CERAMIC MEMBRANE TREATMENT PLANT

TriTech

MEMBRANE RELATED PRODUCT

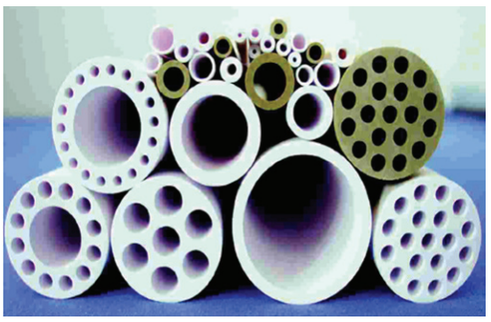
The ceramic membrane filtration plant is a flexible unit for using ceramic membranes for low pressure MF and UF applications. The plants can be configured to run higher pressure UF/NF applications as well as other tubular membranes (inorganic or polymeric).

The plant can be setup to test a variety of membrane pore sizes, operating parameters (pressure, trans membrane pressure, cross-flow rate, temperature, back pulsing, etc.), and feed channel diameters (3mm, 4mm, and 6mm) to achieve optimal performance.

The ceramic membranes are available in a range of pore sizes or molecular weight cutoffs (MWCO): MF/UF membranes from 5 micron to 0.02 micron; UF/NF membranes of 5,000 and 1,000 MWCO.

The plant can be operated in: batch mode, semi-batch mode, or feed and bleed mode. The pilot plant design has a single stage recirculation loop.

The membrane filtration pilot plant is skid mounted and will be delivered with all the components required for quick installation and easy operation, including an operating manual with data sheet templates.



	Applications
Oils	De-oiling and silica removal of oilfield produced water, oily-water emulsion, edible oil, waste oil treatment
Water and wastewater	Industrial effluent membrane bioreactor, industrial textile wastewater treatment, alkaline cleaner recovery
Chemicals	Solvent removal
Foodstuffs	Sugar, starches and juices extraction

FEATURES OF BASIC CERAMIC PLANT

Standard Features

- One, tubular ceramic membrane module
- 190L feed tank
- Back pulse device
- Control loops (temperature and tank level)
- Feed and recirculation pumps
- Motor starters
- Permeate and concentrate flow indicators
- Heat exchanger
- Temperature and pressure gauges
- Stainless steel construction
- Skid mounted

Optional Items

- UF/NF membrane modules
- Operating pressure up to 20 bar
- Pre treatment equipment
  - screens and depth filters
  - chemical feed systems

Operating Conditions

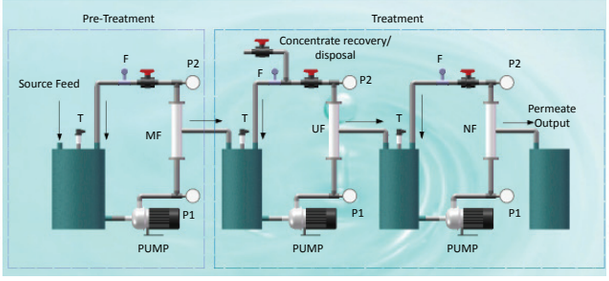
- Membrane Area 3.6 to 6.7 m2
- Permeate Capacity 9-45 m3/day
- Pressure up to 7 bar
- Temperature up to 93°C

Utility Requirements

- Power 230/380V, 3 phase, 60 Hz
- Electric Service 60 amps / 380 V
- Plant Air 5 bar, oil-free
- Cooling Water 60 lpm, 15°C
- CIP Water 95 lpm

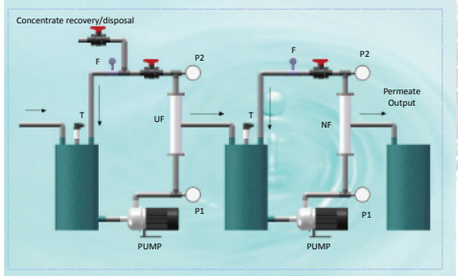
MODULAR DESIGN

Modular basic unit that can be cascaded together to customize for an application



MF module pretreatment UF and/or NF module final treatment

Three modular plants are cascaded to provide a wastewater treatment solution for oil field produced water to meet regulatory discharge standards.



Two UF and NF modular plants are cascaded to provide the treatment solution for effluent from a textile industrial plant.

Tritech Water Technologies (Singapore) Pte Ltd
2 Kaki Bukit Place, Tritech Building, #06-00
Singapore 416180

Tel : +65 6848 2567 (4lines) / Fax : +65 6848 2568
Email : membrane@tritech.com.sg / www.tritech.com.sg

PROCESS KNOWLEDGE CONFIGURATION

In order to provide effluent treatment solutions to a wide sector of the industries, all operational process parameter are programmable: These include

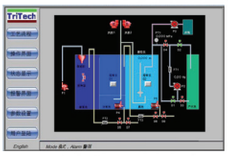
- Pressure and flow rate (P1, F)
- TMP: trans-membrane pressure (P1-P2)
- Temperature of feed (T) to be maintained by a control system
- Programmable process valves switching system to configure and direct the flow of the feed, concentrate, permeate between/within each cascade module.
- Programmable backflush system to remove materials from the membrane surface to restore production efficiency.
- Programmable Clean-In-Place (CIP) system for monthly chemical cleaning of the ceramic membrane to ensure peak performance.
- With our in depth knowledge of the process parameters for different industrial applications, each process and system can be optimized to meet all regulatory requirements. By selecting from our process knowledge database, this knowledge is downloaded into the system controller to customize this system for a specific application.

