

Whisper 30 integral, modular-Frame



Whisper 30 integral
12/24 Volt DC 230 V AC

User Guide and Installation handbook

PureWater 
Das Trinkwasser aus dem Meer

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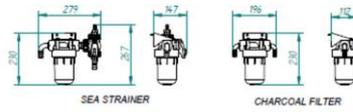
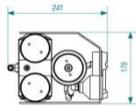
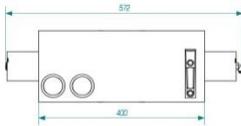
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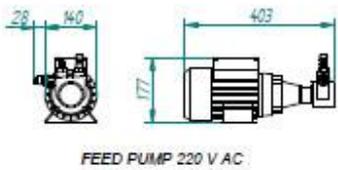
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The Sea Star Whisper 30 modular-Frame individual parts:

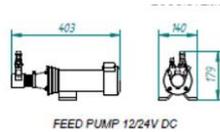


ETD Basic unit

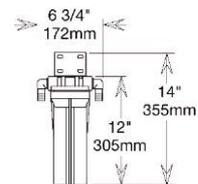
Filter-system Whisper



FEED PUMP 220 V AC



FEED PUMP 12/24V DC



Vane Pump

Pre-Filter

Vane Pump 230V

The dimensions of Motor and pump are subject to change, because different motors are used.

Vorsichtsmaßnahmen **Precautionary**

Bitte beachten Sie folgende Punkte bevor Sie Ihre SEA STAR Anlage einbauen und in Betrieb nehmen!
Please pay attention to the following point's bevor you install the system.

1. Die Anlage sollte innerhalb von 12 Monaten nach Auslieferung in Betrieb genommen werden.
You should take the unit into service within 12 month.
2. Die Anlage sollte ca. alle 7 Tage, oder in sehr heißen Gebieten alle 3 Tage mit Seewasser betrieben oder mit Frischwasser gespült werden. **You should flush the unit every 7 days ,or in hot climate every 3 days.**
3. Wenn die Anlage für eine lange Zeit außer Betrieb ist, sollte sie spätestens nach 12 Monaten gespült und neu konserviert werden. **If you have the unit not in use for a very long period, you should flush and preserve the unit every 12 month.**
4. Betreiben Sie die Anlage nie in Häfen oder in Gebieten wo Kraftstoff und Öl im Seewasser ist.
Don't use the unit in ports and areas where the seawater is contaminated with fuel and oil.
5. Wenn Sie die Anlage in Frisch- oder Brackwasser betreiben sind keine weiteren Maßnahmen zu ergreifen.
No action has to be taken if you use the system in fresh or brackish water.
6. Schützen Sie die Anlage vor Frost. **Prevent the unit from freezing**
7. Lassen Sie die Membran nicht austrocknen. Wenn Sie die Membran aus irgendeinem Grund ausbauen, ist es wichtig, dass sie sofort versiegelt wird. **Don't let the membrane dry out.**
8. **The seawater inlet must be designed, that the water is pressed in during cruise.**
9. **The pre-filter has to be checked regularly, during operation period at least every 14 days.**
10. **We recommend a fresh water flush after every use.**

Caution!!!

**The amount of produced fresh water is depending on Sea Water temperature and salinity.
For temperatures below 25°C you lose per 1°C – 3% of rated fresh water output performance.
If the salinity is higher than 35000 PPM you could also lose output performance.**

1.0 GENERAL THEORY OF OPERATION

1.1 REVERSE OSMOSIS THEORY

Reverse osmosis, like many other practical scientific methods, developed from processes first observed in nature. Osmosis is a naturally occurring phenomenon in which a semi-permeable membrane separates a pure and a concentrated solution (a semi-permeable membrane is defined as one that preferentially passes a particular substance). Every fluid has an inherent potential that is directly related to the type and amount of solids in solution. This potential, referred to as osmotic pressure, increases in proportion to relative concentration of a solution. A concentrated solution, therefore, has an osmotic pressure that is higher than that of a pure solution. In an osmotic system, the less concentrated solution will attempt to equalize the concentrations of both solutions by migrating across the semi-permeable membrane. When enough pure solution migrates across the membrane such that the inherent potential difference between the solutions is no longer higher than the osmotic pressure of the membrane, the purer solution will stop flowing. If the pressure on the concentrated solution is increased to above the osmotic pressure, fluid flow will be reversed. This condition, called Reverse Osmosis, can be established by artificially pressurizing the more concentrated solution using a high pressure pump. In this type of system, the concentrated solution (normally referred to as feed-water) will become more concentrated as pure water flows out of solution and across the membrane to the permeate side. Discounting the effects of feed-water temperature and salinity, the operating pressure normally required to produce significant amounts of pure water is at least twice the osmotic pressure of the membrane being used.

