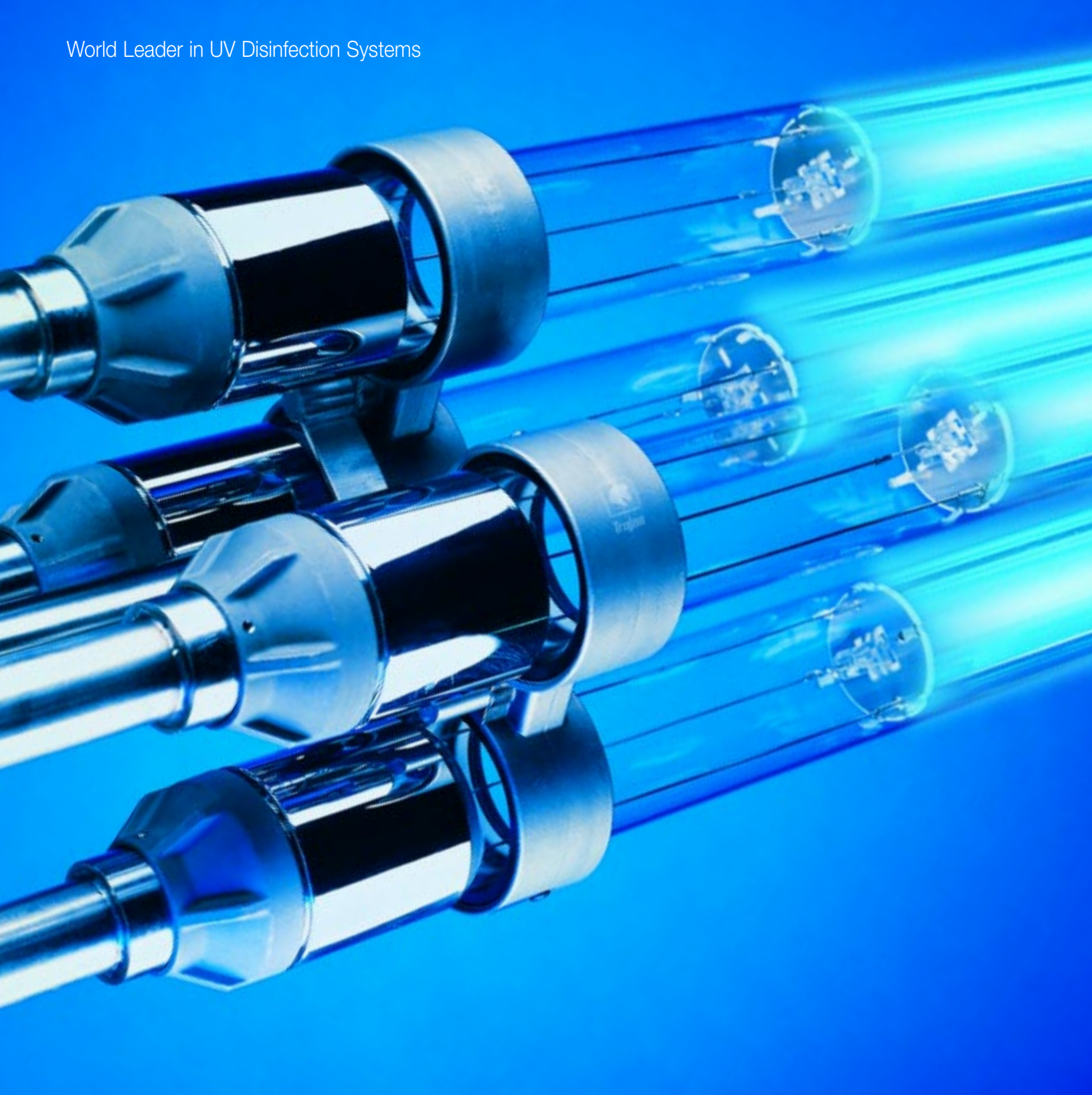


World Leader in UV Disinfection Systems



TROJAN **UV**4000™ **PLUS**



Trojan Technologies

Trojan UV4000™ Plus

The first choice for cost-effective UV wastewater disinfection – featuring Trojan's unique compact design and automated chemical and mechanical self-cleaning technology

More than 3,000 Trojan Technologies ultraviolet (UV) light wastewater disinfection systems operate in municipalities around the world. Commercially pioneered by Trojan in 1982, UV disinfection offers a chemical-free, cost-effective, and environmentally safe alternative to chlorine-based systems for treating effluents, reclaimed water, combined sewer overflows and storm water.

Technological advances in the Trojan UV4000™ Plus

UV4000™ Plus builds on the features and advantages of earlier generation Trojan UV systems. Installed in an open channel, UV4000™ Plus UV lamps are mounted horizontally and parallel to the flow. This design optimizes hydraulics, inducing turbulence and dispersion, and ensures that wastewater is properly

exposed to the UV output for the required duration. Gravity flow carries wastewater through the system, eliminating the need for pressurized vessels, piping, and pumps. Multiple banks of UV lamps can be placed in series in each UV channel. Typical installations use two banks in series for most standard applications and multiple banks in series for wastewater reclamation projects.

