

# Hyperpure I Series

## Industrial RO System

**Hyperpure I Series** Reverse Osmosis System is a truly industrial grade water purification system built for the most demanding industries.

When system down time is costly to you; when production can not be interrupted due to a water treatment system failure, go for the most rugged and reliable water system.

We combined many years of industrial RO system design experience with state-of-the-art technologies to build a unique UF/RO system for those who care about their pure water.

### Applications :

- Electronics Industries
- Pharmaceuticals
- Electro-plating
- Hospitals
- Testing Institutes
- Laboratories
- Food Industries
- Bottling Industries
- Chemical Plants
- Kidney Dialysis Centres
- Municipal Water Treatment
- UPW Pretreatment
- Boiler Feed
- Cooling Tower Make-up



Model: IUR1000

We decided to build this system at a time when everyone in the market are building cheap RO systems. We decided not to jump on the band wagon and follow suit because we care about your production, your product yields and your profits.

Our engineers used to design for the most demanding customers, e.g., IC manufacturers and LCD plants. That's why we realize how important it is for a piece of production equipment to work smoothly and efficiently.

**Hyperpure I Series** Available in 500 lph, 750 lph, 1000 lph

Contact factory for a custom designed RO system beyond this range

All RO systems carry a one year warranty and a life time technical support

### Puritron Engineering Co., Ltd.

Room 208, Techno Centre,  
33 On Kui Street, Fanling,  
N. T., Hong Kong.

Tel: +852-26826449, +852-26826441

Fax: +852-26826445

Web site: <http://www.pec.com.hk>

E-mail: [sales@pec.com.hk](mailto:sales@pec.com.hk)

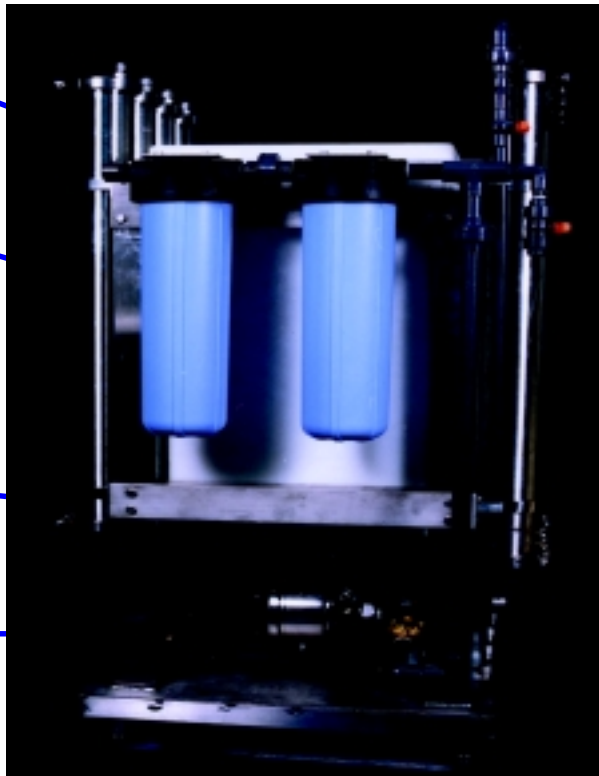
# Engineered for Performance and Reliability

SS 304 pressure vessels for both Ultrafiltration and Reverse Osmosis elements

4.25" x 20" high dirt holding pre-filter and activated carbon filter arranged in series remove suspended solids, sediment and free residual chlorine from the feed water.

All stainless steel frame work prevent corrosion under most environments.

Multi-stage 316 stainless steel centrifugal UF feed pump provides adequate driving pressure for the UF modules.



PVC SCH 80 thermoplastic piping are chosen as low pressure piping for its high physical property, resistance to corrosion and chemical attack by acids and alkalies.

Rinse valve and UF cleaning valve are provided to facilitate rinsing of activated carbon filter and chemical cleaning of UF.

System inlet solenoid valve cut off water supply when the system is on standby mode.

Adjustable legs are used for easy placement of the system on uneven floor.