Abb. 1.1

effects of feed-water required to produce pressure of the

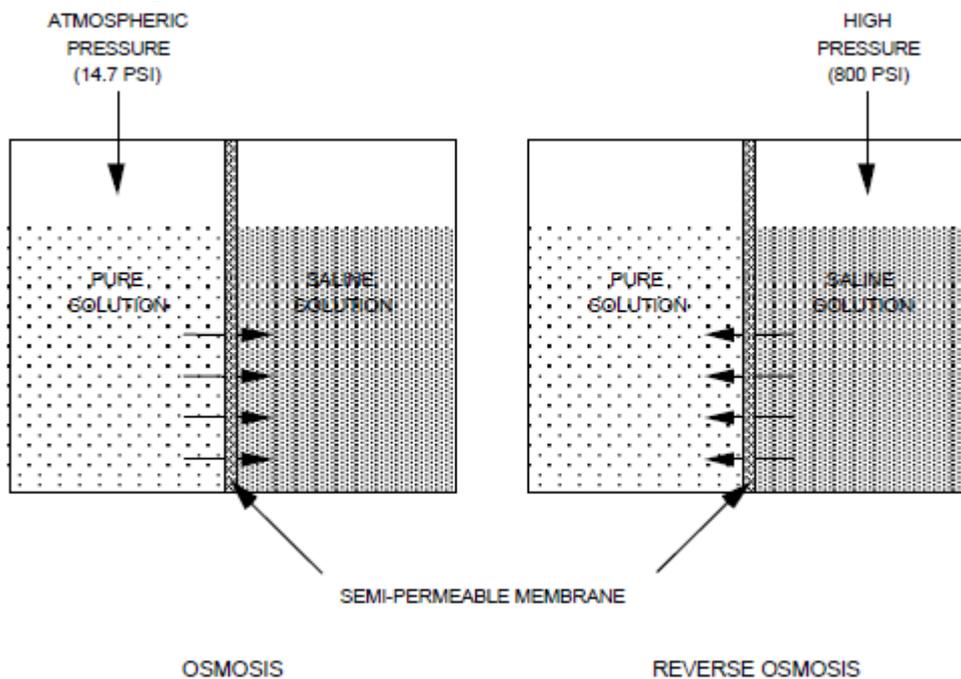


Figure 3.0 - Simple (Reverse) Osmosis Process

1.2 APPLICATION OF REVERSE OSMOSIS

Seawater contains many kinds of solids dissolved in solution. The most prevalent is common table salt (Sodium- Chloride). Other minerals that may be present in solution are substances that usually contain Various Compounds of Calcium and Sulfate. The sum of all of the solids dissolved in a particular sample of water is referred to as *Total Dissolved Solids* or TDS. Seawater normally averages 32,000 ppm (parts per million) TDS although variations of 5000 ppm are common in various parts of the world. The fundamental goal any desalination process is a significant reduction in the amount of dissolved solids in water.

Whisper 30 integral, Modular, Handbook

In a Reverse Osmosis desalination system, most of the dissolved solids do not pass through the Membrane but are instead carried along the membrane surface. This rejected water, referred to as *Brine*, becomes increasingly more concentrated as it flows across the surface of the membranes and is eventually piped to drain. The product water that flows through the membrane is referred to as *Permeate*. The percentage of feed-water that enters the unit converted to permeate is called the *Recovery rate*. A higher than optimal recovery rate (which can be obtained by increasing the back Pressure on the unit above the recommended range) results in greatly increased membrane fouling Rates and a significant decrease in the operational life of the membranes.

It should be noted that no system is capable of removing all 100% of the dissolved solids from Seawater. Designed to reject approximately 99% of the TDS, the system allows 1% of the 32,000 ppm TDS in the seawater to pass into the product water. This yields product water of less than 500 ppm, the recommended TDS for drinking water. A system such as this is said to have a *salt passage* of 1%.

2.0 Whisper 30 integral

2.1 The general scope of application for the WHISPER integral systems

You can use the WHISPER systems without restriction in all oceans around the world and in brackish water areas. Take care in areas where sea water is contaminated with plankton. You must than check the strainer more often. **Clogging of the strainer could cause the vane pump run dry and fail.**

The advantages of the WHISPER systems are:

- No pressure regulation, the system regulates the pressure by itself.
- A whisper quiet system.
- Because of the energy recovery a good balance of power consumption.
- Integrated membrane, no high pressure hoses, compact installation.

Function

The heart of the system is the **ETD (Energy Transfer Device)**

The ETD produces out of a large volume of water with low pressure, high pressure, with a low volume of water. The built in Energy recovery circuit pushes the ETD and saves energy by using the concentrate back flow.

The advantage of this system is:

The system produces almost no noise.

No high pressure regulation is needed, the system regulates by itself.

It is a switch On/Off system.

New ceramic parts extend the time between overhaul.

More Water is pumped through the membrane which extends membrane life and increases water quality.

2.3 Explanation

High Pressure Gauge (at the ETD)

The High pressure Gauge shows the operating pressure. The range is between 35 and 55 Bar, depends on the type of Membrane used.

Low pressure Gauge (at the panel)

The LP Gauge shows the pressure of the Vane Pump. The working pressure is 6-10 Bar.

Feed Pump (Vane Pump)

The feed pump pumps the water to the ETD

Flowmeter

The Flow Meter shows the amount of produced water in GPH (US Gallon per hour)
1 US Gallon = 3,78 Liter. From Jan. 2016 the flow meter is L/h

Sea Water Filter (Strainer)

The Strainer is a 50 μ washable filter and reduces the particles to protect the vane pump.

Pre- Filter

The Pre-Filter is a 5 μ changeable filter cartridge and protects the Membrane from fine particles.

Note: The pre-filter should be checked regularly, at least every 14 days in an operation period.

Sample Valve (at the panel)

With the Sample Valve you are able to take a water sample of your product water..

Fresh Water Flush System (FWF System)

The Fresh Water Flush System is a Carbon Filter activated with the valve at the Strainer.

The Carbon Filter reduces the possible chloride in the ships water system.

Clean/Rinse Kit Part Nr. 940

The Clean-Rinse Kit contains of a Three- way Cleaning Valve and a three Way selector Valve 1.

If you order the Kit with the unit the valves are already mounted.

2.4 Quality Monitor (COMPACT Versions only)

The Quality Monitor shows the quality of the product water in PPM TDS (Part per Million Total dissolved Solids)

When starting the system the quality is always for a short period (30-45sec) high salinity. Shortly the monitor starts to count down. As soon as the quality reaches the pre-set value(factory set point is 500PPM) the water is produced into the tank.



Digital Display ppm
Switch OFF- AUTO- ON
Normal position is AUTO.

OFF= Controller is OFF
AUTO= Controller is in the AUTO position. Automatic product water transfer to tank.
ON= Product water is always produced into tank.

