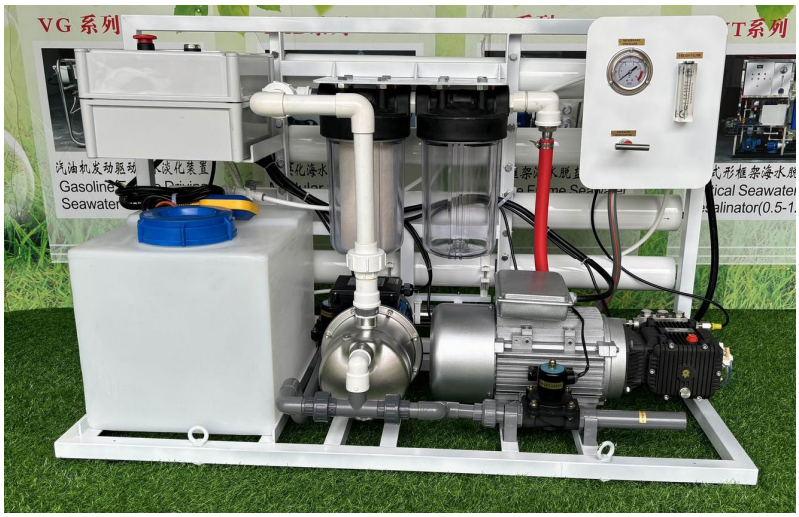
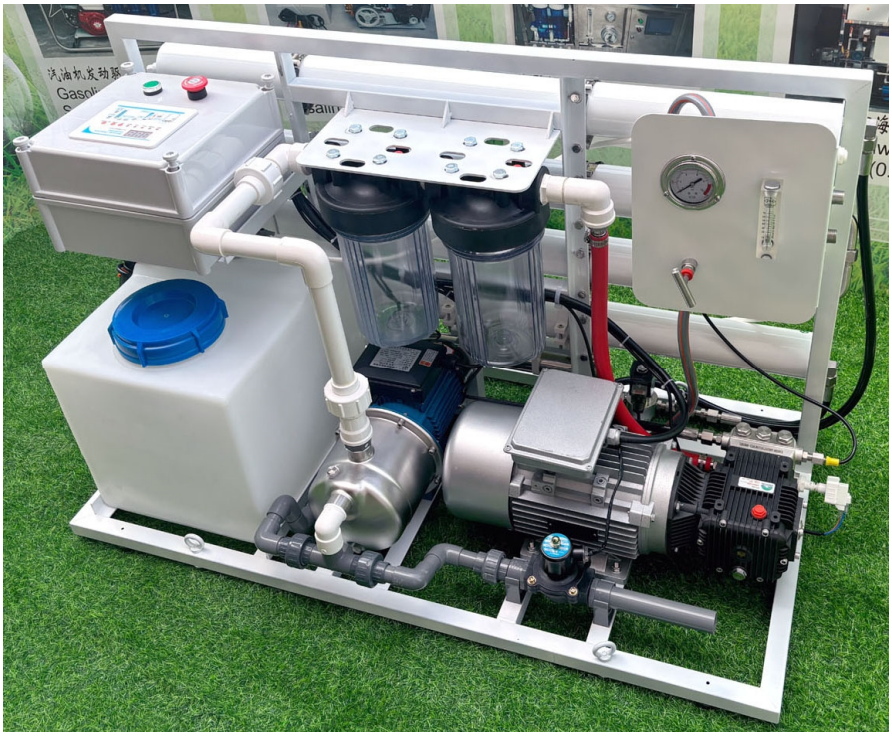
REVERSE OSMOSIS
DESALINATOR

MODEL: SW-IVS-5000L (SEA WATER)





USER INSTRUCTIONS

Manufacturer: **XIN HAO YUAN WATER TECH CO.LTD**
Address:
Distributor:

Website: **WWW.GREENWATERMAKERS.COM**

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Features:

The SW-IVS-5000L desalinator is specially design for salty water such as well water, under-ground water, river water and sea water purification. The user can obtain fresh water from brackish water sources by using this machine. The the unit is an Integrated, heavy duty design with a high recovery rate. It can be applied to a wide range water source. The model SW-IVS-5000L desalinator, is controled by Microchip controller and with auto self flushing function that don't need operator nearby when processing routine water making commissions.

