WATER TREATMENT SYSTEM

OPERATION AND MAINTENANCE MANUAL

FILTRATION & STERILIZING UNIT

H_2O INTERNATIONAL

JOB N° J160271

aquamarine water treatment

A business unit of Murray & Roberts | Murray & Roberts Water Engineers and Constructors

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1.0 Introduction

1.1 General

Congratulations on the purchase of your new Water Treatment System from Aquamarine Water Treatment. We thank you for your trust in us.

Treated with care and regular maintenance, your new system will provide you many years with fresh potable water suitable for human consumption.

This user's manual outlines installation, operation, maintenance and troubleshooting details vital to the sustained performance of your system.

If your system is altered at the site of operation, or if the feed water conditions change, please contact Aquamarine Water Treatment.

All rights regarding the design and configuration of this system may not be copied or passed on to a third party without permission from Aquamarine Water Treatment.

It is most important that this manual is retained with the system for future reference. Should the system be sold or transferred to another owner, or should you move premises and leave the system, always ensure that the manual is supplied in order that the new owner can be acquainted with the functioning of the system and the relevant warnings.

Note: Prior to operating or servicing an Aquamarine Water Treatment System this user's manual and all attached documents must be read and fully understood.
Keep it as well as any other associated information for future reference.

2.0 Health and Safety Precautions

2.1 General

The water treatment plant should be operated only by trained personnel. During operation, the system volume and certain line items are under pressure (higher and / or lower than atmospheric pressure). Staff must comply with precautions stated in this manual and the safety measures listed their own company in manipulating the system. Aquamarine will not be held liable for any damages, injury or death that may result from the use of this equipment.

2.2 Chemicals

Various dosing and cleaning chemicals are frequently used in conjunction with Aquamarine Water Treatment Systems.

These chemicals should be handled with care as some can give off harmful vapour and contact with the skin can result in burns. Personal Protective Equipment should be used when handling these items. Should skin contact occur, then douse the affected area continuously with cold water and seek medical attention immediately. Refer to safety data sheets supplied with chemicals before use.

Ensure chemicals and disinfection agents are used in well ventilated areas.

Manufacturers' recommendations on chemicals containers should be closely adhered to. In the case of major spillages ensure that suitable equipment is on hand to treat the spillage.

Note: Water is not always recommended for large spillages. Sand or saw dust is preferred.

2.3 Electricity

The unit must be properly earthed and the correct rated fuses should be fitted. Power should be isolated before commencing work on the electrical equipment. Consideration must be given to the relevant points that follow when performing work on electrical equipment:

- Repair of electrical equipment must be carried out only by a qualified electrician.
- Check electrical equipment periodically.
- Check all connections and tighten as required.
- Exchange damaged cables immediately.
- Keep distribution boards, switchboards and control panels closed.
- Access should only be by key or special tool

2.4 Air and Water Pressure

Aquamarine Water Treatment Systems operate at high pressure and, where possible, this should depressurise before commencing any form of service or maintenance work.

Standard protection from freezing should be taken, as ice inside pressure vessels and pipe work can cause rupture.

Compressed air can be dangerous and great care should be taken with its use.

2.5 Operator Safety

The system has been designed and manufactured to applicable harmonised standards and technical specifications. The operator must pay particular attention to the following:

- The plant is used as specified only.
- The plant is maintained in a good functional condition and all safety devices should be checked regularly to ensure correct functionality.
- Personnel Protection Equipment (PPE) is available and used when required.
- The operating instructions are complete, readable and available at site for use on the plant.
- Only trained, qualified and authorised personnel are permitted to operate, maintain and repair the plant.
- Personnel are instructed with regard to safe working practices and environmental protection, and know the contents of the operating instructions and any safety notes.
- All safety and warning labels on the plant are visible, readable and are not removed.
- Modifications are only to be carried out by authorised qualified personnel and approved by Aquamarine Water Treatment in writing.
- Before starting maintenance or repair, limit access to the plant by unauthorised people.
- Provide signage indicating that maintenance or repair work is being carried out.
- Depressurise the system and protect against the unit starting automatically or inadvertently
- Switch-off, lock out and label the main power supply before starting maintenance and repair.
- When lifting or moving heavy plant or unit parts, use correct lifting equipment that has been checked/inspected and in good condition.
- Make sure before starting maintenance and repair work that all parts are at room temperature.

2.6 Observe Environmental Regulations

Local regulations for avoiding contamination to waste and sewer systems must to be taken into consideration during work carried out on the plant.
The following substances can be a hazard during installation, cleaning, repair and maintenance work.

