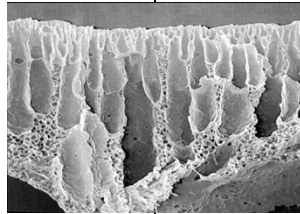


The P4-BIO is modular, it is easy to use, easy to clean and adaptable for small or big needs. Its design makes it interchangeable. It is made of composite materials, it is not only strong but also extremely resistant to any kind of corrosion.

He is already famous in Canada's far North for the treatment of base camps wastewater, in accordance with discharge into the Athabasca River.



Membranes and Modules



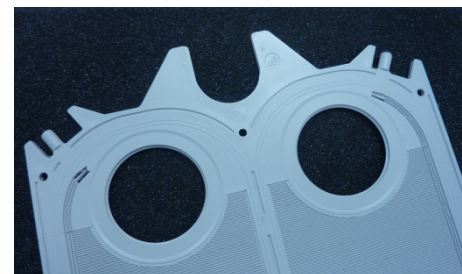
Pleiade® : Worldwide reference in organic ultrafiltration

Pleiade® modules incorporating ultrafiltration membranes provide high performance, reliability, longevity and a low operating cost. The most cost effective organic membrane for demanding applications.

Membranes and Cut-off

	PVDF	PAN	PES
Microfiltration			
0,25 µm	v		
0,20 µm	v		
0,15 µm	v	v	
0,10 µm	v	v	v
Ultrafiltration			
50 nm	v		v
10 nm	v		v
10 kD			v
5 kD			v

PVDF: Polyvinylidene fluoride - PAN: Polyacrylonitrile
PES: Polyethersulfone



EXCLUSIVE RANGE

Fabric supported

3038 (-) grafted PAN 40 kD

3042 (+) grafted PAN 40 kD

3050 (-) grafted PAN 50 kD

Module type

RANGE				
Type	UFP10	P2030	P2060	P2085
Membrane area	0.1 -> 7 m²	7 -> 27.3 m²	30.8 -> 58.8 m²	60.9 -> 88 m²
Number of plates	1 -> 64	20 -> 78	88 -> 168	174 -> 252
Area/plate	0.11 m²		0.35 m²	

NEW MODULE FOR MEMBRANE BIOREACTOR

Type	P2100
Membrane area	88 m²
Number of plates	250
Area/plate	0.35 m²

Recycling

PLEIADE® Polymeric membranes

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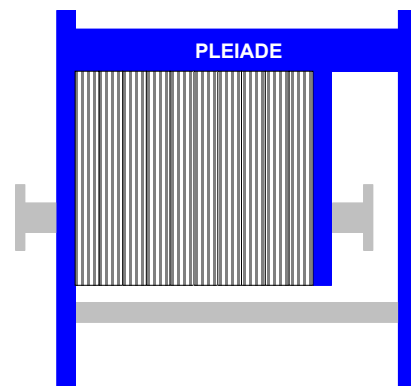
Membrane Bioreactor Wastewater

Versus conventional process

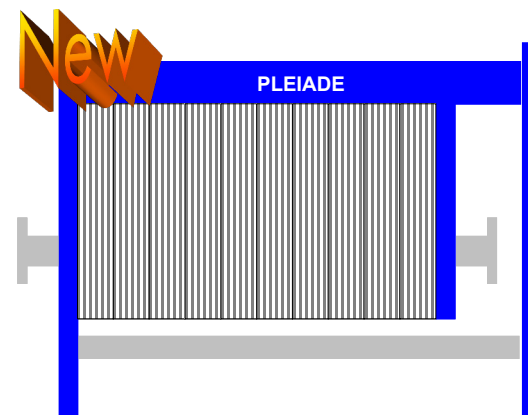
- Proven performances at high MLSS concentration (20 000 mg/l)
- Lower sludge yield (less than 0.1 kg MLSS/ kg BOD5)
- Smaller footprint with compact design
- Superior water quality including effluent disinfection
- Modular expansion capacity within existing buildings

Versus submerged membrane

- Over 30 years of experience with more than 1000 industrial references
- Easy to operate and less maintenance
- Higher peaking capabilities
- Dry mount UF membrane (external loop)
- Cleaning is easier for operator