The SW-IVS5000L desalinator unit consists of the following components

1. Low presure feed pump Feeding pump (auto priming)
2. 10 micron PP pre-filter 10 inch Jumbo size;
3. 1 micron PP pre-filter 10 inch Jumbo size;
4. Auto fresh water fill up to flushing tank 40 Liter;
5. High pressure Tiplex pump;
6. low pressure switch;
7. fresh tank full floating ball;
8. High rejection rate seawater desalination membrane;
9. UV sterilization on Fresh water;

Packing list:

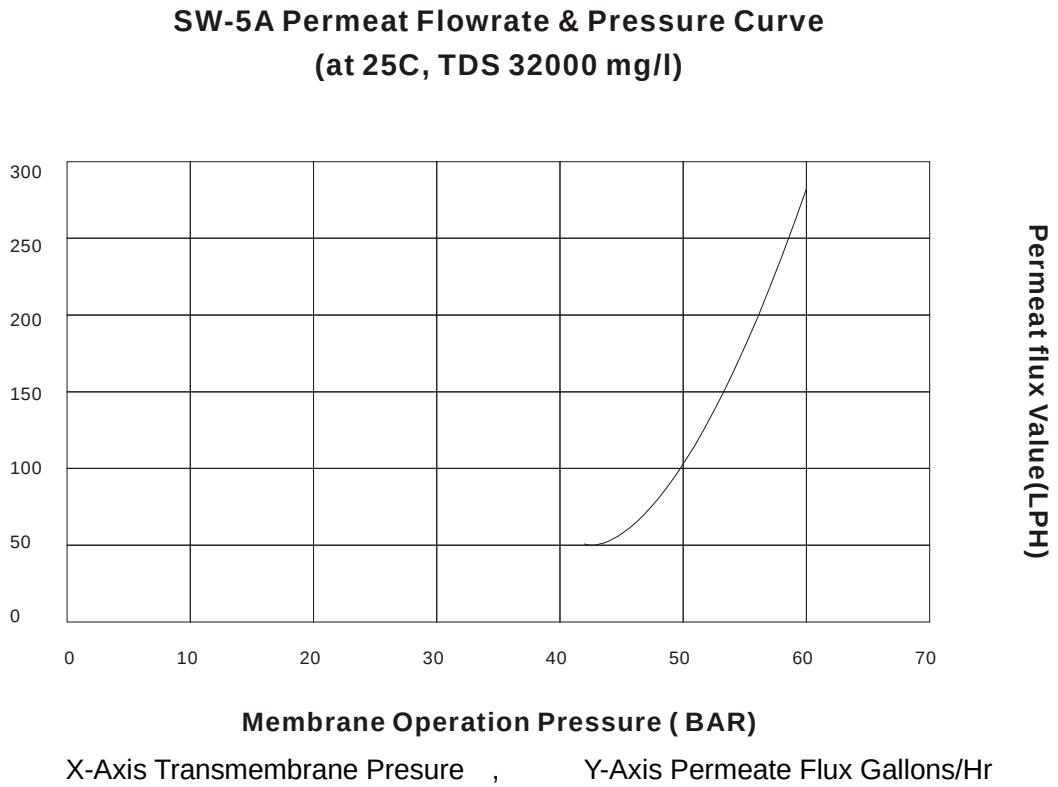
1. IVS5000L main machine x 1 pcs
2. 16W UV bulb x 1 pcs
3. 15L flushing tank with floator x 1 pcs
4. RO tube 3/8" x 3 meter
5. 10 micron PP filter cartridge 12 pcs;
6. 1 micron PP filter cartridge 12 pcs;
7. Water seal package 1 pcs;

Performance Secification are as follows:

Power:	3KW / 220V 50Hz 1 phrases ;
Feeding Water TDS:	< 35,000 mg/l;
Product water TDS:	< 500 mg/l;
Working Pressure:	< 1000 - 1200 psi;
Feeding Pressure:	> 1 bar;
Production Capacity:	< 230-250 LPH (at TDS 32,000 mg/L);
Feeding water Flow:	< 1000 LPH;
Working Temperature:	10-45C;
Chlorine Concentration	<0.1 ppm;
Feeding Water SDI:	< 5;
Feeding water Turbidity:	< 1 NTU;
Feeding water PH:	3 - 10;

Feeding pump Power: 220V, 50Hz, single phrase;

Permeat Flow & Pressure Curve Base on Temperature of 25C and TDS of 32,000 mg/L;



X-Axis Transmembrane Presure , Y-Axis Permeate Flux Gallons/Hr

Spare part required during usage.

a). PP cartridge, 10 inch jumbo size; b) Pulley belts; c) water sealing for plunger pump

d). HP hose for membrane e) membrane f) Orings for membrane vessles and connectors

