



Aquafine® Corporation

A TROJAN TECHNOLOGIES COMPANY

READ THIS MANUAL

PLEASE KEEP FOR PERMANENT REFERENCE

Part Number 127 Rev E

This manual covers the servicing and general maintenance requirements for Aquafine Ultraviolet Water Treatment equipment.

DISINFECTION • TOC REDUCTION • OZONE DESTRUCTION • CHLORINE/CHLORAMINE DESTRUCTION



TrojanUVLogic Series

Installation & Operation Manual



CAUTION

It is imperative that those responsible for the installation of this equipment, as well as operating personnel, read this manual and carefully follow all instructions and guidelines. EQUIPMENT OPERATORS AND INSTALLERS MUST COMPLY WITH OPERATIONAL SAFETY REQUIREMENTS.



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Place System Label

Here.

If no label has been placed here, refer to the label on the UV Equipment for details.

For further clarification of label information, please refer to Chapter 2, page2-3, “System Verification Label Definitions”.

	Record system set points indicated below:	
	UV Intensity Set Point	

The TrojanUVLogic™ in this manual may be covered by one or more of the following United States (US) Patents:

US 6,342,188

US 6,564,157

US 6,659,431

US 6,635,613

OTHER PATENTS MAY BE PENDING.

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PREFACE

PREFACE

General Information

Congratulations on your purchase of the TrojanUVLogic™

This Operations and Maintenance (O&M) Manual provides instructions on how to operate the system and carry out routine maintenance.

The objective of this manual is to provide simple, clear and complete instructions. It is backed by Aquafine Corporations commitment to offer superior customer support. Every effort has been taken to ensure the accuracy and completeness of information in this manual.

If you do not understand any of the information or procedure explanations in this manual, call your Aquafine Service Provider for assistance.

Do not undertake operation, repairs or servicing of equipment unless you are familiar with the operation and servicing of technical equipment and are trained in electrical and mechanical safety.

If your level of training, skill or comprehension of the manual's instructions could possibly result in injury or damage to the equipment, have the work done by a qualified operator or a Aquafine representative. Your common sense and good judgment are crucial to the safe and successful operation and maintenance of the TrojanUVLogic™.

1. Read the *Warnings and Precautions* and *General Lockout Procedure* in this section before operating or performing any maintenance on this equipment.
2. Read procedures thoroughly before starting.
3. Review all warnings and cautions that accompany any procedure and review the *Warnings and Precautions* section each time you prepare to perform maintenance on the TrojanUVLogic™

Three types of notices are used in this manual.



WARNING

CONTAINS INFORMATION THAT IF NOT HEEDED, MAY RESULT IN INJURY TO PERSONNEL OR EQUIPMENT DAMAGE.



CAUTION

TELLS READERS WHEN CARE IS NEEDED TO PREVENT EQUIPMENT DAMAGE.

Note:

PROVIDES COMMENTS WHICH CLARIFY INFORMATION.

This section of the O&M Manual contains *Important Contacts, Warnings and Precautions, General Lockout Procedures, and a List of Acronyms and Glossary of Terms.*

Chapter 1 - provides an introduction into the theory of ultraviolet light disinfection.

Chapter 2 - is an overview of the TrojanUVLogic™ Components and Operation and describes regular Maintenance Procedures.

Chapter 3 - provides instructions for the start up and shut down of the TrojanUVLogic™

Chapters 4 -7 - provides details for the operation, maintenance and specifications for the major components of the TrojanUVLogic™ including the UV Reactor (UVR), Lamps and Sleeves, UV Sensor(s), Control Panel, and optional Manual or Automatic Mechanical Wiping Systems.

Chapter 8 - provides information on Alarms and Troubleshooting.

Chapter 9 – provides Installation Instructions for the TrojanUVLogic™

Appendices include a variety of material such as *Electrical Drawings*, *Layout Drawings* and the *Equipment Warranty*.

Important Contacts

AQUAFINE CORPORATION

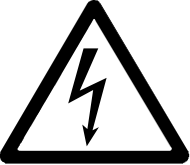
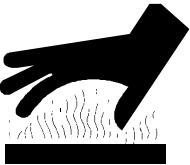
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Local Representative	

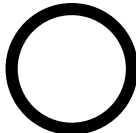
Warnings and Precautions

Please read warnings and precautions before proceeding with operation, maintenance or repair of the equipment. Always follow local safety codes and ensure tools and personal protective equipment are in good condition and properly fitted and tested.

	WARNING
	<i>Wear UV Resistant Face Shield!</i> <i>UNPROTECTED EXPOSURE TO ULTRAVIOLET LIGHT CAN CAUSE SEVERE BURNS TO THE EYES AND SKIN. FACE SHIELD SHOULD BE WORN AS THE PRIMARY PROTECTION AGAINST SUCH EXPOSURE. NEVER LOOK DIRECTLY AT THE ENERGIZED LAMPS UNLESS YOU ARE WEARING ULTRAVIOLET RESISTANT FACE SHIELD OR GLASSES (FOR SHORT-TERM EXPOSURE)</i>
	<i>Eye Protection Must be Worn!</i> <i>AS ADDED PROTECTION, OR AS A MINIMUM PROTECTION FOR SHORT-TERM EXPOSURES, TIGHT FITTING GLASSES- WITH SIDE SHIELDS PROTECTION WHERE SUCH SHIELDS ARE CONTIGUOUS - MUST BE WORN AT ALL TIMES WHEN THERE IS A POTENTIAL EXPOSURE TO ULTRAVIOLET LIGHT. GLASSES SUCH AS WRAP-AROUND STYLE ARE MOST EFFECTIVE.</i>
	<i>Wear Protective Gloves!</i> <i>ALWAYS WEAR PROTECTIVE GLOVES WHEN WORKING ON EQUIPMENT.</i>
	<i>Wear Safety Boots!</i> <i>ALWAYS WEAR PROTECTIVE FOOTWEAR WHEN WORKING ON EQUIPMENT.</i>
	<i>Wear Ear Protection!</i> <i>THE TROJANUVLOGIC™ DOES NOT PRODUCE A HARMFUL LEVEL OF NOISE, BUT USERS ARE CAUTIONED THAT THEY SHOULD WEAR HEARING PROTECTION AS APPROPRIATE TO PROTECT AGAINST OTHER NOISE THAT MAY BE PRESENT AT A WASTEWATER OR WATER TREATMENT PLANT.</i>



	WARNING
	Electrical Hazard! BECAUSE OF THE POTENTIAL HAZARD FROM THIS POWER SOURCE, IT IS PRUDENT TO USE LOCK OUT PROCEDURES AND TAG ALL SOURCES OF POWER BEFORE PERFORMING ANY MAINTENANCE, CLEANING OR REPAIRS ON ANY PIECE OF EQUIPMENT. THE POWER SOURCES MAY INCLUDE ELECTRICAL OR STORED ENERGY. REFER TO THE GENERAL LOCK OUT AND TAG PROCEDURES IN THIS MANUAL.
	Wear Hard Hat! WEAR AN APPROVED HARD HAT AND OTHER PERSONAL PROTECTIVE EQUIPMENT THAT IS REQUIRED ACCORDING TO CONSTRUCTION SITE, WASTEWATER OR WATER TREATMENT PLANT SAFETY REGULATIONS.
	Trip Hazard! STAY ALERT AND BE AWARE OF POTENTIAL TRIP HAZARDS BEFORE WORKING ON EQUIPMENT.
	Hot Surface! ALLOW ELECTRONIC BALLAST AND LAMPS TO COOL BEFORE HANDLING. ULTRAVIOLET LAMPS BECOME HOT DURING OPERATION. HOT LAMPS CAN CAUSE SERIOUS BURNS. ALLOW THE LAMPS TO COOL BEFORE SERVICING.
	THREE PHASE ALTERNATING CURRENT!
	SINGLE PHASE ALTERNATING CURRENT!

	WARNING
	<i>ON (SUPPLY)</i>
	<i>OFF (SUPPLY)</i>
	<i>PROTECTIVE EARTH TERMINAL!</i>
	<i>PINCH HAZARD!</i>
	<i>CONSULT YOUR TECHNICAL MANUAL BEFORE SERVICING!</i>

	CAUTION
	THE LAMPS IN THIS SYSTEM EMIT ULTRAVIOLET LIGHT. EXPOSURE TO ULTRAVIOLET LIGHT CAN CAUSE SERIOUS BURNS TO UNPROTECTED EYES AND SKIN. NEVER VIEW ULTRAVIOLET LIGHT DIRECTLY WITH THE NAKED EYE. ALWAYS USE THE PROPER PROTECTIVE EYEWEAR OR A UV-RATED VIEW PORT. ALWAYS WEAR PROTECTIVE CLOTHING WHEN EXPOSED TO ULTRAVIOLET LIGHT. ENSURE ALL LAMPS ARE PROPERLY SECURED WITHIN THE UVR CHAMBER BEFORE TURNING THE SYSTEM ON. TURN THE SYSTEM OFF BEFORE SERVICING. TO PREVENT ELECTRICAL SHOCK, TURN THE SYSTEM OFF BEFORE REMOVING ANY OF THE COVERS ON THE UVR CHAMBER OR OPENING THE CONTROL PANEL. TO AVOID PERSONAL INJURY, TURN OFF POWER BEFORE REMOVING REACTOR END CAP. ULTRAVIOLET LAMPS, AND THE SLEEVES THEY ARE HOUSED IN, ARE CONSTRUCTED OF QUARTZ TUBING. QUARTZ TUBING IS VERY FRAGILE AND EASILY FRACTURED. DO NOT STRIKE, BEND OR APPLY PRESSURE TO THIS MATERIAL OR IT WILL BREAK. BROKEN LAMPS OR SLEEVES CAN CAUSE SERIOUS CUTS. DISCARD LAMPS AND SLEEVES ACCORDING TO THE REQUIREMENTS OF YOUR JURISDICTION. ACIDS USED FOR CLEANING THE SLEEVES MAY CAUSE BURNS. WEAR PROTECTIVE CLOTHING AND PROTECTIVE EYEWEAR WHEN USING THESE MATERIALS. AFTER CLEANING, RINSE THE SYSTEM COMPONENTS THOROUGHLY WITH DISTILLED WATER. ALWAYS FOLLOW THE SAFETY PRECAUTIONS RECOMMENDED BY THE MANUFACTURER OF THE CLEANING SOLUTION. ACIDS USED TO CLEAN THE SENSOR CAN CAUSE BURNS. WEAR PROTECTIVE CLOTHING AND EYEWEAR WHEN HANDLING THESE MATERIALS. AFTER CLEANING, RINSE THE SYSTEM COMPONENTS THOROUGHLY WITH DISTILLED WATER. ALWAYS FOLLOW THE SAFETY PRECAUTIONS RECOMMENDED BY THE MANUFACTURER OF THE CLEANING SOLUTION. THIS SYSTEM USES ULTRAVIOLET LIGHT TO REDUCE THE CONCENTRATION OF PATHOGENS TO A NON-INFECTIOUS LEVEL. NON-OBSERVANCE OF THE MAINTENANCE INSTRUCTIONS OR THE ALARM MESSAGES WILL DIMINISH THE EFFECTIVENESS OF THIS SYSTEM. REQUIRED DISINFECTION EFFECTIVENESS IS NO LONGER GUARANTEED AND THAT THE REQUIREMENTS OF THE WATER SUPPLY REGULATIONS ARE NO LONGER BEING MET. A HEALTH RISK EXISTS. THIS SYSTEM IS DESIGNED TO WORK OPTIMALLY UNDER THE REQUIREMENTS DESCRIBED BY THE CUSTOMER. ANY MODIFICATION TO THESE FACTORS MAY REDUCE THE EFFECTIVENESS OF THE DISINFECTION OF THE SYSTEM. THE FACTORS THAT AFFECT OPERATION MAY BE FOUND IN THE INTRODUCTION TO UV THEORY. SEE CHAPTER 1. REMOVE THE END CAP COMPLETELY. DO NOT ALLOW THE END CAP TO HANG ON THE WIPER HANDLE WHILE CONDUCTING WORK. THE SLEEVES MAY BE LEFT IN THE WIPER ASSEMBLY WHEN THE STOP PLATE IS REMOVED; HOWEVER, IF THE SLEEVES ARE NOT REMOVED, YOU MUST ENSURE THEY ARE PROPERLY SUPPORTED WHEN THE STOP PLATE IS NOT THERE TO AVOID DAMAGE. IT IS ESSENTIAL THAT THE COMPONENTS OF THE STOP PLATE ASSEMBLY BE PROPERLY INSTALLED ON TO THE END OF THE DRIVE SCREW FOR CONSISTENT WIPER OPERATION. FAILURE TO DO SO MAY RESULT IN IMPROPER WIPER OPERATION. LONG LAMP SYSTEMS (AL MODELS) HAVE TWO SEPARATE WIPER ASSEMBLIES MOUNTED ON TO THE DRIVE SCREW. MAINTAIN THE DISTANCE OF 28" CENTER TO CENTER BETWEEN THE TWO WIPER



CAUTION

ASSEMBLIES. THIS IS TO MAINTAIN FULL WIPING COVERAGE OF THE SLEEVES AND PREVENT JAMMING OF THE WIPER ASSEMBLY ON THE OUTLET END OF THE CHAMBER.

IF YOU HEAR OR SUSPECT SLEEVE BREAKAGE, DO NOT WIPE BY RESETTING THE POWER. YOU WILL BREAK MORE SLEEVES OR LAMPS.

INSTALLATION AND MAINTENANCE TO BE PERFORMED BY QUALIFIED PERSONNEL ONLY.

THIS SYSTEM IS DESIGNED ONLY FOR INDOOR USE.

THIS SYSTEM CAN DISINFECT ONLY WATER.

NEVER OPERATE THE UNIT WHILE EMPTY OR WITHOUT FLOW FOR AN EXTENDED PERIOD.

OPERATE THE SYSTEM ONLY IF THE CHAMBER IS COMPLETELY FILLED WITH FLOWING WATER. INTERMITTENT OPERATION OF THE SYSTEM REQUIRES THAT A MINIMUM AMOUNT OF WATER FLOWS THROUGH THE SYSTEM IN ORDER TO COOL THE LAMPS.

CONNECT THIS SYSTEM ONLY TO AC POWER THAT CONFORMS TO THE INFORMATION IN THE RATING PLATE AS REGARDS VOLTAGE AND VOLTAGE SPECIFICATION.

IF YOUR SYSTEM RUNS WITH PULSE COMPRESSION, A BUFFER TANK OR OTHER REMEDIAL MEASURE MUST BE PROVIDED.

THE ULTRAVIOLET EMISSION OF THESE LAMPS DECREASES OVER TIME. THE UV LAMPS IN THIS SYSTEM MUST BE REPLACED EVERY 9000 HOURS OF OPERATION IN ORDER TO ENSURE PROPER OPERATION, SEE CHAPTER 4.

REGULAR TESTING OF SYSTEM PERFORMANCE USING STANDARDIZED METHODS (E.G., WATER SUPPLY REGULATIONS OF VARIOUS COUNTRIES) IS RECOMMENDED. WHEN INSTALLING THE TROJANUVLOGIC™ SYSTEM, ALLOW ENOUGH ROOM FOR SAMPLING POINTS.

ALL REPAIRS ARE TO BE DONE BY AQUAFINE CORPORATION'S SERVICE OR BY QUALIFIED SPECIALISTS.

DE-PRESSURIZE & DRAIN THE UVR.

PRESSURE MUST BE RELIEVED FROM THE SYSTEM PRIOR TO ANY MAINTENANCE, TO PREVENT DAMAGE TO THE EQUIPMENT OR PERSONAL INJURY.

TO AVOID PERSONAL INJURY, TURN OFF POWER BEFORE REMOVING UVR END CAP.

FOR CORRECT INSTALLATION, FOLLOW THE INSTALLATION INSTRUCTIONS IN CHAPTER 9. REFER TO THE APPROPRIATE ELECTRICAL DIAGRAM IN APPENDIX D, WHICH SHOWS HOW TO SET UP THE PROPER SYSTEM CONNECTIONS BETWEEN THE CONTROL PANEL AND THE REACTOR CHAMBER.



CAUTION



ATTENTION
OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

General Lockout Procedures

The following lockout procedure is the minimum requirement. Additional precautions should be taken depending on site-specific protocols. Always check with the plant manager and senior electrician for additional precautions.

	WARNING <i>EYE PROTECTION! WEAR UV RESISTANT FACE SHIELD WHEN LOOKING AT LAMPS OR REACTION CHAMBER.</i>
---	--

	WARNING <i>HAND PROTECTION! WEAR PROPER GLOVES AND CLOTHING WHEN SERVICING EQUIPMENT.</i>
--	--

	WARNING <i>FOOT PROTECTION! WEAR PROPER FOOT PROTECTION BEFORE ENTERING A WATER TREATMENT PLANT.</i>
---	---

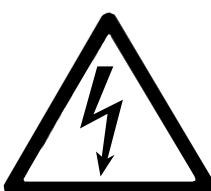
Lockout and Tag Procedure

1. Locate and identify electrical supply to equipment. Identify specific breakers or disconnects that service Aquafine Corporation equipment. If you are unsure, contact the plant electrician or maintenance personnel to locate the correct electrical supply.

	WARNING <i>BE AWARE THAT THE PANEL MAY BE FED FROM MULTIPLE SOURCES!</i>
---	---

2. While standing to the side of the Electrical Panel, use your closest arm to move the Rotary Disconnect Switch to the OFF position.

3. Attach your Lock and Safety Tag to the Rotary Disconnect Switch. Include your name, date and time, and the work to be performed on the tag.
4. Return to the Control Panel (CP) and verify correct power source has been locked out.

	WARNING <i>THE EQUIPMENT MAY HAVE STORED ENERGY! ENSURE THAT ALL PARTS HAVE STOPPED MOVING AND ANY STORED CAPACITANCE HAS BEEN EFFECTIVELY DRAINED.</i>
--	--

5. Proceed to the work area and visually check to ensure that the equipment is OFF.
6. Double check with a Multimeter at the equipment Service Entrance to ensure that the system has been de-energized.
7. Wait **five minutes** once system is turned OFF, to allow for Capacitive Discharge.
8. It is now safe to work on the system.
9. Complete all required maintenance.

After Service Work Is Complete

10. Ensure CP door is closed.
11. Ensure all of the equipment is in the OFF position.
12. Clear any tools or debris from work area.
13. Remove all Lockout Devices and Tags.
14. While standing to the side of the Electrical Panel, use your closest arm to move the Rotary Disconnect Switch to the ON position.
15. Notify the plant manager or site electrician that work is complete and that the system has been restarted.



List of Acronyms/Glossary

This glossary defines a list of acronyms that will be found throughout this manual.

°C – Degrees Celsius

AC – Alternating Current

_L Long Lamp Logic Model

AMWS Automatic Mechanical Wiping System is an optional component that provides automated wiping of the Lamp Sleeves during normal operation.

ANSI – American National Standards Institute

_S Short Lamp Logic Model

Bar - Barometric Pressure

BSP – British Standard Pipe

CCB – Communication Control Board

cm - Centimeter

CP - Control Panel

DC – Direct Current

DIN - Deutsche Industrie Norm (German Equivalent of ANSI)

DNA - Deoxyribonucleic Acid

EOL - End of Life

GND - Ground

GPM - US Gallons per Minute

Hp – Horsepower

Hrs – Hours

in lb – Inch pound

Lb ft – Pound Foot

L/s – Liters per second

LED - Light Emitting Diode

mA – Milliamps

MAX - Maximum

MGD - Millions of Gallons per Day

mg/l – Milligrams per liter

MIN – Minimum

mJ/cm² - Millijoules per square centimeter

MLD - Millions of Liters per Day

mm - Millimeters

MMWS Manual Mechanical Wiping System is an optional component that provides the operator the ability to wipe the Lamp Sleeves during normal operation.

MPa - Megapascals

mW/cm² - Milliwatts per square centimeter

N·m – Newton meter

nm – Nanometers

NPT – National Pipe Thread

O&M - Operations and Maintenance

OH – Hydroxyl-Free Radicals

ph - Phase

ppm – Parts per Million

psi – Pounds per Square Inch

sec – Second

SST – Stainless Steel

TOC – Total Organic Carbon

UV - Ultraviolet

UVR - UV Reactor

VAC – Voltage Alternating Current

VDC – Voltage Direct Current

VFD – Vacuum Fluorescent Display

w – Wire

W/m² – Watts per meter squared

TrojanUVLogic™ Maintenance Requirements

	CAUTION <i>THIS SYSTEM USES ULTRAVIOLET LIGHT TO REDUCE THE CONCENTRATION OF PATHOGENS TO A NON-INFECTIOUS LEVEL. NON-OBSERVANCE OF THE MAINTENANCE INSTRUCTIONS OR THE ALARM MESSAGES WILL DIMINISH THE EFFECTIVENESS OF THIS SYSTEM. REQUIRED DISINFECTION EFFECTIVENESS IS NO LONGER GUARANTEED AND THAT THE REQUIREMENTS OF THE WATER SUPPLY REGULATIONS ARE NO LONGER BEING MET. A HEALTH RISK EXISTS.</i>
---	--

Periodic inspection and service can extend service life, especially under extreme operating conditions such as batch production scenarios where the internal temperature of the UVR may vary greatly. In such applications, it is recommended that an internal inspection be completed periodically. Routine maintenance typically consists of partial disassembly, cleaning and visual evaluation of system components.

Maintenance Requirements must be completed in order to adhere to warranty requirements. Along with the **Maintenance Schedule**, there are two **Maintenance checklists** (simply put in the date, and initial the task completed). These tables must be kept up to date at all times to avoid breach of contract which could void the warranty.

Four other forms that are provided to make troubleshooting easier are as follows:

1. **Alarm Log** - should be filled out at all times to aid in troubleshooting.
2. **System Operating Parameters** - should be filled out daily for the purpose of viewing trends, if a problem arises.
3. **Maintenance Log** – This information needs to be filled out to know what was replaced, when and why, again primarily for the purpose of troubleshooting.
4. **Lamp Log Table** – This must be completed with every Lamp Warranty Claim. Without this form claims will not be processed.

Again all logs should be filled out to ensure that all requirements of the warranty are met.

Ensure that Log pages are photocopied as needed; do not use the originals provided in this manual.

Maintenance Schedule

Refer to applicable sections of the O&M for specific instructions on how to access components and complete the following checks.

Daily:

- ❑ Check Current Alarm History on CP operator interface Check Current Alarms, Alarm Status and Alarm History screens for any new faults. (5 min)
- ❑ Complete System Operating Parameters Checklist.
- ❑ Check for leaks.

Monthly:

*** Monthly procedures may be required more frequently if either a low dose alarm occurs or if the UVR has been turned off for a long period of time.**

- ❑ If Enclosure is Type 3R or made of 304 SST, check CP Fan Filters for buildup. Replace if necessary.
- ❑ Ensure all of the Sleeve Nuts are tight.
- ❑ Remove end cap. Initiate a wipe sequence. Observe the Motor action and wipe sequence, listening for unusual noises or vibration which could indicate Wiper fatigue. Ensure UV Lamps power is OFF before initiating this procedure. Keep hands away from Gear Motor while operating. (10 minute task).
- ❑ If a Wiping System is not provided, check the Quartz Sleeves for fouling. Remove a representative sample of Quartz Sleeves. If external fouling present, remove and clean all Quartz Sleeves. If internal fouling is present replace the Sleeve. (10 minute task per Sleeve with UVR drained).
- ❑ Check UV Sensor Window for fouling. If external fouling present, remove and clean the UV Sensor Window. If internal fouling is present replace the UV Sensor. (5 minute task with UVR drained).

Note: Cleaning frequencies are recommendations and should be used as a guideline. Individual systems may vary depending on effluent quality, algae buildup, etc.

1 year:

*** It is recommended that all components be inspected and cleaned yearly. The following components are noted due to the increased wear over time that they are subjected to.**

- ❑ Check Sleeve Seal O-Rings, Sleeve Support Washer, Sleeve Bushing, and Wear Pads. If there is indications of decay, ie. cracking or brittleness, replace component. (5 min. task per component after accessed).
- ❑ Ensure UVR chamber is cleared of any settled solids. (30 min with chamber empty).
- ❑ Inspect Lamp socket. (1 min. per socket).
- ❑ Check Sleeve Wiper for indications of decay, i.e. Cracking or Brittleness. If such indications exist, replace component. (5 min. task per component after accessed).
- ❑ Check Rod Seal for leakage at Drive Screw. (5 min. task per component after accessed).
- ❑ Check Stop Plate Flange Bushing for wearing. (5 min. task per component after accessed).
- ❑ Check for UV Decay of the Drive Nut. (5 min. task per component after accessed).



- ❑ Inspect the Roller Bearing. (5 min. task per component after accessed).
- ❑ Check Elastomer Compression Spring. (5 min. task per component after accessed).
- ❑ Check Limit Switch Rod Seals. (5 min. task per component after accessed).
- ❑ Check Busing Housing O-Ring for leakage. (5 min. task per component after accessed).

9000 Runtime Hours:

- ❑ Replace all Lamps. (10 min task per Lamp once accessed).



Maintenance Checklist

M = Monthly Y = Yearly	Maint. Req'ts	Jan.	Initials	Feb.	Initials	March	Initials	April	Initials	May	Initials	June	Initials
Manually hand clean Sleeves	M												
Manually hand clean UV Sensor	M												
Check for UV Decay of Sleeve Seal O-Rings	Y												
Check for UV Decay of Sleeve Support Washer	Y												
Check for UV Decay of Sleeve Bushing	Y												
Check for UV Decay of Wear Pads	Y												
Inspect Lamp Socket	Y												
Check UVR Chamber for heavy build up of	Y												
Check Sleeve Wiper	Y												
Check Rod Seal for leakage at Drive Screw	Y												
Check Stop Plate Flange Bushing for wear	Y												
Check for UV Decay of the Drive Nut	Y												
Roller Bearing	Y												
Check Elastomer Compression Spring	Y												
Check Limit Switch Rod Seals	Y												
Check Bushing Housing O-Ring for leakage	Y												



PREFACE

M = Monthly Y = Yearly	Maint. Req'ts	July	Initials	Aug.	Initials	Sept.	Initials	Oct.	Initials	Nov.	Initials	Dec.	Initials
Manually hand clean Sleeves	M												
Manually hand clean UV Sensor	M												
Check for UV Decay of Sleeve Seal O-Rings	Y												
Check for UV Decay of Sleeve Support Washer	Y												
Check for UV Decay of Sleeve Bushing	Y												
Check for UV Decay of Wear Pads	Y												
Inspect Lamp Socket	Y												
Check UVR Chamber for heavy build up of	Y												
Check Sleeve Wiper	Y												
Check Rod Seal for leakage at Drive Screw	Y												
Check Stop Plate Flange Bushing for wear	Y												
Check for UV Decay of the Drive Nut	Y												
Roller Bearing	Y												
Check Elastomer Compression Spring	Y												
Check Limit Switch Rod Seals	Y												
Check Bushing Housing O-Ring for leakage	Y												

Alarm Log (Record All Alarms in this table)

DATE	TIME	ALARM DESCRIPTION	ALARM RESOLVED (Y/N)



System Operating Parameters											
	Date	Time	Flow (Units _____)	UV Intensity UVR 1	UV Intensity UVR 2	UV Intensity UVR 3	UV Intensity UVR 4	UVR 1 Power (%)	UVR 2 Power (%)	UVR 3 Power (%)	UVR 4 Power (%)
Monday											
Tuesday											
Wednesday											
Thursday											
Friday											
Saturday											
Sunday											
	System Alarms (Y/N)	Lamp Hours/ Cycling UVR1	Lamp Hours/ Cycling UVR2	Lamp Hours/ Cycling UVR3	Lamp Hours/ Cycling UVR4	Operator / Signature and Comments					
Monday											
Tuesday											
Wednesday											
Thursday											
Friday											
Saturday											
Sunday											



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PREFACE

[illegible]

Lamp Log Table

Project Name: _____ Date: _____

Completed By: _____

Company Name

Reactor	Lamp	Lamp Hours	Date Installed	Date Changed

This form must be completed and submitted to Aquafine Corporation with all requests for warranty replacements for Lamps. Individual Lamp premature failure information should also be transferred to the outside of the Lamp packaging for the returned Lamps.

For Aquafine Use:

MTR Initials:

Date Received:

Date Completed:

Ref: Sales Order #

RA (Y/N) & #:



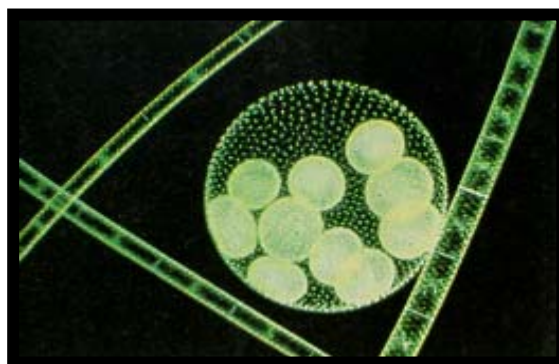
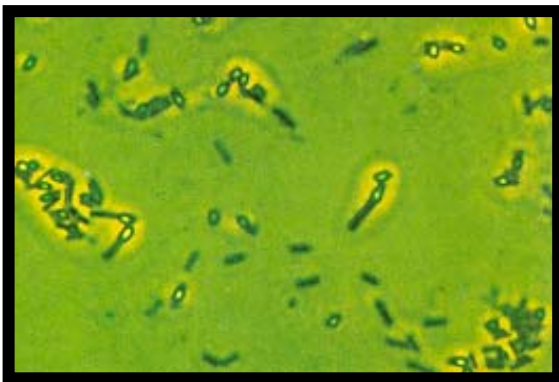
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Chapter 1

INTRODUCTION TO UV THEORY





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Introduction to UV Theory



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Introduction to UV Theory



1 INTRODUCTION TO UV THEORY

1.1 Overview of TrojanUVLogic™

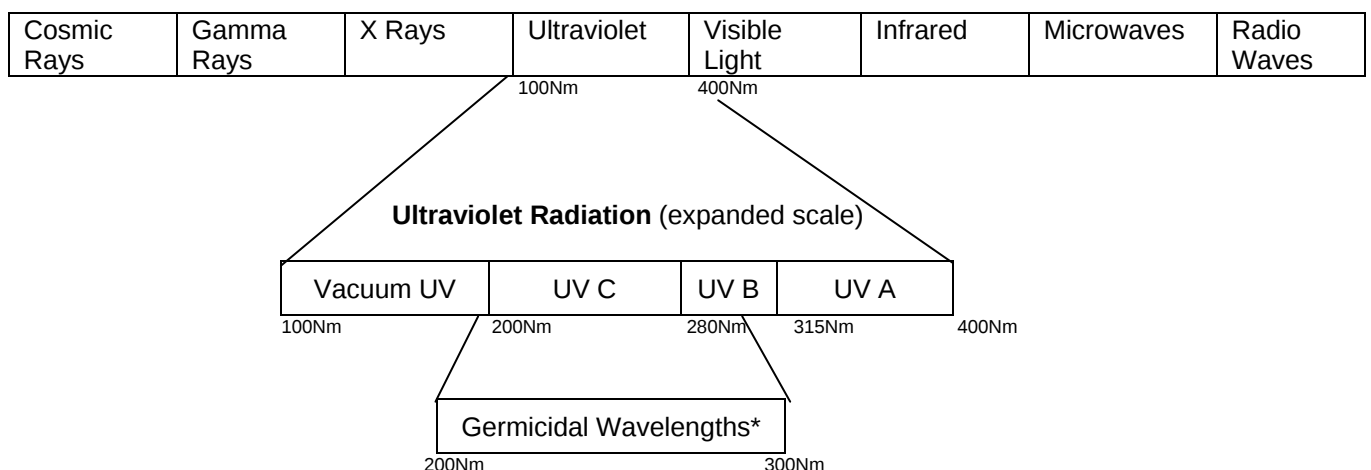
The TrojanUVLogic™ uses ultraviolet light to treat process water in the food & beverage, semiconductor, pharmaceutical, and aquaculture industries. It is also an effective replacement for chemical biocides in the cooling towers and recirculation loops used by many industries. The simple, effective design makes it suitable for many large scale applications in industrial water treatment. Unlike chemical treatment, UV does not require the handling of dangerous substances and adds no toxic compounds to the water. The sealed and pressurized reactor chamber of the TrojanUVLogic™ has capacity for a high volume of water flow. It is a closed system preventing outside particles from contaminating the treated water. The modular design of the TrojanUVLogic™ makes it versatile and permits easy access to the equipment.

1.2 What Is Ultraviolet Light?

UV light is defined as electromagnetic radiation having a wavelength less than that of visible light (400 Nm) and greater than that of X-Rays (100 Nm). The unit of wavelength used is a nanometer (Nm) equal to 10^{-9} meters. The optimum UV wavelength for germicidal effect is 265 Nm, which is found only in small amounts in solar radiation because energy at these wavelengths is absorbed by the atmosphere.

The primary source of UV energy in current technology is a special short wave arc lamp (like the ones supplied with your system). The primary reason for its use is that a significant amount of its UV energy output is near the wavelength of 265 Nm. This radiation is generated by striking an electric arc through a metallic compound vapor. Discharge of the energy generated by excitation of the metallic molecules results in the emission of the UV light.

Electromagnetic Spectrum



*Peak effectiveness approximately 260-265Nm



1.3 Disinfection vs. Sterilization

Sterilization implies the total elimination of pathogens or disease carrying microorganisms. In contrast, disinfection is a reduction in the concentration of pathogens to non-infectious levels.