P2085 module



P2100 module
for membrane bioreactor

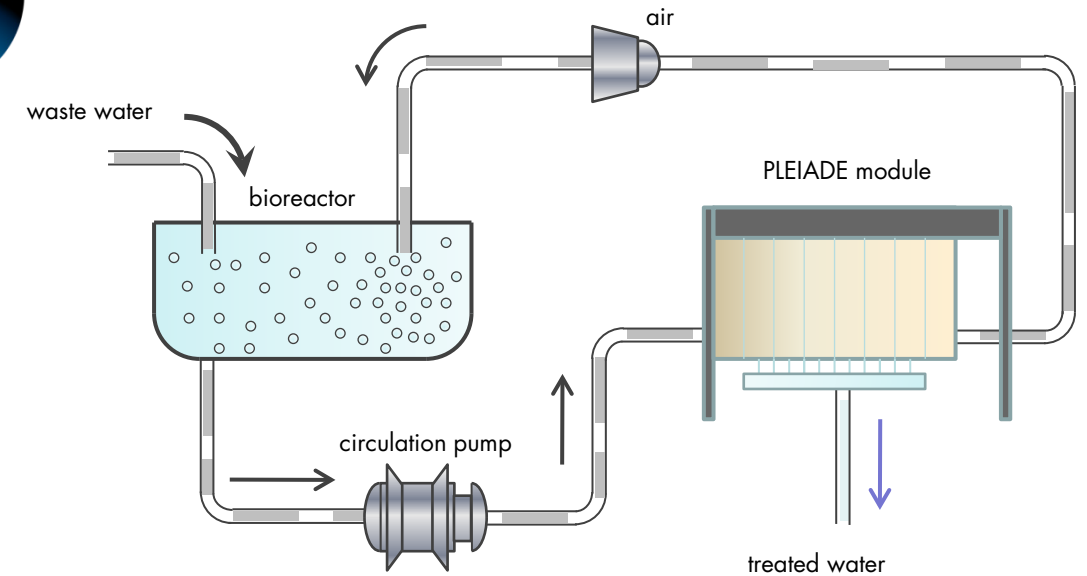
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Bioreactor: External loop



UF unit



PLEIADE® Modules

LABORATORY AND INDUSTRIAL RANGE

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PLEIADE®

The **Innovative**
Solution for Industries:
Polymeric and
Ceramic membranes



The veins free liquids technology is most effective for demanding applications.

MINIPILOT



Perfect for feasibility studies
1 pilot 2 membranes technologies :
Microkleansep™ Module equipped with
ceramic membrane
Rayflow® Module equipped with flat
sheet membrane Pleiade®

KLEANSEP™



The robustness of the membranes allows
the separation of organic and mineral
particles, oils, polymers.

KLEARSEP™



The best Oily Water Separator for the
treatment of Bilge Water

MP4®



It excels for its simplicity and robustness
for the treatment of small communities
wastewater such as base camps and
resorts

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Filtration

Our job: design, produce and sell
organic and ceramic membranes,
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range, plan type, Spiral and Tubular
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PERSEP™ SI