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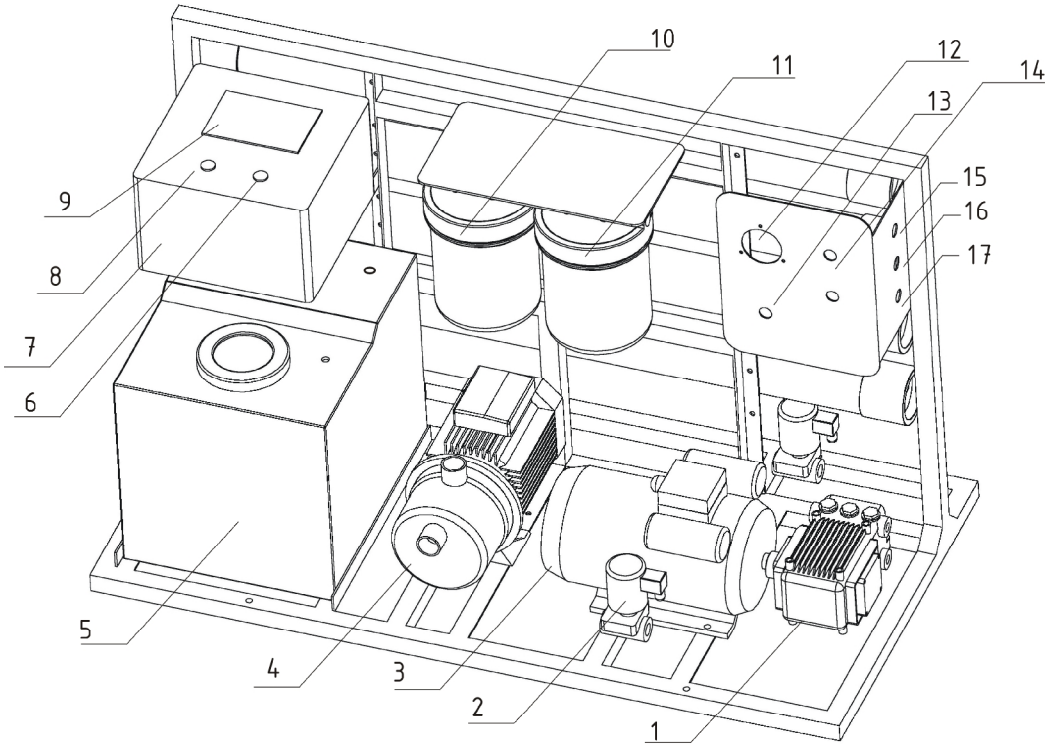
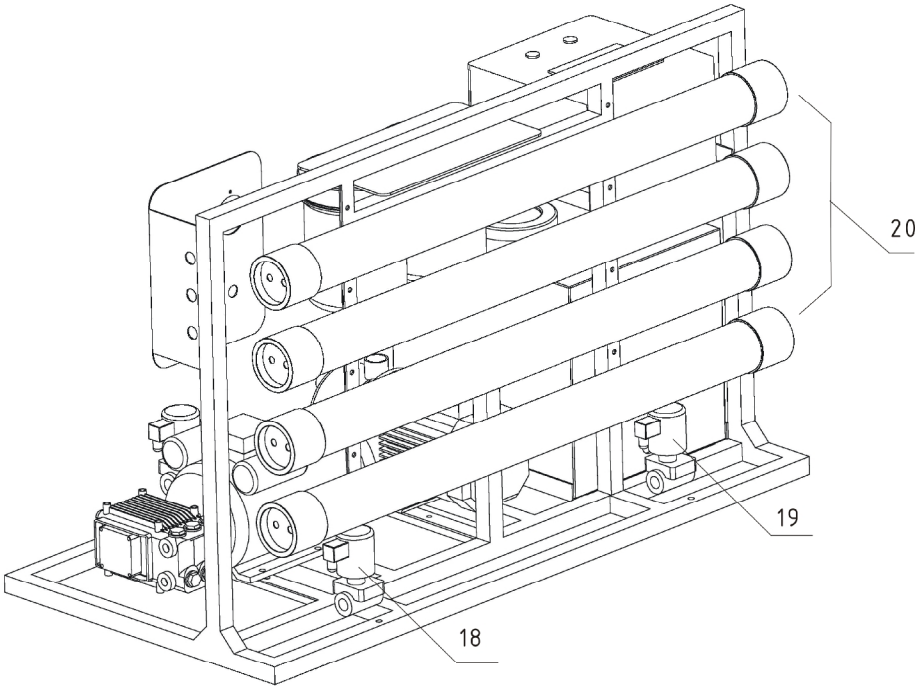
Operating Instructions