- Lubricants and oils
- Hydraulic oils
- Cooling media
- Dosing chemicals
- Cleaning chemicals

Care must be taken before any discharge to drain and local and national regulations adhered to.

2.7 Labelling

Do not remove any warning labels or system labels or direction arrows from the plant as they identify flows and warn against potential hazards.

3.0 Working Conditions

Aquamarine Water Treatment plants must be protected from direct weather exposure (sun, rain, etc.). Plants generally operate at ambient temperatures between 5-40 ° C.

Note: Warranty (Section 4.0) will not be covered if working conditions are not fulfilled.

4.0 Warranty

4.1 General

Products manufactured by Aquamarine Water Treatment are warranted to the original user only to be free of defects in material and workmanship for a period of 12 months from date of delivery or and installation, but not more than 24 months from date of manufacture.

Aquamarine Water Treatment will not be liable for damage or wear to products caused by abnormal operating conditions, accident, abuse, misuse, unauthorized alteration or repair, or if the product was not installed in accordance with Aquamarine Water Treatment printed installation and operating instructions.

To obtain service under this warranty, the defective product must be returned to Aquamarine Water Treatment together with proof of purchase and installation date, failure date, and supporting installation data.

4.2 Log Sheet

Please fill in the log sheet attached to this manual. Read it carefully and in accordance with current regulations complete all sections relevant to the appliance and installation. The details within the log sheets will be required in the event of any warranty work. On completion of the log sheet, please send it to the following contact:

- **Email:** gary.farquhar@murrob.com

Note: Warranty on product will not be guaranteed if log sheets are not submitted to Aquamarine Water Treatment.

5.0 Transportation and Storage

5.1 Delivery

Check all items ordered have been delivered.

- Water Treatment Plant
- Accessories as on order confirmation
- Operating instructions and drawings

Aquamarine Water Treatment Systems should be transported carefully, in particular do not drop. The unit should be checked immediately after receipt to ensure all items ordered are delivered and that there is no transport damage. Report any problems immediately to Aquamarine Water Treatment.

6.0 Specifications and Parameters

6.1 Introduction

The specifiactions pertaining to the particular water treatment unit have been summarized in this section. This inlcudes equipement data, design settings/requirements and such. Operators should be familiar with these specifications.

6.2 Filtration & Sterilizing Unit

6.2.1 Pre-Filter

Filter Vessel	Wave Cyber 10x54" Fibreglass Vessel
Filtration Valve	Runxin F67B1
Filtration Media	AFM 1 (1 bag, 25kg), top layer
	AFM 2 (1 bag, 25kg), base layer

6.2.2 Booster Pump

Pump Type	Ebara CDX 90/10
Motor	230V/1.2kW/5.6A/50Hz

6.2.3 Ozone Generator

Ozone Generator	CDA-E-3GA, 3 g/h, 230V/50Hz
Venturi	Mazzei, 784

6.2.4 IL9 Filtration

Filter Vessel	Wave Cyber 10x54" Fibreglass Vessel
Filtration Media	IL9 Filtration Media
Supplied by H2O International	

6.2.5 Sediment Filters

Filter Housing	Big Blue Housing, 10"
Filter Cartridges	Melt Blow, 20 Micron & 5 Micron

6.2.6 Ultraviolet Sterilizer

UV Type	HC-480
Flow	1.8 m3/h
Power	230V/29Watt
UV-Lamp	T529, 29Watt for HC-480
Quartz Sleeve	680QT, Quarts Sleeve for HC-480
Ballast	UV-6UN, 20-40W/230W/50Hz

7.0 System Requirements

7.1 Plumbing

7.1.1 Connections for Filtration & Sterilizing Unit

Raw Water Inlet	¾" BSP Female Thread
Fresh Water Outlet	¾" BSP Female Thread

7.2 Electrical

230V/ 50Hz

8.0 Process Description

8.1 AFM Glass Media

AFM Activation refers to a process in which the surface structure of glass is changed on a molecular level; this is accomplished in a three-facet process. This process improves the filtration properties of glass by increasing the surface areas, controlling the selective molecular sieve structure and increased catalyst properties.

8.2 Sediment Filter

Cartridge filters are used for sediment filtration – the removal of fine solids from water by passing it through permable barrier. The barrier only allows particles below a certain size to pass through.