All pressure gauges, flow meters, indicator lights and switches are clearly labelled for easy identification. Indicator lights and instrumentation keep operators informed of all system operating conditions. Conductivity monitor keeps track of the product water quality and lights an alarm indicator when product quality falls below setpoint. Provision has been made for an external circulation pump to be connected to the same control circuit within the same electrical enclosure.

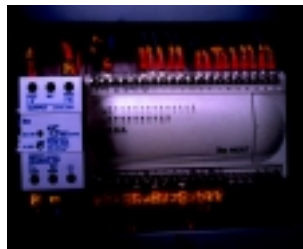
Adjustable inlet pressure switches shut down the system when water supply is cut off, thus protecting pumps from cavitation.



DOW FilmTec High Performance RO membranes give the highest salt rejection and flux.

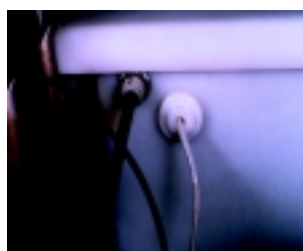


High pressure clamps for all pressure vessels give extra system safety. High pressure nylon hoses and stainless steel Swagelok fittings are used for leak free operation.



Programmable Logic Controller (PLC) provides greater flexibility over electro-mechanical components. Changes of system variables are easy with a program loader.

Grundfos 316 SS multi-stage centrifugal pump coupled with Totally Enclosed Fan Cooled (TEFC) continuous duty motor provides lasting performance.



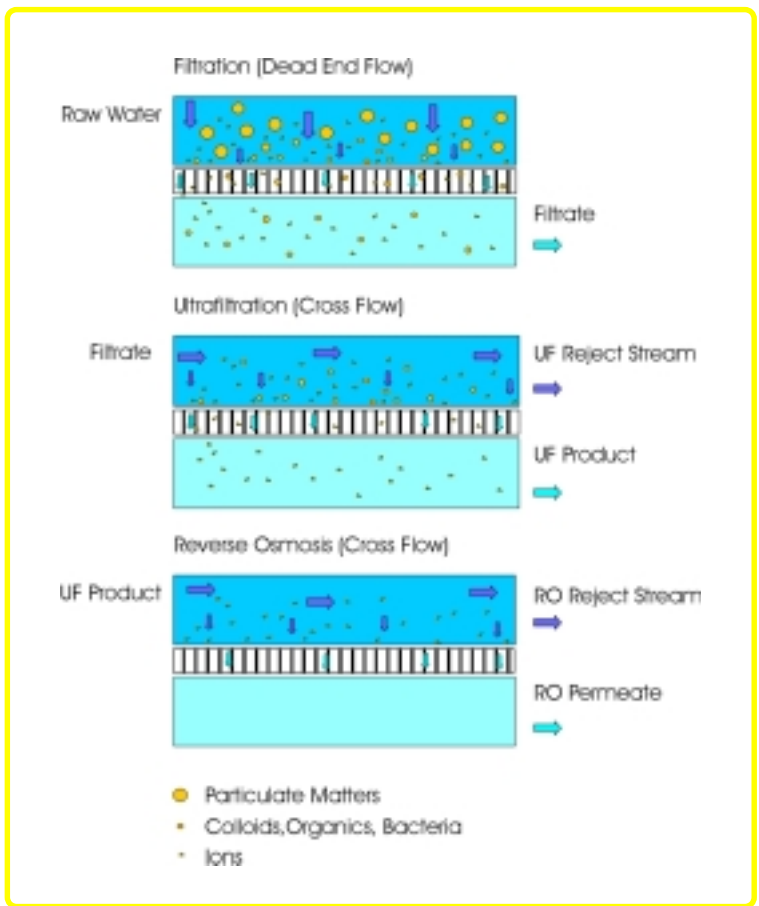
High quality PE permeate holding tank and high/low level switches (PP) prevents re-contamination of the product water.

## What is Ultrafiltration?

Ultrafiltration (UF) is a separation technique similar to that of Reverse Osmosis (RO). The main differences between the two are that: RO separates virtually all dissolved molecules (ions), while UF retains molecules above a certain size and allows some smaller molecules (ions) to pass through as product. UF is rated according to the molecular weight (MWCO) of the solutes removed; most RO membranes are made of delicate polymeric materials with negative surface charge to attract positively charged particles while ultrafilters are made of much tougher and non-stick materials such as modified PVDF and polysulfone which can be cleaned with relatively stronger acidic or alkaline solution when needed.

