

TROJANUVLOGIC™

Operation and Maintenance User Manual

Original Instructions

Edition 2





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Specifications are subject to change without notice.

Specifications Trojan UVLo	Specifications Trojan UVLogic																
Model	02AS20	03AS20	04AS20	03AL20	06AS20	04AL20	08AS20	06AL20	08AL20	06AL30	08AL30	12AL30	12AL40	18AL40	18AL50	24AL50	30AL50
Maximum Flow Rate GPM	290	430	585	690	835	935	1010	1014	1040	2275	2240	2730	3989	4750	7320	8141	8141
HeadLoss at Peak Flow Rat	t e. < 2.0 PSI																
UV Chamber Connections*	*Refer to Outline Drawing																
Electrical Requirements**								**Re	fer to	Elec	trical	Draw	ving				
Control Power Panel (CPP)	with	P40	Disp	lay													
UV Sensor W/ 4-20mA								St	anda	rd							
Lamp Status Indicator								St	anda	rd							
Lamp Out Alert Dry Contacts	Standard																
Temperature Switch	Standard																
Run Time Indicator	Standard																
Remote ON/OFF 24-240V AC/DC	Standard																
Control Cabinet																	
Control Cabinet System Rating								N	EMA	12							
Material of Construction	304 Stainless Steel (Painted Carbon Steel Optional)																
UV Chamber																	
Operating Pressure (Maximum)	10 bar (150 psi)																
Hydrostatic Pressure Test (Maximum)	1.5 times operating pressure																
UV Chamber Material	316L Stainless Steel																
Environmental Conditions	Altitude up to 2000m Humidity 80% to 31° Decreasing to 50% at 40°																
Ambient Operating Temperature	Water 41° to 104°F (5° to 40°C) Air 34° to 104°F (1° to 40°C)																
Ambient Storage Temperature				-20 to 40 °C (-4 to 104 °F)													
Ambient Relative Humidity	Ambient Relative Humidity 10% to 80%, non-condensing																
UV Lamp and Lamp Sleeve	1																
UV Lamp Body Type	240 W, GA64T6, low pressure, high output, angled base (red)																
UV Lamp Overall Length							61	.81 ir	า. (15	70 m	m)						
Compression Nut							Tord	que: 5	50 to	60 in.	lbs.						
Lamp Sleeve Material							GE	214,	fully a	annea	aled						

Specifications

Model	02AS20	03AS20	04AS20	03AL20	06AS20	04AL20	08AS20	06AL20	08AL20	06AL30	08AL30	12AL30	12AL40	18AL40	18AL50	24AL50	30AL50
UV Sensor						1		1									
Туре	Plug-in sensor in measuring window																
Material						3	16 SS	ST, Vi	ton, C	ornin	g 79	80					
Number of Sensors							1	per l	JV ch	ambe	er						
Supply Voltage Power						24 V	′DC (12-30	VDC) from	n the	CPP					
Maximum Operating Temperature								104	°F (40)°C)							
Maximum Upset Temperature	104°F (40°C), 24 hours maximum upset duration (UV Sensor must be removed above 104°F (40°C) i.e. during hot water sanitization.																
Wiper Option Manual or Automatic			Manual or Automatic									Automatic					
Dimensions and Weights (A	Appro	oxima	ate)														
Cabinet Dimensions Inches (MM) * <i>Model Specific</i>	24x16 (610x40			24x24x10 (610x610x254) (610x610x254) (610x610x254) (610x610x254) (610x610x254)						24x16x10 (610x406x254)	24x24x10 (610x610x254)			48x36x10 (1220x914x254)			54)
Weight lbs. * <i>Model Specific</i>		275	285	340	335	360	385	390	385	390	410	660	770	1134	928	1575	1258
Weight kg * <i>Model Specific</i>	123	125	130	154	152	163	175	177	175	177	186	299	349	515	421	715	571
Certification																	
System Certification	cUL	, CE	and I	NSF	50												

*This product is designed for supplementary disinfection and is intended for use with appropriate residual levels of EPA registered disinfecting chemicals. Specific residual levels of EPA registered disinfecting chemicals may be required by the regulatory agency having authority.

Section 2 Safety Information

Please read this entire manual before operating this equipment. Pay attention to all danger, warning and caution statements in this manual. Failure to do so could result in serious personal injury or damage to the equipment.

Make sure that the protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than that specified in installation manual.

2.1 Use of Hazard Information

A DANGER

Indicates a potentially or imminently hazardous situation, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

ACAUTION

Indicates a potentially hazardous situation, if not avoided, will result in minor or moderate injury.

NOTICE

Indicates a situation that is not related to personal injury.

2.2 Precautionary Labels

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed.

	Electrical equipment marked with this symbol may not be disposed of in European public disposal systems. In conformity with European local and national regulations (EU Directive 2002/96/EC), European electrical equipment users must now return old or end-of life equipment to the Producer for disposal at no charge to the user. Note: For recycling, please contact the equipment producer or supplier for instructions on how to return end-of-life equipment, producer-supplied electrical accessories, and all auxiliary items for proper disposal. No equipment is to be returned without authorization. Local recycling programs may be used. For the manufacturer recycling UV lamp program or producer-supplied electrical accessories and auxiliary items, contact the equipment supplier for proper disposal instructions.
Hg	This symbol indicates that mercury is present.
	This is the safety alert symbol. Obey all safety messages that follow this symbol to avoid potential injury. When on equipment, refer to the Operational and Maintenance manual for additional safety information.
A	This symbol indicates a risk of electrical shock and/or electrocution exists.
	This indicates the marked item has stored energy. Obey procedures to wait 5 (five) minutes after disconnecting main power to allow stored energy to dissipate.

Precautionary Labels

This symbol indicates the marked equipment may contain a component that can eject forcibly. Obey all procedures to safely depressurize.
This symbol indicates the components of the system have been exposed to biohazardous waste.
This symbol indicates a potential crushing pinch hazard.
This symbol indicates a fork lift hazard.
This symbol indicates lifting a lifting clearance hazard.
This symbol indicates a trained and competent lift operator should be used to move the equipment.
This symbol indicates a potential body crush hazard
This symbol indicates surfaces may be slippery or there is a potential fall.
This symbol indicates there is a potential UV hazard. Proper protection must be worn.
This symbol indicates the marked item could be hot and should not be touched without care.
This symbol indicates the equipment the marked item should not be touched.

Precautionary Labels

	This symbol indicates a risk of electrical shock and/or electrocution exists. All appropriate Lockout Tag out procedures must be obeyed.
3	This symbol indicates the equipment should be secured with a safety device/hook.
NVC N	This symbol indicates a safety glasses with side protection is required for protection against UV exposure
K	This symbol indicates a full-face shield is required for protection against UV exposure
	This symbol indicates gloves must be worn.
	This symbol indicates safety boots must be worn.
0	This symbol indicates a hard hat must be worn.
	This symbol indicates the operator must read all available documentation to perform required procedures.

Safety Precautions

2.3 Safety Precautions

Read safety precautions in this section before doing maintenance, service or repair. Obey the instructions in the Safety Precautions. Failure to follow the instructions in the safety precautions can result in serious injury or death.

	A DANGER
٨	Arc Flash and Shock Hazard - Live Electrical Circuit Present. Hazardous Voltage.
	 Failure to follow these instructions will result in electrical shock, injury or death from electrocution. Devices inside this equipment contain stored energy. NEVER work inside this equipment until at least 5 (five) minutes after disconnecting main power to allow stored energy to dissipate. Lockout tag out all sources of power before performing any inspection, repair, or maintenance.
	A DANGER
	Pressurized Device – Impalement Hazard.
	 Failure to follow these instructions will result in serious injury or death due to forcible ejection of materials from UV Chamber Inspection, repair and maintenance must be performed by competent personnel only. ALWAYS follow lockout tag out procedures, as required by <i>Operation and Maintenance Manual</i>. NEVER perform any physical inspection, repair, maintenance or service on UV chamber unless UV chamber has been isolated, depressurized and open to atmosphere. Where UV chambers are interconnected in series and vertically stacked, only the top UV chamber must be open to atmosphere. Exception: Performing Reference Sensor check in compliance with "<i>Install or Remove a Reference Sensor</i>" in <i>Operation and Maintenance Manual</i>. NEVER pressurize UV chamber without service end cap properly installed. NEVER stand in front of UV lamp section while UV chamber is undergoing a hydrostatic pressure test. Stand off to the side of the UV chamber while looking for leaks. If a leak is observed, depressurize immediately, drain, repair and retest. Avoid injury. Read and understand the <i>Operation and Maintenance Manual</i> before operating this equipment
	AWAPNING
•	Body Crush Hazard
	 Failure to follow these instructions could result in serious injury or death due to improper lifting procedures, underrated lifting equipment and moving parts. ALWAYS secure with safety device. ALWAYS stay clear of elevated loads. ALWAYS comply with local regulations.
	 Pinch Hazard. Failure to follow these instructions could result in a potential crushing pinch hazard. ALWAYS keep hands clear of this area.

A CAUTION

	 Burn Hazard. Failure to follow these instructions may result in minor or moderate injury due to burns. If accidental exposure occurs immediately cool effected area. Consult a physician. NEVER touch hot surface. Allow UV Lamps to cool for a minimum of 10 (ten) minutes before handling.
	A CAUTION
	 Slip and Fall Hazard. Failure to follow these instructions may result in injuries from slip and fall. ALWAYS ensure safe footing. ALWAYS clean up spills promptly. ALWAYS comply with site specific safety protocols and procedures.
	A CAUTION
	 UV Light Hazard. Failure to follow these instructions may result in serious burns to unprotected eyes and skin. ALWAYS use UV protective gear, including gloves and clothing and face shield, when UV light is present. NEVER look directly at illuminated UV lamp even with protective gear. NEVER illuminate UV lamp if personnel may be directly exposed to UV light.
	NOTICE
	A health risk exists. This system uses ultraviolet light to reduce the concentration of pathogens to a noninfectious level. Failure to observe maintenance instructions or the alarm messages will diminish the effectiveness of this system. This will result in the effective disinfection no longer being guaranteed and the requirement of the water supply regulations no longer met.
	NOTICE
Hg	 Mercury Chemical UV Lamps contain a small amount of mercury in either elemental or amalgam state, depending on lamp type. These lamps are similar to the fluorescent and compact fluorescent lamps (CFL). Always comply with local regulations governing the disposal of lamps containing mercury and the waste associated with breakage. NEVER use a vacuum cleaner to clean up broken lamps containing mercury. Vacuuming could spread mercury-containing powder or vapor. Thoroughly collect broken glass and trace amounts of mercury and place into a sealable bag or container. For further reference see the U.S.EPA guidelines at http://www.epa.gov/cfl/cleaning-broken-cfl If you have further questions about the safe clean-up of mercury containing lamps, contact the AquafineUV service support group at sales@aquafineuv.com

NOTICE

Personal Protective Equipment Required.

- ALWAYS use appropriate eye, hand, and foot protection.
- ALWAYS wear UV-C safety glasses when around equipment or a UV-C face shield when inspecting open running equipment.
- ALWAYS follow plant safety procedures and protocols.
- ALWAYS take the necessary precautions when working around, operating, or working on this equipment, if contamination of components is expected within this application due to effluent biological or chemical contaminants.

NOTICE

Only competent personnel should undertake operation, repairs, maintenance, or servicing of the equipment described in this manual. Maintain the continuity of the lockout tag out between shifts. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

WARNING: This product can expose you to chemicals including phthalates, which is known to the State of California to cause cancer, and mercury, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Notes: 1) Dispose of contaminated parts/components as per country requirements.