8.3 Ozone Disinfection

Ozone (0_3) is an unstable molecule which readily gives up one atom of oxygen providing a powerful oxidizing agent which is toxic to most waterborne organisms. It is a very strong, broad spectrum disinfectant that is widely used in Water Treatment. It is an effective method to inactivate harmful protozoa that form cysts. It also works well against almost all other pathogens (anything that can produce disease). Ozone is made by passing oxygen through ultraviolet light or a "cold" electrical discharge. To use ozone as a disinfectant, it must be created on-site and added to the water by bubble contact. Some of the advantages of ozone include the production of fewer dangerous by-products and the absence of taste and odour problems (in comparison to chlorination) . Another advantage of ozone is that it leaves no residual disinfectant in the water. The U.S. Food and Drug Administration has accepted ozone as being safe; and it is applied as an anti-microbiological agent for the treatment, storage, and processing of foods.

8.4 UV Sterilization

8.4.1 General

The UV light will reduce the level of viruses and bacteria in a process stream. It works by disrupting the DNA (or RNA in the case of a virus), preventing replication of the organism. The disinfection effect is dependent on the amount of UV energy received by the organism, and this in turn is the product of the intensity of the light and the exposure time. This is termed the dose (fluence) and has the unit of Ws/m2, more commonly expressed as mJ/cm2.

8.4.2 Electrical

U.V lights generate heat which is dissipated by the flow of water over the tubes. If this heat is allowed to build up failure of the seals could ensue and the units could leak on start up. In addition the flow of cold water over the hot glass could cause the glass to shatter. The warning lights will glow permanently when the unit is on line, if a warning light goes out , this indicates a lamp failure, ballast failure or starter failure.

Contact Aquamarine Water Treatment for replacement parts (see spare parts at the end).

Caution: Ultra Violet light can cause severe eye problems, blindness or skin problems similar to extreme sun burn. Never connect the light up outside of its casing or look at it without protection.

9.0 Commissioning

9.1 General

The plant should be installed and wired by properly qualified personnel. Unless otherwise indicated these instructions cover the Aquamarine Water Treatment Plants. Please refer to the flow diagrams in the user manual for additional information as well as component manuals attached.

9.2 Pre Start-Up System Configuration Check

9.2.1 Electrical installation

- ✓ Check supply voltage (Voltage and frequency)
- ✓ Install level floats in tanks and connect up to control box (if included)

9.2.2 Hydraulic installation

- ✓ During transportation fittings can be loosened; check all pipe work and vessels for water leaks in joints and fittings during unit flushing.

9.2.3 Filters

- ✓ Check that filter strainers /valves in filter vessels are connected properly and did not come lose.
- ✓ Check filter discs and tighten housing if necessary/applicable
- ✓ Check that bag/cartridge filters have correct filter bags/cartridges in place

9.2.4 Ultraviolet Sterilizer

- ✓ Check that UV sterilizer is functioning correctly (indicator light on UV ballast)

9.2.5 Ozone Generator

- ✓ Ensure Ozone generator is switch on
- ✓ Check that all tubing is properly connected

9.2.6 Pumps

- ✓ Ensure that all pumps are primed before starting.

9.2.7 Level Float

- ✓ Install level float switches (if applicable)

9.3 Placing

Although the plants have very little vibration or movement it is advised to ensure that the plant is placed on a level and secure footing. Allow for sufficient space to perform maintenance around the unit.

9.4 Plumbing

Connect all relevant pipe work leading to and from the water treatment system.

Connect pipe work from the filtrate line and fresh water line to the correct storage tanks.