1.4 Applications of UV Light

Disinfection: The most common application of UV light is disinfection. 254 Nm UV energy penetrates the cell membrane of microorganisms and alters the genetic material of the cell (DNA) destroying its ability to reproduce. In this application, UV is commonly used as an alternate disinfectant to chlorine and other chemical oxidants and also as a protection for other technologies in a complete water treatment system.

Ozone Destruction: Ozone is typically used in high purity water systems to oxidize trace chemicals and to disinfect stored water. Often ozone cannot be tolerated in the final product water and therefore any residual must be removed. 254 Nm UV energy is absorbed by ozone, causing it to break down into dissolved oxygen.

TOC Reduction: In high purity water systems, UV is often used in conjunction with ion exchange equipment for the reduction of trace organics, referred to as TOC (Total Organic Carbon). High-energy UV lamps, emitting UV energy below 200 Nm, are used to trigger the photolysis of water, producing very powerful hydroxyl free radicals (OH). These hydroxyl free radicals attack organic compounds, breaking them down into carbon dioxide and water when fully oxidized. Some organic materials are broken down into weakly ionized acid-based groups which are then easily removed by polishing mixed bed ion exchange equipment.

Chlorine/Chloramines Destruction: UV can replace sodium meta-bisulfite and carbon technologies to remove chlorine/chloramines from source water used in industrial applications. The addition of 254 Nm UV light produces OH radicals that can break chlorine/chloramine compounds down to their lowest constituents.

1.5 Factors Affecting UV Disinfection

Ultraviolet light kills bacteria, protozoa and viruses, by destroying their genetic material. The performance of a TrojanUVLogic™ to disinfect water is expressed in terms of reduction of bacteria, or "kill". Each system is designed to reduce microorganism counts to a certain allowable level, which depends on the requirements of the specific application or regulatory requirements. The dose of UV light available to kill bacteria is measured in millijoules / centimeter², which is equivalent to the product of the light intensity and the duration of exposure, or retention time. Any factor that affects light intensity or retention time will affect performance.

$$\text{Dose} = \text{Intensity (mW/cm}^2\text{)} \times \text{Retention Time (sec)}$$

The TrojanUVLogic™ is designed to deliver a dose that takes into account lamp aging.

Factors Affecting Performance			
DOSE =	INTENSITY(mW/cm²)	X	RETENTION TIME(sec)
	<u>Water Quality</u> • UV Transmittance • Suspended Solids • Level of Dissolved Organics • Total Hardness <u>Lamp Condition</u> • Sleeve Cleanliness • Aging <u>Treatment Process</u>		Flow Rate

UV Transmittance:

UV Transmittance is defined as the percentage of UV light at 254 Nm not absorbed after passing through 1 cm of water sample. UV Transmittance depends on dissolved and suspended matter in the water. Reduced UV Transmittance lowers the intensity of the light in the water, thus requiring longer exposure time in order to deliver the proper UV dose. The visual clarity of a water sample is not always a good indicator of its UV Transmittance since water that is clear to visible light may absorb invisible ultraviolet wavelengths.

Note:	<i>There is NO correlation between turbidity and UV Transmittance.</i>
--------------	--

Suspended Solids:

Suspended Solids consist of any filterable particle in the water and are measured in parts per million (ppm) or (mg/l). They lower UV Transmittance by scattering and absorbing the light. They can also reduce kill by protecting bacteria from exposure to the UV light.

Level of Total Dissolved Solids:

Specific organic compounds in the process water will absorb some energy, which is emitted in the germicidal wavelength region of the spectrum.

Total Hardness:

The presence of high levels of inorganic magnesium or calcium carbonates in a water



stream may contribute to coating of the quartz sleeve.

Sleeve Cleanliness:

To ensure maximum performance from the unit, it is essential that the Quartz Sleeves be kept clean. If a coating is allowed to build up on the sleeves, the amount of the UV light transmitted to the water will be reduced.

Treatment Process:

Water processing equipment located upstream of the TrojanUVLogic™ such as filters, can affect performance. Different treatment processes produce water with different UV transmittance characteristics and different observed cleaning frequency patterns.

Flow Rate:

The flow rate through the TrojanUVLogic™ will determine the retention time, which in turn determines the delivered UV dose at a given UV intensity.

Chapter 2

SYSTEM OVERVIEW







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2.1	OPERATIONS OVERVIEW.....	2-3
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2 SYSTEM OVERVIEW

2.1 System Components

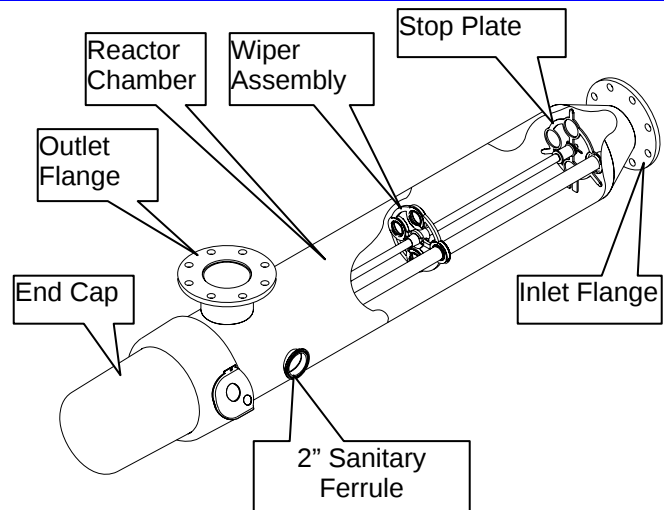
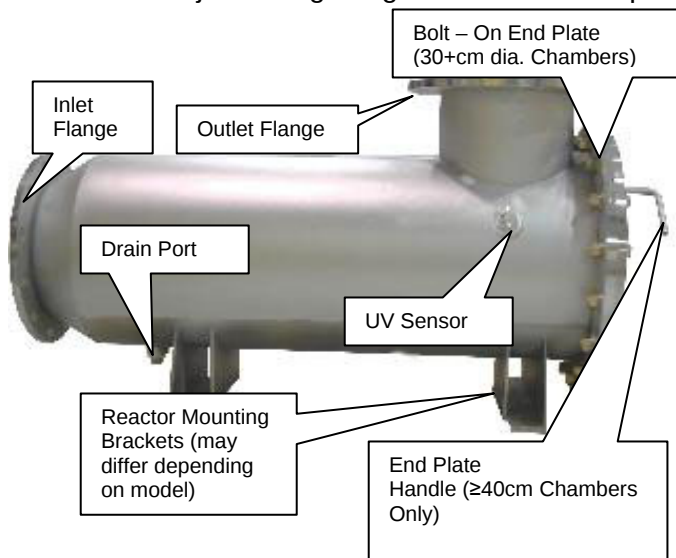
The Trojan[™]UVLogic[™] is made up of several components:

- UV Reactor (UVR),
- Control Panel (CP),
- UV Sensor
- Automatic Mechanical Wiping System (AMWS).(Optional)
- Manual Mechanical Wiping System (MMWS).(Optional)
- Power Pack (may or may not be provided - dependant on incoming power supply)

UV Reactor (UVR)

The efficient L-shaped UVR is a stainless steel pipe which houses the UV Lamps. The Lamps are enclosed in Quartz Sleeves and are supported by the Sleeve Holder / Wiper Assembly. The number of Lamps depends on the water quality and flow rate.

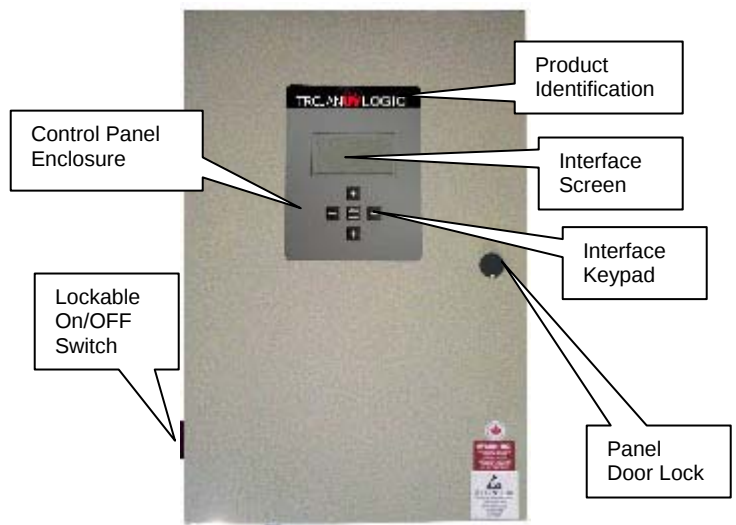
The Trojan[™]UVLogic[™] germicidal UV Lamp is a



low pressure, high Intensity amalgam Lamp.

Control Panel (CP)

The Control Panel (CP) houses the main interface to the UV system and a microprocessor based controller with a Vacuum Fluorescent Display (VFD) that allows for local control, monitoring and configuring of the system. The CP also houses the power supplies that provide power distribution to the UVR and associated equipment (i.e. Automatic Mechanical Wiping system (AMWS), UV Sensors, UV Lamps).



The Operator Interface to the UV system is located on the door of the CP Enclosure. The Operator Interface displays system status and operational information.

UV Sensor

The TrojanUVLogic™ system is provided with one UV Sensor per unit. The UV Sensor is mounted within the Sensor Port located on the wall of the UVR.

The UV Intensity seen by the UV Sensor is continuously displayed on the Operator Interface in mW/cm^2 (milliWatts/centimeter²).

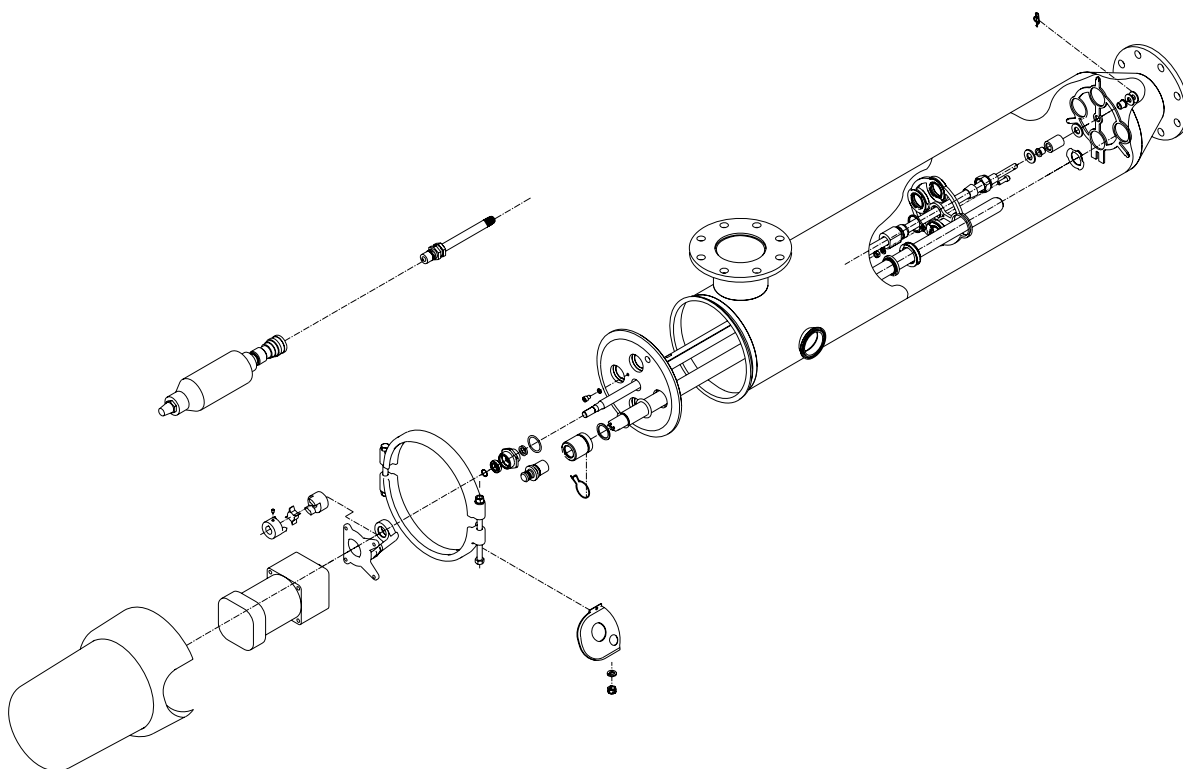
Wiping Systems

(Optional on most models)

Automatic Mechanical Wiping System (AMWS)

The AMWS uses food grade rubber wipers contained within a Split Ring Wiper Housing, mounted on a stainless steel Plate, placed around each of the Quartz Sleeves. The Wipers for all Sleeves are mounted together onto a common Wiper Assembly.

Note: Optional Vent Kit shown below on the reactor is not included with system, unless purchased.



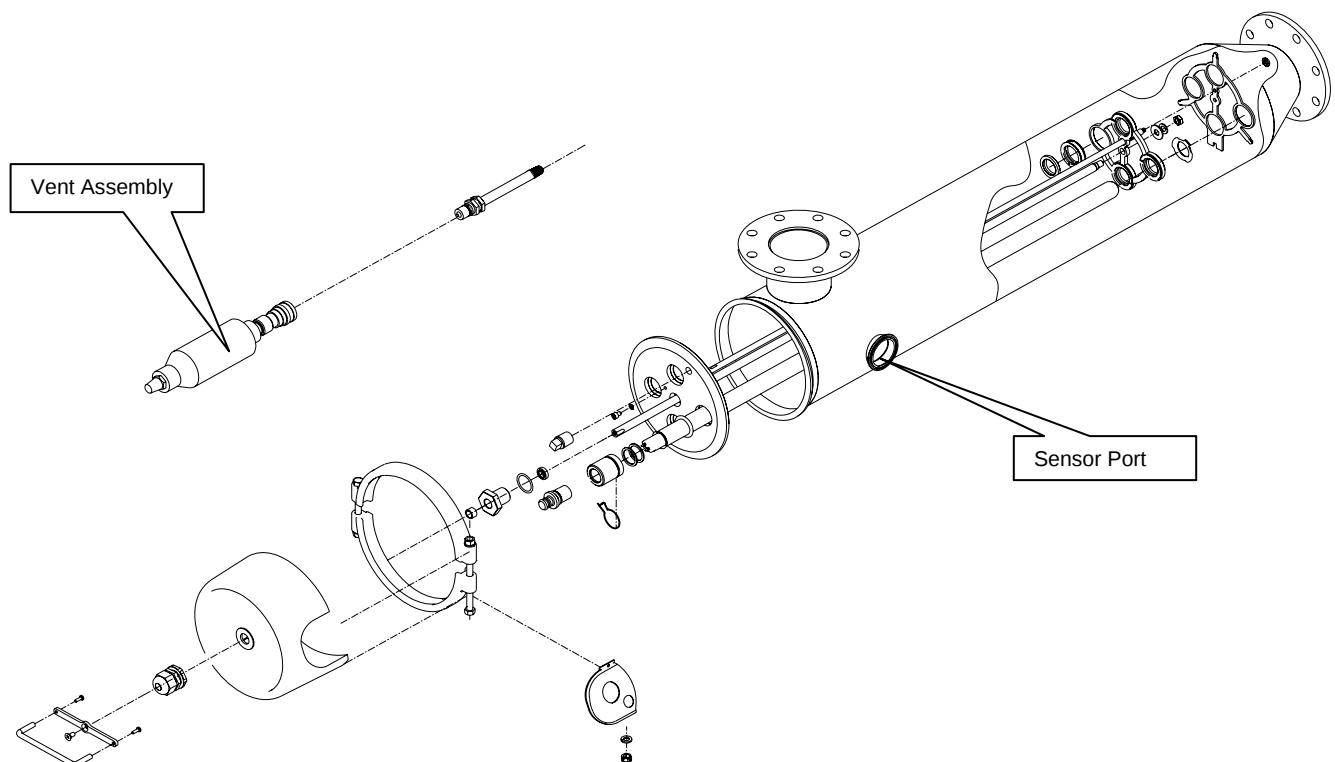


Manual Mechanical Wiping System (MMWS)

The MMWS uses food grade rubber wipers contained within a Split Ring Wiper Housing, mounted on a stainless steel plate, placed around each of the Quartz Sleeves. The Wipers for all Sleeves are mounted together onto a common Wiper Assembly. The Wiper Assembly is driven back and forth by hand using an external handle.

Power Pack

The Power Pack will provide step-up or step-down power. Any plant power can be converted to the 240VAC split phase power required by the CP. The Power Pack is essentially an independent transformer that is housed in its own Type 3R enclosure.



2.2 Operations Overview

Control System Overview

The heart of the control system is a microprocessor-based controller, which continuously monitors and controls the UV system's functions. Custom electronics provide the CP with the necessary indications of system parameters.



2.3 System Verification Label Definitions

Below are the list of the potential options indicated on the Label and a brief description (Reference Your System Sticker located on your equipment and at the front of this manual to determine your system Specifications)

Number of Lamps: 1 = 1 Lamp 2 = 2 Lamps 3 = 3 Lamps 4 = 4 Lamps 6 = 6 Lamps 8 = 8 Lamps 12 = 12 lamps 18 = 18 lamps 24 = 24 lamps 30 = 30 Lamps	ANSI = American National Standards Institute (ANSI #150) DIN = Deutsches Institut für Normung (DIN, the German Institute for Standardization) (DN10) SAN = Sanitary Clamp fittings CUST = Custom Flange Flange Size: 1.5= 1.5" 2 = 2" 3 = 3" 4 = 4" 6 = 6" 8 = 8" 10 = 10" 14 = 14" 40 = 40mm 50 = 50mm 80 = 80mm 100 = 100mm 150 = 150mm 200 = 200mm 250 = 250mm 350 = 350mm CUST = CUSTOM	Manual = Manual Auto = Automatic None = No Wiping
LampType: A = Disinfection V = 100 Hr Validated T = TOC Reduction		
Lamp Length: M = Midflow Lamp S = Short Lamp L= Long Lamp		
Chamber Diameter: 10 = 10cm 15 = 15cm 20 = 20cm 30 = 30cm 40 = 40cm 50 = 50cm CUST = Custom		Sleeve Wiping Option: None= No Sensors Provided Gers= Germicidal Sensor DVGW = DVGW Certified Sensor Customer Supply Voltage: Example: 480Y/277V,3PH, 4W+GND(L-L- L-N) = 480 Volts Line to Line, 277 Volts Line to Neutral, 3 Phase, 4 Wire, plus Ground (Line-Line-Line- Neutral) ENSURE: that value displayed on your sticker matches your intended input power. Enclosure Material: 0 = No Enclosure Provided PST = Painted Steel
Flange Type:	Sleeve Wiping Option:	

PROJECT # _____

NUMBER OF LAMPS:_____

LAMP TYPE:_____

LAMP LENGTH:_____

CHAMBER DIA:_____ / FLANGE TYPE:_____ /

FLANGE SIZE:_____

SLEEVE WIPING OPTION:_____

SENSOR TYPE:_____

CUSTOMER SUPPLY VOLTAGE:_____

ENCLOSURE MATERIAL:_____ / RATING:_____

OPERATING VOLTAGE:_____

POWER PACK:_____

ANALOG INPUT DEVICES:_____

ANALOG OUTPUT DEVICES:_____

REMOTE ON/OFF:_____

REMOTE OVERRIDE:_____

MOUNTING BRACKETS:_____ /

AIR VENT KIT:_____



SST = *Stainless Steel*

Enclosure Rating:

No = *No Enclosure*

Provided

3R = *Type 3R*

12 = *Type 12*

Operating Voltage:

208V -

240V, 1PH, 2W+GND(L-L) = *Your UVSwiftSC CP Panel accepts any power supply between “208 Volts Line to Line” up to and including “240 Volts Line to Line”, 1 Phase, 2 Wire, plus Ground (Line-Line) – For the Midflow Models – it will alternatively accept a power range between 120VAC through to 240VAC* **Note: That for any other input power supply a Power pack is required to convert power to this range.**

Power Pack:

Required = *Provided*

(When the Customer Supply Voltage **is not** within the required Operating Voltage.)

Not Required = *Not*

Provided (When the Customer Supply Voltage **is** within the required Operating Voltage.)

Analog Input Devices:

Indicates the number of A/I devices provided from (1 – 5)

Analog Output Devices:

Indicates the number of A/O devices provided from (1 – 4)

Remote ON/OFF:

Required = *Provided*

(Optional when Customer requested – Customer must supply power from device.).

Not Required = *Not*

Provided (standard).

Remote Override:

Required = *Provided*

(Optional when Customer requested – Customer must supply power from device.).

Not Required = *Not*

Provided (standard).

Mounting Brackets:

Fixed = *Welded Brackets*

Adjustable = *Adjustable*

Bolt-On Brackets

None = *No Brackets*

Air Vent Kit:

None = *Not Provided*

Provided = *Provided*

(Option available if needed for D06 units only when Mounted vertically)



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Chapter 3

START UP AND SHUT DOWN PROCEDURES



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Start Up/Shut Down Procedures



3 Start Up and Shut Down Procedures 3-1

3.1 START UP UV SYSTEM..... 3-1

3.2 SHUT DOWN UV SYSTEM..... 3-1





3 START UP AND SHUT DOWN PROCEDURES

3.1 Start Up UV System

1. Allow the UV Reactor (UVR) chamber to fill with water.



CAUTION

Never operate the unit while empty or without flow for an extended period.

Operate the system only if the chamber is completely filled with flowing water. Intermittent operation of the system requires that a minimum amount of water flows through the system in order to cool the lamps.

2. Check UVR to ensure that there are no leaks.
3. Proceed to procedure number 5 if the Remote On/Off option was not provided.
4. If the Remote On/Off option was provided:
 - Select Systems Settings under Main Menu on the operator interface.
 - Move the cursor to line 2 – Operation Mode.
 - Change setting from Local to Remote.
 - Return back to Main Menu Screen.
 - Supply 24-240 VAC or VDC to Digital Input 1.
 - Maintain the supply of power to Digital Input 1.
5. Turn the TrojanUVLogic™ ON using the switch located on the side of the Control Panel (CP). A 20-second delay timer is initiated when the system is turned on. The system will not register any alarms until this 20-second warm-up timer has expired. This feature prevents

any false alarms from registering while the system is warming up.

6. Depending upon the water temperature, the lamps can take a varying amount of time to reach maximum output.
7. Allow the UV Intensity reading on the front of the CP to stabilize for a minimum of 10 seconds. If the UV Intensity display does not change during this 10-second period, by-pass or process water may be allowed to pass through the chamber. However, **flow for disinfection must not be allowed to pass prior to the expiration of the 8-minute warm-up timer.**
8. If after 8 minutes the Low UV Intensity Alarm has not cleared, maintenance measures must be taken. Refer to the troubleshooting section of this manual for the actions to be taken in the case of the Low UV Intensity alarm.
9. Allow any untreated water present in the system to flush through before using.
10. Monitor the system periodically to determine if any alarms are present.

3.2 Shut Down UV System

1. Turn off the water flow through the UVR chamber. Isolate the UVR.

Note:

Ensure that the plant has been switched to bypass or plant is shut down to avoid damage to other plant equipment.

2. Shut the power OFF at the CP. Follow the *Lockout and Tag Procedures* in the Preface.



WARNING

Electrical Hazard!

Because of the potential hazard from this power source, it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.

3. Relieve the water pressure and drain the water from the chamber through the drain provided on the UVR.



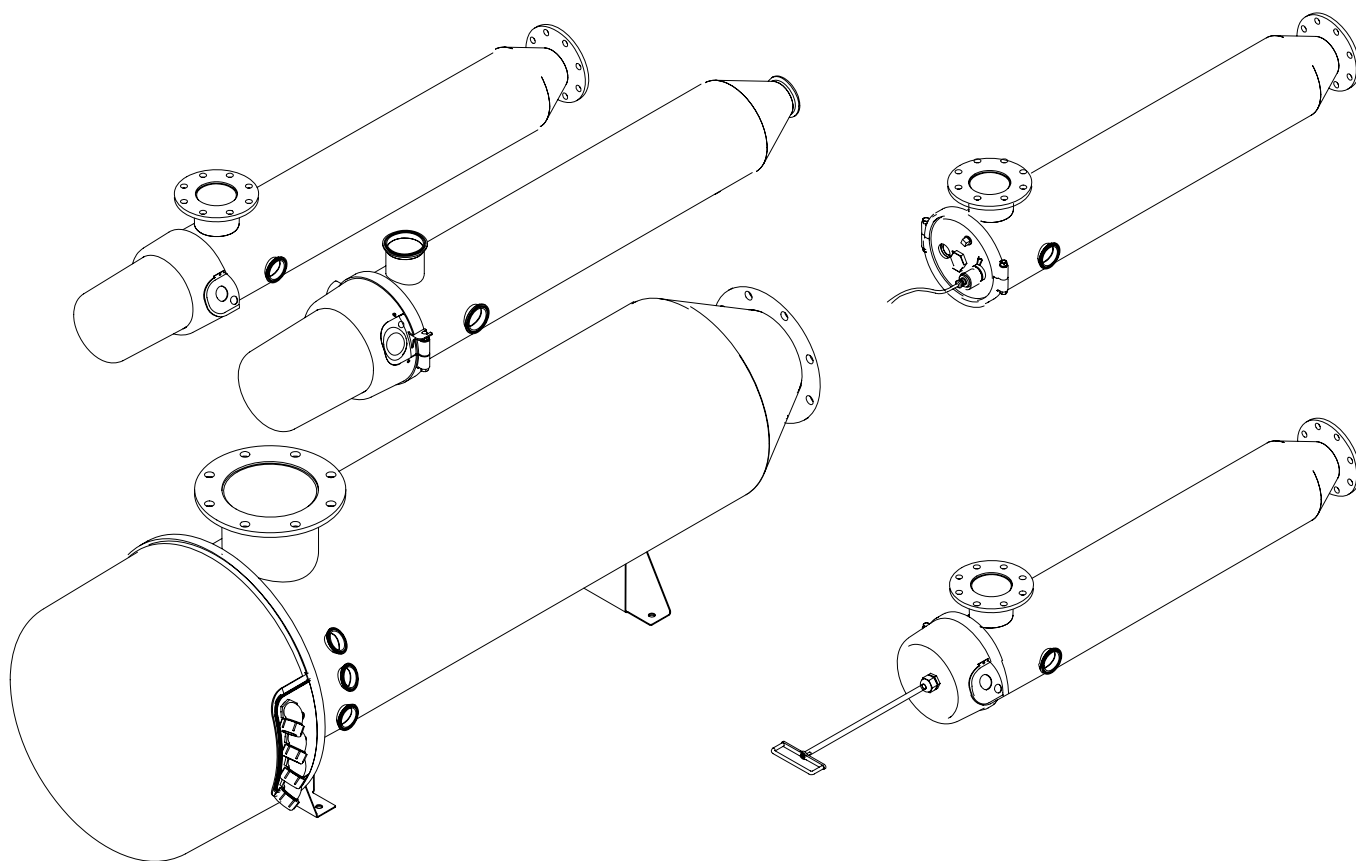
CAUTION

De-Pressurize & Drain the UVR.

Pressure must be relieved from the system prior to any maintenance to prevent damage to the equipment or personal injury.

Chapter 4

UV REACTOR (UVR)





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UV Reactor (UVR)

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UV Reactor (UVR)



4 UV REACTOR (UVR)

4.1 Introduction

Description

The TrojanUVLogic™ UV Reactor (UVR) is of welded construction and is manufactured from stainless steel 316L tubing. All wetted surfaces of the UVR are manufactured from Type 316L stainless steel, Type 214/219 Quartz or suitable food-grade UV resistant materials.

The UVR is provided with standard flanged fittings for hookup to plant piping (150# ANSI flanges in North America, DIN Flanges in Europe or an optional sanitary flange for Europe or North America – availability depending on the model). On the smaller capacity units (01_M to 08_S/_L), the supported piping connected to the UVR flanges is sufficient to support the UVR, however, bolt on brackets are available if requested by the site. On the larger units (12_S-30_L), brackets are required and come standard with each UVR. Each UVR is provided with a

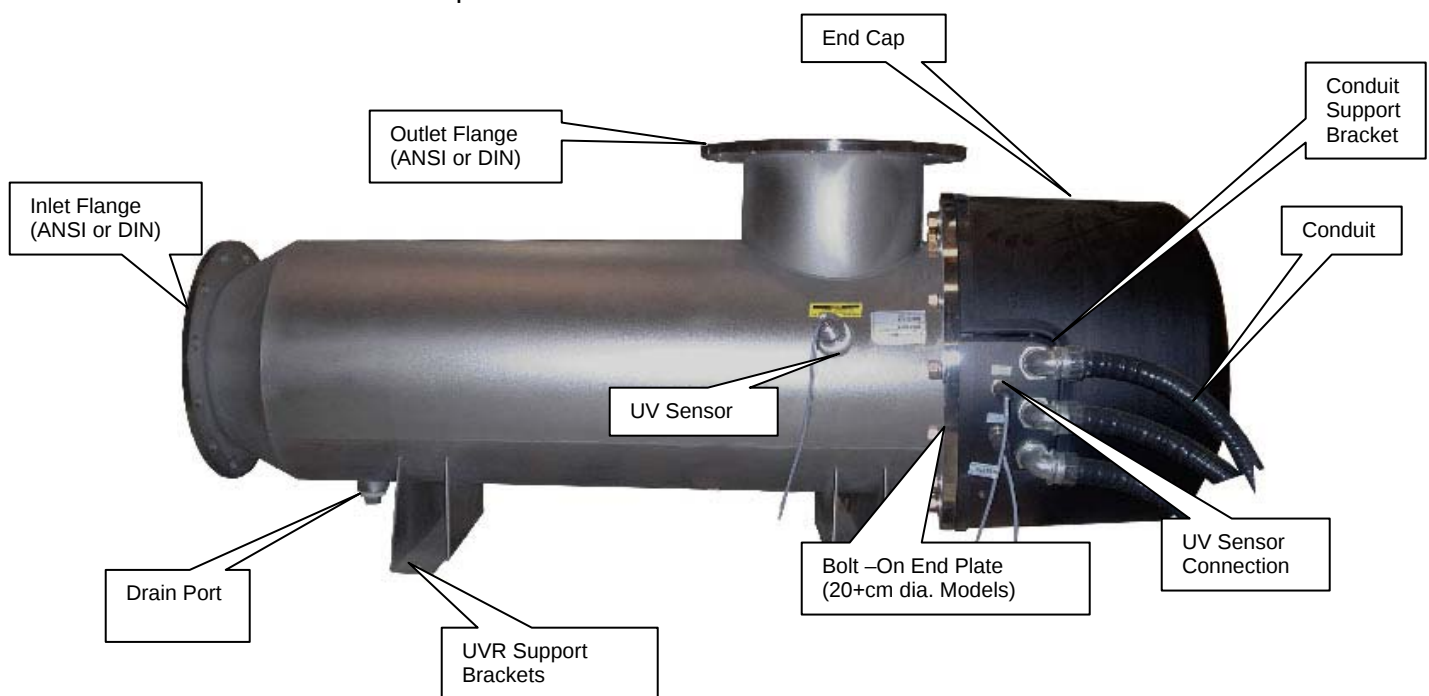
drain port fixed to the outer wall.

Flow enters parallel to the Lamps and exits through a flange located perpendicular to the UV Lamps.

Each UVR is designed for a maximum operating pressure of 150 psi (10 Bar) and has been hydrotested to 225 psi (15 Bar) prior to shipment. A hydrostatic pressure test certificate is furnished with each UVR.

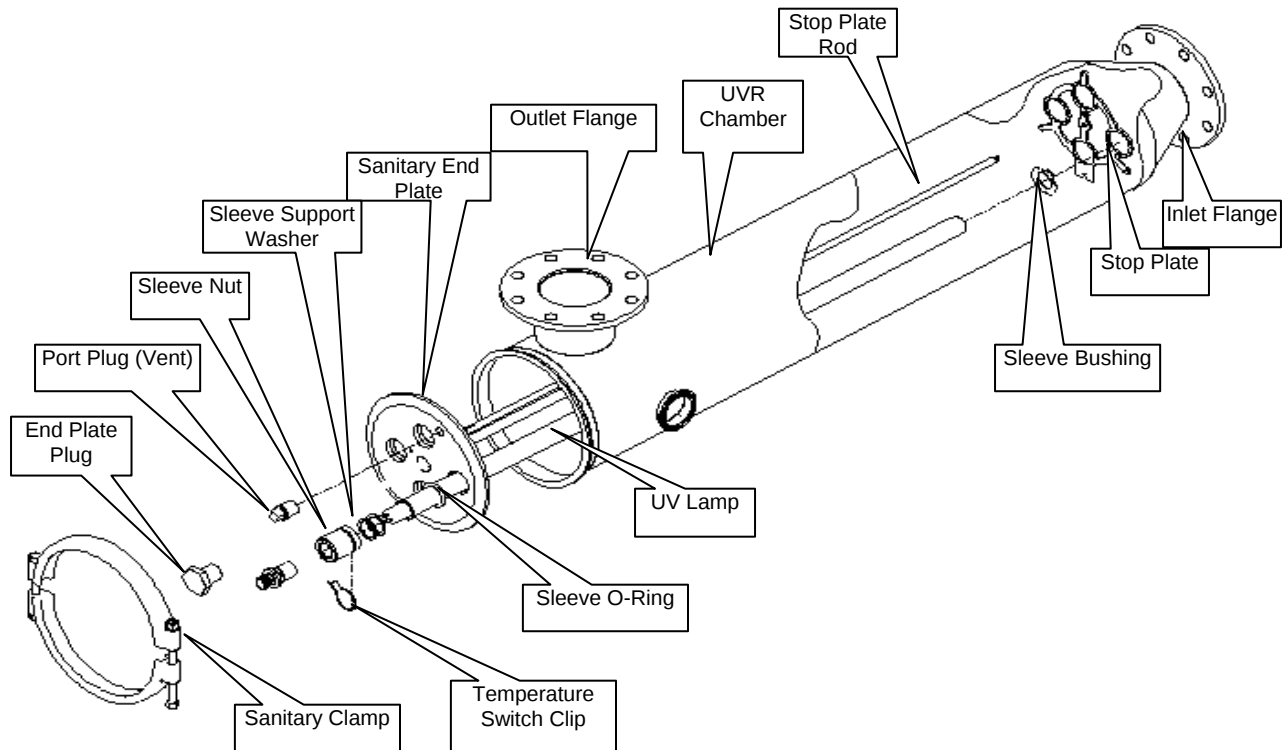
The UVR is designed to accept its respective UV Lamps and Quartz sleeves through only one end of the vessel. This end of the UVR shall allow for complete UVR entry so internal inspection and/or service can be accomplished. All service to the UVR is from this end.