2) Refer to the Safety Data Sheets for accidental exposure to materials.

Section 3 General Information

The information in this manual has been carefully checked and is believed to be accurate. However, the manufacturer assumes no responsibility for any inaccuracies that may be contained in this manual. In no event, will the manufacturer be liable for direct, indirect, special, incidental or consequential damages resulting from any defect or omission in this manual, even if advised of the of the possibility of such damages. In the interest of continued product development, the manufacturer reserves the right to make improvements in this manual and the products it describes at any time, without notice or obligation.

3.1 Acceptable Noise Levels

The airborne noise emissions, A-weighted emission sound pressure level, is not more than 70dB(A).

3.2 Patents and Permissions

The UV System described in this manual, may be protected by one or more patents in the United States of America, Canada, and/or other countries. http://www.trojantechnologies.com/patents/

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any forms or by any means without written permission of Aquafine Corporation.

3.3 Abbreviations and Acronyms

Table 1 describes the abbreviations and acronyms included in this manual.

Abbreviation/Acronym	Description
AMWS	Automatic Mechanical Wiping System
ССВ	Communication Control Board
СОММ	Communications
СРР	Control Power Panel
SCADA	System Control and Data Acquisition

Table 1 Abbreviations and Acronyms

3.4 System Overview

This system has a pressurized UV Chamber that uses high-output amalgam UV lamps. One Control Power Panel (CPP) provides power distribution for one UV Chamber and controls the UV Chamber through a microprocessor user interface.

General Information

3.4.1 Unit Description

Elements to identify the TROJANUVLOGIC Series are:



Figure 1 TROJANUVLOGIC

1.	Service End Cap	5.	UV Treatment Chamber
2.	Inlet	6.	Quartz Sleeves & UV Lamps
3.	End Plate	7.	Outlet
4.	Sanitary Gasket	8.	UV Sensor

3.4.2 Socket Covers/Service End cap

The Socket Cover/Service End Cap on the UV Treatment Chamber provides protection to the Lamp Socket assemblies.

3.4.3 Quartz Sleeves and Lamps

The Quartz Sleeves and lamps fit inside the UV Treatment Chamber. The Lamp Sockets connect to the lamps, creating a water-resistant seal and a vibration proof grip. The Service End Cover on either end of the chamber protects the Lamp Socket assemblies from the environment.

3.4.4 End Plate

Sealing gaskets/O-rings are located on both ends which contain the stainless-steel Compression Nuts and Lamp Socket retainer assemblies on lamp access side.

3.4.5 UV Treatment Chamber

The UV Chamber is manufactured from 316L Stainless Steel.

3.4.6 Control Power Panel (CPP)

The Control Power Panel (CPP) contains the Ballast(s) and controller(s) for the unit.

3.4.7 Drain Port

The UV Treatment Chamber is provided with a drain port to drain the cylinder completely.

4.1 Shipping Contents

The system consists of two major components, the UV chamber and the CPP. Some components may be disconnected for shipment.

4.2 How the Equipment is Shipped

The system is delivered to the site by truck. System components are packed in wooden crates or pallets labelled with the component name. Other labels identify components which are fragile or breakable and components which must be kept dry.

To prepare for installation, remove only the shipping straps and bolts that secure the panel to the pallet.

4.3 Storage requirements before install

The manufacturer recommends indoor storage of the system equipment. The equipment should be stored in a dry warehouse. Heating is not necessary during storage. However, before the system start-up, the equipment must be warmed to greater than 15 °C (60 °F) for a period of 24 hours.

Storage area conditions:

- Ambient air temperatures between -40 °C to 55 °C (-40 °F to 130 °F).
- Relative humidity from 10% to 90%, non-condensing.
- Free from dust and dirt ingress.
- Must not contain corrosive or explosive gases.
- Free from salt air.
- Vermin free.

If indoor storage is not possible, the panel may be stored outdoors, with additional conditions:

- Equipment is stored on high ground that is not susceptible to flooding.
- Equipment is elevated a minimum of 300 mm (12 inches) above the ground or as appropriate to prevent flooding.
- Equipment is completely covered with waterproof tarps to prevent exposure to the elements (e.g. rain, snow sand, dust, etc.). Tarps must be tight fitting, attached securely and examined regularly. Water and snow accumulation should be removed regularly.
- Equipment stored in crates should not be exposed to direct sunlight.
- Equipment can be stored in sea containers.

4.4 Overview of Equipment Connections

Refer to the general layout drawings provided by the manufacturer. If the supplied lay-out drawings do not match the site conditions, contact the manufacturer for assistance.



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

The procedure in Section 5.1 is the minimum lock requirement. Use additional precautions, as needed. Obey all site-specific protocols.

5.1 Lockout/Tag Out Procedure

5.1.1 Equipment Shutdown

Contact the plant manager or shift supervisor for help regarding equipment location and identification.

- 1. Ensure that no hazards will be created by equipment shutdown.
- 2. Shut down all equipment that will need lockout tag out.
- 3. Ensure that all moving parts come to a complete stop.

5.1.2 Deactivate Energy Sources

A hazardous energy source is any energy source that can cause serious injury or death. The potential hazardous energy sources in this manual are:

1. Identify and deactivate the main isolating device of each energy source:





- **3.** Dissipate stored electrical energy in capacitors.
- 4. Close all shut-off valves.

5.1.3 Lockout Tag Out Energy Sources



- 1. Use a multi-lock scissor adapter to lockout each energy source.
- 2. Attach a completed lockout tag. Include the required information:
 - Person and company applying the lockout.
 - Reason for lockout.
 - Date of lockout.
- 3. Apply a personal lock.
- 5.1.4 Verify the Lockout.



- 1. Ensure that the meter is working correctly with a test before and after measuring de-energized source:
 - a. Test the voltmeter to a known, energized 24 VAC/120 VAC source.
 - **b.** Use the same voltmeter to test locked-out energy sources to verify there is no voltage.
 - c. Test the voltmeter again to a known, energized 24 VAC/120 VAC source.
- 2. Ensure that the stored energy sources have dissipated.
- 3. Try to start the de-energized equipment.

5.2 Remove the Lockout Tag Out

When the work is finished, the lockout tag out can be removed.

- 1. Ensure that no hazards will be created by removal of lockout.
- 2. Obey manufacturer's instructions and safe work procedures to energize and start the equipment.
- 3. Clean up the work area.



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

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6.1 Tools and Materials

Symbols	Description	Symbols	Description
	Lifting Straps Properly sized and rated for equipment load.		Tape Measure
LICE REAL	Level	A A A A A A A A A A A A A A A A A A A	Adjustable Wrench
0	Gasket (by others)		Drill with bits

All Aquafine products are carefully inspected and tested before shipment from our plant. Upon delivery, check the packaging and equipment for damage that may have occurred during shipment.

6.2 Installation

Before installing the system:

- 1. When preparing the site for installation, allow for valves, drain and bypass as part of your plumbing circuit.
- 2. The Inlet/Outlet connections on the UV Treatment Chamber or manifolds are the main connection points. It is recommended that valve bypass lines be incorporated in supply lines to facilitate maintenance in the event partial or the complete unit must be taken out of service. Always apply full system LOCKOUT/TAGOUT procedures during all partial or complete unit maintenance procedures.
- 3. Connecting or attached piping to the UV System should be supported to avoid any undue load bearing strain on the UV Chamber. Limit overhead piping load to 10 lbs (4.54kg) per flange for 1 & 1 /2 in, 24lbs (10.9kg) per flange for 2" & 3", 50lbs (23kg), for 4", 75lbs (34kg), for 6" or above. Additional bracing and supports must be installed on any additional piping and valves to reduce the stress on the treatment chamber and manifold Inlet/Outlet connections.
- **4.** Allow sufficient air space for the air vents, a minimum of 12" (30 cm) around the sides of the panel, (or greater if per local code) for sufficient cooling of the inner electronic components.
- **5.** Allow sufficient service access clearance for the unit, at least 42in. for 30in. lamps and at least 72" (183 cm) of clearance for 60 in. lamps on the lamp-changing end of the unit. At the opposite end, there should be a minimum of 36" (92 cm) of clearance for maintenance. Clearance for servicing the electrical cabinet should be allowed.
- 6. If your piping system is subject to impulse pressure resulting in "water hammer" condition, a surge tank or other means must be provided to remove this condition; otherwise the extreme momentary pressure may rupture and fracture Quartz Sleeves.
- 7. Avoid locations that experience vibration within proximity of heavy equipment or from erratic pumps. Excessive vibration from other equipment can cause damage to UV Lamps within the UV Chamber and to the internal electrical components.

- 8. Remove the plastic dowel placed inside the UV Treatment Chamber unit, used for securing the baffle during shipping.
- 9. Protect the equipment from the environment. Do not expose the equipment to direct water spray.
- **10.** As a UV treatment system, does not introduce any chemical residue within the water, it is desirable to install the unit as close as possible to the point-of-use to avoid potential recontamination by discharge pipes, fitting, etc.

6.3 CPP

Prerequisites:



• Clear area where CPP will be installed.

Note: When installing the CPP, make sure that there is at least 12 inches (30 cm) air space around the sides of the panel (or greater if per local code) for sufficient cooling of the inner electronic components. The more air space there is around the CPP, the more efficient the cooling will be.

• Apply lockout tagout devices as necessary. Refer to Section 5.1

Tools:



Materials:



Mounting Hardware (by others)

Procedure:



- 1. Connect lifting straps to lifting lugs on CPP and lift the CPP into position.
- 2. Drill holes in concrete for all the anchor bolts. Refer to anchor bolt manufacture specifications for hole size.
- 3. Install anchor bolts as specified by customers civil engineering drawings.
- 4. Level the CPP top to bottom and front to back.
- 5. Secure the anchor bolt hardware and torque to manufacturer's specifications. Remove lifting straps.

6.4 UV Chamber

Prerequisites:

• Clear area where the UV chamber will be installed.

Note: Allow sufficient service access clearance for the unit, at least 42in. for 30in. lamps and at least 72" (183 cm) of clearance for 60 in. lamps on the lamp-changing end of the unit. At the opposite end, there should be a minimum of 36" (92 cm) of clearance for maintenance. and 9 inches (23 cm) at the sensor port(s) for removal of the UV sensor

Tools:



Materials:



• Mounting hardware (by others)

Procedure:



1. Position a lifting strap around each of the UV Chamber mounting brackets (between the flange and the bracket). Center the lifting straps around the UV Chamber. Bring the two lifting straps above the UV Chamber and connect as required to a crane. Use a crane to lift the UV Chamber into position. The UV Chamber can be installed in either a horizontal or a vertical position.

Note: Avoid trapping air, ensure the outlet is oriented vertically. On vertically mounted units a venting kit is supplied.

- 2. Install a gasket at the inlet and outlet connections of the UV chamber.
- **3.** Loosely install the connection hardware to the UV chamber inlet and outlet connection to the plant piping. The provided mounting brackets on the UV chamber can be mounted to pipe support (by others) if available.

Note: The UV Chamber will not bear the load of process piping or other equipment. Make sure all piping is properly supported independent of the UV Chamber.

- 4. Level the UV chamber from front to back (horizontal), top to bottom (vertical).
- 5. Secure the mounting hardware and torque to manufacture's specifications.
- 6. Remove lifting straps.
- 7. Install air vent if required.
- 8. Connect UV chamber drain to plant piping as required.



