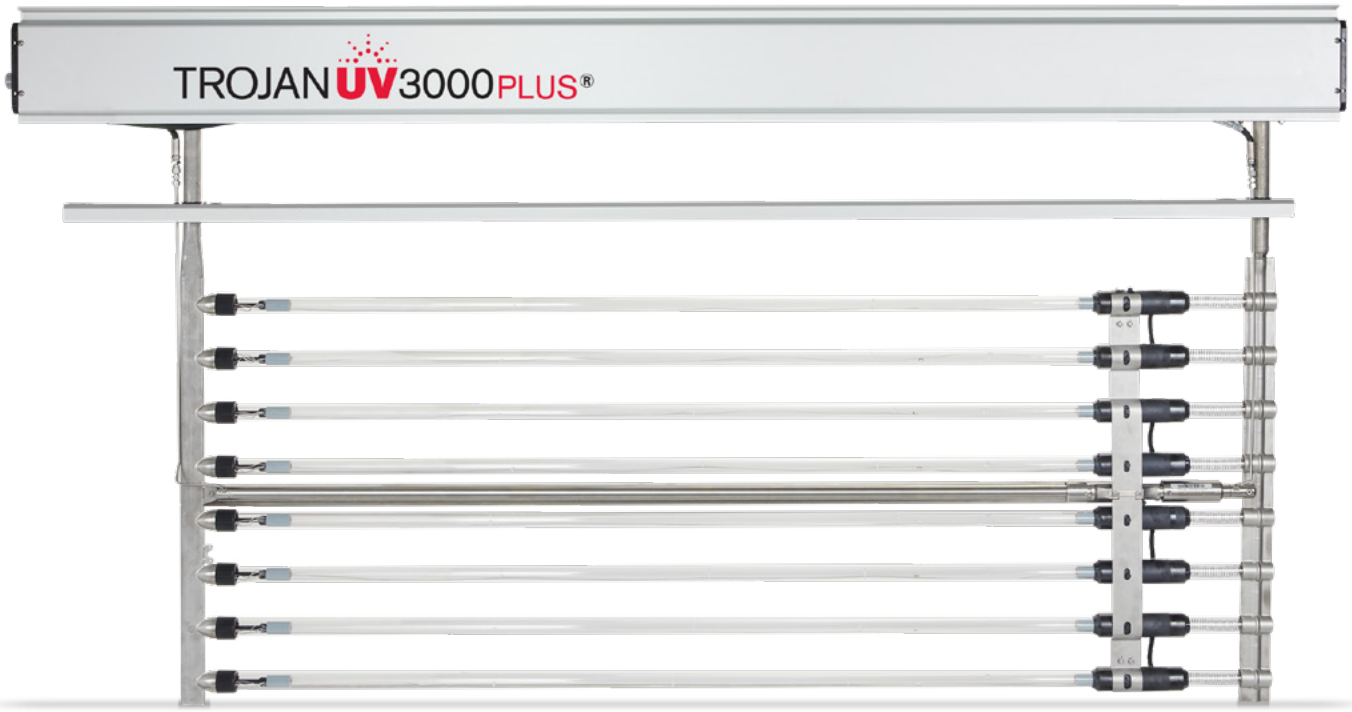
Wastewater Treatment

TROJAN UV®

Water Confidence®

TROJAN UV3000 PLUS®



A reference standard in wastewater UV treatment

UV is a simple and cost-effective way to treat wastewater. A key advantage is its ability to treat *Cryptosporidium* and *Giardia*, which if released into lakes and rivers increases the potential of contamination in communities that rely on these same bodies of water for their drinking water source and recreational use.

The TrojanUV3000Plus® is one of the reasons why UV is now a favored technology in wastewater treatment. This highly flexible system has demonstrated effective and reliable performance around the world in combined sewer overflow, primary and tertiary wastewater, and reuse applications.

The proven infrastructure of the TrojanUV3000Plus has been continuously refined to enhance easy operation. The result is more dependable performance, simplified maintenance and maximized UV lamp output at end-of-lamp life. The TrojanUV3000Plus incorporates innovative features to reduce operation and maintenance (O&M) costs, such as our integrated Integra™ lamp assembly, variable output electronic lamp drivers and our ActiClean® sleeve cleaning system.

