RO-MAN®

INSTRUCTIONS FOR USE

Installation Guide for 450 GPD Reverse Osmosis Pumped Panel Mounted System

Contents

What’s in the Box

3 x 10 inch Filter Housings (including O Rings)

3 x 10 inch Membrane Housings

10 inch 5 Micron Spun Sediment Filter

10 inch Carbon Block Filter

10 inch Chlorplus Carbon Filter

3 x 150 GPD Reverse Osmosis Membrane

Pre-Filter Flush Kit

Auto Flush Bypass Kit

Pump

Flow Restrictor

Pressure Gauge

3 Metres ¼ Inch Green Tubing

3 Metres ¼ Inch Red Tubing

3 Metres ¼ Inch Blue Tubing

Fitting Connection of your choice

Deionisation Vessel (Optional)

Submersible Pump (Optional)

Aluminium Mounting Panel

Installation Guide

How Reverse Osmosis Works

Reverse Osmosis (RO) is one of the most convenient and effective filtration methods available. Reverse Osmosis membranes can usually remove between 96% and 99% of most contaminants, including salts and minerals, dyes, particles, bacteria and hazardous metals.

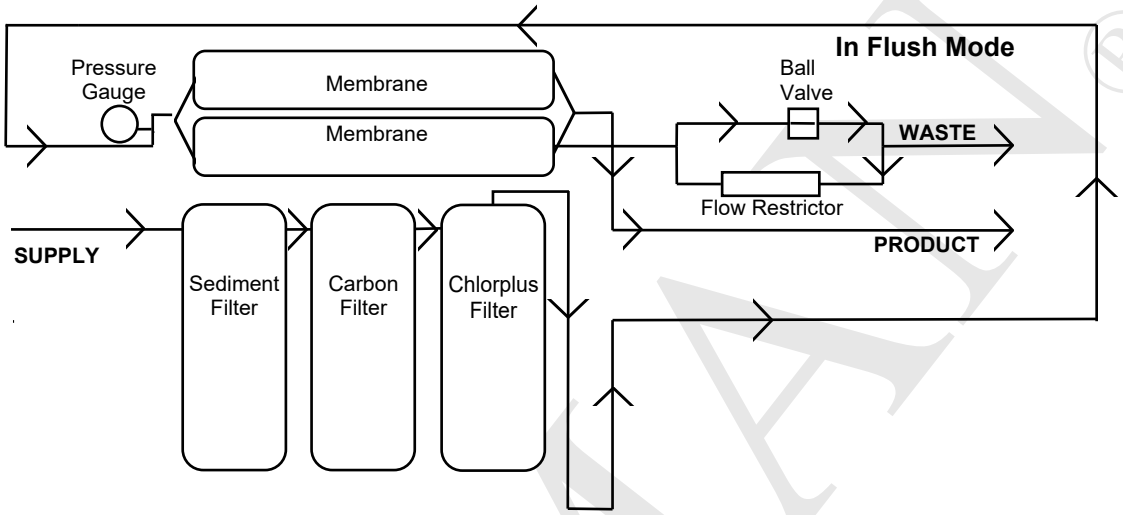
Simply put it is the process of osmosis backwards. Osmosis is the passage of water through a protein membrane to equalize the concentration of particles dissolved in the water. The membrane allows water to pass through however larger molecules like minerals, salts and bacteria cannot. In osmosis, water flows back and forth until the concentration is equal on both sides of the membrane. By using pressure, the water is forced to move away from the membrane rather than attempting to form an equilibrium like normal. This against-flow motion is where the “reverse” in Reverse Osmosis comes from.

In Reverse Osmosis, the process works by separating contaminants from water by forcing the water through a semi-permeable membrane. This membrane acts as a physical barrier to almost all molecules with a molecular weight greater than 200 grams/mole. This membrane is rated at 0.0001 micron which equals to 0.00000004 inch. For example, the membrane may allow passage of water molecules, but blocks molecules of dissolved salt. Unwanted molecules are retained by the membrane while the ultra-pure water continues on for use or further treatment. This is the same technology used to make bottled water and is the only technology capable of desalinating sea water to be made into drinking water.

Non-RO water filters are much less effective with a larger pore size on these filter media, normally between 0.5 – 10 micron. They can only filter out coarse particles, sediments and elements up to their micron rating. Anything finer, as well as most dissolved substances, cannot be filtered out. As a result water is a lot less clean and safe compared to reverse osmosis filtration.

