

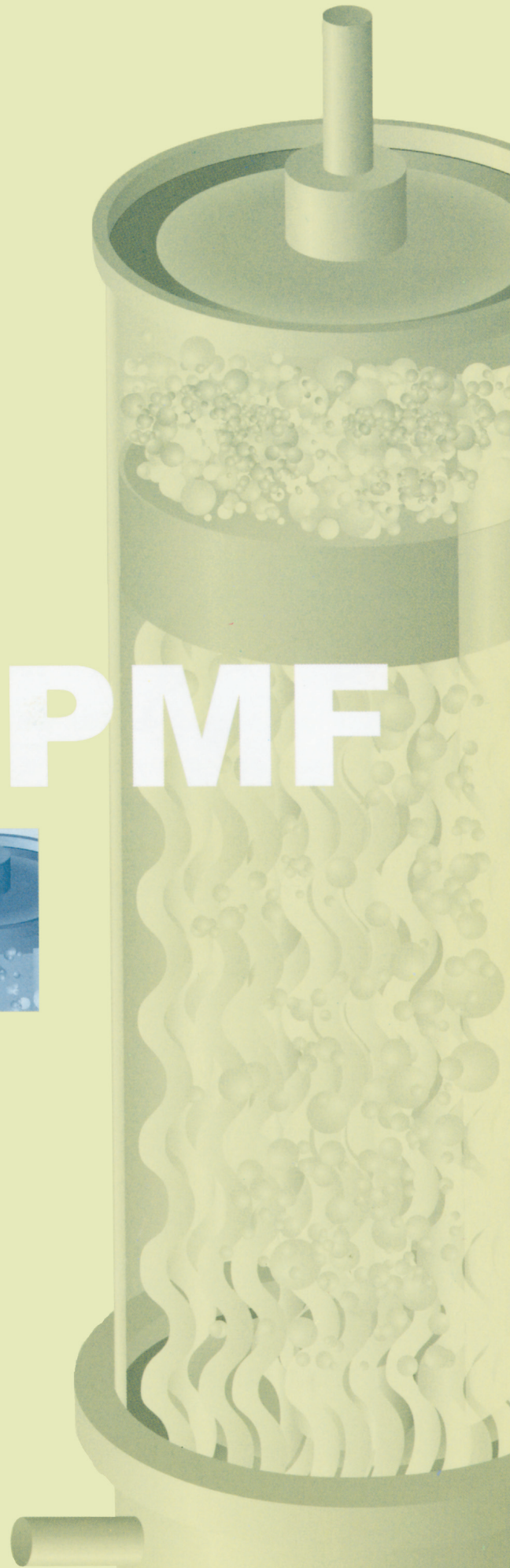
**Universal Filter Group Inc.**  
**and**  
**Global Enfiltec Ltd.**

**Perfect Backwashable Micro Filter**



**VP MF**

*A combined force bringing the next  
generation of water filtration technology  
to North America.....*



## Perfect Backwashable Micro Filter



Though there are numerous technologies available for separating contaminants from polluted water, one of the simplest and most effective is the filtration method. Filtration has been defined as one of the best separation technologies as it is not dependent upon chemical treatment and it prevents re-contamination.

Most of the previously utilized filtration technologies have been conventional sand and media filtration, cartridge or bag filtration, ceramic, highly polymerized compounds and membrane filtration. These products, which are manufactured from various raw materials and are readily available in the market, have the respective pore sizes which range from tens of microns to ionic particle size.

Although these technologies are capable of filtering as intended, they are only marginally utilized in the municipal and industrial marketplace. Such utilization has been limited to small purification plants and other simple treatment processes. The hindrance to complete utilization of these filters has been primarily due to very limited cleansing capabilities of the systems.

Previous micro-filtration systems have had either limited or no backwashing capabilities which was due to the design parameters of the systems. Conventional fixed pore micro filtration systems have also been restrictive in use due to the high cost of element replacements. Cleaning of the elements has been difficult due to penetration of the matter into the pore structure of the element.