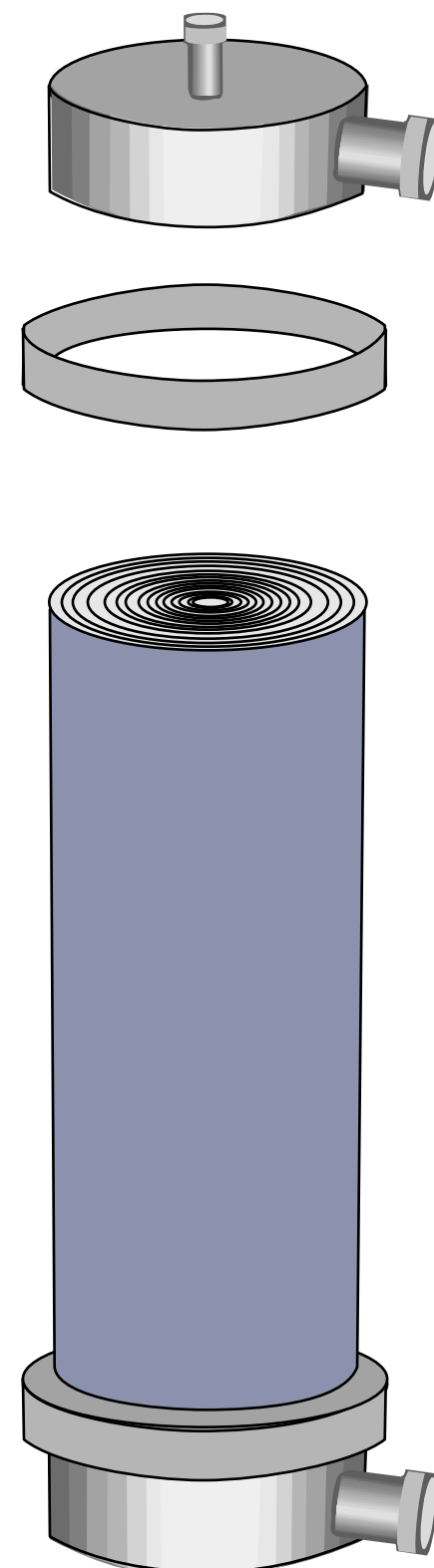
Characteristics	Caractéristiques	PERSEP SI (Spiral Integrated)	
		Metric	US
General characteristics	Caractéristiques générales		
Membrane material	Type de membrane	PVDF or PAN	
Spacer	Espaceur	0.7 mm	31 mils
Membrane surface	Surface active moyenne	28,1 m²	302 ft²
Cut off	Seuil de coupure	E-Coat Ultrafiltration	
Housing type	Type d'enveloppe	PVC	
Specifics characteristics	Caractéristiques spécifiques	Spiral Integrated : l'élément spiral est intégré à l'enveloppe en PVC = prêt à l'emploi	Spiral Integrated: spiral wound element is integrated PVC housing = ready for use
Recommended operating conditions	Conditions opératoires recommandées		
Maximum inlet pressure	Pression maximum d'entrée	5.5 bar à 52°C	80 psi - 125°F
Maximum outlet pressure	Pression maximum de sortie	0,70 bar	10 psi
Maximum cleaning temperature	Température maximum de nettoyage	52°C	125°F
Maximum back pressure	Contrepression Permeat maximum	0,35 bar	5 psi
Chlorine resistance	Chlorine résistance au chlore en continu	2 ppm	
Range of pH	Gamme de pH		
Filtration	Filtration	2 à 10 à 52°C	2 to 10 - 125°F
Cleaning	Nettoyage	1,5 à 10,5 à 52°C	1,5 to 10,5 - 125°F
Paint flow rate	Débit de peinture		
Retentate flow rate	Débit rétentat	14,1 à 17 m³/h	US.GPD 90,000 – 108,000
Maximum pressure drop	Perte de charge maximale	1,7 à 2,4 bars	24 to 34 psi
Dimensions of PERSEP SI module	Dimensions du module PERSEP SI		
Module lenght	Longueur du module	1003 mm	39,5 in
External diameter	Diamètre externe du module	219 mm	8,6 in
Permeate connector Diameter	Diamètre interne du tube permeat	33 mm	1,3 in
Feed connector Diameter	Diamètre du connecteur d'alimentation	191,5 mm	7,5 in
Permeate connector Diameter	Diamètre du connecteur perméat	42 mm	1,6 in
Dry weight	Poids du module (vide)	22,7 kg	50 lb
Working weight	Poids du module (plein)	40,8 kg	90 lb

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PERSEP™ SI



PERSEP™ SI : : spiral wound element is integrated PVC housing = ready for use



PERSEP™ SI diagram

LABORATORY AND INDUSTRIAL RANGE

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PLEIADE®

The **Innovative Solution** for Industries:
Polymeric and Ceramic membranes



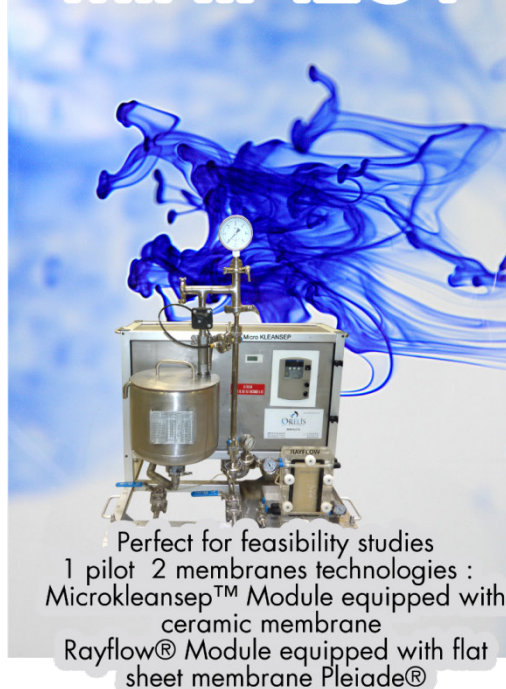
KLEARSEP™



KLEANSEP™



MINIPILOT



MP4®



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Protection

FLOSEP Hollow fiber COLUMN

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FLOSEP: hollow fiber membrane module

Hollow fiber membrane module can be widely applied in many fields in industry and environmental protection.

