



E250RO SERIES PURE WATER GENERATOR

Operation and Maintenance Manual

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KEY: the following symbols draw your attention to...



Regular maintenance



Long-term maintenance



Regular Membrane Flushing

Congratulations on purchasing one of the finest pure water generators available and welcome to the Brodex community.

The Brodex E250 series of machines has been designed by engineers, with reliability, build-quality, robustness and ease of use paramount in their considerations.

Like all engineered equipment, maintenance is an integral part of ensuring continuity in design performance and will guarantee tireless production of top-quality pure water for many years to come.

We would recommend that you take the time to read this manual to fully appreciate that, with just a few simple routine operations, you can protect your investment, whilst minimising any potential downtime in the field.

This manual will give you an overview of the system, the location of significant fittings, controls and a quick guide to get you up-and-running. Then a more detailed explanation of the settings and routine maintenance, along with longer-term maintenance.

It also covers a reminder of your basic training and a few extra hints and tips for window cleaning.

Safety Warning

In the interest of safety and as a result of research into road transport of heavy goods, Brodex recommend that a solid steel bulkhead be installed into all vans where water purification tanks are secured to prevent injury to the driver and passenger in the event of an accident, or the event of heavy breaking where various equipment and materials can career into the passenger compartment. It is the responsibility of the owner of the van to implement this.

Please contact us if you need any further verification, as we do carry out a bulkhead installation service.

Brodex E-250 RO machines utilise pre-filtration, Reverse Osmosis Filtration and Mixed Bed Resin filtration to produce Pure Water in the most economical fashion for window cleaning operations.

General Advice

Congratulations on purchasing the Brodex E-Compact 250RO. We are confident you will be extremely pleased with your new system.

This manual will take you through all you need to know to get your business up and running in the shortest possible time.

Before we remind you of your training and a few basic techniques, some good advice:

The last traditional clean should be the best you've ever done. The first time you use water fed poles it will drag down all the accumulated debris around the outside of window frames which traditional methods might not normally disturb, so your last clean should pay particular attention to these areas.

Remember to advise your customers of the differences they will see with Pure Water Cleaning. For instance, the way traditional "chammy and ladder" cleaning leaves frames and window surrounds means that the first few cleans with Pure Water, may not give the full effect. It may be about the 3rd or 4th clean that they start to notice the difference. After that it will be a breeze and they will never want to go back.

They need to know what to expect, why you have changed and, most importantly, how it will benefit them. They must be advised that their house will be left wet, as drying naturally is what leads to a streak-free finish.

Be sure to promote this as the "Green" option – you are no longer using chemicals and detergents and damaging the environment. Similarly there is reduced impact upon their own "environment" no ladder damage, holes in their lawn or trampled flower beds.

Health and Safety

You should conduct a risk assessment with Health and Safety in mind. Whilst you no longer have the danger of falling from ladders to contend with, simple common sense warns you that you are at risk from overhead power lines and the like. Attend to your work area, paying attention to slipping and tripping hazards and never leave an extended pole leaning up against the side of a building ...for however short a time. The slightest gust of wind will have it over, causing untold damage to your pole, surroundings and passers by!

OVERVIEW OF SYSTEM AND TRAINING

You will have been given a rundown of your system and all its components, along with a guide to basic maintenance, short-term and long-term (covered in later sections of this manual). But it's a lot to take in, in one day. So be sure to familiarize yourself with your machine and all the attachments and fittings by close reference to this manual

Remember to check the pressure of your mains water supply – typically about 50PSI – as this can seriously affect the performance of your system.

The nature of RO membranes is that they perform better and better the higher the feedwater pressure – right up to 150psi. Unfortunately, the low and inconsistent pressure delivered to our homes by the water board is very far from achieving this, often below 60 psi and sometimes as low as 30.

When this becomes significant it may be necessary to consider adding a booster pump.

Quite simply, the higher the water pressure, the purer the water (and that's by a considerable amount).