The introduction of the VPMF (Variable Pore Micro Filter) system revolutionizes the entire concept of micro filtration.





SEA Steel Mill, Korea 600 m3/Hr Recycling of Waste Water

As shown in figure 1, filtration products are usually classified by pore structure and surface type. Most of the previous conventional, variable-pore structure filters have been limited to removal of particle size larger than 15-microns.

Visualizing the need for a superior micro-filtration system, Global Enfiltec Inc. developed the VPMF system, which has been developed, tested and proven with over ten years of performance. VPMF systems are being operated and maintained at over 200 facilities throughout Korea, Australia, Japan and Western Europe.

Figure 1

Pore Structure	Surface Structure	Commercial Products	Pore Size Distribution					
			REVERSE OSMOSIS	ULTRA FILTRATION	MICRO FILTRATION	CLARIFICATION		
			.0001 $\mu$ m	.001 $\mu$ m	.01 $\mu$ m	.1 $\mu$ m	1 $\mu$ m	10 $\mu$ m
Fixed Pore	Depth Type	Catridge Filter						
		Bag Filter						
	Screen Type	Membrane Filter (Hollow Filter)	RO	NF	UF	MF		
Variable Pore	Depth Type	Sand Filter (Multi Media Filter)						
		VPMF						
	Screen Type	Precoating Filter						
		Cross Filter						
		Leaf Filter						

# What is the VPMF?

## Variable Pore-structure Micro Filter

## Perfect Backwashable Micro Filter

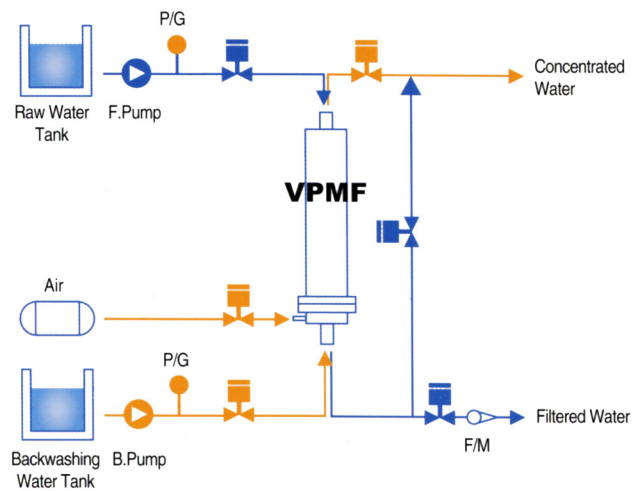
### *Principles of Operation*

#### Filtration Cycle:

In the filtration mode, the micro fibre element is compressed by the raw water in a down-flow filtration pattern. The inflow of raw water gradually compresses the micro fibre element until optimum compression is reached. Suspended solids and sediment are trapped in the folds of the micro fibre element.

#### Backwash Cycle:

In the opposite manner, backwashing is completed by expanding and dividing the pore structure into strands, which are easily cleaned with finely diffused air and water. Vibration of the cylindrical element in the air wash cycle results in a synergism which enhances release of matter from the fibres. Backwash takes only 3 – 5 minutes depending on the raw water makeup.



### Flow Chart



### Operating Condition

No.	Item	Description
1	Operation Pressure	2.0~2.5kgf/cm <sup>2</sup>
2	Operation Temperature	60°C
3	Filtrating Control	Digital Flowmeter or Timer
4	Backwashing Method	Water & Air
5	Backwashing Time	3 to 5minutes, Depending upon the concentration of raw water
6	Air Consumption	170LPM/MODULE, 1.5kgf/cm <sup>2</sup>
7	Backwash Water Consumption	15LPM/MODULE, 1.5kgf/cm <sup>2</sup>