Skid equipped with hollow fiber UF membrane module



Main applications areas

- Industrial wastewater treatment and reuse, such as: electroplating wastewater treatment; mine water reuse; boiler feed water treatment; ...
- Car washing water reuse;
- Reverse osmosis (RO) pretreatment;
- Sea water desalination pretreatment;
- Municipal sewage treatment and water reuse;
- Living area domestic wastewater treatment and water reuse;
- Food and beverage areas...

Picture of the outside-in hollow fiber membrane module

Outside dimensions: 225 x 1760 mm



Outside dimensions: 160 x 1320 mm



Outside dimensions: 160 x 1350 mm



Outside dimensions: 90 x 1120 mm



Performance of hollow fiber membrane

Membrane material	Polyvinylidene fluoride (PVDF)
Membrane diameter inside /outside	0.7/1.3mm
Average pore size	0.05μm / 0.1 μm / 0.2 μm
Operating Pressure	≤ 0.3MPa
Maximum trans-membrane pressure	0.2MPa
Operating temperature	5-45°C
Working PH value range	2-11
Cleaning PH value range	1-12
Pretreatment of accuracy requirement	<150μm
Maximum feed water turbidity	200NTU
Mode of operation	Dead-end filtration or Cross-flow filtration

Side view picture of the outside-in hollow fiber



Picture of the end face



Picture of PVDF hollow fiber membrane



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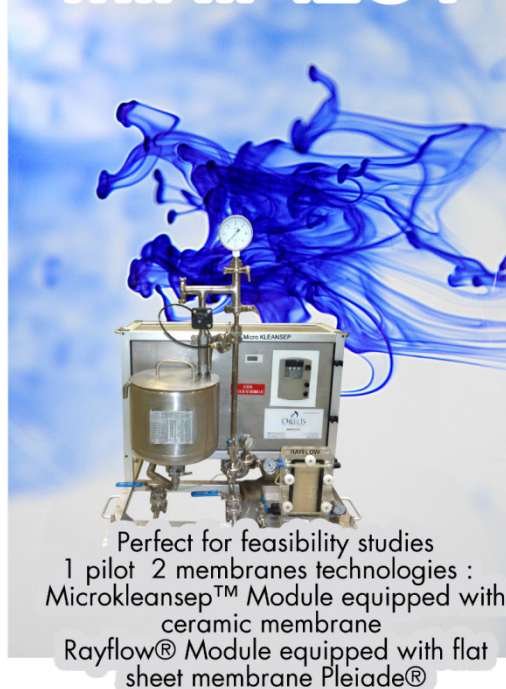
KLEARSEP™



KLEANSEP™



MINIPILOT



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FLOSEP IMMERSED Hollow fiber

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FLOSEP: IMMERSED hollow fiber membrane module

Membrane bioreactor (MBR) is a new sewage treatment technology with the combination of membrane separation and biological treatment technology. New technology, highly efficient water treatment systems and the clear water quality that makes this technology stand out in the lacking water resources world today. The main application fields of MBR are industrial wastewater treatment and reuse; municipal wastewater treatment and reuse; living quarters domestic wastewater treatment and reuse and so on. As one of the most important compositions in MBR technology, Orelis Environnement high quality curtain-type hollow fiber membrane module can be widely applied in different types of MBR.



Curtain-type hollow fiber membrane module

Performance parameters

Membrane form	Hollow fiber
Membrane material	PVDF
Membrane Average pore size	0.1 μm
Membrane diameter (inner/outer)	0.8/1.5 mm
Membrane pore structure	Assymetric
Adhesive	Epoxy

Filtration effect

SS >2 μm	100%
Microorganism	99.999%
Permeate NTU	≤ 1 NTU
Permeate SDI	≤ 2.5

Usage Condition

Filtration method	Outside-in
Pressure	0.01-0.05MPa (Negative pressure)
Operating temperature	5-45°C
PH range of use	2-11 (Cleaning PH range 1-12)
Flux range of design	10-20 L/m ² .h (based on raw water quality selected)
Recommended ratio air-water	20:1-40:1
Air supply requirement	Oil-free compressed air
Oil content of raw water	<3 mg/L
Maximum concentration of residual chlorine in feed water	200 mg/L
Maximum concentration of residual chlorine in cleaning agent	5000 mg/L

Picture of the MBR system installation site