Many advantages include greater production rate (considerably quicker fill-time for your machine), the less blockages caused by scale deposits and more efficient flushing procedure, hence prolonging the life of your expensive membrane.

In practical terms RO Systems work quite satisfactorily where your mains pressure is 50psi or more, and the lifetime of membranes is generally acceptable to the average user. Even so, you might like to consider the Booster Pump as a longterm investment given the obvious benefits listed above.

But, where you are in the 30-40psi region, or lower, a Booster pump is an essential addition to your system and will soon pay for itself. Please call us for more information.

Window Cleaning Technique

You were also given a basic guide to window cleaning techniques. Simply put, you will develop your own technique, and find a systematic pattern which gives best coverage and

gets into all the corners. But there is no definitive technique. Ultimately, this will develop

into your own style and pattern as "whatever works best for you"... Whatever is comfortable and efficient - we merely show you a starting point based on years of experience and feedback from our satisfied customers.

Dangers to System

FREEZING: this system has been designed to be exceptionally resistant to frost damage, but, as you would expect from any system filled with water, allowing it to freeze can cause expensive damage. We suggest you take every possible precaution to protect your investment, perhaps installing a small thermostat heater in your vehicle: a simple greenhouse one will suffice.

MEMBRANE FLUSHING – PLEASE SEE REGULAR FLUSHING ADVICE ON PAGE 10.

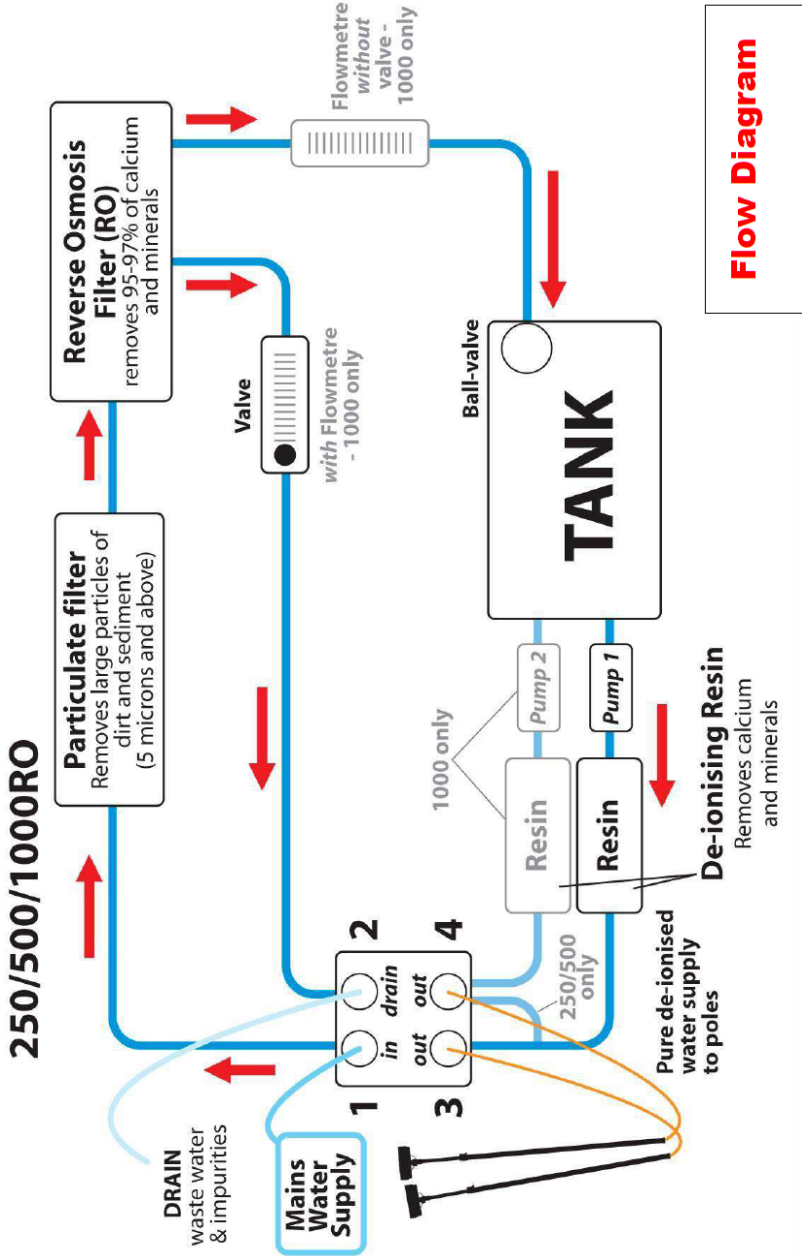
SWITCH PUMPS OFF – The switches are designed to shut down the pumps when no flow is occurring. They are, however, continually drawing current when switched on, even though the pumps are not pumping. Whilst this is only a very small current (6 mAmps) we would, nevertheless, advise you to switch all switches off at the end of each working session. This will prolong the life of the switches and the pumps.

