



Operators Manual

Warnings

Throughout this manual these symbols and notes are used to indicate the following:



Danger

Imminent Danger that is likely to cause serious injury or loss of life



Warning

Safety situations that may cause serious injury or loss of life



Caution

Safety situations that may cause problems or damage to the equipment.



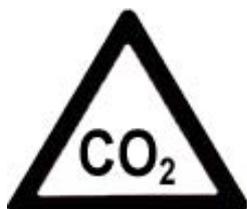
Note

To draw attention to procedures which are essential to observe for correct operation



Electrical Hazard

Electrical equipment that is likely to cause serious injury or loss of life



CO2 Hazard

CO2 Hazard that is likely to cause serious injury or loss of life



Noise Levels

The noise level produced from the equipment is low level

The Reach & Wash™ System has been crash-tested at the Thatcham to the *Federal Motor Vehicle Safety Standard 208*. The equipment must only be installed into motor vehicles by Ionic Systems approved installers. It is recommended that annual safety inspections are carried out by an approved Ionic Systems Limited agent.

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About Ionic Systems

In 1997 Ionic Systems Ltd introduced the very first vehicle mounted waterfed pole system, known as the Reach & Wash™ system. Since then Ionic Systems has continued to lead the field with its proven designs. Ionic's customers can be reassured by the company's commitment to quality and testing of its products.

Window Cleaning has become a safety driven industry. Ionic Systems focus is to provide up to the minute products that are proven to be safe.

Ionic Systems Ltd manufactures the Reach & Wash™ ionic window cleaning system as well as a wide range of other ionic cleaning products. We specialise in making the tools that do the job in the safest, most effective, efficient and economical way. We offer the largest range of mobile water treatment systems and Waterfed Poles in the World and are sure you'll find our great range of ionic cleaning products to be the solutions that prove to be immediate benefit to your business.



Zero PPM and PPB System

Welcome

Congratulations you are the proud owner of the Worlds most advanced yet user-friendly water fed pole system for window and solar panel cleaning.

When it comes to everyday electronic products that we are all used too, most people manage to get by without ever reading the 'Instructions' past the first few lines. But if you have read this far then you are strongly advised to read on.

Generally, there are those who read instructions and follow simple maintenance procedures, and those who do not. Those who take the time to follow these instructions usually enjoy many years of service and avoid unexpected repair bills. For the other group the opposite is true. The machine you have purchased is a water filtration system with multiple filters that work together as a team to produce ultra pure water from any suitable potable water supply anywhere in the World. Each and every Reach & Wash™ machine is thoroughly tested before it leaves our manufacturing facility. Unlike electricity however, water differs from place to place. Certainly water is water however, its delivery pressure, flow and quality changes sometimes significantly within short distances and even at different times of the day. Furthermore water density changes with the seasons, water is at its most dense at 4 degrees. In winter the performance of a filter system will be different to the summer.

Ionic Systems is not responsible for your local water supply; we have no control over its quality, delivery pressure or flow rate. Further we have no control over how you use the machine or whether it is operated, serviced or maintained correctly. The following pages provide guidance as well as instruction. There is a solution (usually simple) to each and every problem that you may encounter and we have done our best to advise you well in the pages that follow.

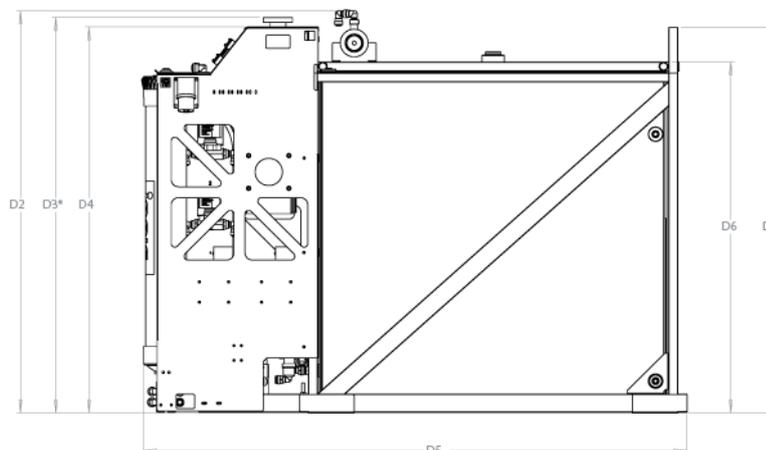
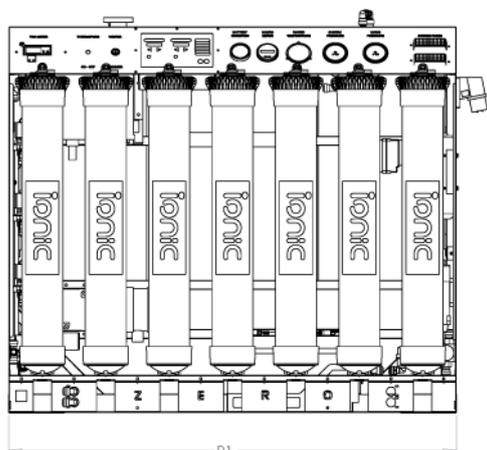
If you have read this far then you are encouraged to read to the end and follow the guidance and simple maintenance procedures. If you will not be the routine operator of the machine and you have purchased it for your staff to operate then you are encouraged to put 'standard operating procedures' in place for your staff to follow.

The automated filtration system of the Zero™ PPB Reach & Wash™ System produces pure water that is 1,000 times purer than machines that produce water of 0ppm quality. Although the Zero™ PPB Reach & Wash™ System has 1,000 times more cleaning power than conventional water fed pole cleaning systems, it is still important to follow the correct cleaning procedure set out on pages 46-51.

The machines ability to produce 0ppb water is wholly dependent on the timely replacement of filters. Failure to replace filters as necessary will reduce the machines ability to produce 0ppb water leading to a poor window cleaning finish, customer complaints, lost profits and higher maintenance costs. Information about filter replacement can be found on page 32.

Zero Weights & Dimensions

Dimensions



Zero System Dimensions Table							
Tank Size (Litres)	D1	D2	D3*	D4	D5	D6	D7
1000	1224	1108	1089	1064	1486	967	1062
900	-	1011	-	-	-	867	-
800	-	926	-	-	-	782	-
700	-	956	-	-	1331	812	912
600	-	841	-	-	-	697	-
500	-	731	-	-	-	587	-
400	1129	871	-	-	1096	727	822
300	-	721	-	-	-	577	-

* = Only relevant to systems fitted with Thermopure

Zero Weights & Dimensions

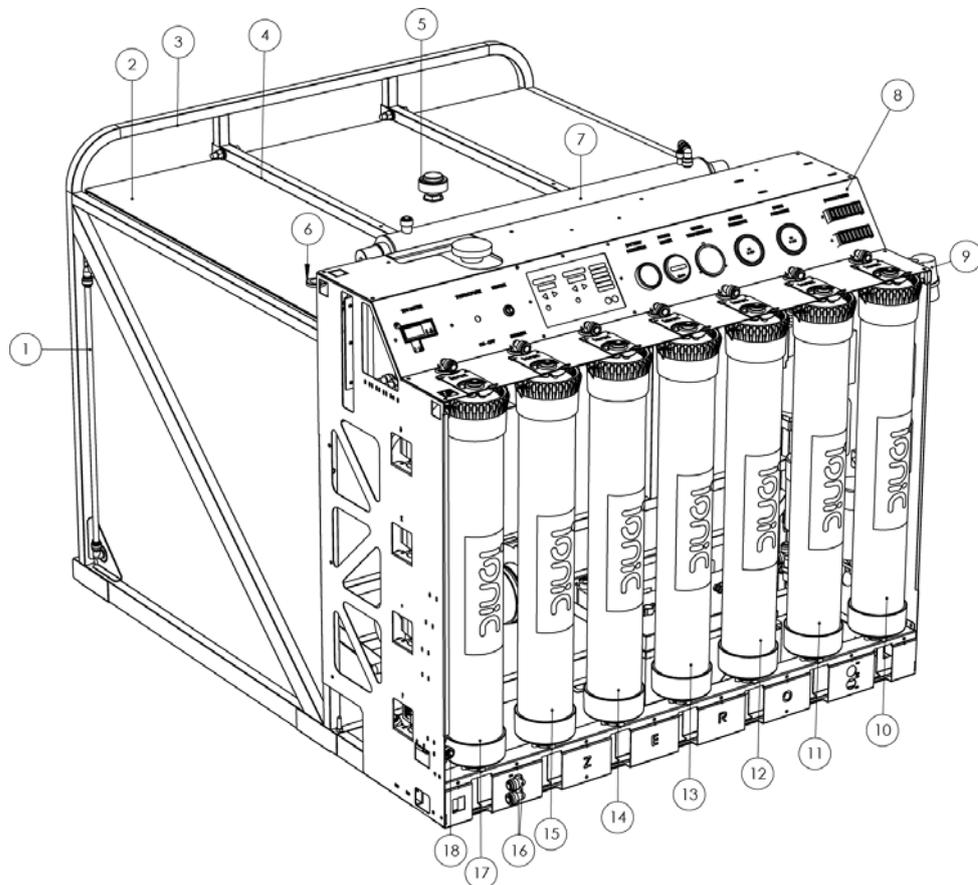
Weights

Zero™	Weight (Dry)	Weight (Wet)
1000 Ltr	205 – 222kg	1225 – 1242 kg
900 Ltr	200 – 212kg	1112 – 1129 kg
800 Ltr	195 – 212kg	1015 – 1032 kg
700 Ltr	190 – 207kg	910 – 927 kg
600 Ltr	185 – 202kg	810 – 827 kg
500 Ltr	180 – 197kg	705 722 kg
400 Ltr	169 – 186kg	594 – 511kg
300 Ltr	164 – 190kg	489 – 506 kg

Note: Weights are given as a guide only. Actual weight may vary

Machine Component Identification

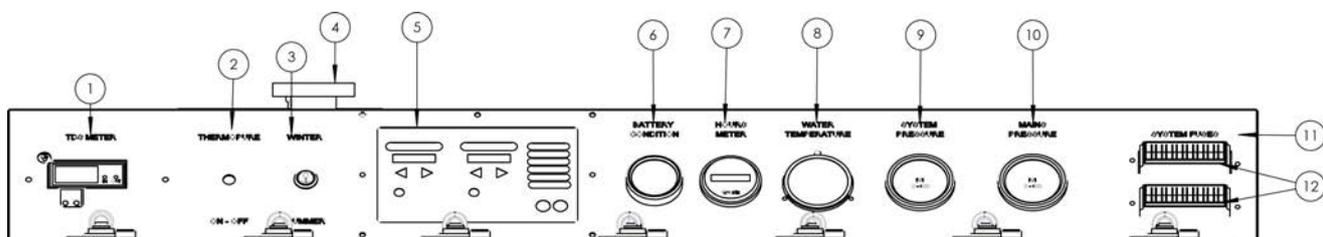
Component Identification



Item No	Description
1	Tank Sight Gauge
2	Holding Tank
3	Stainless Steel Frame
4	Brace Bar
5	Tank Breather
6	Holding Tank Float Switch
7	UV Filter
8	Zero Control Panel
9	3 Pin UK Mains Plug
10	Ionic Filter Housing & NGDI Cartridge
11	Ionic Filter Housing & DI Cartridge
12	Ionic Filter Housing & RO Cartridge
13	Ionic Filter Housing & RO Cartridge
14	Ionic Filter Housing & Sediment Filter
15	Ionic Filter Housing & Carbon Filter
16	Pure Water Outlet (1 per delivery pump)
17	Ionic Filter Housing & Sediment Filter
18	Reject Water Outlet

Machine Component Identification

Control Panel



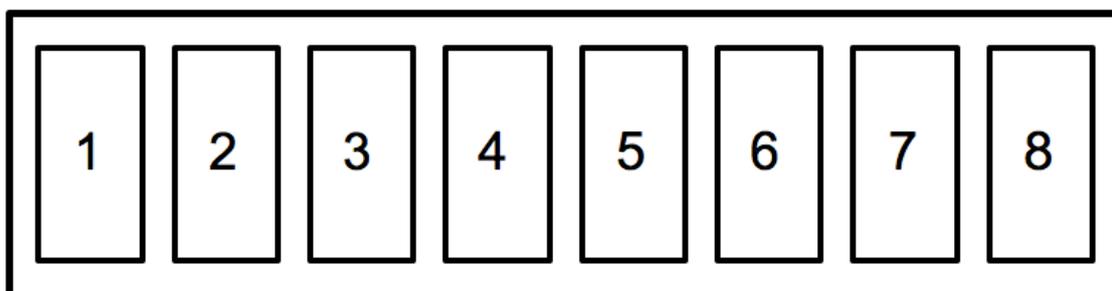
Item No	Description
1	TDS Meter
2	Thermopure Heater Switch
3	Winter - Summer Switch
4	Header Tank Filler Cap
5	Control Module
6	Volt Meter
7	Hours Meter
8	Water Temperature Gauge
9	System Pressure Gauge
10	Mains Pressure Gauge
11	Battery Charger (Mounted on underside of Control Panel)
12	System Fuse Boxes

Machine Component Identification

System Fuse Box

The fuse-box holds all the fuses for the 12v side of the system. Depending upon the specification, up to five fuses may be installed. The position, application and value are depicted in the table below.