Key Benefits

TrojanUV3000Plus

Reduces operating costs by as much as 30% per year. Long-lasting amalgam lamps and lamp dimming capabilities optimize UV output to manage real-time treatment conditions and maximize system efficiency.

Dual-action sleeve cleaning system improves performance and reduces labor costs. The ActiClean automatic chemical/mechanical cleaning system maintains sleeve transmittance of at least 95%, and works online – eliminating the need for removing lamp banks to manually clean sleeves.

Integra lamp and sleeve assembly. Lamps and sleeves are preassembled, and factory sealed together as a single unit for more efficient lamp replacement that also reduces the chance of lamp or sleeve damage. O-rings and seals are permanently built-in, preventing water from getting inside the assembly.

Reduced installation costs. The compact TrojanUV3000Plus can be retrofitted into existing chlorine contact tanks, or existing UV channels and comes pre-tested, pre-assembled and pre-wired to minimize installation costs.

Outdoor operation. Can be installed outdoors, eliminating the need and costs of a building, shelter and possible heating or cooling of the equipment.

Validation through microbial testing. The TrojanUV3000Plus has been validated through microbial testing. Through this testing, performance data has been generated for UV dose delivery to inactivate microorganisms *Escherichia coli (E. coli)* and fecal coliform.

Guaranteed performance and comprehensive warranty. TrojanUV systems include a Lifetime Performance Guarantee* and comprehensive warranties for systems and parts.

TROJAN UV3000PLUS®

Designed for efficient, reliable performance

System Control Center (SCC)

The SCC monitors and controls all UV functions. Designed by Trojan engineers, the TouchSmart® line of controllers offer a full suite of features and functionality. Large, outdoor-rated screens are easy to navigate for rapid monitoring, diagnosis and adjustment of UV system operation. TouchSmart controllers offer SCADA connectivity, dose-pacing control, and data logging for trending and analysis (flow, power, UVT, UV intensity and dose). Programmable Logic Controllers (PLC) are also available.

TouchSmart controllers feature large and outdoor rated screens allowing user-friendly and easy to-navigate system monitoring and control.

Power Distribution Center (PDC)

The PDC powers each bank of modules. Its ergonomic, angled design provides easy access to module power cables and hoses for the ActiClean cleaning system. The robust stainless steel enclosure is mounted across the channel, with module fuses and interlock relays visually aligned with module receptacles for fast diagnostics. Modules are individually overload-protected for safety. Like all TrojanUV3000Plus components, the PDC can be installed outdoors and requires no shelter, heating, ventilation or air conditioning.

UV Intensity Sensor

The UV intensity sensor continually monitors UV lamp output. The ActiClean system automatically cleans both the lamp and sensor sleeves simultaneously.

Electronic Lamp Drivers

The variable-output (60–100% power) electronic lamp driver is mounted in its own TYPE 6P (IP67) rated enclosure within the module frame. Features “quick connect” electrical connections. Cooling is by convection and requires no air conditioning.

Connected Service With Stream™

Stream (only available in North America) is our digital network and toolbox that gives you access to the right information and support when and where you need it. The Stream App is your personal view into your UV system; see system status, receive instant alarm notifications and access guided troubleshooting resources. Stream Connection is a support tool that provides our Technical Assistance Center with instant access to your UV system to quickly diagnose and resolve UV issues.

ActiClean Sleeve Cleaning System

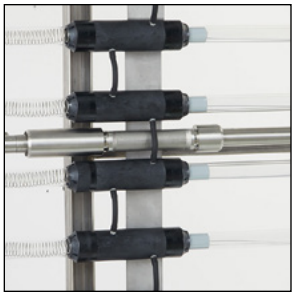
The system consists of two components:

1. Hydraulic System Center (HSC)

The HSC is mounted close to the channel in a stainless steel enclosure. It contains the pump, valves and ancillary equipment required to operate the cleaning system and links to the extend/retract hoses of the module wiper drives via a manifold located on the underside of the PDC.

2. ActiClean Wiper Assembly

A submersible wiper drive on each UV module drives the wiper carriage assembly along the module. Attached wiper canisters surround the quartz sleeves, and are filled with ActiClean Gel. The gel uses food grade ingredients and contacts the lamp sleeves between the two wiper seals. Cleaning takes place while the lamps are submerged and while they are operating.