	, i i i i i i i i i i i i i i i i i i i		
1.	Clearance for UV Lamp replacement.	5.	Inlet
2.	Outlet	6.	Drain
3.	Cleaning Port	7.	UV Chamber Mounting Bracket
4.	Pressure Relief Valve	8.	UV Sensor

Figure 2 UV System Components

6.4.1 Acceptable UV Chamber Installation Orientations

Horizontal Installation:



Figure 3 Horizontal Installation

1.	Only Allowable Orientation 12:00	4.	Floor
2.	Outlet	5.	Inlet
3.	Service End Cap		

Note: The only allowable outlet orientation is directly up (12 o'clock, from service entrance side).

Vertical Installation:





Figure 4 Vertical Installation

1.	Service End Cap	3.	Inlet
2.	Outlet	4.	Floor

Notes: 1. Outlet orientation angle currently shown at 0.

2. Inlet must not be installed at top.

3. Vertical installations require an air vent.

6.5 Inlet/Outlet Process Piping to the UV Chamber

Prerequisites:

• Clean and inspect inlet and outlet connections for any damage (i.e. scratches, nicks, gouges and burns).

Tools:

R &

Materials:



- Bolts and hardware (by others)
- Gaskets x 2 (by others)

Procedure:

- 1. Install gasket on UV chamber inlet connection.
- 2. Apply anti-seize lubricant and install bolts.
- 3. Tighten bolts to bolt manufacturer's torque recommendation.
- 4. Repeat for UV chamber outlet connection.

6.6 Electrical Connections

Prerequisites:



- Apply lockout tagout devices as necessary. Refer to Section 5.1
- Install the CPP Refer to Section 6.3
- Install the UV Chamber Refer to Section 6.4

Tools:

S.

Materials:



• Electrical drawings (supplied with the system)

Procedure:

- 1. Connect the CPP to the UV Chamber. The individual lamp connectors are numbered with wire tags for convenient connection, match these numbers to their corresponding number on the UV chamber end plate.
- 2. Install UV lamps (if not already installed). Refer to Section xxx
- 3. Connect the lamp socket to the corresponding UV lamp.
- 4. Provide AC power to the CPP matching voltage and power specifications on the serial label of the system.
- 5. Complete Hydrostatic Test. Refer to Section 6.7

For all Voltages:

- 1. Control wiring should reference appropriate wiring diagram. Control wiring is based upon customer requirements and installed options. Should your requirements differ, contact your local Aquafine representative or Aquafine Customer Service.
- 2. Connect wiring to the cable entry hole on the back of the cabinet. Make sure the electrical service matches the electrical data shown on the nameplate decal

Note: UV performance is line voltage sensitive. Line voltage should be $\pm 10\%$ of the rating on the electrical nameplate. Voltage outside of these limits will affect the performance of the UV equipment.

6.7 Hydrostatic Test

Prerequisites:



- Apply lockout tagout devices as necessary. Refer to Section 5.1
- Remove UV lamps (if installed) Refer to Section 9.6
- Inspect condition of sleeves for visible cracks or damage. Replace if necessary.
- Make sure the drain valve is closed.

Materials:



Procedure:



- 1. Slowly fill the UV chamber with water.
 - a. Stand off to the side and make sure the area is clear of all plant personnel.
 - b. Pressurize the UV chamber.
 - c. Check for leaks.
 - d. Wait twenty (20) minutes.
- 2. If leaks are found:
 - a. Depressurize and drain the UV chamber. Refer to Section 9.4
 - b. Fix the leaks.
 - c. Fill the UV chamber and do a pressure test. Check for leaks.
- 3. If there are no leaks, depressurize the UV chamber. Refer to Section 9.4.
- 4. Install the UV lamps. Refer to Section 9.6.

A DANGER



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

Do not operate the UV system until the UV Chamber is completely filled with water.

To prevent alarm conditions, overheating or equipment damage, process water level and flow in the UV Chamber must be established and maintained at all times when UV Lamps are in operation. Follow all provided site specific instructions about automatic or manual power to operate system.

7.1 Start-Up Procedure

7.1.1 Pre-Start Checklist

- 1. Check for complete assembly:
 - UV chamber is completely assembled.
 - UV Lamps and Lamp Sleeves are completely assembled and installed.
 - Installation of UV Sensor is complete.
 - Verify all incoming power connections conductors, including the ground conductor, are properly terminated.
 - There is water in the UV chamber.
 - There are no water leaks in the UV chamber.
 - The Service End Cap is fastened and secure.
 - Make sure that drainage and by-pass provisions are ready.

7.2 Start-up the UV System From SCADA

Prerequisite:

Pre-Start Checklist. Refer to Section 7.1

Start-up Overview:

The UV System is configured to enable on/off control of the system through SCADA communications.

Start-up Procedure:

- **1.** The plant SCADA:
 - Does not allow disinfected flow in the UV chamber.
 - Ensure that there are no Critical Alarms present in the UV system.
 - Sets the Turn ON UV chamber bit.
- 2. The UV system control logic (Microprocessor Board):
 - Sets the UV chamber to Warming state.
 - Sets the UV Warming bit.
 - Sets the power level at 100%.

System Start-up and Shutdown

- Does not register any alarm until a 20-second start-up timer has expired. This prevents false alarms during system start-up. In addition, most alarms have individual delay timers associated with them.
- 3. When warming is complete, and no major or critical alarms are present, the UV system:
 - Sets the UV system Online bit.
 - Clears the UV system Warming bit.
- 4. The plant:
 - Resolves any active alarms.
 - Allows disinfection flow through the UV chamber.
- 5. For Pacing systems, the UV system will adjust the UV lamp power.

7.3 Start-up the UV System from Local

Prerequisite:

• Pre-Start Checklist. Refer to Section 7.1

Start-up Overview:

The UV system is configured to enable on/off control of the system through the local CPP interface.

Start-up Procedure:

- 1. The plant:
 - Ensures there are no Critical Alarms present on the UV system.
 - Does not allow disinfection flow during start-up.
 - Changes the UV system Operation Mode from REMOTE to LOCAL. Refer to Section xx (for P40 display)
- 2. The UV system control logic (Microprocessor Board):
 - Sets the UV chamber to Warming state.
 - Displays the warm up status with countdown timer display on microprocessor interface.
 - Sets the power level at 100%.
 - Does not register any alarm until a 20-second start-up timer has expired. This prevents false alarms during system start-up. In addition, most alarms have individual delay timers associated with them.
- 3. When warming is complete, and no major or critical alarms are present, the UV system:
 - Shows "OK".
- 4. The plant:
 - Resolves and active alarms.
 - Allows disinfection flow through the UV chamber.
- 5. For Pacing systems, the UV system will adjust the UV lamp power.

7.4 Start-up System from Remote

Prerequisite:

• Pre-Start Checklist. Refer to Section 7.1.

Start-up Overview:

The UV system is configured to enable on/off control of the system though Digital Inputs or Digital Outputs.

System Start-up and Shutdown

Start-up Procedure:

- 1. The plant:
 - Ensures there are no Critical Alarms present on the UV system.
 - Does not allow disinfection flow during start-up.
 - Energizes the Remote On/Off digital signal.
- 2. The UV system control logic (Microprocessor Board):
 - Sets the UV chamber to the Warming state.
 - Energizes the UV system Warming digital output signal (configuration optional).
 - Sets the power level at 100%.
 - Does not register any alarm until a 20-second start-up timer has expired. This prevents false alarms during system start-up. In addition, most alarms have individual delay timers associated with them.
- 3. When warming is complete and no major or critical alarms are present, the UV system:
 - Energizes the UV system Warming digital output signal (configuration optional).
 - De-energizes the UV system Warming digital output signal (configuration optional).
- 4. The plant:
 - Resolves any active alarms.
 - Allows disinfection flow through the UV chamber.
- 5. For Pacing systems, the UV system will adjust the UV lamp power.

7.5 Shutdown the UV System from SCADA

Prerequisite:

• Pre-Start Checklist. Refer to Section 7.1.

Shutdown Procedure:

- 1. The plant:
 - Stops process flow through the UV chamber.
 - Clears the "Turn On UV chamber" bit.
- 2. The UV system:
 - Clears the UV system Online bit.

7.6 Shutdown the UV System from Local

Prerequisite:

• Pre-Start Checklist. Refer to Section 7.1.

Shutdown Procedure:

- 1. The plant:
 - Stops process flow through the UV chamber.
- 2. The Operator changes the UV system Operation Mode from LOCAL to REMOTE.
- 3. The UV system:
 - Changes the status from Online to Shutdown.

7.7 Shutdown the UV System from Remote

Prerequisite:

• Pre-Start Checklist. Refer to Section 7.1.

Shutdown Procedure:

- 1. The plant:
 - Stops process flow through the UV chamber.
 - De-energizes the Remote On/Off digital input signal.
- 2. The UV system:
 - Changes the status from Online to Shutdown.

A DANGER



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

The microprocessor user interface screens on the CPP vary with the system configuration. The screens described in this section of the manual may not be the same as the screens shown on the CPP.

A communication Control Board (CCB) and microprocessor user interface are located on the door of the CPP. The CCB monitors the UV chamber and the microprocessor user interface provides system status, alarms and control for the UV chamber.

If the CPP loses power, the control program is retained in memory.

8.1 Operator Interface.

The Operator Interface is a Florescent Display that is programmed with custom screens. The Operator may navigate through the different screens using the 5-button Keypad, as shown below.

The system is controlled by the main On/Off Power Switch located on the side of the CPP. The Ballasts / Lamps are turned ON and OFF in accordance with the position of the switch.

Aquafine TrojanUVLogic

Figure 5 Operator Interface.

8.1.1 Change the Settings

The procedure to change the settings depends on the type of setting. Listed are three different procedures to change the settings.



For some settings, pressing **MENU/ENTER** enters the Setting mode. By using the UP or DOWN arrow buttons the values can be changed. After assigning the desired value, pressing **MENU/ENTER** accepts the value and exits Setting mode.

For most settings, pressing **MENU/ENTER** will toggle between the list of options.

For some settings, pressing MENU/ENTER will initiate an action.

8.2 Control Panel (CP) Software

8.2.1 Boot Screen



Figure 6 Boot Screen

This screen is displayed from the main power on is about 7 seconds and then you see the above for 4 seconds when the power to the unit is initially turned ON. After the 4 second timer has expired, the Main Display screen will appear.

8.2.2 Main Menu Screen



Figure 7 Main Menu Screen

To enter the Main Menu, the Operator must Press the Enter (\downarrow) or Menu button, located in the center of the keypad. This will bring up the following menu. From here the Operator can choose to navigate through any of the listed menus by placing the cursor, beside the desired screen, using the arrow keypad and then hitting the Enter (\downarrow) key.

8.2.3 Main Display Screen DVGW Version



Figure 8 UV Sensor Main Screen

8.2.4 Main Display Screen EPA Version



Figure 9 UV Main Display Screen

The Main Display screens consist of the UV Intensity Sensor 1 and optional Flow Rate and UVT screens. To navigate through all the main screens, press the Menu (\downarrow) button. To access the Main Menu, press the Menu (\downarrow) button through each of the Main Display screens until the Main Menu screen appears.