Fuse Box Diagram

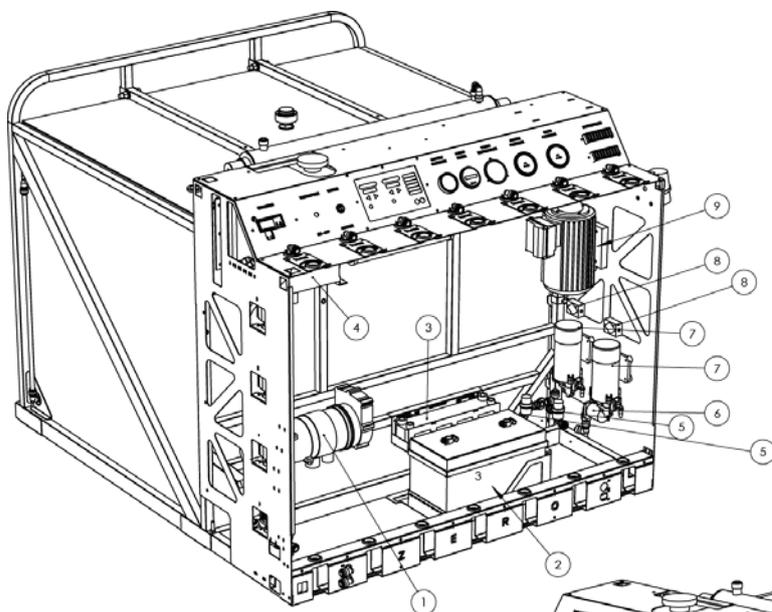


Function	Amps	Position
Supply	15 A	1
Pump 1	15 A	2
Pump 2 (Hot pump on ThermoPure™ system)	15 A	3
Thermopure™ Heating Unit	20 A	4
Thermopure™ Switch	5 A	5

(Fuse box positions 6-8 are not used)

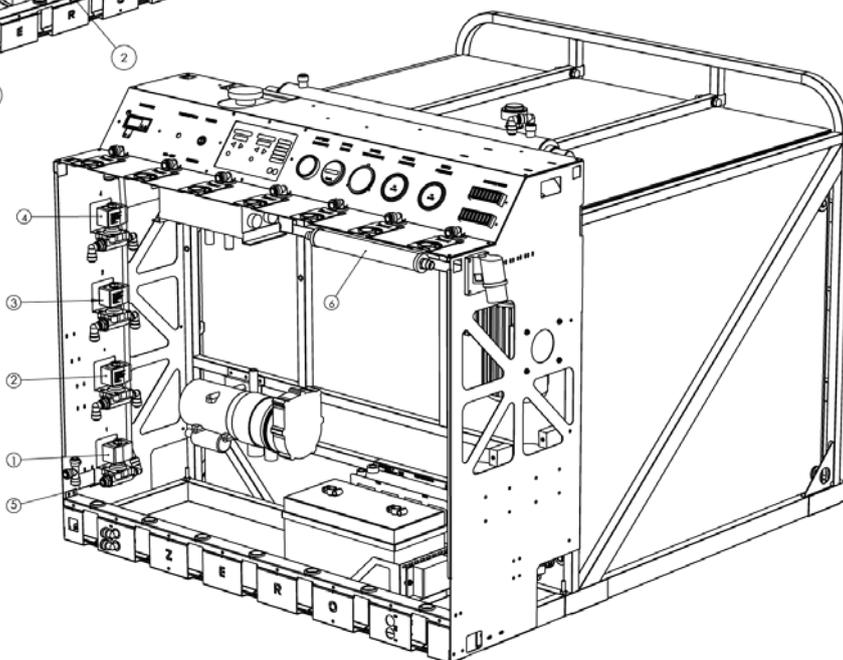
Machine Component Identification

Zero™ System
(Filters Removed)



Item No	Description
1	Thermopro 90 Diesel Burner
2	12V Leisure Battery
3	Heat Exchanger
4	Header Tank
5	12V Delivery Pump Strainer
6	12V Recirculation Pump
7	12V 100 psi Delivery Pump
8	12V Delivery Pump Remote Module
9	240V Boosted Filling Pump

Item No	Description
1	12v Solenoid - No 1
2	12v Solenoid - No 3
3	12v Solenoid - No 2
4	12v Solenoid - No 4
5	Untreated water Inlet
6	UV Ballast Enclosure



Machine Component Identification

8) Split Charger

Automatically charges machine's battery when vehicle engine is running.



The split charger should not be relied upon as the sole source of charging for the vehicle's battery. Regular charging using the mains-powered charger is recommended.



When the vehicle's engine is running, a green LED illuminates to indicate that charging is taking place.

9) Recirculation Pump

12v pump re-circulates pure water from tank through NGDI filter. (OPP machines only).

10) Delivery Pumps

12v Pure Water delivery pumps

11) A & B

Incoming and outgoing water connections. The system has optional water connections for both left/right hand drive vehicles.

12) Battery

The machine's 12volt power source

13) Fast Fill Pump (Optional upgrade)

A 240v pump to boost water pressure to increase pure water production (reduces holding tank filling time).

14) Thermopure™ Burner (Thermopure™ Systems Only)

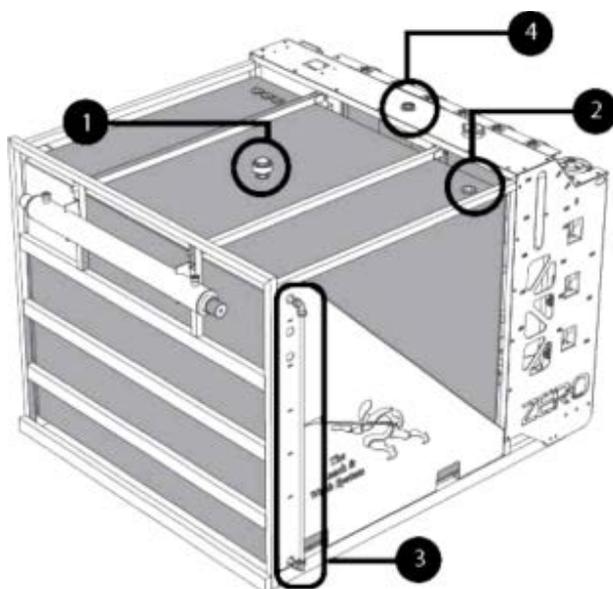
The Thermopure™ burner situated behind the carbon filter.



When the Thermopure™ is operating, the burner components become very hot and injury could occur if touched. (Do not operate the Thermopure™ with the filters removed)

Machine Component Identification

Zero™ System Holding Tank



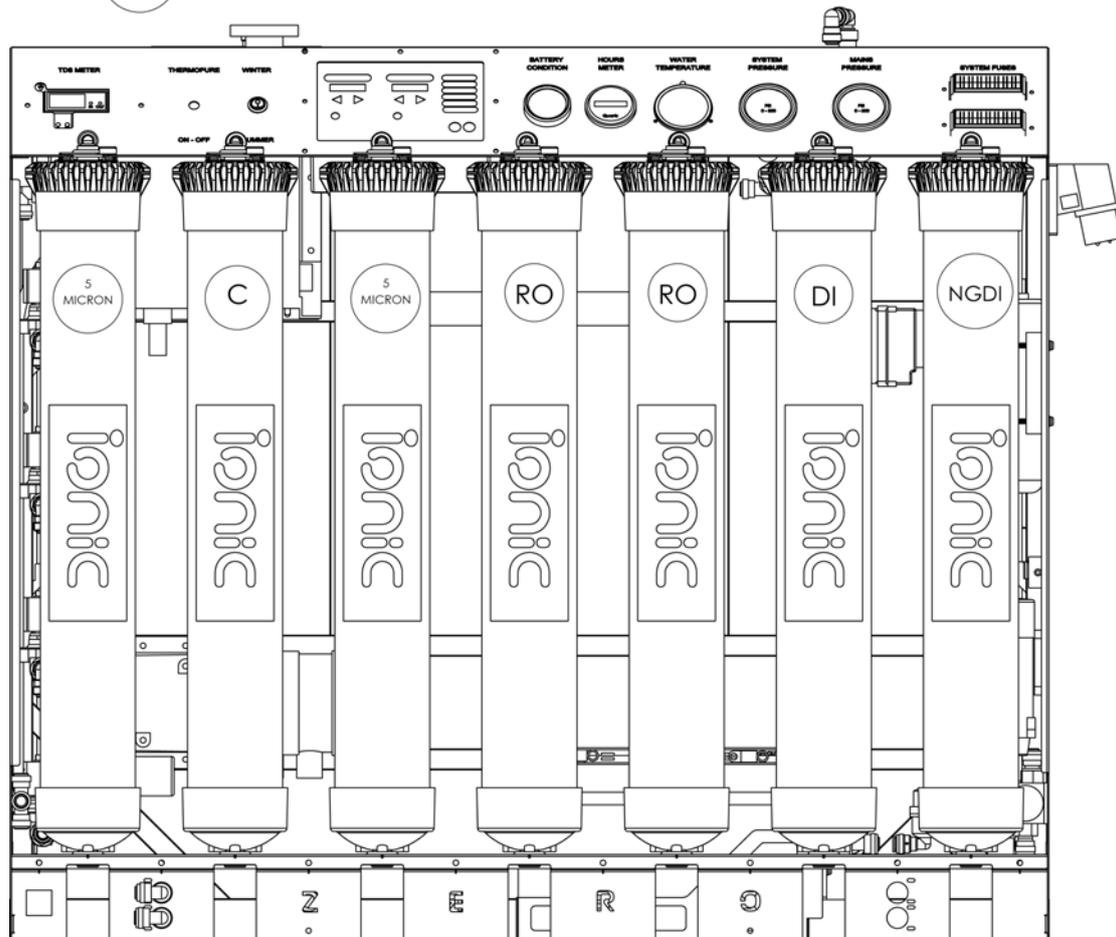
- 1) **Tank Breather**
Allows air in and out of the tank as it empties and fills (Do not cover or block)
- 2) **Float Switch**
The float switch stops ultrapure water production when the tank is full.
- 3) **Tank Level Sight Gauge**
Coloured float indicates ultrapure water level in tank
- 4) **Tank Spirit Bubble**
To indicate if machine is level for filling.

Machine Component Identification

Filter Identification

Zero™ PPB System

UV (Situating on reverse of Control Panel, Not Visible in diagram)



Machine Component Identification

Filter Identification



Carbon

The Carbon filter removes chlorine, chloramines, sediment and volatile organic compounds (VOCs) from water. Protects the RO membrane.



5 Micron (Sediment Filter)

The sediment filter removes all particulates larger than 0.00005mm. Protects the RO membrane



Softener

Exchanges Calcium and Magnesium ions for Sodium ions. Protects the RO membrane



RO Filter (Reverse Osmosis)

A semi-permeable membrane that filters out 95-98% of dissolved solids



De-ionisation (PPM)

Mixed-bed ion-exchange resin filter that purifies water between 0.9 – 0.5ppm



De-ionisation (PPB Machines only)

Mixed-bed ion-exchange resin filter that purifies water between 0.055 – 0.0371ppm



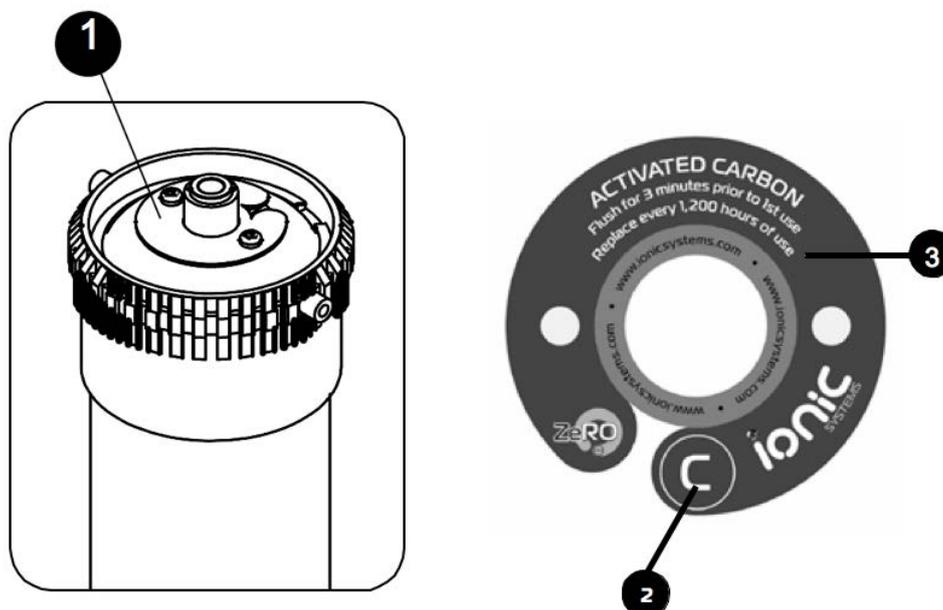
Ultra Violet Sterilisation

Germicidal water treatment to eliminate water-borne hazards such as the Legionella bacterium.

