

# WHITEPAPER: UV DISINFECTION FOR Swimming Pools & Hot Tubs



## The Issue: Germs in the Water

Swimming pool water is prone to the growth and spread of harmful microorganisms. It has been observed that most people have .14 grams of feces on their bodies at any given time.<sup>1</sup> Using a hot tub is not much safer; the bacteria in a hot tub become airborne as the whirlpool jets agitate the water.

According to the CDC, swimming-related illnesses can be caused by swallowing water, exposing your orifices to it, or breathing in mist that evaporates from infected water.<sup>2</sup> While many pool owners use chemicals like chlorine to treat their pools and hot tubs, microorganisms like *Cryptosporidium* are immune to chlorine and must be treated by another method. Chemical pool treatment also produces chloramines, byproducts that irritate eyes, noses, and throats—and corrode pool components.



**“The number of reported cryptosporidiosis outbreaks has increased an average of approximately 13% per year from swallowing contaminated water in pools or water playgrounds.”**

CDC, *Cryptosporidiosis Outbreaks* <sup>3</sup>



## How UV-C Works

UV disinfection is a process that exposes water to ultraviolet rays in the UV-C range. The wavelength of 254 nanometers makes harmful microbes unable to reproduce, and hence inactive. Even chlorine-tolerant microbes eventually die off via this economically-sound method that reduces chlorine use *and* chloramines.

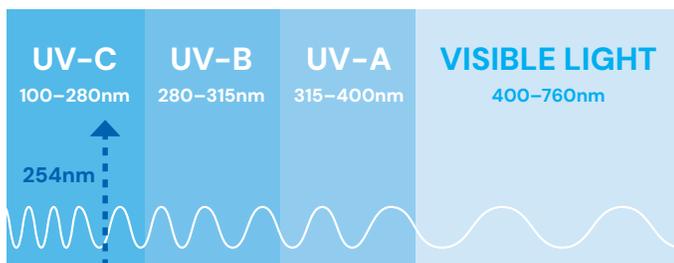


Figure 1: A Portion of the Electromagnetic Spectrum

Because illness outbreaks associated with aquatic centers have vastly increased in recent years, the CDC’s Model Aquatic Health Code recommends a supplemental water treatment such as UV disinfection.<sup>4</sup>

## UV-C Doses

The UV-C doses below will inactivate bacteria and viruses that are commonly found in swimming pools and hot tubs. Millijoules per square centimeter (mJ/cm<sup>2</sup>) is the measurement of energy produced by germicidal lamps over a certain amount of time.

Microorganism	UV Dose (mJ/cm <sup>2</sup> )
<i>Salmonella</i>	7.60
<i>Shigella</i>	7.0
<i>E. coli</i>	6.60
<i>Rotovirus</i>	24.0
<i>Giardia</i>	100.0
<i>P. Aeruginosa</i>	3.90
<i>Coxsackievirus</i>	6.30
<i>Legionella</i>	12.30
<i>Hepatitis A</i>	8.0

Table 1: UV-C Doses to Neutralize Waterborne Microbes

## Sizing and Installation

We offer UV solutions to meet wide-ranging water volume scenarios—as large as a water park or as small as a backyard swimming pool and hot tub. Please see our recommended product lines on the next page and contact a UV application specialist for help determining the properly-sized system for your needs.

We recommend your swimming pool water be turned over three times daily, cycled through the pool water filter and UV-C water purifier. For example, a flow rate of 40 gallons per minute (using our SANITRON® Model S2400C) will treat a pool of 19,200 gallons.