For all Midflow models, the Lamp Holder and Sleeve Bolt provide protection at the service end for the ends of the Lamps, Lamp connector plugs, and wiring. For all Short & Long Lamp models, the ends of the Lamps, Lamp connector plugs, wiring, and cleaning system drive (if applicable) are protected at the service end by the End Cap.

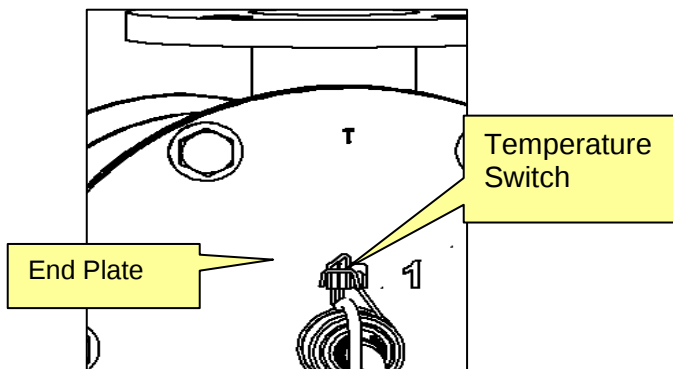




UV Reactor (UVR)



A high Temperature Switch is mounted externally on each UVR for safety purposes. This high Temperature Switch will trigger an alarm and shut the system down to prevent Lamp damage in the event that the system is overheating. Once the temperature has dropped below the alarm major setpoint the system will attempt to initiate a start-up.



Each UVR is provided with a UV Intensity Sensor that monitors the UV output from one Lamp in the array. The UV Sensor is mounted in the UV Sensor port, which is located at the wall of the UVR.

An optional feature available on most of the TrojanUVLogic™ systems is a manual mechanical wiping system, which provides the operator the ability to wipe the sleeves during normal system operation. The wiping system is driven by hand using an external handle, and will allow for sleeve wiping during disinfection.

Most TrojanUVLogic™ models can also be provided with an automatic mechanical wiping system, which provides automated wiping during normal system operation. The wiping system is driven by an internal screw drive with an externally mounted electric motor. The wiper motor is housed within the End Cap.



Power is provided to each UVR from the corresponding Control Panel (CP). Each UVR must be wired together with its CP. Please see the section on the CP for more details.

Specifications

Maximum Operating Pressure: 150 psi (10 Bar)

Material: 316L SST Chamber

Inlet/Outlet Flange requirements: DIN / ANSI / Sanitary (Up to and including 20cm diameter chambers.)

Drain Connection: NPT or BSP 1/2in or 1-1/4in (depending on unit provided.)

Maintenance

Minimal UVR maintenance is required. Follow the schedule for *TrojanUVLogic™ Maintenance Requirements*, found in the *Preface* to ensure that:

- There is no leaking around the UVR.
- There are no loose fittings or bolts on flanges.

In addition, during any maintenance being completed on the UV system, the operator should wipe clean the UVR of anything that may have come in contact with it. Mild soap and water should be used.

4.2 End Caps

Description

There are different End Caps depending on system features and types. All Short & Long Lamp models come with End Caps. The purpose of the End Caps is to help protect the equipment against accidental damage. Models that come with Automatic Wiping have longer End Caps, while models that come with no wiping, or mechanical wiping have shorter End Caps.

Specifications

Material: Painted Aluminum or Plastic depending on |

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CAUTION

To avoid personal injury, turn off power before removing UVR End Cap.

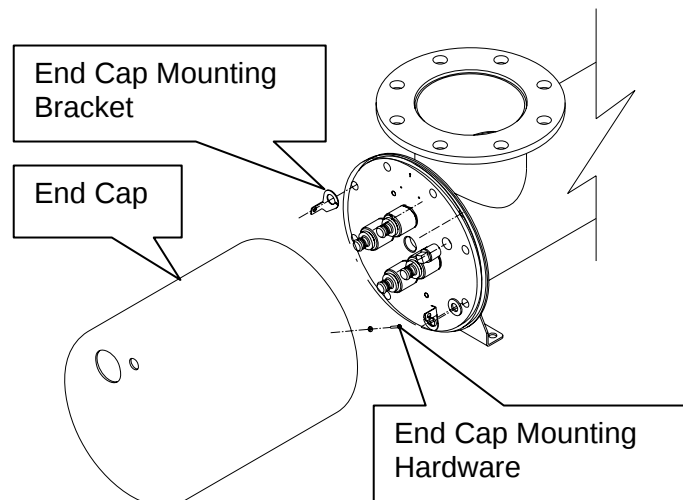
End Cap Removal & Installation

Note:

Midflow Models are not supplied with End Caps.

For Bolt-On Flange Style End Plates (20+cm Diameter Models)

1. Remove the two Philip screws from the End Cap.



2. Pull the End Cap Straight out and away from the End Plate.
3. Complete the required Maintenance.
4. Line the End Cap up with the Conduit Support Bracket and push the End Cap over the End Plate until it sits flush against the UVR Flange.



5. Replace the two Philip screws from the End Cap.

For Sanitary Clamp Style (Up to and including 20cm diameter chambers)

1. Remove the two Philip screws from the End Cap.
2. Loosen the outer nut of the sanitary clamp, on the side opposite the Conduit support bracket.
3. Pull the End Cap straight out from the End Plate.
4. Complete the required Maintenance.
5. Line up the End Cap so that the opening for the Conduit Support Bracket is in the correct position and that the securing tab located on the End Cap is placed between the inner and outer nut of the sanitary Flange Bolt.
6. Replace the Screw on the Conduit Support Bracket side and then tighten the outer nut on the Sanitary Clamp bolt down to secure the End Cap.
7. Replace the two Philip screws from the End Cap.

4.3 UV Lamp Assembly

Description

TrojanUVLogic™ Lamps are mounted inside the UVR. Each UV Lamp is housed within its own protective Quartz sleeve, which protects it from water flow. The Lamps and sleeves are supported by the Sleeve Holder / Wiper Assembly. The entire Sleeve Holder / Wiper Assembly can be removed for service.

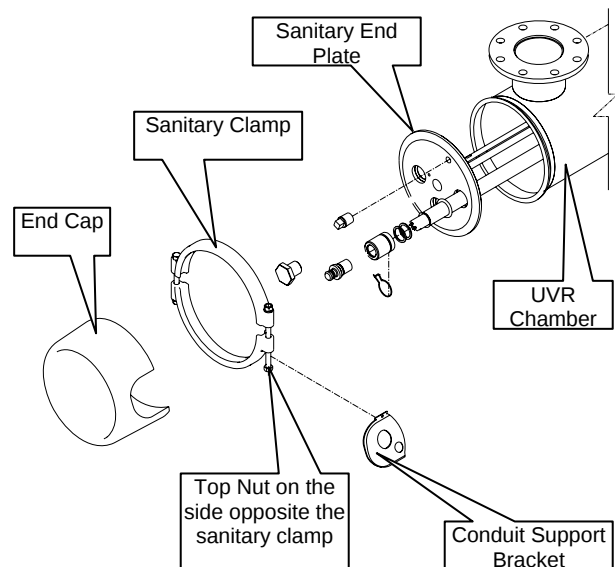
The TrojanUVLogic™ germicidal UV Lamp is a low pressure, high intensity amalgam Lamp, preheated to promote longevity. The Lamps are resistant to UV, shock and vibration and are designed to produce zero levels of ozone.

Specifications

The frequency of Lamp replacement will depend on factors such as:

- Water Temperature,
Max Operating Temperature= 40°C
- Frequency of Switching Lamps ON and OFF
- Total operating time of the Lamps. Max operating Hours = 9000

Note:	<i>Do not cycle Lamps ON/OFF more than Three (3) times per 24-hour period.</i> <i>Cycling of Lamps ON/OFF more than 3 times in a 24-hour period may result in pre-mature Lamp failure and void of warranty.</i>
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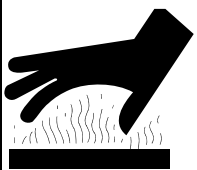
Maintenance

Lamp Inspection/Replacement

The ultraviolet output of these Lamps decreases with time. UV Lamps must be replaced every 9000 hours of operation even if Lamp failure has

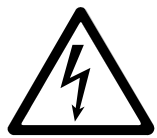
	CAUTION <i>The Lamps in this system emit ultraviolet light. Exposure to ultraviolet light can cause serious burns to unprotected eyes and skin. Never view ultraviolet light directly with the naked eye. Always use the proper protective eyewear. Always wear protective clothing when exposed to ultraviolet light. Ensure all Lamps are properly secured within the UVR chamber before turning the system on. Turn the system off before servicing.</i>
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not occurred.

	WARNING <i>HOT SURFACE!</i> <i>Ultraviolet Lamps become hot during operation. Hot Lamps can cause serious burns. Allow the Lamps to cool before servicing.</i>
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	WARNING <i>Wear UV Resistant Face Shield!</i> <i>Unprotected exposure to ultraviolet light can cause severe burns to the eyes and skin. Face shield should be worn as the primary protection against such exposure. Never look directly at the energized Lamps unless you are wearing ultraviolet resistant face shield or glasses (for short-term exposure)</i>
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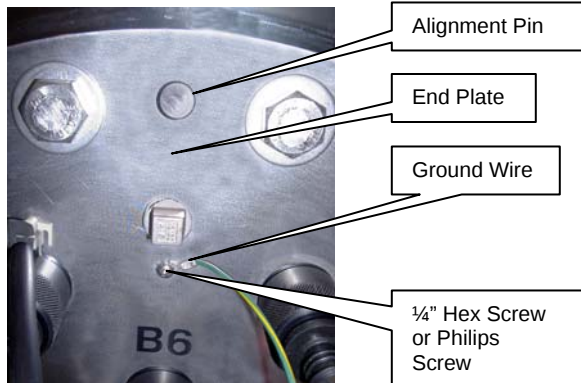
1. Switch the power off. Follow the *Lockout and Tag Procedures* found in the *Preface*.

	WARNING <i>Electrical Hazard!</i> <i>Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.</i>
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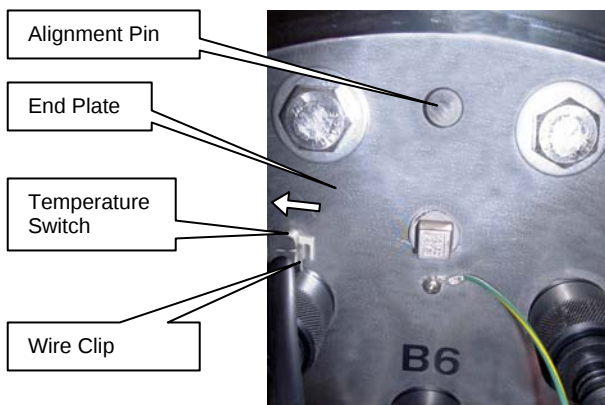
2. Remove the End Cap from the UVR chamber. Follow the *End Cap Removal and Installation* instructions earlier in this chapter.
3. Disconnect the Ground Wire and remove the 1/4in screw as shown below.



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4. Disconnect the Temperature Switch; slide the Switch out from beneath the Wire Clip, as shown below.



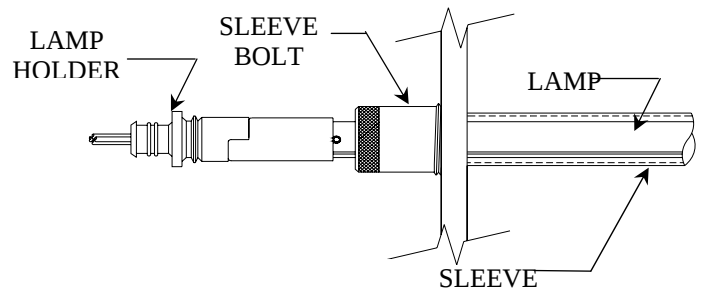
5. If your system comes with an Automatic Mechanical Wiping System (AMWS) **AND** the chamber has a diameter 20cm or greater, detach the Gear Motor from the End Plate. See *Gear Motor Removal* in Chapter 5, *Wiping System*. If Automatic Wiping is not provided, continue with next step.
6. Disconnecting Lamps: Follow instructions for your model.

Midflow Models only:

Gently rotate the Lamp Holder a 1/4 turn counter-clockwise and pull the UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).

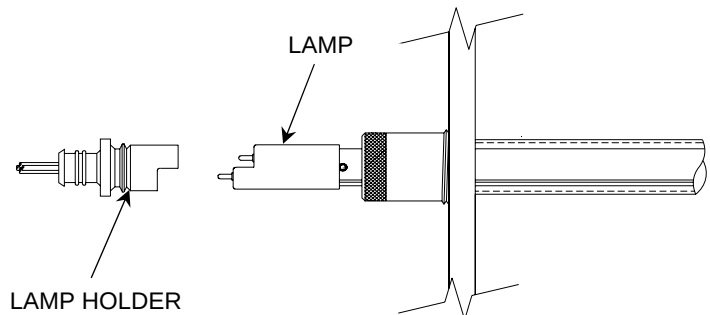
Short & Long Lamp Models only:

Gently pull the Lamp Holders and UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).



	CAUTION <i>Ultraviolet Lamps, and the sleeves they are housed in, are constructed of Quartz tubing. Quartz tubing is very fragile and easily fractured. Do not strike, bend or apply pressure to this material or it will break. Broken Lamps or sleeves can cause serious cuts.</i> <i>Discard Lamps and sleeves according to the requirements of your jurisdiction.</i>
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7. Carefully disconnect the Lamp from the Lamp Holder and pull the Lamp out.





- Use only quality replacement parts from Aquafine Corporation. Use clean gloves (cotton) to install the new Lamp. Touching the Lamp with bare hands will contaminate the Quartz. If contaminated, wipe the replacement Lamp with alcohol and a non-abrasive cloth to ensure that it is free of fingerprints, dust or other contaminants.

Note:

When inserting new Lamps ensure the correct orientation.

It is especially important that the Lamp that is situated at the UV Sensor be inserted as shown below.

- Insert the replacement Lamp into the sleeve leaving the Lamp end sticking out of the Sleeve Bolt in order to connect the Lamp Holder to the Lamp. Slide the Lamp gently into the Sleeve Bolt pushing the Lamp Holder into the Sleeve Bolt until you feel a slight pop. Confirm the Lamp Holder is secure by tugging on it slightly.

View looking through the UV Sensor port with the UVR shut OFF.

sliding it down the Lamp, using cotton gloves. If there is interference with the UV Sensor gently rotate the Lamp until it is situated correctly.

- Reconnect the Temperature Switch and Ground Wire connections, locations as shown in steps 3 & 4.
- Replace the End Cap on the UVR chamber, as per the *End Cap Removal and Installation* instructions located earlier in this chapter.
- Turn the power on. Confirm that the operator display on the Control Panel (CP) does not show an alarm.

Elapsed Time Reset

When the set-able hours equals the system run hours the *End of Lamp Life* (EOL) Alarm will be displayed in the status field, indicating an EOL alarm condition. Once reset the EOL alarm will appear again at the next EOL set point (eg: 9000 hrs then at 18000 hrs). To reset the elapsed time, refer to *Chapter 7 Control Panel* under *System Settings Screens with Technician Level Access*.

Lamp Number Configuration

The number of Lamps in a TrojanUVLogic™ is factory pre-set.

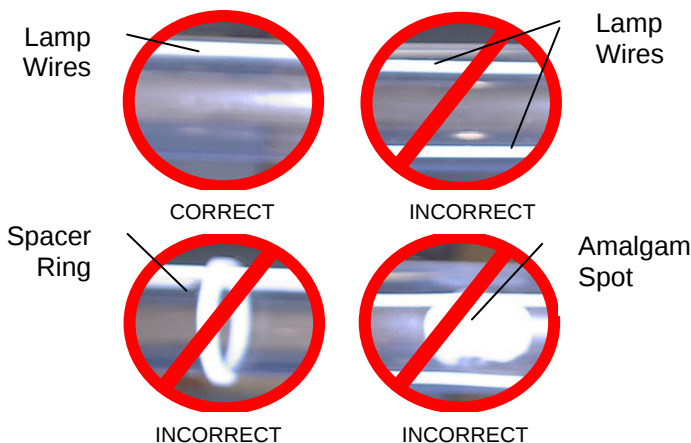
4.4 Quartz Sleeves

Description

Each TrojanUVLogic™ Lamp Assembly is contained within its own Quartz sleeve. One end of the Quartz sleeve is of a closed domed shape. The open end is sealed against the UVR chamber endplate by means of an o-ring compressed by the Sleeve Bolt. The Quartz sleeves are made of type 214/219 clear fused Quartz.

Specifications

Type 214/219 clear fused Quartz.



The Lamps must be inserted so that there is little interference with the Lamp wires, spacer ring, or the amalgam spot. The optimal orientation for an accurate reading from the UV Sensor is with the amalgam spot down and the Lamp wires at the top or at the far side of the Lamp relative to the Sensor. The spacer can be moved if needed by



HOW TO INFO

Maintenance

Sleeve Replacement

Note: *Sleeve replacement can either be done by replacing each sleeve within the UVR or by removing the Sleeve Holder / Wiper Assembly, (See Sleeve Holder / Wiper Assembly Removal procedure found later in this chapter). It is recommended that when sleeves are removed from the UVR an inspection of the Sleeve Holder / Wiper Assembly components be performed.*

1. Turn off the water flow through the UVR chamber. Isolate the UVR.

Note: *Ensure that the plant has been switched to bypass or plant is shut down to avoid damage to other plant equipment.*

2. Shut the power OFF at the CP. Follow the *Lockout and Tag Procedures* in the Preface.



WARNING

Electrical Hazard!

Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.

3. Relieve the water pressure and drain the water from the chamber through the drain provided on the UVR.



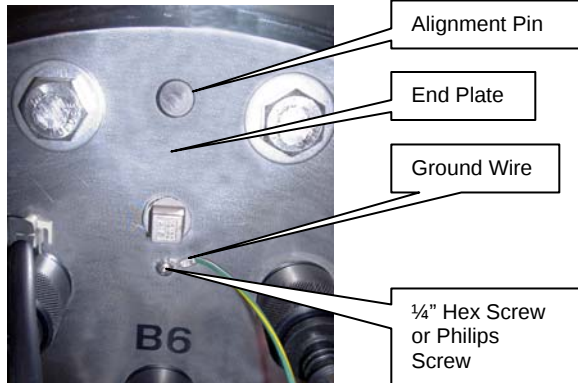
CAUTION

De-Pressurize & Drain the UVR.

Pressure must be relieved from the system prior to any maintenance, to prevent damage to the equipment or personal injury.

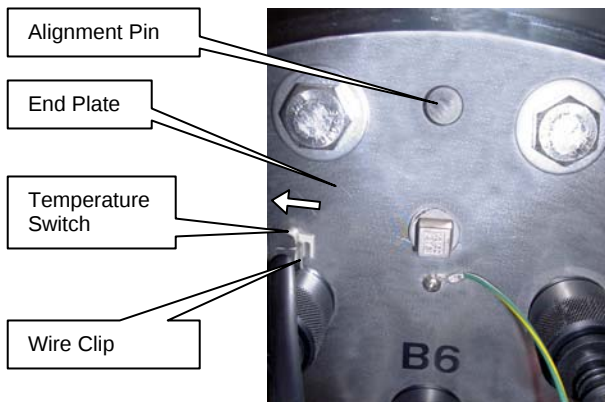
4. Remove the End Cap from the UVR chamber, as per the *End Cap Removal and Installation* instructions earlier in this chapter.

5. Disconnect the Ground Wire and remove the



1/4in screw, as shown below.

6. Disconnect the Temperature Switch and slide the Switch out from beneath the Wire



Clip, as shown below.

7. If your system comes with an Automatic Mechanical Wiping System (AMWS) AND the chamber has a diameter greater than 20cm, detach the Gear Motor from the End Plate. See *Gear Motor Removal in Chapter 5, Wiping System*. If Automatic Wiping is not provided, continue with next step.

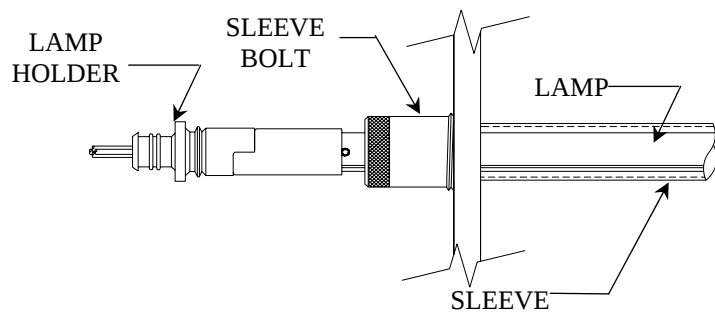
8. Disconnect Lamps: Follow instructions for your model.

Midflow Models only:

Gently rotate the Lamp Holder a 1/4 turn counter-clockwise and pull the UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).

Short & Long Lamp Models only:

Gently pull the Lamp Holders and UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).



9. Carefully disconnect the Lamp from the



Lamp Holder and pull the Lamp out.



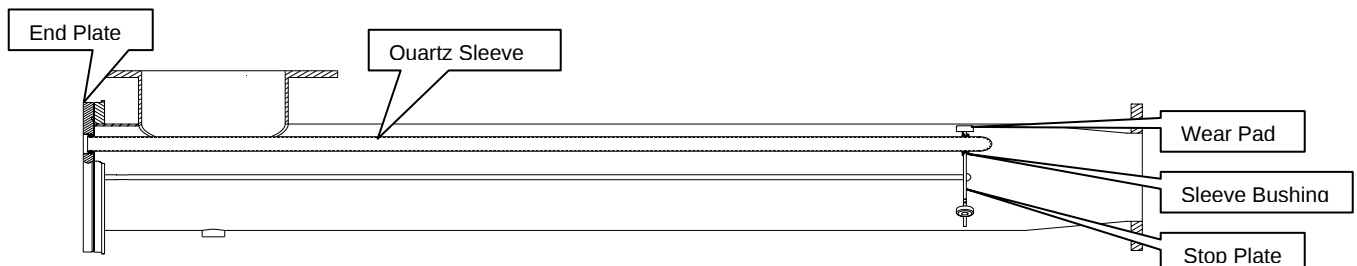
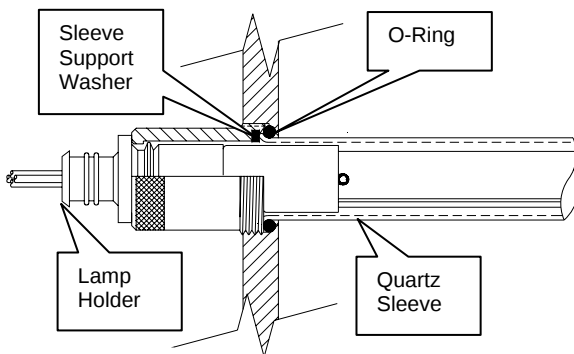
UV Reactor (UVR)

10. Remove the Sleeve Bolt by hand, turning it in a counter clockwise direction.

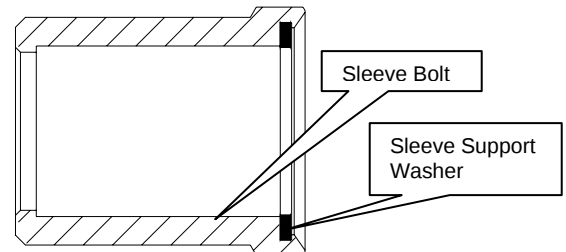
Use clean gloves (cotton) to remove the Sleeve. Touching the Sleeve with bare hands will contaminate the Quartz. Gently remove the Sleeve being careful not to let it drop once the sleeve end leaves the Stop Plate.

11. Place the Sleeve Seal O-Ring into the Sleeve Hole of the End Plate as shown. Ensure that O-Ring does not get damaged while inserting into Sleeve hole. Replace the O-Ring whenever the Sleeve is removed.

12. Use clean gloves (cotton) to install the new Sleeve. Touching the Sleeve with bare hands may contaminate the Quartz. Wipe the Sleeve clean with alcohol and a non-abrasive cloth before installation. Insert the new (or cleaned) Sleeve into the sleeve pocket while keeping the Sleeve aligned with the chamber, insert the Sleeve through the Sleeve Bushing located inside the chamber until the flare of Sleeve bottoms out against the O-Ring.



13. Place the Sleeve Support Washer into the Sleeve Bolt as shown. Ensure that the Washer seats flat on the recess of the Sleeve Bolt. Replace this Washer whenever the Sleeve is removed or the seal is broken.



14. Place the Sleeve Bolt over the Sleeve Hole and turn it clockwise by hand to tighten. The Sleeve Bolt should be tightened 1 turn after hand tight to ensure proper seal. Due to the soft material of the Sleeve Bolt, special care should be taken. The use of plastic or cushioned jawed tools should be employed. Do not over tighten the Sleeve Bolt or damage to the sleeve or internal parts may result.
15. After the Sleeve Bolts are installed, slowly open the inlet valve and fill UVR chamber with water. Check carefully for leaks. If leaks are detected, inspect the interior of Sleeves for water. If there is water inside any Sleeve follow *Sleeve Cleaning Procedure* that follows in this chapter. If water is not inside any of the Sleeves, ensure bolts are tight. If leaks are still detected replace O-Ring.
16. Flush a few gallons of water through the UVR chamber to remove any particles or dust that may have collected during installation.
17. Proceed to install Lamps per *Lamp replacement/Inspection* procedure found earlier in this chapter.



Sleeve Cleaning

Sleeve Cleaning Solutions

The following cleaning solution is recommended for the removal of scale build-up and coatings from the Quartz Sleeves: ActiClean™ Gel.

Mild acid solutions can also be used. Acid solutions can be bought commercially or diluted from industrial strength acids. (Cleaners such as “Lime-A-Way” and “CLR” may be used.)

- 15% Phosphoric Acid
- 5% Nitric Acid
- 10% Citric Acid*

* Citric acid solutions cannot be reused. All other types of solutions can be stored indefinitely and reused until they no longer have the strength to effectively clean the sleeves.



CAUTION

Acids used to clean the Quartz sleeves can cause burns. Wear protective clothing and eyewear when handling these materials. Rinse the components thoroughly with distilled water after cleaning. Always follow the safety precautions provided by the manufacturer of the cleaning solution.

Sleeve Cleaning Procedure

1. Remove the Quartz Sleeves as directed in *Sleeve Replacement* procedure found previously in this chapter.
2. Using a non-abrasive cloth soaked in one of the Cleaning Solutions listed above and wipe along the length of the Quartz Sleeve.
3. After cleaning, rinse the acid solution thoroughly from the sleeves with distilled water. Inspect the interior of the Sleeve

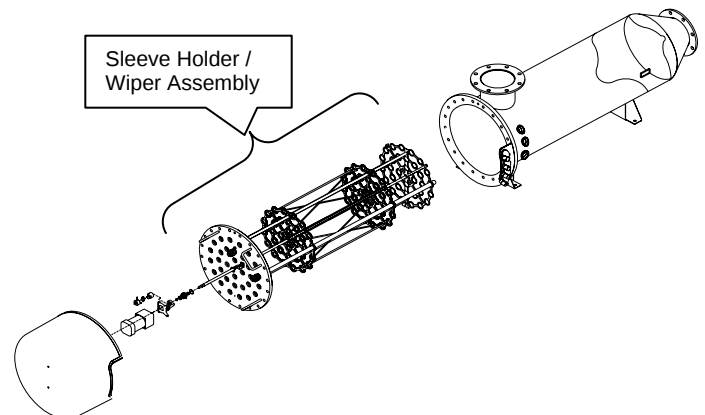
before installation to make sure they are clean and dry. Clean the interior of the Sleeves with alcohol if they have been exposed to water or acid solutions.

4. Insert the Sleeve in the UVR chamber per *Sleeve Replacement* procedure found earlier in this chapter.

Sleeve Holder / Wiper Assembly Removal

The entire Sleeve Holder / Wiper Assembly may be removed as an alternative to removing the Quartz Sleeves from the UVR chamber individually for cleaning.

Note:	<i>This component is referred to as a Sleeve Holder Assembly when there is no Wiping System. It is called a Wiper Assembly when a wiping system is included.</i>
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Note:	<i>Assembly complete with cage is supplied on models with 24 to 30 lamps.</i>
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UV Reactor (UVR)

1. Turn off the water flow through the UVR

Note: *Ensure that the plant has been Switched to bypass or plant is shut down to avoid damage to other plant equipment.*

chamber. Isolate the UVR.

2. Shut the power OFF at the CP. Follow the *Lockout and Tag Procedures* in the Preface.



WARNING

Electrical Hazard!

Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.

3. Relieve the water pressure and drain the water from the chamber through the drain provided on the UVR.



CAUTION

*De-Pressurize & Drain the UVR.
Pressure must be relieved from the system prior to any maintenance, to prevent damage to the equipment or personal injury.*

4. Disconnect all UV Sensors from the Conduit Support Bracket.
5. If there is an End Cap, remove the End Cap from the UVR chamber, as per the *End Cap Removal and Installation* instructions earlier in this chapter. If not, proceed to the next step.



UV Sensor Analog Receptacle

6. Disconnect the Ground Wire and Temperature Switch connections.
7. If your system comes with an Automatic Mechanical Wiping System (AMWS) AND the chamber has a diameter 20cm or greater, detach the Gear Motor from the End Plate. See *Gear Motor Removal* in Chapter 5, *Wiping System*. If Automatic Wiping is not provided, continue with next step.
8. Disconnect Lamps: Follow instructions for your model.

Midflow Models only:

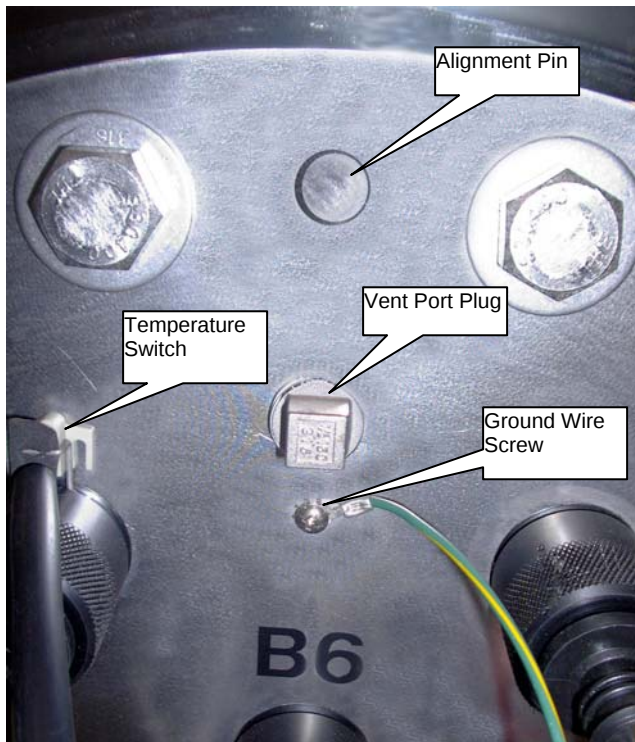
Gently rotate the Lamp Holder a 1/4 turn counter-clockwise and pull the UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).

Short & Long Lamp Models only:

Gently pull the Lamp Holders and UV Lamp from the Sleeve Bolt. An internal spring at the far end of the UV Lamp will push the Lamp out approximately 12 mm (0.5in).



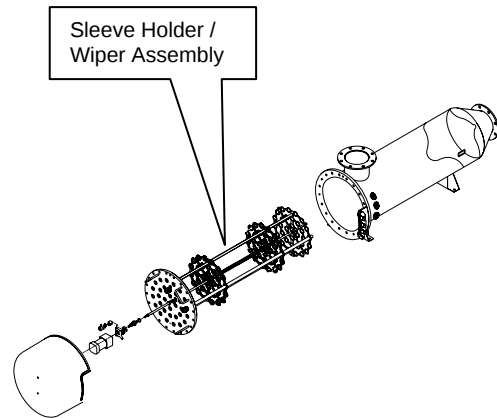
UV Reactor (UVR)



9. Carefully disconnect the Lamp from the Lamp Holder and pull the Lamp out.



10. For models with a chamber diameter greater than 20cm, remove all of the flange bolts. For models with a chamber diameter up to and including 20cm, remove the two Sanitary Clamp Bolts for each Sanitary Clamp (the inlet, outlet and End Plate).