Machine Component Identification

Filter ID Discs

The ID Discs can be found on the top of each filter housing (1)
 ID discs provide information about the filter contained within the housing (2)
 It also provides information about the maximum estimated filter life (3)



Estimated Filter Life

Information about filter life and subsequent replacement frequencies is provided for guidance purposes only. Actual filter life is dependent on local water conditions, usage and care in routine operation and maintenance. Information printed on filter ID discs and in the table below provides estimates about likely filter replacement frequencies.

Filter Type	Estimated Life	Order No.
Carbon (C)	Replace every 4 months.	IF CARBON
5 Micron	Replace every 4 months	IF SED
Softener (CA)	Replace after 3 years	IF SOFT
Reverse Osmosis (RO)	When water quality or production speed is reduced by more than 10%	IF RO
PPM	When water quality rises above 1-2 ppm	IF DI
PPB	At Every 4th PPM Filter replacement	IF NGDI
UV	Replace Lamp every 12 months	

NB: Snap Rings and 'O' Rings must be replaced every twelve months.

General Guidance

WATER CONNECTION

This section deals with the procedure and recommendations for connecting a suitable water supply to the Zero™.

Connection

Follow the guidance on this page and connect a suitable water supply to the connection marked 'Water Connection' and open supply fully.

Suitable Water Supply

A suitable water supply means water drawn from the mains potable water supply with a minimum delivery pressure of 40psi for machines with boosted fill and a minimum delivery pressure of 65psi for machines without the boosted fill option.

As well as water pressure, the flow rate of the water supply is an equally important factor. The chosen water supply needs to flow a sufficient volume of water to satisfy the machines needs. To ascertain the flow rate simply count the number of litres on open flow that is produced in 1 minute from the chosen water supply (litres per min). For example, a machine that is capable of producing 5 litres of pure water per minute requires a minimum flow of 10 litres per minute from the mains water supply. This is because up to 5 litres per minute is rejected by the machine carrying impurities to drain.

A machine capable of producing more than 5 litres of pure water per minute shall require a flow rate of at least double its design capability. Where mains water pressure/flow is low the use of a break tank will avoid cavitation in the water supply. The size of the break tank will depend upon the volume of pure water required and the speed at which it can be refilled. Sufficient pressure and flow are both relevant for the machine to perform to its design specification.

Unsuitable Water Supply

In addition to low pressure and low flow, unsuitable water supplies include lakes, reservoirs, and rivers, bore holes, and seawater.

Recommendations

- 1) In the case of static machines water connection should be by means of a permanent hard piped connection.
- 2) In the case of mobile/vehicle mounted/portable machines a flexible hosepipe connection will be suitable.
- 3) In all cases the machine should be sited as close to the water supply so that the connecting hose can be kept as short as possible. Hoses of 13mm or 1/2inch are suitable however hoses of 22mm or 3/4 inch are more desirable especially when the machine is sited further away from the water supply.
- 4) Care should be taken to ensure that accidental disconnection from the water supply does not occur. Beware of vehicles stopping on hoses, poor connections, and disconnection by third parties, flattening of hoses during hot weather, kinking of hoses. Take precautions such as placing hoses in the shade, protecting hoses from compression by vehicles, placing "do not disconnect" signs at mains water connections.
- 5) Avoid dirt ingress and flush hoses prior to connection.
- 6) Replace damaged or leaking hoses and connections.

General Guidance

EFFECTS OF LOW PRESSURE AND TEMPERATURE ON PURE WATER PRODUCTION

Each stage of filtration serves a particular function. It is good to understand that the first four stages of filtration (UVO₃, Carbon, 5 Micron and Softener) are in place to protect the RO membrane. The RO membrane is in turn, is in place to reduce the workload of the PPM filter, and the PPM filter is in place to reduce the workload of the PPB filter.



The RO Membrane is the filter where there is a restrictive back-pressure. A minimum mains feed pressure of 4.2 bars or 60 PSI is required in order for the system to function correctly. Should the feed pressure drop below this limit, damage to the RO membrane may occur. In low-pressure areas a fast fill/boost pump option is strongly recommended. Low pressure feed will result in premature failure of the RO. This will be due to membrane blockage, as the reject water will fail to flow rejected dissolved solids to drain.

Temperature has a major effect on pure water production. Industry standards for pure water production through an RO membrane are referenced at 25°C the following table gives guidance to temperature correction figures

(When the water temperature drops to 4°C the correction factor is 0.48 so pure water production is nearly halved)

Temp	Correction Factor multiply by
4	0.48
10	0.60
16	0.73
21	0.88
25	1.00
27	1.06
32	1.26

The lower the temperature of the feed water, the slower pure water production will be.

Therefore, the three most important factors to consider for RO water production are;

1. Feed Temperature
2. Feed Pressure
3. Feed TDS

Each machine is tested at manufacture and pure water production values are recorded as part of a comprehensive testing regime.

As filter life is used up over time, pure water production speed and quality degenerates.

Degeneration is determined by the factors listed above.

Machine performance can only be maintained by filter replacement dictated by local water conditions.

General Guidance

ELECTRICAL CONNECTION

This section deals with the procedure and recommendations for connecting a suitable electricity supply to Zero™ machines fitted with boosted fill pumps.

Connection

Follow the guidance on this page and connect an electricity supply to the machine and switch on.

Suitable Electric Supply

A suitable electric supply means connection to either the mains power supply, or a generator of sufficient capacity. Machines are supplied in both 220-240v and 110v formats dependent on territory or type of use.

Caution

Ensure that the machine is only connected to the correct voltage power supply.

Recommendations

- 1) In the case of static machines electrical connection should be by means of a permanent hard wired fused connection.
- 2) In the case of mobile/vehicle mounted/portable machines a flexible cable connection will be suitable. It is highly recommended that an RCD is used at the end of the cable connected to the mains electricity supply.
- 3) In all cases the machine should be sited as close to the electric supply so that the connecting cable can be kept as short as possible. Cables stowed on reels should be fully unwound from reel when connected to the machine.
- 4) Care should be taken to ensure that accidental disconnection from the electric supply does not occur. Beware of vehicles stopping on cables, poor connections, and disconnection by third parties. Take precautions such as placing cables in such a way as to avoid trip hazards, protect cable from compression by vehicles, place "do not disconnect" signs at mains connections.
- 5) Replace damaged cables and connections.
- 6) Always use an RCD

General Guidance

STATIC SYSTEMS

For the purpose of this guidance, any water treatment system used to produce purified water within any building, whether permanently or temporarily is considered to be a 'Static' system.

Not to be understated is the risk of serious damage caused by a water leak from any water treatment machine operated within the confines of a building. Any person procuring, installing, operating or having responsibility for such a machine should expect that it may leak at some time in its life. Any person with responsibility for any building and its contents in which a 'Static' system is installed should undertake a 'Risk Assessment' and satisfy themselves that all reasonable precautions have been taken to protect against the inevitability of a water leak. Precautions could include but are not limited to;

- 1) The equipment only be installed by qualified plumbers and electricians.
- 2) The equipment should be installed on a level surface able to support the total load, ideally positioned on the ground floor level, or otherwise within a suitably designed 'plant room'.
- 3) Hard pipe water connections to the mains water supply and drainage system are made.
- 4) A water isolator be fitted to the hard piped water supply.
- 5) Isolating the water supply when not in use.
- 6) Installing the water treatment machine, holding tanks, transfer pumps and pipe work within the confines of a suitably designed and installed bunded area with adequate drainage capability.
- 7) Offices, storerooms and other vulnerable areas are protected from water ingress.
- 8) Vulnerable goods and equipment are stored off the ground when kept on the same floor space.
- 9) Vulnerable electrics are suitably protected.

Likely Causes of Water Leaks

For guidance purposes the following conditions are likely to cause water leakage. These include but are not limited to;

- 1) Poor installation.
- 2) Frost Damage.
- 3) Accidental damage.
- 4) Malicious damage.
- 5) Blocked breathers.
- 6) Blocked drainage.
- 7) Blocked overflows
- 8) Failed float switches
- 9) Component failure.
- 10) Lack of servicing/improper maintenance.
- 11) Modification.
- 12) Wear and tear.
- 13) Unsupervised first use.

Ionic Systems Ltd is a manufacturer and supplier of water treatment machines. If required by the customer following completion of an installation by qualified plumbers and electricians, Ionic Systems Ltd or its agents may commission a 'Static' machine but its responsibility shall only be to ensure the correct working of the machine and the provision of training to the operator. Ionic Systems Ltd will not be responsible in anyway for damage of any kind, howsoever caused by the use of its machines within any building. The use of any water treatment machine manufactured by Ionic Systems Ltd within any building shall be at the discretion and sole risk of the building occupier.

General Guidance

CAUTION LABELS

'CAUTION' labels are fitted to each machine to draw the operator's attention to important information about the safe use and operation of the machine.

"CAUTION" labels fitted to Filter Housings detail the Operating Specifications relating to the Maximum Pressure and Maximum & Minimum Temperature as well as specific instructions about safe use.

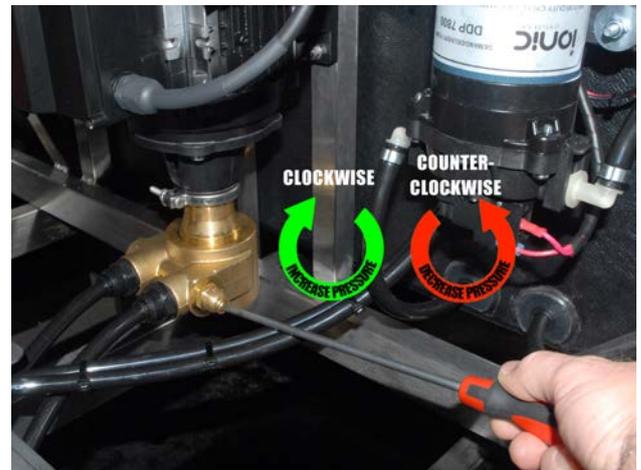
Local conditions may mean that the pump pressure has to be adjusted from time to time to ensure that the Maximum Pressure is never exceeded.



Locate the pressure adjustment screw on the side of the Brass Pump Body, using a screwdriver turn the screw clockwise to increase the pressure and anti-clockwise to decrease the pressure. Refer to the machine's own pressure gauge when adjusting the pressure adjustment screw. Please refer to diagram.

IT IS THE OPERATORS RESPONSIBILITY TO ENSURE CORRECT ADJUSTMENT TO ENSURE THAT THE MAXIMUM PRESSURE RELATIVE TO TEMPERATURE IS NEVER EXCEEDED.

DO NOT TO EXCEED THE MAXIMUM PRESSURE & TEMPERATURE RANGES.



WARNING LABELS

Like many other cleaning machines, Ionic Systems machines with mains powered pumps have no 'Run Dry' protection. In the field it is possible to operate Ionic's range of machines in ways that would not be possible if 'Run Dry' protection was fitted.



For example Solar Panel sites seldom benefit from any mains water supply, instead operators work from water storage tanks that provide a good flow of water to machines but with very low pressure. In such circumstances 'Run Dry' devices may prevent the machine from working.

'WARNING' labels are fitted to all machines with mains powered pumps warning that "DAMAGE WILL OCCUR IF PUMP IS RUN DRY". It is the operator's responsibility to ensure that a constant and suitable water supply is maintained at all times when the machine is in operation. In practice 'DRY' means bone dry. If a pump has been running correctly for some time and is 'WET' then if the water supply is temporarily interrupted then it is unlikely that damage will occur. PUMPS THAT HAVE BEEN 'RUN DRY' FOR LONG ENOUGH FOR DAMAGE TO HAVE OCCURRED, ARE NOT COVERED BY THE WARRANTY.

General Guidance

ZERO™ WATER SOFTENING

Introduction

Water softening is essential to ensure superior performance of any water treatment system that utilizes RO and DI filtration. Water softeners work by exchanging calcium carbonate (hardness ions) for sodium (salt) within the filter.

A water softener performs two beneficial functions. Firstly by locking calcium carbonate (hardness ions) away within the filter harmful calcium deposits are prevented from forming upon the surface of the thin film RO membrane. With no softener in place RO membranes quickly foul leading to expensive replacement.

When exchanging calcium for sodium (salt) the second benefit is realised. Salt crystals form quickly upon other impurities in water, by swelling their physical size, they are more easily removed by the RO filter leading to improved RO performance as well as longevity. Water softeners require regular regeneration with salt. The backwash process works in reverse by exchanging sodium (salt) for calcium.

To select the capacity of the pre-machine water softener recommended for your geographical area refer to the table below or visit www.ionicsystems.com/hardwatermaps or consult your Ionic Systems dealer.