## Why Ultrafiltration?

Ultrafiltration employed as a RO pretreatment process is the best means of reducing Silt Density Index (SDI). Most RO membranes must operate with water having a SDI of less than 5. Higher SDI over 5 will accelerate membrane fouling and decrease production. UF reduces SDI by removing large molecular weight organics, colloidal silica and bacteria which are not removable by ordinary dead end filters. The cross flow pattern of UF also helps to remove entrained solutes from the membrane surface with the reject stream thus self-cleans the membrane surface.

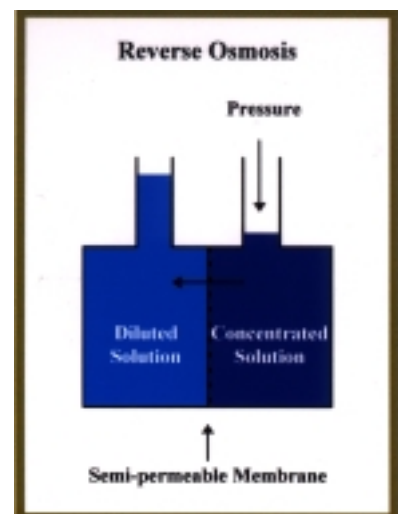
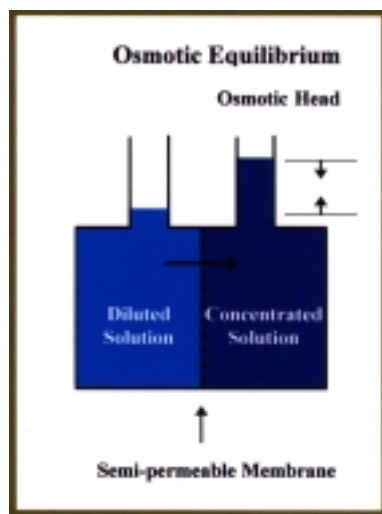
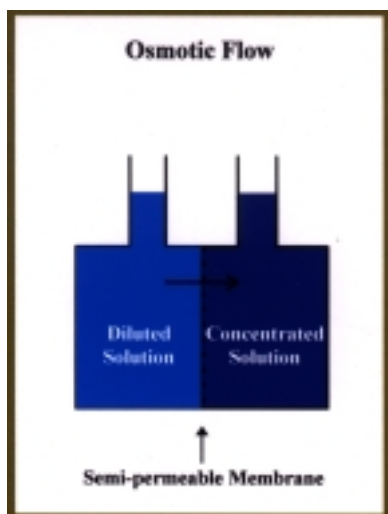