Schematics

200/300/450 GPD System



Before you begin

This water system has been designed for quick and simple installation and maintenance. If preferred, a local plumber can install the system for you. Please read this entire guide prior to beginning installation. If at any time you need additional advice, please contact us by emailing: helpdesk@ro-man.com.

By carefully reading this instruction manual and following the operational guidelines you will ensure a successful installation and reliable operation. Please keep in mind which system you have as some sections may not apply to you.

Routine maintenance is essential to the longevity and performance of the system. Filters should be changed every two to six months depending on the quality of the feed water supply and quantity of water produced.

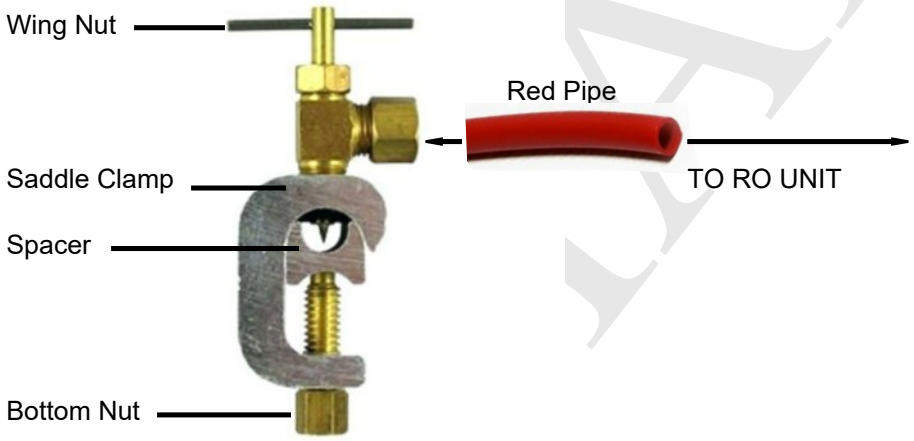
Important: this system is not designed for use where the water is microbiologically unsafe or of unknown quality.

Planning

- Determine the location for the installation of the system. Avoid locations where the system might come in contact with hot water pipes, other hazards or exposed to extreme cold. (RO membranes can be damaged by frost.) This system may be mounted in either a vertical or horizontal position and must be positioned to allow access for servicing and filter cartridge changing.
- Determine the location for the discharge of the waste water.
- Determine the location of the cold water pipe. To assure you are using the cold water line, turn on both the hot and cold tap. After the water is warm to the touch, carefully feel the pipes under the sink. It will be easy to identify the hot and cold pipes.

Installing Supply Feed

- Locate the water shut-off valve for the **cold** water feed line of your mains supply and shut off the water.
- Accidentally hooking up the system to the hot supply line will permanently damage the membrane (See conditions for operation).
- Close the cold water valve. Turn on the cold water tap only to assure that the line is completely shut off and the line is drained. If no shut off valve is located under the sink, turn off the main supply at the entry to the house.
- Before fitting the saddle clamp to the cold water supply ensure that the valve is fully open i.e. when looking down the wing nut is turned anti clockwise as far as it will go (don't force it).



- Now fit the saddle valve to the 9 or 15mm copper cold water supply pipe ensuring that the spacer is fitted closely to the pipe, then tighten the lower bolt with a spanner. You can now connect the red ¼" pipe, which will feed the RO system, by simply pushing it into the saddle valve as far as it will go and then gently pulling back to ensure that it is gripped securely.

Remember when you are ready to feed water to the RO system turn the wing nut fully clockwise which will cause a spike to be driven into the copper pipe and then anti clockwise to start the flow of water.

Important: Do not use this valve on a regular basis to turn the system on and off, a ball valve should be used for this.

Installation of Drain Saddle (If Supplied)

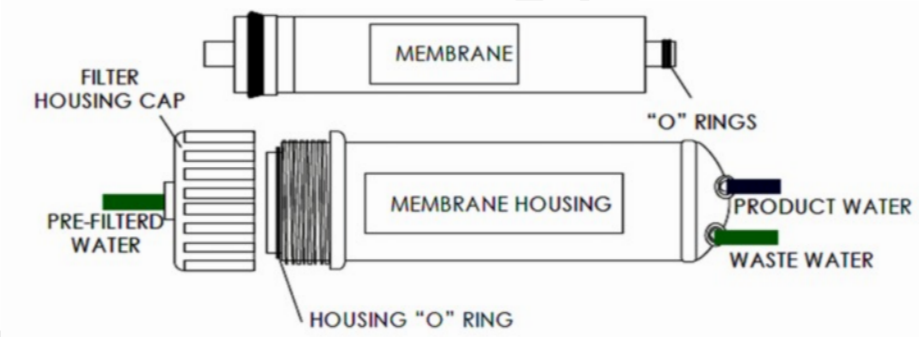
- Position as far away from garbage disposal as possible.
- The drain saddle should be installed above the p-trap on the vertical or horizontal tailpiece.
- Drill a 1/4" hole into the drain pipe observing the above position.
- Mount drain saddle aligning holes (drill bit may be left in saddle hole for alignment).
- Carefully tighten both screws on drain saddle until snug. Do not over tighten.