LED display: RED Controller is OFF
Amber= Water is produced into tank.
Green= Water is going over board

Calibrating screw

Set Point for adjusting product water set value. To readjust, push the yellow set button and turn with a tiny screwdriver the desired set point.
Return- push MEAS

The controller is activating a diversion valve to control the destination of the product water.

The diversion Valve is located at the right side of the Main control panel. There is an emergency gray button, to override the valve. Only to be used, when the controller is not working. Push and turn to the right to lock.

3.0 Performance

Sea Star Whisper 30 integral, Modular

Weight: 35 Kg

Power consumption:

Whisper 30 integral, Modular 12V - 16A 24V- 8A 230V 1,6A

Operational Parameter:

Pressure: High Pressure: 500-950psi 35-55Bar
 Low Pressure: 7-12 Bar

Maximum Salinity: 46000 ppm (ppm= Parts per million)

Temperature Range: 1° C to 45° C

PH – Range: 2 - 11

The produced fresh water is better than WHO requirement.

4.0 Installation

4.1 Required Material

- 1/4" PVC Hose (for the product water line)
- 1/2" PVC Hose (for the overboard Line)
- 1/2" PVC Hose (for the Sea Water Line)
- ca. 10 hose Cleats (1/2" Niro)
- Tie-Raps
- 15-25 mm² Cable (Option) depends on the length
- Breaker 25 A (Option) Relay (Option)

4.2 Preparations for Installation

For installation pay attention to the Flow Diagram on Page 19

Sea Water Filter (Strainer)

Place the Strainer direct after the Sea Cock. The Strainer has a 50 μ washable Filter inside. At the Strainer is the **Selector Valve** mounted. Here you can select either Sea Water operation or Fresh Water Operation. The lower connection is for Sea Water, the upper connection is for the line from the Carbon Filter (FWF System) or, if installed from the Selector Valve 1 if a Clean/Rinse Kit is installed.

Vane Pump. (Feed Pump)

The outlet of the Strainer has to be connected to the inlet of the vane pump. Install the Vane Pump at or better below the waterline. For the first use, fill the Vane pump with water.

Pre-Filter

The Pre-Filter can be installed above the waterline.

Product Water connection

The product water can be picked up at the top of the flow meter. There is an 8mm hose connection. Connect this to the sample valve at the 5" post carbon filter. This is the lower hose barb. The hose barb at the right is the sample line.

4.3.1 Feed Pump, Pre- Filter and Hose connections

The Sea Water feed should be a marine grade Sea Cock, that you can close the Sea Cock individually

Step 1 Connect the Sea Water intake with a re- enforced ½“ hose to the lower hose barb at the valve at the Strainer. Connect the outlet of the Strainer with the intake of the feed pump. The upper connection of the Valve at the Strainer has to be connected with the outlet of the Carbon Filter. (FWF System) The inlet of the Carbon Filter must be connected with your boat pressure water.

Step 2 Connect the outlet of the Feed Pump with the inlet of the red Pre-Filter.

Step 3 Connect the outlet of the Pre-Filter with the inlet of the ETD, marked **with E**.

Step 4 The outlet of the ETD is marked with **S**. Connect a ½” hose to the outlet over board.

Note!!

All connections past the Feed Pump have to be checked carefully, because there is already a pressure of 7-10 Bar. Tighten the hose cleats carefully and check for leaks by the first use. Use only reinforced water hoses which can stand the pressure of 10 Bar.

----- Pre – Filter installation completed -----

4.3.2 Product water connection.

At the top of the product flow meter, there is an 8mm hose barb. This is the product water pick up. Refer to the flow diagram on page 17.

NOTE: Any connections to the ships freshwater Tank has to be connected always from the top of Tank.

4.4 Hose Connections to PH Stabilizer (Only COMPACT Models)

Step 1 The Pre – Filter installation is completed

Step 2 The Product Water outlet at the Manifold has to be connected with the PH Stabilizer.

Note: The PH Stabilizer is not working as a filter, but as an injector. Therefore the flow is vice versa. OUT is where the line from the Manifold Position Fresh Water must be connected and IN is going to ships fresh water tank.

----- Hose Connections completed -----

4.4.1 Electrical Control Box with Relay 12/24V DC (Option)

This is an option if you have long way from your ships Battery to the Feed Pump Motor

Warning!

Disconnect power from the system.

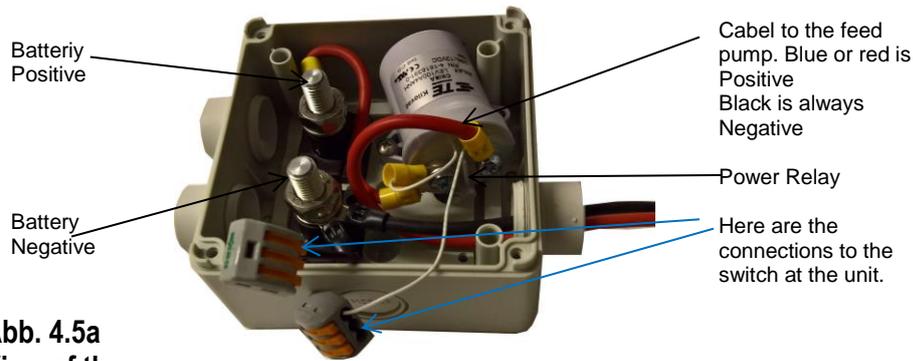


Abb. 4.5a
View of the box

Step 1 Disconnect Power

Step 2 Connect the Battery Positive cable to the 10mm Bolt, marked red.

Step 3 Connect the negative cable with the not marked Bolt.

Step 4 The Cable to the Feed Pump is factory connected.

Step 5. Look into the connection Box of the Motor. The Positive Bolt is marked with a + at the bottom. Use a light to find it out. Wrong connection of the motor will result in wrong direction turning and the pump rotation is wrong. Then connect the Feed Pump Cable to its respective side.

