REVERSE OSMOSIS DESALINATOR



MODEL: SW-IMD-300L (MODULAR 12VDC)



USER INSTRUCTIONS

Manufacturer: Jiangmen City, Pengjiang district, Xin Hao Yuan water tech. Co.ltd

Address: Distributor:

Website: <u>www.cyber-desalt.com</u>

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Features

SW-IMD-300L modular desalinator is specially design for portable water producing from seawater which TDS is less than 35000 mg/l, any other under-ground water, river water or borehole water is also applicable to it. The character of the unit is small, compact, easy to use and maintainence, most of all, the modular construction allow the user to make use of all kind of small wholes , which means less space occupation on the deck. SW-IMD-300L composed of Italy Annoivi Reverbi Triplex pump of over 30 years experience and less maintainence than other brand pumps. And the HP motor use a Brushless DC motor that can be use as long time running horse. The Main features of the unit are as below:

Power: 960W / 12V DC, Max 80 Amps, Rated 65 Amps;

Feeding Water TDS: <35000mg/l;
Product water TDS: <600mg/l;
Working Pressure: <1000 psi;
Feeding Pressure: > 1 bar < 3 bar;

Production Capacity: 300 LPD (15-18 LPH);

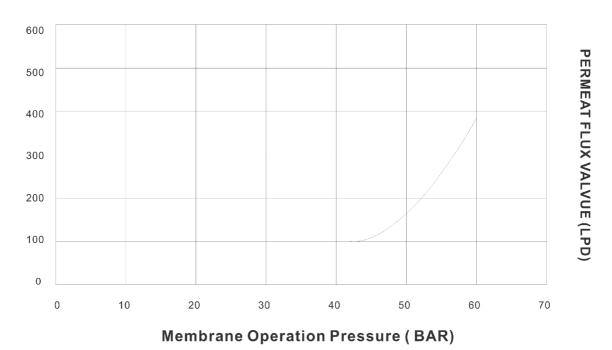
Feeding water Flow: < 200 LPH; Working Temperature: 10-45C; Chlorine Density: <0.1 ppm;

Feeding water SDI: < 5; Feeding water Turbidity: < 1;

Feeding water PH: 3 < PH < 10;

SW-IMD-300L Permeat flowrate & Pressure Curve

(at 25C, TDS 32000 mg/l)



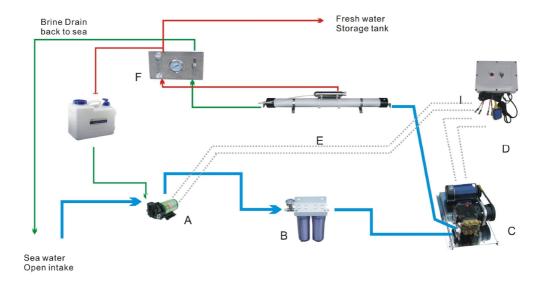
Packing List:

Please check the items in the package whether the items listed below is all included, if any Item is missed, please contact the supplier.

a). Souce water pump :	1 pcs;
b). 5 micron PP filter cartridge:	6 pcs;
c). 0.5 micron pleated filter cartridge:	2 pcs;
d). Prefilter housing and mounting board:	1 pcs
e). DC motor + High pressure pump block:	1 pcs;
f). Membrane and vessel with membrane :	1 pcs;
g). Electrical box:	1 pcs;
h). Pressure and flow control panel:	1 pcs
i). TDS Pen meter:	1 pcs;
j). 1/4" plastic tube (3 meter)	1 bundle;
k). Knitting HP tube(1.2 meter)	1 pcs

Operation Instruction

A. SYSTEM CONSTRUCTION ILLUSTRATION:



Diagrame 1: connection diagram

Study indication:

- A-> Auto suction jet pump, draw the water from the sea and supply to the prefilter and HP pump
- B-> Prefilter: to remove the Suspend Solids and algaes.
- C-> HP motor and HP pump which give pressure to the seawater after prefiltration
- D-> RO membrane vessels and membrane to seperate the salt ions from the water
- E-> Control panel to adjust the membrane pressure and flow capacity
- F-> A cleaning water tank for proceed a fresh water flushing or chemical flushing, user ready
- I-> the Eletrical control box to start and stop the HP motor, with over load and lack water protection control.