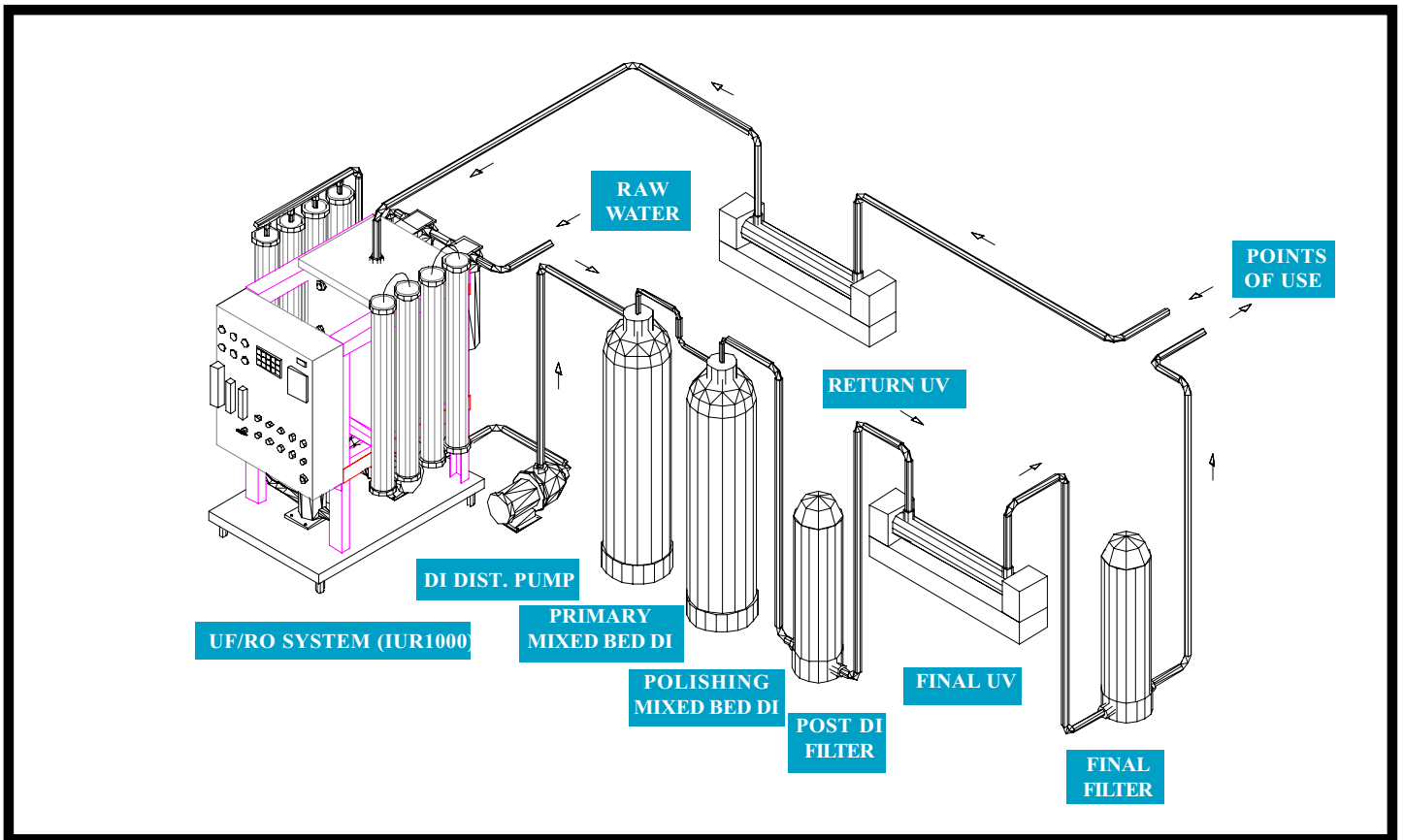
**Osmosis** is the passage of a liquid through a semi-permeable membrane. A semi-permeable membrane is a membrane which allows one component of a solution to pass through it and not the other.

In osmosis, there is a tendency for liquid to go from an area of less concentration to an area of more concentration through a semi-permeable membrane. This is an **Osmotic Flow**.

The osmosis continues, the level of the concentrated solution rises until the pressure created by the osmotic head equals the osmotic pressure created by the different concentration of the two solutions. This is an **Osmotic Equilibrium**.

If pressure is applied to the concentrated side, **Reverse Osmosis** will take place. The pressure causes a flow through the semi-permeable membrane into the dilute solution as a result of the passage of water molecules through the membrane while the mineral ions are rejected. The semi-permeable membrane acts as a barrier to ions and does not allow them to pass through into the dilute solution. When applied to water, this means that the product water has a reduced total dissolved solids (TDS) content.





## A Typical Ultrapure Water System Starts With A Quality Reverse Osmosis System

### The purity of the water changes as it goes through each treatment process.

**UF/RO System** is the make-up portion of the entire system. Filtered water will go through an activated carbon filter to remove free residual chlorine before entering the UF unit. Product water from the UF unit is virtually bacteria free and has a SDI of less than 1. UF product water is repressurized to 12 to 14 kg/cm<sup>2</sup> and then directly fed to the RO unit for the removal of ionic contaminants, silica and organics. Up to 99 % of all ionic contaminants, bacteria, silica and organics are removed with the RO reject stream.