Step 6 Now look for 2 black cables coming out of the box. These cables have to be connected to the switch at the panel. Check for function.

NOTE!

If you have a long way from ships Battery to the Motor and Panel, you should order the Control Box Option. Then you have the possibility to draw Battery cables with 16mm² or more to the Motor.

We recommend using the unit with engine running.

----- Electrical Connection completed-----

5.0 How to use the system

5.1 Filling and starting the system.

Step1 Place the Sample Valve in Pos. SAMPLE and guide the hose to a drain.

Step 2 Open the Sea Cock and let water flow into the system.

Step3 We recommend bleeding the system carefully.

Step 4 Start the system and open the bleed Valve at the red pre-filter. When water is coming out, close the valve.

If you don't see water coming out at the overboard outlet within a Minute, stop the system and check the position of the valves.

Step4 If everything is fine and the overboard brine flow is free of air you can watch the pressure indicators. The low pressure at the panel should read between 8 to 10 Bar and the high pressure Gauge at the ETD should read in normal seawater 45-55 Bar. If you test the unit in brackish water the pressure is lower.

Step 5 **ONLY FOR COMPACT MODELS.** Watch the Quality Monitor. After 1-2 Minutes, the water quality should be below 500 PPM and the system produces water into the tank.

Step 6 **NOTE!!**

If you use the system for the first time or you start the system after having done long term storage, drain the product water for about 5 minutes to allow all chemicals drained.

Step 7 Check the product water either with a handheld tester (Option) or just taste it.

Step 8 If you find the water quality good, stop the unit and place the sample valve to Pos. Tank. Start the unit. Now the product water is produced into the tank.

Step 9 Check all connections for possible leaks.

-----The unit is now ready for use -----

Whisper 30 integral Handbook
Preservation Configuration

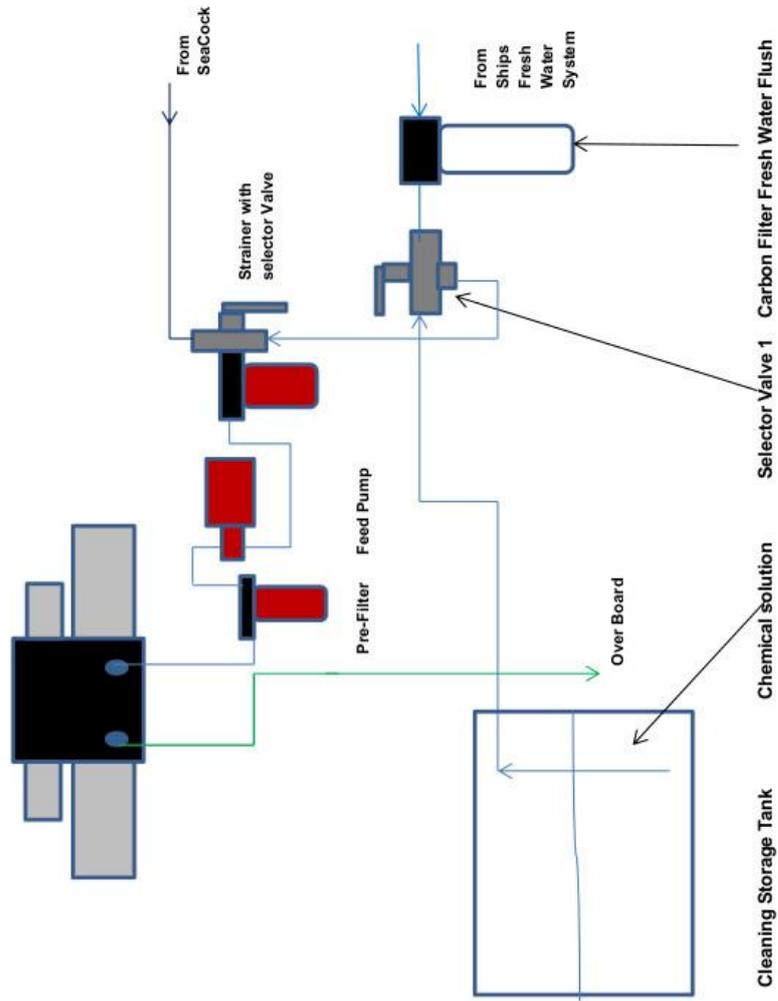
Preservation Configuration

- Sea Water High Pressure
- Brine Low Pressure
- Suction Line from Storage Tank

Clean /Rinse kit contains :
Cleaning Valve and Selector Valve 1

Whisper 30 integral

Clean/Rinse Kit installed



6.0 Maintenance

6.2 Short Term Storage/Fresh Water Flush

Ideally, the SEA STAR performs optimally when the RO unit is used periodically. However, the Likelihood of bacterial and biological growth in the membranes increases, when stagnant seawater (in extended periods) is in contact with the membranes. A freshwater flush procedure is necessary to prevent clogging and growth of organic contaminants in the RO system and its membranes. This method pushes out older stagnant seawater (saltwater) out of the membranes and replacing it with freshwater (non-saltwater), leaving less chance of fouling the membranes. The freshwater flush procedure should be used when the unit will be placed idle or in “stand by” condition for more than seven days **OR** idle for three days in hot, tropical climates. We recommend a fresh water flush after every use. Although they do not attack the membranes or other system components directly, high concentrations of biological matter can block enough of the product water channels to cause a reduction of as much as 40% of the total system capacity.

PERFORM A FRESHWATER FLUSH TO THE RO UNIT WITH NON-CHLORINATED FRESH WATER ONLY. EXPOSING THE MEMBRANES TO CHLORINATED WATER WILL CAUSE IRREVERSIBLE DAMAGE AND VOID THE RO UNIT WARRANTY. THE FRESHWATER FLUSH SYSTEM USES A CARBON FILTER INLINE BEFORE SYSTEM TO CONSUME THE CHLORINE.