Water softener Capacity

Hardness CaCO ₃ (ppm)	Litres before backwash*		
	Single	Double	Triple
50	4200	8400	12600
100	2100	4200	6300
200	1050	2100	3150
300	700	1400	2100
400	525	1050	1575
500	420	840	1260

*Refers to litres of product water based on 70% product 30% reject

Machine Operation

Zero™ Operation (Vehicle Mounted Machines)

Pure Water Production

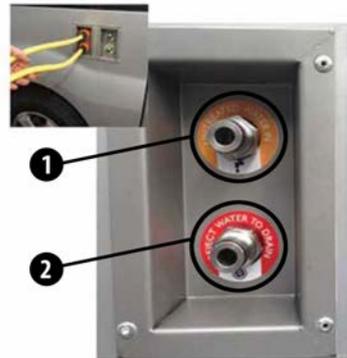
After suitable water and electric connections have been made, pure water production, filter flushing and regeneration are all automatic functions of the machine. The following step-by-step guide and explanation of the sequence of events are all that the operator needs to know about the operation of the machine. For any servicing or repairs other than routine filter replacement please refer to Ionic Systems Ltd or an approved agent of Ionic Systems Ltd.

Step 1

Connect a suitable water supply to the mains water 'IN' connection and ensure that the water supply is fully open, please refer to page 25.

Step 2

Connect a suitable hose to the 'Reject' water connection to run reject water to a suitable drain.



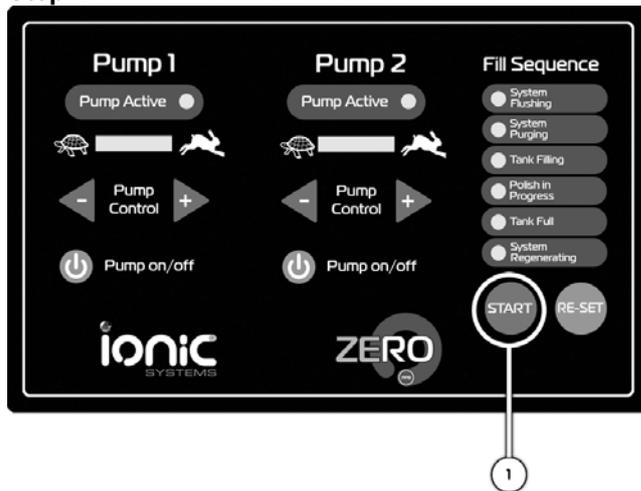
1: Mains Water In

2: Reject Water Out

Step 3

Connect a suitable mains electric supply, please refer to page 18.

Step 4

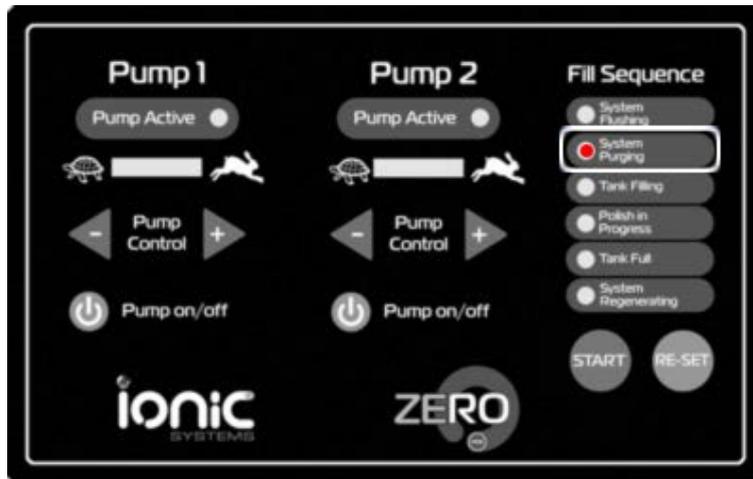


Only after steps 1 through 4 have been completed, press the green 'START' button on the control panel.

Machine Operation

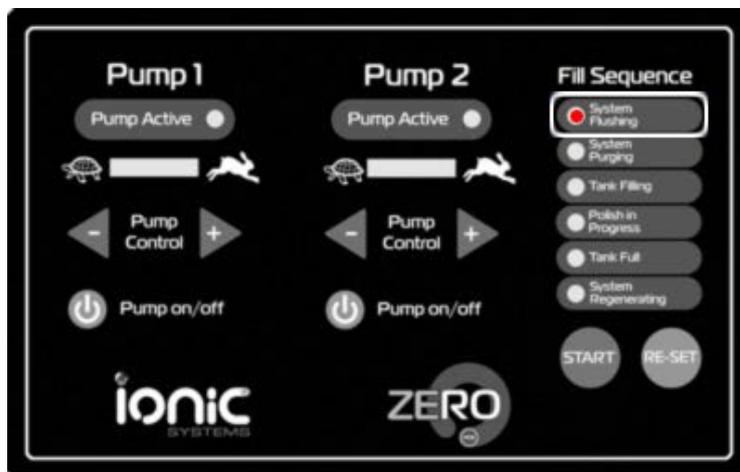
Explanation of Events

Stage 1



On pressing the green 'START' button the 'SYSTEM PURGING' light will illuminate to indicate that standing water in the UV/03, Carbon Filter and both Sediment Filters is being replaced with fresh water. Purging of these filters prepares them for use. This process takes four minutes to complete. At this stage the machine is in open flow and rejected water will be observed flowing to drain.

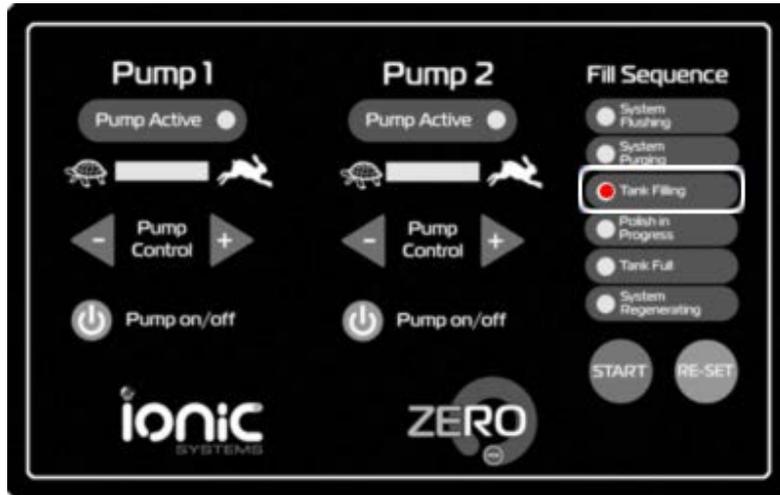
Stage 2



After four minutes the 'SYSTEM PURGING' light will extinguish and the 'SYSTEM FLUSHING' light illuminates. If fitted, the mains electric boost pump will start and system pressure will increase on the gauge. During this stage both RO filters are being flushed, for a period of two minutes pure water production is directed to drain. This two minute RO flushing cycle is repeated once every hour until the tank is full.

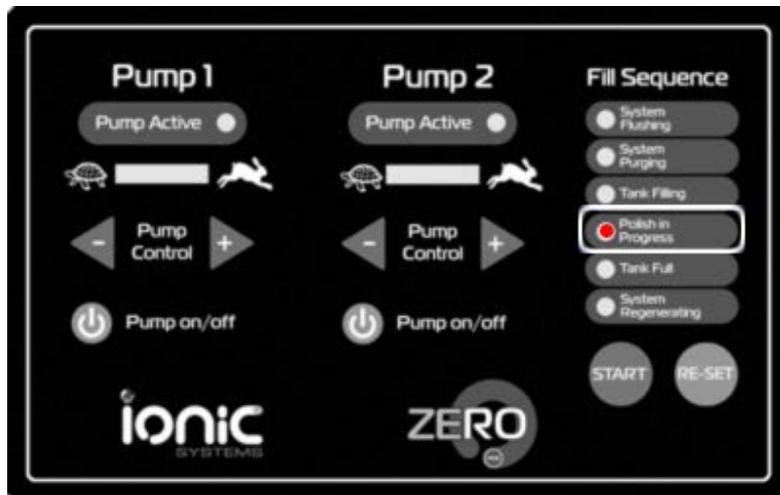
Machine Operation

Stage 3



After two minutes the 'SYSTEM FLUSHING' light extinguishes and the 'TANK FILLING' light illuminates. During this stage pure water enters the holding tank via the DI filter and will continue to do so until the tank is filled with pure water. During this stage the digital TDS monitor can be used to measure the quality of water produced by the RO filter as well as the water quality following the DI filter. When the holding tank is full a float switch triggers the end of pure water production, The mains water supply will be shut off at the machine, the boost pump will stop and the UV/03 lamp will extinguish.

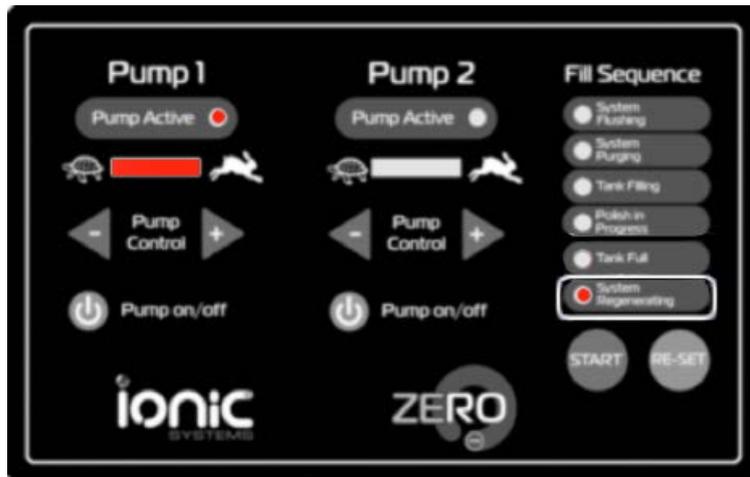
Stage 4



One hour after the green 'START' button has been pressed the 'SYSTEM POLISHING' light will illuminate. For a period of seven hours a small pump draws pure water from the holding tank passing it repeatedly through the 'NGDI' filter back to the holding tank. This stage ensures that 0PPB is achieved (subject to filters being replaced at the correct intervals in accordance with the instructions, please refer to page 32).

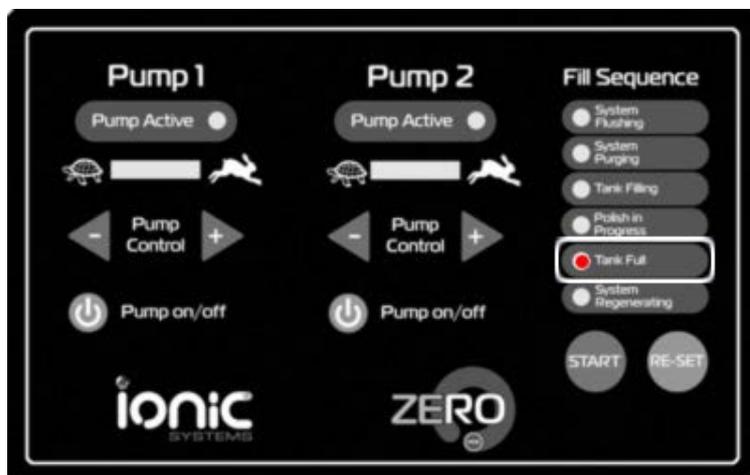
Machine Operation

Step 5



When the tank is full the water supply to the filters will be stopped and the mains powered boost pump (if fitted) will stop. The 'SYSTEM REGENERATING' light will illuminate and Pump 1 will operate for a period of eight minutes. During regeneration purified water is pumped from the tank into both RO filter housings. The purpose is to replace standing tap water with water of low TDS so that dissolved solids in the standing water do not foul the RO membrane between fills and also to dissolve solids that may have lodged on the RO membrane during the filling process. Regenerating the RO's in this way prolongs day one performance and extends RO membrane life.

Step 6



At the end of the process the "SYSTEM POLISHING" light will be extinguished. The only light remaining at the end of the entire process will be the 'TANK FULL' light. Pressing the red 'RESET' button at any stage will stop the filling operation. Pressing the red 'RESET' button leaves the machine ready for the machines next pure water production cycle.

Step 6

Turn off the electricity supply before disconnecting the cable from the machine. Turn off the water supply before disconnecting the water hose from the machine. Once both electricity and water have been disconnected, depressurize the filter system by pressing the Green 'START' button. Thirty seconds later press the Red 'RESET' button.

Machine Operation

Thermo-pure™ Operation (Hot Water Systems)

The Thermo-pure™ system utilises a diesel burner that heats pure water from the tank in order to improve the cleaning results for many applications. The system can heat the water up to 80°C (dependent upon ambient temperature). Heated pure water gives fantastic cleaning results, powering through first cleans effortlessly and keeping you working even when the temperature drops.



The Thermo-pure™ system draws power from the systems 12v battery. The operator must ensure that battery is properly charged and maintained. Automatic battery charging takes place whenever the vehicle is driven or the filter systems is operated for tank filling. However in the event that the system has not been operated for more than four days additional battery charging may be required.