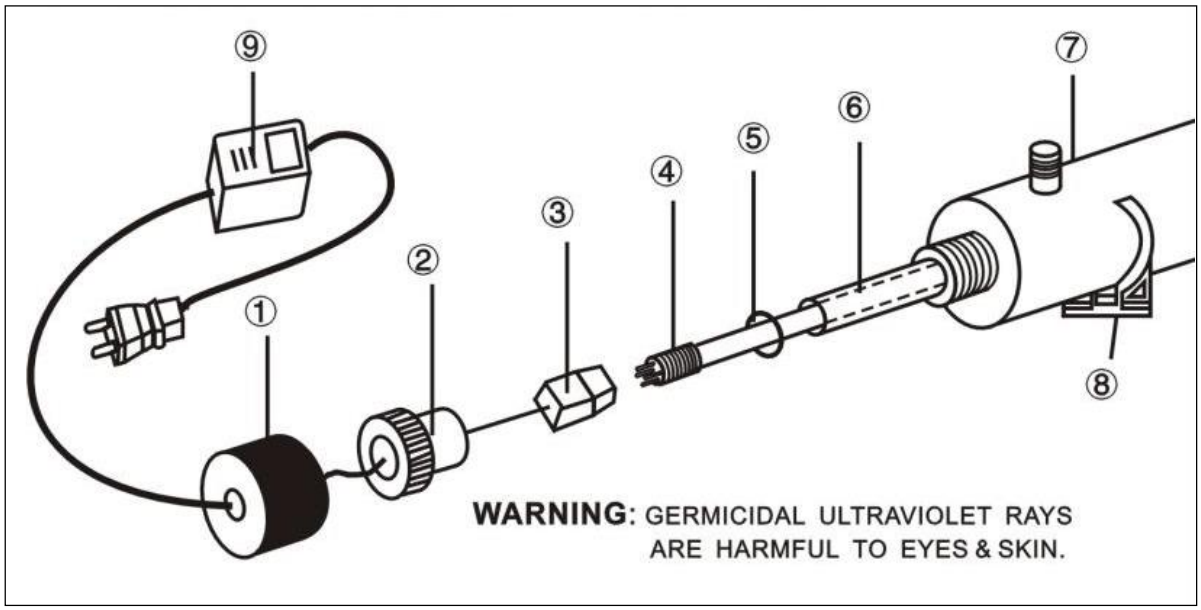
Connect feed water lines from the storage tanks to the system inlets.

Connect pipe work from the backwash water as well as brine to a suitable drain or soak away allow the water to run freely with no restrictions (if applicable).

9.5 Installing UV Lamps

9.5.1 General

The system is on and in operation when the power is switched on and the green LED light on the ballast (9) is illuminated. A problematic bulb will be indicated by the red LED light on the ballast (9) illuminating and by a buzzing sound being emitted from the ballast (9).



9.5.2 Installation Process

Caution: **Before attempting any maintenance insure the power supply is off and isolated.** Ultra Violet light can cause severe eye problems, blindness or skin problems similar to extreme sun burn.

Step 1: Carefully insert the quartz sleeve (6) into the stainless steel housing (7) until it reaches the support spring on the opposite end.

Step 2: Slip the silicone O-ring (5) onto the outside of the quart sleeve (6) until it makes contact with the stainless steel threaded nipple.

Step 3: Screw the securing nut (2) onto the treaded nipple and tighten until the sealing face makes contact with the silicone O-ring (5). Take caution not to over tighten as this can crack the quartz crystal sleeve.

Step 4: Pressurise the system and make sure there are no leaks from the silicone O-ring (5) seal.

Step 5: Once the system has been checked and rectified from leaks insert the UV lamp (4) into the stainless steel housing (7)

Step 6: With the power disconnected carefully fit the lamp plug socket (3) onto the 4 pins located on the UV lamp (4) and insert the UV lamp (4) all the way into the stainless steel housing (7)

Step 7: At this stage the power can be turned on for a few seconds to insure the lamp is burning, which is evident by a blue glow. This must only be done for a few seconds after which the power must be turned off to avoid eye and skin exposure to the UV rays.

Step 8: Slip the plastic sleeve (1) over the securing nut (2) to conceal the UV lamp (4) and plug end (3) and to insure there is no risk of exposure to the UV rays.

Step 9: Once the UV lamp (4) has been concealed in step 8 the power can be turned on and the unit put into operation. Always insure there is water flow or at least water in

the stainless steel housing (7) before the power is switched on and put into operation.

9.6 Start-Up Procedure for Ozone & UV Sterilization Unit

Hereafter follow sthe start-up procedure for the Ozone & Sterilization unit.

1. Check that all suction and discharge valves are open.
2. Ensure that the UV light has been installed correctly, as per Section 9.5.
3. Prime the booster pump by opening the bleed nut on the pump head. Close the nut once all air has been bled out.
4. Switch on the unit by turning the switch on the main control box to the “on” position.
5. Bleed air from the sediment filter housings.
6. Ensure that the Ozone Generator is functioning correctly.
7. Check to see if that the unit functions correctly.

10.0 Maintenance

10.1 General

- Always insure that the system is leak free.
- Check motor and pump daily for excessive noise, vibration and heat.
- Pumps need to be serviced once every 12 months.
- Logbook is regularly maintained and any abnormal trends acted upon when necessary.
- The condition of the filter cartridges should be regularly checked and replaced if required. Increased pressure drop occurs the sediment filters indicates that filters should be replaced.