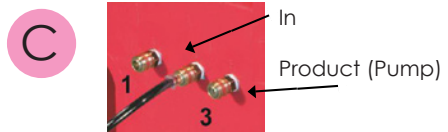
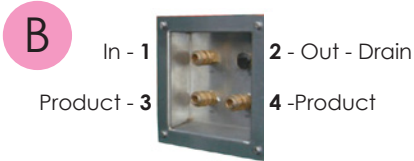
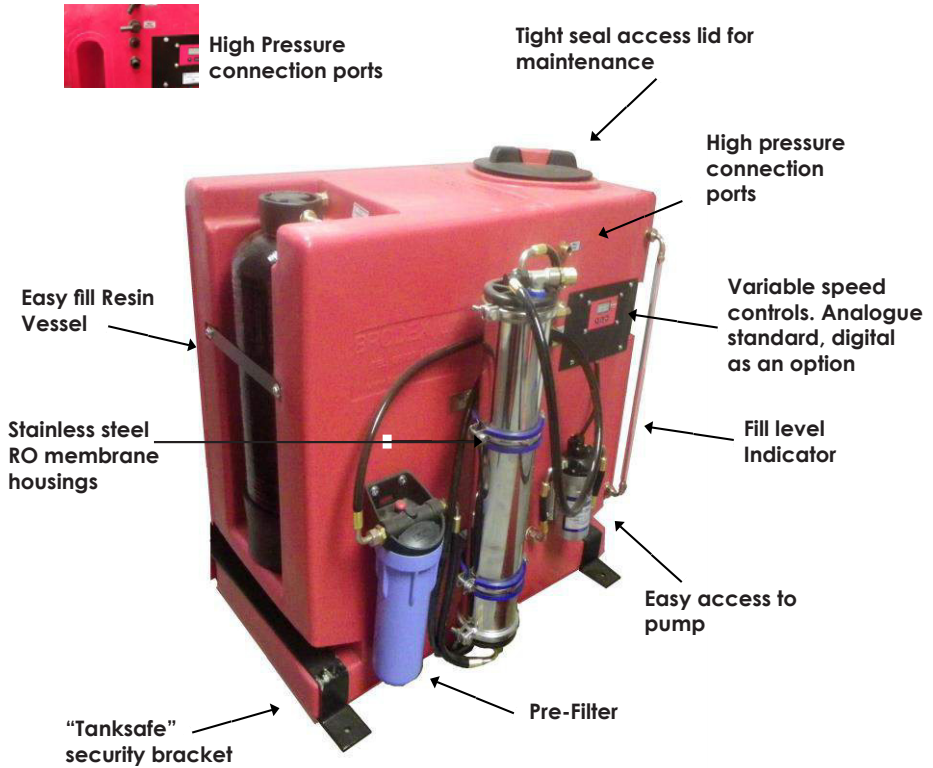
HOW PRESSURE BLOCKS MEMBRANES AND USES EXCESS RESIN – Low mains water pressure of around 30-40psi results in premature scale build-up on the membrane surfaces. This blocks the pores and reduces flow-rate of product, and also dramatically increases the TDS of the product water which consumes a lot more resin, ultimately costing you far more than necessary See page 5 for Booster Pump advice.