### Materials

No.	Item	Description
1	Housing	PVC, SS
2	Lower Flange	SS
3	Filter Fiber	PE, PP, Nylon
4	Filter Holder	PVC, MC
5	Permeate, Pipe	SS

# Perfect Backwashable Micro Filter



## *Introduction of the VPMF System*

Operation of the VPMF system is entirely different from the traditional media or cartridge filtration systems. The VPMF has been defined by users as the perfectly backwashable micro filter. It has been patented in the USA (Patent No. 5984108), Japan (Patent No. 3131190) and Korea (Patent No. 0241198). Further patents are being applied for in various countries.

The VPMF has the following characteristics:

1. The filtration process operates with multiple layers of micro fiber
2. The backwash process is very rapid, requiring only 3 – 5 minutes
3. Perfect backwashing is achievable by means of water and air
4. There are five models available ranging from 25-micron to 0.2-micron

The VPMF system may be utilized over a wide range of applications such as potable water purification, sewage and wastewater treatment, pre-treatment of advanced water treatment processes and the removal of green algae such as chlorophyceae.

## *Uses for the VPMF system*

### **1. Purification Plants**

The VPMF is capable of replacing conventional sand filters, cartridge filters and MF membrane systems.

### **2. Polluted Water Treatment**

The VPMF is able to remove the SS, and to decrease the BOD after biological treatment.

### **3. Sewage Water Treatment**

After biological treatment, the effluent from the VPMF systems can be utilized for irrigation purposes.

### **4. Waste Water Treatment**

The levels of COD, BOD and SS are dramatically reduced by use of the VPMF.

### **5. Pre-treatment for Advanced Water Treatment**

The VPMF may be utilized as pre-treatment for membrane systems, ion-exchange, ozone, activated carbon, and UV systems.

### **6. Removal of algae and other organisms**

The VPMF has been found to provide excellent performance in removal of chlorophyceae in aquatic fish ponds, process water recirculation, cooling tower filtration, vehicle washing recirculation and numerous other raw water conditions.

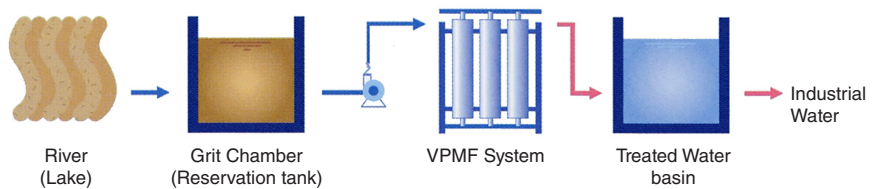
*Visit our website at [www.universalfiltergroup.com](http://www.universalfiltergroup.com) to view a video of the VPMF system in operation.*



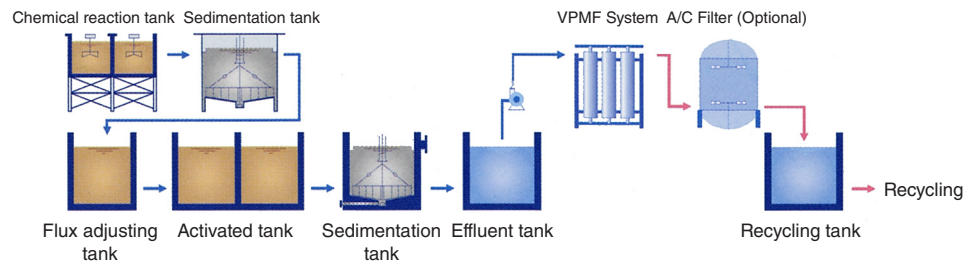
# The Range of Applications

For sewage applications, the effluent from VPMF systems can be used for irrigation purposes in golf courses and parks after biological treatment. For industrial waste water applications, the effluent can be recycled and reused for production purposes, thereby avoiding the waste of this valuable commodity.