Medium-pressure, high-intensity UV lamps

The incorporation of medium-pressure, high-intensity UV lamps reduces the number of lamps required by 90 per cent, lessening space requirements and decreasing installation and maintenance costs.

The UV lamp array is positioned within the UV reactor providing a controlled water layer geometry at all flows. The unique design of the UV reactor eliminates the potential for short-circuiting of flow that could result in performance failure. High-intensity lamps also extend the applicability of UV disinfection to poorer quality effluents.

*Fouled quartz sleeves come clean.
The unique self-cleaning process of
UV4000™ Plus reduces maintenance costs.*



How does UV disinfection work?

Ultraviolet light disinfects wastewater by altering the genetic (DNA) material in cells so that bacteria, viruses, and other microorganisms can no longer reproduce. The UV light is produced by germicidal lamps submerged in an open channel. As wastewater flows past the UV lamps, microorganisms are exposed to a lethal dose of UV energy. The UV dose is a product of UV light intensity and exposure time.

PROTECTING THE ENVIRONMENT WITH UV DISINFECTION

Until recently, chlorine has been the disinfection treatment of choice. Today, however, an increasing number of governments have restricted the amount of chlorine residual that may be discharged into the environment. These restrictions have led to the adding of dechlorinating agents such as sulfur dioxide or sodium bisulfate. But this practice does not adequately protect the marine environment because chlorine combines with organic compounds in the wastewater to form known carcinogens that are not neutralized during the dechlorination process. UV disinfects without the formation of by-products, making UV a safe and cost-effective alternative to chemical-based disinfection.



Trojan System UV4000™ Plus Latest Advancements

Better By Design...

- Medium-pressure, variable output high-intensity lamps
- ActiClean™ fully automated chemical mechanical cleaning
- Improved reactor hydraulics
- Improved ballast cooling
- Improved wiper design
- Reduced number of hydraulic lines and connections
- Simplified module removal mechanism



Variable lamp output improves disinfection control

The output of UV4000™ Plus high-intensity lamps can be varied as effluent quality and flow rates change. Matching lamp output to actual wastewater conditions conserves energy, prolongs lamp life, reduces operating costs, and ensures that an adequate dose is delivered regardless of the effluent quality and flow rate.

This process is fully automated using Trojan's On-line UV Transmission Monitor, which tracks changes in effluent quality. In conjunction with a flow signal, the effluent quality data is used to automatically adjust lamp output to maintain disinfection standards. Lamp life is extended and operating costs are reduced.

The Trojan Difference

- ActiClean™ fully automated chemical and mechanical self-cleaning technology cuts labor costs
- High-intensity lamps reduce total lamp requirements by 90 per cent; reduces operational costs
- Variable output ballasts allow UV output to be tailored to meet wastewater and flow conditions
- Open-channel, gravity flow configuration eliminates need for pressurized vessels, piping, and pumps
- Environmentally safe – no chlorine required; and no disinfection by-products created
- Dedicated regional field service staff ready to meet your needs
- In-house call center technicians available through 1-800 line
- Significant annual commitment to Research and Development for innovations such as: on-line chemical and mechanical cleaning; lamp and ballast testing laboratory; microbiology services; and reactor design and optimization

ActiClean™ automated chemical and mechanical self-cleaning technology

Effluents will eventually coat the quartz sleeves that house the UV lamps, reducing their effectiveness and increasing their energy consumption. To offer an alternative to costly and time-consuming manual cleaning, Trojan's scientists and engineers developed an automatic, self-cleaning system. With the UV4000™Plus the modules – while remaining in operation – are thoroughly cleaned by a combined chemical and mechanical self-cleaning system. Chemical cleaning has become the industry standard way to remove scaled deposits that accumulate on the quartz sleeve over time. In fact, the US EPA Design Manual on Municipal Wastewater Disinfection, when discussing design considerations for effective maintenance, explains that “periodic chemical and/or detergent cleaning will be required to maintain the outer quartz.”

(EPA/625/1-86/02, p. 237)

Trojan's sealed cleaning mechanism uses a small amount of solution to remove deposits on the quartz sleeves more effectively than mechanical cleaning alone can do. Cleaning cycles are activated by a timer and are programmed to clean modules sequentially within each operating bank.

The fully automated cleaning cycle is programmed for each installation and is set to operate as frequently as once an hour, depending on the rate of fouling. Plants that previously could not use conventional UV reactors because poor effluent quality led to rapid lamp fouling (e.g., primary effluent, CSOs) can now take full advantage of the economic, environmental, and safe benefits of ultraviolet light with UV4000™Plus.

