Drinking Water Treatment

TROJANUV™

Water Confidence™

Water Confidence for Communities Large & Small

Our UV solutions provide validated, cost-effective disinfection

UV's environmental and water quality benefits for disinfection of drinking water are proven and embraced by communities large and small. Offering broad-spectrum protection against a wide range of pathogens, including bacteria, viruses and chlorine-resistant protozoa (such as *Cryptosporidium* and *Giardia)*, UV is a reliable, cost-effective part of a multi-barrier treatment strategy.

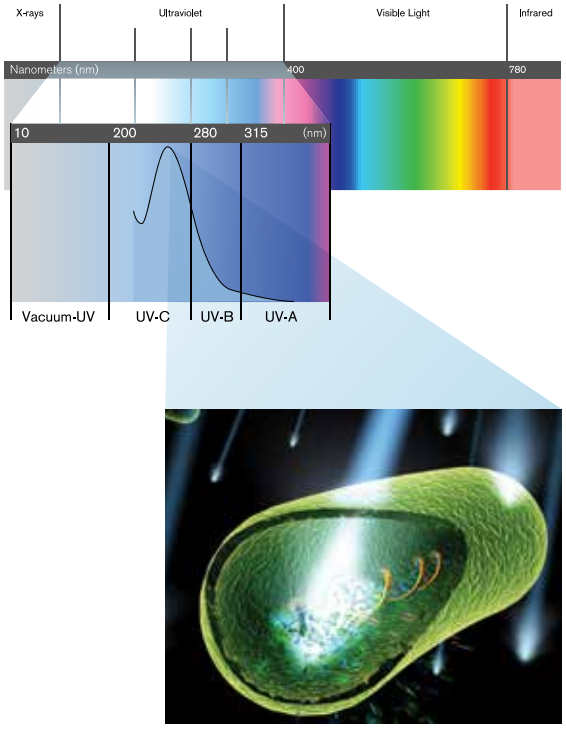
The TrojanUVSwift™SC is designed to treat flow rates of 20 gallons per minute (GPM) to 16 million gallons per day (MGD) or 4.5 to 2,525 m^3/hr. These compact UV systems offer communities an economical solution for drinking water disinfection. The TrojanUVSwiftSC is bioassay validated, having undergone rigorous DVGW and USEPA certification to ensure verified dose delivery, maximum public safety and peace of mind.

It's engineered and built to provide reliable performance, simplified maintenance, and reduced operating costs with innovative features like an optimized, "L-shaped" chamber, high-intensity amalgam lamps and optional automatic or manual sleeve wiping.

The Benefits of UV

Broad-spectrum, cost-effective protection that offers unparalleled safety

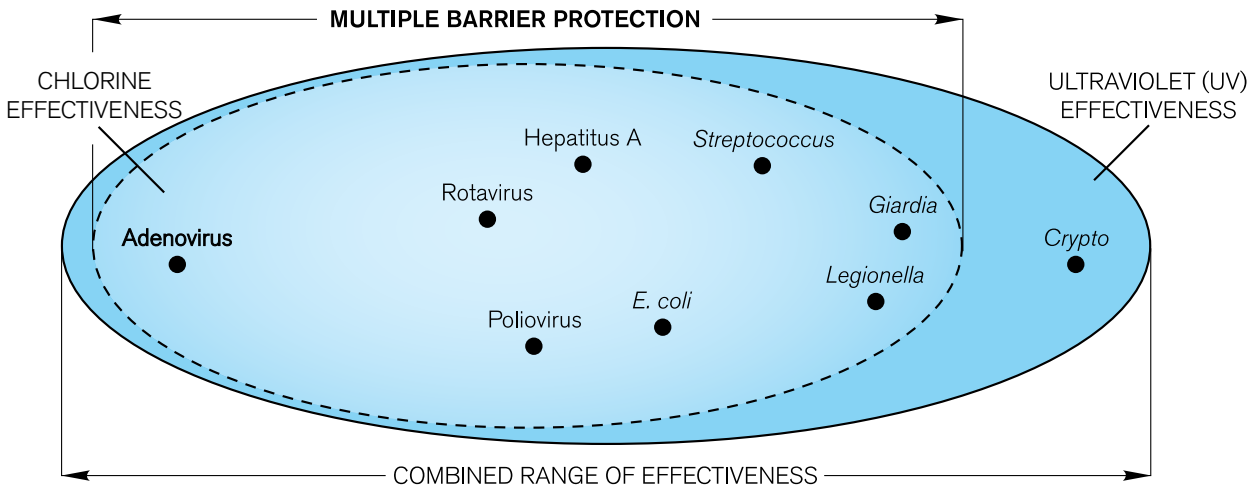
- Chemical-free way to safeguard water against harmful pathogens
- Widely accepted and endorsed worldwide for disinfection of drinking water
- Offers broad-spectrum protection against a wide range of pathogens, including bacteria, viruses, and chlorine-resistant protozoa
- Provides *Cryptosporidium*, *Giardia* and virus inactivation of up to 4-log (99.99%)
- Does not create disinfection by-products (DBPs) and does not affect taste
- At approximately 1/5th the cost of ozone disinfection and 1/10th the cost of membrane filtration, UV is the most cost-effective approach for multi-barrier treatment strategies