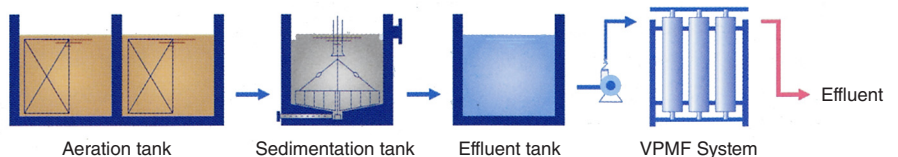
## Substitution of clarifier and sand filter



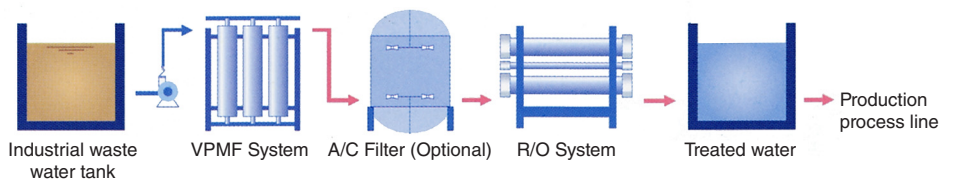
## Recycling of waste water



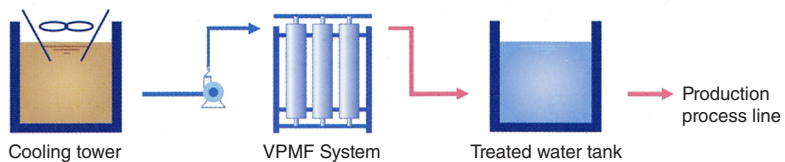
## Advanced treatment of sewage



## Pretreatment of R/O system for industrial waste water

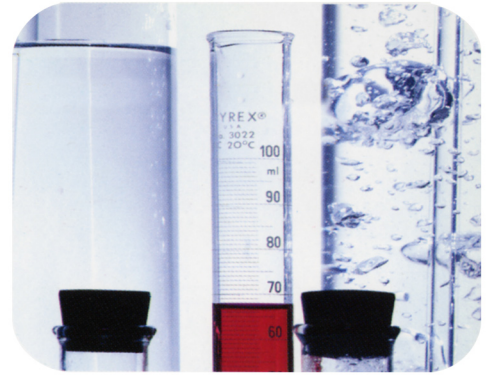


## Recycling of cooling water



*One of the most advanced and environmentally-conscious filtration designs in the world today . .*

# Perfect Backwashable Micro Filter



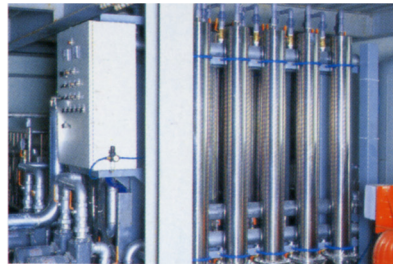
- Makes recycling usage feasible for irrigation and industrial process water.
- Removal of chlorophyceae possible by removing SS, BOD, T-N and T-P simultaneously.
- Protects drinking water sources against pollution.
- Restore environmental friendly parks with artificial rivers for the public.



- Recycling of industrial wastewater.
- Easily accommodated in existing facilities.
- Less space required and lower maintenance costs.
- Eliminates waste water effluent due to recycling
- Enhances the client reputation as being environmentally friendly.



- Maintain less than 10 PPM of both BOD and SS.
- Enables improvement of water quality without interrupting the operation of an existing facility.
- Fully automated operation by means of a PLC control system.
- Less space required and lower maintenance costs.



- Can replace existing sand and micro filter units.
- Extends life expectancy of RO systems and Ion-exchange resins
- Perfect backwashing performance ensures high efficiency.
- Modular design allows for easy future expansion.



- Prolongs useful life of machinery due to removal of suspended solids.
- Lower production cost owing to the most optimum recycling system.
- Less backwash water produced due to efficiency of BW process.
- Fully automated operation by means of a PLC control system.