Mounting the Unit Assembly

- Mounting the unit is optional. Determine if this is a necessity before proceeding.
- Mark screw locations at the desired positions. Use the two holes on back of assembly mounting bracket for marker guides.
- Screw wood screws with unit into marked positions. Leave screw heads out a little.
- Mount unit assembly onto screws.

Fitting the Membrane(s) (If not already fitted)

- Remove the membrane from packaging.
- **It is important not remove the white sticky tape or the plastic wrapping from around the membrane.**



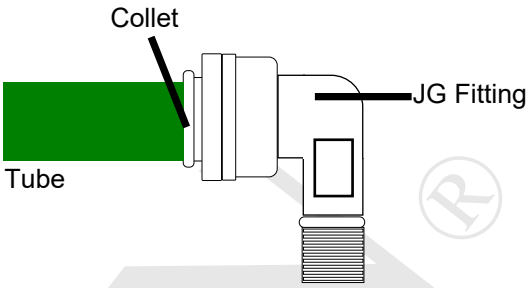
- It is recommended that both the two small black o-rings and the large black O ring are given a VERY light smear of petroleum jelly such as Vaseline to make installation easier.

- Holding the housing, unscrew the housing cap complete with pressure gauge and insert the membrane with the two small, black o rings first. It will stop at the large black gasket seal located on the outer edge of the membrane material. Push the membrane into the housing sometimes it's a tight fit so push with adequate force. You will feel it "seat" into the housing.

- Once the membrane is seated properly, make sure the housing "o ring" is fitted and moist. Then screw the housing cap onto the housing.

Fitting the Pipes

The Push Fit Connectors are opened by pushing down on the collet ring and pulling the hose at the same time. If you prefer you can use a pair of pliers, a small spanner or any tool that can apply pressure on both side of the quick connect collet.



A. Red Pipe: Connects the water supply connector

After cutting the red pipe to a suitable length connect it to the red capped inlet of your Sediment Filter housing found at the top right of the RO unit and marked with an up arrow and the word “IN”. Do NOT turn the water on yet!

B. Blue Pipe: Connects y fitting to the sink top faucet

This can be connected to the outlet of the DI Unit and the other end to your point of use. Bear in mind that you will have to discard the first 2 gallons from this pipe.

C. Green Pipe: Connects to the drain saddle

One end of this to be attached to a suitable waste water discharge point, typically this will be a 36mm white plastic domestic pipe. Should this be the case a 6mm hole drilled into the top of the pipe will accept the RO system waste pipe and can be sealed with silicone. An alternative is to use the same pipe as the washing machine. The other end should be run to the vicinity of the CCB filter housing but do not cut this yet as it will eventually have to be connected to the membrane housing.