- Turn the handle at the strainer to Fresh Water Position (Selector Valve)
- Start the unit.
- Let the system run for app. 10 minutes. At least so long, until the high pressure has dropped.
- Stop the system.
- Place the selector Valve back to Sea Water.
- For storage longer than one week, replace the 5µ pre-filter. An old filter can contaminate the system.

Now you can leave the System in Stand-by for 3-4 Months. In very hot climates only on month.

Note: A fresh water flush after using the system will increase the lifetime of the membrane. However, you should not have sea water in the system for more than 2 days.

6.3 Long Term Storage/Preservation

During periods when the RO unit is to be shut down for an extended period of time, it is necessary to re-flush the unit every three month OR to circulate a preservative solution through the membrane to prevent the growth of biological organisms. Use the following procedure to preserve the RO elements:

PRESERVATIVE CHEMICAL #3 IS A FOOD GRADE PRESERVATIVE. SEE WARNING LABEL ON SIDE OF PACKAGE AND ADHERE TO ALL SAFETY PRECAUTIONS ON LABEL. Do not breathe the chemical

NOTE: You should allow your unit's product water to run to drain for the first 30 minutes after preservation.

Pay attention to the Diagram Preservative Configuration on Page 12

- Step 1 Flush the system with Fresh Water (6.2)
- Step 2 Place the position of the Sample Valve to SAMPLE and guide the hose to the Cleaning Storage Tank. This can be a simple bucket.
- Step 3 Place the **Selector Valve 1** to the right. There should be a hose to the cleaning storage Tank. (Bucket) Place the Selector Valve at the Strainer to Fresh Water pos.
If you don't have the Selector Valve 1 installed, you have to draw a hose from the pumps inlet to the cleaning storage Tank.
- Step 4 Mix 4 Tablespoons of Chemical Nr. 3 into the Clean/storage Tank (Bucket) filled with non-chlorinated water. (10L)
- Step 5 Start the system until the bucket is empty.
- Step 6 Stop the system. It is now preserved.

Note: If you have used Sea Water for preservation please repeat the preservation with fresh water as soon as possible.

Important: Repeat the preservation procedure annually. Even if you don't use the system you can keep your membrane in a good condition.

6.4 Re-Enter Service after Long Term Storage

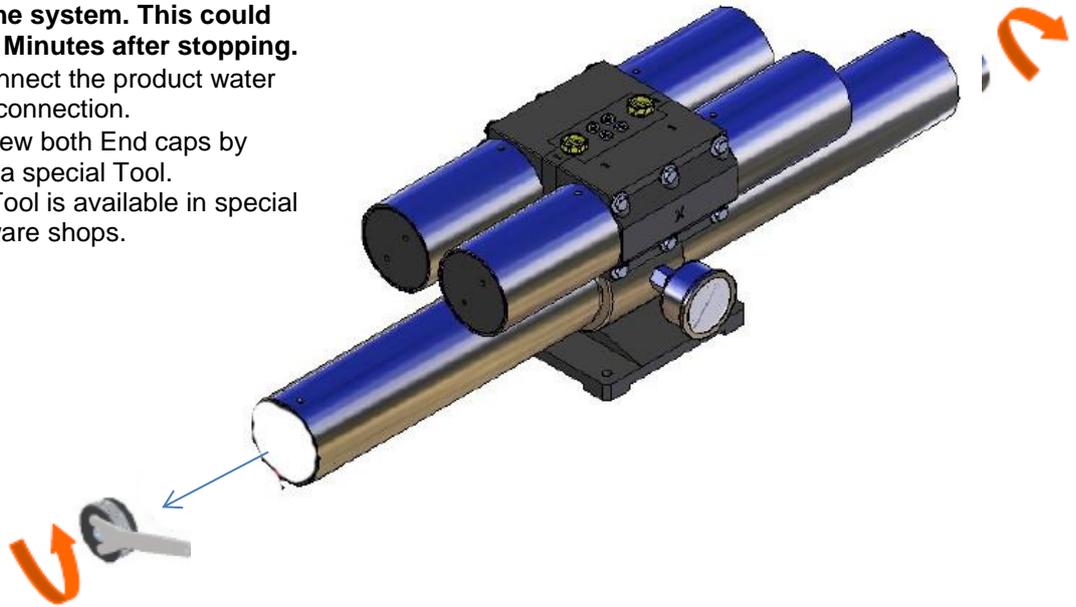
Before starting the system after a Long Term Storage change the 5µ pre-filter cartridge. You can use the old cartridge for preservation again.