*.. Adding nothing, Leaving nothing, Producing only a high quality effluent product.*

# Perfect Backwashable Micro Filter



VPMF has been developed to meet the needs of the next generation of technology for filtration and separation in liquid phase

The advantages of the VPMF technology are numerous:

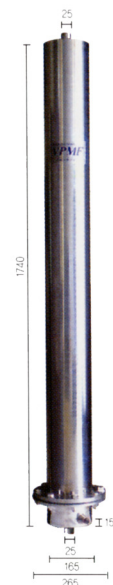
1. Reduced maintenance compared to conventional media filtering systems
2. Reduced water consumed in the BW process
3. Less floor space is required, which results in lower capital cost
4. Excellent backwashing relates to cost savings of energy
5. Extended life expectancy due to the superior backwashing performance
6. Modular design allows for easy expansion in capacity
7. Economical in terms of initial investment
8. Tremendous removal capacity of suspended solids

## Applicable Fields

\*Note: The flux as shown below is based on clean water at 2 Kg. / Sq. Cm.

Model name	Pore Size	Flux	Applicable Fields
VPMF-LQ	25 $\mu$ m	3.5 m <sup>3</sup> /hr	Removal of chlorophyceae in lakes and fish farms. Cooling water recycling.
VPMF-MQ	5 $\mu$ m	2.5 m <sup>3</sup> /hr	Replacement of cartridge and sand filters. Removal of suspended solids wastewater. Removal of SS and BOD in effluent of sewage purification plant. Recycling the removal of SS in sewage treatment plant. Pre-treatment of membrane filter. (R/O, NF)
VPMF-HQ	1 $\mu$ m	1.5 m <sup>3</sup> /hr	Replacement of sand filter in water treatment plant. Purification treatment in swimming pools. Pre-treatment of high level treatment. (i.e. activated carbon, ion exchange resin, ozone, and U.V. etc.) Pre-treatment of membrane filter. (R/O, NF)
VPMF-SQ	0.5 $\mu$ m	0.6 m <sup>3</sup> /hr	Pre-treated of membrane filters. (R/O, NF) Filtering of industrial water and recycling of industrial wastewater. Sewage and gray water treatment by direct filtering.
VPMF-UQ	0.2 $\mu$ m	0.3 m <sup>3</sup> /hr	Recycling of sewage effluent. Portable water purification pre-treatment unit.