8.2.5 UV Sensor

This screen provides a general system overview of all key operations including:

Items	Description			
UVI1	Displays the UV Intensity of the UV Sensor in mW/m ²			
Bar Graph Depicts the live UV Intensity reading with the Low UV Intensity Major marked as ""				
XX.XX Hrs	Displays the total Lamp Runtime to date in Hours and Minutes.			
XX UV Lamps	Displays the # of Lamps in the system.			
Power &	The Power is displayed as a percentage for Long Lamp Models only. The mode will be displayed as either Local or Remote. There is no %Power display for Midflow or Short Lamp models.			
Mode	Local: Control override by Operator at the CPP.			
	Remote: Control by the UV System CPP.			
NOTICE				

The microprocessor user interface screens on the CPP vary with the system configuration. The screens described in this section of the manual may not be the same as the screens shown on the CPP.

Final Line "Status Line": This line will display one of the following status lines:

- 1. During start-up
 - Ballast Ignition
 - Lamps preheat
 - Lamps On
 - Warm-up X XX m
- 2. During Wiper Cycle (if Wiper is provided)
 - Wiper Find Home
- 3. During Remote Standby
 - Remote Host Standby
- 4. During Shutdown
 - Lamps Turned Off

Operation from the CPP with P40 Display

- 5. Upon any Active Alarm
 - Most Current Alarm From the list in the Alarm Overview, Section 10.1

8.2.6 Reactor Temp Option (4 - 20 Analog Required):

This screen will only appear if the Reactor Temperature options are configured. This screen provides an overview of the following:



Figure 10 Reactor Temp Screen

Items Description	
Reactor Temp Displays the current reactor temperature	
Decoust	The bar graph depicts live readings. The Reactor Temp graph works indicates both the High
Bar Graph	Temperature Major and High Temperature Critical respectively from left to right as ""

NOTICE

The alarm settings are pre-adjusted at the factory or with specific instructions from Aquafine Corporation. Devices for UV Disinfection systems are delivered with fixed programmed threshold values for the main alarm that are suited for the specific application.

8.2.7 Active Alarms Screen



Figure 11 Active Alarms Screen

Access this screen by selecting Alarms Lists from the Main Menu. This screen provides the Operator with a list of alarm faults for use in troubleshooting. The screen is capable of storing up to 18 alarms. If the list exceeds 18 entries, the oldest alarm entry will drop off the list

NOTICE

Alarms also flash on each of the display screens. See the Three UV Sensor Option screen for an example.

8.2.8 Alarms List Screens Series

For a full list of alarms and their descriptions, Refer to Section 10.1.

8.2.9 Alarm History Screen



Figure 12 Alarm History Screen

The Alarm History Screen can be accessed from the Active Alarm Screen by pressing the *HIST* button. This screen provides the Operator with a history of all active and all resolved alarms, including the time of their occurrence. The screen is capable of storing up to 18 alarms. If the list exceeds 18 entries, the oldest alarm entry will drop off the list.

8.2.10 Alarm History Details Screen



Figure 13 Alarm History Details Screen

By scrolling down the list of Alarms in the Alarm History Screen, the Operator can highlight individual Alarms. Hit *enter* while the cursor is beside a specific Alarm and the Alarm History Detail Screen appears. Figure 13 provides additional information about individual Alarms.

8.2.11 Digital Input Output Screen Series

These screens are accessible through the Main menu by selecting the Digital Input-Output Screens.

Access to screens is limited to the level of password entered on the login screen.

NOTICE

The entire Alarm History can be cleared by selecting "Clear" found at the top right of the screen. The "Clear" button is only visible and active when logged in as a Technician.
8.2.12 Operator Access Level Screen



Figure 14 Operator Access level Screen

The Operator has viewing access of the following screens. The first screen shows what the Current Digital Alarm Relays are set to (i.e. 1R refers to Relay #1). The second screen depicts which Digital Inputs are designated and how they are assigned.



Figure 15 Operator Access Level Screen

8.2.13 Technician level Access Screens

To access these screens you must have entered the Technician's Password. Then, from each of the previous Digital Input/Output Screens select the **CHANGE** button. The text will reverse (dark text with light background) indicating that change mode has been entered.

DΙ	GITAL OUTPUT SELECT
1	Common Alarm Minor
\$	Reactor HiTemp Crti
4	System On-Line
20	
ĩ	MAIN MENUD

Figure 16 Technician level Access Screens

These screens enable the Technician to select which Digital Inputs and Outputs they wish to be present at the Operator Level. To designate Inputs and Outputs move the cursor to the line of choice, and press enter to scroll through the list of items that could be connected to that particular input or output on the board.

Once the corresponding item is displayed, arrow up or down to another line. Continue till all lines are configured as required. Move the cursor to *Save* and the press **ENTER** (\leftarrow) to accept and keep all changes.

A blank line indicates that the Input or Output has not been configured.

Operation from the CPP with P40 Display

For the following screen, the Reactor High Temp is an additional Digital Input/Output that is mandatory. As a standard, it is set to Critical.



Figure 17 Technician Level Access Screens

NOTICE

The Digital Input and Output screens are factory set alarm choices. Personnel with Technician level access are able to change these options.

When an alarm occurs the corresponding Digit Input/Output name will flash.

NOTICE

For typical operator connections, refer to the Digital Output Wiring Diagrams at the end of the chapter.

8.2.14 Analog Input-Output Screen Series

These screens can be accessed through the Main Menu by selecting the Analog Input-Output Screens.

Access to screens is limited to the level of access entered into the login screen.

NOTICE

Digital input 1 and 2 are optional and will only appear if you have opted to have each or both of these inputs configured with your UV system.

8.2.15 Operator Access Level Screens

The Operator has viewing access of these screens. The first screen shows the Current Analog Inputs that are in use. Each input number shows the real time analog value being received.

ANALOG INPUTS	VALUES
1 UV Intensity 2 Reactor Temp	1 15.2
3 A	0.0
5 1 <u>0[:]42 0 =2 0 ++>></u>	0.0 H::::2(14)

Figure 18 Operator Access Level Screens

The second screen allows the Operator to view the Analog Output usage, including the real time analog values being transferred. In addition to this, the Operator can configure the location of the UV Sensor (UV Intensity 1 - 3), Dose Achieved, and optional Flow Rate and Reactor Hi Temp (Reactor High Temperature) Inputs to any of the 5 addresses listed on the previous screen.



Figure 19 Operator Access level Screens

8.2.16 Technician Level Access Screens



Figure 20 Technician Level Access Screens

To access these screens, you must have entered the Technician's Password. Then, from each of the previous Analog Input-Output Screens select the **CHANGE** button. The text will reverse (dark text with light background) indicating that change mode has been entered.

Ah F	IALOG OUTPUTS VA IND SELECT	LUES
12	UV Intensity 1	12.5
54		0.0
2	ă(:D42) ă(=1210)+KKK	

Figure 21 Technician level Access Screens

Within these screens the Technician is able to select which Analog Inputs and Outputs they wish to utilize. The UV Intensity Input is mandatory and is designated in the Operator Level Access Screens. As options, Flow Rate and Reactor Hi Temp (Reactor High Temperature) are also available.

To designate Inputs and Outputs move the cursor to the line of choice, and press enter to scroll through the list of items that could be connected to that particular input or output on the board. Once the corresponding item is displayed, arrow up or down to another line. Continue till all lines are configured as required. Move the cursor to SAVE and press ENTER (-1) to accept and keep all changes.

A blank line indicates that the Input or Output has not been configured.

NOTICE

The UV Intensity can be displayed for each UV Sensor or as an average of multiple sensors. Displaying both individual intensities and an average of all UV Sensors simultaneously is also an option.

8.2.17 System Settings Screens

These screens can be accessed through the Main Menu by selecting **SYSTEM SETTINGS**. The access to screens is limited to the level of access entered into the login screen.

8.2.18 Operator Access Level Screens

The first three screens are available for the Operator to adjust, however changes should not be made **unless you are familiar with the consequences of doing so.**



Figure 22 Operator Access Level Screens

This screen allows the Operator to adjust the following:

Items	Description		
Wiper Timer Adj (For systems with a Wiper).	This feature sets the cleaning cycle frequency.		
	This mode selector can be changed to:		
	Local – control at the CP by the controller.		
Operation Mode	 Remote – control by an external device by powering a voltage loop into the CCB's voltage sensing circuit. 		
	 SCADAR (SCADA Remote) - control by an external device through SCADA communications 		
On/Off Power	This is a counter that keeps track of the number of times the power to the system (i.e. Boa is cycled ON/OFF.		
On/Off Lamps	This is a counter that keeps track of the number of times the power to the Lamps (i.e. UV CHAMBER) is cycled ON/OFF.		
Wiper Cycle	Systems with Wipers use a counter that keeps track of the number wiping cycles.		
Run 100% This field allows the Operator to force the system ON, to override Critical Alarms that shut the UV CHAMBER down, by changing this field to "ON".			
Wiper Reset and Home (For systems with a Wiper)	rith Clears the wiper fault alarm(s) and sends the wiper to the home position.		

NOTICE

In order to use all the available Analog Outputs, additional Analog Boards must be purchased. See your System Verification Label located at the front of the manual for the number of Analog Boards provided with your system.



Figure 23 Operator Access Level Screens

This screens allows the Operator to adjust the following:

Items	Description		
UV Sensor Units	The operator can select either mW/cm ² or W/m ² units to view UV Intensity. Changing the units automatically scales the Main Screen bar graph and set points accordingly.		
Alarm Delay:	This field allows the Operator to adjust the Alarm delay to anytime between 10 and 999 seconds.		
Minor Low UV STP	This is a preconfigured, nonadjustable field that indicates at which value a Minor Low UV Alarm will be triggered.		
Major Low UV STP	This is a preconfigured, nonadjustable field that indicates at which value a Major Low UV Alarm will be triggered.		
Dose Units	The operator can select either mJ/cm2 or J/m2 units to view UV Dose.		
	Fail-Safe Logic (default):		
Open	• Normal operation, Remote Standby: "System On-line", "System Warming" and "Common Major Siren"; 24 VDC Relay contacts closed and LED is on.		
	• Alarm active or UV System is off: 24VDC Relay contacts open and LED is off.		
	Non Fail-Safe Logic, Relay contacts close and LED is ON for active alarms.		
Closed	• Normal operation and Remote Standby: 24 VDC Relay contacts open and LED is off.		
	• Alarm active, UV System is off, "System On-line", "System Warming" and "Common Major Siren": 24 VDC Relay contacts closed and LED is on.		

The following system settings screen information should not be reconfigured unless otherwise authorized by Aquafine.

Trojan	UVLogic	WIPER
8 AL 5	9 Water 8"/147cm	LPHO+
08AL FI	XED BPL	TR2343
Check 3	12	202/08
3	MEDIN	

Figure 24 Operator Access Level Screens

NOTICE

During start-up, the UV Sensor Alarm Delay + an 18-second alarm suspension will occur before an alarm appears. Refer to the Normal Operation heading in this chapter for more details.

Operation from the CPP with P40 Display

The information presented on this screen includes the System Type, With or Without Automatic Wiping, Equipment Usage (i.e. Drinking Water), Number of Lamps, Lamp Length (ie. 36 for 36 inch), Current Time and Date, Firmware Name, and Version & Date

8.2.19 Technician Level Access Screens

To access these screens, you must have entered the Technician's Password at the Login Screen, refer to Section 8.2.30. Then from the previous System Settings screen select NEXT.