A. SYSTEM CONSTRUCTION





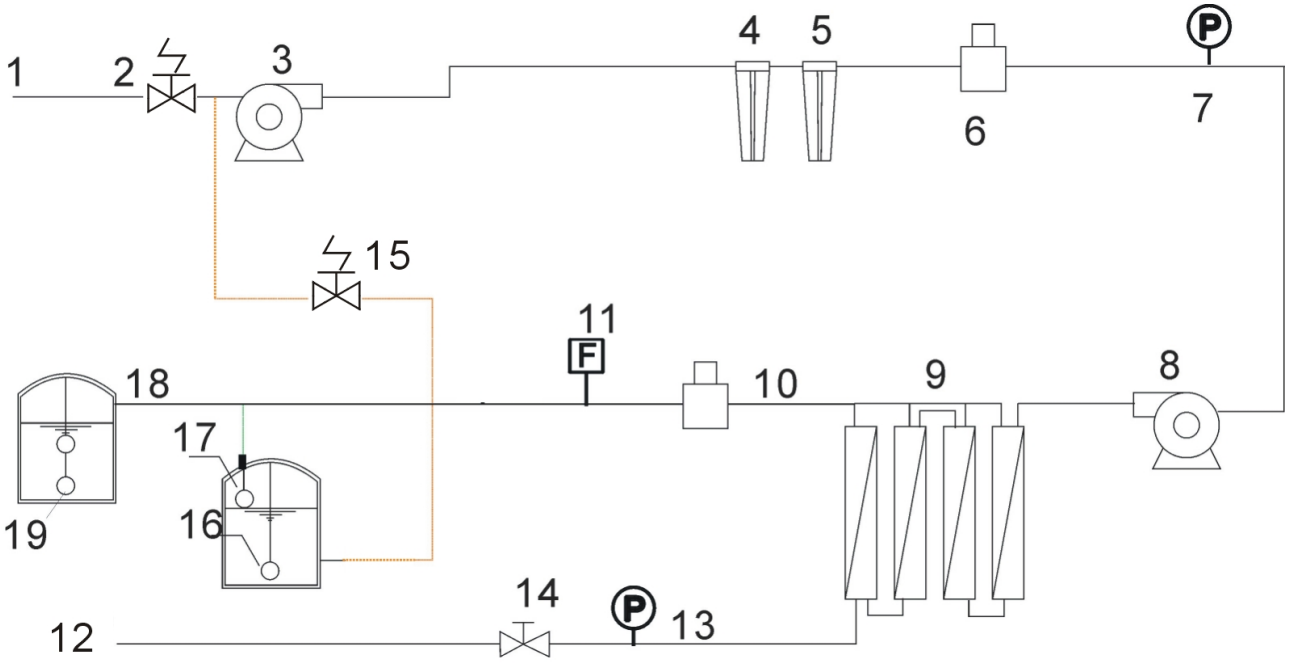
Diagrame 1

1. High Pressure pump
2. Seawater feeding solenoid
3. HP pump motor
4. Raw water priming pump
5. Flushing tank 40L

6. Auto running button
7. Electrical Box
8. Emergency Stop button
9. RO diagram controller
10. 5 micron jumbo PP prefilter

11. 1 micron jumbo PP prefilter
12. High pressure gauge.
13. Pressure regulator valve
14. Permeate water flow meter
15. Permeate fresh water outlet
16. Brine water outlet
17. Flushing water outlet
18. Flushing HP solenoid
19. Flushing water feeding solenoid
20. Seawater membranes and housing
21. UV sterilizer

A1: WATER FLOW DIAGRAM



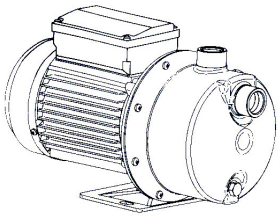
Diagrame 2

1. Sea water inlet
2. Seawater feeding solenoid
3. auto suction jet pump
4. PP filter (10 micron)
5. Pleated filter (1 micron)
6. LP switch
7. LP gauge
8. HP Triplex plunger pump
9. seawater RO membranes
10. fresh water TDS probe
11. flowrate meter
12. Brine water outlet
13. HP pressure gauge
14. HP regulator valve
15. Flushing water solenoid
16. tank empty floator
17. water tank feeding floator valve
18. Fresh water outlet
19. Product tank level floater switch
20. Brine outlet

All related ports specs:

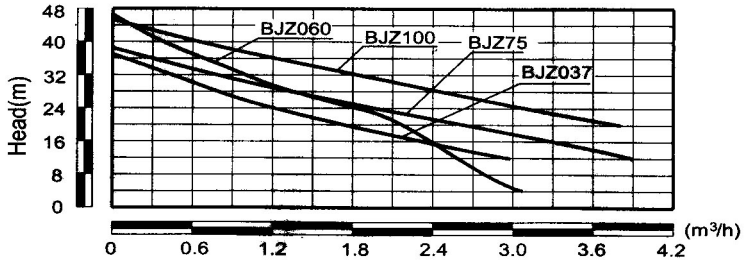
Sea water inlet :	1 inch UPVC tube
Fresh water outlet	3/8” john guest
Brine water outlet	1/2: male thead

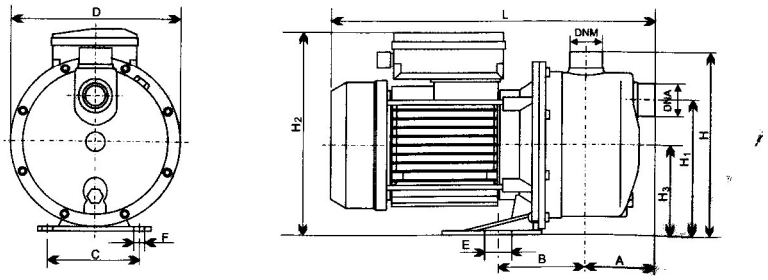
B. FEED WATER PUMP SPECIFCATIONS



Model single phase 220V	Power		SUCTION HEIGHT Hs(m)	Entry Size (Inch)		Q	L/min	5	15	20	30	40	50	60
	kW	HP		Inlet	Outlet		m^3/h	0.3	0.9	1.2	1.8	2.4	3.0	3.6
BJZ037	0.37	0.5	8	1	1	Heading H (m)		31	25	23	19	14	9	
BJZ060	0.60	0.8		1	1			41	33	29	24	15	5	
BJZ75	0.55	0.75	9	1	1			34	29	26	23	19	16	13
BJZ100	0.75	1.0		1	1			38	32	30	25	22	19	13

Curves & installation size



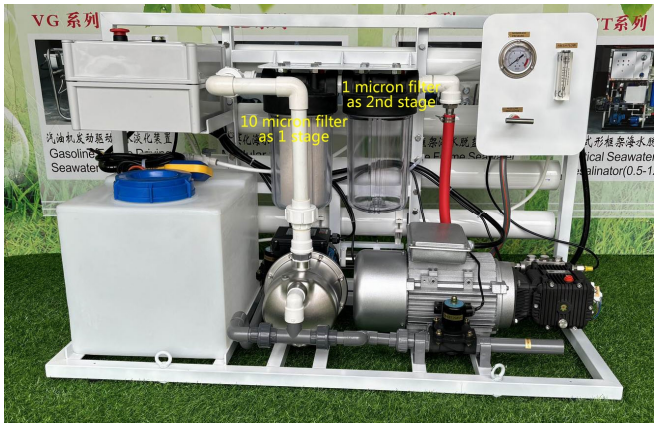


Model	A	B	C	D	E	F	H	H_1	H_2	H_3	L	DNA	DNM	Weight (Kg)
BJZ037	88	109	100	170	7	7	178	128	195	88	365	G1	G1	6.0
BJZ060	88	109	100	170	7	7	178	128	208	88	388	G1	G1	7.0
BJZ50	80	80	98	184	20	10	203	157.5	187	98	332	G1	G1	6.0
BJZ75	80	80	98	184	20	10	203	157.5	202	98	354	G1	G1	8.0
BJZ100	80	80	98	184	20	10	203	157.5	202	98	354	G1	G1	9.0

Feed water pump is a pressure boosting device which can both draw the water and feed to the unit, The operator should please pay attention to the water level at the entry side because the pump can be damaged if it is allowed to run dry.. We recommend that the uses should install a foot valve (*bottom check valve*) at the end of the entry pipe as well as a *water level sensor* and alarm for precaution.

For detailed instructions please check the lnext chapter.

B1. PREFILTER INSTALLATION STEPS



B2. CONTROL CIRCUIT DIAGRAM AND CONTROLLER FUNCTIONS

a) Permeate TDS monitoring (1-999ppm)
b) Selectable operation mode
c) Automatic raw water flush
d) Multiple delayed feed solenoid valve closing time
e) System status LED lights indications
f) Manual flush button
g) Adjustable flush time
h) Permeate tank full shut down & flush
i) Low feed pressure shut down
j) Improved EMI/EMC interference
k) Startup password enable/disable

Controller operation description as below:

Status Lamps

FULL	Alerts operator when the permeate storage tank is full. The light will turn red and the RO system will stop automatically.
FLUSH	This lamp is green while the system is going through an automatic flush cycle.
PUMP	This lamp is green while the high-pressure pump (system)isoperating normally and delivering raw water to the membrane(s).
LOW	This lamp is red when there is insufficient feed water pressure.
INLET	This lamp is green when the feed solenoid valve is opened.