11. Extract the entire Sleeve Holder / Wiper Assembly from the UVR chamber. Pull the Sleeve Holder / Wiper Assembly in a direction parallel to the UVR chamber to prevent the Quartz Sleeves from striking the sides of the chamber.
12. Clean the sleeves according to Sleeve Cleaning procedures, indicated previously in this chapter.

Note:	Follow the previous procedures in reverse order to re-assemble the UVR chamber. Ensure that Lamp hole #1 is aligned with the UV Sensor port and that the Stop Plate straddles the key inside the UVR (where required). Ensure the Flange O-ring is properly seated in its groove. Torque the flange bolts to: 38 N.m (28 ft·lb) 1/2-inch diameter bolts 80 N.m (60 ft·lb) 5/8-inch diameter bolts
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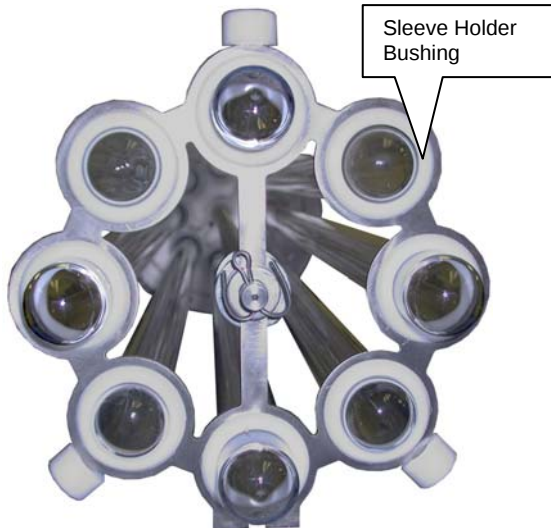
Sleeve Bushing Replacement

1. Remove sleeves per the *Sleeve Holder / Wiper Assembly Removal* procedure found earlier in this chapter.

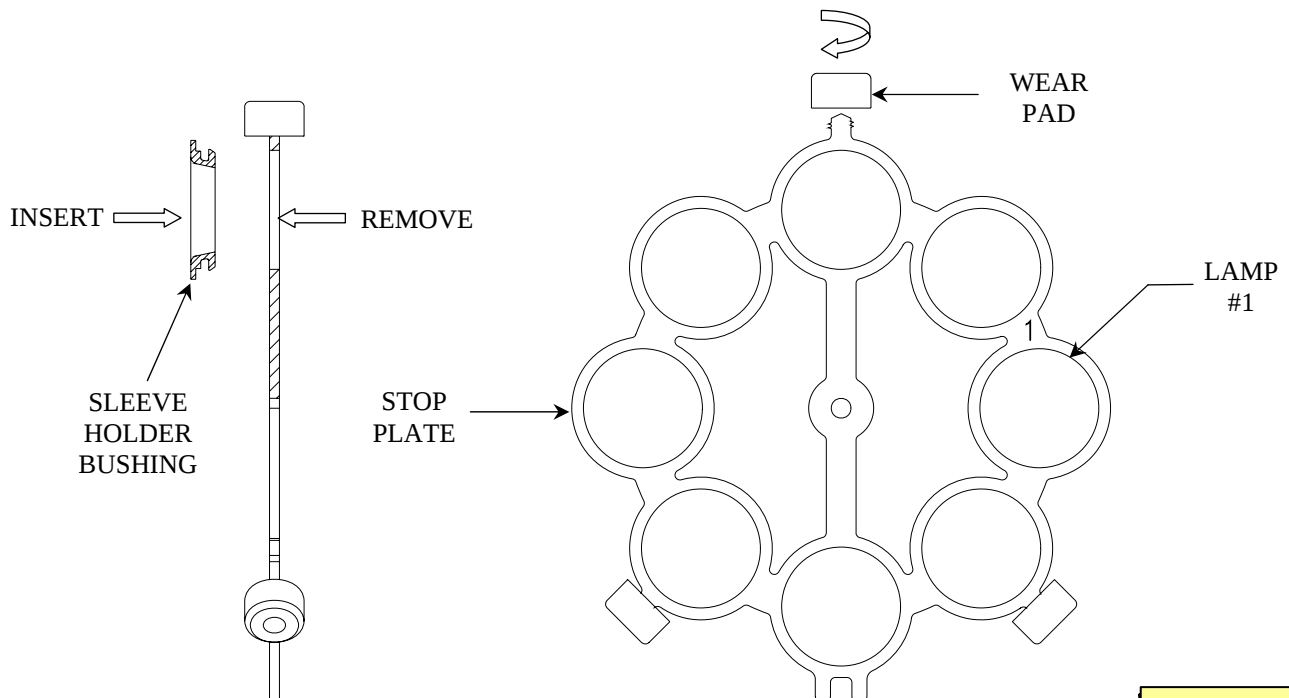


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2. Remove Sleeve Holder Bushings by pressing against the small end.
3. Insert the replacement Sleeve Holder Bushings from the stamped side of the Stop Plate.



4. To remove the Wear Pad turn counter clockwise.
5. Insert replacement Wear Pad by turning clockwise slowly until there is full engagement between the Wear Pad and the Stop Plate.
6. Ensure that the Wear Pad takes up any excess play between the UVR inside diameter and the Stop Plate by adjusting its height.



Looking
From End
Plate End

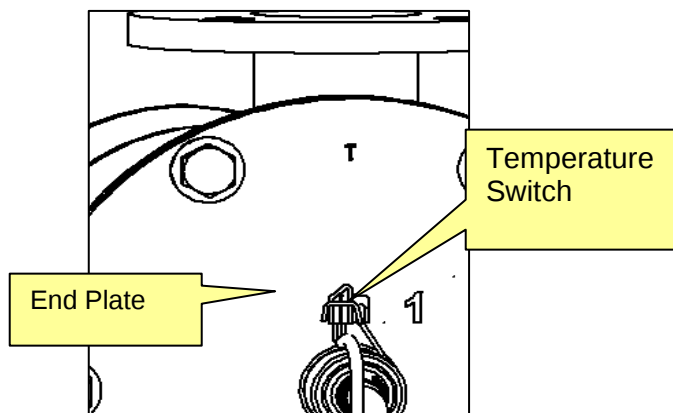


4.5 Temperature Switch

Description

For safety reasons, a Temperature Switch is provided which will trigger a warning alarm and shut the system off if the UVR is running too hot.

The High Reactor Temperature alarm is factory pre-set to indicate either Minor or Major alarms for "REACTOR HIGH TEMPERATURE" conditions.



Specifications

Type: Normally Closed
Open: $50^{\circ}\text{C} \pm 5^{\circ}\text{C}$
Close : $40^{\circ}\text{C} + 5^{\circ}\text{C} / - 10^{\circ}\text{C}$
Capacity: 2.0A @ 250VAC
Normal Operating Temperature:
 $5^{\circ}\text{C TO } 40^{\circ}\text{C}$



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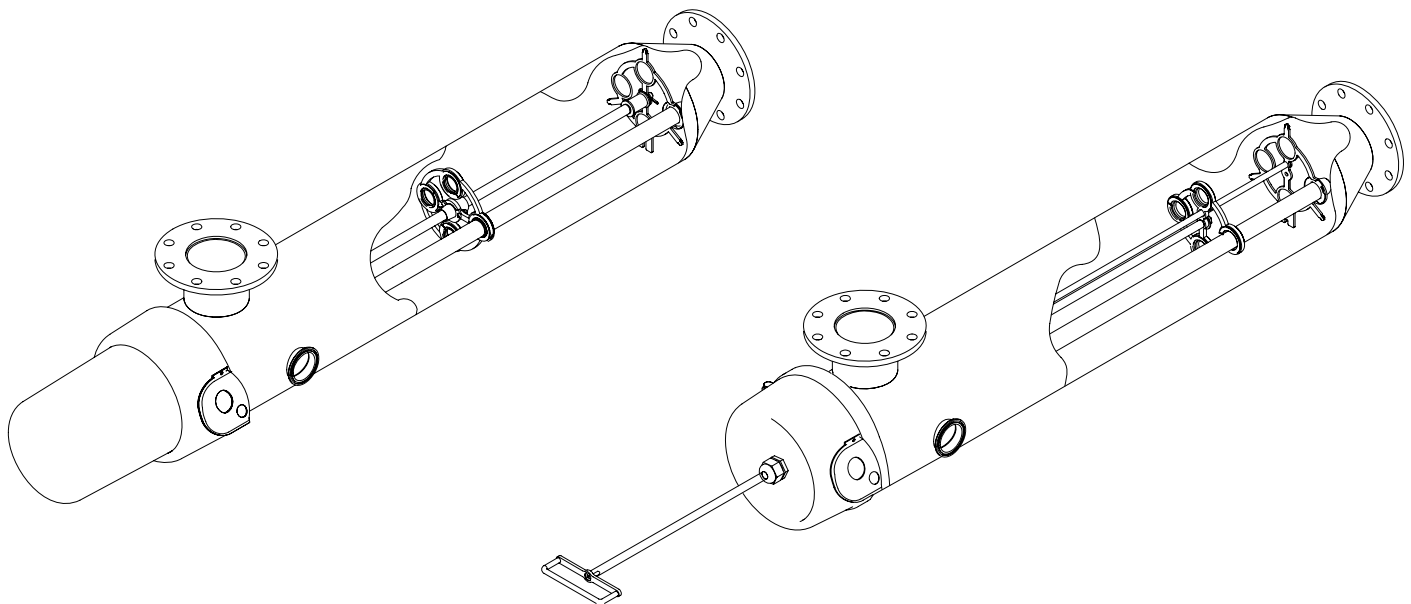
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UV Reactor (UVR)



Chapter 5

MECHANICAL WIPING SYSTEMS (OPTIONAL)





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Mechanical Wiping Systems (Optional)



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Mechanical Wiping Systems (Optional)



5 MECHANICAL WIPING SYSTEM (OPTIONAL)

5.1 Introduction

Description

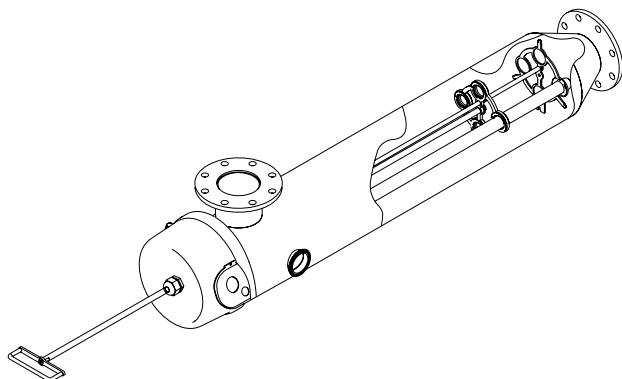
The TrojanUVLogic™ system can be provided with a Manual Mechanical Wiping System (MMWS), an Automatic Mechanical Wiping System (AMWS) or no Mechanical Wiping System. Please refer to your system specifications as listed at the front of this manual.

Note:

No matter which option is provided, this does not alleviate the need for regular maintenance (Manual Hand Cleaning). Refer to the TrojanUVLogic™ Maintenance Requirements in the Preface section of your manual for frequency of cleaning, and to the Sleeve Cleaning Procedure found in Chapter 4, UV Reactor (UVR).

5.2 Manual Mechanical Wiping System (MMWS) (Optional)

Description



The TrojanUVLogic™ system can be provided with a Manual Mechanical Wiping System (MMWS). Please refer to system specifications as listed at the front of this manual to see if your system is equipped with manual wiping.

The MMWS uses food grade rubber wipers mounted into stainless steel collars, placed around each of the Quartz Sleeves. The Wiper Housings for all Sleeves are mounted together onto a common Wiper Assembly. The Wiper Assembly is driven back and forth by hand using an external handle.

The operator must ensure that the Wiper is returned to its home position. This is accomplished by ensuring that the Wiper Handle is returned to its original position after wiping.

Do not force; at no time should the Handle come in contact with the Strain Relief on the End Cap.

Maintenance

Manual Wiper Assembly Removal

1. Turn off the water flow through the UVR chamber. Isolate the UVR.

Note:

Ensure that the plant has been switched to bypass or plant is shut down to avoid damage to other plant equipment.

2. Shut the power OFF at the Control Panel (CP). Follow the *Lockout and Tag Procedures* in the Preface.



WARNING

Electrical Hazard!

Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.

3. Relieve the water pressure and drain the water from the chamber through the drain provided on the UVR.

Mechanical Wiping Systems (Optional)



CAUTION

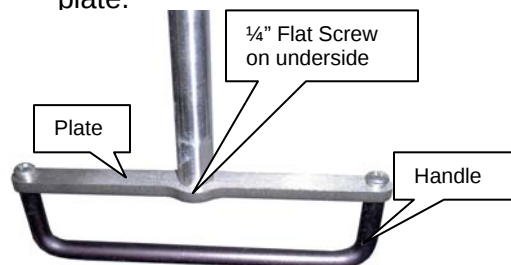
De-Pressurize & Drain the UVR.
Pressure must be relieved from the system prior to any maintenance, to prevent damage to the equipment or personal injury.



CAUTION

Remove the End Cap completely. Do not allow the End Cap to hang on the Wiper Handle while conducting work.

- Remove the 1/4" #1 Flat screw from the handle plate. Access to this screw may require the removal of the handle from the plate.



- Unplug UV Sensor cable following instructions for your model type. See below.

AM Models only:

Follow the 3' cable to the UV Sensor to its connection to the cable that connects the UV Sensor and the CP. Unscrew the cables from each other.

Short & Long lamp Models only:

Unscrew and unplug the UV Sensor from the outside of the Conduit Support Bracket. As shown in the following picture.

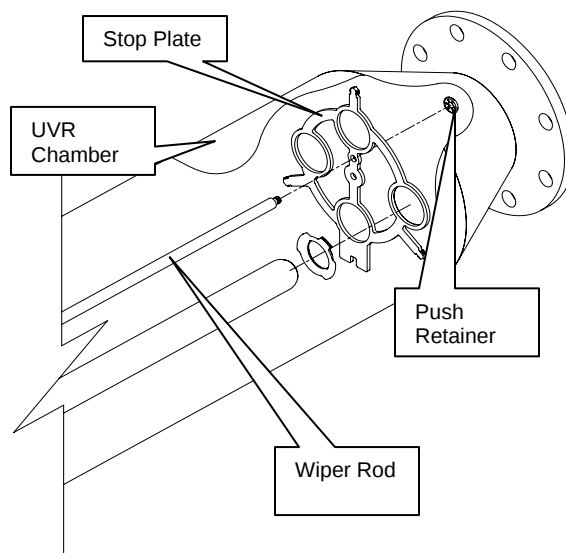


UV Sensor Analog Receptacle

- Loosen the Strain Relief on the End Cap. (If there is no End Cap, skip the next step).
- Remove the End Cap as per the Follow the *End Cap Removal and Installation* instructions in *Chapter 4, UV Reactor (UVR)*.
- Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
- Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.

Push Retainer Replacement

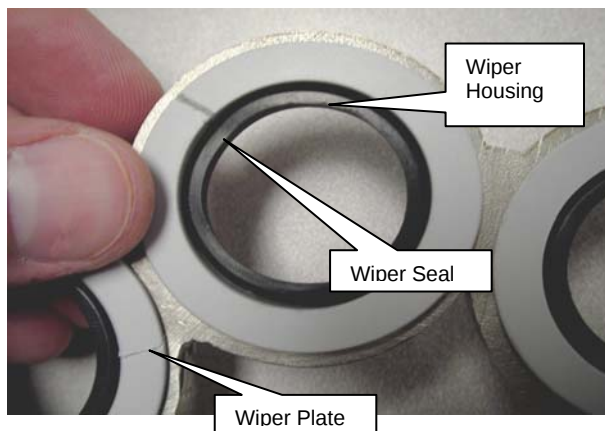
- Complete the *Manual Wiper Assembly Removal* procedure immediately preceding this procedure.
- If worn or damaged, remove and replace Push Retainer with a new one. The Push Retainer fastens the Stop Plate to the end of Wiper Rod.





Sleeve Wiper Replacement (MMWS)

1. Complete the *Manual Wiper Assembly Removal* procedure immediately preceding this step.
2. Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
3. Remove the Sleeves as per as per the *Sleeve Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
4. Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.
5. Remove worn Sleeve Wipers by gently pulling on the wiper seal out with a pair of needle nose pliers. Be sure not to pry on the Wiper Housing. Wiper should come out easily.
6. If the Wiper Housing is damaged remove it by prying the Split Ring Wiper Housing out with your thumb or using a broad standard screwdriver to gently pry it out, being cautious not to damage the Wiper Plate.



7. Install a new Split Ring Wiper Housing by slowly working it into the hole in the Wiper Plate, as shown below.
8. Carefully insert new Sleeve Wipers into the Wiper Housing Assembly by squeezing them together and letting them pop into place. Ensure that the wipers are fully seated and



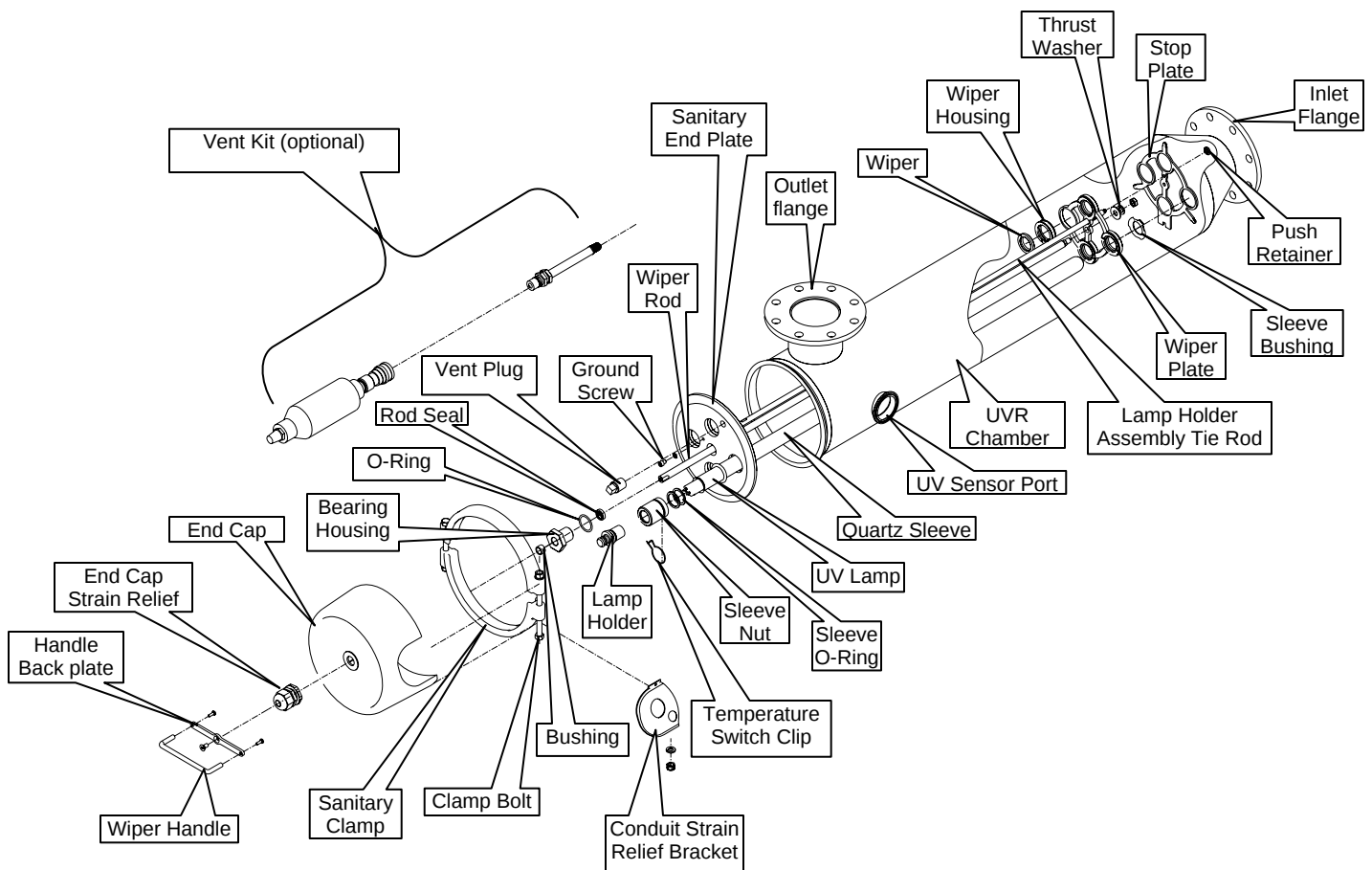
that they can float freely in their respective housings prior to reinserting Sleeves. See Figure below.

9. Reassemble chamber as shown on next page by following steps 1-4 in reverse order.



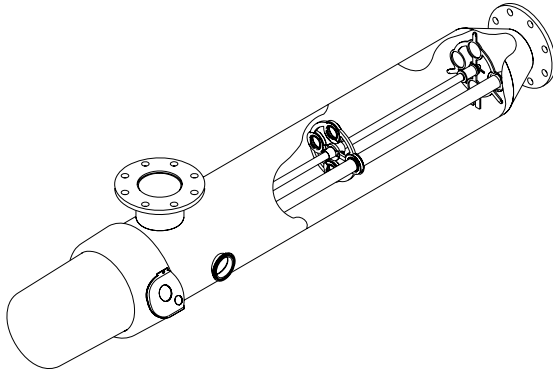


Mechanical Wiping Systems (Optional)





5.3 Automatic Mechanical Wiping System (AMWS) (Optional)



Description

Most TrojanUVLogic™ models can be provided with an Automatic Mechanical Wiping System (AMWS). Please refer to the system specifications as listed at the front of this manual to see if your system is equipped with this feature.

The AMWS uses food grade rubber wipers contained within a Split Ring Wiper Housing, mounted on a stainless steel Plate, placed around each of the Quartz Sleeves. The Wiper Housings for all Sleeves are mounted together onto a common Wiper Assembly.

Short lamp systems (AS models) have one (1) Wiper Assembly per UVR. Long lamp systems (AL model) have two (2) Wiper Assemblies per UVR to maintain full wiping coverage of the Sleeves.

Wiping System Drive

The Wiping System is driven by an internal Screw Drive which is directly driven by an externally mounted Electric Motor. The Screw Drive is installed within the UVR chamber and is powered by an Electric Motor. The Electric Motor is mounted on the service end of the UVR and is protected within the End Cap. The power for the Wiping System is brought in from the

Control Panel (CP). The power requirement given for the CP includes operation of the wiping system.

The Wiper Assembly is mounted to the Drive Screw attached to a Carrying Nut that moves the Wiper Assembly along the Drive Screw.

Wiping System Operation

The AMWS operation is controlled via the CP. The Wiping System is set to clean at a regular time interval.

The wiper cycle frequency (cycles one hour) in which the Wiper Assembly operates is set by the customer and is dependent upon the water quality entering the chamber. The faster the Quartz Sleeves tend to foul and reduce UV Transmittance, the higher the cycle frequency should be set by the customer in order to prevent fouling.

If the Wiper Assembly encounters significant resistance while in operation, the Gear Motor will automatically turn OFF, protecting both the Wiper Assembly and the Quartz Sleeves. The display will indicate Wiper Alarm General, in the Status field of the Operator Interface.

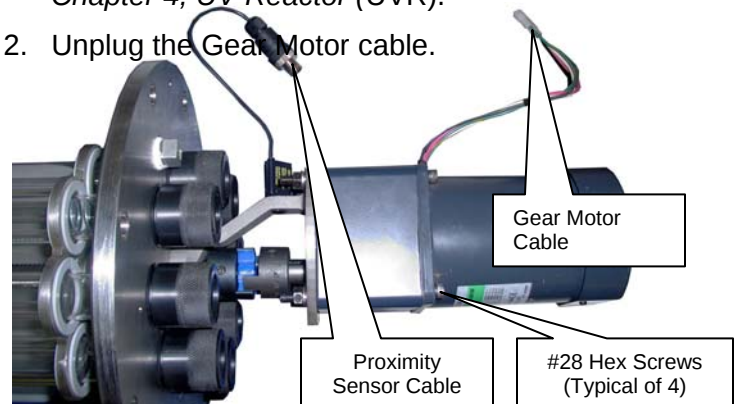
Specifications

- 1/8 Hp Motor
- 240 VAC

Maintenance

Gear Motor Removal

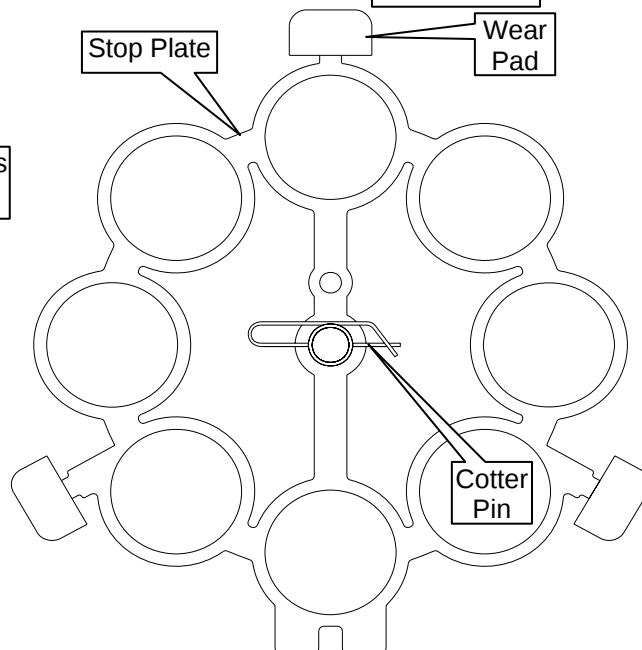
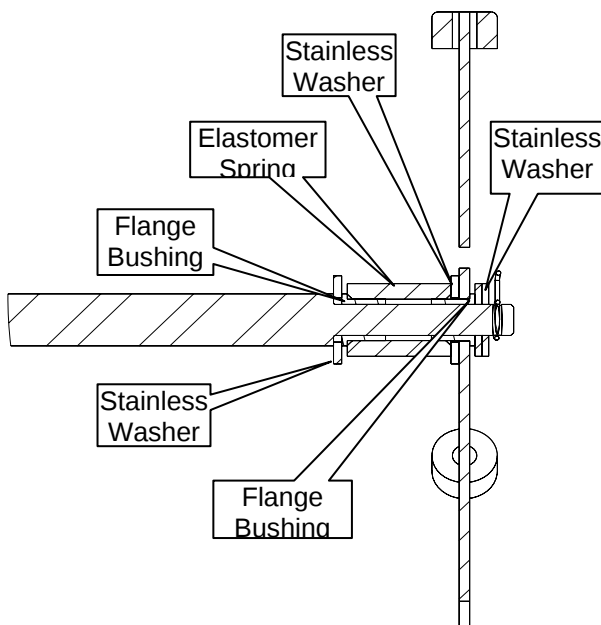
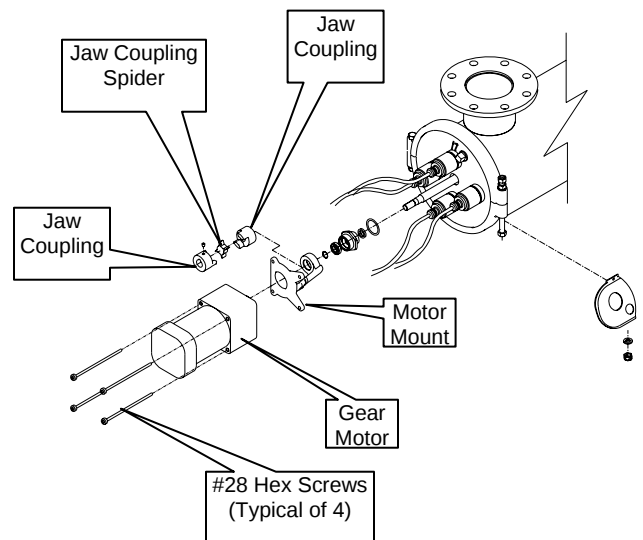
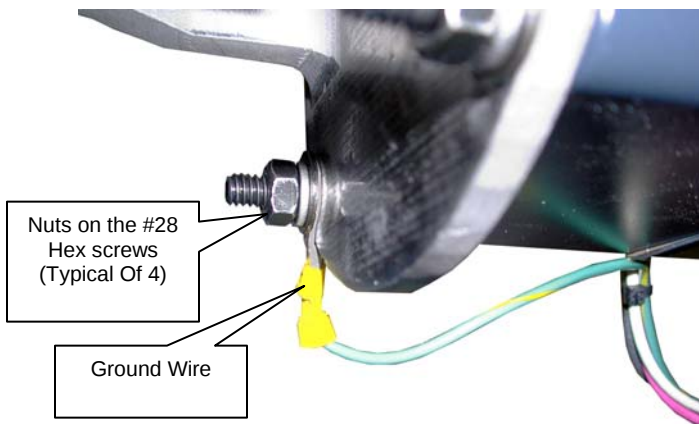
1. Remove the End Cap, following the *End Cap Removal and Installation* procedure in *Chapter 4, UV Reactor (UVR)*.
2. Unplug the Gear Motor cable.





Mechanical Wiping Systems (Optional)

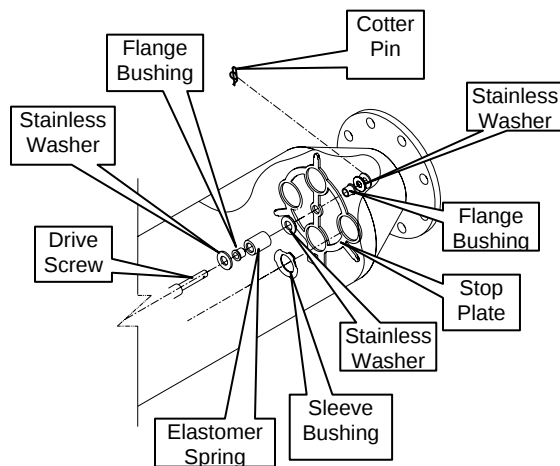
3. Unplug the Proximity Sensor cable.
4. Remove four 1/4-28 Hex Head Cap Screws on the Motor Mounting Plate and remove Gear Motor Assembly.
5. Remove Jaw Coupling Spider and store it with the Gear Motor Assembly.
6. When reinstalling the Gear Motor ensure that all previously mentioned cables are reconnected, but also ensure that the Ground Wire is connected as shown.





Stop Plate Bushing Replacement

1. Remove Gear Motor, following *Gear Motor Removal* procedure earlier in this chapter.
2. Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
3. Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.
4. Remove the Cotter Pin from the end of Drive Screw.



5. Remove the Stainless Steel Washer.
6. Option 1: Remove the Sleeves as per the *Sleeve Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.

Option 2: Leave the Quartz Sleeves in the Wiper Assembly and remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.

	CAUTION <i>The Sleeves may be left in the Wiper Assembly when the Stop Plate is removed, however, if the Sleeves are not removed, you must ensure they are properly supported when the Stop Plate is not there to avoid damage.</i>
--	---

7. Slide the Stop Plate Assembly off the end of the Sleeves and Drive Screw end
8. Remove Sleeve Bushing by pressing against the small end while supporting Stop Plate.
9. Insert replacement bushings noting proper positioning in relation to the Stop Plate.