Storage tank: for manual flushing units, the white storage cleaning tank is not necessary to be connected in the tubing diagram, only use it when the membrane need to be proceed a flushing.

UV sterilizer can be installed long the fresh water line (before the user tap).

Setting Up Steps;

- 1. Pipe up the the booster pump inlet by a 3/8" PP tube, it's an quickly insert type connection, and the other end insert to the sea strainer
- 2. Pipe up the booster pump outlet and the prefilter inlet also by another 3/8" PP tube
- 3. Pipe up the Prefilter outlet and the High pressure pump inlet by another 3/8" PP tube
- 4. Pipe up the High pressure pump outlet with the membrane block inlet by HP SS knitting tube
- 5. Pipe up the membrane block outlet with the needle valve inlet by HP SS knitting tube
- 6. Pipe up the Drainage port witht the needle valve outlet by 3/8" soft PP tube

- 7. Pipe up the flow meter inlet and fresh water outlet tube from the membrane block by a 1/4" PP tube
 - Pipe up the flowmeter outlet to the user fresh water tank by a 1/4" PP tube.
- 8. Connect the HP pump power (U, V, W, Hall signal) according to the label on the wire
- 9. Connect the Suction pump power, according to the label on the wire
- 10. Connect the general Power to a 12V DC power source.

Running Steps:

- 1. Double check HP pump crank, it should carry half tank of oil SAE-10-40
- 2. Turn the regulator valve to max, open position before any pump start
- 3. Start LP pump
- 4. All the pipeline should full of water, before adjusting pressure
- 5. Adjust HP pump speed, Turn left to the end first, to make sure the speed is Zero, then put to 5 slowly, no fast, no over, then turn back a little to 4, then adjust the water pressure 5.5-6.5 Mpa, and 15 LPH

CAUSION

Don't use the fresh water produced within half hour, the water can be stored in the PE tank for flushing usage.

B. FEEDING WATER PUMP SPECIFCATION



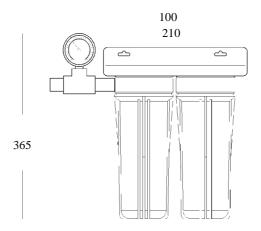
Spec: 5 LPM, 5A, suction height 2 meter, Max 4. 5 bar, Power 120W The feeding water should be intall at the place avoid raining or any moisture Surrounding and well ventilated

Size: 20 x 13 x 12 cm

C. Install the Prefilter cartridges

The Prefilter can be install at any place which can be fix or hang on, the cartridge installation order should PP 5 micron melt blow cartridge then PP pleated miniport cartridge. When install the filter cartridge, the user need to pay attention to the arrow on the housing plate or the carved arrow on the housing cap, to make sure the installation order is right.

Installation size drawing is as below: (mm)



D. Install the main engine block

The main engine block should be firmly fixed at a non-movable place with 4 pcs M6 screws. The installation place should avoid raining or any moisutre surrounding and well ventilated. As the during the main engine running, it will become hot and with a certain noise (< 80 db), so please be sure the running place have a radiator fan and the place should be far away to the human sleeping room.

The AC motor should be steady grounded and use a standard 2.5mm2 wire as connection. The pump should be well lubricated before running and any damage due to non-follow the user manual operation or any attentive damage would be out of warraty.

Installation size drawing is as below: (mm)

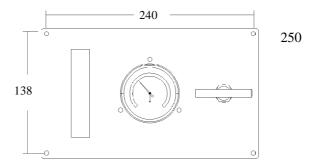


Spec: 6 LPM, Max 70 bar, inlet: 3/8" quick insert type, outlet G3/8"

D: Install the meter panel

The meter control panel should be install at a convenient place which close to the operator, and should be fixed by 4 pcs M5 screws, there should be at least 10 cm gap after the panel to the wall to allow the pipes srewing on and departing.