6.5 Membrane Replacement

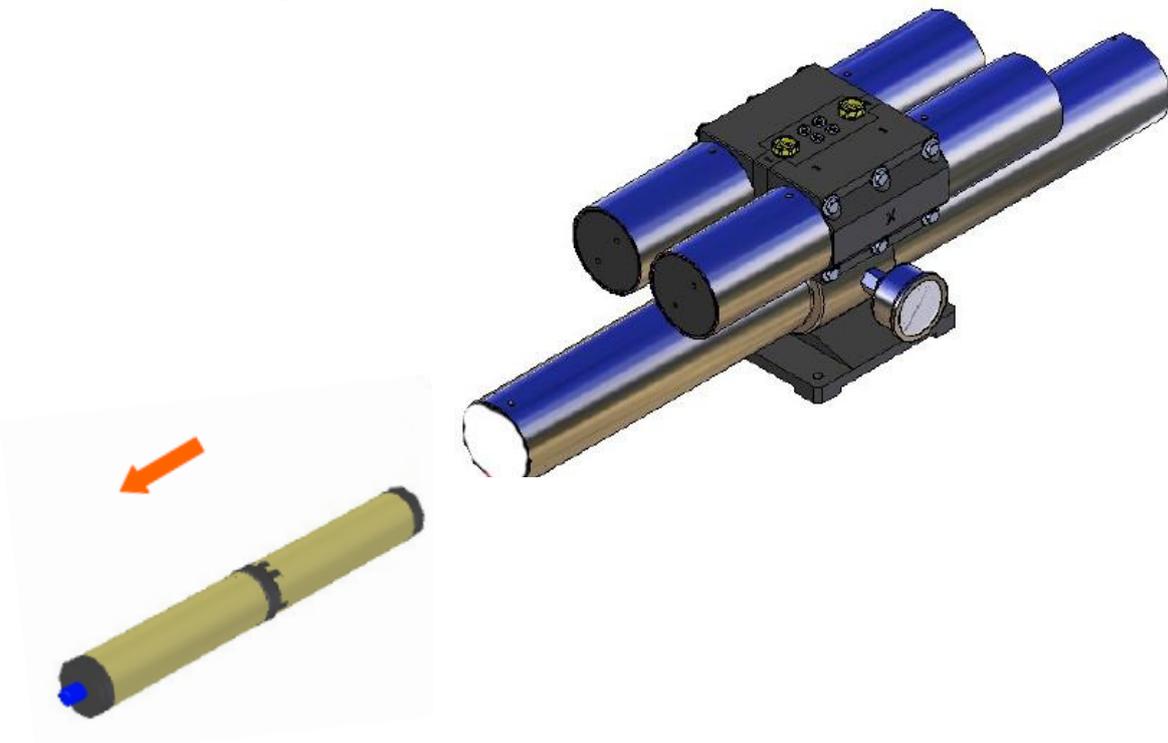
Follow the instructions to change the membrane.

Make sure that there is no pressure anymore in the system. This could take up to 90 Minutes after stopping.

- Disconnect the product water hose connection.
- Unscrew both End caps by using a special Tool. This Tool is available in special hardware shops.



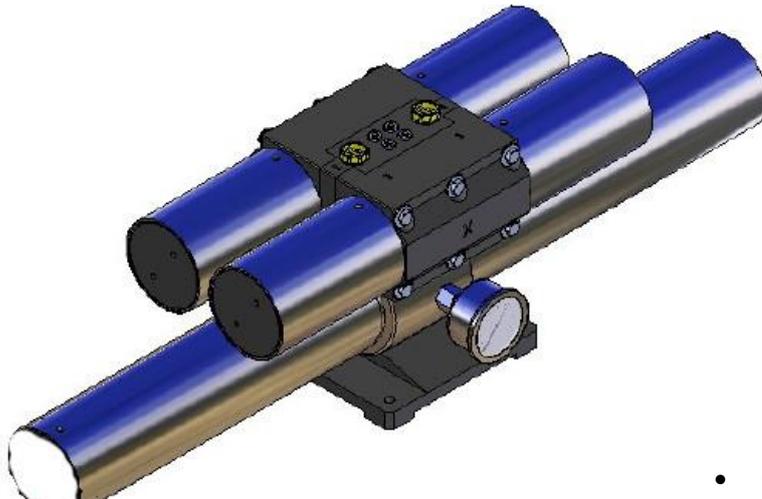
- After you have unscrewed the End Caps pull the membrane at the left side out. Use a rubber Hammer and give a little push from the right side on the membrane.
- Clean the tube with non-chlorinated water.
- Unpack the new Membrane which is in a vacuum sealed package.



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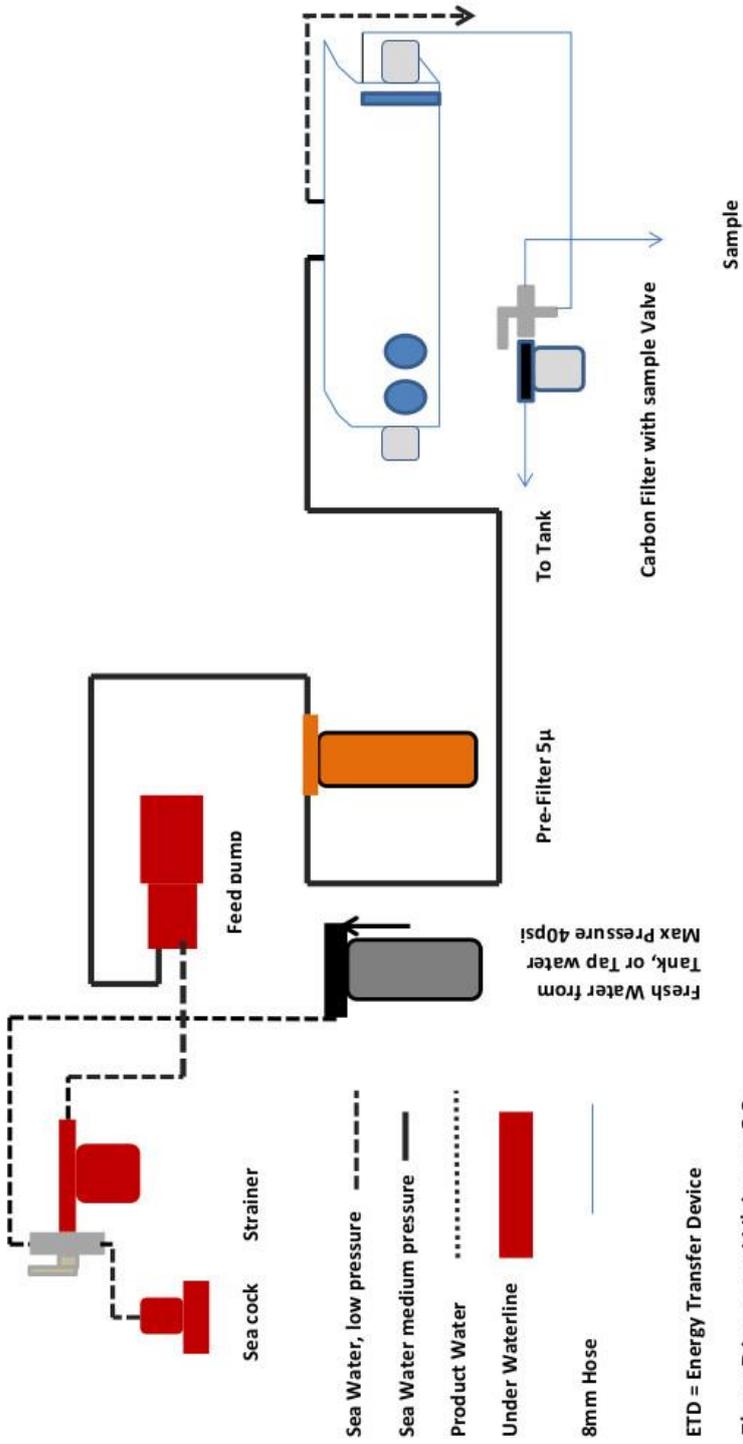
Membrane Replacement