Figure 25 Technician Level Access Screens

This screen allows the Technician to change the following variables:

Items	Description	
Reset Lamp Hours	This field allows the Technician to reset the Lamp run time hours to zero. This should occur on a yearly basis when the all the UV lamps are changed at the same time.	
Language Selection	This field allows for language selection. Options are: French, Dutch, German, Spanish, and Norwegian.	
ON/OFF Cycles Reset	This field allows the Technician to reset the System ON/OFF Main Power Cycles to zero.	
ON/OFF Lamps Reset	This field allows the Technician to reset the Lamp ON/OFF Cycles to zero.	
Factory Config Reset	This field allows the Technician to reset the System Controller back to the factory settings.	
Wiper Cycles Reset (For systems with a Wiper only)	This field allows the Technician to reset the Wiper Cycle counter to zero.	
Wipe Lamps ON or OFF	This field allows the Technician to have the controller wipe the Lamps regardless if the Lamps are powered or alternatively only wipe when the Lamps are on.	



Figure 26 Technician Level Access Screens

This screen allows the Technician to adjust the following:

Items	Description	
Set Clock	This field allows the Technician to adjust the system Time.	
Set Date	This field allows the Technician to adjust the system Date.	
Change Technician Password	This field allows the Technician, who would have correctly entered their password, the ability to change it.	
Trend Time	This Field allows the Technician to change the duration of the Trending feature to either 12 minutes or 1 hour (for testing) or 24 Hours or 1 week (for normal operation).	
Hi Temp Off Delay	This field allows the High Temperature Off delay to be set anywhere between 0 - 15 minutes. If '0" is selected, lamps will turn off immediately.	
SCADA Command	This field allows the SCADA Command to be set to Enable (E) for normally operation or Disable (D) to block SCADA commands and perform Local operation and/or or testing.	

8.2.20 Trends Screens

UV Sensor Trend Menus Screens:



Figure 27 Trends Screen

8.2.21 UV Sensor Trend Screen



Figure 28 UV Sensor Trend Screen

8.2.22 Reactor Temperature Trend Screen



Figure 29 Reactor Temperature Trend Screen

The Trend Screens provide live graphical displays based on the Analog Input readings from any of the analog devices connected to the Board. Trending can be shown over a period of 12 minutes, 1 hour, 24 hours or 1 week.

8.2.23 Wiper Screen – (Optional Wiper Only)



Figure 30 Wiper Screen

This screen can be accessed through the Main Menu Screen by selecting Wiper Status. Alternatively, if you are in the Main Screens this screen will automatically pop up upon the start of a wipe sequence. Once the sequence is complete, it will return to the Main Screen.

The Wiper screen provides the Operator with the following information:

Items	Description
Next Wipe In	Displays the time remaining until the next wipe cycle is to occur, indicated in hours.
Wiper Cycle	Indicates how often the Wiper will cycle.
Rev	Number of revolutions the Wiper has turned during extend or retract sequence.
L	Represents the Limit Switch. The L will blink and "fault" will appear on the screen if a fault associated with the switch occurs. M: Represents the motor.
М	Represents the motor
С	Represents Revolution Switch Count. The "C" will blink and "fault" will appear on the screen if a fault associated with the counter occurs.
Wiper Now	When selected will initiate a wipe sequence.

NOTICE

The Rev number is useful for determining the location of the Wiper if it repeatedly stops at a location and is faulted. The Rev number divided by 10 equals the approximate location in inches from the start position of the wipe sequence.

8.2.24 Wiper Sequence Timer

The system is delivered from the factory with a frequency setting of one wiping cycle occurring every 8 hour period. The wiping cycle duration is approximately 65 seconds.

This setting is a starting point for initial system set-up. The wiping frequency can be increased or decreased based on water quality and system performance (UV Intensity). A good understanding of your water quality will enable the Operator to adjust the Wiper cycle frequency to maximum efficiency.

One of the imbedded features of the Board is the Auto Power off.

8.2.25 Wiper Auto Power Off

If the Wiper encounters significant resistance while operating, the Gear Motor will automatically turn off, protecting both Wiper Assembly and Quartz Sleeves. The display will flash "Fault" which indicates the Wiper is not functioning properly

NOTICE

While the Wiper system is in the Auto Power Off mode, the UV system remains operating not compromising the disinfection of the water, however, attention to the Wiper system should be addressed as soon as possible.

NOTICE

If you hear or suspect Sleeve breakage, do not wipe by resetting the power. You will break more Sleeves or Lamps.

The Operator can reset the Wiper system by turning the CP off, waiting 10 seconds and turning the power on again. Alternately, the Operator can remove the Wiper Assembly from the chamber to diagnose the problem.

The other button Wipe Now allows the Operator to do a manual wipe sequence at any time.

8.2.26 Analog Menu Screen

To access this screen, select *Analog Menu* from the Main Menu screen. From the Analog Menu screen, the operator can select *Reactor Temperature* to access the following Flow Rate configure screen.



Figure 31 Analog Menu Screen

8.2.27 UVT Pass Thru

UV Transmittance
Source Live Passilinu
Passihru 4-20mH data
the Modbus board. This
option has no affect
on UVSystem operation
I NEITH KKY EMERICE HAT

Figure 32 UVT Pass Thru



Figure 33 Pass Thru Screen

8.2.28 Reactor Hi Temp (Reactor High Temperature) Configure Screen (Optional)

This screen allows the Operator to adjust the following:

Items	Description
Reactor Temperature °C / °F	Temperature can be set to either Celsius or Fahrenheit from the Systems Setting screen page 2 if the analog Reactor Temperature option is enabled.
Source	This field is a preconfigured live, measured 4-20 mA analog signal reading.
Major High Alarm	This Major High Temperature alarm setpoint acts as a warning. This field is adjustable between $0 - 60$ °C (32 - 140 °F). Default is 45 °C (113 °F).
Critical High Alarm:	This Critical Temperature Alarm set point is adjustable between (0) and 60 °C (32 and 140 °F). The default setting is 50 °C (122 °F). This Analog Reactor Temperature option works in a similar fashion to the Reactor Hi Temp (Reactor High Temperature) Digital Input. If the timed delay setting is set to between 1 and 15 minutes, a delay will occur before the alarm occurs and the lamp de-energize. Setting a delay of (0) minutes causes the alarm to occur and the lamps to de-energized immediately.
Full Scale	This value is preconfigured at 100°C or 212 °F depending on the Reactor Units set. It cannot be adjusted.

8.2.29 Valve Position Screen



Figure 35 Valve Position Screen

8.2.30 Login Screen



Figure 36 Login Screen

If a password has not been entered, the system will automatically allow Operator level access only. Technician level access requires a password entered on the Login Screen.

When you enter the Login Screen, you will be prompted to enter your password. If you are a Technician you will enter your password using the keypad arrows to select each character. Once, the password is entered select Enter using the *Enter* (\leftarrow) or *Menu* button.

If the password was incorrect, "INVALID" Password text will appear. Correct incorrect password numbers and select enter.

If the password was correct it will take you back to the Main Menu Screen. You will notice that along the bottom of the screen it will now say TECH. This stands for Technician Level Access.

NOTICE

The Login screen will automatically log the user out after 10 minutes.



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

9.1 Tools and Materials

Symbols	Description	Symbols	Description
	Screwdriver	B	Philips Screwdriver
0	Adjustable wrench		Allen Wrench
59	3/4 in Wrench		17 mm Wrench
Case News	Clean Water	- USLING	Mild acidic solution (for example, ActiClean Gel) or approved by Aquafine Service, food grade cleaner
Romona Alconoa	Isopropyl alcohol		Lint free cloth
	Cotton swab	J.S.	Socket Wrench

All Aquafine products are carefully inspected and tested before shipment from our plant. Upon delivery, check the packaging and equipment for damage that may have occurred during shipment.

9.2 Maintenance Schedule

Scheduled maintenance and inspections can extend the life of the system and prevent problems. Routine maintenance may include partial disassembly to access components for cleaning and visual evaluation.

Table 2 shows the maintenance schedule. During any maintenance activity, the manufacturer recommends inspection of all components that can be seen. Some of the preventative maintenance tasks may also need to be done to remove a condition that caused a system alarm.

Table 2	Preventive	Maintenance	Schedule
---------	------------	-------------	----------

System Component	Maintenance Requirement	Monthly	Semi-Annually	Annually	12,000 hours	As needed
Lamp sleeves	 Inspect a representative sample (i.e., 10%) of lamp sleeves. Check the lamp sleeve O-rings for UV decay and brittle parts. Replace the lamp sleeve O-rings as needed. Remove any condensation inside the lamp sleeves. Inspect the lamp sleeves for physical damage. Inspect for build-up on the lamp sleeves. 	x				
CPP	Replace the air filter.	Х				
Lamp sleeve O-rings	Inspect all lamp sleeve O-rings for wear or when the lamp sleeves are removed			Х		
	Inspect the UV lamps and UV lamp pins.			Х		
UV lamps	Replace all the UV lamps when an End of Lamp Life alarm occurs.				х	
	If there is physical damage to a lamp sleeve, replace the lamp sleeve.					х
Lamp sleeves	If there is build-up on any of the lamp sleeves inspected, clean all lamp sleeves. While the lamp sleeves are removed, inspect all lamp sleeve O-rings. Replace the lamp sleeve O-rings as needed.					х
Lamp sleeve O-rings	Replace lamp sleeve O-rings if worn.					х
UV lamps	If a UV lamp fails inspection or burns out, replace the UV lamp.					Х
	Clean the UV sensor.	Х				
UV sensor	Replace the UV sensor.					Х
	Inspect the UV sensor window and O-ring.					
	• Replace the UV sensor window O-ring as needed.					
	• Remove any condensation inside the UV sensor window.	Х				Х
	Inspect the UV sensor window for physical damage.					
	Inspect for build-up on the UV sensor windowassembly.					
	If there is physical damage to the UV sensor window, replace the UV sensor window.					Х
	If there is build-up on the UV sensor window assembly, clean the UV sensor window.					х

Table 2 Preventive Maintenance Schedule (continued)

System Component	Maintenance Requirement	Monthly	Semi-Annually	Annually	12,000 hours	As needed
UV sensor O-ring	Replace the UV sensor O-ring if worn.	Х				Х
Wiper revolution proximity sensor	Replace the wiper revolution proximity sensor.					х
СРР	Replace a Lamp Driver.					Х
Home switch proximity sensor	Replace the home switch proximity sensor.					х
Wiper Seals and Wiper Seal Holders	Replace the wiper seals and wiper seal holders*					Х

*Contact your Service Provider

9.3 Legend

The symbols in the following table will be used in this Section to define the wiping option provided. Follow the instructions that correspond to the supplied system.

Symbol	Description
A	Automatic Wiping Option
М	Manual Wiping Option
N	Non-Wiping Option

9.4 Depressurize and Drain a UV Chamber

The user must depressurize and drain UV chamber before performing any maintenance, service or repair task is done. Failure to depressurize and drain the UV chamber can result in serious injury or death. Always follow all site-specific safety protocols and procedures. Refer to Section 2.

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- The drainage or water bypass provisions are followed until disinfection starts.

Materials:



Procedure:



- 1. Stand off to the side of the end plate. Open the drain valve, as the water level drops, the UV system will depressurize.
- 2. To depressurize only, close the drain valve.
- 3. To depressurize and drain, keep drain valve open until the UV chamber is empty.
- 4. When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.5 Remove and Install the Service End Cap

The service end cap must be removed before any maintenance, service or repair task can be done.

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- Depressurize the UV chamber. Refer to Section 9.4

Tools:

(ID

Materials:





- To install a service end cap, do the illustrated steps in the reverse direction.
- When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.6 UV Lamps



UV lamps and lamp sleeves are made of fragile quartz tubing and easily fractured. Do not strike, bend or apply pressure or it will break. Discard UV lamps and lamp sleeves appropriately. Follow all local regulations.