Water Level Sensor

The system includes an externally powered electrode low water level sensor for each channel. If effluent levels fall below defined parameters, an alarm will be activated.

Integra Lamp Assembly

Lamps and sleeves are pre assembled, and factory sealed together into a water-tight assembly. This allows operators to remove and replace these components as a single unit. O-rings and seals are permanently built-in, preventing water from getting inside the assembly.

Water Level Controller

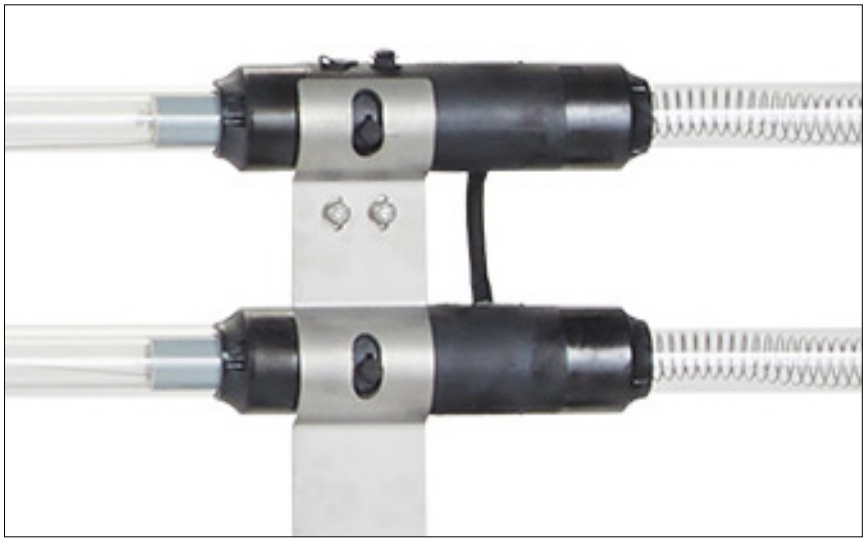
A fixed weir, motorized weir gate, or Automatic Level Control gate (shown), is required in the channel to maintain the appropriate water level over the lamps. Trojan engineers will work with you to select the appropriate level control device for your application.

ActiClean Dual-Action, Automatic Cleaning System

Chemical/mechanical cleaning system eliminates sleeve fouling

Benefits:

- Cleans 50% more effectively than mechanical wiping alone
- Operating costs are reduced by maximizing the output of the UV lamps
- Lowers capital expenses by reducing equipment requirements
- Online operation requires no system shut-down
- Large gel canisters require infrequent gel re-fills
- Maximizes UV treatment in plants with heavy fouling and high solids

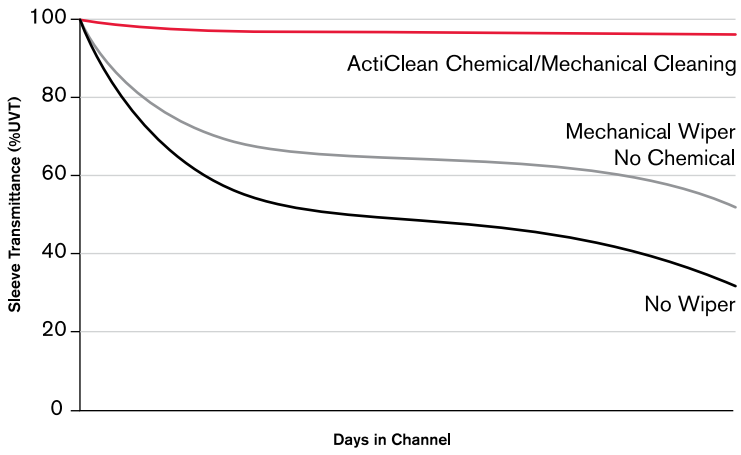


The dual-action, chemical/mechanical cleaning with the ActiClean system provides superior sleeve cleaning and reduces maintenance costs. Fouling and residue build-up on quartz sleeves reduces system efficiency. ActiClean maintains at least 95% transmittance, ensuring sleeves are clean and the system is consistently delivering accurate dosing while reducing power consumption.