BATTERY INFORMATION & ADVICE – The machine is powered by a 12volt battery. As standard we connect this to the van battery under the bonnet or floor compartment of your vehicle. If the van battery is in good condition, the 250 Litres of water can easily be pumped and used without flattening the battery and affecting the start up of your van at the end of the day.

However, the energy removed from the battery by the pumps must be replaced by the engine's alternator whilst you drive around. Normally 2-3 hours of driving a day is adequate for this and no further action is required. But if the pumps are used for 6-8 hours and the van is only driven for 30 minutes to an hour each day, the battery will drain. If this is not a regular occurrence, a trickle charge, from a mains charger during the weekend will be sufficient. But, if this usage is excessive compared to the recharge, then you should opt for an additional battery-pack, which is fitted in the rear of the van and has a splitcharging system connected to the engine.

The machine will only take from this battery and not cause the no-starting issues which are quite common in this industry. Obviously the engine will still need to run to charge the battery pack, and sometimes an overnight top-up will be necessary if your mileage is low. But this is far more convenient for this type of operation.





D

T-piece fitting on top of stainless steel membrane housing. For weekly flushing of membrane only, connect your drain hose to the brass fitting shown here, for at least an hour.



Operating Instructions

Your connection ports are in the form of a manifold: either external, fitted to the outside of your van as a security option (as illustration B, opposite); or internal, on the side of your machine, close to the fixing bracket (as illustration C, opposite).

Either way, they are connected as follows:

1-IN, 2-Drain (RO only), 3-Pump One, 4-Pump Two. (as illustrations B & C, opposite).

1. FILLING

- a. Connect the filling hose provided to the town's mains supply and the other end to **Port 1** on the manifold.
- b. Turn on the mains water supply fully.
- c. Connect the drain hose to **Port 2** on the manifold or - if no external manifold fitted - to the RO drain connector, which is the brass fitting near the bottom of the membrane. A drain rate of approximately 2 litres per minute has been set to drain. This can be checked with a measuring container and watch.
- d. The water is now passing through the pre-filter, the Reverse Osmosis Membrane and the Resin bed. A reading of 1.2-1.6LPM is usual at an incoming pressure of 50psi. 80psi can double this production rate and this is often seen when a Booster Set is used to fill the system.
- e. The system will continue like this until full. A ball valve in the tank will shut off the supply to prevent overflowing. Should this fail, there is an overflow with a tap on the rear of the machine (top right in illustration A, opposite) **this should be opened during filling, but closed for transit.**

2. OPERATION

- a. With the machine full, or part full, switching the machine on - via either of the pumps - will enable the window pump to transfer water through the outlet ports, 3 (pump 1) or 4 (pump 2).
- b. Be sure to connect your hose trolley to the appropriate port, then connect your pole hose accordingly. Each outlet is controlled by a different variable speed pump and so the operator can independently control the water flow to two separate hose trolleys and poles that may be doing different work. The water delivery is controlled entirely by the pumps on the front panel and it is usually beneficial to set the pumps at approximately 1 litre per minute delivery to the brush heads. If you are a distance away from the machine, all of the brass HP fittings have an auto shut-off facility and will shut off the water, which in turn will shut off the pump. As soon as the hoses are reconnected the water delivery will return to its previous settings.
- c. You can fill the machine as you are using it, as the fill and service water circuits are separate.
- d. During use, the resin will become exhausted and will show as elevated TDS readings (Total Dissolved Solids) 5ppm+, which can be read using your TDS Water Purity Meter.



FLUSHING ALERT!