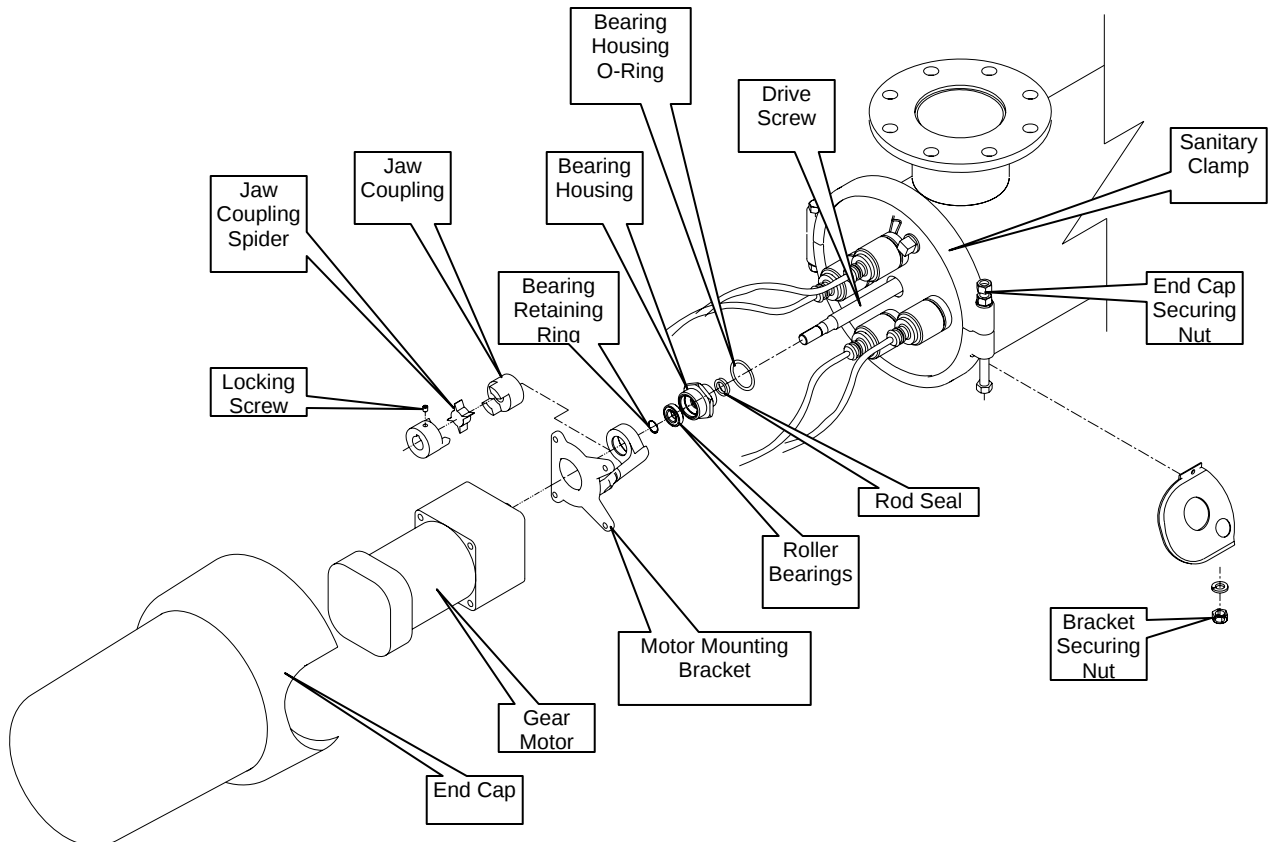
	CAUTION <i>It is essential that the components of the Stop Plate Assembly be properly installed on to the end of the Drive Screw for consistent wiper operation. Failure to do so may result in improper wiper operation.</i>
--	---

10. Reassemble the Stop Plate in the reverse order.



Drive Screw Roller Bearing, O-ring & Seal Replacement

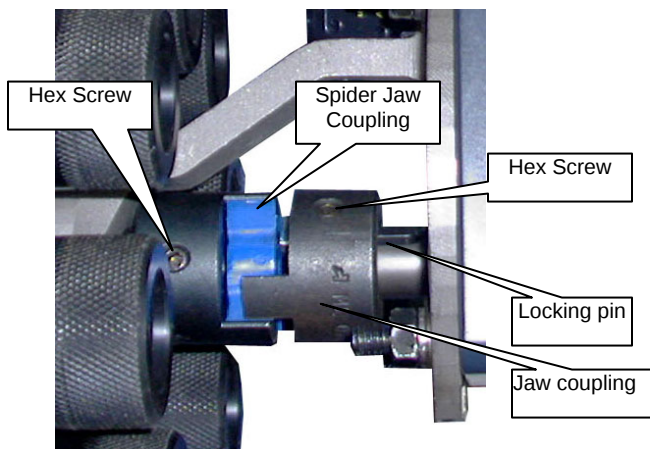
1. Remove Gear Motor, following *Gear Motor Removal* procedure earlier in this chapter.
2. Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
3. Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.
4. Jaw Coupling located on end of Drive Screw. See Figure below.
5. Remove Cotter Pin from the end of Drive Screw.
6. Unscrew the Motor Mount from the End Plate.
7. Unscrew the Bearing Housing
8. Slide Drive Screw out through the End Plate.
9. Remove the Rod Seal from the Bearing Housing noting its position.
10. Remove the O-Ring on Bearing Housing.
11. Rest the Bearing Housing on solid surface and remove the Bearing Retaining Ring and the sealed Roller Bearing from it. It should require very little force.



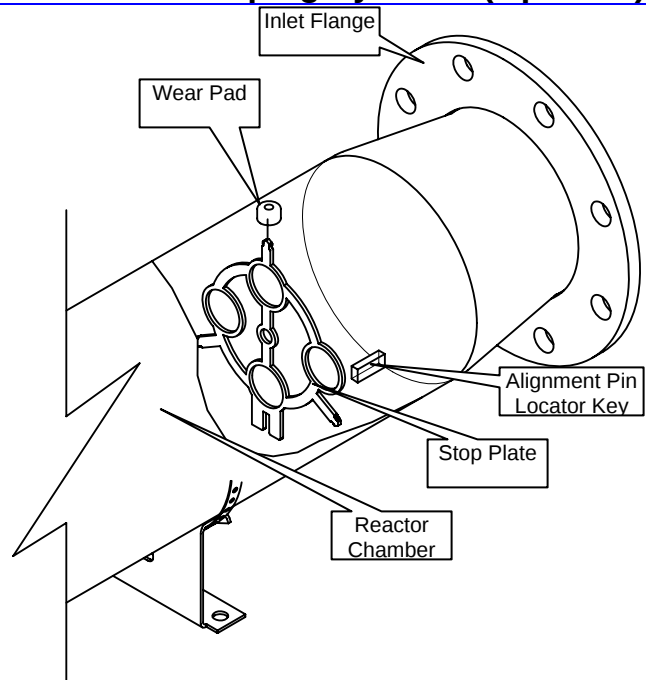


Mechanical Wiping Systems (Optional)

12. Install new Roller Bearing by pressing it into Bearing Housing. Push all the way into Housing.
13. Install new Bearing Retaining Ring. Ensure it is properly seated into its groove.
14. Install new O-Ring into Bearing Housing. Ensure it is properly seated into groove.
15. Screw Bearing Housing into End Plate until it is secure.
16. Screw the Motor Mount on to Bearing Housing until it is secure. Ensure that Bearing Housing does not unscrew from the End Plate while tightening.
17. Slide Drive Screw into Bearing Housing (being careful not to pinch Bearing Retaining Ring).



18. Install Locking Pin on to the end of the Drive Screw.
19. Install Jaw Coupling half on to the Drive Screw and tighten the hex screw. Ensure coupling end is flush with the end of Drive Screw when tightening.
20. Ensure that the Drive Screw is free to rotate with no binding occurring.
21. Reassemble Wiper Assembly into the chamber. Ensure the forked tab on the Stop Plate is engaging the Locator Key on inside



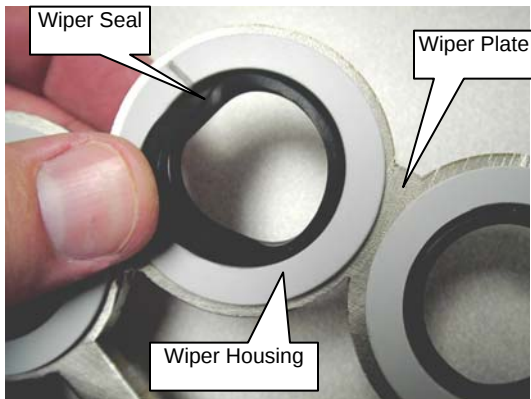
of chamber, as shown in the following diagram. This is critical to the operation of the wiper system.

Sleeve Wiper Replacement (AMWS)

1. Remove Gear Motor, following *Gear Motor Removal* procedure earlier in this chapter.
2. Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
3. Remove the Sleeves as per the *Sleeve Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
4. Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.
5. Remove the worn Sleeve Wipers by gently pulling on the Wiper Seal out with your fingers or a pair of needle nose pliers. Be sure not to pry on the Wiper Housing. Wiper Seals should come out easily.



Mechanical Wiping Systems (Optional)



Note:

The diagram below only shows wipers for a 4 lamp system for ease of viewing. The 12_L will have 12 lamps and the 18_L/24_L/ and 3_L will have 18/24 and 30 lamps respectively, each with two Wiper Plates.

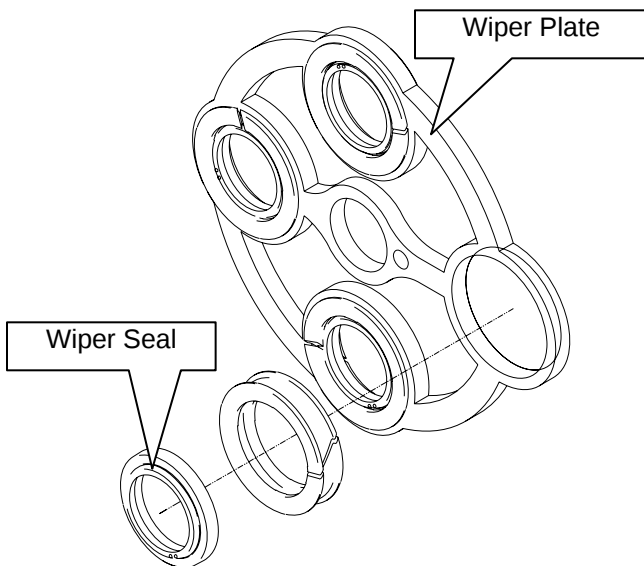
6. Carefully insert new Sleeve Wipers into the Wiper Housing Assembly by squeezing them together and letting them pop into place. Ensure that the Wipers are fully seated and that they can float freely in their respective Housings prior to reinserting the Sleeves.
7. For AL Models there are two Wiper Plates. Ensure Wiper Lips closest to the inlet end are pointing toward the End Plate. Ensure Wiper Lips closest to the outlet end are pointing toward the Stop Plate.

See Figure below



CAUTION

Long lamp systems (AL models) have two separate Wiper Assemblies mounted on to the Drive Screw. Maintain the distance of 28" center to center between the two Wiper Assemblies. This is to maintain full wiping coverage of the Sleeves and prevent jamming of the Wiper Assembly on the outlet end of the chamber.

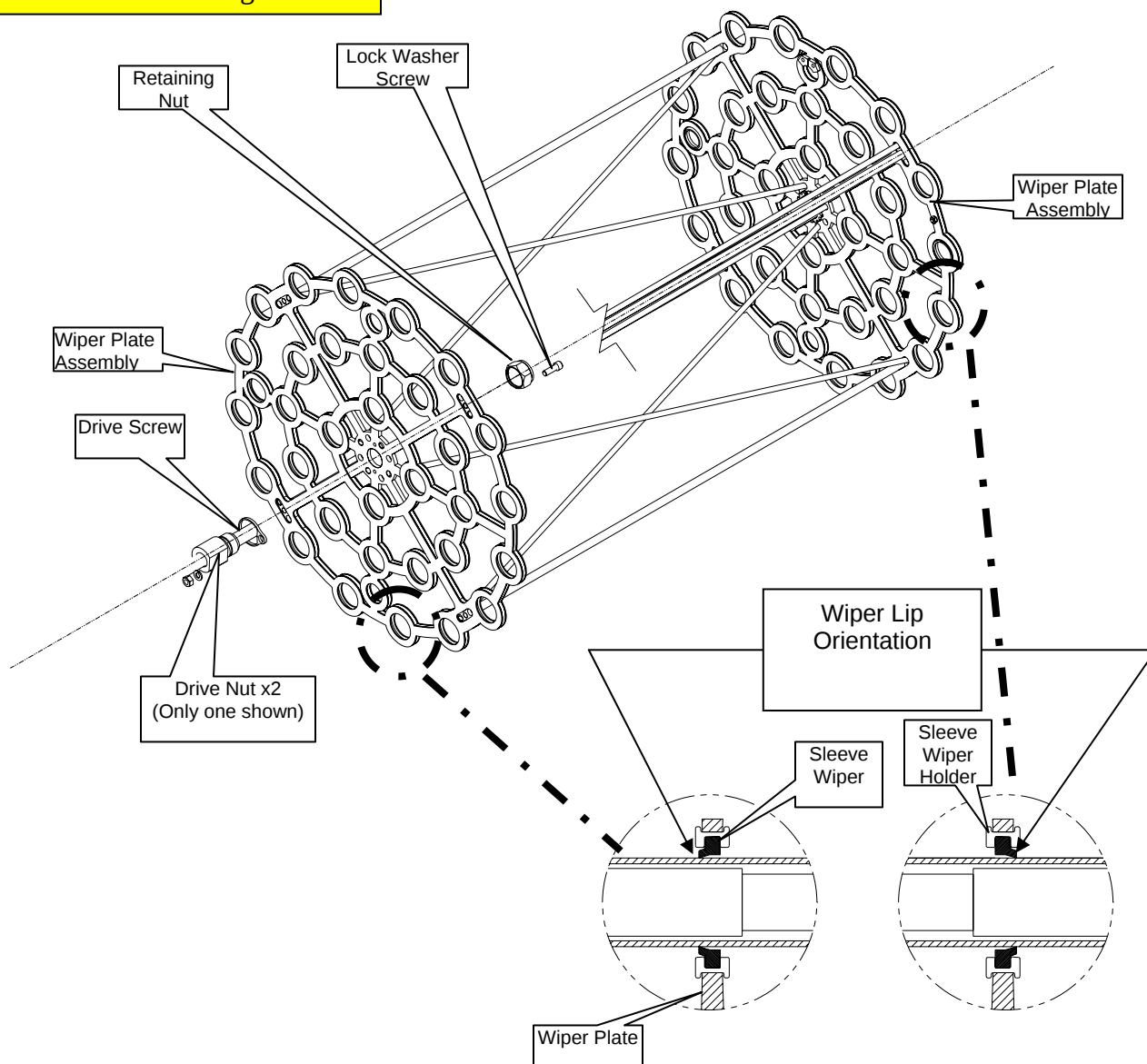




8. Reassemble chamber.

DIAGRAM REFERS TO AL
MODELS ONLY
Cage is only available on 30cm
chambers and larger.

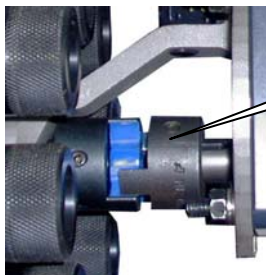
Note: The resting position of the wiper Assembly for the 03_S/_L – 08_S/_L is at the Inlet end.
The resting position of the wiper Assembly for the 30_L is at the End Plate end and for the 12_S/_L – 24_L the resting position is before the outlet flange.





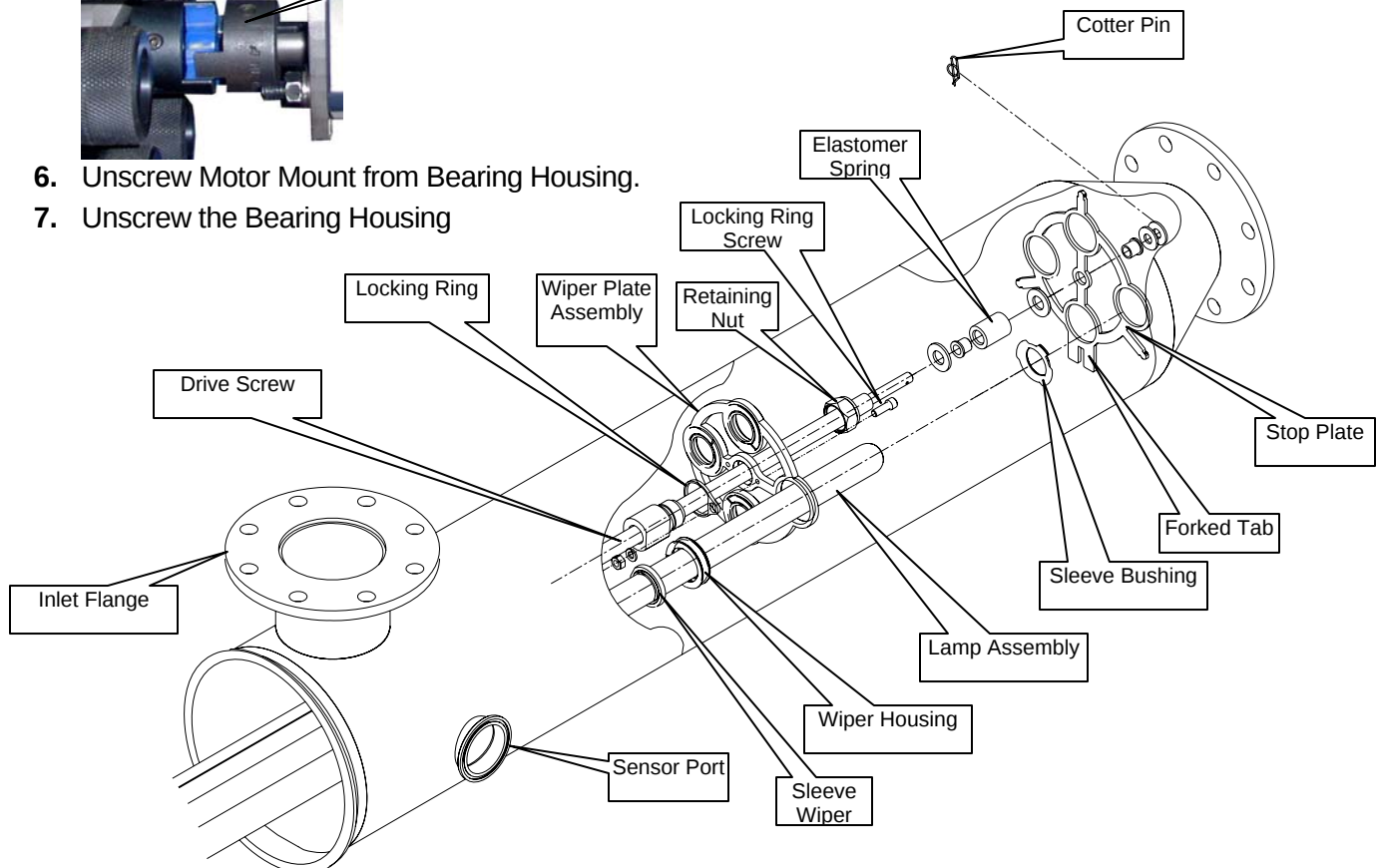
Drive Nut Removal / Replacement

1. Remove Gear Motor, following *Gear Motor Removal* procedure earlier in this chapter.
2. Remove lamps as per the *Lamp Inspection/Replacement* procedure found in *Chapter 4, UV Reactor (UVR)*.
3. Remove the Wiper Assembly as per the *Sleeve Holder / Wiper Assembly Removal* procedure found in *Chapter 4, UV Reactor (UVR)*.
4. Remove Stop Plate, following steps 4-7 of the *Stop Plate Bushing Replacement* procedure found earlier in this chapter.
5. Remove Jaw Coupling located on end of Drive Screw. See Figure below.



Jaw Coupling

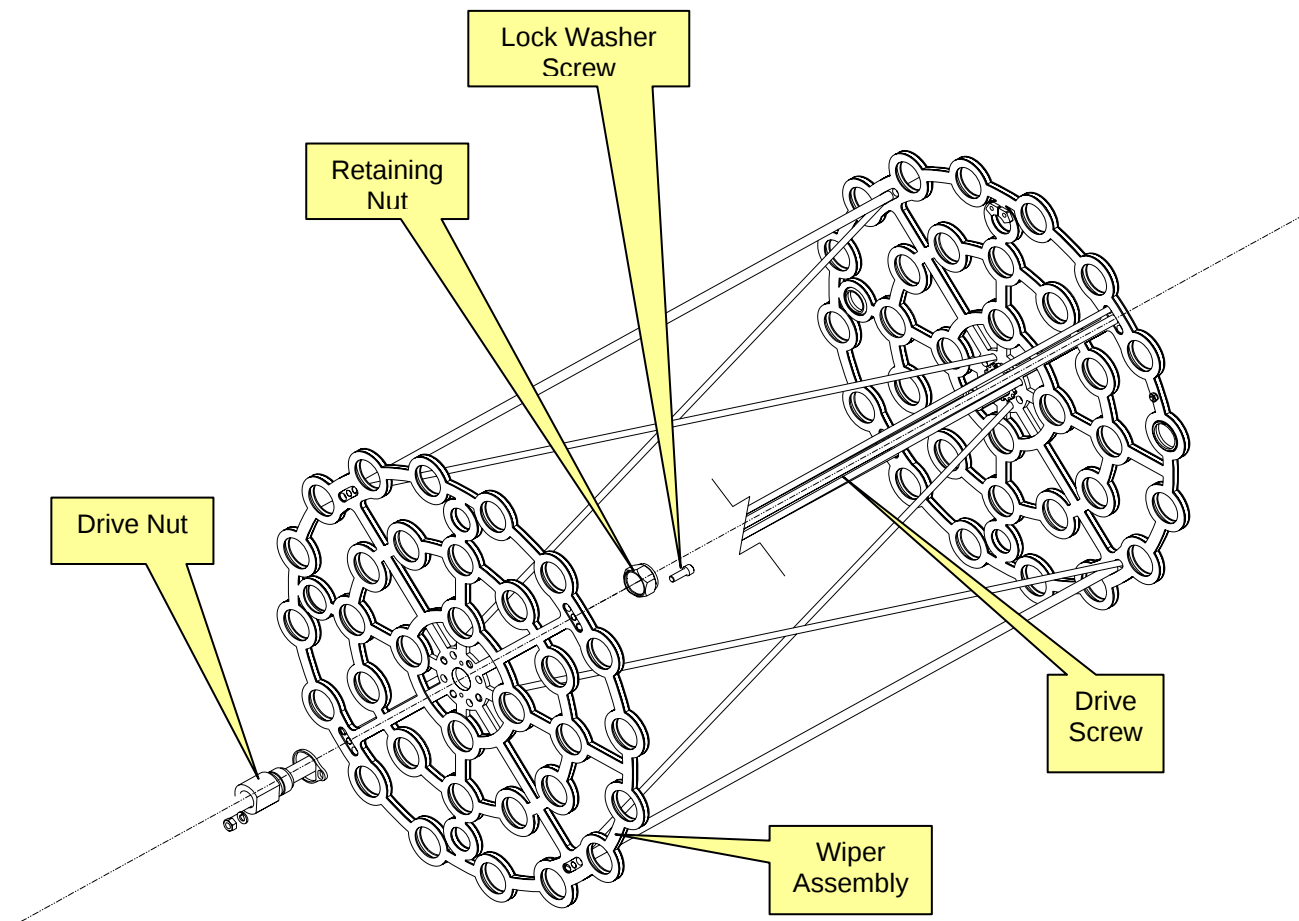
6. Unscrew Motor Mount from Bearing Housing.
7. Unscrew the Bearing Housing



8. Slide the Drive Screw out through the End Plate.
9. Remove the Rod Seal from the Bushing Housing noting its position.
10. Remove the O-Ring on Bushing Housing.
11. For 12_S/_L – 30_L Models go to Step 36, for all others (03_S/_L – 08_S/_L), remove the Locking Ring Screw from the Drive Nut.
12. Remove the Locking Ring from the Drive Nut, and then remove the Wiper Plate noting the direction for reAssembly.
13. Turn the Drive Nut until it is free of the Drive Screw and replace it with a new one. Ensure that the direction of the Drive Screw is as shown below.
14. Place the Locking Ring in as shown.
15. Lock it into place with the screw that was removed earlier.



16. Rotate the Drive Screw until its end is clear of the Wiper Assembly.
17. Remove the Jam Nut (s) and Screw Lock Washer. Remove the Lock Washer (s) and Drive Nut (s). (Long Lamp models have 2).
18. To reassemble, slide one Jam Nut over the Drive Screw.
19. Slide the one end of the Wiper Plate Assembly over the Drive Screw.
20. Place the Lock Washer over the end of the Drive Screw.
21. Thread the new Drive Nut onto the Drive Screw. Ensure the threaded end faces toward the End Plate. For 12_S models proceed to Step 36, since 12_S 's only have one Wiper Plate Assembly.
22. Continue to rotate the Drive Screw until it has been threaded far enough to allow the second Drive Nut to be installed.
23. Thread the second new Drive Nut onto the Drive Screw. Ensure that with this nut the threaded end faces the Stop Plate.
24. Slide the Lock Washer over the Drive Screw. Ensure the correct orientation.
25. Turn the Drive Screw until the it is situated through the other Wiper Plate.
26. Insert the Jam Nut over the end of the Drive Screw.



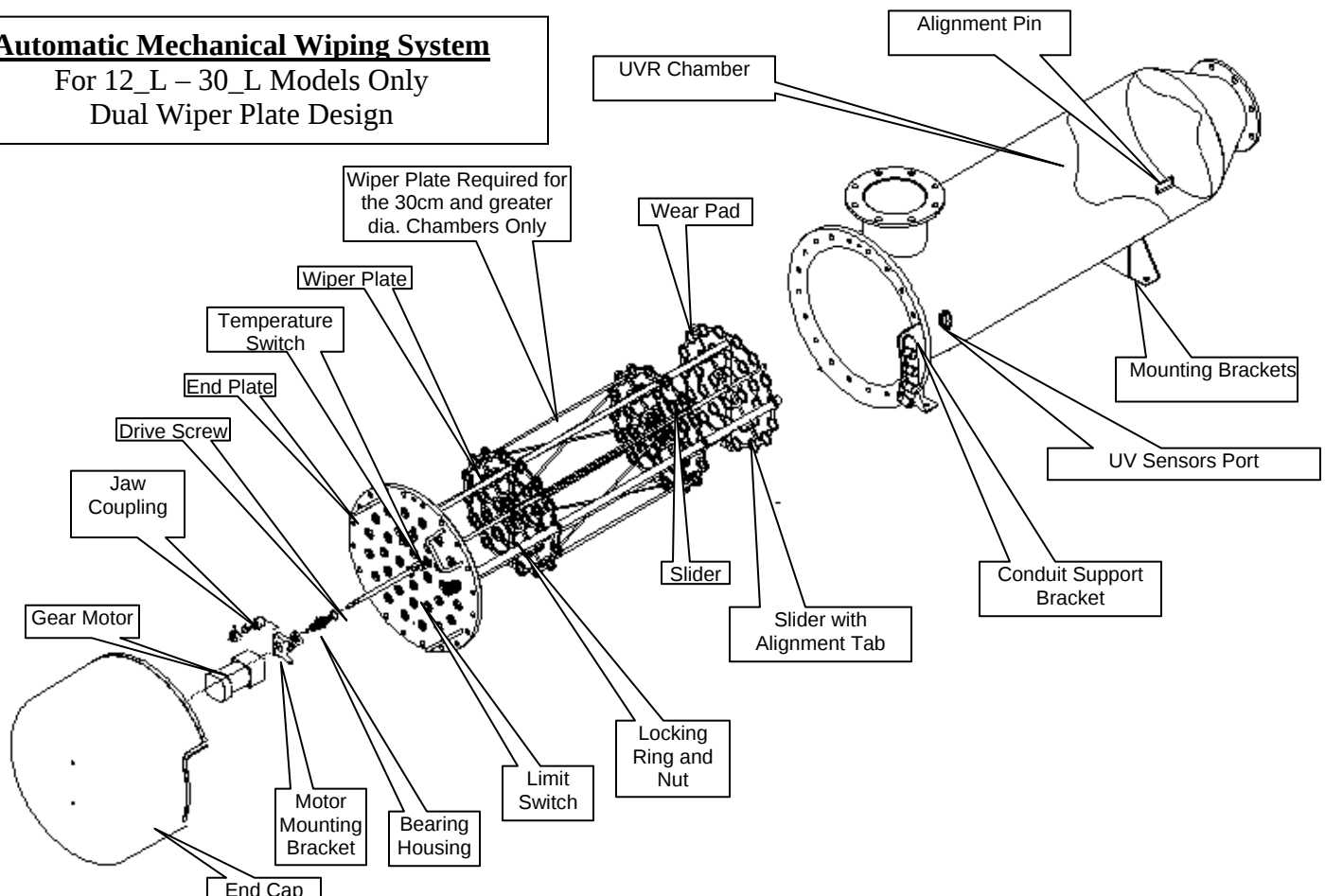


Mechanical Wiping Systems (Optional)

27. Turn one of the Drive Nuts through its Wiper Plate and tighten the Jam Nut onto it.
28. Slide the Lock Washer over the Drive Nut against the Wiper Plate.
29. Adjust the Drive Nut slightly so a slot in the Lock Washer lines up with its hole in the Wiper Plate.
30. Position the #8 nut for the Lock Washer Screw against the Wiper Plate so that a flat of the nut aligns with a flat on the Jam Nut. (This may require repositioning the Jam Nut slightly).
31. Slide the #8 screw through the slot in the Lock Washer and the Wiper Plate and tighten into its nut.
32. Turn the second Drive Nut on the Drive Screw until it just touches the other Wiper Plate. [Do not tighten.]
33. While holding the Drive Nut in position tighten the Jam Nut against the Wiper Plate.
34. Install the Lock Washer and securing hardware. (#8 screw & nut)
35. Reassemble the UVR chamber by repeating steps 1-4 in reverse order.
36. Rotate the Drive Screw until it is situated through the Stop Plate. Make sure that the screw turns freely by hand.
37. Connect Motor Harness, Proximity Sensor, Limit Switch, Temperature Switch, and End Cap Switch Harnesses.
38. Fill the UVR with water and pressurize to the operating pressure, checking that there are no leaks. If everything is OK, proceed to start-up.

Automatic Mechanical Wiping System

For 12_L – 30_L Models Only
Dual Wiper Plate Design



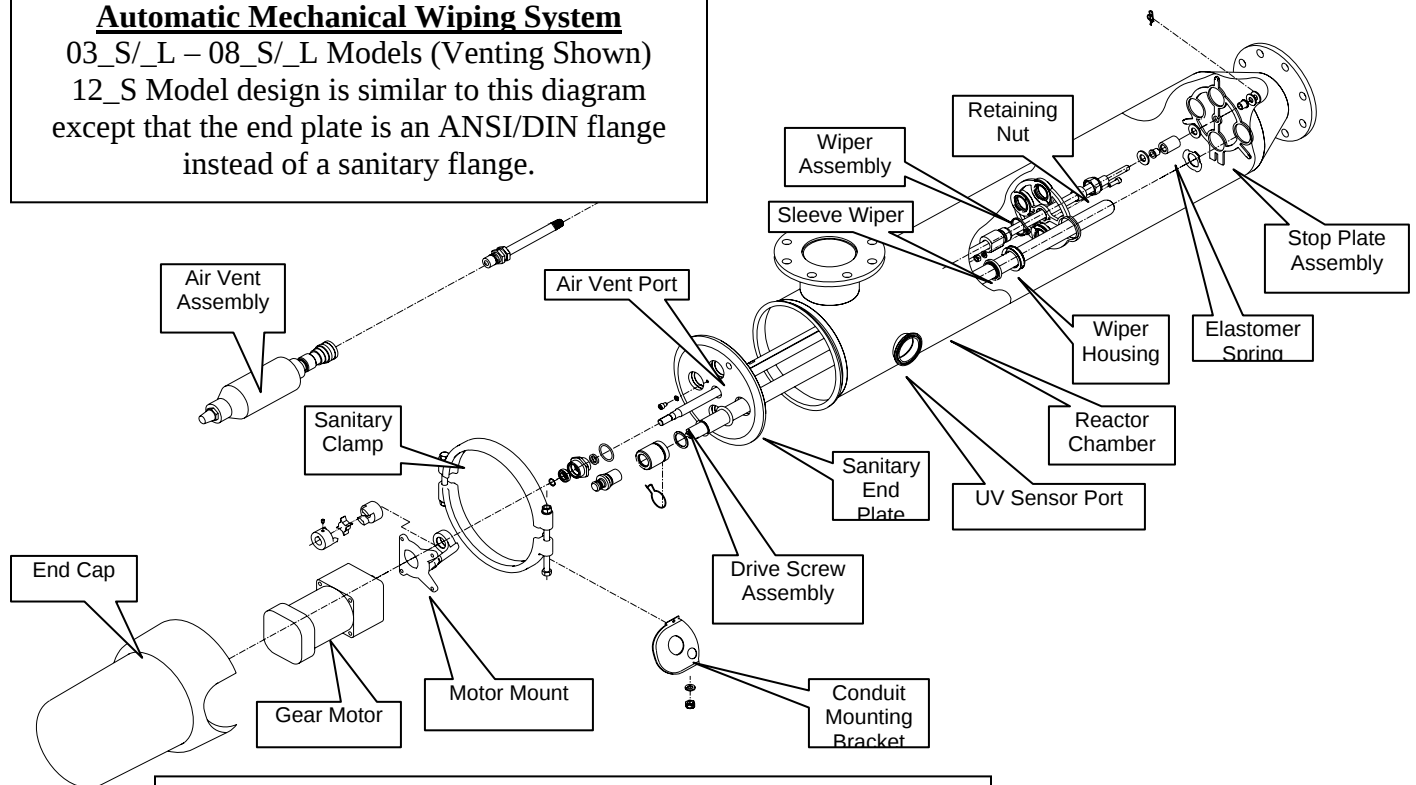


Mechanical Wiping Systems (Optional)

Automatic Mechanical Wiping System

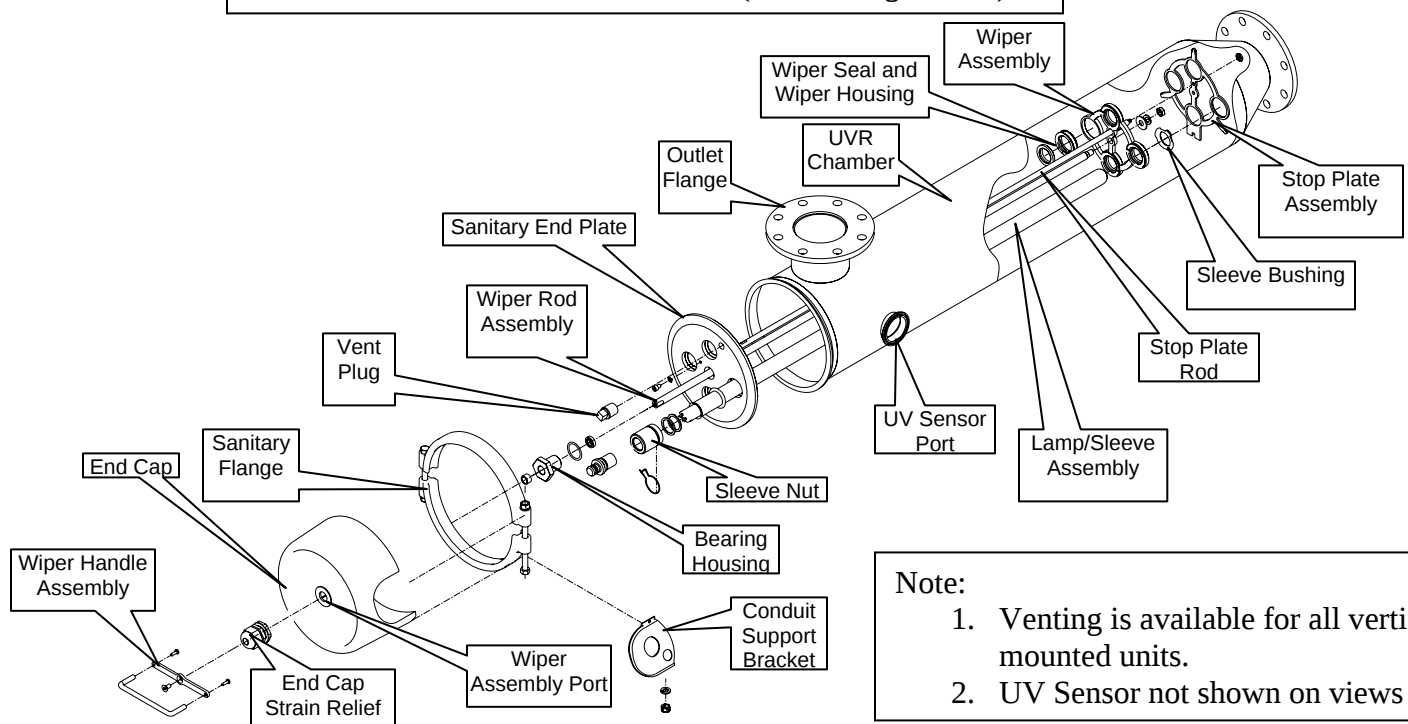
03_S/_L – 08_S/_L Models (Venting Shown)

12_S Model design is similar to this diagram except that the end plate is an ANSI/DIN flange instead of a sanitary flange.