UV light is invisible to the human eye, but a highly effective, chemical-free way of inactivating microorganisms in water. UV light penetrates the cell wall of the microorganism and alters its DNA so it can no longer reproduce or cause infection.

Our New Virus Validation Redefines Multi-barrier

UV offers a cost-effective barrier of protection to safeguard drinking water against virtually all microorganisms treated by chlorine – including adenovirus – as well as proven inactivation of chlorine-resistant protozoa, including *Cryptosporidium* and *Giardia*. Treatment using UV provides significantly greater community safety and reduced liability risk for municipalities.



TROJAN UVSWIFT™ SC

Designed for efficient performance

Amalgam Lamps

Utilizes high-output amalgam lamps. Each is located within its own protective quartz sleeve and supported by a removable, sleeve holder assembly. Designed for easy lamp replacement.

UV Sensor

Highly accurate, DVGW-approved, photodiode sensor monitors UV output within the chamber. Mounted within the sensor port on the side wall for easy access.

Sleeve Wiping System

Optional manual or automatic systems available; both operate online, without interrupting disinfection. Fluorocarbon wipers are mounted in stainless steel yoke around the quartz sleeve of each lamp. The manual system is driven by hand using an external handle. The automatic system allows cleaning at preset intervals using a motor-driven wiper assembly.

UV Chamber

Type 316L stainless steel. Chamber configurations are available with multiple inlet/outlet diameters. Rated to 150 PSI (10 BAR) with an optional rating of 232 PSI (16 BAR). A drain port is located opposite the outlet flange.

Control Panel (CP)

Epoxy-painted, carbon steel cabinet is designed for indoor, wall-mount installation. Houses a microprocessor-based controller with input/output (I/O) connection points, and electronic power supplies. Distributes power to the UV chamber as well as the UV sensor and optional automatic wiping system. UV intensity, lamp elapsed time and lamp status are continuously monitored and displayed on the operator interface, located on the control panel door.

Remote Monitoring & Control

Robust microprocessor-based controller provides standard I/O signals for on/off control from a remote location. Programmable digital and analog I/O capabilities can generate unique alarms for individual applications, and send signals to operate valves and pumps. All units feature optional SCADA communication via Modbus, Modbus TCP/IP, EtherNet/IP and PROFINET. D-Series systems offer dose pacing to minimize energy use while maintaining required dose.

Key Benefits

TrojanUVSwiftSC

Proven performance – full bioassay validation. Meets the stringent, internationally-recognized DVGW and USEPA standards – having undergone comprehensive validation at a wide range of flow rates and UV transmittance levels.

Assurance of NSF 61 compliance. Meets the stringent standards of NSF International.

Compact footprint for installation flexibility. Can handle maximum flow capacity in minimal space. Its compact design allows it to be installed vertically or horizontally in restrictive spaces, thereby lowering installation costs. Where approved by local regulators, the system can even be installed immediately after a 90° elbow and other upstream piping configurations.

Fewer lamps required to treat a given flow. High-intensity amalgam lamps minimizes the lamps, seals, and maintenance to meet dose delivery requirements.

Sleeve wiping system reduces maintenance costs. Can be equipped with a highly-effective manual or fully automated sleeve wiping system to minimize the frequency and costs of cleaning. Both options work while the UV unit is online and disinfecting.

Designed for maximum operating efficiency. High-efficiency, electronic ballasts ensure cost-effective operation. Our high-capacity D-Series models can be equipped with optional dose pacing that adjusts lamp output to match dose to actual disinfection requirements – minimizing operating costs and extending lamp life.