Ease of Maintenance

The self-cleaning technology of UV4000™Plus allows the UV lamp modules to remain submerged in the channel until the lamps need

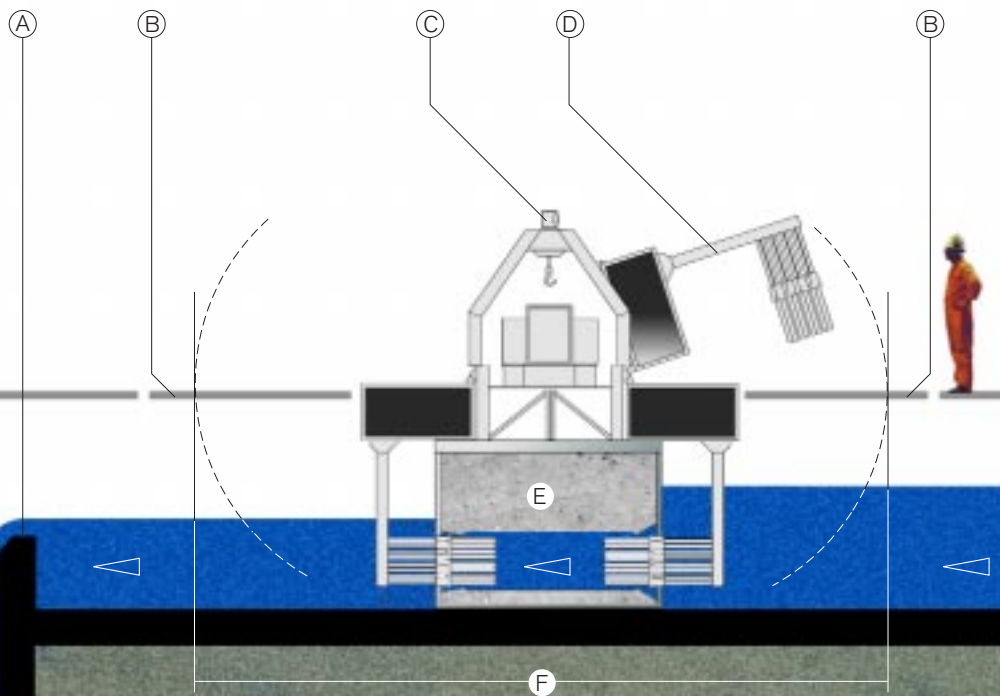
replacing. When lamps need to be replaced, modules are lifted out of the channel by the Module Removal Mechanism (MRM). Using a reversible electric winch, the MRM raises lamp modules from the channel to a convenient working height. One person can replace single or multiple lamps in minutes.

General layout requirements

As with every Trojan UV System, the sizing of UV4000™Plus in a particular application will depend on the effluent quality and flow rates, level of disinfection required, and the degree of equipment redundancy needed (for wastewater reclamation applications). Please contact Trojan's local representative for more information regarding the UV4000™Plus or any of Trojan's products or services.

Trojan UV4000™Plus Channel Layout

- A Level control weir
- B Access hatch
- C Module removal mechanism (MRM)
- D UV module shown in raised position
- E Reaction chamber insert after installation. Void areas of the insert are filled with concrete
- F UV module maximum swing



Trojan Technologies: a pioneer and global innovator

For more than 25 years, Trojan Technologies has led the global improvement of water quality by continually refining its ultraviolet (UV) disinfection systems. Trojan innovations have set industry standards for treating both wastewater and drinking water. With the largest number of UV installations worldwide and an industry-leading research and



development team, Trojan offers municipal water utility operators and engineers unmatched technical insight and experience.

Trojan constantly reengineers its systems to incorporate state-of-the-art technology and offer customers new and improved features, benefits, and conveniences.

Quality products, quality people

Trojan's systems are ISO 9001 certified, an internationally recognized designation that reflects the high quality of Trojan's design, development, production, installation, and service.

Behind the company's products are the most experienced and knowledgeable professionals in the industry. Comprising internationally recognized experts in microbiology, chemistry, physics, and engineering, Trojan's research and development team creates many of today's most successful UV technology innovations.

Trust ... integrity ... teamwork ... respect for employees and customers ... and a strong sense of purpose — these are the underpinnings of Trojan's corporate culture.

By creating a positive work environment that both challenges and rewards employees, Trojan is able to meet its commitments of providing lasting solutions to environmental problems.

Support from the industry leader keeps your system up and running

Trojan's global presence mirrors a strong commitment to its customers and to its future. With offices in Canada, the US, Europe and the UK, Trojan is able to serve customers no matter where they are located. An extensive network of professional manufacturer's representatives expands the company's reach into South America, Europe, the Middle East, and the Pacific Rim, giving Trojan comprehensive global coverage.

Trojan is recognized for its exceptional customer service. The company's highly trained technicians are strategically located at Trojan support centers around the world. This extensive support network allows Trojan to respond quickly to customer calls — no matter what the time zone or location. And the company's state-of-the-art technical support center permits technicians to dial up and diagnose problems on-line, quickly and effectively.



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Trojan Technologies is a publicly traded company on the Toronto Stock Exchange under the symbol TUV.