Manual Mechanical Wiping System

AM & 03_S/_L – 08_S/_L Models (No Venting Shown)



Note:

1. Venting is available for all vertically mounted units.
2. UV Sensor not shown on views



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Mechanical Wiping Systems (Optional)

Chapter 6

UV Sensor





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UV Sensor



6 UV Sensor	6-1
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UV Sensor Replacement	6-2



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UV Sensor



6 UV SENSOR

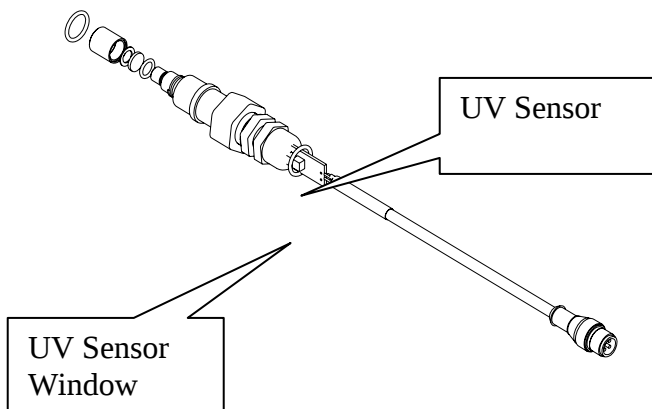
6.1 Introduction

Description

The TrojanUVLogic™ system is provided with a UV Sensor for intensity measurement.

The UV Sensor is mounted within the sensor port located on the wall of the UV Reactor (UVR). One UV Sensor is supplied for each system.

The UV Intensity seen by the UV Sensor is continuously displayed on the operator interface in mW/cm^2 . If the UV Intensity drops below the set-point, the display will flash indicating an alarm condition. The Common Alarm output relay will be energized.



Maintenance

UV Sensor Removal and Cleaning

1. Turn off the water flow through the UVR chamber. Isolate the UVR.

Note:

Ensure that the plant has been switched to bypass or plant is shut down to avoid damage to other plant equipment.

2. Shut the power OFF at the Control Panel (CP).

WARNING	
	Electrical Hazard! <i>Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.</i>

3. Relieve the water pressure and drain the water from the chamber through the drain provided on the UVR.

Specifications

- Sensor Output: 4-20 mA current loop (2 wire)
- Sensor: Photodiode
- Supply Voltage: $\pm 24\text{V DC}$



CAUTION

De-Pressurize & Drain the UVR.

Pressure must be relieved from the system prior to any maintenance, to prevent damage to the equipment or personal injury.

4. Remove the Nut by turning it counter-clockwise.
5. Gently remove the UV Sensor from the UV Sensor port.



CAUTION

Acids used to clean the sensor can cause burns. Wear protective clothing and eyewear when handling these materials. After cleaning, rinse the system components thoroughly with distilled water. Always follow the safety precautions recommended by the manufacturer of the cleaning solution.

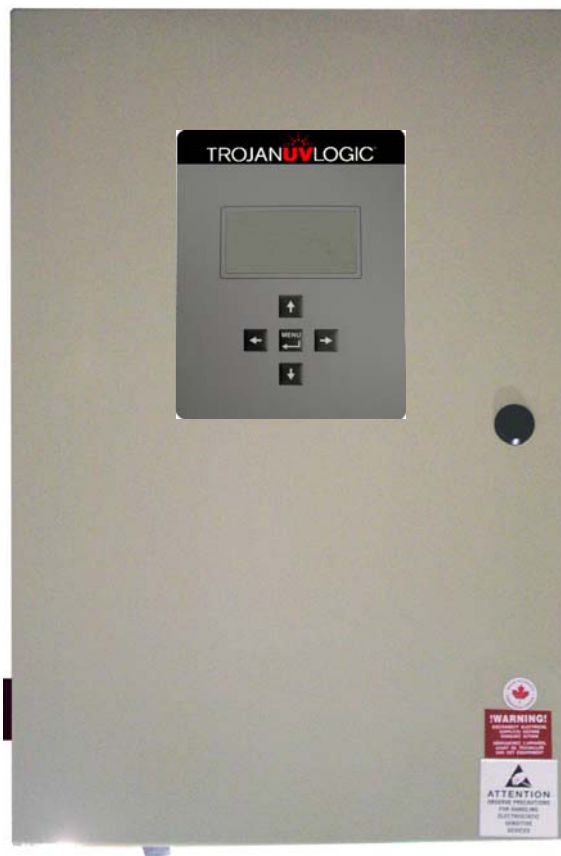
6. To re-install the UV Sensor follow steps in the reverse order. Tighten the Nut until snug. Do not over torque.(40in·lb)

UV Sensor Replacement

When replacing the UV Sensor, unscrew the old UV Sensor from the 4 pin male connector and reattach it to the new UV Sensor.

Chapter 7

CONTROL PANEL (CP)





Aquafine® Corporation

A TROJAN TECHNOLOGIES COMPANY

Control Panel (CP)

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7 CONTROL PANEL (CP)

7.1 Operational Details

Controls Philosophy

Control System Overview

The Control Panel (CP) provides control and monitoring of the UV Reactor (UVR). The basis for system control is a Microprocessor controller located in the CP and fully capable of allowing Lamps to be operated to maintain sufficient fixed power. The Operator Interface is located on the CP door and provides complete control and monitoring of the UVR accomplished through the Communication Control Board (CCB) Operator Interface local display.

Power supply mains provide power to the ballasts contained in the CP.

In the event of a disruption of power to the controller, the system shall retain the control program in memory.

UV Reactor Control

Each UVR has a Selector Switch for “OFF / ON” located on the side of each CP enclosure.

When “OFF” is selected, that UVR is not in operation (i.e. the Lamps are not powered).

When the system is ON there are 3 modes of operation. The system can be controlled:

- **Locally** - at the CP.
- **Remotely** - through an input voltage sensing circuit.
- **SCADA** - with Modbus, through a communication module.

In both Remote modes, the CCB and UVR are in the “Standby Mode” and waiting for the “Start-up” sequence and operational control from the Plant PLC. In any mode all Lamps are turned on/off together and operate at the same power level.

When power is restored after an electrical service interruption, any UVR required for operation will immediately go into a Warm-up mode (refer to the Normal Operation Start-up heading) before the UV System returns to the previous operational mode.

Normal Operation Start-up

The UVR will be placed into an 3 minute Warm-up mode until the UV Intensity has stabilized. During the first 18 seconds of the 3 minute Warm-up mode, all alarms are temporarily suspended except for Reactor HiTemp Critical (Reactor High Temperature Critical) and all Wiper Alarms (if AMWS is provided).

Flow for disinfection must not be allowed to pass prior to the expiration of the 3-minute warm up mode. However, if a customer wishes not to wait the full 3 minutes, process water may be allowed to pass through the chamber after 18 seconds of the warm-up mode has expired and the adjustable Alarm delay time has passed (see Normal Operation for example). In addition the Low UV Minor set point must not be in alarm.

While in Warm-up mode the UV Lamps will reach 100% output. Once the Warm-up mode timer expires, the UVR will be placed into the “System On” mode and the system will continue to provide 100% power output at all times.

Normal Operation

As the UV system Lamp Hours increase, the power level of the UVR will be increased to ensure disinfection while maintaining efficient power levels. Long Lamp Models have a power level that is variable from 60-100% that can be programmed and changed in increments of 2%. Midflow and Short Lamp Models have a fixed power level of 100%.

An adjustable Alarm Delay of 10 – 999 seconds is available. This delay is defaulted at 10 seconds during normal operation. However, when starting up the UVR the first 18 seconds of Warm-up mode time is added to the Alarm Delay time. I.e. (standard 18 second Warm-up



mode Alarm suspension) + (the adjustable 10 to 999 second Alarm Delay) = minimum 28 or maximum 1017 seconds before alarms can be activated after start-up.

Shutdown

If the system is being controlled by a Plant PLC and if the Remote On signal is removed, the system will turn off and remain in Standby mode. In Standby mode the UVR Lamps are de-energized.

The UV System will also initiate a shutdown sequence for the UVR in response to only one Critical fault condition – “Reactor HiTemp” (Reactor High Temperature). When a UVR Critical alarm is active, the CCB will shut off the lamps. Refer to table of Critical alarm details at the end of this chapter.

Lamp Control and Monitoring

The UVR CCB is set to a fixed power level. Each Lamp is controlled directly from the Lamp ballast. All Lamps for the UVR will be turned on/off together if commanded by the CCB and all operate at the same power level.

Specially designed current sensing circuits detect Lamp on/off status. The status of each individual Lamp whether it's faulted or okay is displayed by the CP Operator Interface on the panel door.

When switched on, Lamps are initially energized for a Warm-up period regardless of Local or Remote control. After the warm-up period has expired, the Lamps are automatically switched to the operational power level (100% Power Level).

Wiping System (Optional)

When an automatic and integral mechanical cleaning system is provided, the cleaning system uses a mechanical wiping action to de-scale the Lamp Sleeves. The cleaning system is fully operational without requiring the UVR to be placed out of service. A UVR cleaning

sequence may be initiated automatically as scheduled by the CCB CP controller.

In Automatic mode, the interval between cleaning sequences is determined by the "cleaning sequence" timer, which is normally pre-set at 8 hours and adjustable to 0, 0.5, 1, 2, 3, 4, 6, 8, 12, 24, 48, or 96 hours.

For systems with greater than 30 cm chambers, they will use the Home Limit Switch. At the start of a wiping sequence, the UVR Wiper extend sequence is energized and counts out a specific number of revolutions using the Proximity Sensor. After reaching the extended position, the UVR Wiper extend sequence is de-energized, the motor is stopped, pauses for 3 seconds and the retract sequence is energized. The Proximity Counter will count back past “0” until it has forced the Wiper Home Limit Switch to engage, which sends a signal that stops the motor. After a 3 second pause, the CP initiates an extend sequence and the motor is then instructed to move the Wiper Plate out 5 revolutions from the Wiper Home Limit Switch to the *Park* position. The CCB uses a "Wiper stroke" timer during the wiping sequence for fault logic.

For systems with chambers 30cm and smaller an EPDM spring is attached to the Stop Plate. This spring is used to reset the Park position instead of the Home Limit Switch on the larger Models. At the start of a wiping sequence the UVR Wiper extend sequence is energized and the Wiper extends to the extended position using a proximity counter. After reaching the extended position, the UVR Wiper extend sequence is de-energized and the retract sequence is energized until the proximity counter has returned to zero. However, a reset to the Park position is performed every 15 cycles. During this reset cycle the proximity sensor continues counting past Zero until Wiper compresses the EPDM Spring and the Proximity Sensor detects a reduction in revolution speed. The motor is then de-energized, and the Wiper is now in the Home



Position. After a 3 second delay, the CP initiates an extend sequence for 5 revolutions, placing the Wiper in the reset “Park” Position.

If the power to the system becomes disconnected due to a power failure, again the Wiper travels to the *Home* position and back to *Park* when the power is restored.

UV Sensor

A UV Sensor is provided for each UVR to measure UV intensity. The signal is converted to 4-20mA and is available from the CCB in the Analog Output.

The UV Sensor (Intensity) alarm will be pre-set at the factory, based on customer supplied data.

External Interfaces

There are 2 modes available for connecting to an external interface:

- The standard “Remote (Remote On)” mode allows connection to the customer Plant PLC by powering a voltage loop into the CCB’s voltage sensing circuit.

Note:

Refer to the SCADA Communication Module Appendix for a detailed list of communication commands and states.

- The optional “SCADA (SCADA Remote)” mode allows connection to the



customer Plant PLC through SCADA communications.

SCADA Communication (Optional)

The Modbus RS485 communication protocol is an optional feature that enables the Control Panel to communicate with and be controlled by the Plant PLC by remote means.

Communication can be received from the Plant PLC to the Control Panel as well as transmitted from the Control Panel to the Plant PLC. The following are a general list of communication commands that can be exchanged:

Receive from Plant PLC: (examples)

- Turn ON/OFF (Remote ON/OFF)
- External Interface and System Operation Modes
- Initiate Wiper Sequence (if provided)
- Lamp and Wiper (if provided) ON/OFF Resets
- 4-20 mA Flow Signals
- Etc.

Transmit to Plant PLC: (examples)

- All Lamp/Ballast Alarms
- All timers and counters
- All values (i.e. Wiper Cycles,etc.)

Alarms

All alarms generated by the CCB will be displayed on the Operator Interface. The last alarm to occur will be displayed on line 7 of the Main Screen and line 1 of the Active Alarm and Alarm History Screens. All alarms will be displayed in order of occurrence - position 1 always indicates the most recent alarm which will then move to position 2 upon the next occurring alarm etc. A maximum of 18 alarms can be displayed before the oldest alarm drops off the list.

Auto Home Position Reset (if Wiper is provided)

Any time the CP is turned ON; the Wiper resets itself by travelling to the *Home* position, it then



pauses and travels back to the *Park* position to wait for the signal to cycle. Whenever the Wiper is in operation the controller will change to the Wiper Screen.

If there is a power failure, again the Wiper travels to the *Home* position and back to *Park* when the power is restored.

The operator can also reset the wiper faults and send the wiper to *Home* position from the System Setting screens.

If a problem occurs during a wipe cycle, the display will generate a Wiper Fault Alarm. The four types of Wiper Fault Alarms include the *Wiper Revolution Alarm*, *Wiper Home Alarm*, and the *Wiper Limit Switch Alarm*. The fourth alarm is the *Wiper General Alarm*, which includes one of or any combination of the first 3 Wiper Alarms. Simply turning the CP off for 10 seconds and on again should remedy the problem. This procedure may have to be repeated once or twice. If this fails to resolve the issue, refer to Chapter 8 for troubleshooting.

Should the Wiper Fault continue to appear, the Wiper system should be disassembled and the problem diagnosed.

Reactor Proximity Switch Input (Rev Counter)

The Proximity Sensor is used to count the number of revolutions that the Motor makes to extend the Wiper Plate to the end of the chamber. This number is factory set and is different depending on Lamp length. When the Proximity Sensor counts out to the set limit, the Motor is shut off, the Wiper Plate pauses and then the return sequence is initiated.

Depending on the size of UVR, either a Limit Switch or EPDM Spring will be used

Alarm Output Relays

The 7 Programmable Digital Outputs are 24VDC operated dry contacts. All are Normally Open (NO) contacts. When the (customer provided) 24VDC power is supplied to the contacts they will individually be held closed. In the event of an

alarm, the power will be lost, and the closed contact will return to its normally open state, which indicates an alarm.

Refer to section 7.7 for a typical wiring application.

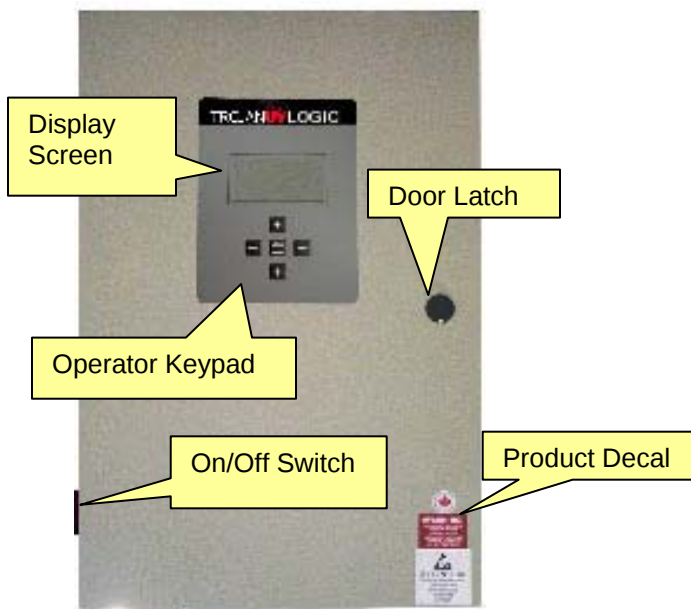
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7.2 Control Panel (CP) Hardware

Control Panel (CP) Enclosure

Description



The Control Panel (CP) enclosure houses the main Interface to the UV system and a microprocessor based controller with input and output connection points. The CP also houses the power supplies and provides power distribution to the UV Reactor (UVR) and associated equipment (i.e. Automatic Cleaning System, UV Sensors).

The CP will directly accept an input power from between 208 and 240 VAC split phase power for all Models. The CP for the AM (Midflow) model only, can alternatively accept 120VAC. If the power supply is other than that previously indicated the system will be supplied with a Power Pack. This device is used to convert the plant power supply into the required 240VAC as needed.

The Operator Interface to the UV system is located on the door of the CP enclosure.

The CP is a metal enclosure that houses the control electronics and power supplies. The CP may be fan cooled depending on Model requirements and is suitable for indoor installation. Refer to the System Label located at the front of this manual for the specifications for your system.

Specifications

Material of Construction: Type 12 is epoxy painted carbon steel, or Type 4x which is 304 SST (optional)

Rating: Type 12 or optional 4x

Installation: indoors, wall mounted

Size: Dependant on system Type:

- AM (Midflow) Models – 16" High x 14" Wide x 6" Deep
- 03Short Lamp/Long Lamp-06Short Lamp/Long Lamp Models- 24" High x 16" Wide x 10" Deep
- 08Short Lamp/Long Lamp-12Short Lamp/Long Lamp Models-24" High x 24" Wide x 10" Deep
- 18Long Lamp-30Long Lamp Models - 48" High x 36" Wide x 10" Deep

Input Power to CP:

- A Models – 110,120,208,220,230, or 240VAC input power
- B & C Models – 208, 220, 230, or 240VAC Input Power Only

Maximum Cable Length (UVR to CP):

- 4.5 m (standard) (Supplied with conduit to run from Reactor to Panel)
- 7.5 m (optional) (Supplied with conduit to run from Reactor to Panel)
- 7.5 -25 m (Custom) – (supplied without conduit)



Control Panel (CP)

Maintenance

Similar to steel products exposed to the outdoor environment, the exterior of an enclosure installed indoors needs to be washed monthly with a mild soap and water solution.

A damp sponge or soft cloth should be used for regular cleaning. Do not use any corrosive cleansers on the CP cabinet or Operator Interface.

The TrojanUVLogic controller may have a



venting filter depending on the Model requirement. If equipped, remove the filter and blow clean on a monthly basis or as determined by site conditions.

Power Pack

Description

The Power Pack will provide step-up or step-

down power. When incoming supply voltage is not the standard 208 through 240 VAC, a Power Pack will be required. The Power Pack is essentially an independent transformer that is housed in its own Type 3R enclosure. The enclosure may reside wherever needed; however it should preferably be installed in a Plant's Distribution Panel/ Electrical Room.

Based on your system size and the power being provided by the plant, an appropriate Power Pack will be provided when necessary.

Specifications

Material of Construction:	Painted Steel
Rating:	Type 3R
Installation:	indoor

Electronic Ballasts

Description

The TrojanUVLogic Ballasts are located within the CP. The system utilizes an electronic Ballast to energize the germicidal Lamps. Each of the Ballasts can drive one or two UV Lamps (depending on configuration).

For the AS & AL (Short & Long Lamp) Models, each pair of lamps is powered by an electronic ballast located in the CP.

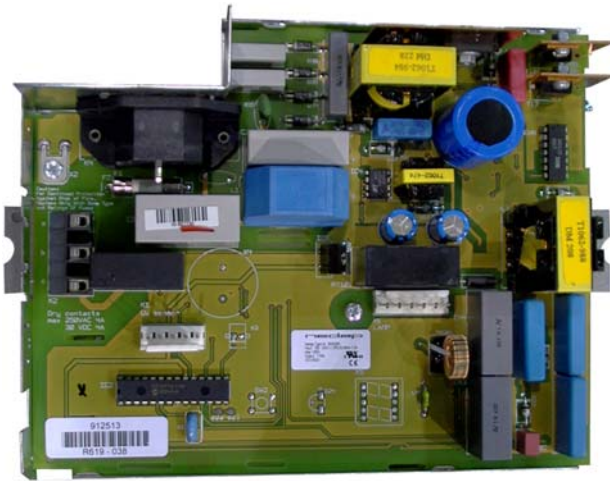
For AM (Midflow) Models, each lamp is powered by one ballast.

Since the Ballast type will differ depending on system type provided, when ordering replacement Ballasts, ensure that you reference AM, AS, or AL Model.

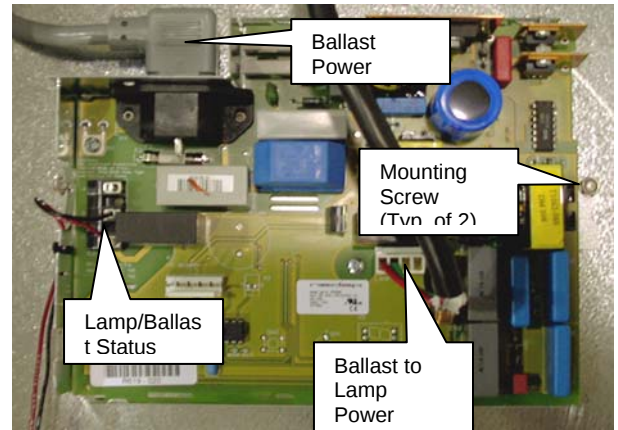




Control Panel (CP)



Ballast for AS and AL Models



Ballast for AM Models

	WARNING HOT SURFACE! <i>Allow electronic ballast and lamps to cool before handling.</i>
--	--

Maintenance

AM Model –Ballast Removal & Replacement

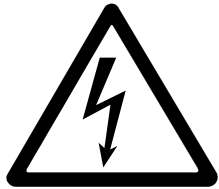
1. Disconnect all power to the CP and follow *Lockout and Tag Procedures* which are found in the *Preface*.

	WARNING Electrical Hazard! <i>Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.</i>
--	---

2. Disconnect the Power Cable to the Ballast, as shown below.
3. Disconnect the digital Contact Wires for Lamp/Ballast Status, by removing or loosening the slotted screws as shown. Note their location for installation of the new Ballast.
4. Remove the Connector that distributes power from the Ballast to the Lamps.
5. Remove the two hex Mounting Screws on either side of the Ballast and lift it out.
6. Place the new Ballast onto the Back Plate, align the 2 hex Mounting Screw holes and fasten the Ballast into place.
7. Reinstall the Connector that provides power to the Lamps on the new Board.
8. Reconnect the Lamp/Ballast status digital Contact Wires to the correct locations.
9. Reinstall the Power Cable to the Ballast
10. The system is now ready to power up.

AS & AL Model –Ballast Removal & Replacement

1. Disconnect all power to the CP and follow *Lockout and Tag* procedures which are found in the *Preface*.

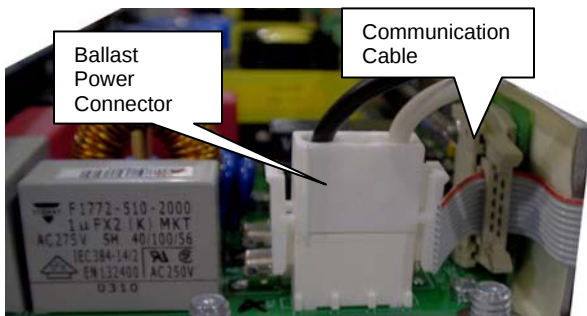


WARNING

Electrical Hazard!

Because of the potential hazard from this power source it is prudent to use LOCK OUT procedures and TAG all sources of power before performing any maintenance, cleaning or repairs on any piece of equipment. The power sources may include electrical or stored energy. Refer to the general lock out and tag procedures in this manual.

2. Disconnect the power to the Ballast, as

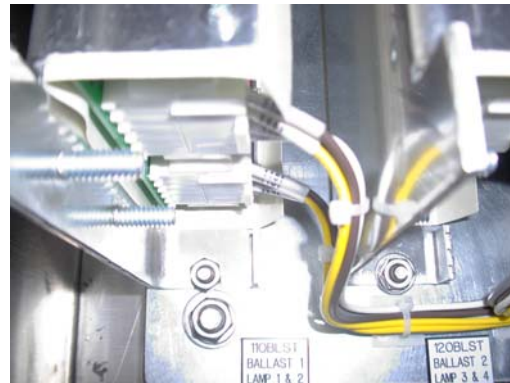


shown below.

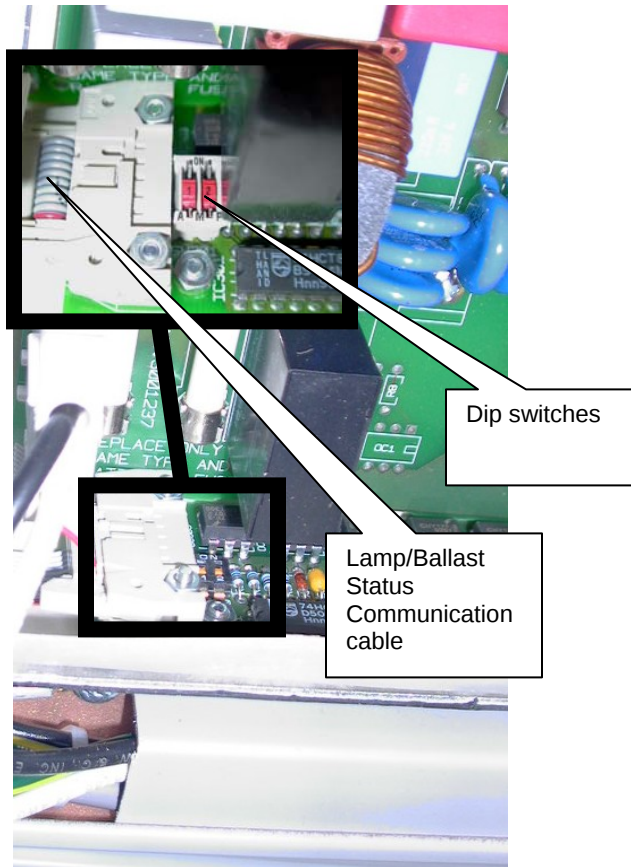
3. Disconnect the Communication Cables for Lamp/Ballast Status, as shown above.
4. Remove the Connector that distributes power from the Ballast to the Lamps.



5. Remove the 2 hex Mounting Screws on either side of the Ballast and lift it out.



6. Take note of the Dip Switch settings for Switch 0 and 1 (found right below Communication Cable Connector).
7. Set the Dip Switches on the new ballast to match the old Ballast or consult the *Electrical Drawings* provided in *Appendix D*.



8. Place the new Ballast onto the Back Plate and align onto the Mounting Screw holes. Fasten the Ballast into place.
9. Reinstall the Connectors that provide power to the Lamps on the new Board.
10. Reconnect the Lamp/Ballast status Communication Cable to the correct locations as shown on previous page.
11. Reinstall the Power Plug to the Ballast.
12. The system is now ready to power up.

Note:

Incorrect alignment of the Lamp/Ballast status Communication Cable will damage the pins and ruin the Ballast.



System Controller – The Control Board

Description

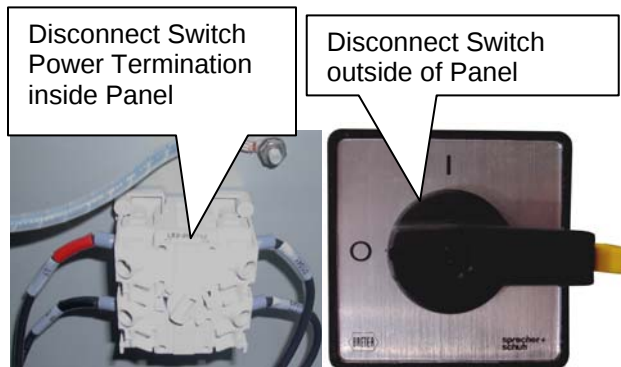
The heart of the control system is a microprocessor-based controller, which continuously monitors and controls the UV system's functions. Custom electronics provide the CP with the necessary indications of system parameters.



The Control Board is powered by a 24Vac power supply which is located in the control panel and is similar to the one shown below.



The Board is configured by a user-friendly Operator Interface Menu System and Keypad. The Board allows the Operator to recall its original factory settings. If for some reason someone accidentally changes parameters and is uncertain what they have done, these factory settings are stored right on the Board, and can be retrieved at any time.



Board Power supply requirements – AM Models

The AM Model requires 2 Input power connections to the P40 Board:

- 120 or 240VAC for Ballast Power.
- 24VDC for LC Display and Board Power.

The Board provides 3 output power connections to supply power to up to 3 Ballasts. Since each Lamp uses its own Ballast, you may or may not use all 3 Connections.

P40 Board Power supply requirements –AS and AL Models

The AS and AL Models require 1 Input power connection to the P40 Board:

- 24VDC for VF Display and Board Power.

**Note:**

The terminations required by the contractor include:

- *The Main Power to the Disconnect Switch as shown in the Previous figure.*
- *The Alarm terminations*
- *Optional Digital Inputs if applicable. (Remote ON/OFF).*

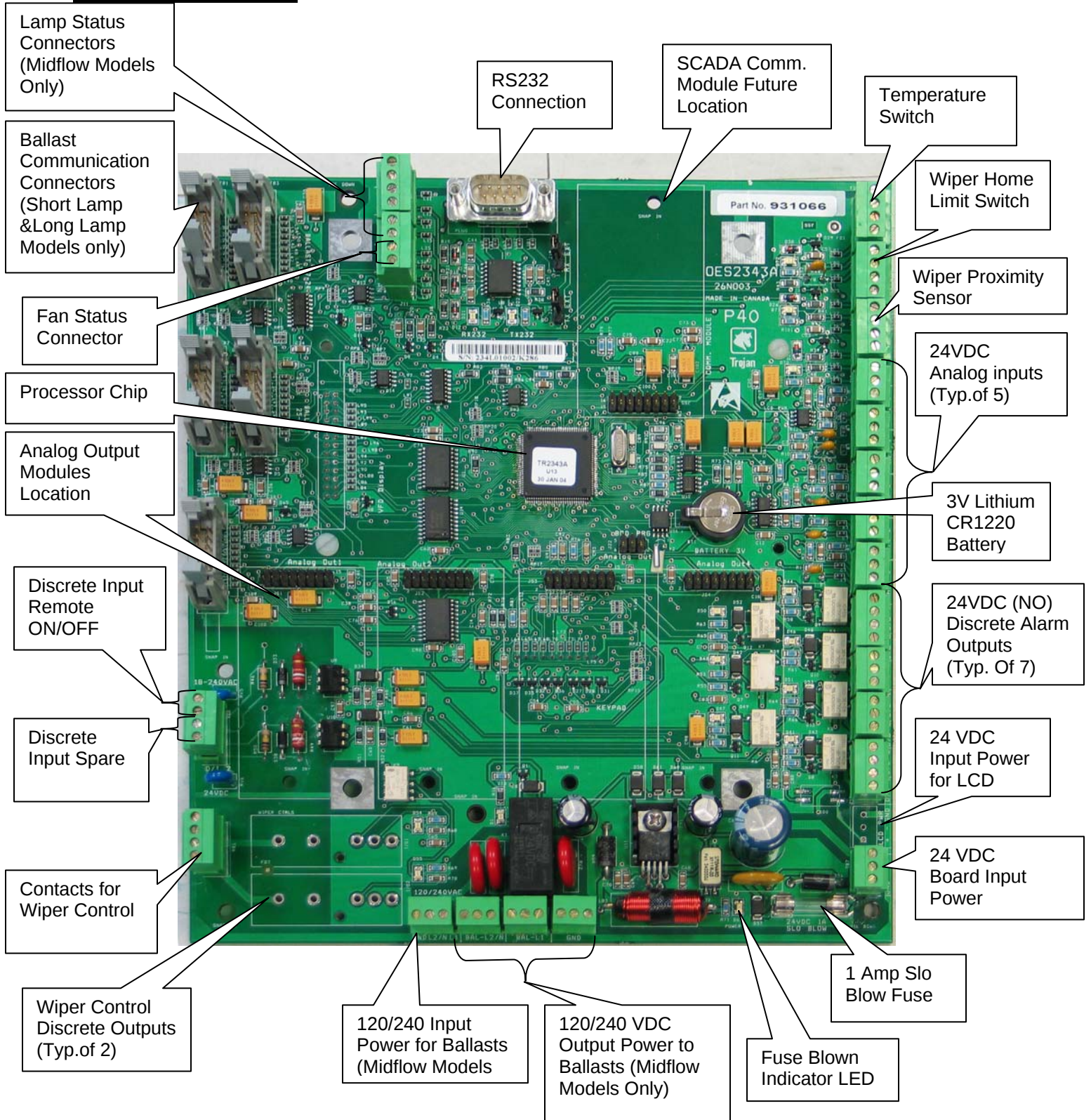
Board Diagram

See the following page.