Control Buttons

SET FLUSH	Press once to initiate a membrane flush cycle while the system is in normal operation for preset (30 seconds) time. Press again will stop the flush cycle and resume to normal operation. Press and hold for 3 seconds to enter to setup mode. Use up and down buttons to select the mode then press again to value mode. Use up and down buttons to adjust

the desired value.

After the value is adjusted, press again to confirm.

Setup Mode Description

FUL	Setup time for tank-full slow flush (Preset 30 seconds)
OSC	Setup running hours for periodically fast flush (Preset 6 hours)
SFH	Setup time for initial start-up slow flush (Preset 30 seconds)
FOC	Setup time for periodically/manual fast flush (Preset 30 seconds)
OPO	Setup up passwords for initial start-up

Setup Passwords

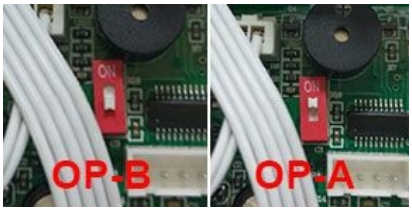
OPO=Passworddisable

OPI = Password Enable

After OPI has been selected during setup mode, use up and down buttons to choose 3 digit passwords, then press SET FLUSH button to confirm.

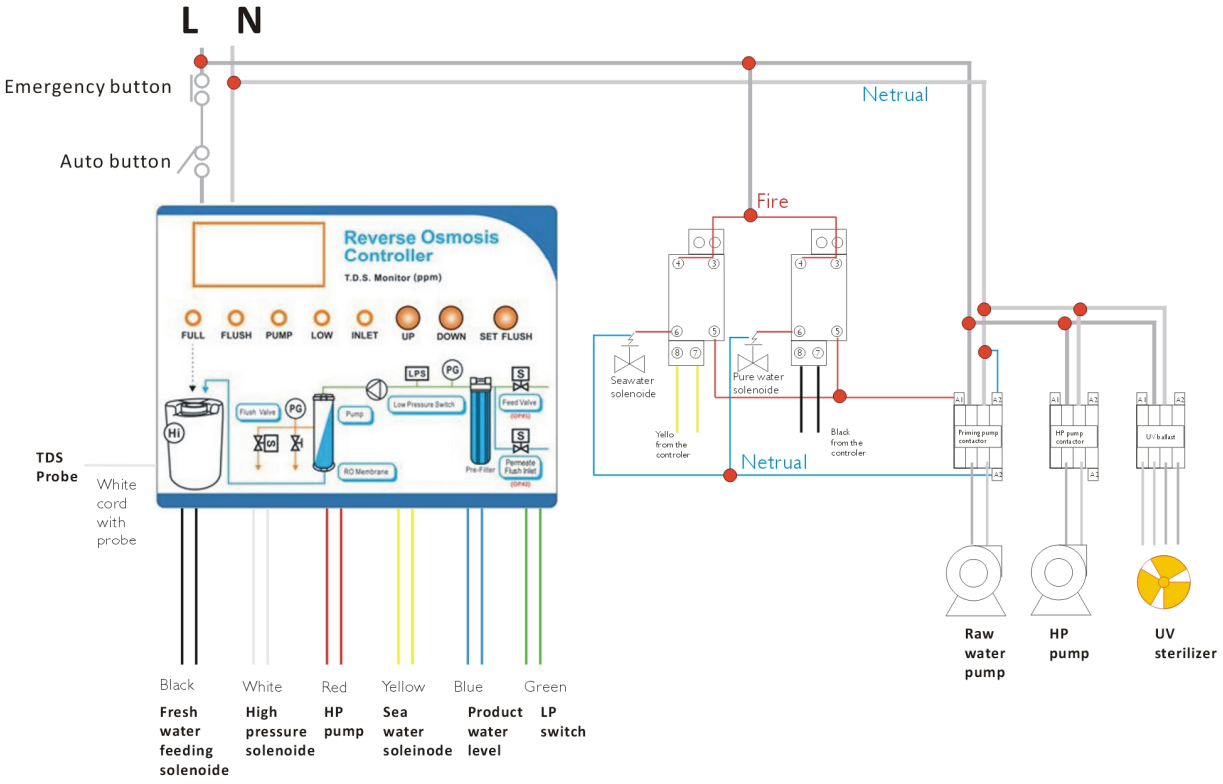
Be Extra Caution that once the password requirement is activated, you must remember the password you have set for, or you may not be able to start-up the system if the password is lost.