Local service. Global support. Our comprehensive network of certified service providers offers ongoing maintenance programs and fast response for service and spare parts.

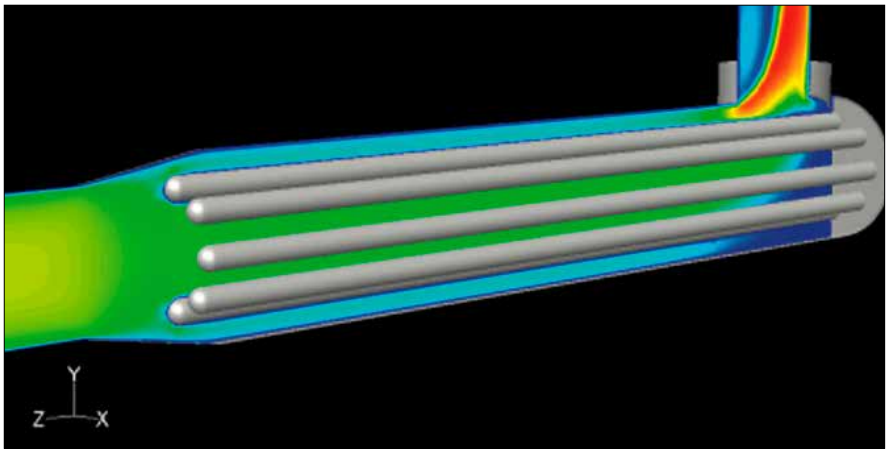
Guaranteed performance and comprehensive warranty. Our systems include a Performance Guarantee and comprehensive protection for your investment.

Compact Chamber for Installation Flexibility

Efficient, cost-saving design can be installed vertically or horizontally

Benefits:

- Compact footprint simplifies installation and minimizes related capital costs – making it ideal for retrofit applications into existing water treatment plants
- Engineered to fit into restrictive pipe galleries
- Lamps and sleeves are fully serviceable from one side – allowing the system to be installed tight to walls, other equipment or piping
- Validated with a 90° elbow installed immediately before the chamber to ensure consistent dose delivery – even under challenging hydraulic conditions created by upstream piping
- "L-shaped" design is 40% more efficient than "U-shaped" systems
- Low head loss design simplifies integration into existing processes, and minimizes the need for additional pumps and their associated capital and operating costs
- Wall-mounted control panel can be located up to 82' (25 m) from the chamber



The highly efficient "L-shaped" design and low-pressure, high-output (LPHO) amalgam lamps result in an extremely compact footprint.

Developed using advanced Computational Fluid Dynamic (CFD) modeling, and incorporating high-output amalgam lamps, the TrojanUVSwiftSC is extremely space-efficient. Its compact footprint allows the system to be integrated into restrictive pipe galleries of water treatment facilities.

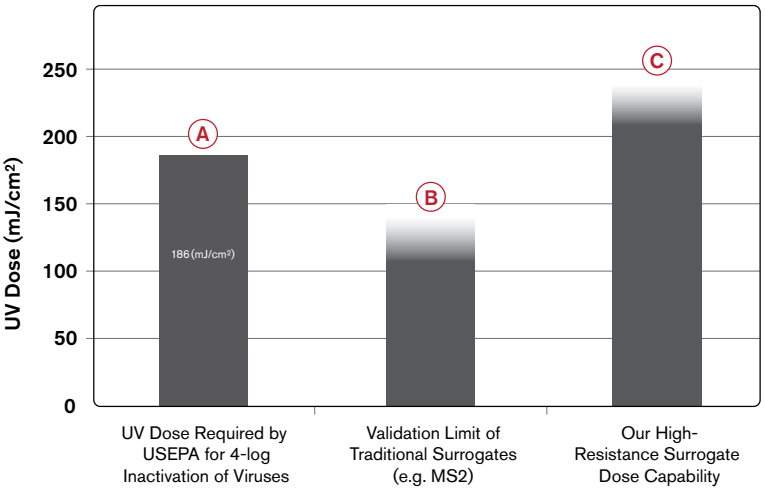
Industry-Leading Bioassay Validations

Validation testing to world standards ensures regulatory compliance regardless of location

Benefits:

- D-Series Units validated in accordance with USEPA 2006 Guidance Manual
  - Use of multiple surrogate organisms (T1, T7 and MS2) allows tailoring of UV dose to that of the target organism (e.g. *Cryptosporidium*)
  - Intensity Setpoint or Calculated Dose control options
  - Validations performed under worst-case hydraulics – with a 90° elbow at the inlet
- UV for Virus Treatment
  - Cutting-edge validation for TrojanUVSwiftSC D-Series chambers demonstrates doses sufficient for 4-log inactivation of viruses, including adenovirus, with a single unit
  - Fully EPA compliant, third-party witnessed
- All TrojanUVSwiftSC units are bioassay tested according to German DVGW standards
- Bioassay validations eliminate the use of theoretical calculations which can significantly overstate dose, potentially jeopardizing community safety (see Figure 2).

Figure 1. A UV dose of 186 mJ/cm² is required by the USEPA for 4-log treatment of viruses (column A). Traditional surrogates, such as MS2, aren't resistant enough for UV to demonstrate inactivation of 4-log virus (column B). To overcome this challenge, a high-resistance surrogate was used to validate to the doses required for 4-log virus inactivation (column C).



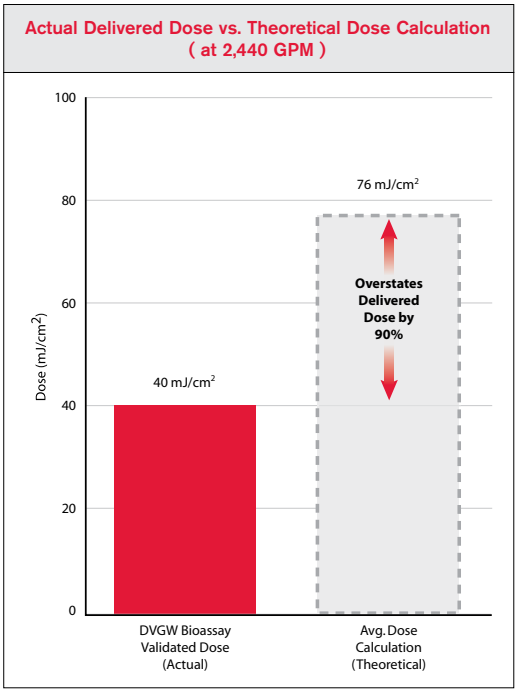


Figure 2. The graph to the left highlights an actual comparison of DVGW bioassay validation results with theoretical dose calculations for a TrojanUVSwiftSC at a flow rate of 2,440 GPM. The theoretical calculation overstates the delivered dose by 90%. Had a drinking water system been selected based on the results of the calculated dose, public safety could have been compromised.

Energy-Efficient, High-Output Amalgam Lamps

Fewer lamps reduces capital and O&M costs

Efficient, LPHO amalgam lamps allow TrojanUVSwiftSC systems to deliver the required UV dose with fewer lamps and lower operating costs.

Benefits:

- The TrojanUVSwiftSC requires 1/2 to 1/3 fewer lamps to deliver the required dose compared to traditional UV systems using low-pressure lamps
- With fewer lamps, the TrojanUVSwiftSC is very compact and can be installed in small spaces
- Fewer lamps means reduced annual maintenance costs for lamp change-outs

Robust Sleeve Wiping System

Optional manual or automatic wiping ensures consistent dose delivery

The optional wiping system reduces maintenance costs. Operators have a choice of the manual system that is operated by hand, or motorized system (shown above) which can be programmed to wipe automatically at preset intervals.

Benefits:

- Wiping system minimizes fouling of the quartz sleeves
- Ensures consistent UV dose delivery for maximum public safety
- Operates online while the lamps are disinfecting, reducing downtime
- Can be programmed to wipe lamp sleeves at preset intervals

User-Friendly Digital Controller

Intuitive system provides at-a-glance system status and allows remote operation

The TrojanUVSwiftSC controller and high-efficiency electronic ballasts have been proven in thousands of installations. The Control Panel features a user-friendly digital interface, and can be mounted up to 82 ft (25 m) from the chamber.