**DI Distribution Pump** serves to circulate the RO permeate through other equipment on the Polishing Loop and deliver the DI water to the points of use. The Polishing Loop is a continuously circulating loop. The quality of the Ultrapure Water running through the Polishing Loop is being kept at its highest through continuous circulation.

**Primary Mixed Bed Deionizer** receives RO permeate from the RO permeate tank and raises its quality from 5 - 10 microsiemens/cm to around 17 megohm-cm.

**Polishing Mixed Bed Deionizer** further removes the last traces of ionic contaminants and polishes the deionized water to over 18 megohm-cm.

**Absolutely rated sub-micron Post DI Filter** is used as a guard to resin fines induced by the Mixed Bed Deionizers. This filter also helps to increase the service life of the 0.1 micron Final Filter by providing a rough pre-filtration.

**UV Sterilizer** capable of emitting 254 nanometer UV light at a dosage of over 30,000 microwatt-second/cm<sup>2</sup> can effect a 99 % + destruction of bacteria in the water.

**Final Filter** removes all particles larger than 0.1 micron thus making the final product - 18 Megohm Ultrapure Water suitable for a wide variety of applications.

**Return UV Sterilizer** is provided to kill any bacteria that may have proliferated in the process equipment or in-house piping before the water is sent back to the RO permeate tank, thus keeping the whole system clean.

# Hyperpure I Series

## Basic Components

Model	Pre-filter	Activated Carbon Filter	UF Feed Pump	RO Booster Pump	UF Elements	RO Elements	Storage Tank (PE)
IUR500	4.25"x 20", 20 um	4.25 X 20", 5 um	Grundfos, CHI 2-60	Grundfos CRN2-180	4040 x 3	TW30 4040 x 2	150 liter
IUR750	4.25"x 20", 20 um	4.25 X 20", 5 um	Grundfos, CHI 2-60	Grundfos CRN2-180	4040 x 4	TW30 4040 x 3	150 liter
IUR1000	4.25"x 20", 20 um	4.25 X 20", 5 um	Grundfos, CHI 2-60	Grundfos CRN2-180	4040 x 4	TW30 4040 x 4	150 liter

## Feed Water Requirements

Model	Minimum Feed Flow	Feed Water <sup>1</sup> Pressure	Maximum Temperature	Feed Water <sup>2</sup> (SDI <sub>15</sub> )	Feed Water <sup>3</sup> (LSI)	Chlorine Tolerance	Feed Water pH	Feed Water <sup>4</sup> (TDS)
IUR500	8.8 gpm (2000 lph)	1 - 3 kg/cm <sup>2</sup>	45 Degree C	< 6	Negative	< 2 ppm	2-11	< 1,000 ppm
IUR750	8.8 gpm (2000 lph)	1 - 3 kg/cm <sup>2</sup>	45 Degree C	< 6	Negative	< 2 ppm	2-11	< 1,000 ppm
IUR1000	8.8 gpm (2000 lph)	1 - 3 kg/cm <sup>2</sup>	45 Degree C	< 6	Negative	< 2 ppm	2-11	< 1,000 ppm

## Specifications

Model	Frame Work	Element Housings	Hydraulic Connections	Electrical <sup>5</sup> Requirements	Power Consumption	Dimensions (L x W x H)
IUR500	Stainless Steel	SS 304	1" Inlet, 1/2" Reject	220. 380V/3PH/50, 60HZ	3.5 kw	1.20 x 1 x 1.7 m
IUR750	Stainless Steel	SS 304	1" Inlet, 1/2" Reject	220. 380V/3PH/50, 60HZ	3.5 kw	1.35 x 1 x 1.7 m
IUR1000	Stainless Steel	SS 304	1" Inlet, 1/2" Reject	220. 380V/3PH/50, 60HZ	3.5 kw	1.35 x 1 x 1.7 m

## Performance

Model	RO Rejection	UF (MWCO)	UF Recovery	RO Recovery	System Recovery	Feed Flow	Capacity <sup>6</sup> @ 25 C, 225 psi	UF Reject	RO Reject
IUR500	98%	50,000	71 %	42 %	42 %	5.2 gpm	2.2 gpm (500 lph)	1.5 gpm	1.5 gpm
IUR750	98%	50,000	75 %	53 %	52 %	6.3 gpm	3.3 gpm (750 lph)	1.6 gpm	1.4 gpm
IUR1000	98%	50,000	75 %	59 %	59 %	7.4 gpm	4.4 gpm (1,000 lph)	1.9 gpm	1.1 gpm