ActiClean Gel is Safe to Handle

- ActiClean Gel is NSF60 certified and safe for use in all waters
- Quick connects allow for easy refill of gel solution
- Lubricating action of gel maximizes life of wiper seals

Efficacy of Cleaning Technologies to Control Sleeve Fouling



Integra Lamp Assembly Simplifies Maintenance

- Lamps and sleeves preassembled, and factory sealed together as a single unit
- Reduces chance of lamp or sleeve damage during maintenance
- O-rings and seals permanently built-in, preventing problems with reassembly and water leaks
- Fewer parts to keep track of, remove and reassemble
- Clean fresh sleeve every time to ensure the maximum amount of UV light is reaching the water

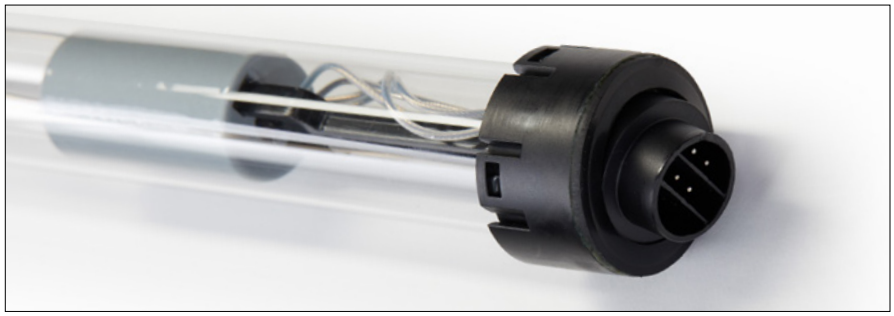
Lamps and sleeves are preassembled, and factory sealed into a single unit with easy screw caps.

Amalgam Lamps Require Less Energy

Require fewer lamps and reduce O&M costs

Benefits:

- Stable UV output over a wide range of water temperatures
- Fewer lamps are required to deliver the required dose, which reduces O&M costs
- Can treat lower quality wastewater such as primary effluents, combined sewer overflows and storm water
- Fewer lamps allow systems to be located in compact spaces, reducing installation costs



High-efficiency amalgam lamps generate stable UV output in a wide range of water temperatures.

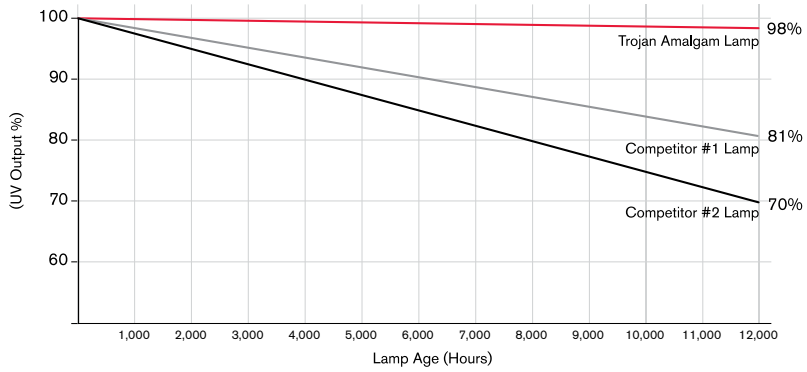
Amalgam Lamps Maintain Maximum UV Output

Delivers 98% of full UV output after more than one year of use

Benefits:

- Delivers consistent UV output
- 20% less decline in UV output after 12,000 hours of use compared to competitive UV lamps
- Validated performance assures you of reliable dose delivery and prolonged lamp life

Decrease in UV Lamp Output Over Time



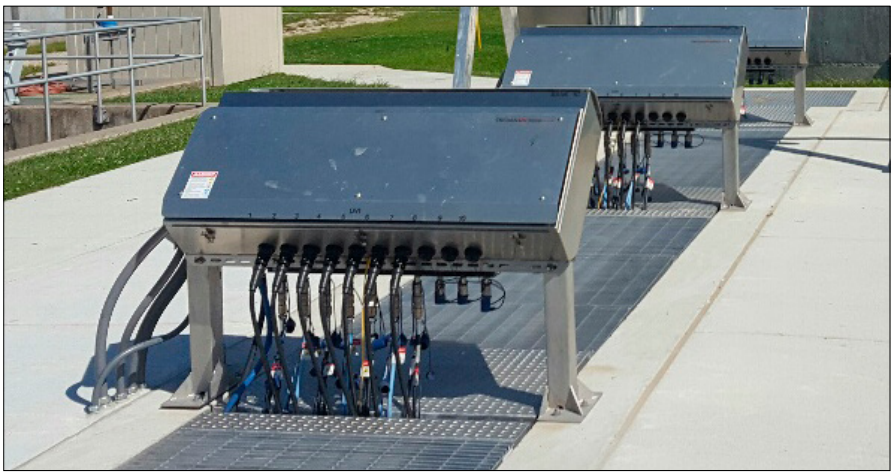
The lamps used on the TrojanUV3000Plus system have been independently validated in accordance with standards set in the AwwaRF/NWRI 2003 Guidelines for Drinking Water and Water Reuse to maintain 98% of original output after 12,000 hours of operation.