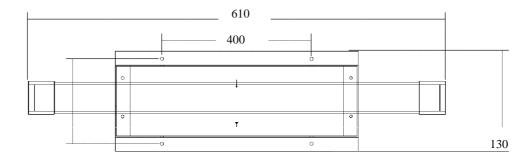
Installation size drawing is as below: (mm)



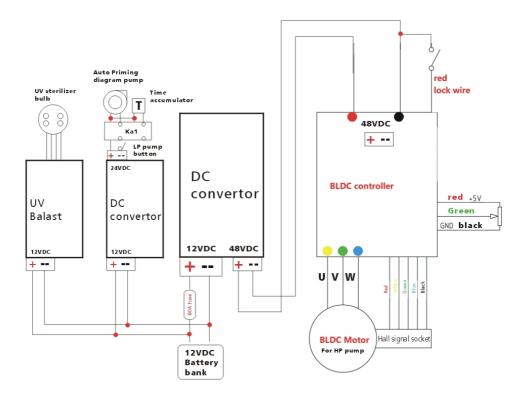
E: Install the membrane block

The membrane block can be located at any place which can put 4 pcs M6 screws, it can be install horizontal or vertical according to the user place. Please be sure to make out the membrane blow INLET and OUTLET, a Wrong connection on inlet and outlet may lead to permernment membrane damage and this is out of warranty terms.

Installation size drawing is as below: (mm)



F. CONTROLLING CIRCUIT DIAGRAM



For the first time Running, the Source water pump should be wired to the control box, or use separate power supply of 12V, 4-8Amps;

If wire to the control box, please follow the pins illustration above

Fuse should use at lease rated 80Amps
Power wire for HP pump should use Over 10mm2
Control wire and UV, Source pump shoulduse Over 0.75mm2;

The Fuse will give off a certain heat while running, So try to install the control box at a ventilated place.

E2: Shut down the machine

- 1). Turn the regulator valve to Max release.
- 2). Turn down the HP pump Speed till Zero.
- 3). Push off the Source pump button.

E3: Flushing the machine

- 1). Pipe up necessary components according to Diagram 1; but please cycle the fresh water tube and the brine water tube back the flushing tank
- 2). Put the PE tank on or above the desalinator; turn the regulator valve to Max release (no pressure)

- 4). Switch on Source pump and HP pump as in normal running step. Adjust the membrane pressure ONLY at . 0.5 1 Mpa
- 5). Flush the membrane for 10-15 minutes then shut down the plant
- 6). Drain off the PE tank.

Note:

If the package did not inloude the PE tank the User can use any tank of over 10 liter capacity and with 2 pcs 1/2" Ports, that can be connect to the unit inlet and brine water Outlet, it can do the same work.

F. Maintenance

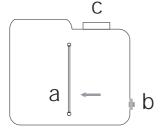
F1: Necessity of Chemical Cleaning and Fresh water Cleaning.

While running the desalination plant, the separated mineral ion, metal salt, bicrobiology, algae, colloid and other impurities will gather on the surface of the membrane, and then cause the membrane pollution, and this will lead to the flow rate decreasing, or the desalination rate drops. No matter at any time, if the freshwater flow rate drops to the rated standard (the same condition), or the salinity of the freshwater increase obviously, that mean the membrane need cleaning.

The reason for membrane pollution will be somehow complex, and the pollution character and the pollutant could be different. On the other hand, not enough working pressure or pump flow rate decreasing will cause the decreasing of the freshwater productivity. So the user should analyze the proper reason, in order to get a proper way to solve the problem.

The most popular pollution come from the microbiology, organics and the algae in the sea. To recover from this kind of pollution is to do a monthly cleaning for the membranes. In the package come with the plant, there is 5-10 dose chemical liquid, they are the solute of the cleaning liquids. But for a special chemical cleaning, please contact the manufacturer or process under the guidance from the professional.