VITAL: REGULAR ADDITIONAL MEMBRANE FLUSHING

We cannot overstate the importance of flushing your reverse osmosis membrane ...at least weekly, preferably every day, by setting the machine up as if to fill, but connecting your drain hose to the brass fitting on the T-piece on top of the membrane housing (see illustration at left) rather than the normal drain port. Then feed the hose out of the vehicle door. This reduces the amount of calcium scale build up and prolongs the life of the membranes.

Also in areas of the country where the water is particularly hard with calcium salts, the life of a membrane will be dramatically increased if the machine is fed with artificially softened water.

Adjusting the pump pressure switch

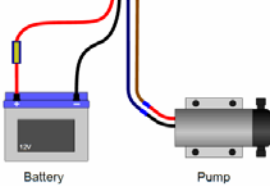
There are two independent pump switches on the tank, the speed of each pump can be adjusted resulting in control of the water flow. Once a water delivery rate is chosen the switch will ensure that this amount is delivered regardless of how high the pole is extended.

Pressure Switch Control instructions

To increase the longevity of your pump due to excess or unnecessary demands, the pump is fitted with a pressure switch (we set ours to approx 80psi). What this means is that when the pump is requested to exceed this setting it switch off the pump via the switch. When this happens you will need to adjust the pressure control settings.

Instructions:

Set Up



- Connect the pump controller.
- Connect your hose and brush to the pump
 - o Turn on the controller by pressing the UP or DOWN button. Keep the button held until the display lights up.
- Press UP until the display shows 30.
- Press and hold UP and ENTER to go into calibration
- Press DOWN to select AutoCal, then ENTER to start
- After several moments the calculated Cal value will be displayed and the controller is ready to use.
- Press ENTER to exit calibration
- The Cal value can be adjusted manually instead of using AutoCal
- To enable or disable the low battery cutoff (when battery is below 10.5V) press DOWN and ENTER then UP or DOWN to select. Press ENTER to save.



Use

- Press UP or DOWN to set a suitable flow of water
- Press ENTER to display the current battery voltage
- Press ENTER again to return to the current flow rate
- To turn off the controller, press and hold ENTER

Operating Warnings

Adjust your flow settings carefully. Repeated false dead-end detection indicates that the Cal value should be increased (less sensitive).

For absolute safety, always wire through the pump pressure switch. (The pressure switch can be bypassed if absolutely necessary – the unit will protect itself under normal conditions).

This is a WATER PUMP controller: it will not work with air in the system. Always prime your system before starting work. If air in the system causes false dead-end detection, increase Cal value (less sensitive).

Do not set the Cal value too high. Setting it higher than necessary places extra strain on both the pump and the controller in a dead end situation. This can result in damage to the pump and your controller.

Routine Maintenance



Taking a TDS Reading

Total Dissolved Solids (TDS) are the total amount of mobile charged ions, including minerals salts or metals dissolved in a given volume of water. It is expressed in parts per million (ppm) or milligrams per litre (mg/L). Our industry tends to work in ppm.

Specific instructions will have been included with your meter, but generally it will be as follows:



Remove the protective cap, turn the meter on and immerse the sensor into the water to be measured - usually no more than 2", as the whole unit may not be waterproof! Lightly stir the meter to dislodge any air bubbles. Wait about 10 seconds, until the display has stabilized, then read your ppm from the LCD screen. Some models may have a "hold" button to enable you remove the unit from the water and still read the display.

As a general guide, mains water in soft water areas will usually be in excess of 50ppm, and in hard water areas in excess of 300ppm,

While Pure Water, suitable for cleaning windows will be 0-2ppm.

And sodium chloride used to calibrate TDS meters is 342ppm.

It is advisable to use the TDS meter to measure the ppm readings at three points:

- incoming mains
- RO water directly from the membrane
- water delivered from the manifold

Match these with your water pressure readings to produce a very accurate health check of your system. This will help you diagnose problems before they arise and cure them when they do occur. It is also a great tool to educate your customers about the power of Pure Water.