9.6.1 Remove a UV Lamp

Inspect a UV lamp as part of scheduled maintenance and when a UV lamp status alarm occurs.

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- Depressurize and drain the UV chamber, and stand off to the side. Refer to Section 9.4.
- Wait ten minutes to allow UV lamps to cool.
- Remove the service end cap. Refer to Section 9.5.
- If necessary, remove the gear motor assembly. Refer to Section 9.9.

Materials:



- 1. Remove the UV lamp from the lamp sleeve.
 - a. Put on rubber or latex gloves.
 - **b.** Pull out on the locking ring while pulling out on the lamp plug. The lamp plug will partially disengage.
 - **c.** Wait 5 minutes and pull the lamp plug out far enough to disconnect it from the UV lamp. Disconnect the lamp holder from the UV lamp.
 - d. Remove the UV lamp from the lamp sleeve. Make sure the spring remains inside the lamp sleeve.
- 2. Inspect the UV lamp pins for:
 - Evidence of overheating
 - Moisture
 - Displaced or bent pins
- 3. Inspect the UV lamp for:
 - Cracks or breaks, loose ceramic ends.
- 4. If any of the conditions listed are present, replace the UV lamp with a new one. Refer to Section 9.6.
- 5. If the UV lamp is in good condition, go to the next step.

- 6. Reinstall the UV lamp.
 - a. Put the UV lamp in the lamp sleeve.
 - **b.** Align the UV lamp so that the amalgam spot is on the bottom.
 - c. Connect the lamp plug to the UV lamp.
 - d. Push the UV lamp and lamp plug into the lamp sleeve bolt until it stops.
 - e. Turn the locking nut clockwise while pushing in on the lamp plug to partially engage the lamp plug.
 - f. Make sure the lamp holder arrow is pointing up to ensure amalgam spots are on the bottom.
- 7. When service is complete, assemble the prerequisites in the reverse order of the disassembly.



Figure 37 Remove the Lamp Holder

1.	Lamp Sleeve Cap	6.	Spring Washer
2.	Lamp Sleeve Cap Washer	7.	O-Ring
3.	Lamp Plug	8.	Lamp Sleeve
4.	UV Lamp	9.	End Plate
5.	Compression Nut	10.	Spring

9.6.2 Replace a UV Lamp

Replace a UV lamp for every 9000 hours (an End of Lamp Life alarm occurs) or when the UV lamp fails inspection.

Prerequisites:



• Remove the UV lamp. Refer to Section 9.6.

Materials:



• UV lamp

- 1. Dispose of the old UV lamp, as per local regulations.
- 2. Wearing clean cotton gloves, get a new UV lamp.
- 3. Install the UV lamp.
 - a. Put the UV lamp in the lamp sleeve, ensure the lamp spring is in the lamp sleeve.
 - **b.** Align the UV lamp so that the amalgam spot is on the bottom.

- c. Connect the lamp plug to the UV lamp.
- **d.** Turn the locking nut clockwise while pushing in on the lamp plug to partially engage the lamp plug.
- e. Make sure the lamp holder arrow is pointing up to ensure amalgam spots are on the bottom
- 4. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.7 Lamp Sleeves



UV lamps and lamp sleeves are made of fragile quartz tubing and easily fractured. Do not strike, bend or apply pressure or it will break. Discard UV lamps and lamp sleeves appropriately. Follow all local regulations.

NOTICE

Use caution and apply only 50 lbf.in of torque to the lamp sleeve bolt. Excessive torque will crack the lamp sleeve. Low torque may result in water leakage into the service end cap. Use only the provided lamp sleeve bolt tool.

9.7.1 Remove and Inspect the Lamp Sleeves and Lamp SleeveO-rings

To remove and inspect the lamp sleeves and lamp sleeve O-rings, inspect a representative sample (10%) of the lamp sleeves in the UV chamber.

Inspect the lamp sleeves and lamp sleeve O-rings as a part of scheduled maintenance, when a UV Intensity Low alarm occurs or a Dose/RED Low alarm occurs.

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- Depressurize and drain the UV chamber, and stand off to the side. Refer to Section 9.4.
- Wait ten minutes to allow UV lamps to cool.
- Remove the service end cap. Refer to Section 9.5.
- If necessary, remove the gear motor assembly. Refer to Section 9.9.
- Remove a UV lamp. Refer to Section 9.6.

Tools:

- Lamp sleeve removal tool
- Lamp sleeve bolt cushion rings
- Lamp Sleeve O-rings
- Lamp Sleeve Bolt Socket
- 3/8-in. drive torque wrench, 50 lbf.in

Materials:



NOTICE

To prevent lamp sleeve damage during removal, be sure to keep the lamp sleeve level and perpendicular to the end plate. Physical damage to lamp sleeves indicates a possible serious condition in the UV chamber. Full service of the UV chamber may be needed.

Procedure:

- 1. Remove the lamp sleeves. Refer to the illustrated steps.
- 2. Inspect the lamp sleeves for:
 - Scratches, fractures or other physical damage. If there is physical damage to the lamp sleeves, remove all lamp sleeves for inspection and replace the lamp sleeves with physical damage.
 - Excessive build-up. If the inspection sample shows excessive build-up, remove all of the lamp sleeves for manual cleaning.
 - Excessive build-up, service the AMWS. Refer to Section 9.9.
- 3. Replace any lamp sleeve O-rings that are worn.
- 4. If the lamp sleeves do not have excessive buildup or physical damage, go to the next step.
- 5. Install the lamp sleeve. Refer to the illustrated steps.

Note: Replace the lamp sleeve bolt cushion ring (placed inside the lamp sleeve bolt groove) whenever the lamp sleeve bolt is removed or the pressure seal is broken.

- 6. Do a pressure test to check for leaks.
 - a. Stand off to the side of the end plate. Refer to Section 2.
 - **b.** Fill the UV Chamber with water.
 - c. Check for leaks.
- 7. If a leak is found:
 - a. Drain and remove the water pressure in the UV Chamber. Refer to Section 9.4.
 - b. Fix the leak.
 - c. Fill the UV Chamber and do a pressure test. Check for leaks.
- 8. When service is complete, assemble the prerequisites in the reverse order of the disassembly.



Figure 38 Lamp Sleeve Overview

1.	Compression Nut	4.	Lamp sleeve
2.	Lamp sleeve washer	5.	End plate
3.	Lamp sleeve O-ring	6.	Spring

9. To remove a lamp sleeve, do the following illustrated steps:



10. To install a lamp sleeve, do the above illustrated steps in reverse order and direction.

9.7.2 Clean the Lamp Sleeves

Clean all the lamp sleeves manually if there is buildup on any of the inspected lamp sleeves.

Prerequisites:



• Remove the lamp sleeves. Refer to Section 9.7.

Tools:

- Lamp sleeve removal tool
- Lamp sleeve bolt tool
- Lamp sleeve bolt cushion rings
- Lamp sleeve O-ring

Materials:



NOTICE

DO NOT use abrasive pads to remove built up debris, or the lamp sleeve will be damaged.

Procedure:

- 1. Use a mild acidic solution and a lint-free cloth to wipe down the outside of the lamp sleeves to remove all solid particles.
- 2. Rinse the outside of the lamp sleeve thoroughly with clean water. Keep the inside of the lamp sleeve clean and dry. Moisture can cause deposits to form when the UV lamps are turned on.
- 3. Repeat steps above as required until the lamp sleeve is clean.
- 4. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.7.3 Replace a Lamp Sleeve

Replace a lamp sleeve if buildup cannot be removed, or when the lamp sleeve shows signs of damage, such as cracks and chips.

Prerequisites:



• Remove the lamp sleeve. Refer to Section 9.7.

Tools:

- Lamp sleeve
- Lamp sleeve O-ring
- Lamp sleeve bolt cushion ring

Materials:



NOTICE

Replace the lamp sleeve bolt cushion ring whenever the lamp sleeve bolt is removed or the pressure seal is broken.

Procedure:

- **1.** Dispose of the lamp sleeve.
- 2. Put on clean cotton gloves.
- 3. Get a new lamp sleeve and lamp sleeve O-ring.
- 4. Put the O-ring on the lamp sleeve. Refer to the illustrated steps.
- 5. Do a pressure test to check for leaks.
 - a. Stand off to the side of the end plate. Refer to Section 2.
 - **b.** Fill the UV Chamber with water.
 - c. Check for leaks.
- 6. If a leak is found:
 - a. Drain and remove the water pressure in the UV Chamber. Refer to Section 9.4.
 - **b.** Fix the leak.
 - c. Fill the UV Chamber and do a pressure test. Check for leaks.
- 7. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.8 UV Sensor

9.8.1 Clean the UV Sensor and Sensor Window

Clean the UV sensor as a part of scheduled monthly maintenance and when a low UVI alarm occurs. **Prerequisites:**



- Shut down the UV system. Refer to Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- Depressurize and drain the UV chamber. Refer to Section 9.4.

Tools:



- UV sensor window O-ring
- UV sensor window

Materials:



- 1. Remove the UV sensor from the UV sensor window.
 - a. Remove the UV sensor cable.
 - b. Use wrench on flats of the UV sensor window to prevent turning.
 - c. Loosen the UV sensor nut.

- d. Put on clean cotton gloves.
- e. Pull the UV sensor out of the UV sensor window.
- 2. Clean the optical window on the end of the UV sensor.
 - **a.** Use a clean swab and rubbing alcohol to wipe the diode window.
 - **b.** Dry the UV sensor optical window with a lint-free cloth or a dry swab. Do not touch the sensor optical window after it is cleaned.
 - c. Remove the UV sensor window from the UV chamber. Use an adjustable wrench on the flats provided to unscrew the UV sensor window from the UV chamber.
- 3. Inspect UV sensor window for damage or cracks on the quartz window (replace if needed).
- 4. Clean the UV sensor window on both sides of the lens.
 - **a.** Use a clean swab and rubbing alcohol to wipe the UV sensor window.
 - **b.** Dry the UV sensor window with a lint-free cloth or a dry swab. Do not touch the UV sensor window after it is cleaned.
- 5. Install the UV sensor window. Use wrench on the flats provided to screw the UV sensor window into the UV chamber.
- 6. Install the UV sensor.
 - a. Push the UV sensor in to the UV sensor window gently until the UV sensor stops.
 - b. Use wrench to hold UV sensor window on flats provided, and tighten the UV sensor nut.
 - c. Connect the UV sensor cable.
- 7. When the service is complete, assemble the prerequisites in the reverse order of disassembly.



Figure 39 Remove the UV sensor

1.	UV sensor window	3.	UV sensor nut
2.	UV sensor		

9.8.2 Replace the UV Sensor

Replace the UV sensor if the UV sensor is damaged, or UVI alarms occur that are not caused by UV lamp failure.

Prerequisites:



- Shut down the UV system. Refer to Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary. Refer to Section 5.
- Depressurize the UV chamber. Refer to Section 9.4.

Tools:



Materials:



New UV sensor

Procedure:

- 1. Remove the UV sensor from the UV sensor window.
 - **a.** Disconnect the UV sensor cable.
 - b. Use wrench to hold UV sensor window on flats provided and loosen the UV sensornut.
 - c. Put on clean cotton gloves.
 - d. Gently pull the UV sensor out of the UV sensor window.
- 2. Dispose of the UV sensor.
- 3. Install the new UV sensor.
 - a. Push the UV sensor in to the UV sensor window gently until the UV sensor stops.
 - b. Use wrench to hold UV sensor window on flats provided, and tighten the UV sensornut.
 - c. Connect the UV sensor cable.
- 4. When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.9 Automatic Mechanical Wiper System (Optional/AMWS)

9.9.1 Remove the Gear Motor Assembly

Remove the gear motor assembly as necessary to access UV lamps and lamp sleeves that are located behind the gear motor assembly.