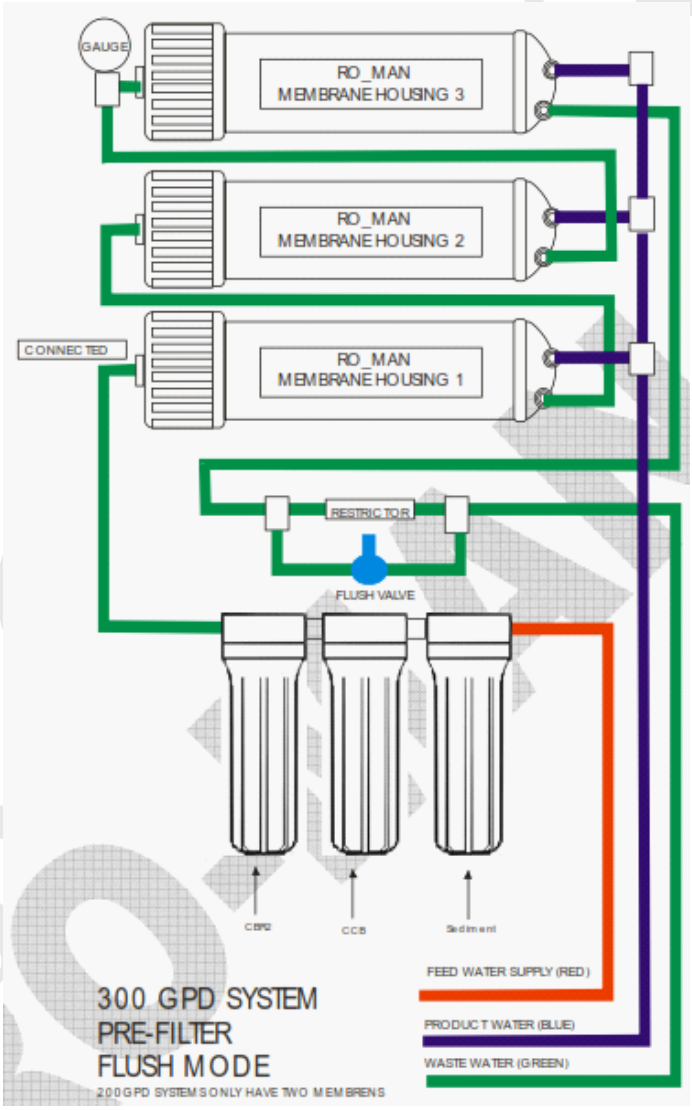
D. Blue Pipe: Connects Y fitting to the storage tank.

Fitting the Pipes for Production

Red: **Feed Water** – This goes from the mains connection to the In connection on the system.

Green: - **Waste Water** – This goes from the flow restrictor to the waste saddle if included or to drain(please note this water is Perfectly usable for many purposes).

Blue: - Product Water – From the system to the water container .



Flushing the Filters

Important: This step is essential to protect the membrane from damage.

- Switch the water supply on.
- Check seal for leakage and allow at least 2 UK Gallons of water to run through the system.
- Locate the T piece and 1/4” turn valve located to the right hand side of the three filters.
- Open this to flush your filters.

Flushing the Membrane

- Your system is fitted with an auto flush.
- Upon switching this on, this will flush for approximately 30 seconds.
- Repeat process 3 - 4 times.

Important: Do not use the first 5 gallons of water. This process is to remove the sanitizing solution from the entire system.

Connecting the DI Unit (Optional)

- After you have run 5 gallons of production through the system turn off the feed water and insert the blue pipe at the back of the unit into the DI unit. Assemble the system back together and run another two gallons of production water. Test the TDS after the water has finished running and you should now get a low reading.
- Please note you should use a TDS meter to accurately indicate when to change the Deionizing Resin. Failure to change the resin when the TDS starts to rise will cause the resin to unload unwanted contaminants back into the product water.

Startup Procedure

- Once everything is connected, switch on the water to check for leaks.
- The system is now ready for use.

Turning off your RO System

This system will automatically switch itself on and off when connected to a float valve in your storage tank. This is achieved by connecting the RO out post of the system to a float valve in your storage tank.
The system will turn itself on and off under pressure.

Maintenance

To keep your system producing quality water, please follow the sequence as below.

Flushing the System with the Flush Valve

- Your system will flush automatically.

Filter Changing

- The filters need changing every 1000 gallons of product water or 6 months, whichever comes first. Failure to do so will damage the membrane. We recommended using RO-MAN replacement parts only to ensure your guarantee.

Conditions for Operation

Source Water: Community / Private / Non-Chlorinated / Chlorinated providing the carbon filter is utilised and replaced every 6 months or every the recommended output, whichever comes first.

SYSTEM PRESSURE (PRE-FILTRATION)	0 – 80 PSI
MEMBRANE PRESSURE RANGE	40 – 125 PSI
TEMPERATURE	4º-38º C (40º-100º F)
PH RANGE	3.0-13.0
MAXIMUM SUPPLY TDS LEVEL	1500 MG/L
TURBIDITY	<1.0 NET TURBIDITY (NTU)
HARDNESS (CACO.)	<350 MG/L (<20 GPG)
IRON (FE)	<0.1 MG/L
MANGANESE (MN)	<0.05 MG/L
HYDROGEN SULFIDE (H2S)	0.00 MG/L
CHLORINE (CL2)	0.00 MG/L

Nominal Rejection Characteristics

Thin Film Composite Reverse Osmosis Membranes:

Calcium	93-99%	Sulphate	96-99%
Sodium	92-98%	Thiosulfate	96-98%
Magnesium	93-98%	Silicate	92-95%
Potassium	92-96%	Silica	90-98%
Manganese	96-98%	Nitrate	90-95%
Iron	96-98%	Boron	50-70%
Aluminium	96-98%	Borate	30-50%
Copper	96-99%	Fluoride	92-95%
Nickel	96-99%	Polyphosphate	96-98%
Cadmium	93-97%	Orthophosphate	96-98%
Silver	93-96%	Chromate	85-95%
Zinc	96-98%	Bacteria	99+%
Mercury	94-97%	Lead	95-98%
Hardness Ca&Mg	93-97%	Arsenic	50-90%
Radioactivity	93-97%		
Chloride	92-98%		
Ion	92-98%		
Bromide	90-95%		
Phosphate	95-98%		
Cyanide	90-97%		

Membrane Performance

Performance of the reverse osmosis membrane element is affected by two key factors, temperature of the feed water and the net driving pressure across the element. These two factors must be taken into account before comparing or evaluating the performance of the membrane element of a reverse osmosis system.

The higher the temperature will provide more the product flow and a lower temperature will provide less product flow. All reverse osmosis membrane elements and systems are rated at 77º Fahrenheit (25ºCelsius).

To find the membrane permeate rate at different temperatures follow these steps:

1) Find the Temperature Correction Factor (TFC) from the table below.

2) Divide the rated permeate flow at 77º F by the TFC.

The result is the permeate flow at the desired temperature.

Feed Water Temperature		Correction	Feed Water Temperature		Correction	Feed Water Temperature		Correction
ºC	ºF	Factor	ºC	ºF	Factor	ºC	ºF	Factor
5	41.0	2.58	5	41.0	2.58	5	41.0	2.58
6	42.8	2.38	6	42.8	2.38	6	42.8	2.38
7	44.6	2.22	7	44.6	2.22	7	44.6	2.22
8	46.4	2.11	8	46.4	2.11	8	46.4	2.11
9	48.2	2.00	9	48.2	2.00	9	48.2	2.00
10	50.0	1.89	10	50.0	1.89	10	50.0	1.89
11	51.8	1.78	11	51.8	1.78	11	51.8	1.78
12	53.6	1.68	12	53.6	1.68	12	53.6	1.68
13	55.4	1.61	13	55.4	1.61	13	55.4	1.61

Example Question: If a thin-film membrane permeate rate at 77 degrees Fahrenheit = 100 gallons/day. What is the permeate rate at 59 degrees Fahrenheit?

Answer: Temperature correction factor (from table above) = 1.47permeate flow at 59 degrees Fahrenheit = 100÷1.47 = 68.03 gallons (us)/day.

Net Pressure Correction

The membranes used in the systems referred to in these instructions are rated with water at 60 psi pressure and a temperature of 25 degrees Celsius. To calculate your expected production rate, first establish your expected production at a given temperature as explained above. This will be called Temperature Correct Flow (TCF).

Multiply TCF by the membranes rated pressure, for these membranes this is 60psi. Then divide by your water pressure supply (WPS). Expected production rate will = (TCF * 60) / WPS

About Total Dissolved Solids (TDS)

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals, salts or metals dissolved in a given volume of water. These are expressed in units of MG per unit volume of water (MG/L) and can also be referred to as parts per million (PPM). TDS is directly related to the purity and quality of water and water purification systems. This will affects everything that consumes, lives in or uses water and either organic or inorganic.

Dissolved solids refer to any minerals, salts, metals, cations or anions dissolved in water. This includes anything present in water other than the pure water (H2O) molecules and suspended solids. Suspended solids are any particles or substances that are neither dissolved nor settled in the water, e.g. wood pulp.

In general, the total dissolved solids concentration is the sum of the cations (positively charged) and anions (negatively charged) ions in the water. Parts per Million (PPM) is the weight to weight ratio of any ion to water.

TDS is based on the electrical conductivity (EC) of water. Pure H2O has virtually zero conductivity. Conductivity is usually about 100 times the total cations or anions expressed as equivalents. TDS is calculated by converting the EC by a factor of 0.5 to 1.0 times the EC, depending upon the levels. Typically, the higher the level of EC will give a higher conversion factor to determine the TDS.

Where do Dissolved Solids come from?