Pump Connections

1

The window pumps is located on the side of the machine, next to the controller. To change the pump, use a spanner to release the chrome fittings attached to the brass inlet/outlet.



2

The electrical connections can be easily pulled apart. But, when reconnecting, please ensure that only the round fittings go together, and the flat fittings go together i.e. positive – orange/red and negative – black.



3

The pump has four mounting bolts in the base. These need to be removed with a spanner or 8mm socket set tool. The pump will now lift away from the tank. Replace new pump in the reverse of the above.





3G Intelligent Filter Housings 10" Particle and Carbon Pre Filters

Pre-filtration is essential to protect to Reverse Osmosis membranes from damage caused by suspended and some dissolved solids present in ordinary tap water. The most cost effective way is to use 10" disposable cartridge filters, one to remove any suspended solids that would block the membrane and one to remove any background chlorine which can also damage the membrane over time. Brodex use intelligent pre-filter housings fitted with an indicator gauge. When the gauge needle runs into the red, it is time to change the filters accordingly. If the filters are not changed, filling times will be dramatically reduced and running costs of the machine can rise, which is due to poorer quality RO water product water. If no gauges are fitted, we **recommend replacement every 4-6 months**, but be aware that, if you see brown town's main water in your area, due possibly to local water authority repairs, the filters can block very quickly. However they are cheap to replace and ensure the health of your membrane which is the most expensive single component on your machine. Pre-filter maintenance is an insurance policy on your machine, please remember to log dates in your owners' manual when you change them. Replacement is straightforward, please follow steps below.

1

Ensure any booster pumps are turned off and that the machine is de-pressurised. Put a bucket under the housing to catch any water spillage. Using your housing spanner supplied with your machine, locate onto the moulded ribs of the housing and turn anti-clockwise from housing body.

PLEASE NOTE: Viewed from above the direction is clockwise to loosen. Watch closely for a rubber "O" ring which must be refitted to prevent leaks.



2

The filter housing bowl will detach from the black gauge body. Remove the old 10" filter and discard. Replace with the new filter and discard. Replace with a new filter (1st housing is particle) ensuring that all packaging is removed. Refit bowl hand-tight, ensuring "o" ring is still in correct position. Once both filters are replaced, pressurise the machine and bleed air from the top of each housing by depressing the red toggle button on top of each gauge body. Once clear water bleeds out of the red recess, the filter is now back on line protecting the membranes.





DI Resin Vessel Filling

The resin that needs to be changed regularly is found in this blue resin vessel. With time and use, this resin will become exhausted and will need replenishing with fresh resin. This is available from Brodex in convenient 25 litre sacks. Please follow the instructions carefully to ensure that your machine will produce good quality purified water, as verified by using your water purity testing TDS meter.

SAFETY NOTICE

Ensure that the vessel is de-pressurised before removing any connecting pipe work. This can be achieved by simply connecting an open outlet hose to the machine pure water outlet on the machine or on the associated security manifold. Wear approved eye safety equipment.

- 1** Disconnect the reinforced inlet and outlet pipes from the machine body by sliding back the sleeve on the brass.



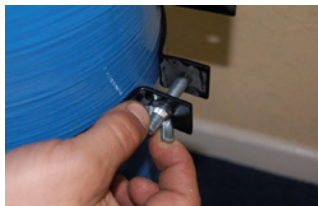
Occasionally an alternative cap is supplied (as right), but in each case the IN and OUT are clearly marked. Simply take care to note which side is which and duplicate this when reconnecting.



- 2** For a van-mount system, unscrew the alan bolts and allow the strap to fall freely to one side.



For a Bulkflow, undo the wing-nut on the circular bracket.



3

Unscrew in an anticlockwise direction the head assembly which will then release from the vessel body. Take care not to lose the black "O" ring which may fall away. Withdraw the cap assembly taking care not to damage the riser tube and end distributor.