- Guide the new Membrane from the right side into the tube.
- Pay attention that the Membrane is exact in the middle.
- Now you can screw the Endcaps on the tube.



- Connect the Product Water connection.
- To start the system refer to chapter Starting and Filling the system.

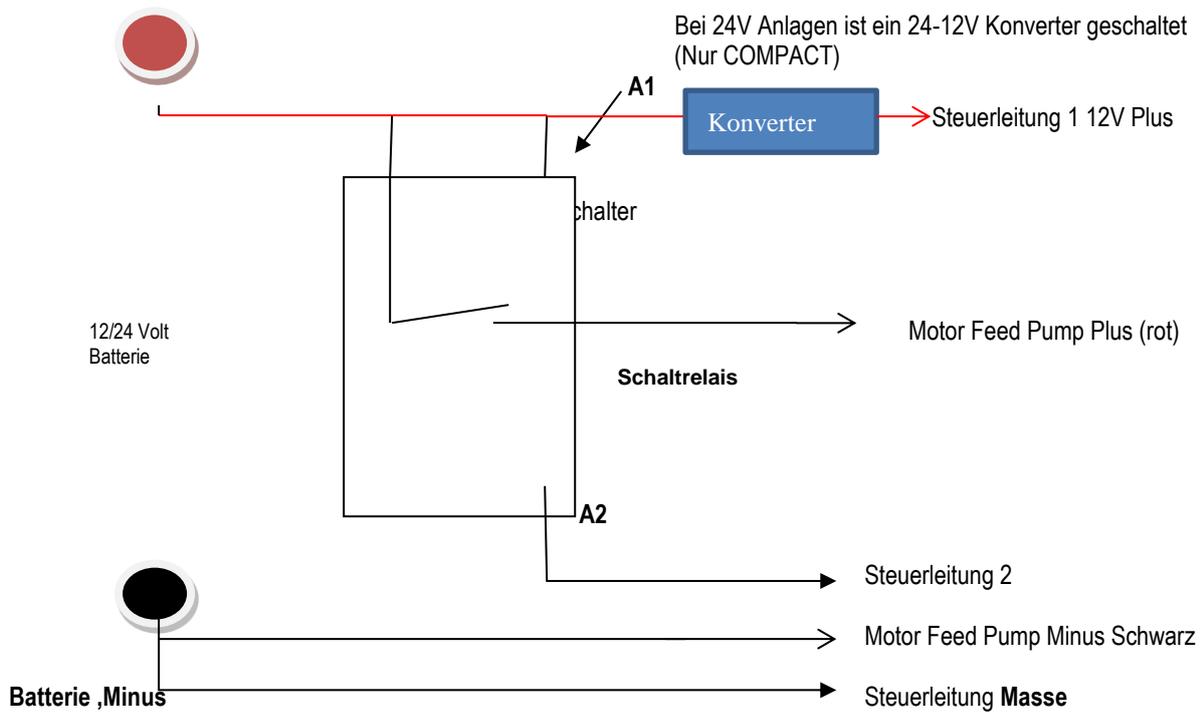
7.0 Flow Diagram Normal Operation



ETD = Energy Transfer Device
 Flow Diagram Whisper 30
 Integral Frame
 PureWater- Entsalzungsanlagen

8.0 Elektrische Schaltung/ Wiring 12/24V DC with the Option Control Box

Batterie + (10mm Bolzen)



8.1 Connection of a 230V/50Hz Motor

If you use the system with a 230V 50Hz Motor it is possible to switch ON and OFF with the Switch at the Panel. However, to use a Relay is always the better Idea. Parts for this installation could be ordered via us.

8.1.2

12/24V Motor

The 12/24V Motor has a Box on top of the Motor. You have to determine the Positive + connection. There is an embossment of + and – at the bottom. You only can see this if you use a light. **Reverse connection will result in reverse pump rotation direction and can damage the pump.**