1. Some dissolved solids come from organic sources such as leaves, silt, plankton, industrial waste and sewage. Other sources come from runoff in urban areas, road salts used in winter as well as fertilizers and pesticides used on lawns and farms.

2. Dissolved solids also come from inorganic materials such as rock and air that may contain calcium bicarbonate, nitrogen, iron phosphorous, sulphur and other minerals. Many of these materials form salts, which are compounds containing both a metal and a non-metal. Salts usually dissolve in water forming ions. Ions are particles that have a positive or negative charge.

3. Water may also pick up metals such as lead or copper as they travel though pipes used to distribute water to consumers.

4. It is important to note that the efficacy of water purification systems in removing total dissolved solids will be reduced over time. It is highly recommended to monitor the quality of a filter or membrane and replace them when required.

Taste / Health High TDS results in undesirable taste which could be saltly, bitter or metallic. It could also indicate the presence of toxic minerals. The recommended maximum of TDS in water in 500 mg/l (500 ppm).

Filter Performance Test your water to make sure the reverse osmosis or other type of water filter or water purification system has a high rejection rate and know when to change your filter (or membrane) cartridges.

Hardness High TDS indicates hard water, which cause scale build-up in pipes and valves, ihibiting performance.

Aquariums A constant level of minerals is necessary for aquatic life. The water in an aquarium should have the same levels of TDS and pH as the fish and reef's original habitat.

Hydroponics – TDS is the best measurement of the nutrient concentration in a hydroponics solution.

Pools and Spas TDS levels could impede the functions of certain applications.

Colloidal Silver TDS levels must be controlled prior to making colloidal silver.

Common Problems

Most problems are fixable and in general they will show up in the first 24-48 hours after the system is fully charged.

Problem: I have leakage from a push-in fitting

Solution: The push-ins rarely leak but on the occasion that they do try pushing the line in harder. If this fails, take the line out and check the end of the tube. Check this is a clean square cut. If not, take a pair of sharp scissors or a sharp knife, cut it again and push it in again firmly.

Problem: The system is not making water

Solution: This is almost always a psi problem with 40 psi being as low as possible. If the psi is low it can be a bad hole on the feed water pipe. Try drilling it out. If you have good psi to the inside of the pre-filters, then check the following:

a) Check to see if the water is flowing out of the green discharge line. If so, then the membrane is getting water.

b) Disconnect the blue line from the RO membrane housing. Check if there is any water.

c) If the green line is flowing and the blue is not, it may be blocked. Check the valve at the RO housing. There are two outlets on the out end of the RO membrane. One goes to the discharge saddle and the other is purified water. This outlet has a built in check valve inside the chrome plated brass part. Take this out and check if there is any water.

d) If unit has been in service for a while, the problem could be clogged filters. Pull the filters out and test them one at a time by putting them into the first filter position and seeing if it flows. Clogged filters are usually only associated with well water or with very turbid water.

e) The RO Membrane has silted up. This is very rare unless you have very bad feed water. The RO Membrane is self-flushing. Try back-flushing the membrane.

Problem: My filters are leaking

Solution: You may have a loose O Ring. Take the housing off and make sure they are properly aligned. If the housing is not tight enough then tighten this further.

If you need advice, please contact us on 01823698813 or email us: helpdesk@ro-man.com

RO-MAN Options

Pressure Gauge

There are two reasons for fitting a pressure gauge:

1. To read the water pressure in order to check whether it is within specification. System pressure is very important too little pressure will make the production rate very slow and too much pressure will make the seals fail. Low pressure will make the TDS higher e.g. a system running at 65 psi may have a TDS of 5 while the same system running at 40psi could have a reading as high as 15.
2. To work out when the sediment filters are blocked.

Deionisation (DI)

Deionisation is used to polish the water making it 100% pure. TDS reading should be near zero if using a DI unit.

Inline TDS Meter

TDS (Total Dissolved Solids) meters are used to work out how well the reverse osmosis system is running. By measuring the feed water TDS and then measuring the output you can work out the rejection rate.

92% Rejection is OK 95% Rejection is GOOD 98%+ Rejection is EXCELLENT.

Waste Clamp

This can be bought from www.ro-man.com and can be used to attach the waste pipe from the RO system to a 36mm domestic plastic waste pipe.

RO-MAN Integrated Pumpbox

We have developed a pump box that will increase the water pressure that drives the membrane. This pump box contains a pump, high pressure switch, to protect and help extend the life of the pump. The pump box also has a solenoid valve to stop water going through the system when the pump is not working.

Manufacturer Information

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