

BARRIER™ UV SYSTEM

B SERIES

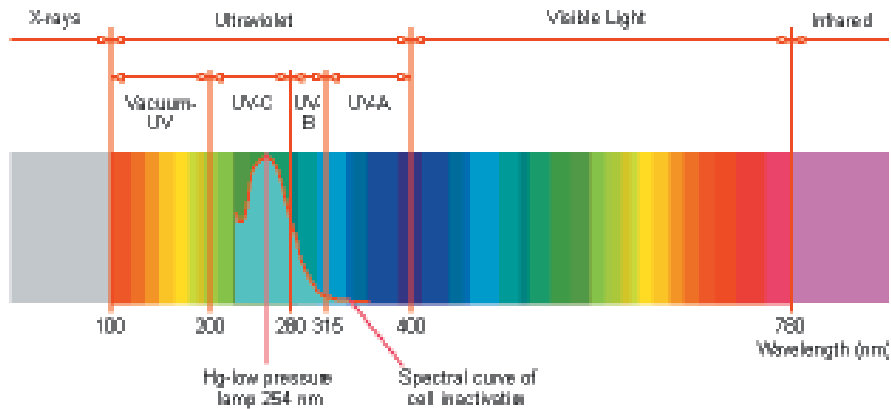
The B Series Barrier UV System is designed for municipal drinking water applications at treatment flows up to 858 gpm (1.25 MGD). It is ideally suited for small to medium community drinking water systems as well as non-community installations including campgrounds, service stations, and recreational parks. The addition of ultraviolet technology provides a multi-barrier approach to the disinfection process ensuring complete inactivation of waterborne pathogens, including protozoa such as Cryptosporidium and Giardia.



The SEC controller handles all monitoring and control functions.

The Barrier UV System from USFilter's Wallace & Tiernan Products provides a cost-effective, reliable, operator-friendly solution for low- to medium-flow rate disinfection applications. The system consists of a stainless steel vessel containing the UV lamps and a mounted micro-controller with LCD display for complete control and monitoring capabilities. An advanced technology—the Spektrotherm® low-pressure, high-intensity, amalgam lamp—is utilized to maximize disinfection performance while providing significant capital, operating, and maintenance cost savings compared to other UV systems. Each Barrier UV System features:

- Cost-effective, chemical-free disinfection
- Fast and easy installation and start-up
- Simple operation and maintenance
- High-efficiency Spektrotherm low-pressure, high intensity UV lamps
- High-quality, stainless steel, electropolished disinfection chamber
- Fully certified biosimetric certification with third-party (ÖNORM) performance verification of 40 mJ/cm²
- Continuous monitoring of irradiance (intensity) with calibrated UV sensor
- Superior chemical cleaning; no moving parts required



ULTRAVIOLET DISINFECTION

Ultraviolet (UV) disinfection units are capable of controlling harmful bacteria, viruses, yeasts, and molds, as well as parasites such as Cryptosporidium or Giardia that are resistant to chlorination. UV light inactivates microorganisms, altering their genetic (DNA, RNA) material so that they can no longer reproduce. The efficiency of UV light is highly dependent on the wavelength at which it is emitted (see electromagnetic spectrum curve above). Because UV is a physical disinfectant (using UV energy), it does not alter the chemical make-up or affect the natural taste, odor, or color characteristics of the water during treatment. UV provides an effective disinfection solution without the potential for chemical by-product formation.

SUPERIOR LAMP TECHNOLOGY

The heart of any UV system is the UV lamp technology. Combined with the reactor vessel hydraulics, it determines the disinfection efficiency, and operating and maintenance costs. The Barrier B Series features state-of-the-art Spektrotherm low-pressure, high-intensity lamp technology. These lamps exhibit the high efficiency and

long-effective useful life of low-pressure, low-intensity lamps while producing up to five times more UV-C output (watts). This minimizes system size and reduces overall capital and operating costs, since up to 80% fewer lamps are required (compared to conventional low-pressure systems) to deliver the same absolute UV disinfection power. In addition, using a solid amalgam as opposed to liquid mercury, these lamps are temperature-stable for the wide temperature ranges encountered in potable water applications (32 - 113° F). Compared to medium-pressure lamp technology, the Spektrotherm lamps offer significantly lower energy consumption and fewer maintenance requirements. The polychromatic operation of medium pressure lamps produces a broad-spectrum wavelength above and below the germicidal action curve, most of which represents wasted energy. Spektrotherm lamps are monochromatic, producing all of their UV en-

ergy output at the desired disinfection wavelength of 254 nm. Wasted energy is minimized and power consumption can be as much as 70% lower than an equivalent medium-pressure system. Also, Spektrotherm lamps have a longer operating life (10,000 hrs vs. 3-5,000 hrs) than medium-pressure lamps, resulting in fewer lamp replacements. In addition, since the low-pressure lamps operate at a lower temperature, they are less prone to fouling, requiring no wiping and infrequent chemical cleaning, and can tolerate no-flow conditions over an extended period of time without overheating. Finally, solid amalgam lamp technology lessens the environmental risk associated with liquid mercury.