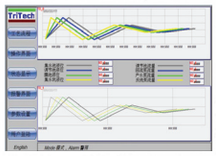
PRODUCT RANGE FOR TRITECH® CERAMIC PLANT

Pre-engineered Package Plants are cost effective and compact solutions for water treatment

Ceramic module (qty)	Output Capacity (m3/h)	Power (KW)	Model
1 to 3	1 to 6	4 to 15	CER-3
6 to 16	1 to 50	10 to 55	CER-16
14 to 32	3.5 to 100	20 to 100	CER-32
30 to 52	7 to 170	45 to 170	CER-52

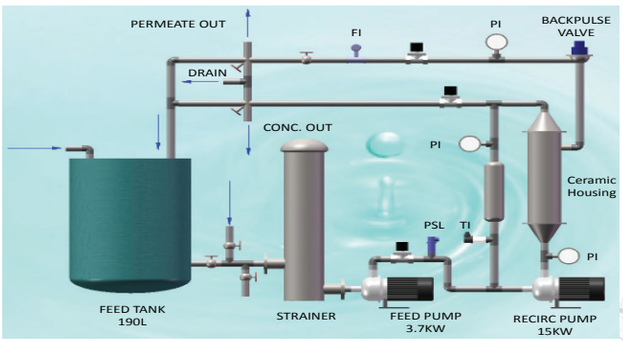
PLC HMI PICTURES


Process flow monitoring


Historical trends


Control panel

PROCESS FLOW



CERAMIC MEMBRANE

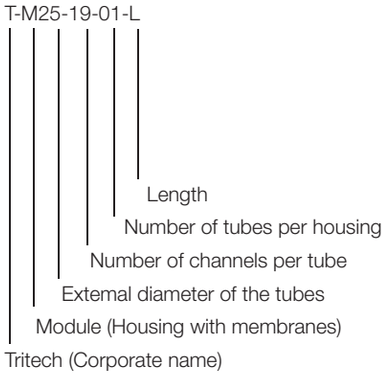
	Material	Mean pore size	Cut-off	Open porosity	Dimension
Microfiltration	$\alpha - Al_2O_3$	800nm		40%-55%	Monochannel and multichannel tubes with a length up to 1200 mm
		600nm			
		400nm			
		200nm			
		100nm			
		70nm			
	TiO_2	800nm			
		250nm			
		100nm			
		110nm			
Ultrafiltration	$\gamma - Al_2O_3$	10nm		30%-55%	
		5nm	7500D		
	TiO_2	30nm			
		5nm	8500D		
		3nm	2000D		
Nanofiltration	SiO_2	1.0nm	600D	30%-40%	
	TiO_2	1.0nm	750D		
		0.9nm	450D		

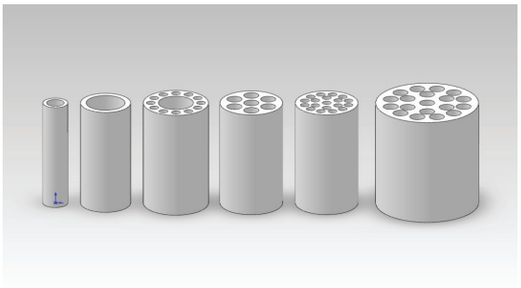
MEMBRANE HOUSING AND PACKAGE

Specification	Membrane area/m²/per		Reference size of fittings/ISO		
	L-500mm	L-1200mm	Feed	Retentate	Permeate
T-M10-1-01-L	0.011	0.026	$G^3/_8A$	$G^3/_8A$	$G^1/_4A$
T-M10-1-03-L	0.033	0.079	$G^1/_2A$	$G^1/_2A$	$G^3/_8A$
T-M10-1-07-L	0.077	0.185	$G^3/_4A$	$G^3/_4A$	$G^1/_2A$
T-M10-1-19-L	0.209	0.501	DN40	DN40	DN15
T-M10-1-37-L	0.407	0.976	DN50	DN50	DN20
T-M10-1-91-L	1.001	2.402	DN80	DN80	DN32
T-M25-19-01-L	0.10	0.25	$G^3/_4A$	$G^3/_4A$	$G^1/_2A$
T-M25-19-03-L	0.31	0.75	$G1^1/_4A$	$G1^1/_4A$	$G^1/_2A$
T-M25-19-07-L	0.73	1.75	DN50	DN50	DN20
T-M25-19-14-L	1.46	3.51	DN65	DN65	DN25
T-M25-19-19-L	1.98	4.76	DN80	DN80	DN32
T-M25-19-37-L	3.86	9.28	DN125	DN125	DN40
T-M41-19-01-L	0.18	0.43	G1A	G1A	$G^1/_2A$
T-M41-19-03-L	0.54	1.29	DN50	DN50	DN20
T-M41-19-07-L	1.25	3.01	DN80	DN80	DN32

Number of channel	1	1	12	7	19	19
External diameter /mm/	10	20	26	25	25	41
Channel diameter /mm/	7	15.5	3.5	6	3.5	6
Filtration area per 1.2 m/m²	0.026	0.058	0.16	0.16	0.25	0.43
Inflow area per tube /mm²/	38	189	116	198	183	537

Nomenclature of specification:





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