Control Panel (CP)

CONTROLLER BOARD





RS232 Com Port

The RS232 communications port can accommodate a laptop connection.

Ballast Communication Ports

The Ballast Communication Ports are used for Lamp and Ballast Status information, to determine Runtime and Alarm Faults. These 10 Pin ports connect directly by a ribbon cable to the Com Ports on the Ballasts. These ports are used by the Short Lamp and Long Lamp Models only.

Lamp Status (Midflow Models Only)

These Lamp Status ports are used on the Midflow Model systems only. They are used for Lamp or Ballast Status, sending a signal to the Board that there is a fault based on a Lamp or ballast fault. There are three ports available, however only one will be used on the 01Midflow Models and only two will be used on the 02Midflow Models.

Board Fuse

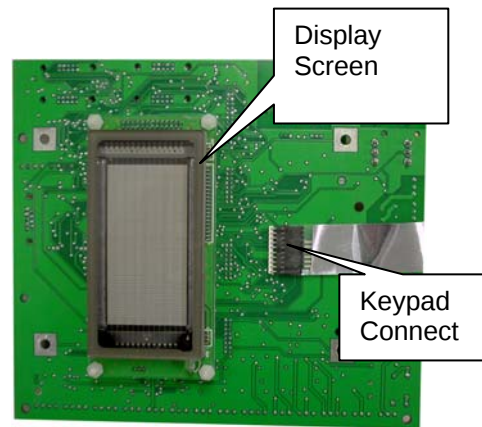
The Control Board houses a 1 amp Slow Blow Fuse for the Board power supply. In the event of a blown fuse, the LED beside the fuse will be lit, signifying that the fuse needs to be replaced.

Keypad Connector

Located on the solder side of the Board is the Keypad Connector, which simply provides the connection of the keypad to the Board for navigation and control.

VFD Communication Port

The VFD (Vacuum Florescent Display) Communication Port is on the solder side of the Board as well. The function of this connection is to provide power and communication from the Board to the Display Screen.



Battery Replacement

The time and date, Alarm History, Elapsed Lamp Hours and Time to Next Wipe will be lost when the battery is replaced. The Lithium 3V battery #CR1220 should not require replacement. However if it is changed, any System Settings that have been changed, will be reset to the factory default settings when power is returned to the system after Battery replacement.

Input / Output Features

The Board has many built-in and add-on features. Some of the features are as follows:

- 7 Programmable Digital Output Relays
- 2 Digital Output Relays (wiper only)
- 2 Digital Inputs
- 5 Analog Inputs
- 4 Analog Outputs
- Communications Module

Programmable Output Relays

These Output Relays can be custom programmed to alarm on up to 7 different items. The standard configuration is set up with the following list of alarms:

1. Common Alarm
2. Low UV Intensity (Major)



3. Reactor High Temperature (Critical)
4. System On
5. Spare (blank)
6. Spare (blank)
7. Spare (blank)

For a full list alarm possibilities refer to the

Note:	<i>For typical operator connections, refer to the Digital Output Wiring Diagrams at the end of this chapter.</i>
--------------	--

“Alarms Overview” section within this chapter.

Digital Output Relays (if Wiper is provided)

These two pluggable Relay Modules are provided on systems with an Automatic Mechanical Wiping System (AMWS). The relays provide control of the Wiper Motor for extend and retract sequences.

Digital Inputs

Inputs are provided with input voltage detection circuitry and, once enabled, will accept 24-240 VAC or VDC.

The two standard Inputs are Wiper Limit SW (Wiper Limit Switch) and Reactor Hi Temp (Reactor High Temperature).

There are two optional Inputs. One D/I 1 is for Remote ON/OFF Control and D/I 2 is a spare.

- **Remote ON/OFF Power Control (Optional)**

The Remote ON/OFF Power Control option enables the user to switch the TrojanUVLogic ON/OFF from a remote location. To make use of this option, power must be supplied to the terminals.

- **Max Ramp Power (Optional)**

This is an input response loop to a site monitored water condition. When the condition(s), i.e. a high flow rate occurs, the system will be instructed to operate at 100%

power. When the condition has ended, this response will de-energize, and the required system power level will return. Since the Long Lamp Models are the only models that have variable power, this option is only available on the Long Lamp Models.

- **Wiper Limit SW Input (Limit Switch) (if Wiper is provided)**

Used only on systems with larger than 30cm chambers, the Wiper Limit Switch acts as a digital signal to send a message to shut the Motor OFF. In normal operation the Wiper Plate sits in the *Park* position until a wipe sequence is initiated. For details on the operation of the wiping system, refer to the *Controls Philosophy* section at the beginning of this chapter.

- **Reactor Hi Temp Input (Reactor High Temperature)**

The Reactor High temperature Input connection has a low current signal loop. This loop is continuous. In the event the UVR exceeds the limit of the High Temperature Switch, the Switch will break the Circuit, causing an alarm condition and consequently turn the UVR off.

Analog Inputs

The TrojanUVLogic is provided with the 5 Analog Inputs available for use. Refer to your *System Description* in this manual to see what they are being used for.

Analog Outputs

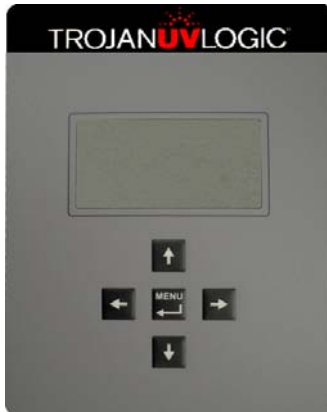
Up to 4 Analog Outputs are available for use with the TrojanUVLogic. Refer to your *System Description* in this manual to see how many Analog Boards where requested. As an example, if the UV Intensity Sensor reading was requested for remote monitoring, then an additional Analog Output module Board would be provided. The module Board is located on the Control Board in one of the 4 available slots, as shown on the Board Drawing. This output module provides a 4-20 mA, 24 VDC signal.



Control Panel (CP)

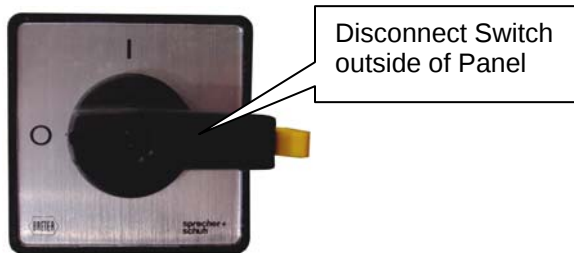
Operator Interface

The Operator Interface is a Florescent Display that is programmed with custom screens. The Operator may navigate though 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 CP. The Ballasts / Lamps are turned ON and OFF in accordance with the position of the switch.

Operation



The TrojanUVLogic is designed to operate with very little intervention. The system will monitor UV Intensity and Dose when required to ensure that proper disinfection is being met. The system will also monitor the UVR Temperature, Lamp and Ballast Status, and when provided - Wiper Status. In the event of an alarm, the Operator Interface will display an alarm on the screen and will keep track of them in an Alarm History. With AMWS, the controller will monitor wiping sequences, the frequency of wiping, as well as the status. The variables on cleaning

frequency can be adjusted to suit varying site conditions.

The buttons at the bottom of the following screens take the Operator to the respective screens:

HIST – Alarm History Screen

ACTI – Active Alarm Screen

MAIN – Main Screen

LOGIN – Login Screen

NEXT – Next page within this screen series. (This option will only appear if there are enough screens to need multiple pages.)

PREV – Previous page within this screen (This option will only appear if there are enough screens to need multiple pages.)

CHANGE – Take user to the configurable version of the current screen.

SAVE – Saves configurations and returns user to the view only version of the current screen.

Specifications

Display: 128 x 64 Dot Matrix VFD

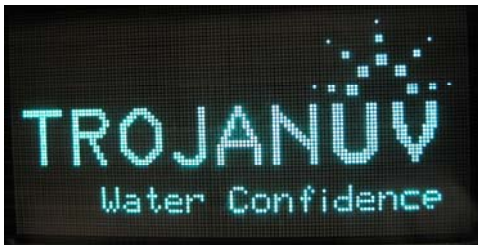
Control: Keypad with Five Button Integrated Decal



Maintenance

7.3 Control Panel (CP) Software

Boot Menu Screen



This screen is displayed 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.

Main Display Screen

The Main Display screens consist of the UV Sensor and optional Flow Rate screens. To navigate through all the main screens press the *Menu* ↵ button. To access the Main Menu, press the *Menu* ↵ button through each of the Main Display screens until the Main Menu screen appears.

UV Sensor

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

- UVI1:** Displays the UV Intensity of the UV Sensor in W/m^2 , and the Analog reading in mA.
- 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 Lamps:** Displays the # of Lamps in the system.
- Power & Mode:** 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.

Local: Control override by Operator at the CP.

Remote: Control by the UV System CP

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

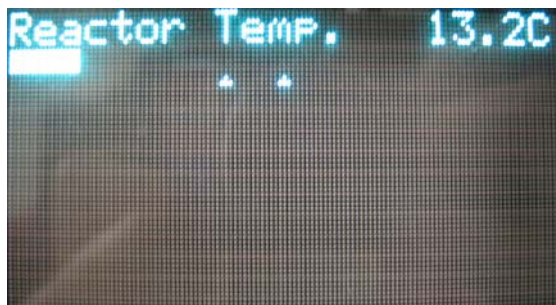
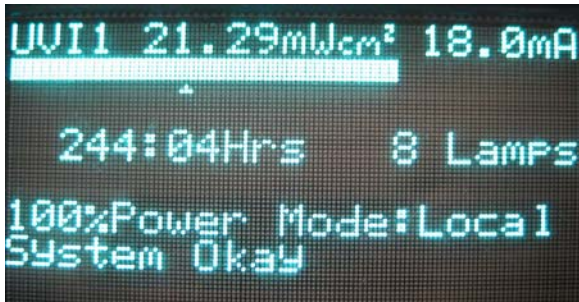
- 1- During start-up
 - *Ballast Ignition*
 - *Lamps Preheat*
 - *Lamps On*
 - *Warm-up X:XXm*
- 2- During Wiper Cycle (if Wiper is provided)
 - *Wiper Find Home*
- 3- During Remote Standby
 - *Remote Host Standby*
- 4- During Shutdown
 - *Lamps Turned Off*
- 5- Upon any Active Alarm
 - *Most Current Alarm* – From the list in the Alarm Overview, Section 7.5.

Note:	<i>The alarm settings are pre-adjusted at the factory or with specific instructions from Aquafine Corporation.</i> <i>Devices for UV Disinfection systems are delivered with fixed programmed threshold values for the main alarm that are suited for the specific application.</i>
Note:	<i>Operator Interfaces vary depending on the system configuration. The screens described in this chapter may not be the exact screens provided on your system.</i>



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:



Reactor Temp.: Displays the current reactor temperature.

Bar Graph: The bar graph depicts live readings. The Reactor Temp graph works indicates both the High Temperature Major and High Temperature Critical respectively from left to right as "▲".

Main Menu Screen



To enter the Main Menu the Operator must Press the *Enter* ↵ 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* ↵ key.

Active Alarms Screen

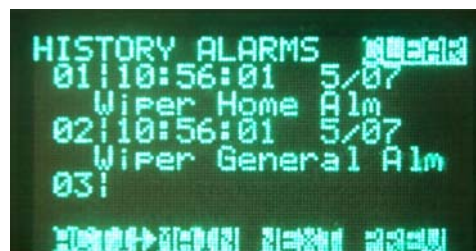
Access this screen by selecting Alarms Lists



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.

Alarms List Screen Series

For a full list of alarms and their descriptions see the Alarm Overview Section in this chapter.



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.

Note:	<i>Alarms also flash on each of the display screens. See the Three UV Sensor Option screen for an example.</i>
--------------	--

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. This screen (like the one shown above) provides additional information about individual Alarms.

Note:	<i>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.</i>
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Digital Input-Output Screen Series

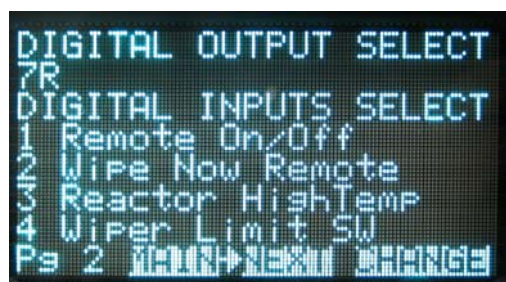
These screens are accessible through the Main Menu by selecting the Digital Input-Output Screens.

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

Operator Access Level Screens



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



Note: 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.

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.



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 → to accept and keep all changes.

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

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.





Analog Input-Output Screen Series

Note: *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.*

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.

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 OUTPUTS	VALUES
AND SELECT	mA
1 UV Intensity 1	14.6
2	0.0
3	0.0
4	0.0

Pa 2 CHANGE

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.

ANALOG INPUTS	VALUES
AND SELECT	mA
1 UV Intensity 1	16.0
2 Reactor Temp	0.0
3	0.0
4	0.0

Pa 1 CHANGE

Technician Level Access Screens

ANALOG INPUTS	VALUES
AND SELECT	mA
1 UV Intensity 1	18.1
2 UV Intensity 2	18.0
3 UV Intensity 3	18.0
4 Flow Rate	11.7
5 Reactor Temp	10.9

Pa 1 CHANGE

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.

ANALOG OUTPUTS	VALUES
AND SELECT	mA
1 UV Intensity 1	0.0
2 UV Intensity 2	17.7
3 UV Intensity 3	0.0
4 UV Intensity 4	0.0

Pa 2 CHANGE

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.

Note: *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.*

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



Control Panel (CP)

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* ↵ to accept and keep all changes.

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

System Settings Screens

These screens can be accessed through the Main Menu by selecting the *System Settings*.

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

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.



This screen allows the Operator to adjust the following:

Wiper Timer Adj: (For systems with a Wiper). This feature sets the cleaning cycle frequency.

Operation Mode: This mode selector can be changed to:

- Local – control at the CP by the controller.
- Remote – control by an external device by powering a voltage loop into the CCB's voltage sensing circuit.

- SCADA^R (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. Board) 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. UVR) is cycled ON/OFF.

Wiper Cycle: Systems with Wipers use a counter that keeps track of the number wiping cycles.

Run 100% Power: This field allows the Operator to force the system ON, to override Critical Alarms that would shut the UVR down, by changing this field to "ON".

Wiper Reset and Home: (For systems with a Wiper). Clears the wiper fault alarm(s) and sends the wiper to the home position.

Note:	<i>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.</i>
--------------	---



Control Panel (CP)



This screen allows the Operator to adjust the following:

UV Sensor Units: The operator can select either mW/cm² or W/m² 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.

Temperature Units (not shown): This feature sets the units of temperature measure C - Celsius or F- Fahrenheit and appears when the analog Reactor Temperature is available.

Dose Units: The operator can select either mJ/cm² or J/m² units to view UV Dose.

Note:	<i>During startup, 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.</i>
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UV Sensor Alarm Delay: This field allows the Operator to adjust the delay for a UV Sensor alarm to any



value between 0 and 8 minutes. Default =0

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

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.

Technician Level Access Screens

To access these screens you must have entered the Technician's Password at the Login Screen. Then from the previous System Settings screen select the "Next" button.



This screen allows the Technician to change the following variables:

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.

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.



This screen allows the Technician to adjust the following:

Set Clock: This field allows the Technician to adjust the system Time.

Set Date: This field allows the Technician to adjust the system Date.

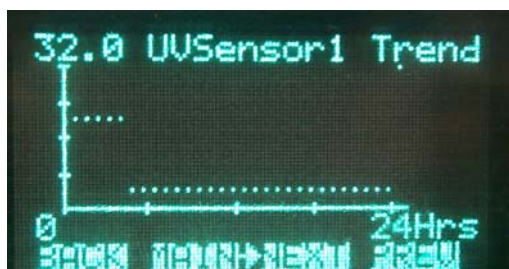
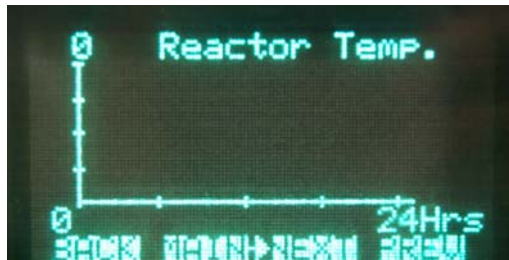
Change Technician Password: This field allows the Technician, who would have correctly entered their password, the ability to change it.

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.

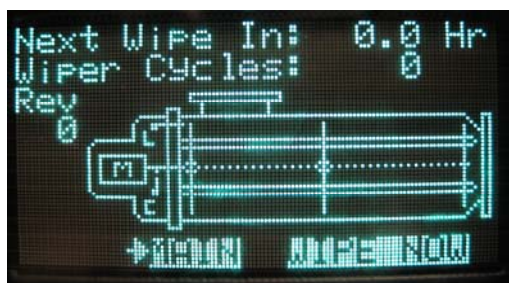
SCADA Command: This field allows the Scada Command to be set to Enable (E) for normally operation or Disable (D) to block SCADA commands and perform Local operation and/or or testing.

Trend Screens



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.

Wiper Screen (AMWS) (For systems with a Wiper).



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:

- 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.

Note:	<i>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.</i>
--------------	--

- M: Represents the motor.
- C: Represents Revolution Switch Count. The “C” will blink and “fault” will appear on the screen if a fault associated with the counter occurs.

Note:	<i>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.</i>
--------------	---

- Wiper Now: When selected will initiate a wipe sequence.



The screen also graphically displays the UVR wiping as it is in progress.

Wiper Sequence Timer (AMWS) (For systems with a Wiper)

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.

Wiper Auto Power Off (For systems with a Wiper)

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.

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.

	CAUTION
	<i>If you hear or suspect Sleeve breakage, <u>do not</u> wipe by resetting the power. You will break more Sleeves or Lamps.</i>

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 labelled *WIPE NOW* allows the Operator to do a manual wipe sequence at any time.



Reactor Hi Temp (Reactor High Temperature)



Configure Screen (Optional)

This screen allows the Operator to adjust the following:

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.

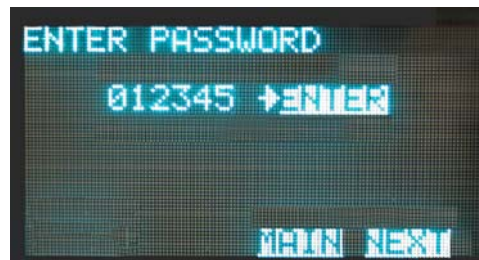
Source: This field is a preconfigured live, measured 4-20mA analog signal reading.

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.

Login Screen



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

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* 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.



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Control Panel (CP)

7.4 System Status Alarm List

	CAUTION <i>This system uses ultraviolet light to reduce the concentration of pathogens to a non-infectious level. Non-observance of the maintenance instructions or the alarm messages will diminish the effectiveness of this system. Required disinfection effectiveness is no longer guaranteed and the requirements of the water supply regulations are no longer being met. A health risk exists.</i>
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System Status	Description
System On	Indicates system is ON.
Common Alarm	Appears when any Minor, Major or Critical Alarm is occurring.
Wiper Alarm General	(For systems with a Wiper only). Appears when any of the Wiper Alarms are occurring.

7.5 Alarm Overview

Minor Alarms

On a minor fault the UVR will remain On-Line. Minor alarms will display on the CP and alarm relays will be deactivated. On a Minor alarm, action should be taken to correct the problem soon after the alarm but disinfection may not be in jeopardy

Alarm	Description
Wiper Revolution Alarm	For systems with a Wiper only. Appears when there is an incomplete Wiper Cycle.(i.e. Motor Failure or a Jamb)
Wiper Home Alarm	For systems with a Wiper only). Appears when there is a Wiper Failure during a home cycle.
Wiper Limit Switch Alarm	For systems with a Wiper only). Appears when there is a Limit Switch Failure
End of Lamp Life Hours	The lamp has exceeded the EOL according to the factory programmed set point.

Refer to section 8-1 for alarm indicators and troubleshooting.

Major Alarms

On a Major alarm immediate action is required by the Operator to ensure that disinfection is not compromised. Alarm relays will be deactivated.

Alarm	Description
Low UV Intensity 1 Major	When the UV Intensity has dropped below the factory set point.
Multiple Lamp Alarms	Multiple lamps are not functioning. It is based on a factory set number of 2 or more, that is dependant on the dose required.
Lamp Alarm XX Major	Appears when a lamp has ceased to function, lost power, or lost communication.
Ballast XX Alarm Major	Appears when a ballast has ceased to function, lost power, or lost communication.
SCADA Communication Alarm Major	Appears when the SCADA Communication connection has been lost.
No Flow Signal Major	When flow signal is not detected the system automatically jumps to 100% power until the signal is restored.
Reactor Hi Temp Major (Analog Temp)	This High Temperature Alarm occurs as a warning. This option is available only when an Analog High Temperature is configured for this system. (Not Required - Analog Option)

Refer to section 8-1 for alarm indicators and troubleshooting.

Critical Alarms

On a critical fault the UVR will be placed into Shutdown. On a Critical alarm the system CP will take immediate action to prevent damage to the equipment and immediate action is also required by the Operator and ensures that disinfection is not compromised.

*** For the Reactor High Temperature Alarm, a timed critical response can be set to allow for plant personnel to correct the problem or bring other equipment on-line.

Alarm	Description
Reactor High Temperature Critical	The Reactor Temperature has exceeded the maximum factory set point. Customer can decide if they want to set a timed delay from 0-15 minutes. (A setting of zero (0) minutes causes Lamps to de-energize immediately. Any value greater than zero minutes will activate the alarm relay, but will not turn off the Lamps till the delay time has expired.) For the Reactor High Temperature Alarm, a timed critical response can be set to allow for plant personnel to correct the problem or bring other equipment on-line. This alarm can clear itself if the reactor temperature cools below the temperature switch default value of 50 °C (122°F) +/- 5 °C/°F. The reactor will then re-start.

Refer to section 8-1 for alarm indicators and troubleshooting.

7.6 Input and Output Overview

Item	Inputs / Outputs	Type	Mode	Source
Standard Inputs and Outputs				
UV Sensor (1 – 3)	Input	Analog	4-20mA	System I/O
Alarms (7)	Output	Digital	Normally Open (NO)	Customer I/O
Optional Inputs and Outputs				
Optional Inputs and Outputs cannot typically override standard provided Inputs and Outputs.				
Analog (4)	Output	Analog	4-20mA	System I/O
Remote ON/OFF	Input	Digital	Voltage Sensing Input	Customer I/O
Wiper Option – Revolution Sensor	Input	Digital	9.4Hz Pulse	System I/O
Max Power Response Loop (Jumps to 100% power)	Input	Digital	Voltage Sensing Input	Customer I/O
Wiper Option – Limit Switch	Input	Digital	Normally Closed (NC)	System I/O
Wiper Option – Extend (forward)	Output	Digital	Normally Open (NO)	System I/O
Wiper Option – Retract (reverse)	Output	Digital	Normally Open (NO)	System I/O



Additional Inputs and Outputs

The following are available for custom applications. This list is not intended to cover all options. It is a representative list of options that sites **may** wish to exercise. Custom applications, like the ones that follow will allow a site to wire device information into our system by these analog inputs. The controller will provide a **graphical display of the information only**. Also, if a signal is brought in, it can then be wired out of our system to another if required. If you have a specific request, please contact your representative. Additional Inputs and Outputs cannot typically override standard provided Inputs and Outputs.

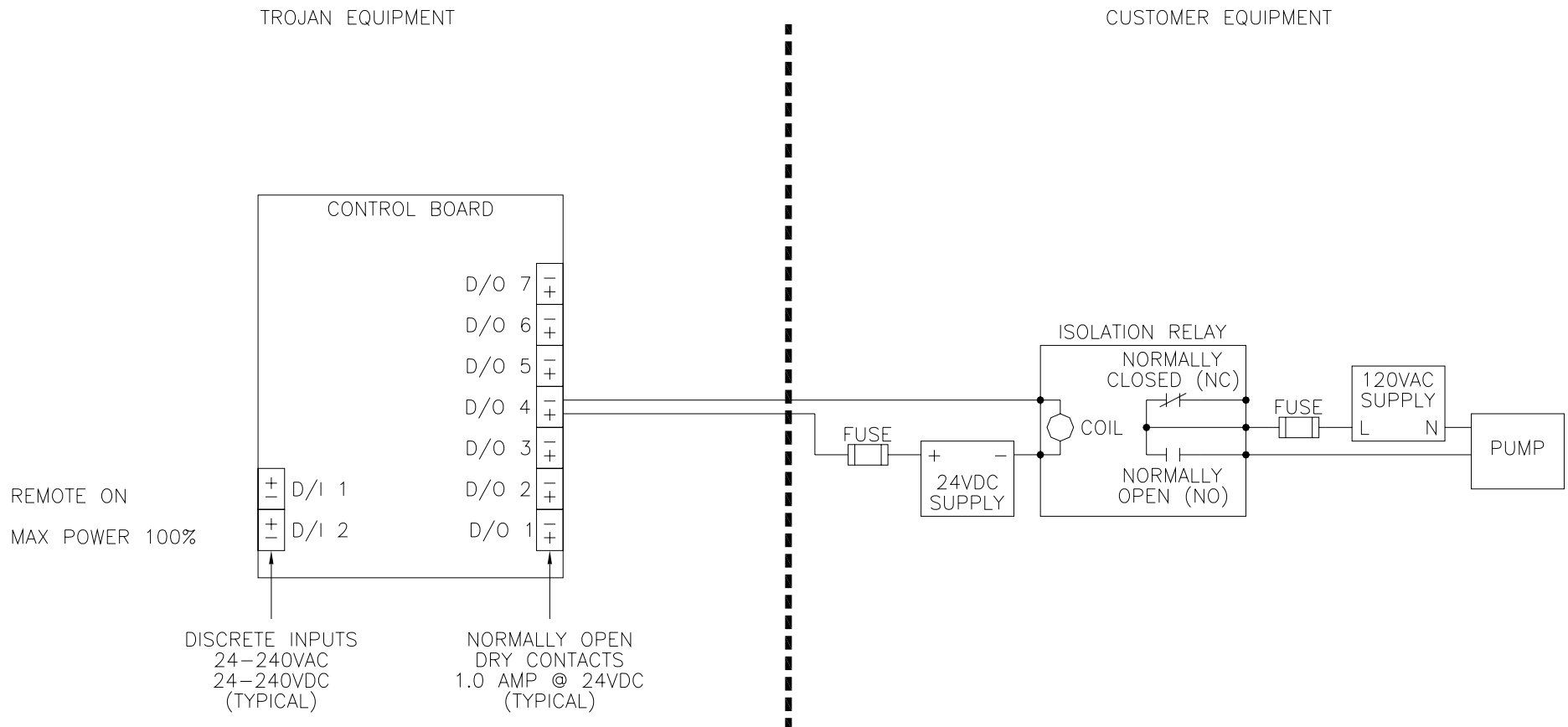
*****It is possible to have up to 5 Analog Inputs and 4 Analog Outputs in total.**

High Panel Temperature	Input / Output (See note above)	Analog	4-20mA	Customer I/O
------------------------	------------------------------------	--------	--------	--------------

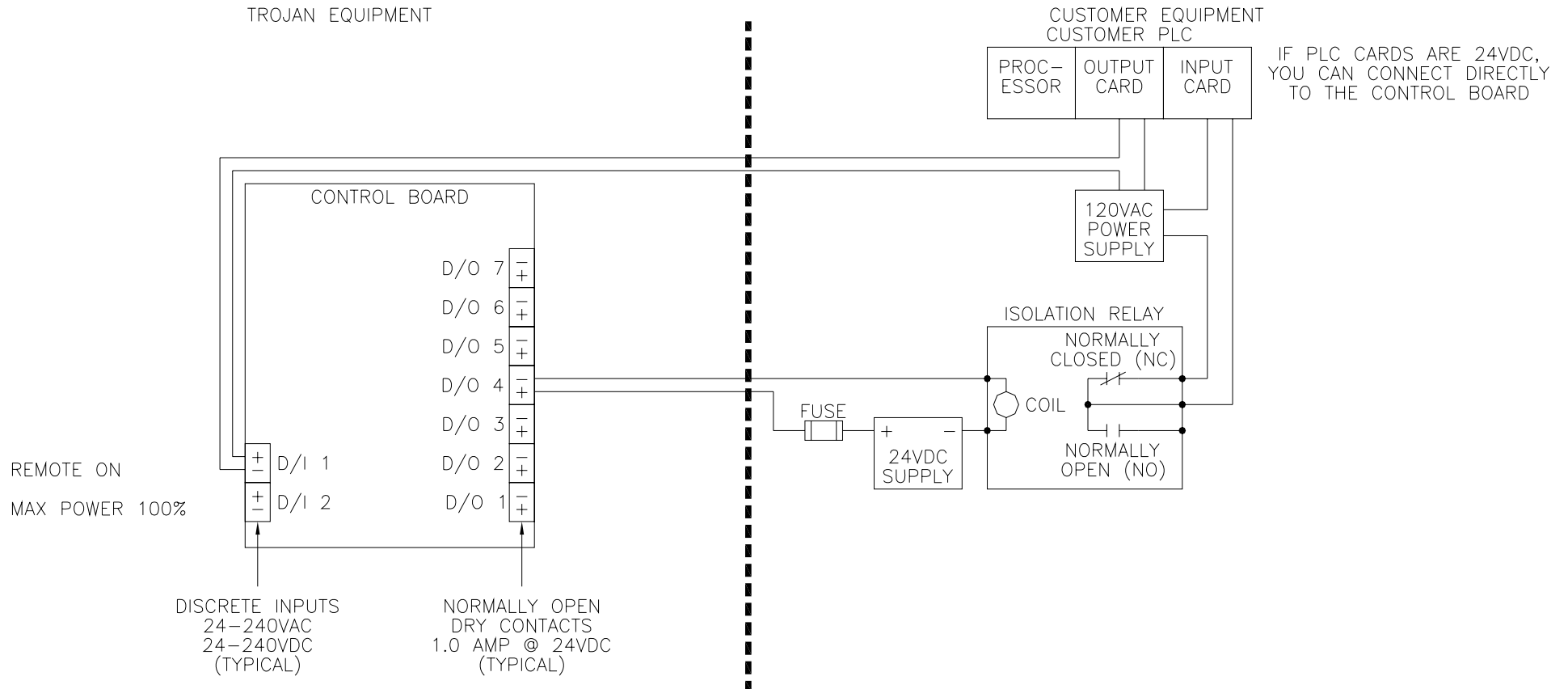
7.7 Digital Output Wiring Diagrams (next few pages)

(CP)

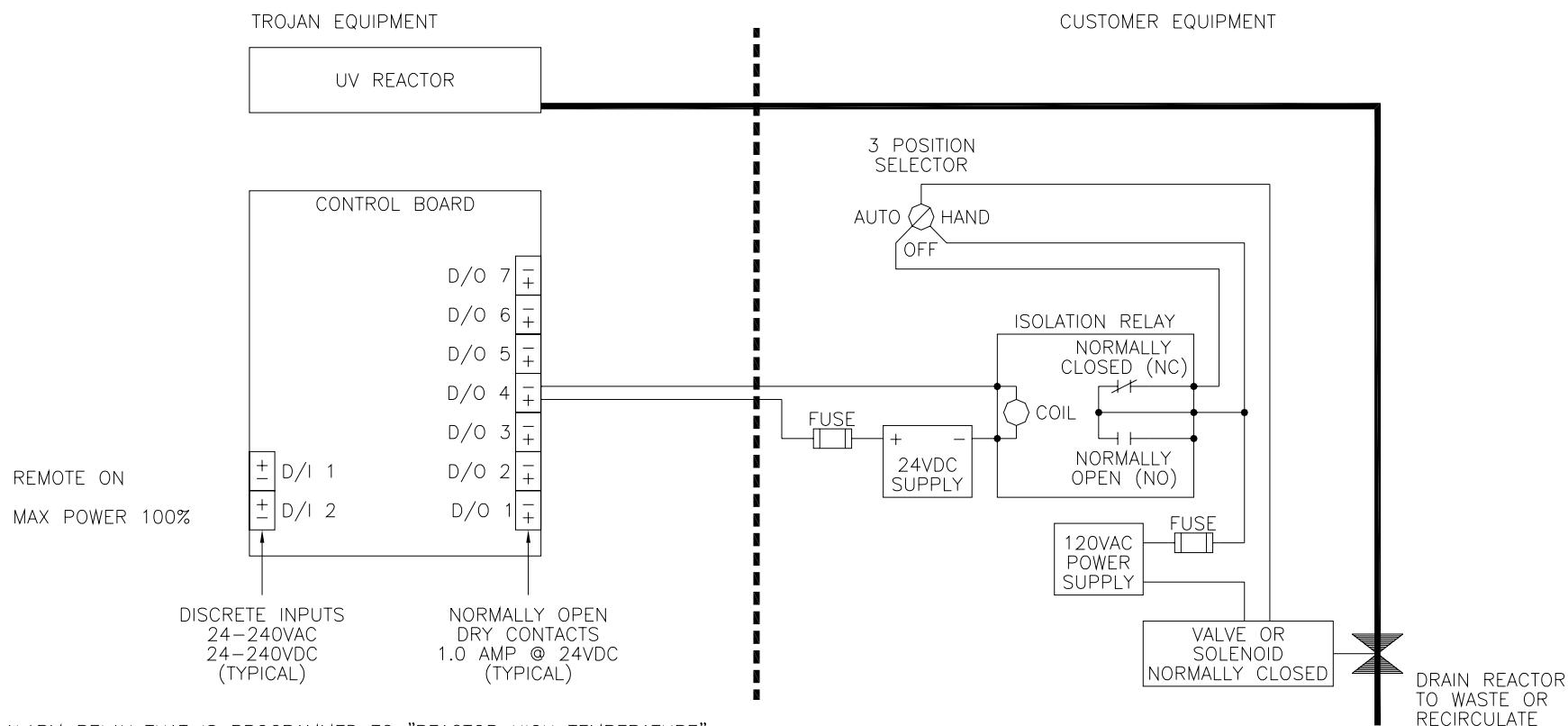
DIGITAL OUTPUT WIRING



PLC OUTPUT WIRING



REACTOR HIGH TEMPERATURE DRAIN WATER DIGITAL OUTPUT WIRING



WHEN ALARM RELAY THAT IS PROGRAMMED TO "REACTOR HIGH TEMPERATURE", NORMALLY D/O 4 GOES OPEN WHEN THE REACTOR WATER TEMPERATURE IS ABOVE 50°C

THE CUSTOMER 24VDC WILL BE LOST AT THE ISOLATION RELAY.