4

The riser tube can be slowly lifted out whilst shaking the blue vessel and you must inspect this tube to ensure that the white plastic distributors at the top and bottom are intact and undamaged. Again at this time ensure that the black rubber "O" ring is safe.



5

Taking the riser tube and distributor assembly, gently pull the rise tube out of the vessel head. There are 2 rubber "O" rings located within the female recess that accommodates the riser tube. Ensure on re-assembly that the riser tube is pushed gently but firmly home into the head assembly. This will ensure a water tight seal and prevent "tracking" of hard water to service flow.



6

Cover the end of the tube with some sticky tape to ensure that resin does not pass down the tube whilst filling.



7

Empty the old resin out of the vessel and place into a plastic bag and throw away with domestic waste. The resin is non hazardous to the touch and can be handled safely. Rinse the vessel out with a hose to remove any remaining old resin.



8

Place the taped up riser tube inside the bottle.



9

Once the riser tube is centrally positioned into the empty vessel, start to fill the vessel with mixed bed resin. A cut down funnel is a useful tool to assist filling. Fill the vessel up to the shoulder position, as indicated. Shake the container frequently to ensure a good settlement and compaction of resin. Do not overfill and ensure that the riser tube remains central during the procedure.



10

Apply a smear of petroleum jelly (i.e. Vaseline) to the rubber "O" ring on the vessel head assembly. This will assist in a good watertight seal. If the "O" ring is damaged, replace accordingly.



3 Remove the sticky tape from the top of the riser tube and slide on the head assembly as far as it will go. Now slowly screw on the head in a clockwise direction, ensuring that you do not cross-thread until it is tight to the hand. Make sure that the top of the vessel and the shoulder of the head are sandwiching the rubber "O" ring.



4 Reconnect the bottle to the machine; ensure that the inlet port goes into the left-hand side port on the machine.

Do take care to reconnect your "IN" and "OUT" as noted at disassembly.



Long-term Maintenance



Replacing Reverse Osmosis Membranes - 40 & 20 Inch

1 Remove the 40 inch or 20 inch Membrane Housing from the machine by disconnecting the hoses using a 19mm spanner (on the Bulkflow these are pushfits). Then remove the whole cylinder from its two Cobra clamps by undoing the alan bolts on each. Position housing on bench and pay attention to the end of the housing with a single pipe inlet and a grey plastic plug. Undo the clamp which holds the end cap in place using two 14mm spanners, as shown, right.



2 This clamp takes the form of two C pieces, held together by a pair of bolts. Loosen one, but leave in position, and remove the other entirely, as shown.



3 The black end cap has a recess which the clamp fitted into. Place the tip of a broad blade screwdriver in this recess and, using a hammer, gently tap to ease it out of the steel tube.



4 Once a reasonable gap has opened up, insert the screwdriver in this, and twist to open further, taking care not to damage the rubber "O" ring which is now exposed.



5

Once the cap is removed, the white membrane can be seen. Take care to retain the rubber "O" ring and, if damaged, replace.



6

Grasp the central spigot with a pair of pliers and pull gently, turning membrane as necessary and withdraw the membrane fully from the housing.



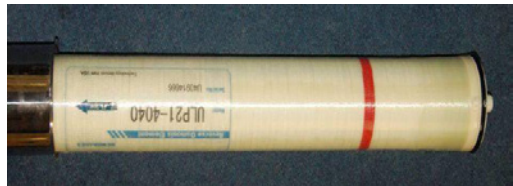
7

Fit new membrane in reverse order of the above. Smear the central spigot on both ends with silicone gel or vaseline.



8

Note: insert new membrane in direction of flow arrow.



9

Ensure "O" ring is in good condition and correctly positioned, as you reinsert black endcap.



- 10** Refit pair of "C" clamps, ensuring outer lip grips the recess in the plastic end cap and the other fits over the stainless steel lip at the end of the membrane housing.