Benefits:

- Robust, microprocessor-based controller combines extensive functionality with an operator-friendly, digital interface
- Display provides at-a-glance, real-time system status information
- Programmable digital and analog I/O capabilities allow remote on/off control and alarm code differentiation for fast identification of changes in system status
- Optional dose pacing on high capacity D-Series systems minimizes energy use while maintaining required dose
- Optional Modbus, Modbus TCP/IP, EtherNet/IP and PROFINET protocols communicate with plant SCADA system for centralized monitoring of UV performance, lamp status, power levels and other parameters

Designed for Easy Maintenance

Operator-friendly design for easy routine maintenance

The TrojanUVSwiftSC design simplifies maintenance procedures. For example, lamp change-outs require no tools and take less than five minutes per lamp.

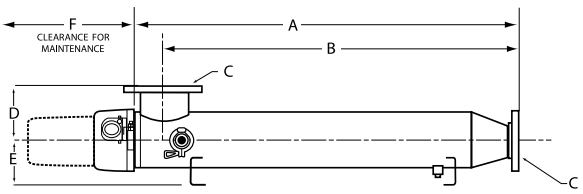
Benefits:

- Single-ended UV lamps simplify replacement
- Lamps require less than five minutes each to change – without tools
- Externally-mounted sensor allows easy access
- Optional automatic or manual sleeve wiping system reduces the frequency, inconvenience and cost of manual cleaning

TROJAN UV SWIFT™ SC

System Specifications

Model #		A02	B03	B04	B06	B08	D03	D06	D12	D18	D30
Validated Dose Range	DVGW (mJ/cm²)	40									
	EPA (mJ/cm²)	N/A					186				100
UVT Range		Nominal Range of 80% to 98%					70% to 98%				
Water Temperature		1°C to 40°C (34°F to 104°F)									
UV Chamber											
Number of Lamps		2	3	4	6	8	3	6	12	18	30
Chamber Material		Type 316L Stainless Steel									
Mounting Feet (Brackets)		Optional					Standard				
Max Operating Pressure PSI (BAR) *Additional Pressures Available		150 (10)									
Chamber Weight (Dry) lbs (kg)		34 (15)	72 (33)	75 (34)	81 (37)	85 (39)	115 (52)	275 (125)	430 (195)	665 (301)	1,200 (545)
Chamber Weight (Wet) lbs (kg)		65 (29)	149 (68)	150 (68)	160 (73)	162 (85)	230 (104)	530 (240)	860 (390)	1400 (635)	2,250 (1,150)
Wiping System Available		Manual	Manual/Automatic				Automatic				
Control Panel											
Ballast Power Level		Electronic Constant Output (100%)					Electronic Variable Output (60% - 100%)				
Electrical - Voltages		120 V 230 V (Europe)	208 or 240 V, single phase , 2 wire + gnd, 50/60 Hz L-L								
Control Panel Rating		Type 12 (IP54), Type 3R (IP24)			Type 12 (IP54), Type 3R (IP24), Type 4X (IP66)						
Material		Painted Mild Steel (Type 12) SS304 (1.4301 in Europe) (Type 3R & Type 4X)									
Inputs/Outputs		5 Analog In, 2 Discrete In, 4 Analog Out, 7 Discrete Out									
Instrumentation											
UV Sensors Per Chamber (DVGW/EPA) 1 per 10 lamps as per DVGW 1 per chamber as per EPA		1					1	1	2/1	2/1	3/1
Other											
Languages		**Standard:** English, French, Dutch, German, Spanish, Norwegian, Swedish, Italian									
Dimensions – Inches (cm)											
	without auto wiper A:	33 (84)	47 (119)	47 (119)	47 (119)	47 (119)	68 (173)	66 (170)	68 (173)	68 (173)	70 (178)
	B:	30 (75)	43 (109)	43 (109)	43 (109)	43 (109)	62 (157)	60 (152)	59 (150)	56 (142)	56 (142)
	Flange Size C:	3 (80DN)	4 (100DN)	4 (100DN)	6 (150DN)	6 (150DN)	6 (150DN)	8 (200DN)	12 (300DN)	16 (400DN)	20 (500DN)
	D:	6 (15)	8 (20)	8 (20)	8 (20)	8 (20)	8 (20)	11 (27)	14 (35)	17 (42)	21 (53)
	E:	6 (15)	7 (18)	7 (18)	7 (18)	7 (18)	7 (18)	9 (23)	12 (30)	15 (38)	18 (45)
	F:	50 (127)	60 (152)	60 (152)	60 (152)	60 (152)	70 (178)	70 (178)	70 (178)	70 (178)	70 (178)



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