CLEANING TANK USAGE



a: water scale b: water outlet c: water inlet (lid)

Cleaning tank is used for holding cleaning water or chemical liquid during routine maintenance. Whole capacity is 40 Liter, usually the user only need to use half of A quarter of the volume. While proceed a flushing, be sure to put the cleaning tank at a place that over the top of the plant (as diagram 2), and make sure the water level inside the tank is beyond the water outlet, so that the HP pump will not dry run.

Tabel 1: list the character for common membrane pollutions:

	Common reason			
Pollution Reason	Salt permeate rate	Membrane pressure loss	Freshwater productivity	
Metal oxides(Fe, Mn, Ni, Cu)	Double up rapidly	Double up rapidly	Decrease 20-25%	
Sediments (CaCO3, MgCO3)	Increase 20-25%	Increase 10-25%	Decrease <10%	
Colloid (Silicon colloid)	Double up gradually	Double up gradually	Decrease ≥50%	
Microbiology (Germs, algae)	Double up	Double up	Decrease ≥50%	

F2: Safe cleaning routines and cleaning steps

(1). Safe cleaning routines

- a. Before use any chemical dose mentioned at the follow charters, be sure to follow the experience that stated here, and claim the detail operation instruction from the dose supplier or the professional.
- b. While prepare the protecting liquid, be sure stir the solute to dissolved totally and equally.
- c. Use the freshwater without free chlorine to flush the membrane, the water temperature should not be less then $20\,^\circ\!\!\!\!$ C. The permeated water from the membrane or the water after pre-filtration from a non-rusty pipes can do.
- d. Before return to normal running, be sue to flush the system under no pressure for about 5 minutes, and then release the freshwater of the initial 30 minutes when the machine begin working.
- e. There is a water temperature limit on cleaning, if the PH of the water is 2-10, the temperature should be lower than 40° C, and if 10-11, should lower than 35° C, and if 11-12, should lower than 30° C, please keep the cleaning liquid over 15° C, otherwise the cleaning time could be too long.

F3: Cleaning and protection chemical dose use instruction

Cleaning dose operation

- 1. flush the water tank with fresh water at $40\sim45\,^{\circ}\mathrm{C}$ for 5-10 minutes, till the water turn clean.
- 2. Add fresh water into the tank, at 40~45 °C, add alkaline cleaning dose, density at 0.5%~1%, control the PH value at 11-12, cycle for 40 minutes.
- 3. flush plant with freshwater at 40~45°C for 10 minutes, till the water be neutral.
- 4. Add fresh water into the tank, at $40\sim45^{\circ}$ C, add acid cleaning dose, density at 3%, cycle for 15 minutes.
- 5. flush plant with freshwater at 40~45 $^{\circ}\mathrm{C}$ for 10 minutes, till the water be neutral. Protection dose operation

Add fresh water into the tank, at normal temperature, add protection liquid, density at 1-2%, cycle for 15-30 minutes, keep the liquid inside the system.

Caution: Either the desalination rate or product water flow rate decrease over 15%, the plant should be cleaned immediately, otherwise the life and the plant capacity can not be recovered any more.

F4: PLANT MAINTAINENCE

- 1. Keep the plant clean, wipe off the oil stain or splashed seawater
- 2. Fasten the screw or change the sealing if leakage is found between the pipes
- 3. Clean or change the precision filter cartridges
- a. After running the plant for some time, the pre-filter cartridge could be stuffed by the impurities in the seawater, this will affect the feed water pressure loss, or feed water flow rate decrease, then could lead to low fresh water productivity. When the reading of the feed water pressure gauge less then 0.1 Mpa, that means the precision filter need to be cleaned or replaced.
- b. When replace the cartridge, screw off the housing with the plastic wrench come with the package, put the old cartridge out, and install the new one, and then screw the housing back.
- c. The stuffed cartridge can be recovered by dipping it into caustic soda liquid of 5-8% density, for about 6 hours. then flush it with fresh water, then airing to dry.