Open-Channel Architecture Designed for Outdoor Installation

Cost-effective to install and expand

Benefits:

- Compact, open-channel design allows cost-effective installation in existing effluent channels and chlorine contact chambers
- System can be installed outdoors to reduce capital costs – no building, shelter or HVAC is required
- Gravity-fed design eliminates costs of pressurized vessels, piping and pumps
- Scalable architecture allows precise sizing – reduces capital and O&M costs associated with oversizing
- Modular design is readily expandable to meet new regulatory or capacity requirements
- Thorough design approach ensures that effluent quality, upstream treatment processes, and O&M needs are addressed in system configurations
- Horizontal lamp mounting delivers optimal hydraulic performance. This arrangement induces turbulence and dispersion, maximizing wastewater exposure to UV output



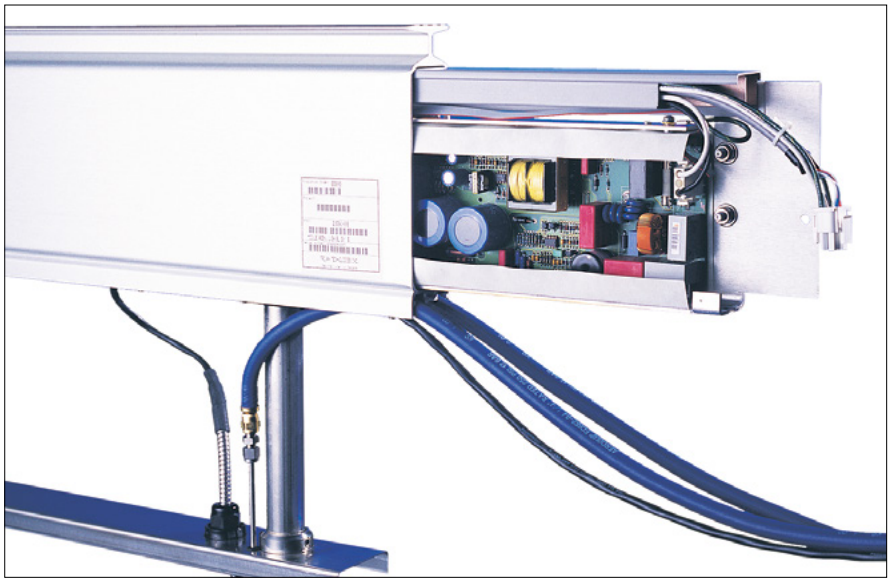
The TrojanUV3000Plus system delivers flexibility and cost savings through its simple installation in existing channels and chlorine contact chambers. The system can be installed outdoors with no additional building, shelter or cooling requirements.

Advanced, Self-Contained UV Module

Reducing footprint and maintenance

Benefits:

- Electronic lamp drivers installed in the module eliminate the need for separate external cabinets
- Lamp driver enclosures are rated TYPE 6P (IP67) – air/water tight
- Module leg and lamp connector have a hydrodynamic profile to reduce headloss
- TrojanUV3000Plus lamps are warranted for 12,000 hours
- Modular design allows for maintenance on one module without disrupting treatment performance