REACTOR VALIDATION

In potable water applications, it has been determined that a UV dose of 40 mJ/cm² is required to consistently achieve 4 log inactivation of the most prevalent pathogens. To verify that a UV system is capable of delivering this dose, and to avoid the need for expensive on-site bioassay testing, a reactor validation is required. Proper certification requires the dose delivery to be measured by actual bioassay testing, not inferred performance based on modeling. Presently, there are only two facilities in the world that are recognized for certifying UV systems (ÖNORM, in Austria, and DVGW, in Germany) for municipal drinking water applications. **The Barrier UV System has been certified by the Austrian ÖNORM M5873-1 standard to provide the required UV dose for potable water applications.**



REACTOR VESSEL

For optimum performance, the Barrier B Series UV System utilizes a stainless steel, electropolished, engineered disinfection chamber with integral flow baffles. The design allows for quick lamp replacement without draining or depressurizing the reactor. The water flow is directed parallel to the UV lamps to maximize contact time and exposure to the UV irradiation. The highly efficient UV lamps, combined with the turbulence and constant velocity profile optimized by the baffles, maximize the energy utilization and disinfection performance. These features ensure uniform UV dose delivery during treatment for predictable and reliable disinfection results, as well as low head losses during operation. A very small footprint is required with vertical or horizontal mounting options. The optimized hydraulic design lowers the overall operating cost and eliminates the need for lengthy upstream straight pipe. It can be installed anywhere.

UV MONITORING SENSOR

To ensure continuous, proper operation, a UV sensor is used to monitor the UV irradiance in the reactor. This sensor is located at the wall of the vessel, which is



the most distant point from the UV lamp. The sensor has a 99% response to the 254 nm wavelength, so that it correlates to the disinfection performance of the UV lamps. If the UV irradiance should decrease for any reason, such as fouling of the quartz sleeve, decrease in output due to lamp aging or lamp failure, or change in water quality resulting in a lower percentage transmittance of the water, an alarm is initiated to shutdown the water flow. This prevents insufficiently treated water from passing through the system.

SYSTEM CONTROLLER

The SEC controller handles all monitoring and control functions of the Barrier UV System. This controller is mounted remotely from the reactor vessel. It has an illuminated alphanumeric LCD display to provide system status, UV irradiance (0-100%), lamp status, run-time hours, and start-up programming. A three-light (green, yellow, red) indicator display provides the following operating status information:

- GREEN - Normal Operation (UV intensity higher than prealert threshold value)

- YELLOW - Warning Signal (UV intensity lower than prealert threshold but higher than alarm threshold)
- RED - Alarm Signal (UV intensity lower than alarm threshold, circulation pump signaled to shut off)

Thus a warning is provided when the UV intensity begins to decrease to provide adequate time to arrange for cleaning or lamp replacement.

The SEC controller also provides the control logic for the lamp start sequencer. This includes a pre-heat function to heat up the filament prior to igniting, which helps to prolong lamp life. Once the lamp has reached the required operating intensity, an interlock is activated to begin the water flow. In addition, the controller provides relay contacts for alarms and system status, as well as remote start/stop. A 4-20 mA signal for UV irradiance monitoring is also provided. Finally, the controller has a dedicated control panel with user-friendly operator interface and remote communication capabilities. The system can be tied to an existing SCADA system or interlocked with the well pumps.

	MODEL						
	B40	B60	B80	B120	B160	B220	B300
Capacity* (gpm) *UV dose = 40 mJ/cm ² at end of lamp life. Transmittance = 94% (see CN 193.102)	103	156	228	322	515	698	858
Reactor Vessel (316L SS)							
Inlet/Outlet Connections	6" Flange	6" Flange	6" Flange	8" Flange	8" Flange	10" Flange	12" Flange
Dimensions	See CN 190.106						
Volume (gals. approx.)	6.9	9.5	11.6	15.8	20.3	28.0	35.13
Weight (lbs. approx.)	93	126	136	143	172	187	232
Operating Pressure (PSI) Max	145						
Pressure Loss a Nominal Flow (PSI approx.)	1.45						
Water Temperature	32-113°F						
Cleaning & Drain Valves (qty. 2)	1/2"	1/2"	1/2"	1/2"	3/4"	3/4"	3/4"
UV Lamp							
Lamp Power (W)	120	170	170	170	170	170	290
UV-C Output/254 nm (W)	43	63	63	63	63	63	95
Quantity	3	3	4	5	7	9	9
Lamp Lifetime (h)	10,000						
UV Monitoring System							
Number of Sensors	1						
Output Signal (mA)	0/4-20						
Control Panel (Painted Steel)							
Dimensions - See	CN 190.110						
Weight (lbs. approx.)	40	40	40	154	220	242	265
Voltage (V / Hz / pH)	220/60/1 (standard - consult for other voltages)						
Power Consumption (KW/kVA)	0.40/0.47	0.57/0.67	0.76/0.89	0.95/1.12	1.33/1.56	1.71/2.01	2.84/3.34
Ambient Temperature	32-104°F						
Cooling	Forced Ventilation Fan						
Protection Class	NEMA 12						
Cable Length (feet) Vessel to Controller	15						
Chemical Cleaning Unit Model (refer to TI 85.330-3 for more information)	C120	C120	C120	C120	C120	C220	C220



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