Operation Mode Description

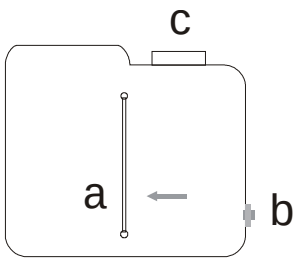


OP-A Mode	Tank-full slow flush and manual/periodically fast flush uses feed raw water solenoid valve (desgined for feedwater TDS < 1,000ppm)
OP-B Mode	Tank-full slow flush and manual/periodically fast flush uses feed pure water solenoid valve (desgined for feedwater TDS > 1,000ppm)

The wire diagram inside the electrical box is as below:



B3: CLEANING TANK USAGE



a: floating ball b: water outlet c: water inlet (lid)

Cleaning tank is used for holding cleaning water or chemicals liquid during routine maintenance of the machine. The tank capacity is 15 Liter,but usually, the user only need to use 10 liter . The membrane cleaning system of the VS-5000L integrated a 1/4 floator valves and water level switch. While the machine is making water, it can fill the tank automatically, and flush the membrane every 2 hours till the flush tank floator drop to the lower level. The flushing tank is connected by a flexible 1/2 tube to the main machine flux inlet.

C. OPERATION STEPS

**** Causion ** : be sure to fill the crank oil and keep the oil at half level of the HP pump side window, if this operation missed, the HP pump might cause an incurable burnt. And be sure to replace the red cap by the oil scale after filling the oil. The oil number should use a proper spec or follow the supplying advice.**

C1: Starting up the machine

1). Connect the inlets and outlets according to the diagrams at the previous charters.

2). Release the regulator valve to max permission. And put the product floater into the Product water tank, adjust the floater to right length amount the water tank.

3). Connect the power cord to a suitable power socket, and make sure the plug and socket are both rated to conduct up to 20A or above

4). Plug on the plant, on which the conductivity meter will show readings.

5). Fill up the booster pump via the hexagon nut on the pump head

6). Put the feeding water inlet pipe into the water source , and make sure it's within the autosuction distance(about 3-5 mters).

7). Make sure the source water is available.

8). Push auto button to start the controller

9). The controller will flush the machine before start up. 30 seconds. After the HP start, turn the Regulator valve clockwise to increase the pressure little by little, at least reach 200-250 LPH and The right pressure should be 55-60 bar. (but do not over 80 bar , below this pressure, it is ok).

Now the fresh water will come after some second, and when it drops to 500-600 ppm or lower, the fresh water is good for use.

CAUTION

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

C2: Shutting Down the Machine

1). Turn the regulator valve to Max release.

2). Push off the Auto Button.

C3: Flushing the Machine

The machine can proceed once auto slow flush when the fresh water tank (the user tank , the blue floating ball point upward) is full, and once fast rinse when the machine is starting up. And 1 fast rinse every 6 hours continuous running. (this is resettable on the panel)

D. Maintenance

D1: Necessary Chemical and Fresh Water Cleaning.

While running the desalination plant, the separated mineral ions, metal salts, microbiology, algae, colloid and other impurities will gather on the surface of the membrane, to for a film which leads to the a gradual reduction in the flow rate , or the desalination rate drops. Whenever the freshwater flow rate drops below the rated standard or the salinity of the freshwater increase the membrane should need cleaned to restore the offending condition to the desired level

The reason for membrane pollution is somehow complex, and the pollution nature and character of the pollutants varies. On the other hand, insufficient working pressure or a pump flow rate decreasing will cause the decreasing of the freshwater productivity, so the user should consider this when troubleshooting the unit.

The most common pollution come from the microbiology, organics and the algae in the sea. To

recover from this kind of pollution the user should clean the membranes at an apropriate interval The Unit is supplied with 5 – 10 dose containers of liquid chemicals, they are the solute of the cleaning liquids. But for a special chemical cleaning, please contact the manufacturer or proceed under the guidance of a certified professional.