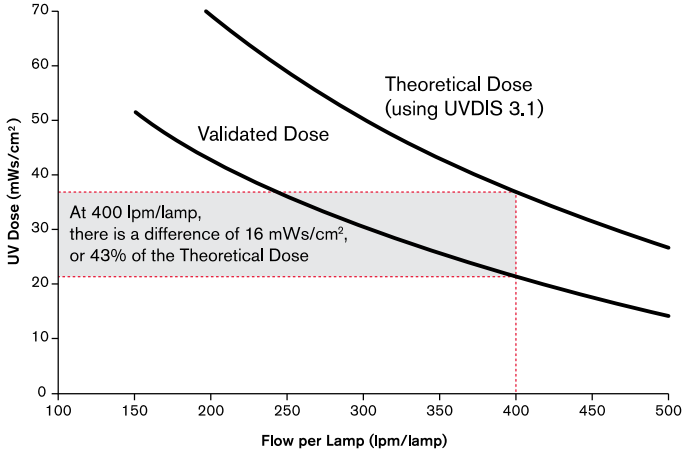
Bioassay Validation

Real-world testing ensures accurate dose delivery

Benefits:

- Validated through microbial testing – through this testing, performance data has been generated for UV dose delivery to inactivate *Escherichia coli* (*E. coli*) and fecal coliform
- In-field bioassay testing offers the peace of mind of verified dose delivery – not theoretical calculations
- The TrojanUV3000Plus has third-party validations to USEPA and NWRI guidelines for secondary and high-level reuse applications

Field Validated Dose vs. Theoretical Dose at 65% UVT
(Before Fouling & Lamp Aging Are Taken into Account)



This shows the validated dose of an actual working system and the theoretical dose calculated using UVDIS. Note that the UVDIS 3.1 dose calculation overestimates the system performance.

System Specifications

System Characteristics	TrojanUV3000Plus
Typical Applications	Wide range of wastewater treatment plants
Lamp Type	High-efficiency Amalgam
Lamp Driver Type	Electronic, variable output (60 to 100% power)
Input Power Per Lamp	250 Watts
Lamp Configuration	Horizontal, parallel flow
Module Configuration	4, 6 or 8 lamps per module
Level Control Device Options	ALC, fixed weir or motorized weir gate
Water Level Sensor	1 electrode low water level sensor per channel
Enclosure Ratings:	
Module Frame / Lamp Driver Enclosure	TYPE 6P (IP68) / TYPE 6P (IP67)
All Other Enclosures	TYPE 4X (IP56)
Lamp Driver Cooling Method	Convection; no air conditioning or forced air required
Installation Location	Indoor or outdoor
Sleeve Cleaning System:	
ActiClean Cleaning System	Optional Automatic Chemical/Mechanical Cleaning System
ActiClean Gel	Non-corrosive
Recommended Fouling Factor	1.0
System Control Center:	
Controller	TouchSmart Controller, TouchSmart Plus Controller or PLC-based
Analog Inputs (Typical)	Flow (4-20 mA) and UVT (4-20 mA)
Discrete Outputs (Typical)	Bank status, common alarms and SCADA communication
Maximum Distance from UV Channel	656 ft. (200 m)
Electrical Requirements:	
Power Distribution Center	208V, 3 phase, 3 wire + GND, 60 Hz (Max. 8 modules per PDC) 480Y/277V, 3 phase, 4 wire + GND, 60 Hz 380Y/220V, 3 phase, 4 wire + GND, 50/60 Hz 400Y/230V, 3 phase, 4 wire + GND, 50/60 Hz 415Y/240V, 3 phase, 4 wire + GND, 50/60 Hz
System Control Center (stand alone)	120V, single phase, 2 wire + GND, 60 Hz, 1.1 kVA 220/230/240V, single phase, 2 wire + GND, 50/60 Hz, 1.1kVA
Hydraulic System Center (for Sleeve Cleaning System)	G4 HSC (1-8 Banks) separate power line 380 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2kVA) 400 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2.1kVA) 415 VAC 50Hz, 3 Phase, 3 Wire + GND (3A, 2.2kVA) 380 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2kVA) 400 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2.1kVA) 480 VAC 60Hz, 3 Phase, 3 Wire + GND (3A, 2.5kVA) 208 VAC 60Hz, 3 Phase, 3 Wire + GND (7A, 2.5kVA) or G4 HSC (1-8 Banks) powered from PDC (same as above)
Water Level Sensor	24VDC powered from PDC

* When you use TrojanUV parts, we guarantee that your system will meet the treatment requirement specified at purchase, provided that the system's original design parameters haven't changed (e.g., flow rate, UV Transmittance) and maintenance is completed per the UV System O&M manual. Should you experience an issue, our Service Technicians will work with you to resolve it as fast as possible.

To learn more about the brands and affiliates of Trojan Technologies, please visit www.trojantechnologies.com

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