4. HP pumps maintenances

- a. Strictly prohibit impurities or particles to enter the HP pump
- b. Strictly prohibit HP pump racing without water
- c. Add and replace the gear oil. The oil should be SAE10-40 engine oil or any higher class engine oil (SAE xx < 10), The volume of the oil should be kept between the upper limit and the lower limit indicator of the scale. Be sure always use the same model lubricant. If the lubricant appears white or dirty, then it should be replaced. At normal working time, the lubricant should be replace once a month, if the HP pump have a lubricating whole, then the user should add 2-3 drops of lubricant every week.</p>
- d. Before the plant leaves the factory, the HP pump and the motor position is regulated, if the user have to replace the motor wheel or the underlay rubber, they should readjust the co-plane of the pump wheel and the motor wheel, otherwise the HP pump or the motor could not work properly.
- e. The lubricant should be replace once at the first 50 working hours, and then once every 500 working hours; the sealing of the HP pump should be replace every 6-10 months, this depend on the working time of the pump.

Detail technical information refers to the HP pump manual and the illustration.

5. Membrane and membrane shell maintenance

- a. Don't depart the membrane elements by the user itself, please contact the local supplier or the manufacturer for the departing operation.
- b. During normal running, if the fresh water capacity or the desalination rate decrease and can not the recovered by chemical cleaning, the membrane should be replaced. The normal working life of a membrane should be 3-5 years. While the membrane burst for over pressure, the desalination rate drops rapidly, the membrane should be replaced immediately.
- c. membrane replacement operation refer to the membrane shell construction illustration. While insert the membrane into the shell, the end without the "V" sealing should enter first, then follow the arrow direction on the membrane shell, push into the shell slightly, then put on the cap, and the fittings. While connecting the inlets and outlets of other membranes, the operator also should follow the arrow instruction on the membrane shell.

If the plant is to be leisure for over 72 hour to 1 month, please inject the protection liquid of 5%, and if over 1 month or in the winter, please inject protection liquid of 10%. The protection liquid could restrain the germs and the microbiology growth, humidify the membrane and protect the membranes from pollution and frost. If the membrane is exposed in the air or without protection liquid, it could be damaged badly.

G.TROUBLE SHOOTING

TYPE	FEATURES	REASON	MEANS	
System Failure		Power not connected	Put the power through	
		Power Voltage or phases not meet	Change the Power source	
	Start up Failure	Circuit problem or bad touch	Check the starting circuit- Reposition the heat relay, or increase its current.	
	Tanac	No Feed water	Start the source water pump or turn on the infall valve	
		Lack of Feed Pressure	Increase the feed water pressue or check the the precision filter	
		Feed water capacity not enough	Increase the source water prssure	
Booster		Lack of water pressure	Increase the feed water pressue or change the the precision filter	
	Pressure not	Pump suction, Single-track expel	Depart the pump, clear the stem change the bad parts.	
		Sealing abrasion	Change the sealing	
	increase, With	Inserts damage	Change the bad parts	
	abnormal sound;	Connecting pole abrasion, burn	Change the bad parts	
pump failure	abnormal libration,	Pressure Valve damage	Change the spring or valve core	
	Pressure Gauge	Lack of lubrication	Fill lubration to normal position	
	finger waggle	Crankcase lubrication mixed with water	Change the oilproof gasket	
		Pipe leakage, air enter	Check the entry pipe, seal the leakage	
		Base loosen	Fasten the screw nut	
		Driving belt slid & hop	Fasten the driving belt or change it	
	Output decreasing	Running Pressure too low	Turn up the working pressure	
		Feed water temp. Too low	Heat feed water	
		Salinity too high	Feed water salinity too high	
		Wrong connection to the membrane	Correct to the right direction	
RO system Failure		Membrane is stuffed	Clear the stem by clean the membrane	
		Membrane aging	Change a new membrane	
		Membrane damage	Change a new membrane	
	Low desalination Rate and bad quality	Membrane polluted	Clear and flush the membrane	
		O ring of the membrane damage	Change the O ring	
		Two high recovery rate	Reduce the working pressure	
		Chlorine too high	Add active carbon filters	
		Chemical corrusion	Avoid the chemical elements	

APPENDIX: SOURCE WATER PUMP USER MANUAL