Operating the Thermo-pure™ system with an under charged battery may lead to aborted starts and subsequent component failure requiring specialist technical attention from an Ionic approved technician



The Thermo-pure™ system burns diesel drawn from either the vehicles fuel tank or an ancillary remote tank



The Thermopure™ must only be operated in a well-ventilated area, as carbon monoxide is present in the exhaust gas.

Operational Procedure: Hot Water

Step 1

Switch on the heater by turning the heater switch (1) clockwise, a green light in the switch will illuminate. The heater will go through a controlled start up sequence and will be heard running after a few minutes. Coolant from the header tank will be circulated through the heater and then the heat exchanger. Allow the burner to run for 3-4 minutes before turning the hot water delivery pump on.



Step 2

Heated water will re-circulate back to the holding tank whenever the hot water pump is running if the out port on the vehicle is not open. As soon as there is demand for hot water to the water fed pole the water prioritises to the pole

This feature allows the operator to pre-heat the tank prior to going on site. This is particularly useful in winter months when it takes more energy for the heater to raise the water temperature to the desired temperature

A further benefit during periods of extreme cold when the system may freeze is the ability to pre-heat the water in the holding tank during the evening in order to prevent freezing of the system.

Machine Operation

Thermopure™ Heating System

The heater unit has built in protection devices and will switch its self off if it detects a fault. If the heater fails to start, first check the fuel level and battery condition, in the event that the heater will not restart refer to Ionic Systems technical support.

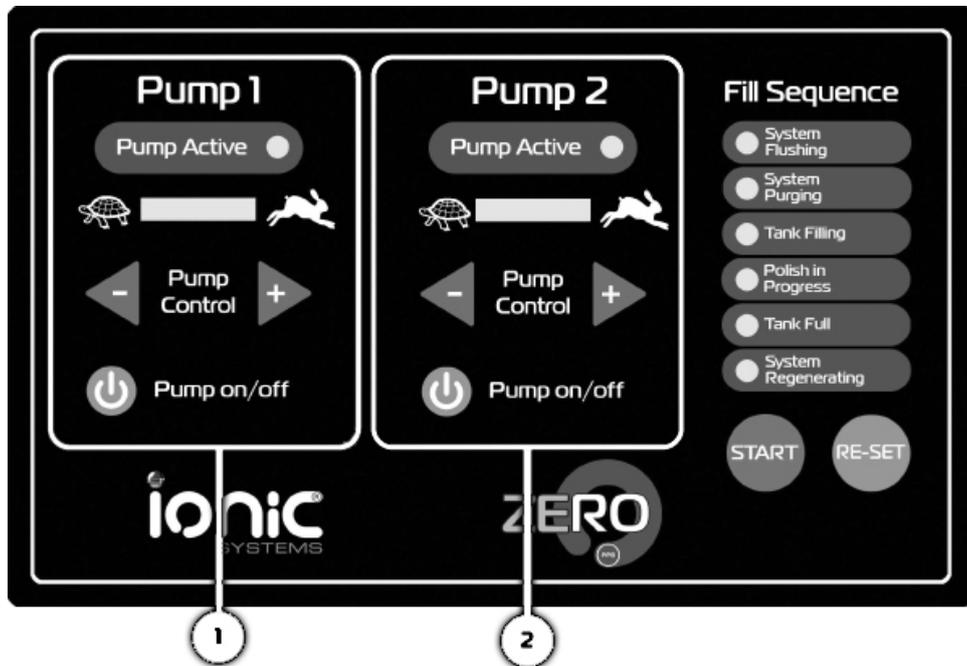
The types of malfunctions are indicated by code flashing signals via the operation indicator light during the after-run period of the heater.

After five short signals have been emitted, the long flashing pulses can be counted:

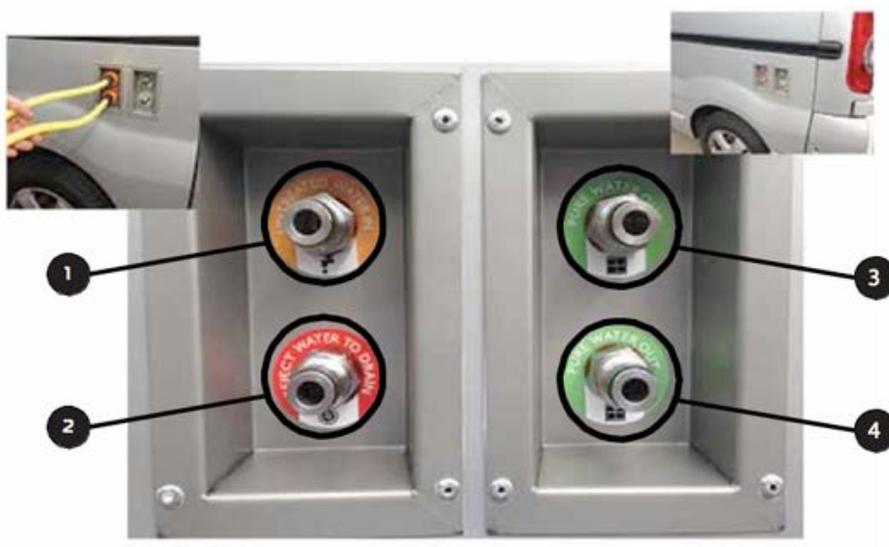
- x1 No start (After 2 start-up attempts)
- x2 Flame extinction (recurrent >5)
- x3 Under voltage or Over voltage
- x4 Premature flame detection
- x5 Flame detector interrupted or flame detector short circuit
- x6 Temperature sensor interruption or temperature sensor short circuit
- x7 Metering pump interrupted or metering pump short circuit
- x8 Blower motor interrupted or blower motor short circuit or blower motor incorrect speed
- x9 Pencil-type glow plug interruption or pencil-type glow plug short circuit
- x10 Overheating

Delivery Pump Operation

The Control Panel (See Diagram on page 8) also houses the Delivery Pump Controllers. They allow control of the volume of water to the water fed poles as well as switching on and off. The left Pump (1) is the hot pump on a Thermopure™ system and the right pump (2) is always a cold delivery pump. On a non-Thermopure™ system they are both cold.

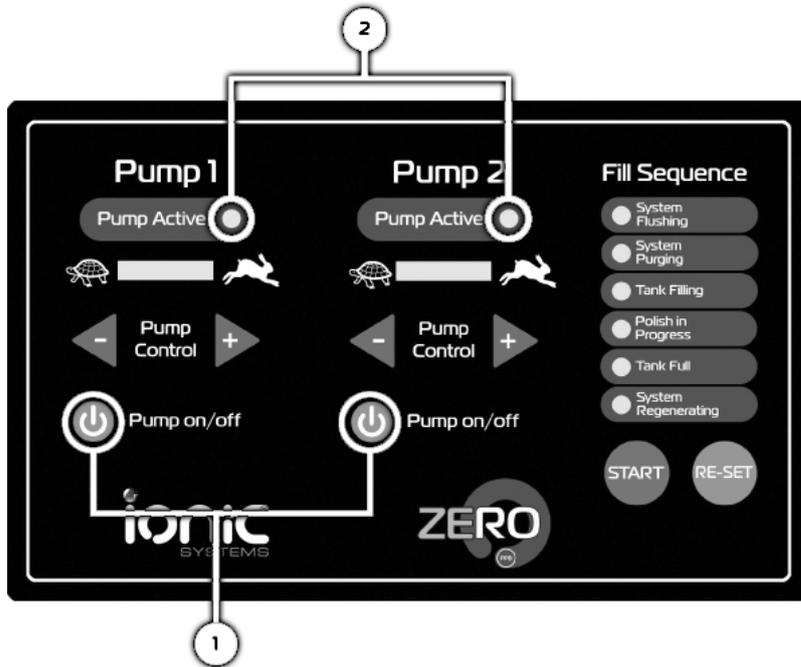


Pump No1 is connected to the upper port on the side of the vehicle (3) and No2 to the lower (4). Prior to switching the pumps on connect up the water fed poles that are required for the task and open the outflow shut-off valves between the system and the out ports in the vehicle.

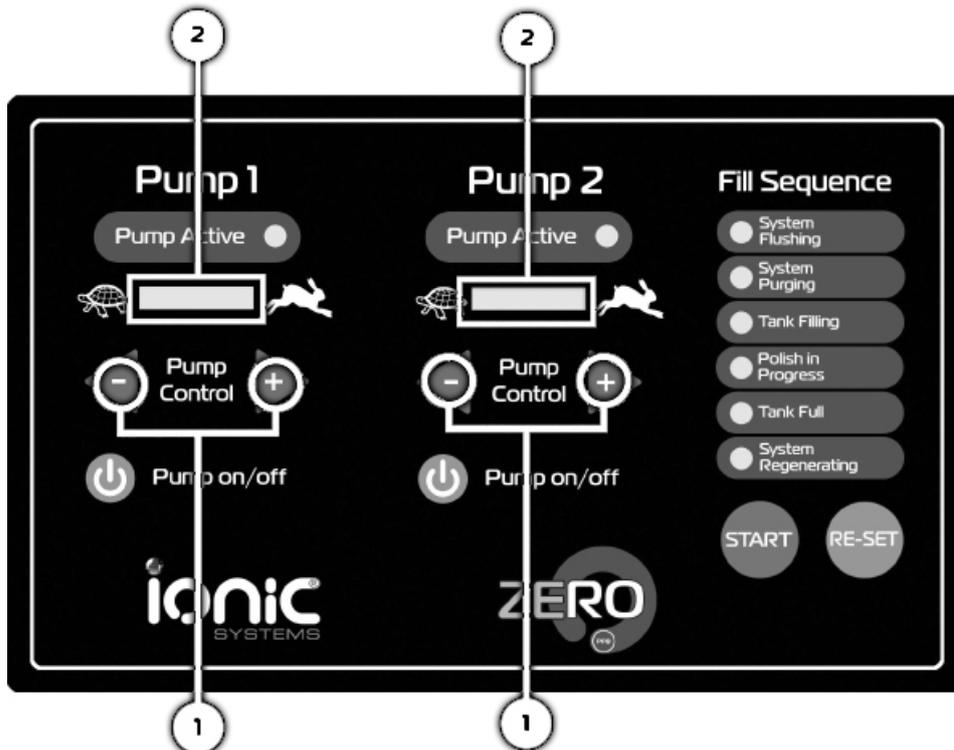


Maintenance Procedures

Step 1 - Depress the 'Pump on/off' (1) for the desired pump. The Pump Active light will illuminate.



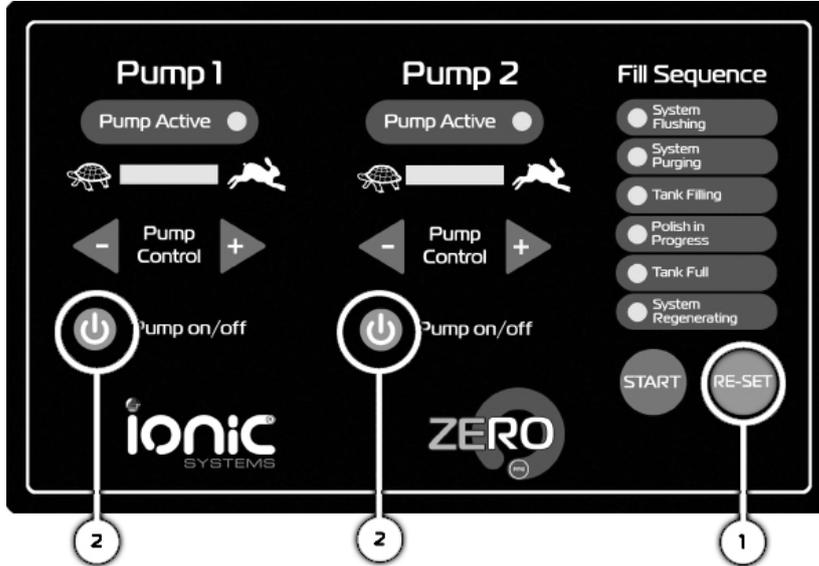
Step 2 - Select the desired volume for delivery using the + or -. The normal operating volume is less than 50%.



Maintenance Procedures



If the RE-SET button (1) is depressed at any time the pumps will be switched off. If this happens simply depress the Pump On/Off (2) and pump will operate once more at the last volume setting



On some models pump remote control is fitted. This feature means that pumps can be operated from distances of up to 200mtrs. The pumps must first have been switched on at the control panel.



Maintenance Procedures

Maintenance Procedures

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General Maintenance

Before any maintenance activities are undertaken care must be taken to ensure that all mains electrical power has been removed. When replacing 12v electrical components such as pumps etc. The battery must be isolated. Water pressure within filters and pipelines must also be dissipated to avoid injury.

Do not open any connections or filter housings with pressure in the system or injury may occur or damage to equipment

Battery Charging

Battery charging is automatic, however after periods of exhaustive discharging of the battery it may be necessary to perform a recondition charge. This is a setting on the mains charger that can be selected by 3 presses of the mode button. This will recondition the plates within the battery and restore some of the batteries efficiency.