9.1 ETD Parts

“INTEGRAL CERAMIC” ECO-SISTEMS PUMP

Re. no.	Position	Name	Quantity
44022012	1	Direct distributor plate	1
44021022	2	Manifold X	1
44021032	3	Manifold Z	1
44021042	4	Manifold lid R18	2
44021052	5	Manifold lid R22	2
44021062	6	Inner liner Ø55	4
44021072	7	Outer cylinder	4
44021083	8	Cylinder cap Ø55	4
43850510	9	Spindle Ø5x10 mm A-4	4
44021101	10	Rod Ø16 M8	2
44022072	11	Slide	4
44021122	12	Plunger Ø55	4
44022020	13	Membrane container body	1
44022031	14	Membrane vessel	2
44022041	15	Membrane vessel cap	2
44406130	17	Spring ø 3 x 12 x 0.3 mm MONEL	8
44022081	18	Spring guide stop	4
44022060	19	Manifold flat washer	1
44022092	20	Base intermediate plate (CERAMIC)	4
43911852	21	O-ring Ø18.72x2.62	2
43912340	22	O-ring Ø23x2	4
43914140	23	O-ring Ø48x2	4
43914140	24	O-ring Ø51x2	4
43916352	25	O-ring Ø63.17x2.62	10
43916952	26	O-ring Ø69.52x2.62	2
43941600	27	Seal Ø16x24x6.3	4
43941800	28	Seal Ø18x26x6.3	2
43943550	29	Seal Ø45x55x6	4
43946300	30	Seal Ø63x73x6	1
43590380	31	Elbow R3/8 BSPx1/2 barb PVC	2
43822080	32	Flat washer DIN-9021 Ø8 A4	4
43801380	33	Allen screw DIN-912 M6x80 A4	4
43802315	34	Screw DIN 931 M6x150 A4	6
43812060	35	Self-locking nut M8 A4	6
43812080	36	Self-locking nut M10 A4	4
43822060	37	Flat washer DIN-9021 Ø6 A4	12
43822100	38	Flat washer DIN-9021 Ø10 A4	4
43910935	39	O-ring Ø9.25x1.78	6
43911041	40	O-ring Ø10.5x2	4
43911035	41	O-ring Ø10.8x2.78	8
43911235	42	O-ring Ø12.42x1.78	12
43710220	43	Cap 1/4"	1
43580620	44	Elbow barbed fitting Ø 6 mm tube	1
43570620	45	Connector Ø6 tube x 1/4BSP plastic	1
43586620	46	Elbow barbed fitting Ø 1/4" tube	1
43690120	47	Reduction M1/8"-H1/4"	1

How Super Speedfit Works

To make a connection, the tube is simply pushed in by hand; the unique patented John Guest collet locking system then holds the tube firmly in place without deforming it or restricting flow.

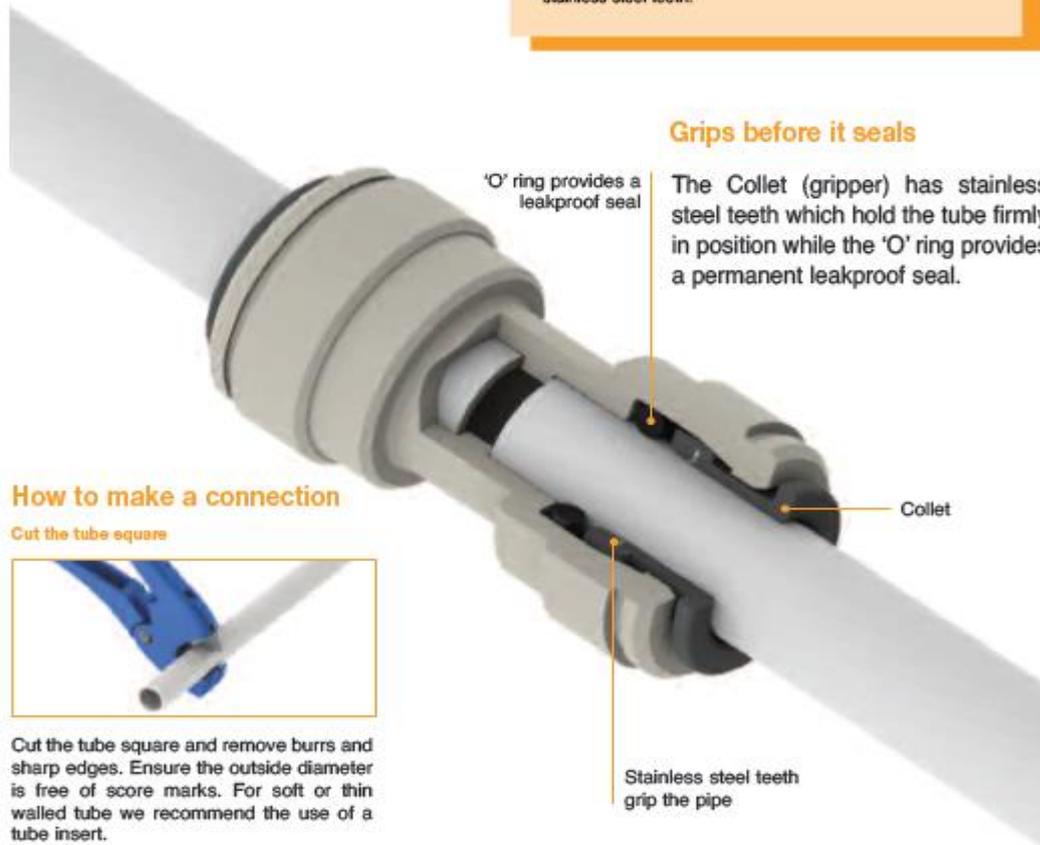
Materials of construction

Super Speedfit fittings are made up of three components:

Bodies are produced in an acetal copolymer or polypropylene.

'O' rings are Nitrile rubber or EPDM.

Collets are produced in acetal copolymer or polypropylene with stainless steel teeth.



Grips before it seals

'O' ring provides a leakproof seal

The Collet (gripper) has stainless steel teeth which hold the tube firmly in position while the 'O' ring provides a permanent leakproof seal.

Collet

Stainless steel teeth grip the pipe

How to make a connection

Cut the tube square



Cut the tube square and remove burrs and sharp edges. Ensure the outside diameter is free of score marks. For soft or thin walled tube we recommend the use of a tube insert.

Push up to tube stop



Push the tube into the fitting, to the tube stop.

Pull to check secure



Pull on the tube to check it is secure. Test the system before use.

To disconnect

Push in collet and remove tube



To disconnect, ensure the system is depressurized, push the collet square against the fitting. With the collet held in this position the tube can be removed.