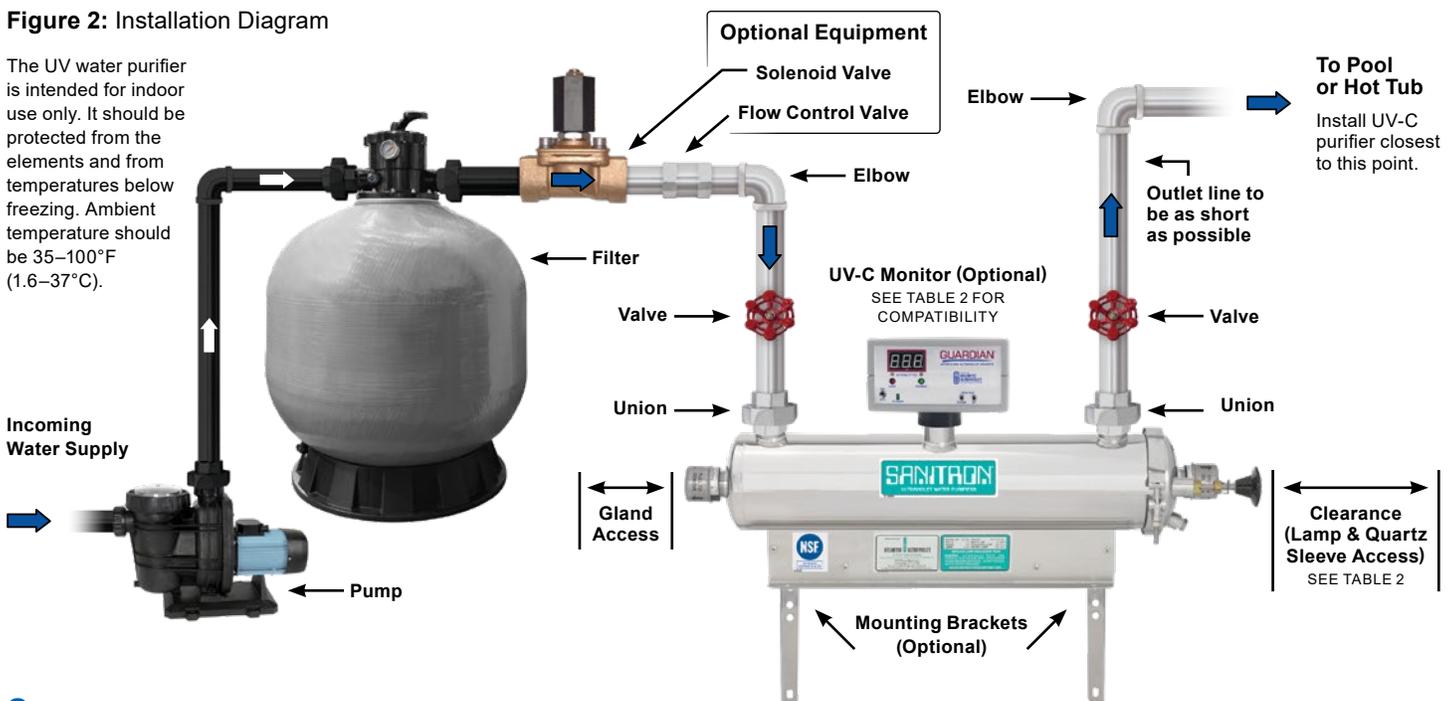
Usually, customers can greatly reduce their chlorine use. However, chlorine concentration levels should be kept high enough to prevent reduction in water quality or increase in bacteria levels. Be sure to frequently test and carefully observe your pool water, particularly right after installation. This practice will make you aware of the purifier’s operating characteristics and ensure the desired results are achieved.

**Table 2:** Comparison of UV Water Purifier Models

Feature	Swimming Pools		Hot Tubs	
	Sanitron®	Megatron®	Minipure®	Mighty Pure®
Flow Rate (GPM)	3–40	90–450	1–9	3–20
Min. Clearance (Lamp/Quartz)	17–50"	71"	10¾–29"	16–49"
Min. Clearance (Gland Access)	6"	12–24"	6"	6"
Lamp Indicator(s)		✓	✓	
Sight Port	✓	✓	✓	✓
Drain Fitting(s)	✓	✓		✓
HMI Touchscreen		✓		
Dual-Action Wiper	Manual	Manual or Auto		
UV Monitor	Optional	Standard		Optional
Audio Alarm	Optional		Standard	Optional
Solenoid Valve	Optional		Optional	Optional
Flow Control Valve	Optional		Optional	Optional

**Figure 2:** Installation Diagram

The UV water purifier is intended for indoor use only. It should be protected from the elements and from temperatures below freezing. Ambient temperature should be 35–100°F (1.6–37°C).



## Sources

1. CDC, *MMWR: Vol. 62 / No. 19*, May 17, 2013, <https://www.cdc.gov/mmwr/pdf/wk/mm6219.pdf>
2. CDC, *Healthy Swimming: Preventing Swimming-related Illnesses*, <https://www.cdc.gov/healthy-swimming/prevention/>
3. CDC, *MMWR: Vol. 68 / No. 25*, June 28, 2019 <https://www.cdc.gov/mmwr/volumes/68/wr/mm6825a3.htm>
4. CDC, *MMWR: Vol. 70 / No. 20*, May 21, 2021, <https://www.cdc.gov/mmwr/volumes/70/wr/mm7020a1.htm>



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