General Cleaning

It is good husbandry to maintain a clean environment for your pure water system. Regularly cleaning the machine with a micro-fibre cloth and ensuring the surrounding area is kept clean and dry will make for a more efficient system and create a more pleasant working environment

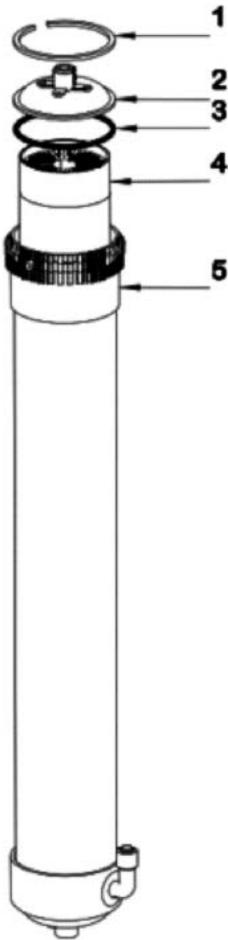
Draining

If the holding tank is drained completely, on re-filling you may encounter an airlock in the system before the delivery pumps. If this occurs simply attach a hose to the relevant pump outlet port and suck to prime the pump.

DO NOT DO THIS WITH A RUNNING THERMOPURE™ SYSTEM.

Maintenance Procedures – Filter Replacement

Filter Cartridge Replacement



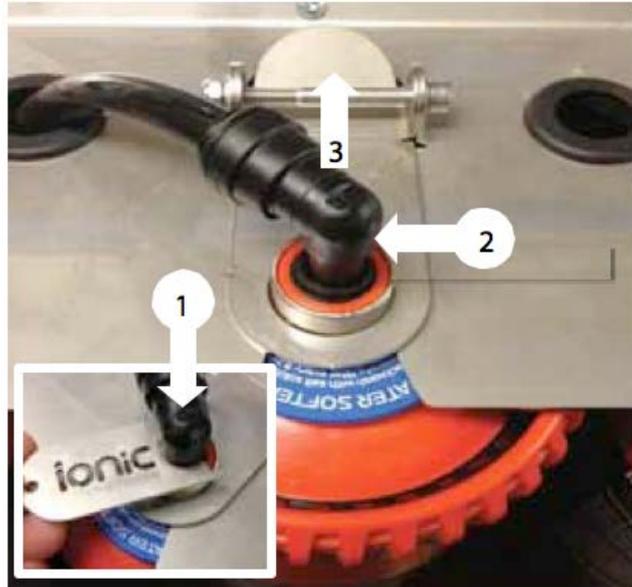
- 1 Filter Snap Ring
- 2 Filter Top Cap
- 3 Filter O ring Seal
- 4 RO Filter
- 5 RO Filter Housing

NB: Snap Rings and 'O' Rings must be replaced every twelve months.

Maintenance Procedures – Filter Replacement ‘S’ Model

Step 1

Use the Ionic key-ring tool to push down on the retaining ring (1) in the filter housing cap, then pull the fitting (2) upwards and out of the filter cap.(3)



Step 2

Move the pipe and fitting clear of the filter cap.



Step 3

Hold the Filter to stop it falling forward and lift the latch upwards.



Maintenance Procedures – Filter Replacement ‘S’ Model

Step 4

Moving the filter housing forward gives access to remove the filter cap.

If there is sufficient headroom above the filter housing then the filter housing cap can be removed and the cartridge can be removed and replaced.

If there is insufficient headroom then it will be necessary to use the key-ring tool to remove the pipe from the bottom fitting in the filter housing so that the filter housing can be completely removed from the machine.

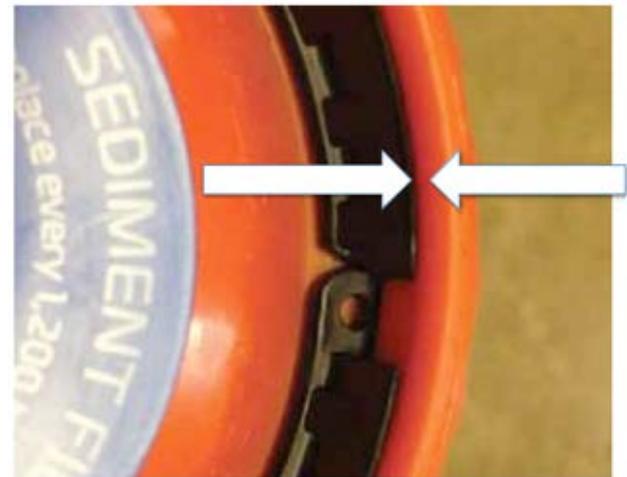


Step 5

Note the relationship between the black Snap Ring and the edge of the housing.

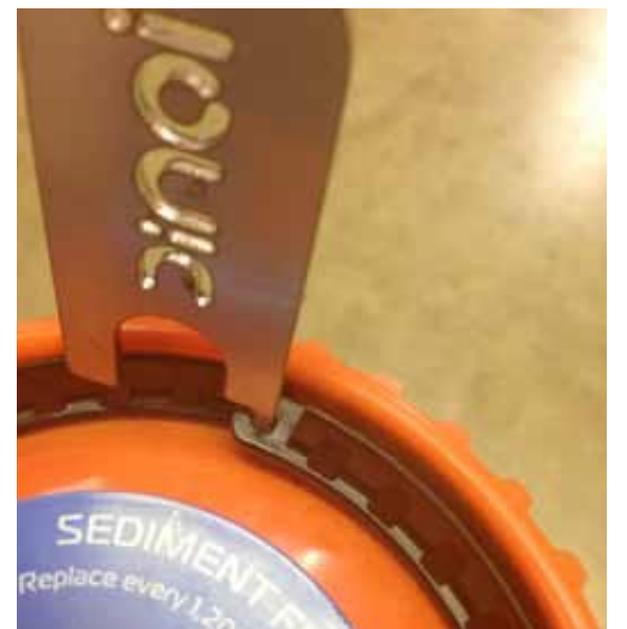
There should be no gap, the Snap Ring must fit flush all of the way around.

When refitting, ensure that the Snap Ring is fitted correctly



Step 6

Using the Key-ring tool, remove the Snap Ring



Maintenance Procedures – Filter Replacement ‘S’ Model

Step 7

With the snap ring removed, gently ease the cap over to one side by pressing against the top port, This will allow the cap to pop out from it's housing.

Notice in this image the sealing ‘O’ ring has remained in the top of the filter canister, this must also be removed



Step 8

With the ‘O’ ring removed the Filter element can be simply withdrawn by hand and the replacement inserted in its place. (in this case a Sediment Filter)



Step 9

On some Filters when the Top Cap has been removed a small black loop handle will be visible.

Using either the Filter Element Element tool or a finger. (1)Hook the loop and lift upwards to release the Filter cartridge from its housing.



Maintenance Procedures – Filter Replacement ‘S’ Model

Step 10

When reinstalling the cap and seal, ensure the seal is lubricated lightly with silicone grease and pushed onto the cap.



Step 11

Line up the arrows on the cap and the filter housing.

Push down the cap evenly and firmly. When it is fully home the groove for the retaining snap ring will be visible.



Step 12

Insert the pointed end of the snap ring into the groove first.

With the snap ring located in the groove push it in by hand all the way round.



Step 13

Check that the snap ring is correctly installed all around its circumference.



Step 14

The re-fit of the newly assembled filter housing into the machine is a reverse of steps 1-4.

NB: Snap Rings and ‘O’ Rings must be replaced every twelve months.

Maintenance Procedures – Filter Replacement ‘S’ Model

Filter Replacement for Stainless Steel Housings

Because of a ‘tight’ fit, it may not be possible to remove filter cartridges from ‘S’ model filter housings as easily as in the standard plastic housings. Therefore it may sometimes be necessary to connect a water supply to give a helping hand by hydraulicing out the cartridge. The steps below detail the simple the procedure.



Step 1.

After removing the filter housing from the machine insert the orange hose adaptor to the bottom connection. (on some machines ie; Quattro, X5 it is possible to undertake this task without removing the filter housing).



Step 2.

Connect a water supply and open the supply tap.



Step 3.

Water pressure will slowly push the cartridge out of its housing. Apply silicone grease to the lip seal and around the inside of opening to aid the insertion of the replacement cartridge.



NB: Snap Rings and ‘O’ Rings must be replaced every twelve months.

Cleaning Your RO

Eventually the day comes when your RO system will require cleaning. Cleaning is recommended when your RO shows evidence of fouling, just prior to a long-term shutdown, or as a matter of scheduled routine maintenance. Fouling characteristics that signal you need to clean are a 10-15% decrease in normalized permeate flow, or a 10-15% decrease in normalized permeate quality.

RO cleaning frequency due to fouling will vary by location. A rough rule of thumb as to an acceptable cleaning frequency is once every 3 to 12 months. If you have to clean more than once a month, then it is likely that the pre-filters are not being properly maintained/replaced or that the water softener is not being regenerated properly or frequently enough. It is also likely that the system has insufficient water softener capacity, in which case you should be able to justify further capital expenditure for improved RO pre-treatment (additional water softening).

One RO maintenance procedure that is commonly over-looked in reducing RO cleaning frequency is the use of RO permeate water for flushing foulants from the system. Soaking the RO elements during standby with permeate can help dissolve scale and loosen precipitates, reducing the frequency of chemical cleaning. (refer to section about Winterising and Storage).

What you clean for can vary location to location, depending on the foulant. Complicating the situation frequently is that one more than one foulant can be present.

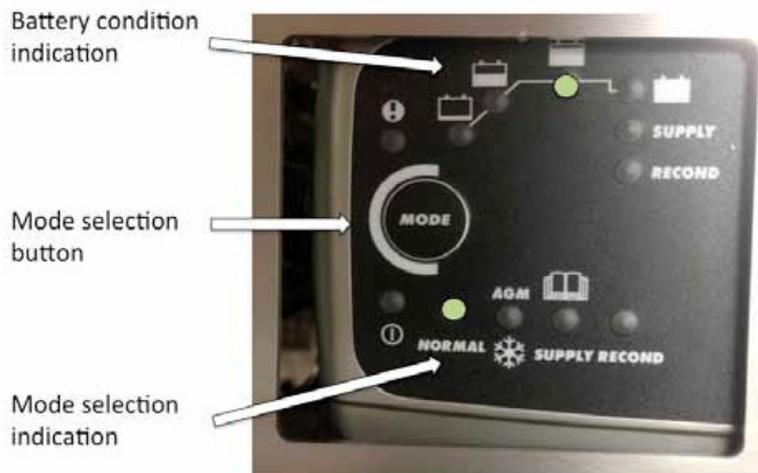
Typical foulants are:

- Calcium carbonate scale
- Sulfate scale of calcium, barium or strontium
- Metal oxides of iron, manganese, aluminum, etc.
- Silica scale
- Colloidal deposits (inorganic or mixed inorganic/organic)
- Organic material of natural origin or man-made origin
- Biological (biofilm, mold, or fungi)

There are a number of factors involved in the selection of a suitable cleaning chemical (or chemicals) and proper cleaning protocol. The first time you consider that RO performance has deteriorated it is recommended to contact Ionic Systems Ltd or one of its agents.

Battery Charging with the CTEK XS7000

FOR PROPER FUNCTION OF THE THERMOPURE SYSTEM, ENSURE THE BATTERY IS CHARGED EVERY DAY.



Settings are made by pressing the “MODE” button and stepping forward by pressing the button one step at a time, releasing the button when the required mode is reached. After approx .2 seconds, the charger activates the chosen mode. The select mode is saved in the chargers memory and remains even when the charger is switched off.

Mode “Normal” (14.4v)

Normal setting for wet batteries.

Mode “RECOND” (15.7V, 1.5a 0.5 - 4h)

This mode is used to recondition very discharged batteries where stratified acid is expected (High acid weight in bottom, low on top). Use this mode with care as it can cause some water loss.

15.7V is normally not a problem for fast charging however do not operate the machine whilst charging in this mode.

Maintenance Procedures – Battery Charging

Technical Specification

Model	1007
Voltage	AC 170 - 260VAC, 50 - 60 Hz
Back Current Drain *	<1mA
Voltage Charging Voltage Nominal	12 v 13.6v; 14.4 v 12.7 v or 15.7 v
Ripple **	Max 150 mV rms, max 0.3 A (=4%)
Current	7A Max
Ambient Temperature	-20° to + 50°, Power is reduced automatically at in- creased ambient temperature
Cooling	Natural Convection
Charging Cycle	Multi XS 7000 is a multi stage fully automatic charger
Type of Batteries	All types of 12v lead-acid batteries (wet, MF, AGM and GEL)
Battery Capacity	14-225 Ah
Dimensions	191 x 89 x 48 mm (L x W x H)
Insulation	1P65**
Weight	0.8kg

*Back Current Drain is what the charger uses to drain the battery if the power chord is disconnected

** Quality of the current and voltage are very important. High current ripple heats up the battery and makes the positive electrode age prematurely. High Voltage ripple could harm other equipment connected to the battery, MULTI XS 7000 produces a high quality current and voltage with very low ripple.