## Dimension





# VPMF-S20 Module Specification

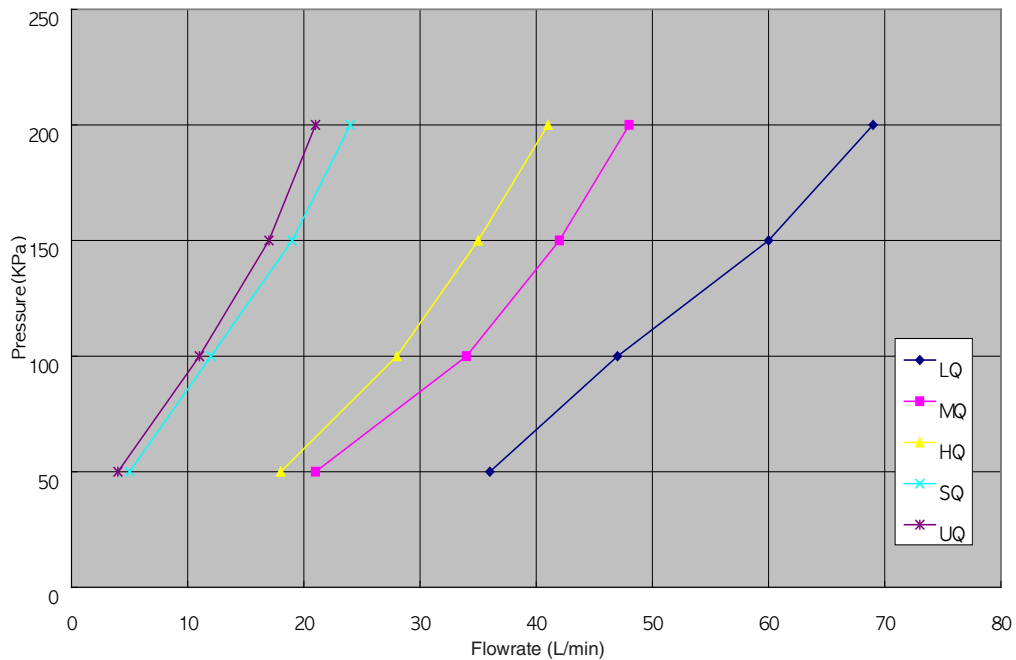
	Material	Housing	SS 304
		Filter Element	PE / Nylon / PP
	Design Pressure		5kg/cm2
	Maximum Temperature		60 Degree (C)
	pH Range		1 - 14
	Operating Pressure		1.5 - 2.5kg/cm2
	Backwash Method		Water & Air
	Backwash Water Flow		15LPM/Module
	Backwash Air Flow		170LPM/Module
	Backwash Duration		3 - 5 minutes
	Backwash Frequency		60 - 120 minutes
	Flow Rate	Pore Size	
		LQ (25micron)	3.5m3/Hr
		TQ (10micron)	3m3/Hr
		MQ (5micron)	2.5m3/Hr
		HQ (1micron)	0.9m3/Hr
		SQ (0.5micron)	0.6m3/Hr
		UQ (0.2micron)	0.3m3/Hr
	Piping		
	Raw Water Supply Port		A: 25 mm
	Concentrated W. W. Port		A: 25 mm
	Backwash Air Supply Port		B: 25 mm
	Backwash Drain Port		C: 15 mm
	Backwash Water Supply Port		C: 25 mm
	Treated Water Effluent Port		C: 25 mm

*Certified to NSF / ANSI Std. 61*

## Specifications of Various VPMF Models

Model	Dimension(mm)			Flow Rate in Cubic M / Hr					
	W	L	H		LQ	MQ	HQ	SQ	UQ
S20-MD2	1000	1100	2150		7	5	2	1.2	0.6
S20-MD4	1000	1500	2150		14	10	4	2.4	1.2
S20-MD6	1000	1800	2150		21	15	6	3.6	1.8
S-20-MD8	1000	2100	2150		28	20	8	4.8	2.4
S20-MD10	1000	2400	2150		35	25	10	6	3
S20-MD12	1000	2700	2150		42	30	12	7.2	3.6
S20-MD14	1000	2900	2150		49	35	14	8.4	4.2
S20-MD16	1000	3200	2150		56	40	16	9.6	4.8
S20-MD18	1000	3500	2150		63	45	18	10.8	5.4
S20-MD20	1000	3800	2150		70	50	20	12	6
S20-MD22	1000	4000	2150		77	55	22	13.2	6.6
S20-MD24	1000	4300	2150		84	60	24	14.4	7.2
S20-MD26	1000	4600	2150		91	65	26	15.6	7.8
S20-MD28	1000	4900	2150		98	70	28	16.8	8.4
S20-MD30	1000	5200	2150		105	75	30	18	9
S20-MD32	1000	5500	2150		112	80	32	18.2	9.6
Microns					25	5	1.0	0.5	0.2