Prerequisites:



• Remove the service end cap. Refer to Section 9.5

Tools:

Materials:





1. To remove a gear motor assembly, do the following steps:



Maintenance

9.9.2 Install the Gear Motor Assembly

Install the gear motor assembly after maintenance on the UV lamps and/or lamp sleeves is complete. **Prerequisites:**



• Remove the Gear Motor Assembly. Refer to Section 9.9.

Tools:



Materials:



Procedure:



1. To install a gear motor assembly, do the following steps:



2. When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.9.3 Replace the Gear Motor

Replace the gear motor when it can no longer turn the drive shaft to move the wiper plates cage.

Prerequisites:



• Remove the gear motor assembly. Refer to Section 9.9.

Tools:



Materials:



Gear motor

Procedure:



1. To remove a gear motor, do the following steps:



- 1. When service is complete, assemble the prerequisites in reverse order of the disassembly.
- 2. To Install Gear Motor, perform the steps above in reverse.

9.9.4 Replace the Wiper Revolution Proximity Sensor

Replace the wiper revolution proximity sensor when the wiper revolution proximity sensor has failed.

Prerequisites:



• Remove the service end cap. Refer to Section 9.5.

Tools:



Materials:



Revolution proximity sensor

Procedure:



1. To replace the proximity sensor, do the following steps:



- 2. Turn the drive shaft coupler so the wiper revolution proximity sensor has enough clearance to rotate freely (approximately 0.050" or 1.25mm).
- 3. When service is complete, assemble the prerequisites in the reverse order of disassembly.

9.10 Home Switch Replacement and Proximity Replacement

9.10.1 Remove the Wiper Home Proximity Switch

Prerequisites:



• Remove the service end cap. Refer to Section 9.5

Tools:

Materials:



Revolution proximity sensor



- 1. Remove the cable harness from the home proximity switch.
- 2. Loosen the two set screws on the outside of the plunger end cap, and remove the plunger end cap.
- 3. Remove the proximity switch from the end cap by loosening the jam nuts (2).



- 4. When service is complete, assemble the prerequisites in the reverse order of the disassembly.
- **5.** To install the Wiper Home Proximity Switch, do the above illustrated steps in reverse order and direction.

9.10.2 Remove the Home Switch Plunger Body

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Lockout tag out the equipment. Refer to Section 5.
- Depressurize and drain the UV chamber. Refer to Section 9.4.
- Remove the service end cap. Refer to Section 9.5.

Tools:

Materials:



Procedure:



- 1. Remove the cable harness from the home proximity switch. Loosen the two set screws on the outside of the plunger end cap, and remove the plunger end cap.
- 2. Use the 3/4-in. open end wrench to remove the home switch plunger.
- 3. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.10.3 Install the Home Switch Plunger Body

Two plunger bodies are supplied in the kit. The manufacturer recommends replacement of both plunger bodies at the same time.

Prerequisites:



• Remove the home switch plunger body. Refer to Section 9.10.2.

Tools:

Materials:





- 1. Clean loose material from the plunger holes in the end plate.
- 2. Put the home switch plungers in the end plate. Use the 3/4-in. open end wrench to tighten the plungers and seal the O-ring. Do not over-tighten. The switch can crack orbreak.
- **3.** Install the home plunger cap and proximity switch on the home switch plunger. Make sure that the proximity switch does not interfere with lamp holders.
- 4. On the outside of the home switch cap, tighten the two setscrews.
- 5. Attach the wire harness cable to the proximity switch.
- 6. Fill the UV chamber and do a pressure test to check for leaks.
- 7. When service is complete, assemble the prerequisites in the reverse order of the disassembly.

9.11 Control Power Panel (CPP)

9.11.1 Open the CPP Enclosure

Open the CPP enclosure to replace lamp driver or the air filter.

Prerequisites:



- Shut down the UV system. Refer to Section 7.5, Section 7.6 and Section 7.7 as needed.
- Apply lockout tag out devices as necessary to main power source. Refer to Section 5.
- Wait five minutes to allow stored energy to dissipate.

Materials:



Procedure:



- 1. Turn the CPP disconnect switch to off (horizontal) to turn power off to the CPP.
- 2. Apply lockout tag out as necessary to prevent unexpected exposure to high voltage.
- 3. Use a screwdriver and on turn 1/4 to open the CPP door.

9.11.2 Replace a Lamp Driver

Replace a lamp driver when a lamp driver failure alarm occurs.

Prerequisites:



• Open the CPP enclosure. Refer to Section 9.11.

Tools:

Materials:



• New lamp driver

Procedure:

1. Remove:



- 2. Install:
- 3. Set the DIP Switches on the new lamp driver to match the settings on the old lamp driver.





Section 10 Troubleshooting

A DANGER



Obey all warning and caution statements. Refer to Section 2

Read and understand the Operation and Maintenance Manual before operating this equipment.

Read all user documentation before performing operations, inspections, repair, or maintenance on this equipment.

Only competent personnel should undertake operation, repairs, maintenance, or servicing of equipment described in this section of the manual. If you do not understand the information or procedure explanations in this manual, STOP and contact your Service Provider for assistance.

NOTICE

Injury or damage to the equipment due to improper testing, handling or maintenance will not be covered under the manufacturer's warranty and is responsible of the individual performing the troubleshooting. If there is any question about a procedure, contact Aquafine® before service.

10.1 Alarm Conditions

NOTICE

For optimum system performance, resolve every alarm condition as it occurs.

Current active alarms are shown in the Active (current) Alarms screen, from the most recent alarm to the oldest alarm. When an alarm condition is corrected, the alarm is removed from the list. Delay times for many alarms are user-adjustable.

An archived history of alarms is shown in the Alarm History screen. When the buffer is full, the oldest alarm is deleted from the archive.

10.2 CPP Alarms

CPP alarms are divided into three categories: Critical, Major and Minor.

Status items listed in Table 3 indicate that an alarm or alarms in the group are active.

Table 3 Alarm Status Indicators

Common Alarm Names and Status	Active When	Alarm Delay	Control Action	
System Warming	During 3-minute warm-up.	No delay	Alarm relay is	
System On-line	After warm-up and there are no alarms.	10 seconds	"closed circuit"	
System In-line	After warm-up.	No delay	LED is on.	
Common Alarm	Any minor, major or critical alarm is active			
Common Minor Alarm	Any minor alarm is active.	No delay	Alarm relay is configurable for either open or closed circuits.	
Common Major Alarm	Any major alarm is active.			
Low UV Common Minor	Any sensor minor. UV intensity for UV systems with multiple sensors is active.	10 seconds in operation or		
Low UV Common Major	A common major siren. Any major or critical alarm is active.	start-up.		

Troubleshooting

10.2.1 Minor Alarms

When a minor alarm occurs, the UV chamber remains online. Minor alarms show on the CPP and the alarm relays are deactivated. When a minor alarm occurs, take action to correct the problem soon after the alarm occurs. Disinfection may or may not be compromised. Refer to Table 4 for alarm definitions.

Table 4 Minor Alarms Defined.

Minor Alarm Name	Active When	Alarm Delay	Control Action	
Low UVT Minor	The UVT value measured is lower than the setpoint.	10 seconds in		
Valve Open	The minor valve is open greater than the minor alarm setpoint.	3:10 minutes in start-up		
End of UV Lamp Life	The UV has exceeded the end of UV lamp life hours according to the factory-programmed setpoint.	No delay	Alarm relay is configurable for	
	UV lamp Fault		closed circuits.	
UV Lamp xx Alarm Minor	Lamp driver Fault.			
	Loss of UV lamp Fault Signal.	Alarm delay		
Low UV Intensity ¹ Minor	No UV intensity signal.	(10s default)		

10.2.2 Major Alarms

When a major alarm occurs, take immediate action to correct the problem. Make sure that disinfection is not compromised. Alarm relays are deactivated. Refer to Table 5 for alarm definitions.

Table 5 Major Alarms Definitions

Major Alarm Name	Active When	Alarm Delay	Control Action	
Low UV Intensity ¹ Major	The UV measured is less than the calculated low UV major alarm setpoint.	10 seconds in operation or		
Multiple UV Lamp Alarms	Multiple UV lamps are not functioning. Factory based set number of 1 or more, that is dependent on the dose required.	3:10 minutes in start-up.		
RED Low Major	Multiple lamp Major Fault. Lamp driver Fault. RED target not met.	Lamp or driver. Alarm relay OR Dose Alarm Delay. OR None	Alarm relay is configurable for either open or closed circuits.	
UV Lamp XX Major	Either: There is no UV lamp function. Power is lost. CPP/CCB communication is lost.	10 seconds in operation or 3:10 minutes in start-up.		
Table 5 Major Alarms Definitions-Cont.

Major Alarm Name	Active When	Alarm Delay	Control Action	
	Either:			
Lamp Driver XX Alarm	There is no lamp driver function.			
Major	Power is lost.			
	CPP/CCB communication is lost.			
High Flow Alarm Major The flow rate is greater than the major alarm setpoint.		10 seconds in operation or	Alarm relay is configurable for	
Valve Open Major	The valve is open greater than the major alarm setpoint.	3:10 minutes in start-up.	either open or closed circuits.	
No Flow Alarm Major	Io Flow Alarm Major The flow rate signal is not present below 2.0 mA.			
No Valve Data Major The valve signal is not present below 2.0				
SCADA Comm	UV chamber in SCADA operation mode.			

10.2.3 Critical Alarms

When a critical fault occurs, the UV chamber is set to shut down. On a critical alarm, the system CPP takes immediate action to prevent damage to the equipment. Take immediate action to make sure that disinfection is not compromised. Refer to Table 6 for alarm definitions.

Table 6 Critical Alarm Definitions

Critical Alarm Name	Active When	Alarm Delay	Control Action
	The end plate temperature switch is above 122 ° F (50° C) due to hot water, hot air or low flow rate.		
UV chamber High Temperature Critical DIGITAL is Standard ¹	A chamber hi temp shut-down delay of 0-15 mins can be set.	10 accordo in	
	This lets the operator correct the problem or bring other equipment on-line before the UV lamps are turned off.10 seconds in operation or start-up.This alarm clears when the UV chamber cools below the switch default value of 104° F (40° C) ±5° °C/°F. The UV chamber then restarts.10 seconds in operation or start-up.		
End Cap Off Critical	Loss of digital signal	20 seconds	Alarm relay is configurable for either open or
Major HI Temp Setpoint (Analog option temp	The analog signal is above the setpoint that is set by the user due to hot water, hot air or low flow rate.		closed circuits.
only)	A chamber hi temp shut-down delay of 0-15 mins can be set.	10 seconds in	
	This lets the operator correct the problem or bring other equipment on-line before the UV lamps are turned off.	operation or start-up.	
	This alarm clears when the UV chamber cools below the switch default value of 122° F (50° C) ±5° °C/°F. The UV chamber then restarts.		

1 For the chamber High Temperature Alarm, a chamber hi temp shutdown delay timer can be set to allow for operators to correct the problem or bring other equipment on-line.