### Notes:

- 1 Consult factory before ordering if feed water pressure is less than **1 kg/cm<sup>2</sup>** or over **3 kg/cm<sup>2</sup>**.
- 2 For high turbidity water with **Silt Density Index (SDI<sub>15</sub>)** over **6**, consider adding pretreatment equipment like multi-media filter ahead of the pre-filter.
- 3 If RO reject **Langeliar Saturation Index (LSI)** is **positive**, soften the feed water or install a chemical feed pump for antiscalant addition into the feed water.
- 4 For high **Total Dissolved Solids (TDS)** water over **1,000 ppm**, consult factory for special RO membranes.
- 5 Other voltages are available on request.
- 6 For capacities over **4.4 GPM (1,000 lph)**, consult factory for a custom designed RO system.

We design and manufacture a whole range of RO systems including Polishing RO, Double Pass RO, Brackish and Sea water RO and RO for waste water recycling.

**SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT FURTHER NOTICE**

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## System features:

- ◆ **Expandable** : An external pump can be incorporated into the system to deliver the RO permeate to other location or to circulate the RO permeate through a polishing loop, thus polishing the RO permeate to 18+Megohm-cm.
- ◆ **Automatic operation** : Automatically shut down upon high liquid level and low inlet pressure, restart when storage tank liquid level is low.
- ◆ **Self-Cleaning** : Automatic fast forward flush of UF and RO elements upon high liquid level shut down or after a preset time period to keep the system clean and prevent bacterial growth. The system can be set to initiate an auto-flush even on standby mode.
- ◆ **Simple installation** : The system can be readily put into operation after electrical and hydraulic connection.
- ◆ **Easy operation** : Operation is easy by simply turning on water supply to the system and switching on an ON/OFF selector.
- ◆ **Reliable** : Composed of industrial grade components that results in a reliable and durable system.
- ◆ **High recovery** : Increased overall recovery as a result of better quality UF product water as feed water to the RO.
- ◆ **Reduced RO cleaning frequency** : The SDI of RO feed water is being reduced to <1 by the UF unit ahead of the RO unit, thus minimizing RO cleaning and maximizing RO element service life.
- ◆ **Simple maintenance** : Routine maintenance is limited to replacement of the prefilter and activated carbon cartridge only.

## Hyperpure I - Salt Rejection Performance

Solute		Molecular wt.	Rejection (%)
Sodium Fluoride	NaF	42	98
Sodium Cyanide	NaCN	49	95
Sodium Chloride	NaCl	58	98
Silica	SiO <sub>2</sub>	60	98
Sodium Bicarbonate	NaHCO <sub>3</sub>	84	98
Sodium Nitrate	NaNO <sub>3</sub>	85	93
Magnesium Chloride	MgCl <sub>2</sub>	95	98
Calcium Chloride	CaCl <sub>2</sub>	111	99
Magnesium Sulfate	MgSO <sub>4</sub>	120	99
Nickel Sulfate	NiSO <sub>4</sub>	155	99
Copper Sulfate	CuSO <sub>4</sub>	160	99
Formaldehyde		30	35
Methanol		32	25
Ethanol		46	70
Isopropanol		60	90
Urea		60	70
Lactic Acid (pH 2)		90	94
Lactic Acid (pH 5)		90	99
Glucose		180	98
Sucrose		342	99

### Standard Testing Conditions

2000 ppm Solute, 15.8 kg/cm<sup>2</sup> Feed Pressure (225 psi)

Feed Temperature 25 degree C, Feed pH 7

Distributed by

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Room 208, Techno Centre,  
33 On Kui Street, Fanling,  
N. T., Hong Kong.  
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Fax: +852-26826445  
Web site: <http://www.pec.com.hk>  
E-mail: [sales@pec.com.hk](mailto:sales@pec.com.hk)