*** If the electrical plug is of the flat euro connector type, the battery charger has insulation class IP63, except in Switzerland where IP65 is valid.

Battery Size (Ah)	Time to - 80% (Hours)
20	3
60	18
100	12
225	25

Battery Condition Indicator

With mains power connected, indicates charge level of battery (see above diagram)

Mode Selection Button

Use to move between the various maintenance modes, the mode selected will be indicated by the LED's position.

Battery Specification	
100 ah	Ampere hour capacity at 20 hr rate
679	Cold Crank Performance
12 v	Potential Difference Voltage
Deep Cycle	
Multi Function Leisure Battery	

Battery Information



- Batteries are only fitted to vehicle-mounted systems
- The battery should never be completely discharged through exhaustive use

The position of the battery is referenced on page 10

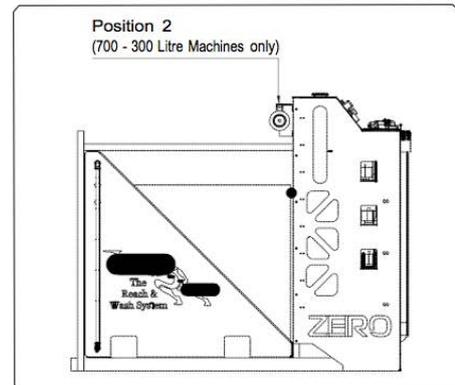
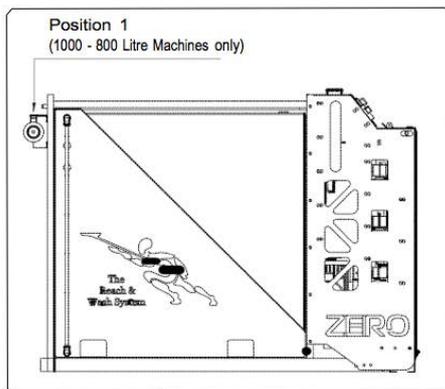
The Battery will satisfy the machine's requirements only when properly maintained.

Maintenance Procedures

UV Filter Maintenance (PPB Machines only)

Ultra-violet light kills biological components in the feed water such as Legionella. It also creates low-level ozone gas. This gas has strong oxidation properties capable of destroying a wide range of pathogens including prions. It prevents bio-film thereby prolonging filter life.

IN ORDER TO PRESERVE THE BENEFITS OF UV/03 STERILISATION THE UV LAMP MUST BE REPLACED EVERY 12 MONTHS



UV LAMP REPLACEMENT



DISCONNECT MAINS ELECTRICITY BEFORE PERFORMING ANY MAINTENANCE ON THE UV UNIT

DISCONNECT THE MAINS WATER SUPPLY BEFORE PERFORMING ANY MAINTENANCE ON THE UV UNIT

NEVER LOOK DIRECTLY AT THE ILLUMINATED UV LAMP

PROPER FUNCTIONING OF THE UV LAMP CAN OBSERVED BY A BLUE GLOW SHOWING THROUGH A SMALL SECTION OF CLEAR TUBING AT THE WATER CONNECTION

Maintenance Procedures

Step 1

Loosen the cable grip on each end of the UV housing (This allows the housing to be unscrewed without twisting the power cables)



Step 2

Unscrew the end caps at each end of the UV unit. Some water inside the housing may escape, so it is advisable to have a suitable container to hand to catch any spillage.



Maintenance Procedures

Step 3

Unclip the white plastic connector from each end of the UV lamp



Step 4

The UV lamp may now be withdrawn from the housing and replaced.



Step 5

Installing the new lamp is a reversal of the above procedure.

Winterising and Storage

The following procedure should be followed if the machine will not be used during Winter or stored for any period longer than 1 month. A storage kit with all parts required is available from Ionic Systems Ltd.

Holding Tank

The holding tank should be completely drained.

12v Pumps

After draining the tank, run 12v pumps until dry (no water is pumped).

De-pressurise

Prior to working on filters, de-pressurise the system. With neither water nor electricity connected, press the green 'Start' button. After 30 seconds press the 'Reset' button. Drain the Salt container by opening the drain valve. Refill the empty salt container to the appropriate level and close the drain.

Sediment Filter

The 5 Micron Filter traps organic matter that will fester and degrade over time, for that reason the sediment filter element should be removed from the filter housing and be discarded. The large diameter spacer fitted to the top of the sediment filter element should be retained for future use. A new Sediment filter element should be fitted prior to putting the machine back in service. The sediment filter element should be replaced at 6-month intervals. Putting the machine back into service at the end of storage creates a good opportunity to replace the filter element.

Carbon Filter

The Carbon Filter also traps organic matter that will fester and degrade over time, for that reason the carbon filter cartridge should be removed from the filter housing and be discarded. A new Carbon filter cartridge should be fitted prior to putting the machine back in service. The Carbon filter should be replaced after every 4-months whichever comes first. Putting the machine back into service at the end of storage creates a good opportunity to replace the carbon filter cartridge.

RO Membrane

The filter housing containing the RO Membrane should be removed from the machine and drained and flushed with pure water for 10 minutes before refilling with pure zero TDS water. Seal the pure water inside the RO housing by fitting blanks into all of the JG fittings. The housing needs to be stored vertically and can be refitted into the machine for this purpose. **DO NOT EXPOSE TO FREEZING CONDITIONS.** Prior to putting the machine back into service, take the RO filter housing and remove all three blanks and drain the pure water from the filter housing. Fit a hose adaptor to the top JG fitting in the cap and flush again with pure water for 3 minutes. After flushing, drain before refitting to machine.

Maintenance Procedures – Winterising and Storage

DI Filter

If the DI filter is still in serviceable condition it may be left fitted to the machine. As a precaution, remove the snap ring but leave the filter cap in place. **DO NOT EXPOSE TO FREEZING CONDITIONS.** Replace the snap ring prior to putting the machine back into service.

NGDI Filter

If the NGDI filter is still in serviceable condition it may be left fitted to the machine. As a precaution, remove the snap ring but leave the filter cap in place. **DO NOT EXPOSE TO FREEZING CONDITIONS.** Replace the snap ring prior to putting the machine back into service.

UV/O3

To protect against any risk of frost damage, remove the UV/O3 lamp by disconnecting the electrical connections at both ends. Withdraw the lamp followed by the quartz tube. Otherwise **DO NOT EXPOSE TO FREEZING CONDITIONS.** The UV/O3 lamp should be replaced at 12-month intervals. Putting the machine back into service at the end of storage creates a good opportunity to replace the lamp.

Battery

Ensure that the 12v battery is charged periodically during the period of storage

Operational Procedure – Cleaning Windows

When tasked with cleaning windows or facade surfaces park the vehicle/trailer containing the Reach & Wash system in a suitable position adjacent to the building. Parking close to one corner of the building is a good idea as two elevations can be reached from one position. When working in areas accessible to others, deploy warning signs to indicate the presence of potential slip and trip hazards. Run delivery hoses from system to furthest extent of work with a view to working backwards towards the vehicle, select appropriate pole for height for work to be undertaken and extend sections to the desired height.

Poles constructed from 6ft and smaller sections may be extended vertically. Poles constructed from sections longer than 6ft are extended horizontally along the ground. Once extended to the desired length it becomes a two person operation to “walk the pole up” in much the same way as a tall ladder is “walked up” by one person with the butt end located in the right angle between the ground and vertical elevation.

In basic terms the technique for cleaning is one of an upwards and downward motion to agitate and loosen soiling, followed by a side to side motion from the top downward in order to rinse away the loosened soiling. In practice however and understanding of the chemistry of the process is necessary in order to attain satisfactory cleaning results, especially for the initial clean and possibly one two subsequent cleans.

Water is known to most as H₂O however, in its pre-treated form water is in fact much more than h₂o as it contains many other chemicals and minerals. When water is processed through the Reach & Wash water treatment system all chemical and mineral content is filtered out to produce 100 % pure water. Pure water has a strong desire to return to its former impure state, when applied to any surface pure water rapidly imports all its purities it comes across. If sufficient pure water is applied, all impurities can be flushed away and the remaining mineral free water will dry leaving a clean, sterile and spot free finish.

Window frames can harbor years of dirt and detergent build up. When washed, dirt and detergent residue within the frames will be diluted and driven further into the frames, only drain out over the glass once the washing has finished and the window is left to dry, At this point, dirt and detergent residue from the frames will be left on the glass leaving a predictably poor finish to the glazing. Armed with this knowledge initial window cleaning with the Reach & Wash system must be carried out in the following manor if acceptable results are to be achieved:

Set the water to flow through the brush. With a side to side motion followed by short up and down strokes across the frame, followed once more by side to side motions,

Thoroughly wash the top frame and the top 8 - 10 inches of glass. If detergent is present bubbles will appear, continue until soap bubbles subside. Wash the remainder of the window including the side frames once only, sufficient to removing visible soiling. Continue in this manor around the entire building. Prolonged washing at this stage will achieve little, as capillary action will only drain soil/detergent from the frames once washing has ceased.

Once the windows have dried, wash the windows a second time, but this time wash the glass without wetting the frames. One again set the water to flow through the brush. Place the brush on the glass at the bottom left or right hand side of the window, then steadily raise the brush towards the top of the glass, doing so will ensure that the bristles curl downwards underneath the brush head. As the brush reaches the top slow the motion and stop just short of the top frame by a margin of 1-2 inches (with practice a closer tolerance can be achieved). Then taking care not to wet the top frame move the brush horizontally along the top of the glass to the opposite side. Repeat this side to side operation moving steadily down until completely rinsed. Repeat this process until all windows have been washed this way.

Operational Procedure – Cleaning Windows

Experience will lead to the user developing correct pole technique, in time operators will learn to use the stored energy in the pole. Downward movement of the pole will cause the pole to bend, as the pole seeks to straighten itself, using the spring in the pole will help the operator to raise the pole. The operator controlling the pole urge to fall due to gravity side to side motion rather than physically pushing and pulling the pole from left to right. Beginners' tend to use their arms to move the pole up and down, whilst old hands simply sway/rock or step forward and back. It is worth remembering that poles feel heavier when used at a steep angle and lighter when standing further back from the building at a shallower angle.

Manual Handling

It is natural to operate a waterfed pole by movement of the arms alone and this is acceptable for poles that extend to a height of 10 m. For waterfed poles that extend beyond 10 m, excessive strain may be exerted upon the upper body when operated for extended periods.

It is recommended that when operating poles that extend beyond 10 m use of arms be reduced by greater use of leg/whole body movement. With experience comes the ability to work with the natural balance of the pole, less effort is expended once the operator has mastered the balance of the pole, less effort is expended once the operator has mastered the balance technique and has learned to use the stored energy generated in the pole as it is guided through the cleaning task. Even with the benefit of training these techniques take time to master and they are easier to acquire when shorter poles up to 10 m are used. It is important both for the development of new skills and in order to deliver acceptable cleaning standards, that new staff become experienced using short poles before moving up to poles that extend above 10 m.

Safety in Window Cleaning

Scope

For the purpose of this guidance, the term “waterfed pole” is defined as a telescopic pole fitted with a brush and a means of delivering pure water for window cleaning.

The use of pure water is an integral part of the cleaning process. The term “Load” is defined as the water treatment system/water delivery tank, waterfed poles and other ancillary accessories such as hose reels and warning signs.

Avoiding Risk

The use of waterfed poles removes the need to work at height and provided the window to be cleaned can be viewed from the ground without obstruction, it is possible to clean using a waterfed pole. Although adopting waterfed pole use may remove the risks involved when working at height consideration must be given to both operational risks that apply to waterfed pole use.

When assessing operational risks consideration must be given to the location of the building, its design, terrain underfoot, weather conditions and overhead power sources. The sustainability of staff with regard to their level of fitness and medical history and the need to identify and muscular or skeletal disorders that may develop as a result of operating a pole with poor technique.

Less obvious risks include the consequences of carrying heavy tank systems when a vehicle is involved in a road traffic accident, as well as the potential for the spread of legionella disease cause by poorly maintained filters.

Buildings on industrial sites and domestic properties present different risks than those in busy town or city locations where consideration must be given to the time of cleaning of traffic conditions. But generally warning signs should be deployed to warn of trip hazards presented from trailing hoses and the slip hazard presented by wet pathways. While Hi-viz clothing should be worn by operators, especially during winter months and when working in proximity to roadways.

Operational Procedure – Cleaning Windows

Hazards associated with the use of waterfed poles

- Trip hazard presented by trailing hoses.
- Slip hazard presented from wet pathways.
- Trip hazard for operator while concentrating at work.
- Falls whilst working from flat roofs.
- Electrocution from pole coming into contact with power source.
- Spread of legionella disease through poor filter maintenance.
- Poorly designed and installed tank systems fitted into vehicles that may become detached.

Portable ladders have traditionally been used by window cleaners mainly for cleaning windows at ground, first, second and even third floor level.

Most falls to window cleaners involve the use of portable ladders. In recent years figures for accidents reported to the HSE and local authorities show that between two and seven window cleaners have been killed each year in Great Britain and about twenty to thirty suffer major injuries as a result of falls involving ladders. Many suffer less serious injuries that result in several days off work.