Troubleshooting

10.2.4 Standard Inputs and Outputs

UV Sensor (1-3)	Input	Analog	4-20 mA	System I/O
Alarms (1-7)	Output	Digital	Normally Open (NO)	Customer I/O
UV chamber High Temp Switch (shuts off UV lamps at 122° F (50° C)	Input	Digital	Voltage Sensing Input	Customer I/O
End Cap limit switch (shuts off UV lamps)	Input	Digital	Voltage Sensing Input	Customer I/O

10.2.5 Optional Inputs and Outputs

Note: Optional inputs and outputs cannot typically override standard provided inputs and outputs.

Analog (4)	Output	Analog	4-20 mA	System I/O
Remote ON/OFF	Input	Digital	Voltage Sensing Input	Customer I/O

10.2.6 Additional Inputs and Outputs

The inputs and outputs in this table are available for custom applications. This list is not intended to cover all options. It is a representative list of options that sites can exercise in order to wire device information in to the Aquafine UV system. The controller provides a graphical display of the information only. If a signal is brought in, it can be wired out of the system to another as needed. For a specific request, contact the manufacturer. Additional inputs and outputs cannot typically override standard provided inputs and outputs.

Note: Up to five (5) analog inputs and four (4) analog outputs in total are possible.

Flow	Input / Output	Analog	4-20 mA	System and/or Customer I/O
UVT	Input / Output	Analog	4-20 mA	System and/or Customer I/O
Valve Position	Input / Output	Analog	4-20 mA	System and/or Customer I/O
UV chamber high water temperature	Input / Output	Analog	4-20 mA	System and/or Customer I/O
RED Value (EPA)	Output	Analog	4-20 mA	System and/or Customer I/O

10.3 CPP Communication Control Board Electrical and I/O Details

The CPP communication control board (CCB) is powered by a 24 VDC power supply that is located in the CPP. The CCB is configured using the microprocessor user interface. The user can reset the CCB to the original factory settings.

In addition to standard CPP alarms, optional analog and digital sources can be configured to the CPP microprocessor CCB relays for additional alarms.



Figure 40 Microprocessor Communication Control Board (CCB)

01.	RS232 Communication Port	8.	Fuse - Slow Blow 1 A
2.	SCADA Communication Module Location	9.	Power indicator LED
3.	Battery, 3 V Lithium CR1220	10.	End Cap attached
4.	Temperature Switch	11.	Remote ON/OFF
5.	24 VDC Analog Inputs	12.	Analog Output Modules Location (4x)
6.	24 VDC Digital Alarm Outputs (7x)	13.	Lamp Driver Communication Connectors
7.	24 VDC Board Input Power		

Section 11 Replacement Parts and Accessories

Part Number	Description
912513	UV LAMP BALLAST (1 - LAMP) (AM MODELS)
917067	UV LAMP BALLAST (2 - LAMP) (AS/AL MODELS)
261067	24 VDC REMOTE ON/OFF RELAY (AM MODELS)
261225	120 VAC REMOTE ON/OFF RELAY (AM MODELS)
795750	SLEEVE BOLT 28mm W/CAP
316148	SLEEVE CUP NUT UV3 MOD
793859	WASHER SLEEVE BOLT CAP
795771-1175	LAMP HOLDER, SSC A 17.5FT (AM MODELS)
795771-1275	LAMP HOLDER, SSC A 27.5 FT
795771-1525	LAMP HOLDER, SSC A 52.5 FT
795771-1775	LAMP HOLDER, SSC A 77.5 FT
903733	240 VAC REMOTE ON/OFF RELAY (AM MODELS)
903794	120 VAC REMOTE ON/OFF RELAY (AS/AL MODELS)
903795	240 VAC REMOTE ON/OFF RELAY (AS/AL MODELS)
903797	ANALOG OUTPUT MODULE 4-20 mA (AS/AL MODELS)
903804	24 VDC REMOTE ON/OFF RELAY (AS/AL MODELS)
912491	INTERFACE BOARD 120V (AM MODELS)
912492	INTERFACE BOARD 240V (AM MODELS)
912864-001	INTERFACE BOARD, NO ANALOG OUT (AS/AL MODELS)
912864-002	INTERFACE BOARD, W/ ANALOG OUT (AS/AL MODELS)
931066-001	TROJANUVLOGIC P-40 BOARD
931067	ANALOG OUTPUT MODULE, P-40 CONTROL BOARD
794540-001	HARNESS ASSEMBLY 50° C TEMP. SWITCH 17' (AM MODELS)
794540-003	HARNESS ASSEMBLY 50° C TEMP. SWITCH 20' (AM MODELS)
792947	TEMPERATURE SWITCH
302509	SINGLE LAMP STANDARD UV LAMP (254 NM) (AL MODELS) *
793664	VALIDATED UV LAMP (254NM) (AL MODELS) *
793923	SINGLE LAMP STANDARD UV LAMP (254 NM) (AS MODELS) *
793661	VALIDATED UV LAMP (254NM) (AS MODELS) *
794113	STANDARD UV LAMP (254 NM) (AM MODELS) *
793658	VALIDATED UV LAMP (254NM) (AM MODELS) *
794107	STANDARD UV LAMP (185 NM) (TM MODELS) *
794108	STANDARD UV LAMP (185 NM) (TS MODELS) *
794109	STANDARD UV LAMP (185 NM) (TL MODELS) *
793075	QUARTZ SLEEVE (254 NM) (AM MODELS)
792934	QUARTZ SLEEVE (254 NM) (AS MODELS)

Replacement Parts and Accessories

Part Number	Description
793024	QUARTZ SLEEVE (254 NM) (AL MODELS)
793017	QUARTZ SLEEVE (185 NM) (TM MODELS)
793016	QUARTZ SLEEVE (185 NM) (TS MODELS)
793018	QUARTZ SLEEVE (185 NM) (TL MODELS)
002190-215F	QUARTZ SLEEVE O-RING - VITON®
2026	SENSOR O-RING - VITON®
792437	QUARTZ SLEEVE O-RING - EPDM
792931	QUARTZ SLEEVE CUSHIONING WASHER
793465	4" END PLATE O-RING (AM MODELS)
820673	SEAL ROD .50 ID VITON-FDA
820693-008	GASKET SANITARY 8" VITON
793418	6" END PLATE O-RING (AM MODELS)
792929	8" END PLATE O-RING (AM MODELS)
796054	SPRING COMPRESSION (AS/AL & AM MODELS)
793200-001	UVLOGIC SENSOR WITH CABLE 3' AS/AL
793200-004	UVLOGIC SENSOR WITH CABLE 21' AM
13029	PIN, COTTER (AUTO)
303428	O-RING, 1 3/16 I.D., NITRILE (MANUAL & AUTO)
792868	WASHER, 5/16" ID SST (AUTO)
792917	PUSH RETAINER (MANUAL)
792929	O-RING, MANUAL & AUTO #269 - EPDM
792942	SLEEVE HOLDER BUSHING
792955	BUSHING, THR 0.5" I.D. BRZ (AUTO)
792956	BUSHING, THR 0.5" I.D. PLASTIC (AUTO)
792957	BUSHING, FLG 0.375" I.D. PLASTIC (AUTO)
793187	SEAL, ROD 0.5" I.D. (MANUAL)
793096	WASHER, 3/8" I.D. X 9/16 O.D. DELRIN (AUTO)
793363	WIPER, SLEEVE 28MM (MANUAL & AUTO)
793455	BUSHING, PLAIN 0.5" I.D. X 0.375" LG (MANUAL & AUTO)
793686	NUT, DRIVE 5/8-8 ACME (AUTO)
794151	SPRING, 7/8"OD 1.19"LG
914172-050	INDUCTIVE PROXIMITY SENSOR

* This component contains MERCURY. Dispose per Local, State, or Federal Laws.

WARNING: This product may contain chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Aquafine® has provided as many Safety Precautions as possible. In the event, you have any question for safe operation or procedure, contact Aquafine before you continue.

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AQUAFINE CERTIFICATE OF EQUIPMENT WARRANTY

The following terms and conditions will govern the equipment warranty provided by Aquafine Corporation Inc. to the Owner/Operator:

Aquafine Corporation ("Aquafine") warrants to the Owner/Operator noted above (the "Customer") that if within 12 months from equipment start-up or 18 months from the date of delivery, whichever comes first, equipment manufactured by Aquafine (the "Equipment") will be free from defects in material and workmanship and will function in accordance with the specifications agreed to by Aquafine for the Equipment.

This warranty shall not apply to any failure or defect which results from the Equipment not being operated and maintained in strict accordance with instructions specified in the Operation and Maintenance manual or which results from mishandling, misuse, neglect, improper storage, improper operation of the Equipment with other equipment furnished by the Customer or other third parties or defects in designs or specifications furnished by or on behalf of the Customer by a person other than Aquafine. In addition, this warranty shall not apply to Equipment that has been altered or repaired after start-up by anyone except: (a) authorized representatives of Aquafine, or (b) Customer acting under specific instructions from Aquafine.

Customer must notify Aquafine in writing within 5 days of the date of any Equipment failure. This notification shall include a description of the problem, a copy of the operator's log, a copy of the Customer's maintenance record and any analytical results detailing the problem. If Customer has not maintained the operator's log and maintenance record in the manner directed in the Operation and Maintenance manual, or does not notify Aquafine of the problem as specified above, this warranty may, in Aquafine's discretion, be invalid.

Customer will fully cooperate with Aquafine, in the manner requested by Aquafine, in attempting to diagnose and resolve the problem by way of telephone support. If the problem can be diagnosed by telephone support and a replacement part is required Aquafine will either, at Aquafine's expense, ship a repaired, reworked or new part to the Customer who will install such part as directed by Aquafine or will direct Customer to acquire, at Aquafine's expense, such part from a third party and then install such part as directed by Aquafine.

In the event that Aquafine determines that the problem cannot be resolved by way of telephone support and/or shipment by Aquafine, or acquisition by the Customer, of a replacement part for installation by the Customer, Aquafine will send one or more persons to make an onsite inspection of the problem. If an onsite visit is made, Aquafine personnel will evaluate the problem and repair or replace any Equipment determined to be in breach of this warranty. If the problem is not attributable to a breach of this warranty, Aquafine reserves the right to invoice the Customer for this service.

Equipment components manufactured by third parties but furnished to Customer by Aquafine are warranted by the original manufacturer, only to the extent of the original manufacturer's warranty, and are not covered by the above warranty.

This warranty is the exclusive remedy for all claims based on a failure of or defects in the Equipment, whether the claim is based on contract (including fundamental breach), tort (including negligence), strict liability or otherwise. This warranty is in lieu of all other warranties whether written, oral, implied or statutory. Without limitation, no warranty of merchantability or fitness for a purpose shall apply to the Equipment.

Aquafine does not assume any liability for personal injury or property damage caused by use or misuse of the Equipment. Aquafine shall not in any event be liable for special, incidental, indirect or consequential damages including, without limitation, lost profits, lost business opportunities, lost revenue or loss or depreciation of goodwill, even if it has been advised of the possibility thereof. Aquafine's liability shall, in all instances, be limited to repair or replacement of Equipment in breach of this warranty and shall not exceed the cost of such repair or replacement. This liability with respect to repair or replacement will terminate upon the expiration date of this warranty.

In addition to the foregoing, in no event shall Aquafine's liability relating to the Equipment, or the agreement between Aquafine and the Customer relating to the Equipment, exceed that portion of the purchase price for the Equipment which is actually paid to Aquafine.

For more information, please contact Aquafine Corporation. Email: sales@aquafineuv.com or go to www.aquafineuv.com 29010 Avenue Paine, Valencia, California USA 91355



Aquafine is an ISO 9001:2008 certified company.

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