10.2 Pumps

Pumps need to be serviced once every 12 month

11.0 Troubleshooting

Should you experience any concerns with the water treatment unit that cannot be readily resolved, please contact one of the following persons at Aquamarine Water Treatment.

- Wade Bills (Sales)
- Kenny Moreland (Process)
- Robert Aspeling (Manufacturing)
- Richard Mondo (Electrical)
- Gary Farquhar (Servicing)

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12.0 Consumables

A list of consumable has been presented below for this water treatment unit:

Description	Part N°	Consumption
Filter Media		
AFM Glass Media	AFM1, AFM2	n/a
Sediment Filters		
Big Blue 10”, 20 Micron, 5 Micron	APPBB10-20, APPBB10-5	1-3 per month, each

13.0 Attachments

- Process Flow Diagram
- Part List
- Equipment Manuals
- Log sheets

Date	Pressure in bar		Maintenance			Comments
	Before Filters	After Filters	Filter Cartridge Change?	UV Change?	Filter Media Change?	

Please fill in the log sheet regularly (at least once a week). The details within the log sheets will be required in the event of any warranty work.
Warranty on product will not be guaranteed if log sheets are not submitted to Aquamarine**. On completion of the log sheet, please send it to the following contact:**
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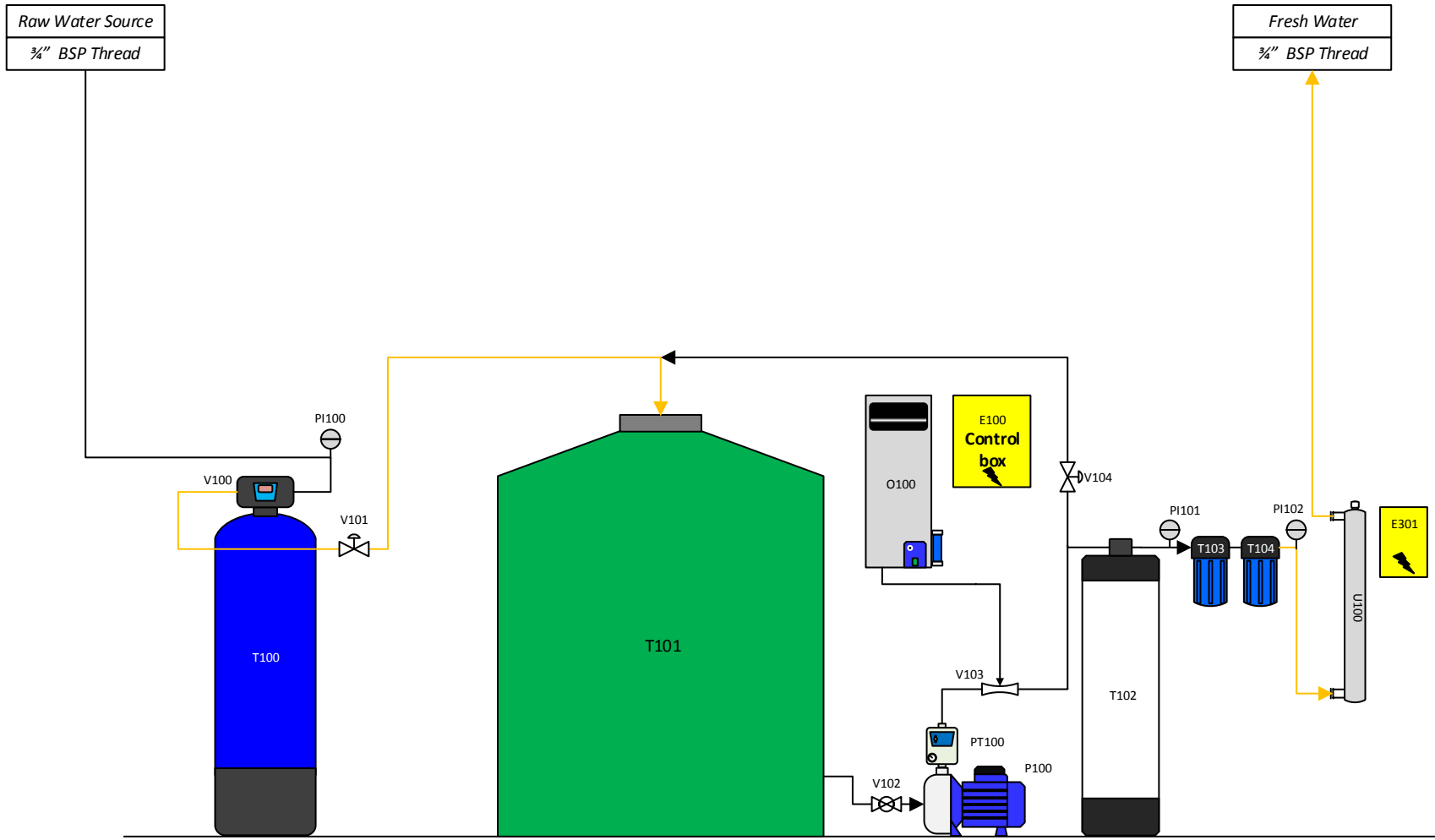