Building owners, designers and window cleaners need to understand that window cleaners will continue to suffer regular accidents unless a different approach is taken.

In recent years many window cleaners have adopted the use of waterfed pole systems that facilitate the cleaning up to 60ft/20 mtrs. Avoiding the need to work at height is an obvious attraction however there are various considerations to be taken into account:

These will include:

- Provision of uncluttered access to commercial building facades.
- Designers of buildings to ensure reasonable access.
- Acceptance by everyone, including homeowners, that if they want clean windows they have to accept the windows will be left in a wet condition and that the process may take 2 - 3 cleans before acceptable standards are achieved.
- Window cleaners adopting waterfed pole cleaning.

Further legal changes resulting from the European Directive on work at height will further tighten the law. All those involved in window cleaning need to adapt if deaths and injuries are to be reduced.

This information sheet sets out practical precautions to help window cleaners reduce risks to as low a level as possible, taking into account the needs of the job. It has been prepared in co-operation with the Federation of Window Cleaners.

Operational Procedure – Cleaning Windows

Road Safety

Journeys to and from the workplace are subject to documented risk assessment. Assessment of these risks will include security of the load to ensure that it does not shift under normal driving conditions, emergency braking or during a minor collision. Responsibility rests with the driver of the vehicle, however business owners have a responsibility to provide suitable vehicles, equipment and means of securing the load.

Consideration should also be given to the potential for the overloading of vehicles fitted with water tanks, for when a water tank is full, a vehicle is less likely to be close to its maximum payload capacity. To assess road safety risk consideration should be given to:

- The design of the water treatment tanks.
- The manufacture of the water treatment tanks.
- The installation of the water treatment tanks.
- The payload capacity of the vehicle and the potential for overloading.
- The security of waterfed poles, hose reels and ancillaries etc.

Legionnaires Disease

Legionella bacteria can be found in low levels in most water sources, the presence of a few bacteria is in itself unlikely to cause a problem, it is when they begin to multiply that the risk increases. They require nutrients to multiply, these can be provided by sediment, scale, sludge and biofilms. These materials build up in the in the filters used to purify water, if not replaced at specified intervals filters may become a fertile breeding ground for Legionella bacteria. Water temperature is a particularly important factor in the survival of and multiplication of Legionella, when the temperature of water rises above 20° the bacteria begin to multiply, the optimum temperature being 37°.

Contracting the Disease

The disease is normally contracted after the inhalation of the bacterium in small droplets (aerosols) or in droplet nuclei that is the residue after the water has evaporated. Waterfed poles produce aerosols and it should be noted that aerosols are not restricted to the point of production. Under suitable wind conditions, viable bacteria can travel up to 500 meters.

Legionella will not normally multiply in cold water systems or even hot water systems when the water is heated at point of use, or when the system is in regular use. However Legionella will multiply when the right conditions exist, these are;

- When sediment, scale, sludge and bio films build up in filters.
- When water temperatures rise above 20° (68°F)

Measures that should be taken to control the risk of Legionella are;

- Replacement of filters at specified intervals.
- Following the manufacturers servicing recommendations.
- Keeping the system stored in a cool place when not in use.
- If the system cannot be kept in a cool place, drain tank and filters whenever the system is to be left standing ideal for more than three days during warm summer months.

The release of Legionella is also subject to the Control of Substances Hazardous To health (COSHH) Regulations 2002.

Operational Procedure – Cleaning Windows

Choice of Equipment

The choice of equipment will be determined by:

- The duration and extent of work.
- The height of windows to be cleaned.
- The site conditions.

For some jobs waterfed poles may be used in support of other access methods, for domestic properties to reach conservatory roofs or other windows inaccessible to ladders.

On high-rise buildings to reach the lower elevations and link bridges or on glazed structures in support of abseilers. For many buildings however waterfed poles may be used for the entire cleaning operation. Due to the physical rigor of prolonged use care should be taken to select the lightest pole for the task, the lightest pole being the one that adequately reaches the top of the window but does not over reach.

Composite poles will be best suited for use on sites such as those near to railways, factories and electricity generating stations, substations or any other site that poses a heightened risk of electrocution.

Pure water may be delivered to the waterfed pole by flexible hose from a variety of sources, these include de-ionising cylinders/ columns or cartridges, vehicle and trailer mounted systems and static systems incorporated into the building design. Delivery hoses pose a trip hazard that can be minimised if brightly coloured hose is used and warning signs are deployed where ever hoses cross a walkway.

The design, manufacture and instillation of water treatment systems fitted to vehicles should conform to the requirements of The Road Vehicle Construction and Use of Regulations and BS: 12195 Load Restraint Regulations. Care should be taken to ensure that the weight of the filled water tank does not exceed the vehicles payload or towing capacity. Allowance should also be made for the weight of other equipment that may need to be carried as well as the weight or personnel travelling in the vehicle.

When extending waterfed poles it is desirable to raise the pole vertically, when this is not possible it will ne necessary to extent the pole to the desired length horizontally along the ground. Raising the pole from this position will be a two-person operation one to stabilise the base and steady the pole while the second “walks” the pole up.

Measures to reduce fatigue:

- Operate poles with greater use of the legs, by stepping a single forward and back use of the arms may be significantly reduced.
- Pole sharing with other members of the team.
- Switching from the left hand side of the body to the right, and visa versa.
- Taking periodic breaks to undertake other tasks.
- Taking periodic breaks free from activity.

Adverse Weather

Generally waterfed poles may be operated in more adverse weather conditions than ladders. In windy conditions care should be taken when moving from a sheltered elevation to one affected by the wind. Waterfed pole use is not recommended in winds above 30 mph. Regardless of wind strength, waterfed poles should never be left unattended in a elevated position.

Operational Procedure – Cleaning Windows

Pure water is a poor conductor of electricity, however waterfed poles of aluminum construction should not be operated in any environment where they may contact or come within 2 m of a source of high voltage electricity. Waterfed poles should not be operated when a risk of an electrical/lightning storm exists.

During cold spells the likelihood of pure water freezing in the delivery hoses will adversely affect the use of waterfed poles. Systems that deliver hot water will be affected to a lesser extent and precautions should be taken to ensure that any water that may fall on to walkways is prevented from freezing by the prior application of sodium grit.

Working in Exposed Positions

The need to concentrate on overhead activity may expose the operator to further hazards that include:

- Trips or falls.
- Falls from flat roofs.
- Collision with pedestrians or road traffic.

The purpose of risk assessment is simply to identify particular risks on any job in order to take pre-cautions to minimise them, typically these may include:

- Instruction in the need for the operator to be vigilant with regard to the surroundings.
- Providing adequate PPE and or roof edge protection.
- Giving consideration to the day and time of cleaning.
- Provision of hi-viz clothing.

In general no window cleaner should work alone with a waterfed pole in any area or location that would involve increased risk to their safety such as busy or pedestrian area or road.

Personal Protective Equipment (PPE)

PPE is not directly relevant to the use of waterfed poles and is limited to protection against adverse weather conditions.

Training

Waterfed pole specific training covering all aspects in these guidance notes in greater detail is available from The British Window Cleaning Academy (Accredited City & Guilds NVQ centre) Road Traffic Act 1988

Further Reading

Road Vehicle (construction and use) Regulations. BS EN: 12195 Load Restraint Regulations. Control Of Substances Hazardous To Health (COSHH) Regulations 2002.

Approved Code of Practice (L8): The Control of Legionella Bacteria in Water Systems 2000.

Workplace Health, Safety and Welfare Regulations 1992. Manual Handling Operations Regulations 1992.

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Warranty

12 MONTH LIMITED WARRANTY

1. What the warranty covers

Ionic Systems Ltd's Reach & Wash™ Systems are warranted to the original owner to be free of defects in material and workmanship from the date of purchase for a period of 1 year subject to the following conditions and exclusions;

- 1) The Warranty shall operate for a period of twelve months from the date on Ionic Systems Ltd original invoice, subject to Ionic Systems Ltd receiving either a completed, signed Handover Form or a completed, on-line Warranty Registration. In the absence of either a completed and signed Handover Form or On-line Warranty Registration Ionic Systems Ltd is under no obligation to provide warranty service for the product. It shall be the customer's sole responsibility to ensure that either a completed and signed Handover Form or On-line Warranty Registration is received by Ionic Systems Ltd.
- 2) Subject to properly completed paperwork/online registration being returned, Ionic Systems Ltd will, within 1 year of purchase, repair or replace at its sole discretion at no charge defective parts excluding replaceable filters, batteries and pumps subject to the conditions of the warranty. Replaceable filters are warranted against defects in material and workmanship only. Service life of replaceable filters varies according to local water quality and is also affected by proper maintenance being undertaken by the user. Claims connected with filter life are excluded from the warranty.
- 3) When fitted, batteries are warranted against defects in material and workmanship only. Service life of batteries is wholly dependent upon the user ensuring that proper charging and maintenance is carried out according to the instruction manual. Claims connected with battery life are excluded from the warranty.
- 4) 12volt pumps are warranted for a period of 3 months only.
- 5) When fitted, Stainless Steel filter housings carry a 5 year warranty
- 6) When fitted, mains powered pumps are warranted against defects in material and workmanship only. Serious damage will occur if mains powered pumps are run dry or in cavitation. Equipment fitted with mains powered pumps have labels warning that damage can occur if pumps are run dry and the operation manual repeats the warning and provides detailed information on the subject. Claims connected with pumps that have been run dry or in cavitation are excluded from the warranty.

2. Conditions of Warranty

- 1) The equipment must be maintained and serviced using replacement parts and filters supplied by Ionic Systems Ltd. The performance and functioning of your Reach & Wash™ System is directly related to the quality of the water being treated and the particular application in which it is being used. Therefore Ionic Systems Ltd's liability is limited to the cost of repair or replacement (at our sole discretion) of any defective part and does not include incidental or consequential damages of any kind.
- 2) Equipment must be installed and operated in accordance with the manufacturers recommended procedures and guidelines.

3. Limitations of Warranty

The warranty shall be void if alterations or modifications are made to the equipment, or if servicing or repairs are carried out by anyone other than Ionic Systems Ltd or any of its appointed agents.

The warranty shall be void if product failure or damage results from freezing, neglect, misapplication, fouling with sediment or scale or failure to operate the system in accordance with the instructions contained in the owners manual, guidelines and labels fitted to the equipment.

4. Obtaining Warranty service

For warranty service please contact Ionic Systems Ltd to make arrangement for inspection of defective parts.

Warranty

Simply contact us by calling +44 (0) 1793 871386 or by e-mail to info@ionicsystems.com

4. Limitations and Exclusions

Ionic Systems shall not be responsible for any implied warranty, including those of merchant ability and fitness for a particular purpose. Ionic Systems Ltd shall not be responsible for any incidental or consequential damages including travel expense, telephone charges, loss of income, loss of time, inconvenience, loss of use of the equipment caused by the equipment and its failure to function properly. This warranty sets out all of Ionic Systems Ltd's responsibilities regarding the equipment.

Annual Servicing

Annual Servicing

Servicing described in the manual is only to be performed by a qualified person.

Installation - Safety Inspection

Reach & Wash™ systems are installed in accordance with BS EN 12195 Load Restraint Regulations, the Road Traffic Act 1986, the Road Vehicle (construction & use) Regulations and to FMVSS - 208 crash test specification.

It is of utmost importance that Annual Safety Inspections (ASI's) are carried out on time, the inspection covers the integrity of the component chassis, welded joints, corrosion of component chassis, mounting brackets, fasteners and torque settings.

On completion a certificate will be issued, a copy of the certificate may be required by your motor insurance company.

Servicing

The use of waterfed pole systems is becoming more commonplace, so the difference between good contractors and poor contractors is highlighted by the quality of the system and the water produced. The high quality of water produced by the Reach & Wash™ system can only be ensured by presenting the machine for an annual service.

Thermopure™ Servicing

Thermo-pure™ systems require annual servicing of the heating components, this is vital to ensure the safety of the machine as well as to guard against the possibility of harmful Bacteria developing within the system.

Your Responsibility

Presenting The Reach & Wash™ system for its annual service is the customers responsibility, proper servicing will ensure many years of service, while providing pure water of the highest quality will ensure that your customers receive the highest quality window cleaning service enhancing your reputation.

Maintenance

The use of waterfed poles requires little skill but can be physically demanding unless the correct techniques are employed. Waterfed poles in a poor state of repair will require more physical effort to operate.

Regular replacement of filters ensures both the quality of water produced for cleaning and the effective control of the Legionella bacteria. Manufacturers will specify the appropriate intervals for filter replacement, generally smaller filters shall require more frequent replacement than larger filters.

Vehicle mounted water treatment/delivery systems must be installed in accordance with the requirements or the Road Traffic, the Road Vehicle Construction and Use Regulations and BS EN: 12195 Load Restraint Regulations. In order to ensure that the installation continues to meet these requirements an annual inspection should be carried out by a competent person and any remedial work signaled by the inspection should be carried out in a timely manor.