IF THE SELECTOR IS IN "AUTO", THE REACTOR WILL DRAIN IT'S WATER UNTIL THE REACTOR TEMPERATURE HAS COOLED BELOW 50°C AND THE CIRCUIT RESET. THIS WILL TURN OFF THE VALVE AND CLOSE THE DRAIN.

THE SELECTOR SWITCH ALSO ALLOWS THE OPERATOR TO TEST OR MANUALLY DRAIN THE REACTOR.

IT MAY BE DESIRABLE TO TURN THE SELECTOR TO "OFF" DURING WARM UP TO PREVENT THE VALVE FROM UNNECESSARY OPEN/CLOSING.



Chapter 8

ALARMS AND TROUBLESHOOTING



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Alarms and Troubleshooting



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Alarms and Troubleshooting



8 ALARMS AND TROUBLESHOOTING

8.1 Alarm Indicators

The table below offers helps for clearing alarms concerning the operation of a TrojanUVLOGIC™. If Alarms are not cleared after following applicable instructions as laid out in the chart, contact your Representative, or Aquafine Corporation Customer Support Center.

Alarm	Cause	Remedy	Temporary Measure
Common Alarm - Minor / Major	Reference the specific Alarm or group of Alarms assigned to this relay.		
Lamp Alarm ### - Major	The respective Lamp has failed.	Replace the Lamp with working Lamp.	Activate redundant system or, if necessary, close upstream valve.
	Lamp Power Cable from Ballast failed, faulty or disconnected.	Remove and replace or reconnect faulty Power Cable between Ballast and Lamp.	
	Communications Ribbon Cable from Ballast to CCB has single broken conductor to Ballast.	Remove and replace faulty Communications Ribbon Cable between Ballast and CCB.	
Multiple Lamp Alarms - Major	Failed or Faulty Lamps	Replace the Lamp(s) with working Lamp(s).	Activate redundant system or, if necessary, close upstream valve.
	Lamp Power Cable(s) from Ballast failed, faulty or disconnected.	Remove and replace or reconnect faulty Power Cable(s) between Ballast and Lamp.	



	Communications Ribbon Cable(s) from Ballast to CCB faulty or disconnected.	Remove and replace faulty Communications Ribbon Cable(s) between Ballasts and CCB.	
Alarm	Cause	Remedy	Temporary Measure
Multiple Lamp Alarms - Major Continued	Failed or Faulty Lamp Ballasts	Replace the Lamp Ballasts.	
Critical Lamp Alarms - Critical	Failed or Faulty Lamp(s) that may compromise disinfection.	Replace the Lamp(s) with working Lamp(s).	Activate redundant system or, if necessary, close upstream valve.
	Lamp Power Cable(s) from Ballast failed, faulty or disconnected.	Remove and replace or reconnect faulty Power Cable(s) between Ballast and Lamp.	
	Communications Ribbon Cable(s) from Ballast to CCB faulty or disconnected.	Remove and replace faulty Communications Ribbon Cable(s) between Ballasts and CCB.	
	Configured lamp(s) have failed (i.e. the lamp in front of the sensor).		
	Failed or Faulty Lamp Ballasts	Replace the Lamp Ballasts.	
Ballast #### Alarm – Major / Critical	Faulty Ballast power supply.	Ensure proper power supply.	Activate redundant system or, if necessary, close upstream valve.
	Failed or faulty Ballast.	Remove and replace failed or faulty Ballast.	
	Communications Ribbon Cable from Ballast to CCB failed, faulty or disconnected.	Remove and replace or reconnect faulty Communications Ribbon Cable between Ballasts and CCB.	



Wiper Alarm General - Minor	One of the 3 following Wiper Alarms has been triggered. Refer to the specific Alarm and follow the appropriate troubleshooting.		
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Alarm	Cause	Remedy	Temporary Measure
Wiper Revolution Alarm - Minor	Wiper Assembly has failed to complete its cycle due to Attempting to cycle after having failed to complete its "Homing" function.	Turn Control Panel off, wait 10 seconds, then on to re-initiate, "Homing" function.	Service to UV Reactor necessary, Schedule Maintenance.
	Wiper Assembly has failed to complete its cycle due to Proximity Sensor is not counting properly.	Check distance between Proximity Sensor and Sensor screw to ensure Sensor is counting revolutions	
	Wiper Assembly has failed to complete its cycle due to Debris in Chamber.	Disassemble Chamber and remove obstruction.	
	Loss of Proximity Sensor signal for more than the programmed delay period during a wipe sequence.	Adjust Proximity Sensor air gap distance.	
		Remove and replace failed or faulty Proximity Sensor.	
		Remove and replace faulty Cable between Proximity Sensor and CCB.	
		Ensure proper Wiper Motor power supply.	
		Ensure Wiper Plate turns freely.	
		Remove and replace failed or faulty Wiper Motor.	

Alarm	Cause	Remedy	Temporary Measure
Wiper Revolution Alarm – Minor Continued	Proximity Sensor signals pulse count value reaches 300 during a wipe sequence.	Ensure Wiper Motor is properly connected to Wiper Plate shaft.	
		Ensure Wiper Plate is properly connected to Wiper Plate shaft.	
		Ensure proper shield grounding for Cable between Proximity Sensor and CCB.	
		Ensure Lamp Cables are not run near the Sensor end of the Proximity Sensor.	
Wiper Home Alarm - Minor	Wiper Assembly has failed to complete its "Homing" function.	Turn Control Panel OFF/ON to re-initiate "Homing" function. Repeat if required.	Service to UV Reactor necessary, Schedule Maintenance.
	Debris in Chamber.	Disassemble Chamber, clean, and replace components as needed.	
	Loss of Proximity Sensor signal for more than 5 seconds while Wiper Plate is moving towards the HOME position during a HOME operation.	Adjust Proximity Sensor air gap distance.	
		Remove and replace failed or faulty Proximity Sensor.	
		Remove and replace faulty Cable between Proximity Sensor and CCB.	



Alarm	Cause	Remedy	Temporary Measure
Wiper Home Alarm – Minor Continued	Loss of Proximity Sensor signal for more than 5 seconds while Wiper Plate is moving towards the HOME position during a HOME operation. CON'T	Ensure proper Wiper Motor power supply.	
		Ensure Wiper Plate turns freely.	
		Remove and replace failed or faulty Wiper Motor.	
	Proximity Sensor signals pulse count value reaches 300 during a HOME operation.	Ensure Wiper Motor is properly connected to Wiper Plate shaft.	
		Ensure Wiper Plate is properly connected to Wiper Plate shaft.	
		Ensure proper shield grounding for Cable between Proximity Sensor and CCB.	
		Ensure Lamp Cables are not run near the Sensor end of the Proximity Sensor.	
Wiper Limit Switch Alarm - Minor	Loss of Wiper Home Limit Switch signal after UV Reactor has performed a successful HOME operation.	Cycle power to CP.	
		Remove and replace failed or faulty Wiper Home Limit Switch.	



Alarm	Cause	Remedy	Temporary Measure
Wiper Limit Switch Alarm – Minor Continued	Loss of Wiper Home Limit Switch signal after UV Reactor has performed a successful HOME operation. CON'T	Remove and replace faulty Cable between Wiper Home Limit Switch and CCB.	
	Loss of Wiper Home Limit Switch signal before the last 10 revolutions of a Wipe Sequence.	Remove and replace failed or faulty Wiper Home Limit Switch.	
		Remove and replace faulty Cable between Wiper Home Limit Switch and CCB.	
	Lack of Wiper Home Limit Switch signal for more than 3 revolutions of the Wiper Motor while Wiper Plate is moving towards the HOME position during a HOME operation.	Ensure Wiper Home Limit Switch and pin is adjusted correctly.	
		Remove and replace failed or faulty Wiper Home Limit Switch.	
		Remove and replace faulty Cable between Wiper Home Limit Switch and CCB.	
Reactor High Temperature Alarm - Major / Critical	The UV Reactor is operating while empty or with too low of a Flow Rate.	Check if water is flowing through the UV Reactor. When the temperature falls to an acceptable level, the Alarm will deactivate by itself.	Ensure minimum flow.

	Loss of Reactor High Temp signal from the UV Reactor thermostat.	Remove and replace faulty UV Reactor thermostat.	
Alarm	Cause	Remedy	Temporary Measure
Reactor High Temperature Alarm - Major / Critical Continued	Loss of Reactor High Temp signal from the UV Reactor thermostat CON'T	Remove and replace faulty Cable between UV Reactor thermostat and CCB.	
	UV Reactor temperature is above normal operating specifications.	Ensure flow rate through UV Reactor is within operating specifications.	
	Water temperature is above normal operating specifications.	Ensure water temperature is within operating specifications.	
Low UV Sensor 1 - Major / Critical	Lamp failure.	Replace Lamp(s).	Activate redundant system or, if necessary, close upstream valve. Divert Flow
	Lamp aging.	Replace Lamp(s).	
	Sleeves fouled.	Clean Sleeve(s).	
	Worn Sleeve Wipers.	Replace Sleeve Wipers.	
	UV Sensor fouled/condensation covered.	Clean UV Sensor.	
	Low UV transmittance.	Check source water for UV Transmittance.	
		Requires a different set-point	

	Low UV Intensity Major / Minor Alarm value) is configured above system ability.	Configure the Low UV Intensity Major / Minor Alarm value to the proper value for the system. See the System Settings screens with Technician level access.	
Alarm	Cause	Remedy	Temporary Measure
Low UV Sensor 1 - Major / Critical Continued	Excessive Lamp Sleeve fouling.	Initiate manual wipe sequence (See <i>Wiper Screen</i> in Chapter 7, Control Panel.)	
		Investigate decreasing period between wipe sequences	
	Lamps no longer able to supply required UV Intensity.	Check Total Lamp Hours value. Remove and replace UV Lamp(s) as necessary and reset the Total Lamp Hours value (See the Technician Level Access Screens of the System Settings Screens in Chapter 7, Control Panel (CP)).	
		Investigate decreasing EOL Hours value.	
	Insufficient Lamps available to supply required UV Intensity.	Investigate Lamp Alarms in this section.	
		Investigate Ballast Alarms in this section.	
	Wiper System has faulted with Wiper Plate stopped in front of UV Sensor.	Investigate Wiper Alarms in this section.	

	UV Sensor has failed or is faulty.	Remove and replace failed or faulty UV Sensor.	
	Missing UV Sensor signal.	Remove and replace failed or faulty Cable between UV Sensor and CCB.	
End of Lamp Life Hours Alarm - Minor	Lamps have reached their EOL. (End of Service Life)	Replace all Lamps in the system and set the expired time to zero. (See the Technician Level Access Screens of the System Settings Screens in Chapter 7, Control Panel (CP)).	Order new Lamps

8.2 General Troubleshooting

Component	Problem	Remedy	Frequency
Lamps	Burned out Lamps Change in colour of Lamp glass	Replace Component.	On Lamp Status Alarm. At End of Lamp Life
Lamps	UV Lamps are off, even if the ON switch was activated.	- Check if the Remote control has been activated - Check the system for short circuits and/or damaged fuses, if necessary, replace fuses.	As required.
Sleeves	Fouling or coating of the Quartz Sleeves, Scratches.	Replace Component.	Clean monthly or when low UV Alarm occurs.
UV Sensor	Fouling or coating of the Quartz window. Moisture.	Replace Component.	Clean monthly or when low UV Alarm occurs.
Sleeve Seal, O-Ring	UV decay and brittle pieces.	Replace Component.	Once a year or when Sleeves are removed.
Sleeve Support Washer	UV decay and brittle pieces.	Replace Component.	Once a year or when Sleeves are removed.
Sleeve Bushing	UV decay and brittle pieces.	Replace Component.	Once a year or when Sleeves are removed.



Wear Pads	UV decay and brittle pieces.	Replace Component.	Once a year or when Sleeves are removed.
Lamp Socket	Signs of pins overheating or moisture. Corrosion of the pins.	Replace Component.	With Lamp Status Alarm or when Lamps are disconnected.
UV Reactor Chamber	Heavy build-up of settled solids	Clean Chamber.	Once a year.

The following maintenance is only required if your unit is equipped with a Mechanical Wiping System.			
Sleeve Wiper	Frequent UV Transmittance Alarm. Streaking or fouling on Quartz Sleeves.	Replace Component.	Once/year or as needed.
Rod Seal	Water leakage at Drive Screw exit thru Bushing Housing	Replace Component.	Once/year or as needed.
Drive Nut	UV decay and brittle pieces. "Home" function problems.	Replace Component.	Once/year or as needed.
Roller Bearing	Significant vibration.	Replace Component.	Once/year or as needed.
Elastomer Compression Spring	"Home" function problems.	Replace Component.	Once/year.
Bushing Housing O-Ring	Water leakage at End Plate and Bushing Housing	Replace Component.	Once/year or as needed.
Limit Switch Rod Seals	Water Leakage at End Plate	Replace Component.	Once/year or as needed.



Chapter 9

INSTALLATION INSTRUCTIONS



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Installation Instructions



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Installation Instructions



9 INSTALLATION INSTRUCTIONS

9.1 Overview



CAUTION

Installation and maintenance to be performed by qualified personnel only.

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



CAUTION

Regular testing of system performance using standardized methods (e.g., water supply regulations of various countries) is recommended. When installing the TrojanUVLOGIC™ system, allow enough room for sampling points

9.2 Shipping Contents

The system consists of two major components, the UVR chamber and the Control Panel (CP). The components are disconnected at the UV Reactor (UVR) chamber for shipment.

9.3 Set-up

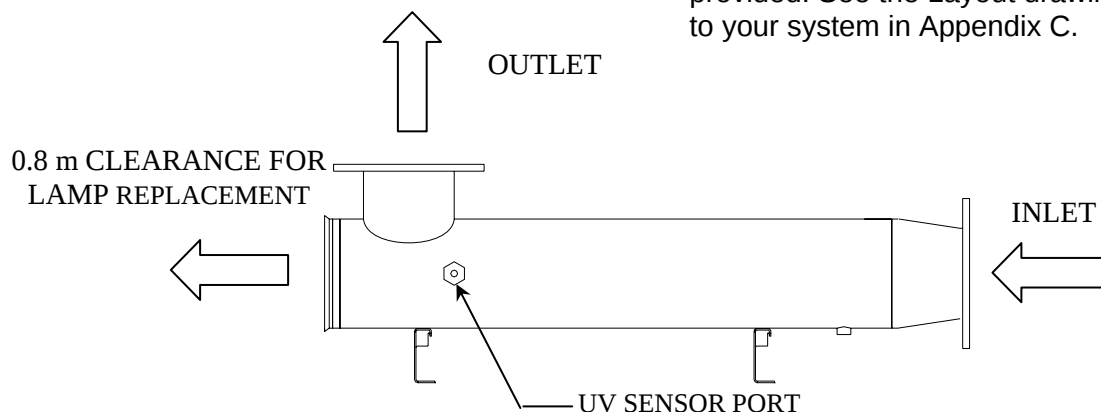
1. Support connecting pipes to UV system to avoid any undue strain on the unit.
2. Avoid vibration from close proximity to heavy equipment or from erratic pumps. Vibrations from other equipment and/ or water hammering can cause damage to lamps within the UVR.



CAUTION

If your system runs with pulse compression, a buffer tank or other remedial measure must be provided.

3. Allow sufficient service access clearance for the unit. Also when preparing the site for installation allow for Valves, Drain and Bypass as part of your plumbing circuit.
4. When mounting the CP on the wall, ensure there is at least a 15-cm (6in) air space around the sides of the panel for sufficient cooling of the inner electronic components. The more air space there is around the control panel the more efficient the cooling will be. You will need gaskets. While larger units have welded on Mounting brackets, smaller units have the option of having Mounting Brackets provided. Appropriate hardware for the mounting brackets, and to attach the UVR to the piping system is not provided. See the Layout drawing applicable to your system in Appendix C.





Installation Instructions

5. The UVR chamber can be installed in a horizontal or vertical position. (See diagram of possible installation orientations at the end of this chapter). Refer to *Appendix C - Layout Drawings* for required maintenance clearances. To avoid trapping air, ensure the outlet is at the highest point. On vertically mounted units an optional Venting kit is available and can be purchased and installed at any time if site conditions require it.
6. After the UVR chamber is installed, slowly open the inlet valve and fill with water ensuring that all air pockets are removed. Check carefully for leaks. If leaks are detected, drain the UVR chamber and reseal the inlet or outlet as required. All UVR chambers are pressure tested at 1.55 MPa (225 psi) at the factory unless indicated otherwise.
7. Flush a few gallons of water through the UVR chamber to remove any particles or dust that may have collected during installation.



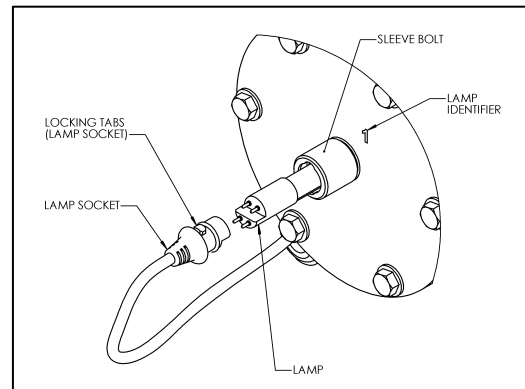
CAUTION

To prevent electrical shock, turn the system off before removing any of the covers on the UVR chamber or opening the Control Panel.

8. Connect the CP to the UVR chamber. The individual lamp connectors are numbered with wire tags for convenient connection; match these numbers to their corresponding number on the chamber End Plate.

9. Connect the Lamp Socket to the corresponding Lamp.

AM Models only:

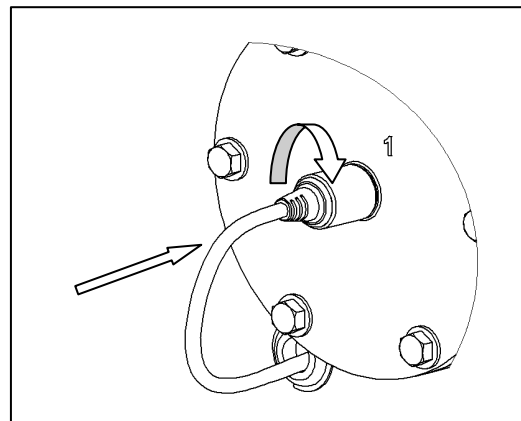


- Align the Locking Tabs of the Lamp Socket with the Sleeve Bolt.

(Single lamp UVR shown for clarity).

- Insert the Lamp into the Sleeve until the Lamp Socket sits against the Sleeve Bolt then turn approximately ¼ turn to secure Lamp in place.

Short & Long Lamp Models only:



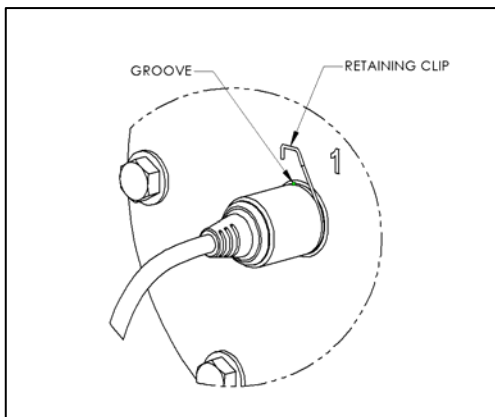
- Insert the Lamp into the Sleeve until the Lamp Socket sits against the Sleeve Bolt. Press it straight in until it seals into the Sleeve Bolt.



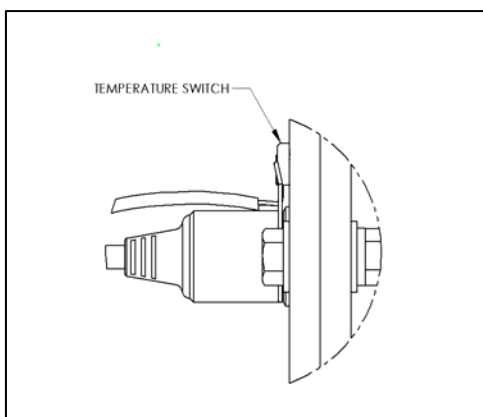
Installation Instructions

10. Temperature Switch installation: For horizontal installations place Temperature Switch at the highest point possible.

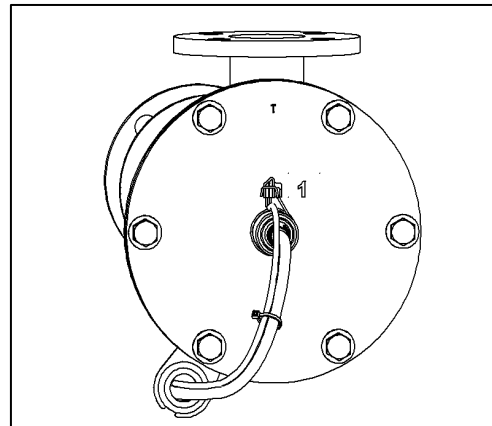
- I. Slide Retaining Clip over Sleeve Bolt from the open end until it sits in groove.



- II. Place the Temperature Switch under the Clip as shown and maintain cables for the Temperature Switch close to Sleeve Bolt and Lamp Harness.

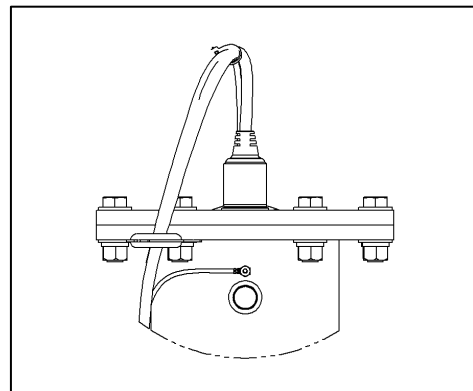


Route Harnesses through Grommet allowing approximately 6in of slack for each Harness. Keep Harnesses together using provided tie wraps



11. System Ground Wire installation:

- I. Secure ring terminal to stud on UVR as shown.



12. Provide AC power to CP matching voltage and power specifications on the serial label of the system. The system is now ready for operation.

	CAUTION
	<i>Connect this system only to AC power that conforms to the information in the rating plate as regards voltage and voltage specification.</i>

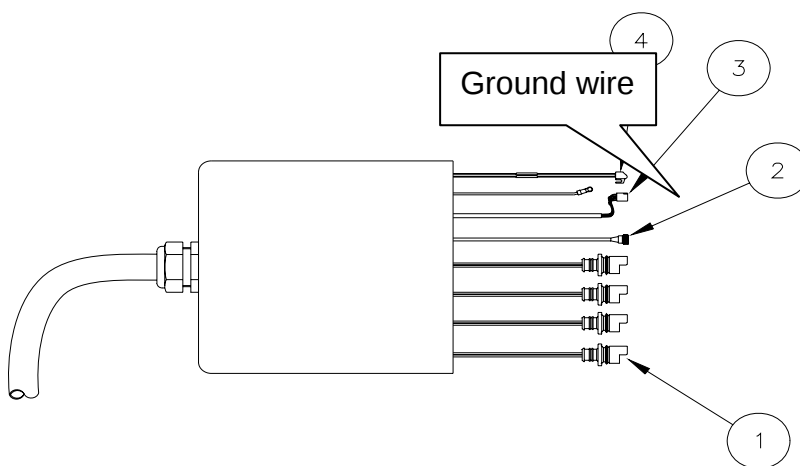
9.4 Automatic Mechanical Wiping System (AMWS) installation

1. If an Automatic Mechanical Wiping System (AMWS) is provided, connect the individual conductors for the Gear Motor and Proximity Sensor to the terminal blocks located inside the CP. Refer to the wiring diagram included with this manual to match wire tag numbers.

ITEM	DESCRIPTION
1	LAMP HOLDER, AMALGAM 5m
2	CABLE, PROXIMITY SENSOR
3	HARNESS, WIRING WIPER MOTOR
4	SWITCH, TEMPERATURE

9.5 System Start-up

1. Allow the UVR chamber to fill slowly with water.
2. Turn the lamps ON by pressing the switch



located on the face of the CP. A twenty-second delay timer is initiated when the lamps are turned ON. The system will not register any alarms until this warm-up timer

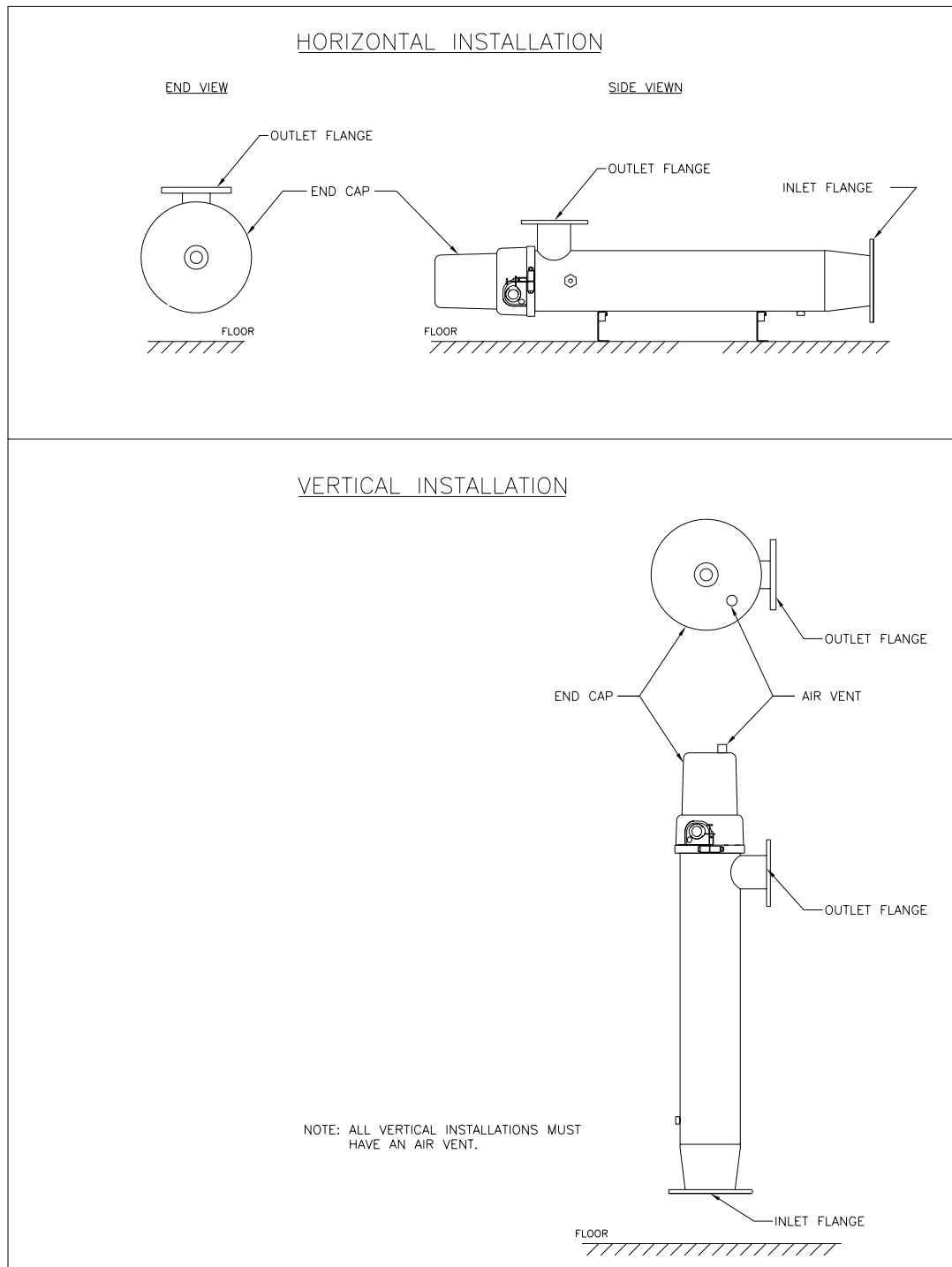


has expired (20 Seconds). This feature prevents any false alarms from registering while the system is warming up.

3. If no alarms are registering after the system has warmed up and "LAMPS ON" is indicated in the status line, water for disinfection may be allowed to pass through the chamber.
4. Allow any untreated water present in the system to flush through before using.
5. Monitor the system periodically to determine if any alarms are present.



Acceptable Reactor Installation Orientations





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Appendix A – Warranty

Appendix A

WARRANTY



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Appendix A – Warranty

WARRANTY



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Appendix A – Warranty

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 particular 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: www.sales@aquafineuv.com or go to www.aquafineuv.com
29010 Avenue Paine, Valencia, California USA 91355



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Appendix A – Warranty



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Appendix B – Replacement Parts List

Appendix B

REPLACEMENT PARTS LIST



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Appendix B – Replacement Parts List



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Appendix B – Replacement Parts List

B.	Replacement Parts List.....	1
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Appendix B – Replacement Parts List



B. REPLACEMENT PARTS LIST

NOTE:

Replacement kits are available for these individual items depending on your specific model. When ordering replacement parts, please provide the serial number for your system.

PART NO.	DESCRIPTION
LAMPS	
794113	Midflow Model Lamp
793923	Short Lamp Model Lamp
302509	Long Lamp Model Lamp
SLEEVES	
793075	Midflow Model Sleeve
792934	Short Lamp Model Sleeve
793024	Long Lamp Model Sleeve
POWER SUPPLIES	
912513	Midflow Model Ballast (1-lamp)
903988-001	Short & Long Lamp Model Ballast (2-lamps)
SEALS/O-RINGS	
792437	Sleeve O-rings
792931	Sleeve Support Washer
SENSOR	
793048-005	UV Sensor (Germicidal)
MISCELLANEOUS	
931067	Analog Output Module
931066-001	Interface Board
792932	Sleeve Bolt (Short & Long Lamp Models)
793860	Sleeve Bolt (Midflow Model)
792718-002	Lamp Holder (Short & Long Lamp Models)
793415-020	Lamp Harness (Midflow Model)
793363	Wiper, Sleeve 28mm Diameter
794146	Wiper Holder
914172-050	Proximity Switch (Revolution Counter)
914129G *	Temperature Switch **
914175-060	CCB Power Supply

Note:

* When ordering this part ensure that you indicate the length of cable required, and if that length is measured from termination points or the distance between the Reactor and the Control Panel.



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Appendix C – Layout Drawings

Appendix C

LAYOUT DRAWINGS



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Appendix C – Layout Drawings



C. LAYOUT DRAWINGS

Refer to the system overview section to determine which layout to use.



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Appendix C – Layout Drawings



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Appendix D – Electrical Drawings

Appendix D

ELECTRICAL DRAWINGS



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Appendix D – Electrical Drawings



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Appendix D – Electrical Drawings

D. ELECTRICAL DRAWINGS

Refer to the system overview section to determine
Information applies to your system.

Our Mission

To strategically supply environmentally safe products through manufacturing and marketing of ultraviolet equipment, world-class in quality, technology, delivery and cost -- with maximum value to our customers while enhancing the safety and development of our employees.

We are committed to serving our customers, our colleagues, our company and our community.

Our Vision

To be the dominant most respected supplier of Ultraviolet treatment technology, in every market niche in which we serve and compete.



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H I G H P E R F O R M A N C E U L T R A V I O L E T S Y S T E M S