Tabel 1: List the character for common membrane pollutions:

Membrane Foulant	Effect		
	Salt Concentration in Permeate	Membrane Pressure Loss	Low Fresh Water Productivity
Metal oxides(Fe，Mn，Ni，Cu)	Increase Rapidly	Increase Rapidly	Decrease 20-25%
Sediments (CaCO3, MgCO3)	Increase 20-25％	Increase 10-25％	Decrease <10％
Colloid (Silicon colloid)	Increase Gradually	Increase Gradually	Decrease ≥50%
Microbiology (Germs, algae)	Increase	Increase	Decrease ≥50%

D2: Safe Cleaning Routines and Cleaning Steps

(1). Safe cleaning routines

a. Before using any chemical dose mentioned at the following chapters, be sure to follow the guidelines that stated here, and request the detail operation instruction from the dosing chemical supplier or the professional.

b. When preparing the protecting liquid, be to sure stir the solute intil it isdissolved totally and uniformly/

c. Use the freshwater without free chlorine to flush the membrane, the water temperature should not be less then 20℃. The permeated water from the membrane or the water after pre-filtration from a rust-free pipes will do.

d. Before returning to normal running, be sure to flush the system under no pressure for about 5 minutes, and then release the freshwater of the initial 30 minutes of operation

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℃， and if 10-11, it should be lower than 35℃, and if 11-12, it should be lower than 30℃, Please maintain the temperature of the cleaning liquid over 15℃, otherwise the cleaning time could be too long.

D3: Cleaning and Protection (Chemical Dose User Instructions)

Cleaning dose operation

1. Flush the water tank with fresh water at 40~45℃ for 5-10 minutes, till the water turn clean.
2. Add fresh water into the tank, at 40~45℃, add alkaline cleaning doseat a concentration of 0.5%~1%,. Control the PH value at 11-12,, Cycle for 40 minutes.

3. Flush Unt with freshwater at 40~45℃ for 10 minutes, untill the water is neutral.

4. Add fresh water into the tank, at 40~45℃/ Add acid cleaning dose, at a concentrationof 3%, Cycle for 15 minutes.

5. Flush plant with freshwater at 40~45℃ for 10 minutes, untill the water be neutral.

Protection dose operation

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

Caution: If either the desalination rate or product water flow rate decrease by over 15%, the plant should be cleaned immediately, otherwise the life and the capacity of the membranes can not be recovered..

D4: 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 when necessary

a. After running the plant for some time, the pre-filter cartridge could be stuffed by the impurities in the seawater, this will cause feed water pressure loss, or feed water flow rate to decrease. It could lead to low fresh water productivity. When the reading of the feed water pressure gauge is less then 0.1 Mpa , that means the precision filter need to be cleaned or replaced.

b. When replacing the cartridge, screw off the housing with the plastic wrench that came with the package, pull 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. High Pressure Pump (HP) Maintenance

a. Strictly prohibit impurities or particles to enter the HP pump

b. Strictly prohibit HP pump from running 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 to always use the same type of lubricant. If the lubricant appears white or dirty, then it should be replaced. Under normal conditions , the lubricant should be replace once a month, If the HP pump has a lubricating leak , then the user should add 2-3 drops of lubricant every week.

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 re-adjust 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 replaced 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.

For detail technical information refers to the HP pump manual and the illustration.

5. Membrane and Membrane Shell Maintenance

a. Users should not remove the membrane elements by themselves, please contact the local supplier or the manufacturer for the membrane renoval instructions.

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. If the membrane burst from over pressure, the desalination rate will drop rapidly and the membrane should be replaced immediately.

c. For membrane replacement operation, refer to the membrane shell construction illustration. While inserting the membrane into the shell, the end without the “V” sealing should enter first, then follow the arrow direction on the membrane shell, push it into the shell gently, 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 beidle 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.

D5.TROUBLE SHOOTING

TYPE	FEATURES	REASON	MEANS
System Failure	Start up Failure	Power not connected	Put the power through
		Power Voltage or phases not meet	Change the Power source
		Circuit problem or bad touch	Check the starting circuit - Reposition the heat relay, or increase its current.
		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
Booster pump failure	Pressure not increase, with abnormal sound; abnormal libration, Pressure Gauge finger waggle	Feed water capacity not enough	Increase the source water prssure
		Lack of water pressure	Increase the feed water pressue or change the the precision filter
		Pump suction, single-track expel	Depart the pump, clear the stem change the bad parts.
		Sealing abrasion	Change the sealing
		Inserts damage	Change the bad parts
		Connecting pole abrasion,burn	Change the bad parts
		Pressure Valve damage	Change the spring or valve core
		Lack of lubrication	Fill lubration to normal position
		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
RO system Failure	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
		Membrane is stuffed	Clear the stem by clean the membrane
		Membrane aging	Change a new membrane
	Low desalination Rate and bad quality	Membrane damage	Change a new membrane
		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

E. APPENDIX

RO Membrane Technical Manual

2540, 1000 psi FRP Vessel Drawing