- 11** Tighten bolts equally, so that a similar gap is on either side of the housing.

Replace housing on machine and reconnect hoses.



Changing a Switch

- Open door (unscrew)
- Unplug wires (Brown and Blue number 1 and 2 from the Red and Black wires connected to pump 1 and 2 – wires are numbered according to which pump they connect to, w1 or 2)
- Remove 4 white locating nuts on door of the machine
Remove the switch from behind the door
- Install new switch
- Repeat the process in reverse

1



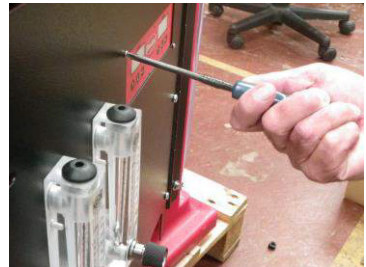
2



3



4



Installation of Machine

This is a basic outline guidance information sheet and does not cover all eventualities. Please ensure a competent engineer is employed to carry out self-installation works. A bulkhead should be fitted to any vehicle carrying machinery & accessories.

The E-Compact range of machines will come complete with an installation kit comprising of the following items;

Mounting Kit

- 2 x Black Steel Locating foot brackets
- Mounting plates, bolts, nuts and washers
- Electrical Wiring loom with inline fuse
- Optional manifold and associated fittings



In Line Fuse Holder with Fuse (40Amp)



- 1** The frame or mounting ring of the machine is bolted to the pallet using the mounting feet you will use for the van installation. Nuts, bolts and backing plates will come with the package.
- 2** The machine needs to be positioned in such a way (i.e. between axles) to distribute the weight correctly to comply with the vehicle permitted payload and axle weights. Once this is determined, look underneath the vehicle and decide what obstructions have presented themselves. We recommend putting at least two of the securing bolts through the vehicle chassis member for the added security required.
- 3** Once the floor pan has been drilled and the mounting feet are all in place, the electrical loom now needs to be passed through the floor and underneath to the front of the vehicle and this needs to be connected to the battery. Various fittings are present on the loom terminals to accommodate the varying battery connections you may have come across.

- 4** Re-check all fastening bolts after machine has been filled and driven for the first time to allow for any settlement of the machines maximum weight. Check all fastening devices on a routine basis and retighten as required.
- 5** If a security manifold has been purchased this must be installed into the side of the van. The E-Compact 250 will arrive with the external water hoses coiled on the outside of the machine. They will be long enough to reach most standard manifold locations. They can then push onto the manifold hose tails and be secured with the jubilee clips provided. Use the galvanised steel hose channelling to direct the hoses in a tidy manor around the van floor. Screw the channelling into the van floor as required.
- 6** If no security manifold was ordered with the machine a small vertical manifold will be installed onto the security ring to one side. The feed and pure water must be taken from this point using the customers supply hose and the systems trolley hoses (supplied with trolleys).



Always ensure that the metal plate is placed on the underneath of the vehicle against the floor plan or chassis member. Position round washer with the bolt on the inside of the van.



Here is an example of how to wire up the vehicle battery. There is a fuse holder on the red - positive. This is how you will receive the wiring loom.



This is how the front of the manifold should look from the outside of the van.



This is an example of how the manifold should look from the inside of the van.

SERVICE LOG

Please fill in and record all service operations as they form part of your parts and labour warranty. All service operations by Brodex are logged and a full service record will help to maintain the resale value of your machine accordingly.

	Resin Change	Filters	Check Mounting Bolts	Check Wiring Condition	Flush Tank & Disinfect
Date		<i>Frequency 6 months</i>	<i>Frequency Annual</i>	<i>Frequency Annual</i>	<i>Frequency Annual</i>

***Whilst every effort is made to ensure the accuracy of this document at time of going to print, we cannot be held responsible for errors and omissions.**

We have a policy of continual development and improvement, so reserve the right to change specifications without notice.

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