Flowrate vs Pressure



# PILOT SYSTEM (PLT-S20-MD2)

## Specification

Module	VPMF-S20 MQ and HQ
Feed Pump	3m <sup>3</sup> /H @ 25mH 0.45KW 304 SS
Backwash Pump	2m <sup>3</sup> /H @ 15mH 0.2KW 304 SS
Flow meter 1	Floating Ball Type - 300LPM For Backwash Air
Flow meter 2	Floating Ball Type - 30LPM For Backwash Water
Flow meter 3	Floating Ball Type - 30LPM For Treated Water
Pneumatic Valve	1" Ball Type (7)
Regulator	0~10bar - 3/4" Brass for Backwash Air
Solenoid Valve	Open / Close of Pneumatic Valve (7)
Control Panel	300W x 600L x 800H SS41 PLC Based with Touch screen
Weight	445 Kg
Frame	835W x 1385L x 2150H Powder Coat Paint
Backwash Tank	250W x 500L x 900H 304 SS 110L c/w Level Sensor
Plumbing	Inlet of Raw Water : 1 1/4"
	Outlet of Concentrated Water : 1"
	Outlet of Treated Water : 1"
	Inlet of Backwash Air : 1/2" One Touch Tube



The PLT – S20-MD2 Pilot Unit is a self contained fully operational unit designed for pilot testing to establish the operating parameters of a full-scale plant.

As shown in the photo one module is supplied in a clear PVC housing to allow the operator to visually determine the operation of all cycles.

The unit is complete except for the air supply which can be supplied by a small air compressor. The air requirements are 170 LPM @ 1 – 2 BAR.

The PLT – S20 – MD2 pilot unit is supplied to prospective clients on a lease basis for pilot plant operation at a nominal cost.



# VPMF Plants in Operation

Company	Capacity	Application
Union Steel Co., Ltd.	2,500 m3 /d	Wastewater Reuse
Je Judo Fish Farm	2000 m3 /d	Sea Water Treatment (Pretreatment of R/O)
Dong Hae Ocean Food	100 m3 /d	Ocean Food Wastewater Treatment
Kia Steel Co., Ltd.	12,000 m3	Recycling of Cooling Water
Castle Pine Golf Club	600 m3 /d	Tertiary Treatment of Sewage
Incheon Grand Country Club	2,160 m3 /d	Municipal W.W. Reuse (Pretreatment of R/O)
Daewo Complex Mach. Co., Ltd. (8 plants)	210 m3 /d	Tertiary Treatment of Sewage
Hyundai Motors Co., Ltd. (12 plants)	190 m3 /d	Tertiary Treatment of Sewage
Union Steel Co., Ltd.	2,500 m3 /d	Wastewater Reuse
Je Judo Fish Farm	2,000 m3 /d	Sea Water Treatment (Pretreatment of R/O)
Kia Steel Co., Ltd.	12,000 m3	Recycling of Cooling Water
Castle Pine Golf Club	600 m3 /d	Tertiary Treatment of Sewage
Samnam Photochemical Co., Ltd.	8,800 m3 /d	River Water Filtration (Drinking Water P.)
Hampyong City Hall	100 m3 /d	Filtration of Underground Water (For Drinking)
Incheon City Hall	2,000 m3 /d	Municipal W.W. (Pretreatment of R/O)
Youngchun City	800 m3 /d	Drinking Water Treatment
ICAYS (Mexico)	900 m3 /d	Textile Waste Water Recycling
Asai Chemical (Japan)	150 m3 /d	Waste Water Treatment (Pretreatment of R/O)
Aweeb GmbH (Germany)	8 m3 /h	Filtration of Sand Filter Concentrate (Swimming Pool)
Lenzing GmbH (Austria)	25 m3 /h	Filtration of River Water for Process Water
TORO (Australia)	10 m3 /h	Pretreatment of Drinking Water
SKC	120 m3 /h	River Water Filtration (Potable Water)
Bongang Steel (Ansan, China)	50 m3 /h	Recycling of Sewage & River Water
Desal Systems (Australia)	10 m3 /h	Pretreatment of R/O (Iron & SS Removal)
ICAYS (Mexico)	40 m3 /h	Recycling of Waste Water

There are over 200 installations globally which may be referenced upon request.

Exclusive Area Distributor

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