Colour Abbreviations

- Filtered Water
- CIP Water
- Permeate Water
- Brine Water
- Backwash Water

Abbreviations

Ball Valve, Three Way Valve, Rotameter, CIP Valve, Flow Switch, pH Probe, Digital Flowmeter, Check Valve, Solenoid Valve, Level Transmitter, Venturi, Conductivity Probe, Butterfly Valve, Pressure Transmitter, Regulating Valve, Air Release, Vacuum Breaker, Pressure Gauge, Pressure Switch, Actuator Valve

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H2O INTERNATIONAL
It's what's inside that counts

DRAWN BY	KENNY MORELAND	DATE	2016/08/24
Job#	J160271	PAGE	1 OF 1
FILENAME	H2O INTERNATIONAL_J160271_PROCESS FLOW DIAGRAM_00.VSDX		

H2O INTERNATIONAL	Part List	
	Project Number:	J160271
	Author:	Kenny Moreland
	Date:	24/08/2016
Description:	IL9 Filtration & Sterilization Unit	

General Part Information				Size		Technical Documents	Part Number	Quantity	Supplier
Tag	Part Descrption	Manufacturer	Part Specifications	mm	DN				
	Pre-Filter								
PI100	Pressure Gauge		0-6 Bar, 63mm, 1/4" back entry		8		Y630-6B	3	
V100	Filtration Valve	Runxin	Runxin 2.5" automatic filtration valve		65		F67B1	1	
	Top Strainer		Top distributor 3/4" fleck type				JD209	1	
	Bottom Strainer		Bottom distributor 3/4" fleck type				JD210	1	
	Riser Pipe		27mm Riser pipe to fit JD107B & 2.5" auto valves				RT101	1	
T100	Filter Vessel	Wave Cyber	Fibre glass vessel with 2.5" inlet				10x54	1	
	AFM1		Activated Filter Media,Grade 1				AFM1	25kg	
	AFM2		Activated Filter Media,Grade 2				AFM2	25kg	
V101	Solenoid Valve		3/4" Normally closed solenoid valve (stainless steel)				YCD21-20GSES91B	1	
	Filtration Skid								
V102	Ball Valve		PVC Ball Valve	40			SVD0400	1	
P100	Booster Pump	Ebara	Ebara CDX 90/10, 230V, 1.2kW				CDXHM 90/10	1	
PT100	Pressure Manager	TeePrees	Teepress pressure manager				TEEPRESS	1	
V103	Venturi	Mazzei	Mazzei 784 Venturi injector		15		VENTURI 784	1	
V104	Solenoid Valve		1/2" Normally closed solenoid valve (stainless steel)		15		YCD21-15GSES91B	1	
PI101	Pressure Gauge		0-6 Bar, 63mm, 1/4" back entry		8		Y630-6B		
T102	IL9 Filter		IL9 Filter supplied by H2O International						
T103	Filter Housing		10" Big blue 1" port DBL O-ring		25		BBB101D	2	
	Cartridge Filter		10" Cartrdige filter, 20 Micron				APPBB10-20	3	
T104	Filter Housing		10" Big blue 1" port DBL O-ring		25		BBB101D		
	Cartridge Filter		10" Cartrdige filter, 5 Micron				APPBB10-5		
	Bracket		Single epoxy coated for BB				AC10-02	1	
	Spanner		Spanner fo Big Blue Housing				AC9-09 20	1	
PI102	Pressure Gauge		0-6 Bar, 63mm, 1/4" back entry		8		Y630-6B		
O100	Ozone Generator		CDA-E Series ozone generator, 3g/h				O3G	1	
E100	Control Box		Control Box manufactured by AQM Water Treat,ent						
U100	UV Sterilizer	Wonderviolet	1800lts/hr, 29 Watt, 1/2" Male with control box		15		HC-480-B	1	